

J. Ward/AP3

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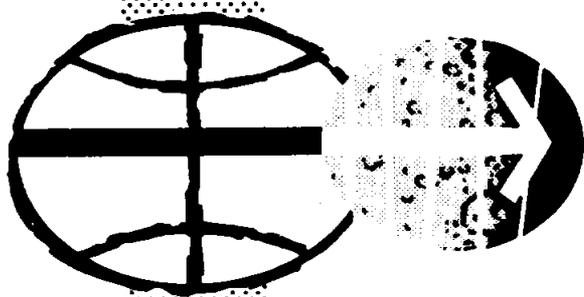


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APOLLO 16

TECHNICAL AIR-TO-GROUND VOICE TRANSCRIPTION

Prepared by
Test Division
Apollo Spacecraft Program Office



MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

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INTRODUCTION

This document is the transcription of the technical air-to-ground (TAG) voice communications of the Apollo 16 mission. The transcript is divided into three columns — time, speaker, and text. The time column consists of four two-digit pairs for days, hours, minutes, and seconds (e.g., 04 22 45 12). All times are in Apollo elapsed time (AET) which is true mission elapsed time. The speaker column indicates the source of a transmission; the text column contains the verbatim transcript of the communications.

The time used by Mission Control Center (MCC) and indicated as ground-elapsed time (GET) in the flight plan may be updated to both the spacecraft and MCC computers but will not be updated to the telemetry downlink pulse-code-modulated bitstream or other time-recording devices. This GET updating will be performed only to correct significant changes in the flight-plan time occurring as the result of delayed lift-off, midcourse corrections, or spacecraft burn-time differences (trajectory dispersions).

Should these updates occur, the Apollo elapsed time (the true mission-elapsed time) used in this transcript may not agree with flight-plan and MCC times. Users of this transcript are cautioned to apply the appropriate time corrections for the updated periods.

Communications recorded from the primary communications network (GOSS net 1) comprise the bulk of this transcript. During periods when the lunar module (LM) and command module (CM) are physically separated, it is occasionally required that communications with both spacecraft be available simultaneously. To accomplish this, another communications network (GOSS net 2) is activated. At such times, this transcript will include the simultaneous but separate communications. To indicate the period of GOSS net 2 usage, a heavy dark line will be used alongside the time column.

A series of three dots (...) is used to designate those portions of the text that could not be transcribed because of garbling. A series of three asterisks (***) is used to designate those portions of the text that could not be transcribed because of clipping caused by the voice-actuated (VOX) mode. One dash (-) is used to indicate a speaker's pause or a self-interruption and subsequent completion of a thought. Two dashes (- -) are used to indicate an interruption by another speaker or the point at which a recording was abruptly terminated. Words given unusual emphasis by the speaker are underlined.

The Apollo 16 mission was flown April 16 to 27, 1972; lift-off occurred at 17:54:00.57 G.m.t. (12:54:00.57 p.m. e.s.t.) on April 16.

Speakers in the transcript may be identified as follows.

Spacecraft:

CDR	Commander	John W. Young
CMP	Command module pilot	Thomas K. (Ken) Mattingly II
LMP	Lunar module pilot	Charles (Charlie) M. Duke, Jr.
SC	Unidentified crewmember	
MS	Multiple speakers	

Mission Control Centers:

CC	Capsule communicator (CAP COMM)
MCC	Unidentified speaker, other than CC, in the Mission Operations Control Room or a Staff Support Room
LCC	Launch Control Center
F	Flight director
S	Surgeon

Remote sites:

AB	Airboss (Recovery aircraft)
CT	Communications technician (COMM TECH)
TIC	USS Ticonderoga
P-1, P-2, etc.	Photographic helicopters
S-1, S-2, etc.	Swim teams
R-1, R-2, etc.	Recovery helicopters

When the CDR and LMP are in the undocked lunar module or on the lunar surface, their speaker designations will be suffixed by either LM or EVA to indicate their status (e.g., CDR-EVA or LMP-LM). Voice calls during this mission were assigned in accordance with the following station operating procedures: "For all phases when only the CSM is manned, the AS-511 call sign will be Apollo 16. When both vehicles are manned, the voice call will be Casper for the CSM and Orion for the LM. The calls for the CDR and LMP during lunar surface operations will be the individual crew's first names."

Transcription of these tapes was managed by James L. Gibbons, Test Division, Apollo Spacecraft Program Office, to whom inquiries regarding this document should be referred.

ACRONYM LIST

Because specialized readers of the Apollo 16 transcription, such as the principal investigators, may not be thoroughly familiar with the acronyms used during the mission, the decision was made to define those acronyms that probably will be encountered. For obvious reasons, no effort was made to include every acronym that conceivably could be used; only those acronyms that are considered likely to be used are included here.

AEA	Abort electronics assembly
AGS	Abort guidance system
ALFMED	Apollo light-flash moving-emulsion detector
ALSD	Apollo lunar-surface drill
ALSEP	Apollo lunar-surface experiments package
AOS	Acquisition of signal (or of site)
AOT	Alinement optical telescope
AP	Alpha particle (spectrometer)
APS	Auxiliary propulsion system (S-IVB) or ascent propulsion system (LM)
ARIA	Apollo range instrumentation aircraft
ARS	Atmosphere revitalization system

ASE	Active seismic experiment
ATCA	Attitude/translation control assembly
BEF	• Blunt end forward
BMAG	Body-mounted attitude gyro
BSLSS	Buddy secondary life-support system
CM	Command module
CMC	Command module computer
COAS	Crew optical alinement sight
CP	Control point
CSC	Close-up stereo camera or contingency sample collection
CSM	Command and service module
CWEA	Caution and warning electronics assembly
DAC	Data acquisition camera
DAP	Digital autopilot
DEDA	Data entry and display assembly
DET	Digital event timer
DOI	Descent orbit insertion
DPS	Descent propulsion system
DRT	Dome removal tool
DSE	Data storage equipment (CM)
DSEA	Data storage equipment assembly (LM)
DSKY	Display and keyboard
DTO	Detailed test objective
ECS	Environmental control system

EI Entry interface

EMS Entry monitor system

EMU Extravehicular mobility unit

EPS Electrical power system

ETB Equipment transfer bag

EVA Extravehicular activity

EVT Extravehicular transfer

FDAI Flight director attitude indicator

G&C Guidance and control

GCTA Ground-commanded television assembly

GDC Gyro display coupler

GET Ground-elapsed time

GETI Ground-elapsed time of ignition

HGA High-gain antenna

HFE Heat flow experiment

HTC Handtool carrier

IMU Inertial measurement unit

IP Initial point

IPI Integrated position indicator

ISA Interim stowage assembly

IU Instrument unit

IVT Intravehicular transfer

LCG Liquid-cooled garment

LCRU Lunar communications relay unit

LEB	Lower equipment bay
LEC	Lunar equipment conveyor
LEVA	Lunar extravehicular visor assembly
LGC	Lunar module guidance computer
LM	Lunar module
LOI	Lunar orbit insertion
LOPC	Lunar orbit plane change
LOS	Loss of signal (or of site)
LPD	Landing point designator

LRRR	Laser ranging retroreflector (also LR cubed)
LRV	Lunar roving vehicle
LSM	Lunar surface magnetometer
MC	Mapping camera
MCC	Mission Control Center or midcourse correction
MEED	Microbial ecology evaluation device

MESA	Modular equipment stowage assembly
MET	Mission event timer
MSFN	Manned Space Flight Network
MTVC	Manual thrust vector control
OID	Octal identifier
OPS	Oxygen purge system
ORDEAL	Orbital rate display earth and lunar
PC	Panoramic camera
PDI	Powered descent initiation
PGA	Pressure garment assembly

PGNCS	Primary guidance, navigation, and control system (CM)
PGNS	Primary guidance and navigation system (LM)
PI	Principal investigator
PIPA	Pulsed integrating pendulous accelerometer
PLSS	Portable life-support system
PRD	Personal radiation dosimeter
PSE	Passive seismic experiment
PTC	Passive thermal control
RCS	Reaction control system
RCU	Remote control unit
REFSMMAT	Reference to stable member matrix
RLS	Radius of landing site
RTG	Radioisotopic thermoelectric generator
SCE	Signal-conditioning equipment
SCS	Stabilization control system
SECS	Sequential events control system
SEF	Sharp end forward
SIM	Scientific instrument module
SLA	SM/LM adapter
SM	Service module
SPS	Service propulsion system
SRC	Sample return container
SWC	Solar-wind composition
TEC	Transearth coast

TEI	Transearch injection
T _{ephem}	Time of ephemeris
T _{ig}	Time of ignition
TLC	Translunar coast
TLI	Translunar injection
TPI	Terminal phase initiation
TSB	Temporary stowage bag
TVC	Thrust vector control
UHF	Ultrahigh frequency
UHT	Universal handtool
VHF	Very high frequency

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

MILA (REV 1)

Day	Hour	Min	Sec		
00	00	00	03	CDR	LIFT-OFF.
00	00	00	05	CDR	Yaw program.
00	00	00	12	CDR	Roger; clear the tower.
00	00	00	14	CDR	Roll program.
00	00	00	15	CC	Roger; roll. You have good thrust in all five.
00	00	00	18	CDR	Roger.
00	00	00	20	CDR	Pitch program.
00	00	00	23	CC	Roger.
00	00	00	57	SC	...
00	00	00	58	CC	Stand by for Mode I Bravo.
00	00	01	00	CDR	Roger.
00	00	01	01	CC	MARK. I Bravo. Your feet wet now, 16.
00	00	01	06	CDR	Roger.
00	00	01	45	CC	16, you're through max q and everything looks good.
00	00	01	56	CC	Stand by for Mode I Charlie.
00	00	01	58	CDR	Roger; we're ... - -
00	00	01	59	CC	MARK. I Charlie.
00	00	02	06	CDR	EDS is manual.
00	00	02	07	CC	Thank you.
00	00	02	18	CDR	Inboard shutdown.

00 00 02 29 CC Roger; inboard. You're GO for staging.

00 00 02 45 CDR Staging.

00 00 02 47 CDR Okay, ignition on the S-II.

00 00 02 50 CC Roger.

00 00 02 59 CC Thrust is GO on all five on the S-II.

00 00 03 14 CDR Second plane SEP light's out. We'll go on time.

00 00 03 17 CC Roger.

00 00 03 20 CDR Tower jettison.

00 00 03 22 CC Roger. And we confirm your skirt SEP. You're Mode II now.

00 00 03 26 CDR Roger. Mode II.

00 00 03 28 LMP Evaporators on.

00 00 03 31 CC Roger. Steering has converged. CMC is GO.

00 00 03 43 CDR Roger.

00 00 04 01 CC 16, Houston. Four minutes; everything looks great down here.

00 00 04 04 CDR Everything looks good up here, too.

00 00 04 07 LMP Hey, Gordy, you ought to see that horizon; just gorgeous.

00 00 04 10 CC Roger.

00 00 05 27 CC 16, Houston. Times are nominal. Level sense will be 8 plus 37, and cut-off at 9 plus 19.

00 00 05 36 CDR Roger.

00 00 05 51 CC Stand by for S-IVB to COI capability.

00 00 05 55 CC MARK. You have it now.

00 00 05 57 CDR Roger.

00 00 06 43 CC Stand by for S-IVB to orbit.

00 00 06 46 CC MARK. You have it now.

00 00 06 47 CDR Roger.

00 00 06 51 LMP You got OMNI Delta, Gordy?

00 00 06 53 CC Roger, Charlie.

00 00 07 42 CDR Inboard shutdown on time.

00 00 07 44 CC Roger; inboard.

00 00 08 09 CC 16, at 8 minutes. Looking good here.

00 00 08 16 CDR PU shift.

00 00 08 26 CC 16, Houston. We saw the PU shift. Thrust looks good, and you're GO for staging.

00 00 08 31 CDR Roger.

00 00 08 41 CC You have level sense arm now.

00 00 08 44 CDR Roger.

00 00 09 17 CC Stand by for Mode IV capability.

00 00 09 20 CC MARK. You have Mode IV now.

00 00 09 22 CDR Okay; there was S-II shutdown.

00 00 09 26 CC Roger.

00 00 09 27 CDR And we have S-IVB ignition.

00 00 09 31 CC And your thrust looks good on the S-IVB.

00 00 09 34 CDR Roger.

00 00 10 28 CC Apollo 16, Houston. You're GO for orbit. Predicted cut-off, 11 plus 49.

00 00 10 34 CDR Roger; 11:49.

00 00 11 48 CDR SECO.

00 00 11 49 CC Roger.

00 00 11 50 LMP Right on.

00 00 12 00 CDR Pitch 1 is coming off.

00 00 12 05 CC Roger.

00 00 12 26 CC 16, Houston. The range safety system is safe. The orbit is GO.

00 00 12 31 CDR Roger. Boy, it's just beautiful up here, looking out the window. It's just really fantastic. And the thing worked like a gem.

00 00 12 40 CC Sure did. We copy NOUN 62, and your orbit by radar is 95 by 90.

00 00 13 44 CC 16, Houston. The booster looks good. It's reconfigured for orbit.

00 00 14 32 CC 16, Houston. The Z-torquing angle will be plus 0.06. Over.

00 00 14 38 LMP Plus - Roger. Plus 0.06.

00 00 14 41 CC That's correct.

00 00 14 58 LMP Okay, Gordy; we're on page 2-11 down through - We're getting to installing the COAS. That MA was the transducer; ECS.

00 00 15 06 CC Roger, Charlie.

00 00 16 18 CC Apollo 16, Houston.

CANARY (REV 1)

00 00 17 16 CC Apollo 16 through Canaries. How do you read?

00 00 17 21 LMP Okay, you're 5 by, Gordy.

00 00 17 23 CC Okay; we're noticing a possible blockage in the primary coolant loop. Would you have John check the GLYCOL RESERVOIR BYPASS valve to be sure it's OPEN?

00 00 17 36 LMP Roger. ...

00 00 18 48 LMP Hey, Gordy, do you want us to go ahead and - and - put the radiators on?

00 00 18 52 CC Stand by.

00 00 19 06 CC Charlie, this is Houston. Whatever you just did up there got the coolant loop flow back. We'd like to watch it for a minute before proceeding. Over.

00 00 19 15 LMP Okay, we're at step 12, page 2-13, configuration now with radiators at bypass. We've got the - the RESERVOIR BYPASS, OPEN, and the OUTLET and the INLET, CLOSED.

00 00 19 25 CDR Okay, let me tell you what it was, Gordon, I think, is the - the OUTLET was - was accidently OPEN, probably at - at some other time, and the - the BYPASS was CLOSED and the INLET was - was OPEN. That's probably been the indications on the line.

00 00 19 47 CC Roger. Understand.

00 00 19 57 CDR We're coming up over Africa now, Gordon, and it really is a spectacular view.

00 00 20 03 CC Roger. I wish I was there with you.

00 00 20 07 CDR I guess we're - we're just over the Canaries looking down at those little islands, and that sure is something.

00 00 20 36 CC 16, Houston. You can proceed with the rest of the normal ECS configuration.

00 00 20 43 CDR Roger. That's in work.

00 00 20 59 CC 16, Houston. We're having a - kind of intermittent data down here due to a problem with Canaries antenna.

00 00 21 17 CDR Okay, we're gonna put the glycol to the res - to the radiators now.

00 00 21 23 CC Roger.

00 00 22 35 CC 16, Houston. Data is back now good, and everything looks fine as we come up 20 seconds to LOS. We'll see you at Carnarvon at 52:39.

00 00 22 45 CDR Roger; 52:39, Gordon.

00 00 22 50 CC Enjoy the view, there.

00 00 22 54 CDR Well, we're just starting to come into darkness now, and the sunset is just as beautiful as always in this space business.

00 00 23 03 CC Roger.

CARNARVON (REV 1)

00 00 52 07 CC Apollo 16, Houston through Canar - Carnarvon. Over.

00 00 52 12 CMP Hey there, Houston. Read you loud and clear.

00 00 52 15 CC You're loud and clear also.

00 00 52 18 LMP Okay, Gordy. We're down through - on page 2-17, P52, and everything is copacetic on all the steps up to that point, and I'll let Ken - Well, I've got the numbers here. He marked on stars 23 and 30. It was NOUN 05 with all balls. Torquing angles were plus 040, plus 031, plus 045, and we torqued them at 38:40. Over.

00 00 52 51 CC Okay, Charlie. We got that.

00 00 52 56 CMP And that torquing angle was just super. And you can even see stars.

00 00 53 07 CC Very good.

00 00 53 14 LMP Man, this is really something, Gordy.

00 00 54 19 CDR Hey, Gordon. Let me tell you a little bit about the ride.

00 00 54 25 CC Okay, stand by 1, John. We're discussing the booster data here.

00 00 54 32 CDR Okay. Pressures look good up here.

00 00 54 37 CC Roger.

00 00 56 15 CC John, this is Houston. If - if there is nothing startling to report about the ride, we'd rather hold off. We're watching - we're evaluating a need for a possible IU NAV update, and also we're seeing some pressure - overpressure in APS module number 2. We'll give you a full story on that over Honeysuckle.

00 00 56 41 CDR Okay, I - No, there's nothing really spectacularly different to report on the ride. We'll hold off on that.

00 00 56 51 CC Okay.

HONEYSUCKLE (REV 1)

00 01 02 03 CC Apollo 16, Houston through Honeysuckle. Over.

00 01 02 07 LMP Go ahead, Gordon.

00 01 02 09 CC Okay. I'll give you all the story on the APS module problem. Evidently APS module number 2, which is our one on top of the vehicle, the one that would cause you to pitch away from the Earth; the primary helium regulator there has failed to the backup, and the backup isn't regulating properly. Normally, it should hold around 190 psi. This pressurizes both fuel and oxidizer. And it has gradually increased now up around the 320 range. And there's a relief valve which will relieve helium pressure at 325 and reseal when the pressure gets down to 225. There should be a gradual loss of helium. We'll have a better hack at the States pass as to when you could expect a deplete. But should you lose control in orbit, go to the procedure on L/2-10 for service module RCS control of the S-IVB. Over.

00 01 03 11 LMP Roger.

00 01 03 52 CC

16, we're just about to LOS. The pressure shows right - in fact, a little bit above the release pressure. We'll have to wait till the States to get a real good handle on how it's gonna deplete. Over.

00 01 04 06 LMP

Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

STATESIDE PASS (REV 1)

00 01 31 04 LMP Okay, Houston. How are you doing?

00 01 31 21 CDR Houston, 16. Over.

00 01 31 23 CC Roger, 16. Loud and clear. Go ahead.

00 01 31 25 CDR Okay. You're 5 by. The coastline is under us. It's beautiful, and we're standing by for some words. The spacecraft has been holding attitude, just perfect in pitch.

00 01 31 39 CC Okay, John. We'll take a look at the APS module here.

00 01 31 43 CDR Okay.

00 01 31 44 LMP Gordy, why the late acquisition?

00 01 33 48 LMP Houston, 16. Over.

00 01 33 50 CC Go ahead, 16.

00 01 33 52 LMP Okay, how are you coming on the pads, Gordy?

00 01 33 59 CC Okay, I'm ready with the TLI plus 90 and the P37 for lift-off plus 8. We're putting together a story and looking at the APS module. No immediate action is necessary, so let's get the pads out of the way.

00 01 34 08 LMP Okay, fine. Go ahead.

00 01 34 13 CC Okay, TLI plus 90, SPS/G&N; the weight is 66973; minus 0.54, plus 1.89; time of ignition is 004:03:18.55; minus 0356.2, plus four balls 1, plus 3600.7; 181, 234, 002; HA is NA; HP, plus 0018.9; 3618.3, 5:04, 3602.0; sextant star is 26, 073.4. Stand by 1. We got a handover coming up; I'll get the rest in a minute.

00 01 36 12 CC Charlie, this is Houston. How do you read now?

00 01 36 15 LMP Okay, 5/5 Gordy. Go ahead.

00 01 36 18 CC Okay, shaft was 073.4, trunnion, 15.1; boresight star 037, up 25.7, right 2.9; minus 21.31, minus 165.00; 1093.2, 34867; and 0.05g time is 023:08:28. Sirius and Rigel; 317, 108, 005. No ullage. Go ahead.

00 01 37 17 LMP Okay, TLI plus 90, SPS/G&N; 66973; minus 0.54, plus 1.89; 004:03:18.55; minus 0356.2, plus four balls 1, plus 3600.7; 181, 234, 002; HA is NA; plus 0018.9; 3618.3, 5:04, 3602.0; 26, 073.4; 15.1; 037, 025.7 — correction — that's up 25.7, right 2.9; minus 21.31, minus 165.00; 1093.2, 34867; 023:08:28. Sirius and Rigel; 317, 108, 005. No ullage.

00 01 38 09 CC Okay, readback correct. Ready for lift-off plus 8.

00 01 38 13 LMP Speak.

00 01 38 14 CC 008:00; DELTA- V_T is 7948, minus 165, 022:06. Go ahead.

00 01 38 30 LMP Roger. P37 for lift-off plus 8: 008:00, 7948, minus 165, 022:06, and ready for TLI.

00 01 38 40 CC Okay, readback correct, and TLI pad time base 6 predict: 2:23:57; attitude 179, 113, 000; burn time is 5:43; 10373.0, 35589; SEP attitude is 359, 146, 319; extraction is 301, 326, 041; R_2 align 112.7, 107.2, 57:20, and yaw is 001. Go ahead.

00 01 39 44 LMP Roger. Give me DELTA- V_C again.

00 01 39 46 CC DELTA- V_C is 10373.0.

00 01 39 53 LMP Okay, copy. TLI, 2:23:57.

00 01 39 57 CC Stand by 1, Charlie - -

00 01 39 58 LMP Okay - -

00 01 39 59 CC Handover.

00 01 40 07 CC Okay. Go ahead, Charlie.

00 01 40 10 LMP Okay, 2:23:57; 179, 113, 000; 5:43; 10373.0, 35589; 359, 146, 319; 301, 326, 041; 112.7, 107.2, 57:20, 001. Over.

00 01 40 35 CC Readback is good.

00 01 40 43 LMP Okay, Gordy - that stateside pass, the part I saw was just super. He - the other guys saw Ellington as we went over.

00 01 40 50 CC How about that? Say, Charlie. Got an update to the ORDEAL monitor numbers on page L 2-28 and 29.

00 01 41 00 LMP Stand by.

00 01 41 07 LMP Okay, you speak.

00 01 41 08 CC Okay, we got a - last-minute change. Stand by on that. Sorry.

00 01 41 45 CC I would like COMMAND MODULE UPTTEL, ACCEPT, for a new vector.

00 01 41 51 CDR Okay, you got it.

00 01 41 53 CC Okay, and words on the APS module. It appears to be operating, not completely normally, but adequately - that we predict that it will be good through TLI and TD&E with no change in procedure. Over.

00 01 42 08 CDR Outstanding prediction.

00 01 42 12 CC Okay, and back to what we started earlier, on L 2-2-28, Charlie. Opposite 56 minutes, "Slow FDAI number 1 to PITCH equal 17," change 17 to 16. Over.

00 01 42 28 LMP Okay, go ahead. It was changed to 16.

00 01 42 32 CC And next page, after the ORDEAL start time, change that to 57:20 rather than 57 even.

00 01 42 42 LMP Okay, ORDEAL start, 57:20.

00 01 42 46 CC That's affirmative. And then, "Insure FDAI number 1 PITCH equal to 11" rather than 13, inside the box there.

00 01 42 58 LMP Okay, at 57 minutes, I've changed that to 57:20 to start the ORDEAL and the - insure FDA [sic] number 1 pitch is at 11.

00 01 43 08 CC Okay, and then the blank under there - "Maneuver to R₂ ignition," attitude is 107 as printed in parentheses.

00 01 43 20 LMP Okay, we copy.

00 01 43 23 CC That's good. And the CMC is yours. The up-link is complete.

00 01 43 33 CDR Okay, and we're back in BLOCK.

00 01 44 28 CMP Okay, Gordy. We're standing by with the SECS arm.

00 01 44 33 CC Roger. Stand by. Go ahead, we're watching.

00 01 44 46 CDR Okay, Houston, stand by for the LOGIC.

00 01 44 50 CC Roger.

00 01 44 51 CMP Okay, LOGIC 1's going on, up; LOGIC 2, on, up.

00 01 44 54 CMP MARK.

00 01 45 08 CC Okay, you're GO for pyro arm.

00 01 45 12 CDR Roger. Thank you, sir.

00 01 45 16 CC And I'd like to update a procedure, the APS-module-fail procedure - one step in that, just in case the prediction is wrong and it does fail to - If you can get that page out, I'll give you a short update.

00 01 45 32 CDR Okay, Charlie's got it.

00 01 45 34 CC Okay, Charlie. In the center of the procedure, it says "DSE command burn mode on," cross that line out. And the one below it says, "If successful,

LAUNCH VEHICLE GUIDANCE, IU." And, after the line that says "Control pitch and yaw with THC, roll with RHC," add "Keep rates below 0.2 degrees per second, pitch and yaw; 0.6 degree per second in roll to avoid fighting the other APS module." Over.

•
00 01 46 16 CDR Roger. We understand.
00 01 46 19 CC Okay, that's it.
00 01 47 16 CC 16, Houston. We're about a minute and a half to LOS. No further updates. Everything looks good. Canaries should have their antenna fixed, and we should be good as we go through their site. Over.
00 01 47 31 CDR 16; Roger.

CANARY (REV 2)

00 01 50 05 CC 16, Houston through Canary.
00 01 50 09 CDR Loud and clear, Gordon.
00 01 50 13 CC Okay, you're a little - a little down in the mud, but I think I can understand you.
00 01 50 20 CDR Okay.
00 01 50 22 LMP Gordy, we heard you then even before we got any signal strength up. That must have been on VHF, huh?
00 01 50 30 CC Roger. You're clear but weak.
00 01 50 42 LMP Okay, how do you read now, Gordy?
00 01 50 45 CC Loud and clear, Charlie.
00 01 50 48 LMP Okay, our signal strength is up to max now.
00 01 50 51 CC Roger.
00 01 52 56 CC 16, Houston.
00 01 52 59 LMP Go ahead. Over.

00 01 53 00 CC We'd like the H₂ TANK 3 FANS to AUTO. Over.

00 01 53 06 LMP Roger; H₂ TANK 3 FANS going to AUTO.

00 01 54 23 CC 16, Houston. About 30 seconds to LOS. We should get - should have you through ARIA at 2:22, a couple of minutes later than shown in the Flight Plan. Over.

00 01 54 33 LMP Roger; understand.

ARIA 1 (REV 2)

00 02 22 17 CDR We don't read anything you say, but we'll transmit in the blind.

00 02 22 36 CC Apollo 16, this is Houston through ARIA. Over.

00 02 22 41 CDR By gosh, loud and clear there.

00 02 22 43 CC And so are you, John.

00 02 22 56 CC How's everything on board?

00 02 23 01 CDR Everything looks good here. We're a minute - 10 minutes and 30 seconds to the burn.

00 02 23 09 CC Roger.

00 02 24 00 CDR Okay, on time for time base 6.

00 02 24 03 CC Roger.

00 02 24 45 CDR Okay, Houston. The S-II SEP light went out on time.

00 02 24 50 CC Roger; very good.

CARNARVON (REV 2)

00 02 26 36 CC 16, this is Houston through Carnarvon now, and the APS module is looking good.

00 02 26 42 CDR 16; Roger. Everything looks normal here.

00 02 26 47 CC Roger.

00 02 26 51 LMP Gordy, one question on the - comment on the primary loop. Does it look okay to you guys?

00 02 27 01 CC Stand by, Charlie. Roger, Charlie. EECOM is happy.

00 02 27 12 LMP Fine.

00 02 28 17 CC 16, Houston. You're GO for TLI.

00 02 28 21 CDR Roger; GO for TLI.

00 02 31 06 CC 16, Houston. We're about LOS Carnarvon, handing over to ARIA. We'll watch the booster for you. Spacecraft is all yours.

00 02 31 17 CDR Thank you much.

ARIA 2 (REV 2)

00 02 33 50 CC 16, we're showing good thrust on the S-IVB.

00 02 33 55 CDR Roger.

00 02 34 38 CDR One minute; looks good.

00 02 34 42 CC Roger; we're looking good here.

00 02 34 55 CC We've seen PU shift; the thrust looks good.

00 02 35 44 CC 16, Houston. At 2 minutes, looking good.

00 02 35 49 CDR Roger. Right on in here.

00 02 35 55 CC Roger.

ARIA 3 (REV 2)

00 02 37 39 CC 16, Houston through ARIA 3 now. Burn time as predicted, 5:43. Everything looks good.

00 02 37 47 CDR Roger.

00 02 38 40 CC 16, everything looks good at 5.

00 02 38 44 CDR Roger.

00 02 39 20 CDR SECO.

00 02 39 22 CC Roger.

00 02 39 28 CDR Okay. SECO right on time.

00 02 39 34 CC Roger; looks like normal shutdown and a guided cut-off.

00 02 39 38 CDR That's what it looked like. We're looking at minus 10 on the DELTA-V_C.

00 02 39 46 CC Roger.

00 02 40 48 CC 16, Houston. If it's convenient, would you give us V_I at cut-off?

00 02 40 59 CMP Okay, Gordy. We got you a late - stand by.

00 02 41 17 CMP Gordy, we broke the display on the - what's - it - the - and we got over to 62, it was already changing.

00 02 41 38 CC Okay, Ken, we copied that, although you faded out at the end. We'll be up on Hawaii here at 44.

00 02 41 49 LMP Okay, Gordy. We're ... we're in P00.

00 02 41 58 CC Charlie, you're just about unreadable. Copy that you are in P00 and we're standing by for Hawaii acquisition.

NOTE

After the ARIA 3 pass following TLI, there is continuous acquisition among Hawaii, Goldstone, Madrid, and Honeysuckle.

00 02 44 00 CC Apollo 16, Houston through Hawaii. Over.

00 02 44 35 CMP Houston, this is the most spectacular view in the -
that you can possibly imagine.

00 02 44 44 CC Apollo 16, Houston through Hawaii. Over.

00 02 44 48 LMP Roger, Gordy. You're 5 by, and it's the most
spectacular view I've ever seen.

00 02 44 53 CC Roger, Charlie. You're loud and clear.

00 02 45 05 CMP Okay, Houston, the direct O₂ is coming on; we're
pumping her up right now.

00 02 45 09 CC Roger.

00 02 49 28 LMP Okay, Houston. I'm going to OMNI Charlie.

00 02 49 43 LMP Gordy, you got OMNI Charlie. Over.

00 02 49 47 CC Roger; OMNI Charlie, Charlie.

00 02 54 35 CMP Okay, and we are maneuvering to the attitude
right now.

00 02 54 38 CC Okay.

00 02 55 12 CC 16, we see the cabin is up to 5.7 now.

00 02 55 17 CMP Roger. Thank you, sir.

00 02 55 33 CC We'd like OMNI Delta, please.

00 02 56 13 CC OMNI Alfa now, please.

00 02 56 17 LMP Say again.

00 02 56 19 CC Give us OMNI Alfa, Charlie.

00 02 56 24 LMP Okay, you got it.

00 02 57 20 CC Request OMNI Bravo now, please.

00 02 57 26 LMP You got it.

00 02 58 28 CC Like OMNI Charlie, please.

00 02 58 33 LMP Roger; OMNI Charlie.

00 02 59 23 CC 16, Houston. The booster is in attitude and stable. You have a GO for T&D.

00 02 59 33 CDR Roger. We'll give you a call just before we get off.

00 02 59 40 CC Okay.

00 03 02 54 CMP Okay, Houston. We're getting ready to arm the pyros. Are you ready?

END OF TAPE

APOLLO 16 AIR-TO-GROUND TRANSCRIPTION

00 03 03 03 CC Roger. We're ready.

00 03 03 04 CMP Okay; PYRO ARM A is armed; and B is armed.

00 03 03 14 CC Roger. That looks good.

00 03 04 35 CDR Okay, we're coming up on 59:40.

00 03 04 40 CDR MARK.

00 03 04 41 CC Roger.

00 03 05 22 CDR Okay; all the talkbacks are still gray, Houston. It's pitching around now.

00 03 05 29 CC Roger, John.

00 03 07 34 LMP Okay, Houston. You got the high gain?

00 03 07 39 CC Roger, Charlie.

00 03 08 44 LMP Okay, Houston, you ought to be getting some TV.

00 03 08 50 CC I haven't got it yet; we're working on it.

00 03 10 01 CC We got a picture now, Charlie, and it looks real good.

00 03 10 06 LMP Man, it just looks like a picture book from up here, Gordo. We must have a zillion particles along with us.

00 03 10 17 CC Roger. We see the particles and - great picture!

00 03 10 22 LMP Hey, is the zoom in too much, Gordo? You - Let me take it out a little bit.

00 03 10 43 CC That's just right, Charlie. That's a good zoom setting right now.

00 03 10 47 LMP Super!

00 03 11 09 LMP Gordy, looks like Orion is - is hanging in there pretty well. She looks great.

00 03 11 16 CC Looks the same to us.

00 03 14 58 CDR About a foot out now, Houston.

00 03 15 01 CC Roger. Looks like a real smooth joinup.

00 03 15 18 CMP Barber pole.

00 03 15 23 CDR Okay, we're captured there, Houston.

00 03 15 26 CC Roger.

00 03 16 13 CDR Yeah.

00 03 18 14 CDR Ken's taking some time in dressing this thing up, getting these attitudes right.

00 03 18 21 CC Okay, John.

00 03 22 01 CDR Okay, Houston. We're hard docked.

00 03 22 04 CC Roger, John. We saw it come in.

00 03 22 08 CMP And there is no question when you get the latches.

00 03 22 11 CDR Yep.

00 03 22 13 CC Roger, Ken.

00 03 22 28 CC John, this is Houston.

00 03 22 31 CDR Go ahead. Over.

00 03 22 32 CC We'd like - We noticed the mixing valves cycling about once every 10, 15 seconds. We'd like to give you a mark, at which time we want you to put the GLYCOL EVAP TEMP IN valve in MANUAL and try to catch the flow rate at a - at a appropriate setting. I'll - I'll give you kind of a countdown and a mark here.

00 03 22 55 CDR Yeah, we've been noticing that ourselves.

00 03 23 01 CC Okay, flow rate's high and starting back down.

00 03 23 25 CC John, now all of a sudden we've stopped seeing it; that it has stopped cycling. You didn't throw the switch already, did you?

00 03 23 34 CDR That's negative. We're awaiting your mark there.

00 03 23 38 CC Well, it - (chuckle) it just hung up. Just as I said that. Stand by.

00 03 24 06 CC We'd like you to cycle the MANUAL back to AUTO and see if that starts it back down. Over.

00 03 24 14 CDR Okay, you were in MANUAL for about 2 seconds and back to AUTO.

00 03 24 18 CC Okay. Okay, it's coming down now. Stand by to put it in MANUAL.

00 03 24 30 CC Ready. Now.

00 03 24 32 CDR Okay. Okay, you got it right there on the "now."

00 03 24 41 CC I was a little slow on the "now," but leave it there for now and press on with the normal procedures.

00 03 25 26 LMP Houston, before we turn the TV off, we gon - we want to give you a picture of the Earth.

00 03 25 31 CC Okay, I'll appreciate that.

00 03 26 40 CC Very nice picture, Charlie. We can see Southwestern United States, Lower California. Very nice.

00 03 26 50 LMP Good. Ken's doing all that good work for you. It's out his window.

00 03 27 10 CMP Gordy, is that color okay for you?

00 03 27 13 CC Very nice, Ken. Beautiful color.

00 03 27 17 CMP I bet it's good, but you just can't believe how beautiful it is. See the reds in the desert down there and the Southern United States and northern part of Mexico. And from here, you see the Great Lakes and the State of Florida out there. And it's just absolutely something. We're going to go back to work, but thought you'd enjoy that.

00 03 27 37 CC Thank you for the picture. It's the next best thing to being up there.

00 03 27 49 CMP And - and we might be able to get you an S-IVB later on. That's if you got room to get that kind of stuff.

00 03 27 59 CC Okay, we'll be waiting.

00 03 29 08 CC 16, Houston. We'll extend the time on commercial TV lines here if - if it looks like we'll get some good shots on the S-IVB.

00 03 29 19 CMP Okay. I really haven't worked out the angles to tell you exactly how the Sun is going to be, but I have an idea we'll see it pretty nicely from here.

00 03 29 27 CC Okay, we'll stand by for it.

00 03 29 39 CDR Just went to AUTO on O₂ teater [sic] 3, Houston. We're down to that part in the postdocking checklist.

00 03 29 45 CC Okay.

00 03 33 19 LMP Okay, Gordy, we're down to 0.2 on the DELTA - I mean, correction 2.0 on the DELTA-P, and we're starting our leak check.

00 03 33 26 CC Thank you.

00 03 36 36 LMP We're picking up again on the procedure, Gordy. Cabin pressure's down to 41.

00 03 36 40 CC Roger.

00 03 38 14 CC 16, Houston. In about 30 seconds, a couple non-propulsive vents will open on the booster.

00 03 38 21 LMP Okay, thank you.

00 03 40 18 LMP Okay, Houston. The hatch is out.

00 03 40 20 CC Thank you.

00 03 43 00 CMP Houston, it looks like number 10 latch is indeed locked. Let me start by saying all the latches are locked. Number 10 is - is over the ring, but the handle isn't all the way up flush, and we're just going to leave it alone. Thought we'd just tell you about it.

00 03 43 17 CC Okay, Ken.

00 03 47 07 LMP Okay, Houston. The connectors are connected, and we got LM power to CSM, and the system test is okay.

00 03 47 14 CC Roger.

00 03 47 20 LMP And, Gordy, the old Rover is right where it's supposed to be.

00 03 47 25 CC That's good.

00 03 49 03 LMP Houston, 16.

00 03 49 08 MCC CAP COMM, 16.

00 03 49 10 CC Roger; go ahead.

00 03 49 12 LMP Okay, Gordy. So when we pitched around, I'd like to tell you a little bit about something we saw on the LM. When we were coming around out about 30 or 40 feet out, we had a lot of white particles. Looked like it was coming out from around the lunar module. Quite a number of them. And, as we got closer, it looked like to me that the primary - most of the particles were coming bet - from between the ascent propellant tank over quad I and this omni antenna. And it looks like they was being jettied out from either some out-gassing or something, and we assumed it's Mylar, but are not convinced of that.

00 03 50 05 CC We copy that, Charlie.

00 03 50 10 LMP The only reason we comment on it, it just seemed like there was a awful lot of them.

00 03 50 15 CC Okay.

00 03 56 32 CDR Okay, Houston. We're ready to proceed with the logic.

00 03 56 38 CC Okay, we're standing by.

00 03 56 45 CDR There's two LOGICS on.

00 03 56 50 CC You're GO for pyro arm.

00 03 56 59 CDR Roger, Houston.

00 03 57 11 CDR Here comes PYRO A.

00 03 57 12 CDR MARK. PYRO B.

00 03 57 14 CDR MARK.

00 03 57 24 CC Okay, they look good.

00 03 58 26 LMP Houston, we got - We're ready to get off if you guys are ready.

00 03 58 32 CC Roger. You're GO for ejection.

00 03 58 34 LMP Okay.

00 03 59 19 LMP Okay, we're off, Houston.

00 03 59 21 CC Roger.

00 04 01 32 CMP Okay, Houston. We're doing our maneuver, and we'll tell you as soon as we have a visual.

00 04 01 41 CC Okay, Ken.

00 04 03 43 CMP Okay, Houston. The post-LM-injection - ejection checklist is complete.

00 04 03 51 CC Roger. And, for your information, we're unable to get lines from Goldstone to Houston for live TV; however, we're going to record any TV you give us for later playback. Over.

00 04 04 05 CMP We'll do it for you.

00 04 07 44 CMP Houston, Casper [sic] is out of his bag; and we got the S-IVB in the window. And the TV is transmitting pictures of it now, and if you want to do your maneuver with it, we're well clear.

00 04 08 03 CC Okay, we copy a GO for the S-IVB maneuver.

00 04 08 11 CMP That's the attitude maneuver we're talking about.

00 04 08 16 CC They'll start the maneuver about 4:10 GET.

00 04 08 24 CMP Okay.

00 04 09 37 CC 16, your TV down-link looks good out at the site; however, we can't see it here in Houston live.

00 04 09 45 CMP Okay. Well we're still adjusting the - all those good things.

00 04 09 49 CC Okay.

00 04 10 23 CC The S-IVB maneuver - attitude maneuver is in progress now.

00 04 10 32 CMP Roger. We can see it maneuvering. I tell you, they never make movies like these.

00 04 10 44 CC I -

00 04 11 19 CC We'd like AUTO TRACK on the HIGH GAIN, please.

00 04 11 27 LMP You got it.

00 04 11 30 CC Thank you.

00 04 12 18 CMP Gordy, we've - we lost the monitor picture, and we're gonna try to power the TV set down, and we're gonna check all the connections, and it's got a lot of horizontal lines. And you really can't even make out the image. It started out okay, and then while John was taking a picture, it - the monitor picture went out. So we're gonna try to take a look at it. It's got a whole bunch of horizontal lines.

00 04 12 40 CC Okay, we'll go to - -

00 04 12 41 CMP It looks like maybe multiple images.

00 04 12 44 CC We'll go to the site. Stand by.

00 04 14 24 CC 16, Houston. The maneuver is complete. We're standing by for your GO for the evasive burn.

00 04 14 30 CMP Okay, stand by 1.

00 04 15 16 CMP Okay, Gordy, we're all set. It looks like it's almost 90 degrees to us.

00 04 15 20 CC Okay. On the TV problem, we had a good picture out at the site there at the first, but then we started losing signal strength, which would - doesn't really tell us whether anything is wrong with your monitor set or not.

00 04 15 35 CMP Okay. Well, we're gonna take pictures like it's working, and you can check it out later.

00 04 15 39 CC Okay.

00 04 15 40 CMP And we are all set.

00 04 15 42 CC Roger.

00 04 16 44 CC 16, Houston. Goldstone says they're getting a good picture, and so your trouble is with the effort there, and we'll start the evasive burn at 4:18 even.

00 04 16 59 CMP Okay, Gordy, thank you. We got another spectacular view of the Earth down here. The polar ice cap. We can see the whole sphere, and the United States is absolutely spectacular.

00 04 17 14 CC How about that.

00 04 17 19 CDR And out the other side, we've got a crescent Moon.

00 04 17 22 CMP In fact, you can see Lake Mead, Gordy; very clearly.

00 04 17 27 CC No kidding?

00 04 19 03 CDR We can see her moving away now, Gordon, and she's just slowly picking up a little speed there. Only way you can tell it's moving is against the - the particles in the background. I don't think you can see those on TV, but it's - it looks like there's a million stars out behind the S-IVB as it moves off.

00 04 19 22 CC Roger, John.

00 04 19 36 CC Now the evasive burn is complete, now.

00 04 19 39 CDR And - Roger. And as she moves out of sight, the old Apollo 16 crew would really like to express their thanks and appreciation to the guys at the Marshall Space Flight Center that give such a phenomenal ride. Not to mention the Boeing Company on the first stage, North American on the second, McDAC on the third, IBM on the IU. It was superb all the way.

00 04 20 05 CC Okay, John, I'll speak to them. Thank you.

00 04 20 25 CDR And you might relay to old Mike Wash, thanks a lot for his help. We know he's leaving, and we're sure glad we didn't have to use any of that training he gave us.

00 04 20 34 CC Okay, we'll sure do that. He's just about to walk out the door.

00 04 21 03 CDR Gordy, up off - looks like Alaska - up maybe a little farther north - is a pretty good swirl pattern. Looks like a pretty good storm up there.

00 04 21 15 CC Thank you.

00 04 21 56 CC Apollo 16, here is a word from the auxiliary CAP COMM here.

00 04 22 01 MCC Good luck, you fellows. Take it easy, and hope everything works out all right.

00 04 22 06 CDR Kind words, Mike. Thank you.

00 04 22 11 MCC Say again?

00 04 22 12 CDR Thank you for all your trouble. We sure enjoyed working with you.

00 04 22 15 MCC It was certainly my pleasure, John; thank you a lot. Good-bye and good luck.

00 04 22 19 CDR Thank you, now.

00 04 24 28 CDR Okay and the - the S-IVB has drifted maybe half a mile away now, so we went ahead and turned off the tube.

00 04 24 37 CC Okay.

00 04 25 26 CC John, just before you turned the mon - the TV off, was the monitor still giving you trouble?

00 04 25 31 CDR That's affirmative.

00 04 25 33 CC Okay, thank you.

00 04 25 35 CDR I guess it's about time for a little VERB 49 to the P52 attitude. How's that suit you?

00 04 25 42 CC Sounds good.

00 04 26 02 CMP Gordy, the - I can't get over the view of that Earth. None of the pictures just do it justice. Absolutely beautiful.

00 04 26 12 CC We're kind of getting the idea that you're impressed.

00 04 26 16 CDR Man, the thing about it, Gordy, is that the whole Southern United States, Mexico, and that - and - and Florida and Cuba and the Virgin Islands down that way - they're all clear of clouds. It's just fantastic!

00 04 26 32 CC Did you take some good pictures?

00 04 26 36 CDR Got some.

00 04 26 38 CMP The way we're going, we may have to get a reload before we get to the Moon.

00 04 26 41 CDR As a matter of fact, you can see as far north as Lake Michigan and Lake Superior.

00 04 26 48 CC Sounds great.

00 04 26 52 LMP And all the way down past the Yucatan and - and into the Central America.

00 04 32 02 CMP Houston, we've got the cabin back up some now, and our LM/CM DELTA-P gage is reading 0.6, and that's probably due to that DELTA on the cabin. And the O₂ FLOW HIGH light has gone out, so things are getting back to normal.

00 04 32 16 CC Okay.

00 04 33 32 CMP And, Houston, we've done a LM/CM DELTA-P; and, at
time 4 hours and 30 minutes, we had a plus 0.6.

00 04 33 41 CC Roger.

00 04 34 44 CMP Houston, we're going to take the WASTE STOWAGE
valve to VENT this time.

00 04 34 49 CC Roger, Ken.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

00 04 39 52 CC Apollo 16, Houston. Don't know if you can see it or not, but we've started the LOX dump on the S-IVB.

00 04 40 01 LMP We lost it a little while ago, Gordy.

00 04 40 03 CC Roger.

00 04 41 07 LMP Houston, are you ready for us to start charging battery B?

00 04 41 17 CC Okay, we're GO for the battery charge on B, and we'd also like you to dial in the Flight Plan high-gain angles, minus 47 and 98, and go to REACQ.

00 04 41 29 LMP Okay, you got the angles, and you're going to REACQ.

00 04 41 31 LMP MARK.

00 04 45 46 LMP Houston, 16.

00 04 45 48 CC Go ahead.

00 04 45 50 LMP Okay, we got BAT B charging, and it says volts should be 37-1/2 to 39-1/2, and I'm looking at 33.

00 04 46 04 CC Okay.

00 04 46 25 CC Charlie, we got - we figured about 8 amp-hours out of that battery, so it'll be a while yet before the voltage gets back up, and EECOM thinks that's okay.

00 04 46 37 LMP Okay, fine.

00 04 47 22 CDR Houston, we got 3.4 on 7A. We're gonna vent - we gonna vent the battery to zero, if that's okay.

00 04 47 31 CC Stand by.

00 04 47 41 CC We'd like you to hold on that a minute.

00 04 47 47 CDR You're too late, we just vented it.

00 04 48 00 CDR Okay, it's reading about 0.2 right now.

00 04 48 05 CC Roger.

00 04 48 06 CDR Say again, 0.4.

00 04 48 09 CC 0.4.

00 04 50 51 CMP Houston, got a couple of comments on the EMS for G&C, whenever he has a break.

00 04 50 59 CC They're all ears; go ahead.

00 04 51 03 CMP That must look funny. Okay. We been running null bias tests here for - well, since we got in orbit - each time the checklist calls for it. On the first one, we found that in our hundred-second check, it gained 2.5; then, just before docking, it got 2.6; and I just ran another one, and I have 2.8. And I don't really know what you can do with that, but I just thought I'd go ahead and tell you about that's the magnitude of what we're looking at.

00 04 51 34 CDR Okay, and our first rough guess as to how the SCS GDC system is performing, it looks like it's well within spec in pitch, yaw, and roll, as far as its drift measurements go.

00 04 51 50 CC Okay, Ken and John, we got that.

00 04 53 15 CC 16, Houston. Whenever you're ready, we're ready to load the PTC REFSMMAT.

00 04 53 23 CMP Okay, you have POO and ACCEPT.

00 04 53 28 CC Okay.

00 04 54 19 CC Ken, sorry about that. We didn't get coordinated here. We don't have an up-link site, so go back to BLOCK until after 5 hours, and we'll try it again then.

00 04 54 29 CMP All righty. They're back in UP TEL to BLOCK. And we're going to be kind of hanging up here for a while anyhow, while we get our suits off. It - it turns out to be a pretty interesting operation with these new B-suits.

00 04 54 46 CC Roger.

00 04 54 50 CMP

I'll tell you, Gordy, there were some sights out there that were really something. One of the - one of the things that - most things happened like people had said they would. But there were a couple of things that I had never seen or heard anyone even mention, and maybe they'd been on - been there all along. But one of the things that was really nifty was, while we were in powered flight, both in later stages of the boost and during the TLI burn, there were particles that I could see out the window that were going past us in the plus-X direction, and I kept thinking that that was an optical illusion, and I kept going back and looking at it again, and sure enough! And these were after we were in steady state. It wasn't around any kind of a staging event or anything that I was aware of.

00 04 55 37 CC

Oh, how about that. I haven't heard of that one before.

00 04 55 43 CMP

Then when we - when we scooted out here and you started your nonpropulsive vent, we could see - First, it just looked like it was a little mist around the outside when you looked at the Sun. And then the Sun hit it at such an angle that you started getting a spectral reflection, and it looked like a rainbow out over the LM. And then after that, you could look out my number 1 window, and apparently the lighting was just right so that it - it had the appearance of light streaming off to a point source at infinity. There was a little blank spot in it at the - at what looked like the origin. And then all these streaks were coming back towards you, like you were right in the center of a cone. And these things would change colors. They go to a light - light purple, and then they'd have a little sandy color to them. That was another one that I don't remember ever hearing before, and it was - maybe it was just the lighting on it, but it sure was pretty.

00 04 56 46 CC

Roger. Enjoying the description.

00 04 56 53 CMP

I'll tell you, you can't wait too many years to make this worth it.

00 04 56 59 CC

Roger.

00 04 57 03 CDR Gordy, on that boost, that S-IC is a real freight train. I'll tell you, boy. I can't get over that.

00 04 57 11 CC Roger.

00 04 57 14 CMP Could you folks see that thing on the TV up through staging?

00 04 57 20 CC I didn't watch it all the way until it went out of sight. I'll have to check here.

00 04 57 32 CC Yeah, I guess we saw even tower jett.

00 04 57 38 LMP Good show. John's in the middle of his suit doff.

00 04 57 43 CC Okay.

00 04 57 52 CMP And thanks to good old Stu Roosa's suggestion, we wrote in the Flight Plan to be sure and take a look at the fires out there in Africa as we went over, which is something we probably would have forgotten or never even thought about. And they are just as beautiful as everybody's ever said they could be. They're just all over the place. All these little - little yellowish-red dots down there. And there was some - looked like some low overcast in parts of the area, or maybe it was - from our altitude, maybe it was a high overcast. But it just gave - It looked like looking at the lights of a city through fog, and then there were others that were clear. Just something well worth remembering to look for.

00 04 58 32 CC Roger. We'll be sure to remind Ron to look for that one.

00 04 58 43 CMP I tell you, God didn't equip us with enough eyes to see everything that there is to see in the first hour.

00 04 58 51 CC Roger.

00 04 59 26 CMP Gordy, it looks like this whole operation may take us longer than - than we had guessed. Is there any thermal constraint on getting a 52 attitude and going to those other attitudes? Looks like ... - -

00 04 59 41 CC I'll check on that, Ken. We're about - -

00 04 59 42 CMP - - but I just wondered if that's something we ought to keep in mind.

00 04 59 47 CC Okay, we're about to a handover here. I'll check on that and come back to you through Hawaii.

00 04 59 51 CMP Okay, thank you.

00 05 00 46 CC 16, we're - through Hawaii now. And you're scheduled in this attitude through 7 hours or - at least, so no problem thermally, and you're not even due to do the P52 for another half hour, so you're plenty ahead.

00 05 01 03 CMP Okay, that P52 - We're going to come to a decision point here pretty soon, whether to - you want us to do that and we'll pick up the suit doffing after that, or we - I'd just as soon go ahead and do the - get all the suits out of the way. And we can do the 52 on schedule, or we can do it after we get the suits off. Does it make any difference to you folks?

00 05 01 24 CC Let me check.

00 05 01 56 CC If that's what you'd like to do, why don't you go ahead with the - finish up the suits. No problem slipping the 52 a little bit. And we'd like POO and ACCEPT for that up-link.

00 05 02 08 CDR Okay, there's POO and ACCEPT. Is Fredo still around there?

00 05 02 18 CC No, he went home about a half hour ago.

00 05 05 28 CC 16, Houston. The computer is yours.

00 06 03 54 LMP Hello, Houston; 16. John and I are back up now.

00 06 04 00 CC Roger. That up-link is complete. In case you didn't hear me some time ago, the computer is yours.

00 06 04 10 CDR Okay, we're in BLOCK.

00 06 04 12 CC Roger.

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00 06 04 13 CDR And it took us about an hour for me and Charlie to climb out of those suits and stow them. It's really something.

00 06 04 23 CC Roger.

00 06 05 19 CC 16, Houston.

00 06 05 23 CDR Go ahead, Gordon.

00 06 05 25 CC I'm going to hand over to Pete here. He's coming on with a good boost there. He's got a bunch of - P37 pad and a bunch of Flight Plan updates for you when you get somebody free to do some stenographic work there. Enjoyed the first 6 hours. Hope the rest of it goes as well.

00 06 05 50 CDR Gordon, that was beautiful. Tell Flight and the guys down in the trenches, "Man, that was super!"

00 06 05 55 CC Okay.

00 06 13 01 LMP Okay, Houston; 16 here. We're ready to copy the Flight Plan updates.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

00 06 13 14 CC Roger, 16. At 11 hours in the flight plan.

00 06 13 20 CDR Stand by.

00 06 13 32 CDR Okay; go ahead.

00 06 13 33 CC Roger. At 11 hours, we want to delete "WASTE STOWAGE VENT valve, CLOSE;" and, at 12:15, we will add "WASTE STOWAGE VENT valve, CLOSE."

00 06 13 50 CDR Okay; copy add at 12:15 "WASTE STOWAGE VENT valve, CLOSE."

00 06 13 53 CC Roger. And delete it at 11.

00 06 14 24 CDR Okay; go ahead.

00 06 14 26 CC Roger. Then we've got the change to the CSM Experiments/EVA Checklist having to do with the ultraviolet filter. UV filter apparently did not meet the specs, and we're going to have to make some changes to the exposures at - on several different pages in the checklist.

00 06 14 56 CDR We'll wait on that; we don't have that checklist out yet, Pete.

00 06 15 00 CC Okay; and I've got P37 block data.

00 06 15 12 CDR Stand by.

00 06 16 14 CDR Okay, Pete, go ahead with the P37 block data.

00 06 16 16 CC Okay; lift-off plus 15. It's 015:00; 5493; minus 165; 046:40.

00 06 16 40 CDR Roger; copy. 015:00; 5493; minus 165; 046:40. Over.

00 06 16 50 CC Roger. That's correct, Johnny.

00 06 16 55 CDR Is that all?

00 06 16 57 CC Yeah ... that's all.

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00 06 16 59 CDR Okay. How's the midcourse looking?

00 06 17 05 CC Stand by 1. We're still looking at it; it looks pretty good right now.

00 06 31 15 CDR Houston, now have NOUN 93; are you happy?

00 06 31 22 CC In a minute, 16.

00 06 31 30 CC Okay, 16. You can go ahead and program.

00 06 39 53 CC 16, Houston.

00 06 39 57 CDR Go ahead.

00 06 39 58 CC Roger. Just wanted to remind you that, before you start the UV photography, we've got to change all the exposures.

00 06 40 05 CDR Okay.

00 06 43 01 LMP Pete, 16 here. Go ahead with the update. Give me a page number for the UV, and we'll update the filter settings.

00 06 43 09 CC Okay; we've got a whole bunch of pages. We'll start on 2-16.

00 06 43 17 CMP Okay; go ahead.

00 06 43 18 CC Under item 4, we want to change from "20 seconds - 2 frames" to "2 seconds - 2 frames."

00 06 43 31 LMP Okay; keep going.

00 06 43 32 CC Okay; on page 2-17. Item 4, "20 seconds - 2 frames," change to "1/15 second - 2 frames."

00 06 43 50 CC Page 2 - -

00 06 43 51 LMP Okay; 2-16 - 2-16, line 4, "20 seconds" to "2 seconds," and 2-17, same line is "1/15" versus "20 seconds."

00 06 43 59 CC That's affirmative. And on page 2-19, we want to change shutter - under item 5 - we want to change "Shutter 1/15 - 2 frames" to "Shutter 1 - 2 frames."

00 06 44 17 LMP Okay; "Shutter 1/15" went to "Shutter 1 - 2 frames."

00 06 44 21 CC Roger. On page 2-21, we have change from "Shutter 1/15 - 2 frames," to "Shutter 1 - 2 frames."

00 06 44 34 LMP Okay. That's item 2?

00 06 44 39 CC Affirmative; that's item 2.

00 06 44 43 LMP Okay; that was "Shutter 1" vice "1/15."

00 06 44 47 CC Affirmative. And on page 2-22, item 2, change "Shutter 1/15 - 2 frames" to "Shutter 1/2 - 2 frames."

00 06 45 02 LMP Copy; 1/2.

00 06 45 04 CC On page 2-23, item 4, "20 seconds - 2 frames" to "2 seconds - 2 frames."

00 06 45 16 LMP Okay, copy.

00 06 45 17 CC And on page 2-24, under "At T start plus 7 minutes," change "20 seconds - 2 frames" to "1/15 seconds - 2 frames."

00 06 45 32 LMP Can you say where that is again?

00 06 45 35 CC Okay, it's on page 2-24, and it's under the heading that says "At T start plus 7 minutes."

00 06 45 41 LMP Okay. What was it? I'm sorry; I got all of that, but didn't get what it was.

00 06 45 46 CC Okay. It's change "20 seconds - 2 frames" to "1/15 second - 2 frames."

00 06 45 55 LMP Okay, copy.

00 06 45 58 CC Okay, on page 2-36 - about 1/3 of the way down the page where it says "Configure lens f/8, 1/30, 4" - We want to change that to "Configure lens 1/2 stop between f/5.6 and f/8, 1/15, and 4."

00 06 46 35 LMP Okay, that's 1/2 stop between f/5.6 and f/8, and the shutter to 1/15?

00 06 46 42 CC That's affirmative, Charlie.

00 06 46 49 CC And on that same page, about 2/3 of the way down, under the step that says "Electrophoresis POWER, ON," we want to add a note to hold for instructions from MSFN.

00 06 47 13 LMP Okay, understand hold for instructions from MSFN. Is that before the POWER, ON?

00 06 47 19 CC Negative. That's immediately after POWER, ON, and I won't read you that instruction now; we'll wait until we get to that in the Flight Plan.

00 06 47 25 LMP Okay.

00 06 50 21 CC 16, Houston.

00 06 50 27 CDR Go ahead, Pete.

00 06 50 30 CC Right, John. This VERB 49 that's at 7 hours in the Flight Plan — we want you to hold up on that so we can have a look at the attitude.

00 06 56 22 CC 16, Houston. We had a temporary very short loss of comm there. Did you do anything on board to return comm?

00 06 56 31 CDR We haven't touched a thing there, Pete.

00 06 56 34 CC Roger. Everything seems okay now. It was very brief, but we lost it for awhile.

00 06 56 39 CDR Okay. We didn't even hear any squelch or any of that noise - -

00 06 56 44 CC Roger.

00 06 56 45 CDR - - like you usually get when you lose comm.

00 06 56 48 CC Roger. Understand.

00 06 57 42 CC 16, Houston. The attitude in the Flight Plan for the VERB 49 is okay. You can go ahead with it.

00 07 04 13 LMP Okay, Houston. You have OMNI Delta.

00 07 04 16 CC Roger. Copy OMNI Delta.

00 07 16 29 LMP Houston, 16. Over.

00 07 16 31 CC Go ahead, 16.

00 07 16 34 LMP Okay, Pete. I think we figured out what all this white particles that's coming off the LM. On the - the side that - of the LM that's between this omni antenna and the APS - the ascent propulsion propellant tank, there's a surface that was gray that is now - for some reason, the thing is all strip - striped looking. It's a surface that's really almost perpendicular - parallel to the plus-X of the LM. And it's all tattered and torn and shredded - looks like shredded wheat, is what it reminds me of. Over.

00 07 17 25 CC Roger; copy.

00 07 17 28 LMP And that's the only surface we have that looks like that, and we continually get particles shredding off from that.

00 07 17 32 CC Roger; copy.

00 07 17 50 CC Charlie, we're having a little trouble figuring out which surface you're talking about. Can you give us a little better description of what you were talking about there?

00 07 17 59 LMP Okay. We - On the plus-X side - on Ken's side - the surface right below the docking target that runs parallel to the plus-X of the LM and right into the top of the APS propellant tank.

00 07 18 17 CC Okay. Right below the docking target, and it runs right into the top of the APS propellant tank.

00 07 18 23 LMP That's affirm, and that axis is almost parallel to the plus-X axis.

00 07 18 29 CC Roger.

00 07 18 34 LMP And whatever that surface was is all shredded, and - as I said, like shredded wheat, and it's continually spitting particles off.

00 07 18 44 CC Okay. In other words, you can see it deteriorating now, huh?

00 07 18 47 LMP That's affirm. It's spitting particles off about five or 10 a second.

00 07 18 52 CC Roger.

00 07 19 18 CC Okay, 16. We got it, and we're going to take a look at it now.

00 07 19 25 LMP Okay.

00 07 19 40 CC And, 16, we've got a correction to the G&C checklist, page 9-4, whenever you get ready to copy.

00 07 19 48 CDR Let's catch that after the UV photos.

00 07 19 51 CC Roger. Will do.

00 07 24 31 CC 16, Houston.

00 07 24 34 CDR Go ahead.

00 07 24 36 CC Roger. On panel 382, the PRIMARY GLYCOL EVAP INLET TEMP valve, we want to adjust it slowly to get that temp to about - to EVAP out to about 45 degrees.

00 07 24 51 CDR You want us - -

00 07 24 52 CC And you'll have to go toward them.

00 07 24 54 CDR You want us to go into manual and set the evaporator - you want to set the temperature - to 45 with the manual while we have the waterboiler going, is that correct?

00 07 25 12 CC That's affirmative.

00 07 25 24 CC 16, you can go ahead and set it. Move it toward MAX, and you'll have to go pretty slow with it.

00 07 25 28 CDR Okay. Can we stand by just a minute?

00 07 25 31 CC Affirmative.

00 07 25 32 CDR Thanks. I got to open up that panel and all that stuff.

00 07 25 35 CC Roger.

00 07 34 41 CC 16, Houston. Can you go MANUAL on the HIGH GAIN?

00 07 34 45 IMP Roger.

00 07 34 58 CC Charlie, it was in REACQ, and it was drifting around.

00 07 35 05 IMP Okay, it's in MANUAL now.

00 07 35 08 CC Roger. We got it.

00 07 41 29 CMP Houston, is that close enough on the evap temp? Looks like I can't hit 45; I can hit 43 or about 46 or 7.

00 07 41 42 CC Affirmative, 16. That looks good enough.

00 07 46 26 CC 16, Houston. On this panel that you were looking at that the particles are coming off of. That's not a hard piece of structure there; that's just a thermal protection covering - a standoff - that's over the top of the RCS A system tanks. And all the RCS A tanks are under there, and what we're concerned about is that one of those tanks may be leaking and affecting that thermal protection blanket on top.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

00 07 47 20 CMP Okay.

00 07 47 24 CC Okay, we are considering the possibility of taking a look - -

00 07 47 28 CMP The - Don - -

00 07 47 29 CC - - at the tank systems.

00 07 47 30 CMP I'm not sure. The picture that we are trying to paint here is like you had painted something and then all the paint started to peel off. It's all stripping off like an old, real - like you painted an old barn and had the paint come off of it. And it's all standing out. You can see it - kind of released from the surface. And I don't know if that fits your picture or not.

00 07 47 41 CC Roger. I think that's the way we understand it. Are you still getting those particles coming off pretty fast there now?

00 07 47 48 CMP They're not coming off as fast as they were awhile back, but maybe that's our Sun angle has changed, making them not quite as obvious.

00 07 47 55 CC Roger.

00 07 51 31 CMP Hey, Don. We're ready to - looks like we ought to be deactivating the primary evaporator. Did you want us to keep it on for awhile or something?

00 07 51 40 CC Stand by a minute. Negative, Ken. You can go ahead and shut her down.

00 07 51 50 CMP All righty.

00 07 53 47 CMP Okay, Don. We've got the evaporator secured.

00 07 53 51 CC Roger; copy.

00 07 56 24 CC 16, Houston. On that panel 382, in the manual control, the mixing valve, looks like we are going to have to play with that valve every time we change

attitudes. So you might just leave that panel open or closed, for the two of the fasteners, so it will be easy to get into.

00 07 56 41 CMP Okay. Looks like that's going to be fun around the Moon, doesn't it?

00 07 56 47 CC Roger. We are looking at that right now, Ken.

00 07 56 55 CMP All right.

00 08 08 48 CC 16, Houston. Go to HIGH GAIN.

00 08 10 26 CC 16, go HIGH GAIN.

00 08 10 39 CC 16, Houston. Give us a HIGH GAIN ANTENNA.

00 08 15 00 CDR Houston, this is 16. Over.

00 08 15 02 CC Roger, 16. You're loud and clearing up.

00 08 15 05 CDR Roger. I see something coming off of the lunar module now that I - I haven't been up here looking out the window. I just noticed - it's - it's - it looks like it's coming out of a vent or something. And from looking at it through the window, it is beneath this sheet that's sort of shredded off, and it's right between the - that spiral antenna and above the big APS tank. But this is definitely coming out in a stream right now, looks like, and not very many particles, but they're just being propelled away from the lunar module at some velocity.

00 08 16 00 CC Roger.

00 08 16 01 CMP Okay. Let's get in there and take a look at it.

00 08 16 07 CC Roger. I think you're going to have to get in the LM and take a look at the RCS systems gages to tell what's going on here. Do you notice any color or anything more descriptive about that stream?

00 08 16 15 CDR Well, my opinion of the color is that it's a brownish material.

00 08 16 24 CC Roger.

00 08 16 26 CDR And it has long - some of it has long flakes to it, and - but some of it is just little particles.

00 08 16 37 CC Roger.

00 08 16 52 CC 16, we would like to have a look at the LM/CM DELTA-P before you start pressurizing it also.

00 08 17 00 CDR Okay. Do you want us to stop the P23 and go in there right now? Over.

00 08 17 05 CC That's affirmative, 16.

00 08 17 10 CDR Okay.

00 08 17 15 LMP Do you want us to stay in this attitude, Pete?

00 08 17 34 LMP And, Pete, you might be thinking about what kind of a - where you want us to enter the checklist.

00 08 17 40 CC Roger. I understand. We'll get back to you in a minute, Charlie.

00 08 17 44 LMP Roger. The Activation Checklist, I guess.

00 08 17 46 CC Roger.

00 08 18 21 LMP We're up to 0.6 on the LM/CM DELTA-P, which is what it was, due to our cab pressure difference. I don't think it has leaked any.

00 08 18 32 CC Roger. We copied; and, Charlie, we want to start on page 2-1 in the Activation Checklist.

00 08 18 38 CMP Okay. Pete, how about if I go to a wider dead band?

00 08 18 53 CC We want to - first of all, Ken, we want a roll to 91 degrees, and that'll boresight the aft omni toward the Earth, and also we want the WASTE STOWAGE VENT valve, CLOSED.

00 08 19 06 CMP Okay, now. Take it a little slower here. You wanted to do a maneuver to a roll of 90. Is that affirm?

00 08 19 13 CC A roll of 91.

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00 08 19 15 CMP Okay. Do you want the other attitudes to be the same as I have now?

00 08 19 18 CC That's affirmative. That's affirmative, 16.

00 08 19 26 CMP Okay, I have 91.00. And we'll use the present pitch and the present yaw, and you get the WASTE VENT, CLOSED.

00 08 19 38 CC Roger. The WASTE STOWAGE VENT valve, CLOSED.

00 08 19 44 CMP We've done that. Okay, we're starting our maneuver now.

00 08 22 10 CDR Okay, Houston. We're opening the LM pressurization valve now.

00 08 22 14 CC Roger.

00 08 22 20 CDR How does it look?

00 08 23 09 CC Ken, we're also thinking about trying to get some TV looks at that venting condition, if it doesn't interfere with the activation.

00 08 23 19 CMP Okay. I'll tell you what. We've stowed the camera aftwards. Wait until they get in the LM, and then I'll go down and get that thing out. I can do that while they're going in there.

00 08 23 30 CC Roger; understand.

00 08 29 49 CC 16, can you ZERO the OPTICS? All you have to do is hit the switch. It's within 10 degrees.

00 08 30 59 LMP Okay, Houston. How far along in this activation would you like us to go?

00 08 31 05 CC Stand by a minute, Charlie. Step 7, page 2-3; 2-3, step 7. Go to 2-3, step 7, Charlie.

00 08 31 18 LMP Okay. We start on 2-1, right?

00 08 31 21 CC That's affirmative.

00 08 34 44 CMP Okay, Don. They're on their way into the LM now. And Charlie's in there and John's joining him, and I'll work on getting the TV camera out.

00 08 34 53 CC Okay.

00 08 36 18 CDR Okay, Houston. We're going on to LM POWER right now.

00 08 36 22 CC Roger.

00 08 36 30 CDR Okay. We've gone to RESET and OFF.

00 08 36 35 CC Roger, 16.

00 08 36 36 CDR The time was 08:36:34.

00 08 36 38 CC Roger.

00 08 37 00 CC Ken, when you get the camera set up and ready to operate, we'll go to MEDIUM beamwidth on the HIGH GAIN ANTENNA.

00 08 37 06 CMP Okay, and it's going to be a few minutes.

00 08 37 09 CC Roger. I understand.

00 08 39 02 LMP Okay, Houston. You should have the data now, according to our checklist.

00 08 39 08 CC Roger.

00 08 39 12 LMP We're down through step 7 on page 23.

00 08 39 17 CC Roger.

00 08 39 35 CDR Houston, can we bring up our RCS quad A and B meter and take a look at them?

00 08 39 42 CC Stand by 1.

00 08 40 34 CC 16, I guess we don't need the - the heaters. We're looking at all the data now.

00 08 40 43 CDR Okay. We didn't say "heater"; we said "meter."

00 08 40 50 CC Roger; stand by.

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00 08 40 56 CDR I guess we can take your word for it, that's for sure.

00 08 41 00 CC Roger. We're - we're looking at all the data now, I think.

00 08 41 05 CDR Okay, fine.

00 08 41 19 LMP Our - our system A RCS meter, which is not powered, is at 92 percent quantity, and B is a little over 100.

00 08 41 32 CC Roger.

00 08 41 38 CMP Okay, I'm ready to give you a TV from the outside.

00 08 41 47 CC Roger, Ken. Understand.

00 08 42 48 CC 16, based on what we're looking at, the system A pressures look okay. We don't see any problem with the tanks.

00 08 43 00 CDR Okay, but it - it sure is something strange coming out of that. I never saw anything like that on LM-4.

00 08 43 16 CDR I mean, I'm not normally a rabble-rouser; it - this just ain't - something - something funny going on here.

00 08 43 39 CMP Would you like to have the TV beamed outside?

00 08 43 55 CC Yeah, Ken, I guess so. We haven't had a picture yet here.

00 08 43 59 CMP No, I was waiting for you. You said something about some high-gain things you wanted to do, and I hadn't done any of those things yet.

00 08 44 05 CC Oh, we wanted to go to MEDIUM beamwidth on the HIGH GAIN, and we're ready for the pictures anytime.

00 08 44 13 LMP Well, if it looks okay to you, Houston, do you want us to fire this thing down now?

00 08 44 22 CC Stand by just a minute, will you? We're going to take one last long look here, but everything looks okay so far.

00 08 44 28 LMP That's great.

00 08 44 54 CC 16, on panel 16 in the LM, under the PQGS display breaker, and let's push that one in and we'll take a look at quantities.

00 08 45 07 CMP Okay, Don. And do you have a picture now? I'm not going to zoom in until - until you've got a good picture.

00 08 45 15 CDR Okay. That one's in, and the quantities went to 100 each.

00 08 45 26 CC Looks like the TV's in standby, Ken.

00 08 45 34 CMP Does that help?

00 08 45 36 CC Roger.

00 08 45 54 CC Quantities look good, 16.

00 08 45 58 CDR That's affirmative; they're both 100.

00 08 46 02 CC Okay, 16. We are ready to - to back out. You pull that breaker?

00 08 46 06 CDR - - back down. We'll pull the breaker first and back down. Thank you.

00 08 46 10 CC Roger.

00 08 46 12 CMP Okay, Don. Can you see any picture yet?

00 08 46 19 CC Negative, Ken.

00 08 47 20 CC Ken, we're still not getting a picture.

00 08 47 30 CMP Okay, I'm in TRANSMIT. Got a good monitor this time. I got FM transmitter. I got the S-BAND AUX to TV.

00 08 47 50 CC Okay, Ken. I think the TV's okay. I think the problem is here. It will take us about another minute, I guess.

00 08 48 00 CMP Okay, I'll stand by. I'm gonna have to show you the part we're looking at.

00 08 48 05 CC Roger.

00 08 48 29 CC Okay, Ken. Now we are getting a picture.

00 08 48 53 CMP Okay. Can you see the docking target, and do you have a grid? I've got a grid on my monitor that you should be able to correlate with. Do you have that available? If you don't, I'll just try to talk you in towards the frame.

00 08 49 09 CC Stand by just a minute.

* 00 08 49 37 CC All right, Ken. I guess we don't have a grid right now.

00 08 49 41 CMP Okay. Right now, the center of my picture is just about on the center of the docking target. Does that look like your picture?

00 08 49 50 CC Affirmative.

00 08 49 54 CMP Okay, I'm gonna move the camera up and there is a flat surface which is now just about on the center of my picture, and it's pointing away from me. This is the one we can see it peeling off of.

00 08 50 05 CC Roger.

00 08 50 07 CMP I'm gonna try to zoom in on it, and I'll see the best monitor picture I can get, and you may have to talk me in on some of the other.

00 08 50 15 CC Okay.

00 08 50 19 CDR Houston. Our Activation Checklist says leave the CABIN REPRESS breaker closed, but we found it OPEN. How do you want to play that one?

00 08 50 27 CC Stand by me a minute, John. Okay, John. We want that one opened on the way out.

00 08 50 37 CDR Open on the way out. Roger.

00 08 50 56 CC That's real good, Ken. Hold it right there.

00 08 51 03 CMP I can't hang on (laughter) I'm stuck here; I'll get back with you.

00 08 51 09 CC Okay. You had a real good picture there, where you were.

00 08 51 16 CMP Okay.

00 08 51 43 CC Yeah, Ken. We're seeing the stuff coming off of there now.

00 08 52 15 CC Ken, while we are looking at it, we are trying to get a hack on whether or not there are any jets firing across that surface that would correlate with those particles coming off.

00 08 52 24 CMP Yes, sir; there are. My A thruster seems to bang on it quite a bit. And we put the LM POWER back to CSM at 08:52; I'd say about 15 seconds ago.

00 08 52 36 CC Roger; copy.

00 08 53 18 CMP Don, are you guys through with this picture, or do you need something else?

00 08 53 21 CC Hang on just a minute, Ken.

00 08 53 55 CC Ken, we see an occasional particle come off, but we're not seeing a stream. Do you see any streaming like John was talking about earlier?

00 08 54 04 CMP No, sir. Well, maybe - Well, you know, we're in an entirely different Sun angle now, and it's not clear to me that we don't see different things. Maybe John can take this thing and show you where it was coming from, because I didn't see it.

00 08 54 19 CC Roger.

00 08 54 24 CDR Yeah, I'd be glad to - I'd be only too happy to point it out.

00 08 54 27 CC Roger.

00 08 56 34 CDR Okay, Houston. On our monitor, the place where the stuff was coming out is at A and 1 on the grid. Over.

00 08 56 41 CC Understand; it's A-1?

00 08 56 47 CDR Roger. It's the upper right-hand corner of that square, A-1.

00 08 56 54 CC Roger.

00 08 57 05 CMP Okay. He's going to put it right in the middle of the picture.

00 08 57 09 CC Okay. Let's try that.

00 08 57 11 CDR And, Pete, I'll tell you, that CABIN PRESSURE RELIEF valve - I mean the CABIN REPRESS valve in the LM will really give you apoplexy, boy!

00 08 57 20 CC Roger.

00 08 57 26 CDR Okay. It's right in the middle.

00 08 57 30 CC Okay, understand. It's right in the middle of the picture now. Okay. I think we're seeing some of it now.

00 08 57 41 CDR No. No, you aren't, Pete. What you're seeing is particles that are floating off, drifting particles.

00 08 57 49 CC Okay. Can you see the venting now?

00 08 57 53 CDR No, it stopped. When we maneuvered it out of the Sun, it stopped peeling off.

00 08 57 59 CC Roger.

00 08 58 05 CDR Okay, Pete. I take that back. You can see a little of it as the particles stream off. When they get out into the Sun, you can see them. And it looked like they had the same trajectory as the other ones, but it's very few right now.

00 08 58 20 CC Roger. Kind of going out the top center, slightly right center of the picture?

00 08 58 28 CDR Yes, that's about right. Yes.

x 00 08 58 30 CC Roger.

00 08 58 35 LMP Okay, I was off comm over there. How about bringing the old LMP up to speed?

00 08 58 53 CC Ken, can we roll to get this area back in the sunlight where we could have a better look at it?

00 08 59 35 CMP Okay, Pete. We're just about ready to maneuver. We are maneuvering.

00 08 59 39 CC Okay. I guess you'll want to go back the way you came and go back to that attitude where you had good sunlight on it.

00 08 59 46 CMP Okay, that's the P23 attitude.

00 08 59 49 CC Roger.

00 08 59 51 CDR Okay, and ever so often, I see a particle come out from that region at some accelerated velocity, like it's leading the spacecraft.

00 09 00 01 CC Roger.

✓ 00 09 00 08 LMP I can't see. For my edification, were all the - the ... pressures, the helium tanks looking okay on the RCS?

00 09 00 18 CC Affirmative. They were, Charlie.

00 09 01 08 CC Charlie, we - Just as a point of verification here, did you have floodlights when you went into the LM? We didn't show any - any current drain when you went in there.

00 09 01 17 LMP Yes, sir. Just like the refrigerator, it came right on, with the hatch about a quarter of the way open. And when I went to ALL, we had all the floodlights.

00 09 01 28 CC Roger.

00 09 01 34 LMP But you can see a lot better over here when you take your shades off.

00 09 01 38 CC Roger (laughter).

00 09 01 50 IMP And, Pete, every time the - one of the command module, service module, RCS plus-X jets fires towards that - that one over the hatch here, it really blows that stuff off.

00 09 02 05 CC Roger; copy.

00 09 03 24 CDR Okay, Houston. As of this moment, that area is completely free of particles. It wouldn't do you any good to show you any TV of it, because it's not doing anything.

00 09 03 33 CC Roger; copy.

00 09 04 33 CC Okay, John. I guess that's about all the data we're going to get. We're going to have to think that over for a while, so we'll go ahead and stow the TV camera and get back to the Flight Plan.

00 09 04 44 CDR Yes, sir. It's certainly an unusual thing; and, furthermore, it's very strange how this upper surface here has flaked off behind the - behind the - docking target, which I guess you - you can't see that on the TV. I couldn't see it on the monitor. Can you see it on the TV?

00 09 05 11 CC We get a pretty good look at a portion of it. Looks like a lot of, like Charlie said, shredded wheat.

00 09 05 21 CDR Yes, it looks like about a half- a half inch or an inch of grass growing out of the - of the surface there.

00 09 05 27 CC Yes, we got a pretty good look at that.

00 09 05 32 CDR Okay.

00 09 05 34 CC I don't think we know what it means yet, but we did get a good look at it.

00 09 05 38 CDR Roger.

00 09 05 53 CDR Charlie might say that looks Ba-a-ad.

00 09 05 59 IMP You're right (laughter).

00 09 06 18 LMP Did you have a TV picture of the cockpit there?

00 09 06 23 CC Affirmative; real briefly there.

00 09 06 26 LMP That's what I was afraid of (laughter).

00 09 06 43 CC Okay, 16. We'd like to get the WASTE STOWAGE VENT valve, OPEN, again now.

00 09 07 05 LMP And, Pete, the lunar module looks very clean. There was very few particles in it, and that's just about it. Over.

00 09 07 15 CC Roger; understand. And, Char - Charlie, we'd like to go into the Flight Plan here at 12:15 and delete closing the VENT - WASTE STOWAGE VENT valve, and move that to 13:15.

00 09 07 30 LMP Okay; we're moving it to 13:15.

00 09 07 34 CC Roger.

00 09 19 31 CC 16, for your information, we're not going to do midcourse correction 1, and we're looking at about 12 feet per second on midcourse correction 2.

00 09 19 42 CMP That's great.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

00 09 24 01 CMP Don, do you anticipate any significant change in the VERB 49 maneuver angles due to our slip in time?

00 09 24 13 CC Negative; none at all, Ken.

00 10 04 24 CMP Hey, Don. You still down there?

00 10 04 27 CC Affirmative. Still with you.

00 10 04 30 CMP Okay. Hey, let me give you a couple of comments here in real time so you can write them down. Yes, one of the things that had been mentioned was this business about the reflections in the sextant when you're doing P23s, and I've got a - gee it's a beautiful picture of the Earth horizon; the optics are just super, and we've got a - got a - what looks like an inverted - sort of like a mirror image - in the opposite side away from the horizon. It's really quite obvious - -

00 10 05 06 CC That's in the - -

00 10 05 07 CMP And you can just see the bright areas.

00 10 05 10 CC Roger. That's in the sextant.

00 10 05 11 CMP And it's about - yes, it's just in the sextant, and it's about - oh, I don't know how to give you a percentage of the intensity, but it is much less intense than - than the thing in the Earth. That's - that's very bright. And the star is - gee, the match between the Earth horizon as seen through the fixed line of sight and the star line of sight is just perfect. It's really nice. The only thing I can't see as well as I'd like is the crosshairs, and with the illumination turned up to full bright, they just don't stand out when the old Earth is in the field of view. When I get them down against the Earth itself, then I can see the dark line, but when I get it out in the sky beyond the Earth's horizon, I just don't see it as well as I'd like.

00 10 06 03 CC Roger. Copy.

00 10 06 06 CMP And, as you probably noticed there, we used that little adaptive short P23 erasable program, which is really swift; that thing just fires these things off, and I don't feel like in any way we're having to take short cuts on the pointing accuracy. The only time it takes now is to dress up the sub-stellar point on initial acquisition. That's what we're doing now, and it seems to take quite a while.

00 10 06 37 CC Roger.

00 10 07 16 CMP Next time we design a spacecraft, Don, we should remember not to put the optics in the kitchen.

00 10 07 23 CC Roger. Understand.

00 10 16 38 CDR That's the first MARK, isn't it? I think he cycled on it.

00 10 17 03 CDR Yes, he's been taking a little bit longer each one.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

00 10 59 26 CC 16, Houston.

00 10 59 29 CDR Go ahead, Don.

00 10 59 30 CC Roger; we are going to dilute - delete that maneuver to thermal attitude that's coming up in the Flight Plan at about 9:30 - in the Flight Plan. And, also, when you get a chance, we want you to zero NOUN 26, because there's a possibility that if you hit a NOUN 30 with what you got in NOUN 26 now, you'll get a transfer to a wrong place in the program.

00 10 59 58 CDR Understand. Zero NOUN 26.

00 11 00 02 CC Roger.

00 11 00 32 CDR Boy, you guys are reading our minds up there, or down there.

00 11 00 43 CDR What do you want to do, just go right into PTC?

00 11 00 48 CC Negative; we're going to do the P52 that's at - down around 10:40 in the Flight Plan.

00 11 00 55 CDR Understand. And then go to PTC, huh?

00 11 01 03 CC Negative; we got some UV photos at 12:20 that have to be done at 12:20.

00 11 01 22 CDR Oh, yeah.

00 11 13 41 CC 16, you can go ahead and torque them.

00 11 16 56 CC 16, we got a state vector update, if you'll go to ACCEPT.

00 11 17 06 CMP Roger; you've got POO and ACCEPT.

00 11 17 07 CC Roger. And, also if you can copy, we've got a change to the G&C Checklist, page 9-4.

00 11 17 36 CMP Okay, I'm on page 9-4, Don.

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00 11 17 39 CC Roger; under Baker, column Baker, line 4, change from 11522 to 13353, and, on line 5, change 13000 to 00041.

00 11 18 05 CMP Okay, I'm on page G/9-4, column Bravo, line 04 is 13353; that replaces 11522. Line 05, 00041 replacing 13000.

00 11 18 28 CC That's affirmative, Ken.

00 11 18 32 CMP All right, sir.

00 11 19 00 CC And, 16, you can have the computer.

00 11 19 08 CMP Okay, we are back to BLOCK.

00 11 19 13 CC Roger.

00 11 19 45 CMP Don, you folks ready for a little fuel cell purge?

00 11 19 50 CC I believe we're ready.

00 11 21 09 CMP Don, fuel - fuel cell 1 purge, O₂ purge is in progress.

00 11 21 15 CC Roger; copy.

00 11 25 19 CC 16, Houston. We're looking at an O₂ flow of less than 1 pound per hour, and we'd like to know if you have closed the waste storage vent valve.

00 11 25 32 CMP Negative.

00 11 25 34 CC Roger; understand negative.

00 11 29 22 CMP Houston, do you want us to dump the waste water down to about 10?

00 11 29 29 CC It's already 60.

00 11 29 32 CMP Okay, 10 percent it'll be.

00 11 29 34 CC Roger.

00 11 40 17 CC 16, let's terminate the charge on battery Bravo.

00 11 40 25 CDR Roger.

00 11 40 32 CMP Okay, we're showing about 29 percent on our waste water, Don. How does that look with what you all have on the ground?

00 11 40 40 CC Well, we're looking at about 30.5 percent now.

00 11 40 45 CMP Okay, so you want us to terminate ours at 10 percent; our gage reading of 10 percent will be good enough?

00 11 40 54 CC That's affirmative, 16.

00 11 40 57 CMP Okay.

00 11 43 30 CDR Okay, we've terminated the waste dump.

00 11 43 34 CC Roger.

00 11 47 47 CDR Houston, we vented the batteries and it went to 0.4, looks - maybe 0.2 now.

00 11 47 54 CC Roger.

00 11 48 28 CC Charlie, did you get a reading on that battery before you vented it?

✓ 00 11 48 37 LMP Roger. 0.9.

00 11 48 41 CC Charlie, was that 0.9?

00 11 48 46 LMP Affirmative.

00 11 48 47 CC Roger.

00 12 01 14 CC 16, could you give us a reading on LM/CM DELTA-P?

00 12 01 39 CMP Roger. LM/CM DELTA-P is 0.2, which is what it was in the altitude chamber, and that apparently is zero on our gage.

00 12 01 48 CC Roger; understand.

00 12 02 04 CMP And the pressure equalization valve is verified closed.

00 12 02 10 CC Roger.

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00 12 10 06 CC 16, Houston. On this UV photography, we want to be sure we go MODE, FREE. I think last time, we didn't get that.

00 12 10 20 CMP No, we did get it last time.

00 12 10 33 CMP Pete, on the last sequence, we did go FREE.

00 12 10 39 CC Say again.

00 12 10 44 CMP I said, on that first UV sequence we had, we did go FREE.

00 12 10 48 CC Roger.

00 12 17 12 CC 16, go OMNI Delta.

00 12 22 13 CC 16, when you finish the UV photos, we'd like you to go on and start the PTC right away if you concur with it.

00 12 22 25 CDR Be glad to.

00 12 22 29 CC Roger; and, in connection with that, we'll ask you to stow the high gain prior to going into PTC.

00 12 22 46 CDR Okay. We'll stow it.

00 12 22 49 CC Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

00 12 32 04 CMP Hey, Don, you really can get some pretty stable initial conditions.

00 12 32 09 CC Good deal.

00 12 40 45 CMP Say, Houston; Casper.

00 12 40 48 CC Go ahead, Casper.

00 12 40 51 CMP It looks - it looks to me like we've used a - a lot more RCS propellant than I would have guessed. Is it just our onboard readings or is that a fact?

00 12 41 10 CC We're seeing apparently some biases in the P - in the RCS sensors up there. Stand by - wait 1. We'll get you some readings, Ken.

00 12 41 23 CMP Okay; thank you.

00 12 44 59 CC OMNI Alfa, 16.

00 12 45 08 CDR OMNI Alfa.

00 12 47 54 CC 16, prior to entering PTC, go MANUAL and WIDE on the HIGH GAIN and minus 52 and 270.

00 12 48 10 CDR Okay.

00 12 48 51 CDR Okay; you got MANUAL and WIDE, minus 52 and 270.

00 12 48 56 CC Roger; thank you.

00 12 53 25 CC 16, Houston. We're going to have to delay going into the PTC until after we close the WASTE STOWAGE VENT valve at 13:50.

00 12 53 41 LMP Okay. We're supposed to wait 20 minutes for the rates to damp anyhow, huh?

00 12 53 49 CC Sounds right.

00 12 54 40 CC Ken, on the RCS quantities, I've got some numbers for you here.

00 12 54 52 CMP Go ahead.

00 12 54 54 CC Roger. The - quad A is reading 1.5 low; all the rest of them are - are reading high. Quad Bravo is 0.6, Charlie is 5.7, and Delta is 5.6. And our DELTA on the Flight Plan is a plus 5 total right now.

00 12 55 42 CMP Okay, is that - is that pounds, or percent, or degrees, or what? Over.

00 12 55 49 CC The - the total of 5 pounds is pounds.

00 12 55 55 CMP Okay. Thank you.

00 12 55 56 CC Roger.

00 12 56 52 CC 16, Houston. We're starting to see a high temperature in the subsatellite battery in the SIM bay, so what we'd like to do is go ahead and close the WASTE STOWAGE VENT valve now and get into PTC as soon as we can.

00 12 57 11 CMP Roger. WASTE STOWAGE VENT going CLOSED now.

00 12 57 29 CMP Houston, how do the rates look to you for going into PCC [sic] now?

00 12 57 34 CC Stand by 1, and we'll take a look.

00 12 57 47 CC The rates look good and you can go ahead into PTC.

00 12 57 51 CMP Roger.

00 13 02 11 CC 16, we're going to let you get in - well into the PTC here. And monitor - the primary loop rad out temps and let it stabilize, and then it may be necessary to go down to panel 382 and adjust it again to try to keep that temperature at about 45 degrees Fahrenheit.

00 13 02 30 CMP Okay.

00 13 02 33 CC And, Ken, if we have to do that, we'd suggest you mark a place down there so that, during the subsequent PTCs, you can just set the thing to that mark.

00 13 04 30 CC 16, go OMNI Bravo and we'll take over switching it for you.

00 13 04 40 CDR You've got OMNI Bravo.

00 13 04 43 CC Roger; thank you.

00 13 10 51 LMP Hey, Don.

00 13 10 53 CC Go.

00 13 10 58 CC Go ahead, Duke.

00 13 11 03 LMP You would really love this sight. We're - as we rotate around now, we've got the Earth out the window number 1, and it's about - oh, almost - not quite down to half. And you can see India and the continent, and it's covered with clouds, and no photograph can ever describe the way it looks. It's really super.

00 13 11 27 CC It really sounds fantastic. Wish I were there.

00 13 11 31 LMP Yes, sir. You would love it.

00 13 11 36 CDR You can see all of Australia, too. It's really something else.

00 13 11 41 CC About what size does the Earth look from where you are?

00 13 11 55 CDR Looks like it's about - it's approximately 4000 miles in radius.

00 13 12 00 CC Hey, that's a pretty good estimate.

00 13 12 04 LMP No, it's - it didn't quite fill the window. Well, I'm not - I'm about - I'm about 3 - my eyes are about 3 feet from the window, and it didn't quite fill it.

00 13 12 15 CC Roger.

00 13 12 25 LMP You know, a sight like that goes a long ways to make tomato soup taste good.

00 13 12 30 CC Yeah, that's what I've heard.

00 13 13 00 CMP I hate - Don, I hate to belabor the point, but I would appreciate it if the guys that are working

on the RCS budgeting and all could take a look and - and see if they could determine if there was any place where we were going over more than what they might have expected for that phase.

- 00 13 13 22 CC Okay; we'll have them take a look.
- 00 13 13 44 CC Okay, Ken; for your info, they said you were slightly ahead following LM extraction and apparently we used a little excess during the P23s.
- 00 13 13 56 CMP Okay; that - that stands to reason; that not being able to see the reticle on there is a real nuisance. You can do it, and it's - I guess there is also a certain amount of getting used to the knack of flying that thing around. It's - for some reason, it seems a little bit different to find the attitude than it was in the simulator; but the biggest nuisance was the inability to see the reticle, but if that's where we used our extra, that's fine.
- 00 13 14 26 CC Okay.
- 00 13 22 50 CC And, 16, I've got P37 block data for about four different times for you when you're ready to copy.
- 00 13 23 12 CDR Okay; we'll get it in a few minutes.
- 00 13 23 14 CC Right.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

00 13 59 21 CC 16, Houston. We're standing by on this P37 block data pad anytime you're ready.

00 14 02 34 CMP Hello, Don. You still there?

00 14 02 41 CC Hello, 16; Houston.

00 14 02 47 CMP Ah, it's a new face.

00 14 02 48 CC Roger. We just changed over down here. How're things going?

00 14 02 52 CMP Ah, this is really a ball, Henry. Hey - as much as I hate to say it, this PTC doesn't look so red hot to us. Can you give us any clues whether it's gonna hack it or not?

00 14 03 11 CC Okay. Stand by.

00 14 03 36 CC 16, Houston. We don't see anything down here that's causing it divert - to diverge, but it does look marginal. We're gonna keep an eye on it.

00 14 03 50 CMP Okay.

00 14 08 34 CMP Houston, Apollo 16. Over.

00 14 08 35 CC Apollo 16, Houston. Go ahead.

00 14 08 55 CC Apollo 16, Houston. Go ahead.

00 14 09 16 CMP Houston, Apollo 16; over.

00 14 09 18 CC Apollo 16, Houston; go ahead.

00 14 09 21 CMP Roger. We just cycled the H₂ fans as per presleep checklist. And FAN number 3 was still in AUTO. Do you want to leave it in AUTO tonight? Over.

00 14 09 36 CC That is affirmative. Leave it in AUTO.

00 14 09 41 CMP Okay.

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00 14 10 24 CC Apollo 16, Houston. The block data - P37 block data for the updates book whenever you're ready.

00 14 10 34 CMP Oh, yeah; wait 1.

00 14 12 23 CMP Okay, Hank; go ahead.

00 14 12 30 CC Okay, that's four - four blocks. I'll just read them in succession: 025:00, 4907, minus 165, 070:45; 035:00, 7454, minus 165, 070:13; 045:00, 5857, minus 165, 094:31; 055:00, 4879, minus 165, 118:41 and these all assume no midcourse 2.

00 14 14 07 CMP Roger. 025:00, 4907, minus 165, 070:45, 035:00, 7454, minus 165, 070:13; 045:00, 5857, minus 165, 094:31, 055:00, 4879, minus 165, 118:45.

00 14 14 44 CC Roger. That last number was 11841.

00 14 14 55 CMP Okay; 11841.

00 14 15 50 CC Apollo 16, Houston. We want to still keep working on this SPS gaging problem. We'd like to get a readout if we could on your SPS fuel and oxidizer pressures.

00 14 16 06 CDR Okay, stand by.

00 14 16 46 CDR Okay, that fuel pressure is reading right now 168. Oxidizer pressure is in the green, and it's reading - 186 or 87.

00 14 17 07 CC Roger. Understand, 168 and 186.

00 14 17 14 CDR That's affirm, isn't it? And we were told this morning before launch that that was nominal.

00 14 17 22 CC Roger.

00 14 17 24 CDR Because - because of a bias in the gage. So we're probably gonna need some kind of a - another DELTA-P figure to go on our LOI card - I mean our midcourse card.

00 14 17 40 CC That's affirmative, and it's in work.

00 14 17 43 CDR Yes, sir.

00 14 17 48 CMP And I think I show we have just at 15 percent waste water, but we are gonna go ahead and chlorinate unless you think the EECOM's don't want that.

00 14 18 04 CC Stand by, Ken.

00 14 18 33 CC 16, Houston. We're - we're not sure we understand your question here. If you're asking if it's okay to chlorinate the potable, that's - that's good.

00 14 18 42 CMP Okay. Just wanted to make sure if you ever need a waterboiler, people don't like to put the chlorine in there, so I just thought I'd check with you before I did it.

00 14 18 55 CC Okay, I copy now. They say still press ahead, Ken.

00 14 30 21 LMP Okay, Houston. We'll run the cabin pressure up to 57 as per this presleep checklist.

00 14 30 29 CC Roger. Copy.

00 14 30 44 CC 16, Houston. When you changed the lithium hydroxide canister, we noted a small drop in the suit compressor DELTA-P down here. Did you change any of the configuration in the suit loop at the time you did that?

00 14 31 07 CMP Well, Henry, sometime back there during the day, I opened up the flow line to my hoses that had been turned off and laid them around to try and get some better ventilation in here. But I don't remember whether that was about the same time or not.

00 14 31 26 CC Okay. We're not concerned; we're just trying to answer the question. That's probably what it was.

00 14 38 50 CMP Thank you, folks. Ready for a VERB 74?

00 14 38 54 CC Stand by.

00 14 38 59 CC Okay. We're ready, Ken.

00 14 39 08 CMP Zap.

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00 14 42 46 CC Apollo 16, Houston. We're showing your cabin pressure up around 59. Recheck your O₂ flow.

00 14 42 55 LMP Roger. It's off.

00 14 48 08 LMP Houston, 16. Over.

00 14 48 11 CC Go ahead.

00 14 48 12 LMP Roger. We gonna turn the voice off - per the pre-sleep checklist. Okay?

00 14 48 20 CC Will you stand by just a minute, 16?

00 14 48 30 CC 16, Houston. Do you have your O₂ heaters configured?

00 14 48 38 LMP That's affirm; 1 and 2 is [sic] OFF, 3 is in AUTO, and the - H₂ HEATERS are both in AUTO.

00 14 48 50 CC Roger.

00 14 49 31 CC Apollo 16, Houston. This is for Ken. Do you have anything to report on your film status?

00 14 49 41 CMP That's in work, Henry.

00 14 49 43 CC Okay.

00 14 50 24 CMP Gee, Henry, I'm 16-millimeter magazine Alfa Alfa. We have approximately 20 percent remaining.

00 14 50 36 CC Copy.

00 14 50 56 CMP On magazine November November, that's a 70 millimeter, we're up to frame 33.

00 14 51 09 CC Okay.

00 14 51 20 CMP And on Oscar Oscar, it's frame 18.

00 14 51 29 CC Roger, 18.

00 14 51 54 CMP And, Henry, we are going without ... what do you think about PTC?

00 14 52 03 CC Roger. The - your first part of your transmission was blocked out. We had a antenna switch. However, on the PTC, guess he thinks it will go throughout the sleep period, and then we'll reinitialize after you wake up. But he doesn't think it'll go a full 16 hours, but it's good for the sleep period.

00 14 52 25 CMP Okay. The first thing you said was we'll go without the tone booster. We'll go with normal comm delay.

00 14 52 36 CC Okay.

00 14 52 38 CMP That's for caution and warning part.

00 14 53 03 CC And, Ken, did you use anything out of mag Juliett Juliett?

00 14 53 07 CMP That's negative.

00 14 53 10 CC Roger.

00 14 54 02 CMP Okay, Henry. Are there any onboard read-outs that you folks would like to have?

00 14 54 10 CC Negative, Ken, I think we're all in good shape here. Everything looks good at this point. You got anything else for us?

00 14 54 20 CMP No, I'm just looking ahead, and I've got 5-1/2 minutes to go to sleep.

00 14 54 29 CC Roger. Why don't you take that? Y'all did a real good day's work. Only two things left to do are those two comm switches, the SQUELCH and the NORMAL MODE VOICE. Get a good night's sleep, and we'll see you tomorrow.

00 14 54 44 CMP Yes, sir. This is - this doesn't come under work category.

END OF TAPE

APOLLO 16 AIF-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

00 23 04 37 CC Apollo 16, Houston.

00 23 04 51 CC Apollo 16, Houston.

00 23 04 56 LMP Go ahead there, Houston. How you doing?

00 23 04 57 CC Hey, you sound good. Good morning up there. How are you doing?

00 23 05 04 LMP Great.

00 23 05 06 CC Good. All your systems look - -

00 23 05 09 LMP ... report to work.

00 23 05 10 CC Good show. Everything looks fine up there from down here.

00 23 05 17 LMP Oh, yes. Sure beats work.

00 23 05 18 CC (Chuckle) How your comrades doing?

00 23 05 31 LMP Oh, they're just starting to stir.

00 23 05 53 CC I'd hum something for you to wake you up, but I got a tin ear.

00 23 06 05 LMP We'll make it, Tony.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

00 23 25 26 LMP Houston, 16. Over.

00 23 25 30 CC Go ahead, Charlie.

00 23 25 34 LMP Okay. I'd like to give you our postsleep report here for today. The commander ate his sandwich and his orange juice that was in his suit, and all of his meal for day 1, and his PRD is 22028, and he had 7 hours sleep. Best ever in space flight. No medication. Three voids: 34, 20, 18. Fluid intake: total, 21 ounces. Over.

00 23 26 20 CC Okay. We got that, Charlie.

00 23 26 24 LMP Okay. For Ken, he had from meal C everything but the pecans, and he ate his sandwich and his orange juice. His PRD is 15030. Six hours in an 8-hour period; he was awake every - once every hour. Okay. Excuse me.

00 23 26 52 CC Okay.

00 23 27 02 LMP Okay, Tony. Had one more than 41 and he let some of them off, and 13 ounces total intake. Okay - -

00 23 27 26 CC Okay, Charlie - - Charlie, could you say the voids again?

00 23 27 27 LMP - - PRD coming - -

00 23 27 28 CC Could you say the voids again on - Ken?

00 23 27 36 LMP One was timed 41 - 41 seconds; the other one was lost due to a malfunctioning bag. And we got on me now - for my meals, I had the sandwich and the orange juice that was in the suit. For meal C, I had half the spaghetti, all the ambrosia, and the cocoa. My PRD is 21040. I got about 5 hours sleep; got two voids of 20 and 25 with about a 20-ounce fluid intake. Over.

00 23 28 19 CC Okay. I got it all. Sounds like you all slept pretty good.

00 23 28 28 LMP Well, it was off and on for me. I must have been ...

00 23 28 42 CC I tell you, I'd be so excited, I wouldn't sleep at all.

00 23 32 36 LMP Houston, we're charging battery A. And on that food, Tony, add my apricot cubes. I just ate them.

00 23 33 04 CC Okay, Charlie.

00 23 41 03 CC Charlie, Houston.

00 23 41 08 LMP Go ahead.

00 23 41 10 CC Okay. On that fluid consumption there, the numbers you gave were in ounces. Could you verify that's ounces and not bags?

00 23 41 25 LMP Say that again, Tony.

00 23 41 28 CC In the fluid you've consumed - the drinks, you gave the numbers in ounces, and I guess the blank here is listed in number of bags and partial bags, and they just want to verify the fact that the number you gave was in ounces and also to check and see what unit you want to use for the rest of the mission so that so everybody will have it straight.

00 23 41 50 LMP Okay, we'll use - we'd like to use ounces, and that's what we'll go with.

00 23 41 56 CC Okay.

00 23 41 57 LMP That's what I read.

00 23 41 58 CC Okay. I understand. Thank you.

00 23 42 07 LMP Tony, the - the menu side of it, the things that are in the menu are in, of course, bags.

00 23 42 16 CC Okay, we understand.

00 23 42 54 CDR Okay. We can see the Earth out there, and it's getting a good deal smaller. It's about the same size as the Moon almost, out the other window. And Africa is clear this morning - at least the part that we can see, which is what's usually clear, right around from the Canaries on.

00 23 44 24 CC Very good. We've got you about a little over - well, you just passed 100,000 miles on our chart here.

00 23 44 32 CDR I would guess we're about 100,000 miles out. Yes.

00 23 44 40 CC Well, sounds like a milestone.

00 23 44 56 CC (Laughter) They say you're only 14 miles off, John. You're going to have to recalibrate your eyeball.

00 23 45 17 CDR Okay. From our point of view, you only got a little more than half an Earth.

00 23 45 23 CC Oh, that's right. We forgot; you're kind of handicapped.

00 23 45 28 CDR Right.

01 00 01 07 CC Ken, Houston.

01 00 01 15 CMP Go ahead.

01 00 01 18 CC Okay. I've got a systems status report whenever you're comfortable and would like to hear it. There's nothing to write down on that.

01 00 01 26 CMP Okay, can we stand by awhile?

01 00 01 28 CC Sure, no hurry at all. Okay, just give me a call when you're ready.

01 00 01 40 CMP All righty. Thank you.

01 00 15 09 CMP Hey, Tony.

01 00 15 11 CC Yes. Go ahead, Ken.

- 01 00 15 18 CMP Okay. I'm about to finish up on my coffee here. If it's something I don't need to write down, I'll just listen to what you have to say as you - as you read it off.
- 01 00 15 27 CC Okay. That sounds good. On the systems status, the RCS - everything looks fine. You're 27 pounds ahead on your usage. Must have a pretty light hand on the throttle there.
- 01 00 15 58 CC Okay, and on the ECS, the failure mode's probably in the control electronics. The valve was driving at max rate - that's 12 seconds, full open to full close, and they saw that on TM by the flow rate. I don't recommend making any extensive changes since that doesn't seem to be the problem, and thermal runs are being made here at this time to determine the settings for lunar orbit. They don't anticipate any problems with it.
- 01 00 16 31 CMP Okay. I - I kept watching it since we've set it. We haven't touched that thing now for a long time, and maybe I just haven't caught any of the extremes, but it looks like it's been holding nicely between about 45 and 50.
- 01 00 16 46 CC Right. We concur. We - we don't think you're gonna have to touch it until you go to the dark side. Okay, and on the SPS - normally during SPS cooldown during translunar coast, the helium in the SPS oxidizer tanks is absorbed by the oxidizer, causing a decrease in oxidizer tank pressure. Your transducer hasn't indicated this, and there - there may be a problem with that transducer. We've got a procedure change that I'll give to you later in your Flight Plan update, prior to the midcourse 2, that will allow them to check that transducer.
- 01 00 17 45 CMP Okay, Tony. And is there any change in the mid-course 2 time, or is it going to be like the Flight Plan?
- 01 00 17 52 CC Right now, it looks as per Flight Plan. Okay. And on your DSE tape, Hank had a chance to take a look at it. Sounded - said it sounds fine. Dick will be in a little later and listen also, so everything looks GO for - for the operations in

lunar orbit. And everything else looks great.
It's kind of nice not to have much of a day here.
Sure isn't like the sims.

01 00 18 36 CMP Yeah, I hope we can quote the last sim (laughter).

01 00 18 39 CC Right. I got a little - -

01 00 18 42 LMP - - You said it all.

01 00 18 46 CC That's right. I went through the news. I don't know whether you guys, over your coffee, would like to read the newspaper, but I've got all the news that's fit to print, and I really don't have much to say. A great piece here is in the world of art. One of Vincent Van Gogh's best was stolen from the San - San Diego Art Gallery as part of a display that was named "Out of Sight." [?] And I've got an input from Dottie here for Charlie.

01 00 19 23 LMP I'm all ears.

01 00 19 25 CC Okay. She says your - your five bird eggs have hatched, and so you've got five new, healthy neighbors.

01 00 19 38 LMP Oh, great; thank you (laughter).

01 00 19 39 CC You're welcome.

01 00 19 53 CC Okay. And on the Flight Plan update, we have five items, and there's no hurry to get them up there. Whenever you're ready to take them and - and write the stuff down, I'll send them on up.

01 00 20 10 CMP Okay. Why don't you give us another 10 minutes or so?

01 00 20 11 CC Okay, that'll be fine.

01 00 20 29 CMP Tony, you'd enjoy seeing this place. After all the things you had to go through to keep the cockpit nice and clean out there, you'd never recognize it.

01 00 20 46 CC Well, it probably looks like any - any bachelor's pad.

01 00 26 50 LMP Okay, Houston. You speak with the Flight Plan update.

01 00 26 55 CC Okay. Stand by a second, Charlie.

01 00 28 33 CC Charlie, Houston.

01 00 28 37 LMP Go ahead.

01 00 28 39 CC Okay. On the Flight Plan update, if you can dig out your CSM Updates, we'll make a change to a couple of procedures in there.

01 00 29 04 LMP Did you want the Flight Plan or the Update Book?

01 00 29 07 CC Okay. This will be in the Update Book, this first one.

01 00 29 33 LMP Okay, go ahead.

01 00 29 34 CC Okay. Go to the section on "Flight Plan Updates." It has the EMP programs.

01 00 29 45 LMP Okay.

01 00 29 47 CC Okay, we'd like you to add a last step to each of the four EMP probe procedures. That would make a fourth step on the "Shortened P23" and a seventh step on "Manual range input," et cetera.

01 00 30 04 LMP Okay. Stand by, Tony. They must had a hand over. You were cut out. Start over again, please.

01 00 30 10 CC Okay, understand. All right. In the "Flight Plan Update" section, on the four EMP programs, we'd like you to add a fourth - correction, a final termination procedure to each of the four programs. So on the "Shortened P23," we'd have a step 4, which reads "VERB 25 NOUN 26 ENTER," and then the "Four registers, ENTER all balls" - correction, "Three registers, ENTER all balls."

01 00 30 53 LMP Okay, copy. Four step for P23 is "VERB 25 NOUN 26, ENTER all balls in all registers."

01 00 31 01 CC Okay. And on the next program, the "Manual range input," step 7 would be the same thing.

01 00 31 30 LMP Copy. "Manual range input," step 7 to "VERB 25
NOUN 26, ENTER all balls."

01 00 31 36 CC Okay. And on the "Optics angle to body angles,"
we'll add a step 7, and it would be the same as
before.

01 00 32 07 LMP Okay. Copy all balls.

01 00 32 11 CC Okay. And on the "Jet monitor" program, it'll be
a step 6, the same thing.

01 00 32 34 LMP Okay. Go ahead.

01 00 32 36 CC Okay. The purpose for these were - was to protect
the E-memory from other programs.

01 00 32 44 LMP Okay - -

01 00 32 46 CC - - Okay. The next change is to your "SPS burn
rules." So if you can get that card.

01 00 33 02 LMP Go ahead.

01 00 33 04 CC Okay. On the fuel to oxidizer pressure, it should
read - or it does read "Greater than 115." Will
you change it to read "124 for oxidizer, 110 for
fuel."

01 00 33 34 LMP Okay. "Pressure greater than 115" is changed to
"124, oxidizer; 110, fuel."

01 00 33 39 CC That's correct. And in the "Fuel to oxidizer
DELTA-P," it reads "Less than 20 psi." We'd
like to change that to "35 psi oxidizer greater
than fuel, or 5 psi oxidizer less than fuel."

01 00 34 09 LMP Okay; copy "35 oxidizer greater than fuel; 5 oxi-
dizer less than fuel."

01 00 34 14 CC Okay. And the final part of that is in the "Tight
constraints" there in the box. It says "Greater
than 160, and greater than 80." We'd like to change
that to "Greater than 168 oxidizer, and greater
than 153 fuel."

01 00 34 44 LMP Okay. "Greater than 168 oxidizer; 153, fuel."

01 00 34 52 CC And I guess on that "Tight constraints" also, it's the - the chamber pressure says "Greater than 80" for the "Tight constraints."

01 00 35 07 LMP Okay.

01 00 35 08 CC Okay. And that's the end of that procedure. A note here that this assumes a - a good oxidizer transducer, and there may be a - a problem that it's hung up. And we'll have a - a little later change in the midcourse 2 burn procedure. And from this, we'll be able to tell what - what - where the problem is. I'll get that up to you as soon as they've sorted it out here. Okay, and there are two notes here. For Ken, a reminder to watch the UV film consumption magazine Oscar Oscar. He's right on the budget now, and there's no pad.

01 00 35 54 CMP Roger. And there's no way to cut a film out.

01 00 35 57 CC I understand.

01 00 36 00 CMP Now, we're - we're aware of it's being tight, Tony. If you see us slip behind - I - I guess I don't know what to do about it. You'll have to come up with a recommendation of what - what other photo to delete.

01 00 36 11 CC Okay. Well, we just thought we'd let you know that you had a two-frame pad, and we've already used it.

01 00 36 18 CMP You mean we've taken two frames we weren't supposed to?

01 00 36 21 CC I don't understand the note here. That was the note I got. Maybe it was used up before - before they loaded it or something. I'll find out.

01 00 36 32 CMP As far as I know, Tony - Yeah, yeah, I just want to make sure that there's no misunderstanding on our part about what it is we're supposed to do, because we took only those frames that were selected, because we are aware of the tight budget.

01 00 36 46 CC Okay; understand.

01 00 36 48 CMP And we might be off a little bit on the numbers we gave you, because, you know, that counter's kind of gross, and it's easy to get off by a - by a number or so, particularly when you start at the low end.

01 00 36 58 CC All right; understand. I'm just off that more than a number. Okay, and a last note. We'd like you to take a look when you get a chance at that - the LM thermal surface, and see if you notice any changes or can give us any more words on it. We really don't anticipate a problem there. It turns out in looking back, there was a history of one batch of bad paint, and they sort of think it's just the paint blistering up. And it doesn't seem to be on a - -

01 00 37 28 LMP All right - -

01 00 37 29 CC - - on the surface that'll give us a real bad problem.

01 00 37 37 LMP Okay. We're ready to bring up the high gain if you've got some angles for us.

01 00 37 41 CC Okay. I'll get them.

01 00 37 52 CC Okay. We'd like you to stand by for 10 minutes on that high gain.

01 00 38 00 LMP All right.

01 00 45 14 CC Charlie, Houston.

01 00 45 19 LMP Go ahead.

01 00 45 21 CC Okay, on the HIGH GAIN, we'd like you to select PITCH, minus 40; YAW, plus 90; and the BEAM width in NARROW. And we'll give you a cue to switch over to the HIGH GAIN.

01 00 45 52 LMP Okay. You've got them selected. You going to cue us, you say?

01 00 45 55 CC That's affirmative. We'll give you a cue.

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01 00 45 59 LMP Okay.

01 00 46 42 CC Charlie, Houston.

01 00 46 49 LMP Go ahead.

01 00 46 50 CC Okay. We'd like you to go REACQUISITION now, and we'll command.

01 00 46 58 LMP Say again?

01 00 46 59 CC We'd like you to go REACQUISITION now.

01 00 47 04 LMP Okay. You've got REACQ and HIGH GAIN.

01 00 47 07 CC Okay.

01 00 47 25 CDR Okay, Houston. To discuss that thermal layer of grass that we got growing on the - growing just outside the docking target, it's thinned out a pretty good bit since last night. I think it's gone somewhere, but there're a lot of these little square - rectangular strips about - up to 2 inches long; I see one that must be 3 inches long, and they're just sort of - look like they're glued - somebody glued a bunch of strips of grass onto that thermal shield, but most of them have gone. Where it was 100 percent coverage before, it looks like it's about 50 percent coverage now.

01 00 48 24 CC Okay. We copy that.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 00 48 24 CC Okay, we copy that.

01 00 49 33 CMP Hey, Tony, are you folks ready for us to press on with a little film cycle?

01 00 49 43 CC Stand by a second, Ken.

01 00 49 47 CMP Okay.

01 00 50 31 CC Okay, Ken; Houston.

01 00 50 35 CMP ...

01 00 50 37 CC Okay, we'd like you to go ahead on the film cycling down to the MSFN cue and then call us back.

01 00 50 47 CMP Wilco.

01 00 52 20 CMP Okay, Houston. How about a cue?

01 00 52 39 CC Okay. Stand by a second.

01 00 53 20 CC Okay, Ken. Go on, then, with your procedure.

01 00 53 25 CMP Okay, I'll read these out as I go through them.

01 00 53 28 CC All right.

01 00 53 29 CMP And the only thing that looked a little different is when I got down to the step where it said "PAN CAMERA MODE to STANDBY," it already was. I guess that's just an oversight.

01 00 53 40 CC Okay. Okay, that's no problem.

01 00 54 04 CMP John, what's the thumbwheel setting?

01 00 54 15 CMP Okay, Tony. Can you read me now? I'm on VOX.

01 00 54 18 CC Yes, you sound fine.

01 00 54 21 CMP All righty. MAPPING CAMERA is coming ON. Stand by.

01 00 54 29 CMP MARK.

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01 00 54 42 CMP Would you like to have the PAN CAMERA SELF TEST simultaneously, or would you like to do it sequentially?

01 00 54 46 CC Okay; we'd like it simultaneously.

01 00 54 52 CMP Okay; PAN CAMERA to SELF TEST, getting SELF TEST.

01 00 54 55 CMP MARK. Barber pole now.

01 00 55 47 CMP Okay, I've got the gray flag on the PAN CAMERA MODE talkback, and that took about 45 seconds, as opposed to a minute.

01 00 55 57 CC Okay, we copy that.

01 00 56 00 CMP Okay. So I'm going to go ahead and take the PAN CAMERA POWER to OFF.

01 00 56 07 CC Okay.

01 00 56 26 CMP Okay, I'm getting ready to take the MAPPING CAMERA to OFF, center.

01 00 56 30 CC Okay, I've got 2 minutes here.

01 00 56 34 CMP You got a good watch.

01 00 56 36 CC Right. A Mickey special.

01 00 57 01 CMP Okay, there's our 30 seconds.

01 00 57 04 CC Okay.

01 00 57 08 CMP Take the SM/AC POWER OFF. Man, that's what you call good timing.

01 00 57 21 LMP Okay, Tony. We're going to OMNI Bravo, and selecting is returned to HIGH GAIN.

01 00 57 24 CC Oh -

01 00 57 25 LMP S-BAND AUX TV to OFF.

01 00 57 30 CC Okay; sounds good, Charlie.

01 00 57 32 CMP Yes, please, John; back to PTT INTERCOM. Thank you.

01 00 57 50 LMP Okay, Tony, we got a DELTA - LM/CM DELTA-P
of 0.8 - -

01 00 57 54 CC Okay - -

01 00 57 55 LMP - - and John's on the biomed now.

01 00 57 59 CC Okay; we copy that.

01 01 06 37 CC Hey, John, you're giving us some great TV there.

01 01 06 52 CDR What did he say? What did you say, Tony?

01 01 06 54 CC I said we're getting some great TV down here.
Looks good.

01 01 07 00 CDR Was that one of your tapes?

01 01 07 05 CC Ah so, that's a tape. Sorry about that.

01 01 18 07 CMP Houston, 16.

01 01 18 11 CC Go ahead.

01 01 18 14 CMP Okay, Tony. We're on the electrophoresis now, and
we're now - just about to - to hook up the power
cable and turn the power on, and it says at that
point "Hold for instructions from Houston."

01 01 18 29 CC Okay (laughter), instructions I have there are to
press on through that hold and go on down to just
before starting the camera and then hold again and
give us a call.

01 01 18 41 CMP Okay.

01 01 20 25 CC Apollo 16, Houston.

01 01 20 29 CMP Go ahead. Over.

01 01 20 31 CC Okay. At your convenience, when you get a chance,
we'd like you to read out all quads of the RCS
propellant quantity for correlation with the TM.

01 01 20 48 CMP Okay. A is 90; B is 96; C is 96; D is over 100,
about 101 or 2.

01 01 21 05 CC Okay, we copy that.

01 01 23 54 LMP Houston.

01 01 23 56 CC Go ahead, Charlie.

01 01 23 57 LMP Houston, we're - we're down to the step - before Ken turns on the electrophoresis fire. Where do you want us to hold that? Over.

01 01 24 12 CC Okay, we'd like you to hold just prior to starting the camera.

01 01 24 20 LMP Okay, just prior to starting the camera.

01 01 24 22 CC Roger. On the next page.

01 01 24 25 CMP Okay; how about telling us where we're going here, because - -

01 01 24 28 CC Okay - -

01 01 24 29 CMP - - I've got to turn this thing on, and I'd like to have it in my mind what it is we're going to do.

01 01 24 34 CC Roger. It's no big deal. The note here was, at that point, you're supposed to observe the current meters, and if there's no indication of a current flow in any tube, you tap the box gently along the - the axis, or parallel with the face, and then you allow the whole de - the whole unit to lie motionless for additional 3 to 5 minutes before proceeding. They're afraid there may be a bubble in one of the tubes, and you don't get a current.

01 01 25 06 CMP Okay. Well, actually, there's a bubble in each tube.

01 01 25 10 CC Say that again.

01 01 25 12 CMP Actually, there's a bubble in each tube. And it's - each tube has a bubble. They are in exactly the same place. They're lined up in a row, and they are directly over meter number 3. And the bubbles are about - oh, one-eighth of an inch in diameter.

01 01 25 41 CC Okay, the PI says that's okay, and we should go ahead and proceed.

01 01 25 47 CMP Okay. Now, the question that you had for me was that if - if any of the meters do not go into the green, we turn the power on. Did you want me to tap the box, and then do what?

01 01 26 02 CC Okay. The instructions were to tap the box gently, allow the unit to remain motionless for an additional 3 to 5 minutes, and then proceed.

01 01 26 13 CMP Okay; and this time, if we don't get the meters into the green, we proceed anyhow; is that correct?

01 01 26 18 CC According to the instructions, that's correct.

01 01 26 22 CMP All righty.

01 01 27 44 CMP Okay, Tony. It turns out that meter number 1 is just barely into the red; meter number 2 didn't come up quite into the red; meter number 3 is about a needle width below the red.

01 01 28 06 CC Okay. We'd like you to go on with the experiment.

01 01 28 14 CMP Okay, I've jiggled it a little bit and I'm gonna let it settle here for a second, and then we'll start. We'll give you a mark when we start.

01 01 28 23 CC Roger, we concur.

01 01 30 16 CMP Okay, Houston; we have started the experiment. And as soon as we got it rotating - got it running, and I turned according to the decal on the box, which is counterclockwise, half rotation; and, soon as I did, the orange film disappeared and - I see white particles coming through - coming through as a stream. It looks much like a - a - it looks like latex.

01 01 31 01 CC Okay. We copy that. Any difference in rates between the different tubes?

01 01 31 06 CMP Yeah. The first thing that happened, as soon as I opened it, I got a big blob of this stuff inside of the - it looks like the inside of the window

here between where it shows - the decal on the outside says "sample 1 and 2." It's got a big - couple of big blobs in there. ... the number 1 sample is approaching it. The number 3 sample is about halfway between ring 2 and 3. Also have current meter number 1 is in the green, current meter number 2 is in the green, and number 3 is still about a needle width below the red line and didn't move at all. The bubbles are moving at about the same rate as the white material, and the first bubble in tube number 2 has just reached the yellow band, and as I understand this, I'm going to have to wait until the white material reaches that yellow band.

- 01 01 32 28 CC That's affirmative. The white material in the fastest tube.
- 01 01 32 33 CMP Okay.
- 01 01 32 36 CC And we had some bad comm right there in the middle when you were describing the rates and the difference in the three tubes of the white material. If you could say a little bit of that again, it might help.
- 01 01 32 47 CMP Okay. It's moving much more rapidly than I had anticipated it would, Tony. Right now, the number 2 sample is leading by about a nose. It's just crossed the one - two - three - four - fifth ring inscribed on that center tube. The number 3 sample has just crossed the fourth one; the number 1 sample has just crossed the fifth one now; and number 2 is about halfway between five and six. Number 3 sample is maintaining a very cohesive shape and looks like a little cylinder with a pointed nose on it, and it's maintaining its white consistency. And it's going in - I - guess that the length of the - group of particles in there that's maintaining a solid appearance is about the width of one of these lines. Then, it tails out to a very diffuse gaseous - just a swirl material behind it that goes all the way back to the Lexan. The faster samples are diffusing much more rapidly, and they have a little nose on them, which is very thin and leads ahead of the larger mass of material. And they form sort of a cone shape. And they are about

two and a half to three ring lengths in length, and -- I'm talking about the distance between - sets of rings. And they both appear to be diffusing about the same amount. The number 2 sample is really starting to break up now and starting to twist the - looks like it's taking on a corkscrew appearance as it approaches the yellow line. And it's approaching the yellow line, and now number 1 is approaching one ..., so I'm gonna hit the REVERSAL SWITCH.

01 01 34 38 CC Okay. You say there is no difference in diffusion between 1 and 2?

01 01 34 48 CMP Well, there wasn't when we started, now - well, now that we've hit the REVERSAL SWITCH (laughter), I guess all bets are off. The - (laughter) they've just really broken up in number 2 and in - number 1 is holding together a little better. They really looked very, very similar; except that just as it crossed the last ring before the yellow ring, number 2 started to get an elongate nose on the point, and it was starting to twist - I say it was looking like a corkscrew. And then about the same time, when - just about the time I hit the REVERSAL SWITCH, the sample in number 1 did the same thing. The sample in number 3 is doing entirely a different operation. It retained sort of a bullet shape all the way down as far as it went, and now - that we've reversed it, the pointed end, which was on the right side, the direction of motion, has now become a flat blunt end, and it's picking up - kind of an arrow-shaped head on the left side as it goes back towards the container. But it's still retaining its cohesiveness. The sample number 2 just really got all diffused and spread around. And number 1 is holding together a little bit better. It's starting to take shape that looks very much like number 3; in fact, the trailing edge - that's the one on the right side now, or sample number 1 - has just about caught up and looks very much like sample number 3, except that you can tell that some of the material in sample 1 has been diffused.

01 01 36 31 CC Outstanding.

01 01 36 32 CMP And we're about to approach the original end. Do you want me to reverse it again, or what do you suggest at this point?

01 01 36 48 CC Yeah, Ken. We'd like you to reverse it again.

01 01 36 51 CMP Okay, and I'll do that when the first large portion of the sample reaches the Lexan manifold; is that okay? That's - some of the diffused material will already coincide.

01 01 37 05 CC Okay, that sounds good.

01 01 37 33 CMP Okay, I've reversed it, and I reversed it when the pointed end of sample number 3 reached the first marked ring before reaching the Lexan manifold.

01 01 37 42 CC Okay.

01 01 37 45 CMP And it's starting to snake now. I - These - these little blobs don't seem to take this reversal so well. Another thing that was a little different on that first - when I - after I reversed it, sample number 1, I mentioned that all three had bubbles who were right together when we started. The bubble on - on them all passed over to the extreme right end, except that number 1, when we reversed the samples, it remained over in the right end, and numbers 2 and 3 traveled with the material.

01 01 38 21 CC Okay. Copy that.

01 01 40 08 CMP Okay, Tony, number 2 has reached the end again. I'm going to reverse it for the last time.

01 01 40 16 CC Okay.

01 01 40 17 CMP It's reversed at this time. Mark it.

01 01 40 19 CC Okay.

01 01 40 23 CMP Number 2 is completely - looks like a - an emulsion. Number 1 still has a central core that's holding together, and number 3 is doing a good job of staying together. It's diffused very little.

01 01 40 41 CC Okay, we copy that.

01 01 40 45 CMP Okay, and at the end of this - it looks to me like it's so diffused that at the end of this run when we get it back, I'll just go ahead and secure it.

01 01 42 37 CC Yeah, Ken, I think they're gonna have fun analyzing that one.

01 01 42 42 CMP I think they've got their work cut out for them. Are there any questions that you might want to get resolved that maybe I - were obvious to me but weren't obvious to you (laughter) before we put it all away? We're going to be closing down here in a couple of minutes.

01 01 43 00 CC Okay. The PI is back there, and hopefully he's working on some questions.

01 01 44 25 CC Ken, Houston.

01 01 44 29 CMP Go ahead.

01 01 44 31 CC Okay. One, you said you - you tapped the box there at the beginning to try to get rid of the bubbles. How long did you wait before you started? I know you gave a mark, but we'd like to verify that.

01 01 44 45 CMP Between the time we tapped the bubbles and the time we started the experiment?

01 01 44 49 CC That's affirmative.

01 01 44 51 CMP Is that the time frame you - ? Okay. That time frame was - I would guess it was about a minute, Tony. Because when I tapped it, I just couldn't get them to move. I had already - I had already tapped that thing once before, for the bubbles, and - because when - as soon as we unpacked it, we saw the bubbles out there, and I banged it a little bit to try and see if I could get them to move and didn't have any luck at all. So we didn't wait any 3 or 5 minutes, it - it was about 2 minutes, I guess.

01 01 45 19 CC Okay, we copy that; 2 minutes. And on the tube 1, did you notice any separation of the two sizes?

01 01 45 29 CMP Not unless that's what this diffuse and central feature turns out to be. But the dark - oh, let me rephrase that, the higher concentration of material that makes it look more solid - if that's a large particle and the diffuse material is the finer particles, then I would say that perhaps there was a separation of small particles from larger ones in tube number 2 just about the time I reversed it, just starting to show up; and number 1 perhaps the same. And number 3, I would say, if that's the proper interpretation, that there was no appreciable separation of any kind. And I'm not sure that number 1 ever exhibited the - some of the symptoms that number 2 did. I can't tell you right now which of these tubes splurged these blobs of particles under the window unit.

01 01 46 30 CC All right, we copy that. We - I sort of expected from the information we got here that 1 would be the one that split up in the two sizes, but I guess we'll have to look at that later.

01 01 46 43 CMP Okay. Again, I'm not sure what this little burst of material that got out on the window might be. Maybe we lost some of the stuff from one of them.

01 01 46 53 CC Okay. That's all the questions I had here. At least the bugs didn't eat the particles.

01 01 50 22 LMP Houston, did you get that? That was magazine UU up to frame 55 on that experiment.

01 01 50 28 CC Okay, Uncle Uncle 55. Thank you.

01 01 50 32 LMP Roger.

01 01 55 36 CC Apollo 16, Houston.

01 01 55 40 CDR Go ahead. Over.

01 01 55 42 CC Okay. At your convenience, we've got the change to your SPS burn procedure.

01 01 55 51 CDR Okay, you've got to stand by on that one. Things are kind of busy right now.

01 01 55 56 CC Right; understand. No hurry at all.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 02 33 55 LMP Houston, 16.

01 02 33 58 CC Go ahead, Charlie.

01 02 34 01 LMP Tony, you just went by my window, and that half-Earth, man, is a spectacular sight.

01 02 34 06 CC I bet it is. I tell you, I'm green with envy.

01 02 34 17 LMP Well, I don't want to trade with you.

01 02 34 19 CC (Laughter) You say the world looked pretty good when it went by?

01 02 34 29 CMP How far out are we now, Tony?

01 02 34 34 CC 108,285.1.

00 02 34 37 CMP Say again. You were broken up.

01 02 34 41 CC Okay; 108,285.1. Change to point 6.

01 02 34 48 CMP Okay, thank you.

01 02 35 08 CMP I think one of the most impressive sights, Tony, is the cloud formations you can see and the polar icecap.

01 02 35 17 CC Very good. Have you had a chance to look long enough to see your - see the dynamics at all?

01 02 35 24 CMP Negative. We just now took the shade down on my side. That's the first view I've had all morning.

01 02 35 31 CC Very good.

01 02 35 33 LMP There was that awful big storm up off the coast of Alaska in the Bering Sea, I guess it was yesterday. I can't see that now, though. I think you all are in the dark.

01 02 35 54 CC I guess our weather chart doesn't go up that high. I was going to see what we've got there now, but it only includes your recovery areas.

01 02 36 34 CC We're reviewing that film that you took - that TV that you took last night. And there are a lot of sparklies out the window there. Were those all just loose particles floating around?

01 02 36 43 LMP Yes, the LM was really shedding on that one panel there, Tony, and, in fact, we've still got quite a few particles floating along with us right now.

01 03 29 09 LMP Houston, 16.

01 03 29 13 CC Go ahead, Charlie.

01 03 29 15 LMP Okay, Tony. I'm back up again. Do you want to talk at - to us about those SPS burn rules?

01 03 29 23 CC Oh - -

01 03 29 24 LMP Stand by 1. Ken wants to - Stand by.

01 03 29 26 CC Okay.

01 03 29 52 LMP Okay, Tony. Go ahead.

01 03 29 55 CC Okay, this isn't the burn rules. It's a discussion of procedures for midcourse 2 only. And a change could be noted in your cue card - SPS cue card - or the G&C Checklist G/5-2, but you might want to hear the whole thing before you write it down. Okay, at burn minus 6 minutes, the line that reads "SPS HELIUM VALVE, two, to AUTO" should be changed to "SPS HELIUM VALVES, two, to manual for 10 seconds." And "After 10 seconds, SPS HELIUM VALVES, two, to AUTO." And then, they'd remain in AUTO for the burn. And we have a couple of notes to that. First - -

01 03 30 53 CMP You're talking about going to CN when you say "manual." And you don't want us to stay there 10 seconds if it exceeds 200, do you?

01 03 31 05 CC That's right. If it exceeds 210, we want you to turn them off. And we'll do the burn with them off - because if it went to AUTO during the burn, we'd go right back into the problem.

01 03 31 24 CMP Okay.

01 03 31 26 CC Okay. That was one of the notes, and you just anticipated it there. The other note is, you may, if - if we've diagnosed the transducer problem correctly, you'll probably get an SPS PRESSURE light. That will go on at 201 pounds.

01 03 31 57 LMP Okay.

01 03 31 59 CC Right now, they are anticipating that, by the time of the burn, that transducer will be biased about 15 pounds high.

01 03 32 10 LMP Okay; that's the oxidizer side?

01 03 32 15 CC That's affirmative.

01 03 32 18 LMP Okay. What is - what do you think is wrong with that transducer?

01 03 32 23 CC Right now, the note is that the comparison chamber, which should be at about atmospheric pressure, has leaked. And the leak is just making up for the normal absorption of helium, so the gage is reading about constant. Eventually, that comparison chamber will leak down to zero, and then you'll be comparing - instead of comparing to 14.7, you'll be comparing to zero, and it will read 15 pounds high.

01 03 33 01 CC We're reading about 11 pounds high now.

01 03 33 07 LMP Okay; our gage has been constant since lift-off.

01 03 33 11 CC Right. We can read the pressure farther on down the line; and, in the fuel side, the tank pressure and the pressure down the line are tracking right along, and they should be on the oxidizer side. But on the oxidizer side, the tank's staying constant and the one down the line is dropping down as it should. So either the one in the tank is just locked up or the leak out of the comparison chamber is just making up the difference.

01 03 33 38 LMP Okay.

01 03 35 53 CC Charlie, Houston.

01 03 35 58 LMP Go ahead.

01 03 36 00 CC Just so there is no misunderstanding here, I'd like to verify this up - this - procedure. We're going to manual for 10 seconds at 6 minutes before the burn, and then, nominally, we'll go back to AUTO even if you get a - a caution. The only point where we'd go to OFF would be if it went above 210.

01 03 36 29 LMP Okay, copy. At 6 minutes, HELIUM VALVES go to manual for 10 seconds, then to AUTO. If pressure goes to greater than 210, go to OFF.

01 03 36 38 CC That's affirmative.

01 03 36 39 LMP If we get a caution light, but less than 210, we still stay in AUTO.

01 03 36 44 CC That's right.

01 03 38 11 LMP Houston, 16. Do you guys feel like that your transducers are good on the ground?

01 03 38 26 LMP What I mean to say is, do you feel like that your telemetry's good on the SPS tank pressure?

01 03 38 36 CC Stand by 1, Charlie.

01 03 40 29 CC Charlie, Houston.

01 03 40 33 LMP Go ahead.

01 03 40 34 CC Okay, the telemetry here - the telemetry is good. And we can read from the transducer that you're reading your oxidizer tank pressure; we can also read from the inlet pressure transducer, which you can't read on board. The inlet pressure transducer indicates that - nominal decay and pressure due to helium absorption by the oxidizer. And this looks just like all the other flights. The other one is the one that you are reading, and it looks like it's locked up. The reason

for the procedure that we've sent up is to make sure that we know the pressures in the lines before this burn, which will give us a baseline to plan the management during the LOI.

01 03 41 20 LMP

Well, okay. That's what had us a - talking in here about how we're going to monitor the LOI.

01 03 41 27 CC

Right. That's our concern, too. And what we're trying to do is get enough unknowns out of this midcourse so that we can have a good handle on the LOI.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 04 10 01 CDR Houston, Apollo 16. Over.

01 04 10 04 CC Go ahead, John.

01 04 10 07 CDR Roger. The bias test is completed at the end of a minute 40 seconds. We got 102.0 on our DELTA-V counter.

01 04 10 19 CC Okay. 102.0.

01 04 24 56 CC Apollo 16, Houston.

01 04 25 08 LMP Go ahead.

01 04 25 10 CC Okay, we've got a few more questions on that paint shredding. When you have a break, if you'll give us a call, we'll send them up to you.

01 04 25 56 LMP Okay, Tony; go ahead.

01 04 25 59 CC Okay. Last night during the TV show, the lighting wasn't ideal. Maybe you have observed something that we couldn't see in the tapes here. Okay, that panel behind the docking target - was it completely covered with the shredded material? There's an access panel right in the middle of that - of the overall panel there - and we're curious to know if it was just in the access panel, or the whole panel.

01 04 26 29 LMP Okay, Tony, it was on the whole panel.

01 04 26 33 CC Okay, how about any other panels around? It looked like on TV there might be some on that panel just to the right. And, if so, do you have any words on any other panels?

01 04 26 46 LMP Okay, it's on that whole section there, Tony. There's two triangular panels, one on each side of this rectangular pattern which is right below the docking target. That whole section that is parallel of the plus-X, below the docking target, the two triangular panels and the rectangular panel all are shredded.

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01 04 27 07 CC Okay, we copy that.

01 04 27 11 LMP ...

01 04 27 12 CC Say again?

01 04 27 22 CC Was there any gold Mylar Kapton visible on the panel behind the docking target?

01 04 27 29 LMP Negative. It's - it's - apparently just a black surface now, most of the white-looking paint, or whatever it is, is all - most all gone now. There's just a - oh, I'd say maybe a 10 percent of the surface is now covered with this shredded white stuff.

01 04 27 47 CC The origin of that question was there was some question whether the panel may not have come off entirely and, underneath that, is some of the Mylar stuff.

01 04 27 57 LMP Well, the panel is still on, in fact, you - you can't even see the Mylar - the - the - Below it is a black surface that looks much like the top of the ascent prop - propellant tank.

01 04 28 10 CC Okay, and I guess you mentioned last night there was some streaming of the paint as it was coming off. Was there a preferred direction - or what was it?

01 04 28 20 LMP Yes, radially - well, from us, it was radial to the X-axis. Almost right out over the ascent module - out the Y-axis.

01 04 28 38 CC Was it independent of your jet firings?

01 04 28 44 LMP When Ken fired the jets, it really blew it off then.

01 04 28 48 CC Uh-huh. In the same direction?

01 04 28 52 LMP No, it made it go the other way down towards - the - the legs of the LM.

01 04 28 57 CC Okay, and, without the RCS then, it was almost at right angles to the panel and, otherwise, it was going down towards the legs?

01 04 29 06 LMP Yes, and it looks like - like John said, right now, Tony, as we come around into the Sun, there's some particles coming out - off now more towards quad 2. And it looks like it's on the underside of this panel as we cannot - we cannot see it, and - but it's between quad 3 - 2 and the APS propellant module - correction the APS propellant tank.

01 04 29 40 CC Okay, we're looking at the drawing here and see where you mean.

01 04 29 46 LMP Say again?

01 04 29 47 CC Roger; we copy that, Charlie. What we're searching for on this direction of flow is if you think there's any - anything in the area that might cause it to stream out like some - a leaky tank or anything of that sort, or whether it just seems to be almost random.

01 04 30 03 LMP Say again Tony, you cut out after - all after "What we're searching for."

01 04 30 08 CC Okay, what we're searching for here is just - We don't think there is any leak over there or anything of that sort. But, if there is a preferred direction of flow, we're looking for any indication of what it might be so we'll know where - where the flow is coming from.

01 04 30 23 LMP Tony, please, you're - for some reason, you weren't up-linking, and we've had all after "What - what we're searching for."

01 04 30 38 CC Okay; stand by a second, Charlie. I'll be back with you in a minute.

01 04 31 23 CC Okay, Charlie; Houston. How do you copy now?

01 04 31 30 LMP You're 5 by.

01 04 31 32 CC Okay, we were just searching around here a little bit - Far-out possibility might be that we had a small leak in there or something and it was causing the peeled paint to flow off in a particular direction; and we were just wondering if you had any indication that that might be the case, or whether it's just flying off at right angles?

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01 04 31 54 LMP Well, when we first saw it, that was our opinion also, but now that most of it's gone - is - it - it's sort of just coming off in different directions. Over.

01 04 32 13 CC Okay, we copy that.

01 04 32 17 LMP And, Tony, the stuff that - is really not white; it's more of - now it's more of a gold-looking color or sandy color now.

01 04 32 26 CC Okay. That's the shredded stuff you're talking about?

01 04 32 32 LMP That affirmative.

01 04 32 35 CC All right, the thermal people aren't - aren't upset about this at all. They don't think it will give us any constraint. Evidently, that surface was only on there for the very high-Sun case.

01 04 32 49 LMP Okay. Well, the panel is intact underneath that paint job, whatever it was. The panel apparently is intact.

01 04 32 58 CC Okay.

01 04 33 14 CC Okay, Charlie, I guess that's the whole set of questions here. Everybody is very happy with - with what we're hearing.

01 04 34 15 LMP Tony, that panel that shredded - the ones we were telling you about are - have some more pronounced wrinkle ridges in them than any of the other panels.

01 04 34 29 CC Okay, we copy that, Charlie. We'll find out what that means.

01 05 11 28 CDR Houston, 16. Do you read?

01 05 11 31 CC Go ahead, 16.

01 05 11 34 CMP Okay, did you read John there?

01 05 11 38 CC Negative.

01 05 11 41 CMP Okay, we're exiting PTC and going to the far-UV attitude.

01 05 11 45 CC Roger.

01 05 21 38 CC 16, we've got a state vector and a target load whenever you're ready to accept.

01 05 21 48 LMP You've got it.

01 05 21 50 CC Roger; thank you.

01 05 21 58 LMP How long you been down there?

01 05 22 00 CC Oh, about 20 minutes.

01 05 22 13 LMP How's the weather down there today, Pete?

01 05 22 16 CC Beautiful. A little warm.

01 05 22 48 CC And, Charlie, you're right over the Gulf of Mexico.

01 05 22 50 CMP He looked out his window and said that you guys are still there.

01 05 22 59 CC Say again, Ken.

01 05 23 02 CMP Looks like you guys are still there.

01 05 23 05 CC Affirmative.

01 05 23 08 LMP What did you say about the Gulf, Pete?

01 05 23 11 CC Yeah, you should be right directly over the Gulf of Mexico.

01 05 23 28 LMP Yeah, I was thinking the same thing - that we could see it, anyway.

01 05 25 02 CC And, 16, you can have the computer.

01 05 25 09 CDR Thank you. Do you want us to go to Delta now, or you guys going to hang on to the antennas?

01 05 25 20 CC Roger. You can stay there.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 05 39 21 CMP Houston, do you have the angles?

01 05 39 24 CC Affirmative; we got them.

01 05 39 33 CMP Torqued at 39:30.

01 05 39 38 CC Roger.

01 05 40 03 CC And, 16, we can get the MCC-2 pad and the high gain antenna angles for MCC-2 whenever you're ready.

01 05 40 47 CDR Okay, Houston. Go ahead with your pad.

01 05 40 50 CC Okay, MCC-2: SPS/G&N; 66768; plus 1.24, minus 0.11; 030:39:00.01; NOUN 81 is plus 0008.9, minus 0001.1, plus 0008.9; 094, 354, 010; NOUN 44s are NA; DELTA-V_T, 0012.6, 0:02, 0008.3; sextant star, 40, 256.4, 30.3; rest of the pad is NA. Set stars are Sirius and Rigel; 219; 166; 313; ullage, none; LM weight, 36258.

01 05 42 25 CDR Okay, we copy MCC-2, SPS slash G&N; 66768; plus 1.24, minus 0.11; 030:39:00. 81; plus 0008.9, minus 0001.1, plus 0008.9; 094, 354, 010; NA; NA; 0012.6, 0:02, 0008.3; 40, 256.4, 30.3; rest of the pad is NA. Sirius and Rigel; 219; 166; 313; no ullage; LM weight, 36258.

01 05 43 13 CC That's affirmative, Johnny. Now you ready for the high gain angles?

01 05 43 25 CDR Go ahead.

01 05 43 26 CC Okay. PITCH, minus 46; YAW, plus 0.

01 05 43 37 CDR PITCH, minus 46; YAW, plus 0.

01 05 43 40 CC Roger.

01 05 45 50 CMP Okay, Houston, we turned on the HYDROGEN PURGE LINE HEATERS; maybe we can get this purge off a hair early.

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01 05 45 59 CC Roger; copied.

01 05 56 41 CDR Houston, can we do this waste water dump now, or do you want us to wait closer in?

01 05 56 50 CC Stand by a minute, John; we'll check it.

01 05 57 01 CC John, we'd prefer you wait until after the sextant star check.

01 05 57 07 CDR Okay.

01 05 57 10 CMP I'll tell you one thing about that - that sextant business, Don. We got so many particles off the LM out there that I don't believe you could recognize a star pattern - in the telescope ever, but they show up just perfect in the sextant.

01 05 57 31 CC Roger.

01 05 57 35 CMP Sure makes you appreciate one of these nondrifting platforms.

01 05 57 39 CC Roger. Ken, in view of that, you can do that water dump any time you want.

01 05 57 53 CMP Oh, we'll go ahead and do that. Do you have any objections to our going ahead and going to the attitude?

01 05 58 11 CMP Looks like we're really crowding the length of time it's going to take to dump the water - up against the burn time.

01 05 58 20 CC Yes, you can go ahead - you can go ahead to attitude, or do the water dump whichever you want.

01 05 58 29 CMP Okay, we'll - we'll go ahead and go to attitude and see what we have for time.

01 05 58 35 CC Roger.

01 05 58 36 CMP I'd like to - We'll get the star check off in the first priority.

01 05 58 39 CC Roger.

01 06 02 48 LMP Pete, we go to stop charging BAT A now?

01 06 02 54 CC Roger, 16.

01 06 03 34 CC And, 16, you can delete charging battery A after the burn; it's charged sufficiently.

01 06 03 42 LMP Okay.

01 06 04 27 CC 16, I've got some gyro drift updates and PIPA bias for you, when you're ready to copy.

01 06 04 54 CMP Okay, go ahead.

01 06 04 57 CC Okay, the gyro drift - I'll give you addresses and numbers. Address 1460, 77552; address 1461, 77756; address 1462, 77307.

01 06 05 31 CMP Okay. That's 1460, 77552; 1461, 77756; 1462, 77307.

01 06 05 44 CC That's affirmative. And on the PIPA bias, the address is 1456, 76747; OMNI Alfa, 16.

01 06 06 01 CMP Okay, 1456, 76747.

01 06 06 06 CC That's affirmative, and did you copy OMNI Alfa?

01 06 06 15 CMP You say OMNI Alfa?

01 06 06 17 CC Roger.

01 06 11 40 CDR Pete, you're on the high gain. Do you want REACQ and NARROW?

01 06 11 47 CC Just a moment. REACQ and NARROW, Johnny.

01 06 11 54 CDR Roger.

01 06 12 46 CDR Okay, the star check checks out good. It's right in the middle, and the waste water dump is in work.

01 06 12 55 CC Say, again, John; I didn't copy that.

01 06 13 01 CDR Star checks good; it's right in the middle, and the waste water dump is in work.

01 06 13 05 CC Roger.

01 06 22 57 CMP Don, could you tell us if - if the DELTA- V_C number you gave us includes any kind of a bias to compensate for the minute of EMS on time prior to ignition?

01 06 23 10 CC Just a moment.

01 06 23 13 CMP Yeah, I'm not asking for one; I'm just asking if that's in there.

01 06 23 16 CC Okay, stand by while I check it.

01 06 23 47 CMP Okay. We are terminating the waste water dump now.

01 06 23 52 CC Roger.

01 06 24 16 CC Ken, the pad does take that into account.

01 06 24 22 CMP Okay; thank you, sir.

01 06 33 04 CDR Okay, we've pressurize the - the - pressure in the SPS now.

01 06 33 12 CC Roger.

01 06 33 53 CDR Okay, Houston. I'm looking at oxidizer pressure of just about 210. We're going to leave the valves in AUTO.

01 06 34 00 CC Roger.

01 06 39 24 CDR Well, the old burn's complete, Houston. It's a big boot.

01 06 39 29 CC Roger.

01 06 41 12 LMP Okay, Houston. Do you want a burn report or did y'all see everything?

01 06 41 16 CC Stand by 1. 16, we'd like a burn report.

01 06 41 25 LMP Okay, DELTA- T_{ig} was 0; burn time was, on my watch, 2.1. We got trim within an attitude of 094, 352, 008; plus 0.1; minus 0; plus 0.1; DELTA- V_C , minus 3.1. Fuel is reading 010, and OX, 010; no unbalance.

01 06 41 55 CC Roger; copy.

01 06 41 56 LMP And on board, our fuel - Okay, Pete, and on board, the fuel pres - during the burn, the fuel pressure dropped to 170 and the oxidizer dropped to 200.

01 06 42 08 CC Understand, 170 and 200.

01 06 43 21 CDR Okay, Houston, our LM/CM DELTA-P is 0.8. You want to go ahead and do the TUNNEL VENT to VENT until greater than 2.7, right?

01 06 43 34 CC Affirmative.

01 06 46 07 CDR Houston, what's your best guess on how long this baby will get to 2.7 if it started off at 0.9?

01 06 46 13 CC Stand by 1. I'll get you a number. They're saying an hour and 50 minutes.

01 06 46 24 CDR That's about what we - that's about what it looks like to me.

01 06 46 28 CC Roger. Understand.

01 06 46 46 CC John, you using Charlie's wristwatch to get that number?

01 06 46 53 CDR No, I was just remembering how small that tunnel venthole is.

01 06 46 57 CC Roger.

01 06 55 31 CC 16, would you verify H₂ tanks 1 and 2 HEATERS, OFF, and H₂ tank 3 FAN, AUTO?

01 06 55 44 CDR Oh, oh, we got tanks 1 and 2 HEATERS in AUTO, and - and FAN 3 in AUTO. I'll turn H₂ HEATERS 1 and 2, OFF.

01 06 55 53 CC Roger; thank you.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 07 53 11 CDR Okay, Houston. We're up to 2.1 on the LM/CM DELTA-P gage now.

01 07 53 16 CC Roger. Copy 2.1. And while I'm talking to you on this oxygen-tank pressure gage, it's starting to look like there is a bias in there of about 14.7 due to the fact that the reference chamber has apparently leaked its 1 atmosphere reference value down to probably vacuum. And that, coupled with a 5-psi meter bias, should give you a total bias of about 20 psi on the oxygen-tank pressure. But the gage seems to be working okay except for that bias, so we're going to continue to follow it so we can give you a - maybe a better number prior to LOI.

01 07 54 08 CDR Thank you, Pete.

01 07 54 10 CC Roger.

01 07 54 27 LMP Houston, 16. Over.

01 07 54 29 CC Go ahead.

01 07 54 32 LMP Okay, Pete. I just took my windowshade out of my rendezvous window and, looking out at quad 1 of old Orion, the thermal shield that sits directly inboard of the - the - of the - of the quad - it's facing the plus-Z direction. It's a little piece about 3 feet long by about a foot wide; it's beginning to peel off also, now. Over.

01 07 55 02 CC It's doing the same thing as the - as the panel we were - we looked at last night, huh?

01 07 55 08 LMP That's affirm, except for - It - it's not nearly as bad, and it's just primarily on the inboard side, but it is beginning to get the shredded-wheat appearance like the other one. Over.

01 07 55 16 CC Roger. Understand.

01 07 55 48 LMP Pete, on the outboard side [clears throat] right out near the quad - or right above the quad - on that same panel, it - it seems to me it's beginning - it looks like it starts out with a very fine, shaggy-grass-type stuff, and then slowly peels up into the shredded-wheat type. Over.

01 07 56 13 CC Roger. Understand.

01 08 03 06 CC 16, Houston. When you get a minute, we've got a - an addition to the Flight Plan at 32:48.

01 08 03 36 CDR Roger. Go ahead with your 32:48 addition.

01 08 03 40 CC Okay. We want to add a note to read the LM/CM DELTA-P.

01 08 03 52 CC And we want to get that prior to that CM/LM pressure equalization decal.

01 08 04 06 CDR Okeydokey.

01 08 04 17 CC And, Ken, that - we've made an ink correction on the back of that AOS/LOS Sun-wheel aid there. And when you get around to digging that out, I can give it to you, or I can pick it up later.

01 08 04 37 CDR Ken's busy right now. Say again. Over.

01 08 04 40 CC Okay, on the back of the Sun wheel - the AOS/LOS Sun wheel - we've entered an ink note to account for the fact that we change REFSMMAT in the middle of his work there. We made an error on it. We've got to change the note now, and sometime when he's got that wheel out, I can read him up the correction.

01 08 05 00 CDR Okay.

01 08 31 41 CDR Okay, Houston. We're maneuvering to the attitude.

01 08 31 45 CC Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 08 43 00 CDR Okay, Houston, we got 2.7 on the tunnel vent right now.

01 08 43 05 CC Roger; copy 2.7 - -

01 08 43 06 CDR I mean CM DELTA-P.

01 08 43 08 CC Roger; LM/CM DELTA-P - -

01 08 43 09 CDR On the LM/CM DELTA-P.

01 08 43 16 CC Okay, we copy.

01 08 44 03 CDR Okay, Houston, we're going to come on with the direct O₂ and pump up the cabin.

01 08 44 10 CC Roger.

01 08 48 12 CDR How does that look, Houston? Is that about 5.7 to you?

01 08 48 19 CC We're showing about 5.5, John.

01 08 48 23 CDR Okay.

01 08 48 28 CC John, they say that's good enough now.

01 08 48 33 CDR Okay, DIRECT O₂ is going CLOSED.

01 08 48 37 CC Roger.

01 08 48 54 CDR And the LM/CM DELTA-P is 3.3.

01 08 49 00 CC Roger; stand by a minute.

01 08 52 00 CC 16, we want to continue LM venting until you have ar - a reading - DELTA-P reading of 3.4 on the meter, and that should take less than 10 minutes.

01 08 52 17 LMP Okay, we copy. We'll go to 3.4.

01 08 52 36 CDR Okay, we're in LM VENT.

01 08 52 38 CC Roger.

01 08 57 03 CMP Okay, Houston, it's an honest 3.4.

01 08 57 07 CC Roger; copy.

01 08 57 15 CMP Are we cleared to proceed? Over.

01 08 57 18 CC Roger, Ken.

01 08 57 20 CMP Okeydokey.

01 09 07 34 CDR Okay, Houston, we're about ready to remove the hatch.

01 09 07 37 CC Roger.

01 09 14 13 CMP Charlie's floating on over there now.

01 09 14 16 CDR Houston, Charlie's floating on over to the lunar module now - to check on old Orion.

01 09 14 24 CC Okay.

01 09 15 41 CDR Extend that docking tunnel index, minus 3.5.

01 09 15 46 CC Minus 3.5.

01 09 24 19 CMP Houston, Casper.

01 09 24 22 CC Go ahead, Casper.

01 09 24 26 CMP Roger, Don. Did you guys get the tunnel index?

01 09 24 33 CC We've got it, Ken.

01 09 24 37 CMP Okay.

01 09 24 48 CMP And, Don, I'm holding off on the oxygen heaters. I'm keeping them all three in AUTO until we get the surge and repress tanks built back up. If that's okay, if you would like for me to turn them off, I can reconfigure now; otherwise, I would like you to help me remember not to leave them on.

01 09 25 08 CC Roger, we concur, Ken. We'll remind you.

01 09 25 17 CMP Okay, thank you.

01 09 53 57 CMP Hey, Don, can I talk to you about the docking latch?

01 09 54 03 CC Roger.

01 09 54 08 CMP You all set, or do you want me to wait a minute?

01 09 54 10 CC No, go ahead.

01 09 54 13 CMP Okay, you remember we told you at the time we - that we docked that we had a number 10 that didn't look like it had stroked quite the same as the others; but the lock was over the - over the rail.

01 09 54 27 CC Right.

01 09 54 28 CMP You weren't on board at the time, that's right, we were talking to Gordy - -

01 09 54 30 CC Right.

01 09 54 31 CMP But that's one of the things we reported and the plate that goes over the bungee fairing is cocked slightly. And now that we've got everything cleaned out of the tunnel, I can look in here. It's real obvious that the bungee hasn't fired completely. It's down; the top of the bungee is recessed about a half of an inch down. It looks like it just hadn't triggered and, as a matter of fact, I'm looking at the latch and, by golly, I can see between the latch and the total ring, so it didn't even pull down against that. And I really obviously don't have any concern for it; except I'm - I've never seen one that looked just like this and I was gonna go ahead and recock it and fire it again and see how that worked with a manual trigger. But I got to thinking maybe that's - maybe it's best to let you folks think about it. The main thing I want to do is make sure it's not a problem in unlatching it when the time comes.

01 09 55 36 CC Roger; stand by.

01 09 56 57 CC Casper, we capt - we got all the data we need and we're going to take a look at it. We do not want you to recock and fire the thing manually and we'll get back to you later.

01 09 57 06 CMP Okay.

01 09 58 31 CMP And, Houston, Casper turned over the power supply to Orion at 33:58.

01 09 58 43 CC Roger, Casper.

01 10 02 02 CMP Orion, how do you read Casper on VHF Alfa?

01 10 02 04 CDR Man, you're just super on VHF Alfa. How me?

01 10 02 08 CMP Man, that's good stuff, isn't it?

01 10 02 11 CDR Just beautiful.

01 10 02 12 CMP You're just as clear as you can be.

01 10 02 14 CDR Okay. Go. Go. Go. Go. Go.

01 10 02 34 LMP Hey, Ken; B SIMPLEX.

01 10 02 49 CMP Orion, Casper on Bravo SIMPLEX.

01 10 02 52 CDR Okay, I'm reading you 5 by, Casper. How me?

01 10 02 55 CMP Loud and clear.

01 10 02 56 CDR You're super.

01 10 03 05 CDR Houston, how do you read Orion? Over.

01 10 03 08 CC You're loud and clear, Orion.

01 10 03 13 CDR Okay, we're coming down DOWNVOICE BACKUP and - on a hot mike, and you're loud and clear to us. Over.

01 10 03 21 CC Roger.

01 10 03 24 CDR Okay, how does the LOW BIT RATE look to you, Pete?

01 10 03 29 CC Looks good, Orion.

01 10 03 32 CDR Okay, I'm going up BIT RATE to HIGH. Okay, how do you read now, Pete?

01 10 03 42 CC Loud and clear.

01 10 03 44 CDR Okay, you're 5 by also. You got HIGH BIT RATE.

01 10 03 53 CC Looks good, John.

01 10 03 57 CDR Okay, we're going BIOMED, RIGHT. How do you read now, Pete?

01 10 04 03 CC Loud and clear.

01 10 04 05 LMP Okay, you want to - we can - we're down to step 5 on page 1-118 - 1-18. Do you want to look at the HIGH BIT RATE some more?

01 10 04 33 CC Negative. We don't want to look at it anymore.

01 10 04 38 LMP You do not. Roger. We're going to LOW BIT RATE. Okay, the book says "Perform voice and low bit rate check with MSFM." How do you read?

01 10 04 52 CC Loud and clear.

01 10 04 55 CDR Same-o.

01 10 05 31 LMP Houston, how do you read with the FUNCTION in VOICE? Over.

01 10 05 34 CC You're loud and clear.

01 10 05 38 LMP Okay, you're 5 by and LOW BIT RATE. How does it look?

01 10 05 49 CC LOW BIT RATE looks good.

01 10 05 53 LMP Okay, we're going to HIGH BIT RATE. And we'll do the same thing with you - voice check and high bit rate check.

01 10 06 22 LMP Houston, how do you read - now? Over.

01 10 06 26 CC You're loud and clear.

01 10 06 30 LMP Okay, give me a short count please, Pete.

01 10 06 33 CC 5, 4, 3, 2, 1.

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01 10 06 39 LMP Roger; you're very good. Okay, we're going to -
BIT RATE is going LOW, and we're going S-BAND
RANGE to RANGING.

01 10 06 46 CC Roger.

01 10 06 50 LMP Okay, how do you read now? Over.

01 10 06 51 CC Loud and clear.

01 10 06 55 LMP Okay, how is the ranging check going?

01 10 06 58 CC Stand by.

01 10 07 13 CC Ranging looks good, Orion.

01 10 07 27 LMP Okay, Houston, our ED bats are both GO at
37 volts and the sequence camera works.

01 10 07 37 CC Roger; copy.

01 10 07 42 LMP And John's OPS was 5800 and mine was 6000. Over.

01 10 07 50 CC Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 10 07 54 LMP Okay. As far as we're concerned, the comm is just super, and we're ready to go on to phase 120 and deactivate it, if you guys are.

01 10 08 09 CC Stand by 1 on that.

01 10 08 24 CC Okay, Orion. You can deactivate.

01 10 08 29 LMP Okay, deactivating.

01 10 19 22 CMP Okay, Houston. Casper has LM power back at 34:19.

01 10 19 28 CC Roger; 34:19.

01 10 19 32 CMP Affirm.

01 10 21 31 CMP Hey, Don, if anyone wonders what I'm doing with 52, I just wanted to use auto OPTICS to point at Jupiter.

01 10 21 38 CC Roger.

01 10 21 41 CMP I'm not gonna take any marks.

01 10 21 42 CC Roger. I understand.

01 10 43 20 CC Casper, we've got the LOI-minus-5 flyby pad whenever you're ready to copy.

01 10 43 28 CDR Stand by 1.

01 10 43 30 CC Roger.

01 10 43 36 CDR We got Casper's keeper over in the lunar module taking a peek, and we'll be closing it out and we'll get it in a minute.

01 10 43 42 CC Roger. Understand.

01 10 47 44 LMP Pete, you - really get to be a real believer in the heating capacity of the Sun. In the lunar module here, the commander's window is in direct sunlight, and it's almost too hot to touch it; and my window's in the shade, and it's got fro - it's frosted over.

01 10 48 01 CC Roger.

01 10 48 08 CDR Okay; we gonna close her out, Pete.

01 10 48 10 CC Okay, Johnny.

01 11 03 53 CDR Houston, the hatch is closed; the drogue is installed; the probe's installed; the hatch is installed on Earthside; the LM TUNNEL VENT valve is in LM/CM DELTA-P; the tunnel lights are off. Is it okay if we go to PTC instead of PDC [?] now, or do y'all want to wait until 34?

(Music in background)

01 11 04 22 CC Stand by 1.

01 11 04 37 CC 16, you can go ahead and do the PTC.

01 11 04 42 CDR Okay.

01 11 06 04 CC 16, in addition to the LOI flyby pad, we've got some cryo tank configuration changes for you.

01 11 06 19 CDR Okay. If you can hold up for a second on that.

(Music in background)

01 11 06 21 CC Roger.

01 11 08 36 CDR Hey, Houston; 16. You can go ahead with the cryo tank reconfiguration.

01 11 08 41 CC Okay. On the cryo tanks, we want H₂ tanks 1 and 2 HEATERS, AUTO; and tank 3 FAN, OFF. OXYGEN tanks 1 and 2 HEATERS, OFF; tank 3 HEATER, AUTO.

01 11 09 03 CDR Okay. Roger. Configuration now: H₂ HEATERS 1 and 2, AUTO; O₂ HEATERS 1 and 2, OFF; 3, we're AUTO. That's as we had it. H₂ fans 1 and 2, OFF; and 3, OFF.

01 11 09 21 CC Roger.

01 11 10 17 LMP Okay. NASA in Houston, you can go ahead with the LOI-minus-5 pad.

01 11 10 39 CC Okay, LOI minus 5 flyby, SPS/G&N; 66603; plus 1.24, minus 0.12; 069:28:26.27; plus 0039.8, minus 0118.9, plus 0422.9; 210, 193, 346; NA; H_p is plus 0020.4; 0441.1; 1:07, 0436.5; sextant star 14, 124.8, 17.4; the next three lines are not applicable. Latitude, minus 23.03, minus 165.00; 1100.9, 36207; 142:23:42. Set stars Sirius and Rigel, 219, 166, 313. Ullage, none. Other: number 1, burn SPS docked; 2, pad based on PTC REFSMMAT; 3, LM weight, 36287.

01 11 12 57 LMP Roger, Pete. LOI minus 5 flyby, SPS/G&N; 66603; plus 1.24, minus 0.12; 069:28:26.27; plus 0039.8. I missed DELTA- V_Y , DELTA- V_Z is plus 0422.9; 210, 193, 346; H_A is NA; plus 0020.4; 4411, 107, 0436.5; 14, 124.8, 174; NA; latitude minus 23.03, minus 165.00; 1100.9; 362.07; 142:23:42. Sirius and Rigel; 219, 166, 313. Ullage is none. Notes are: 1, burn SPS docked; PTC REFSMMAT; LM weight, 36287, which is 30 pounds heavier than we had this morning.

01 11 14 06 CC Roger. We'll take a look at that, and the DELTA- V_Y is minus 0118.9.

01 11 14 18 LMP Minus. Roger; minus 0118.9.

01 11 14 22 CC That's affirmative. Yeah.

01 11 14 29 LMP Is that because we took the film over there?

01 11 14 36 CC Say again, Charlie.

01 11 14 38 LMP I said we took all that film over there, maybe that's the 30 pounds.

01 11 14 42 CC Affirmative, that's where it came from.

01 11 15 11 CC And, 16, we still have this note to go on the Sun wheel.

01 11 15 24 CDR Stand by.

01 11 16 54 CC I need Charlie, 16.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 11 45 16 CC 16, your rates are okay, any time you want to go
into PTC.

01 11 45 28 CMP Okay, Pete. Thank you.

01 11 50 26 CC 16, OMNI Bravo, and then we'll take care of the
antennas.

01 11 50 37 CMP OMNI Bravo, Houston.

01 11 50 40 CC Roger. Thank you.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 13 19 13 CC 16, Houston.

01 13 19 17 CDR Go ahead, Pete.

01 13 19 19 CC Okay - -

01 13 19 20 CDR Go ahead, Pete.

01 13 19 21 CC Okay, just a last few words here. We don't have anything for you except one note to Ken. Earlier you asked about whether or not the pad we read you contained the correct bias for the EMS; we told you it did, and we've looked at it a little more now, and actually it turns out it did not. The bias on that one was less than a foot per second, I guess. In the future, we will include that bias in the pads.

01 13 19 52 CDR Okay, thank you now.

01 13 19 56 CC Roger; and we're ready to copy any time you can give us the onboard read-outs and get into the Flight Plan here at about 37.

01 13 20 11 CDR Roger.

01 13 20 35 CDR Okay, Houston. BAT C is 37; PYRO BAT A is 37; PYRO BAT B, 37.

01 13 21 32 CDR RCS A is reading 87; RCS B, 92; RCS C, 93; RCS D, 96. Is that what you wanted, the quantity of the RCS?

01 13 21 57 CC That's affirmative. And we copied 37, 37, 37, 87, 92, 93, and 96.

01 13 22 16 CDR That's - that's correct, and MAIN BUS - BUS A is reading 29 plus volts.

01 13 23 09 CC Ken, for your information, the PTC looks beautiful; in fact, it was so good, it took some of us quite a while to realize you were in a PTC.

01 13 23 22 CMP Yeah, and my attitude hold looks a lot like that too.

01 13 23 26 CC Roger.

01 13 23 35 CMP All in the technique for the way you hit PROCEED.

01 13 23 38 CC Roger; honest (laughter).

01 13 37 02 CDR Houston, let me read you this cryo tank configuration, and you tell me if that's what you want for the sleep period.

01 13 37 11 CC Okay. Go ahead, 16; we're - -

01 13 37 18 CDR ... over.

01 13 37 20 CC Go ahead, 16; we're ready to copy the cryo configuration.

01 13 37 25 CDR Okay. H₂ HEATERS are - 1 and 2 are in AUTO.
O₂ HEATERS 1 and 2 are OFF, 3 is in AUTO. H₂ FANS
1 - 1 and 2 are OFF, and 3 is in AUTO.

01 13 38 14 CC 16, the H₂ tank 3 FAN should be OFF.

01 13 38 26 CDR Okay. H₂ tank 3 OFF.

01 13 38 54 CDR And, Houston, for your information, the LM/CM DELTA-P gage has not moved since we equalized the two vehicles.

01 13 39 04 CC Roger. Understand, 16.

01 13 39 17 CC And, 16, would you verify optics power OFF?

01 13 39 26 CDR No, sir; we aren't ready to turn it off yet.

01 13 39 31 CC Okay.

01 13 50 15 CDR Houston, 16. Over.

01 13 50 20 CC Hello, 16. Houston.

01 13 50 26 CDR Are you ready for a VERB 74?

01 13 50 32 CC Roger. We're standing by. Go ahead.

01 13 50 39 CDR What do you do on the graveyard shift, Hank?

01 13 50 42 CC Oh, that's lots of fun. Get to watch y'all snooze.

01 13 50 53 CDR Okay. DIRECT O₂'s on, the cabin's coming up now.

01 13 50 57 CC Roger. Copy.

01 13 52 21 CC E-MOD complete, 16.

01 13 52 27 CDR Thank you.

01 13 55 18 CDR Okay, Houston. DIRECT O₂ is off.

01 13 55 23 CC Roger. Copy.

01 14 04 51 CMP Houston, Casper.

01 14 04 55 CC Hello, Casper. Go ahead.

01 14 05 10 CC Casper, Houston. Go ahead.

01 14 05 28 CC Casper, Houston. Go ahead.

01 14 05 57 CC Casper, Houston. If you're transmitting, you're way down in the mud. I can't read you.

01 14 06 07 CMP Can you read now, Hank?

01 14 06 09 CC Okay. Much better now, Ken.

01 14 06 14 CMP Okay. I say - I got a film status report for you. And I'd like to ask you a question about the optics. I'd like to stow the optics instead of leaving them up, unless the temperatures are gonna get too high. And the reason for this is that every time we run around past the Sun, it's like throwing a spotlight inside.

01 14 06 39 CC Roger. Stand by.

01 14 07 03 CC Okay, Ken, go ahead with your film status, and we're looking at that stowing the optics.

01 14 07 16 CMP Okay, the magazine 00 reads 26, magazine November November is either 33 or 34, depending on how you look at it. We finished up the 16-millimeter mag on Alfa Alfa by taking some pictures of the - part of the LM paint that we think is shredding. Magazine Oscar and November have been used just for the

targeted pictures - no extras. And I guess that's -
We didn't take any other original pictures today
except for the AA frames on the LM. Tomorrow
we'll try to get some interior photography.

01 14 08 06 CC Okay. Copy 26 frames on Oscar Oscar. The November
November report we got last night was 33 frames.
You didn't use any of it today?

01 14 08 18 CMP Well, just for that UV. So whatever it was last
night, it must be one more.

01 14 08 25 CC Okay. 34.

01 14 09 04 CC And, Ken, it's okay to stow the optics.

01 14 09 10 CMP Okay, Henry, thank you. And I'd like to go ahead
and take the voice comm down before I turn the
optics power off. I wanted to try to take one last
look and see if I can pick up one of the planets
as we turn around, and I'd like to go ahead and
knock off the voice.

01 14 09 37 CC Okay, Ken, get the voice down and have a good
night.

01 14 09 43 CMP Okay, Henry. See you in the morning. Good night,
sir.

01 14 19 55 CMP Houston, Casper.

01 14 19 57 CC Hello, Casper, go ahead.

01 14 20 02 CMP Okay, I'm not sure what just happened. I just
saw - down looking at the optics and all of a
sudden I saw a warning light and I got a NO
ATTITUDE and a GIMBAL LOCK light. And my - my
ball seems to, in fact - it looks like the platform
may be frozen. Although we're still - still in PTC
here.

01 14 20 34 CC Okay, we're seeing some telemetry. We saw something
about the time you come on the line there.

01 14 20 42 CMP Okay. And it shows the CDUs down there in NOUN 20
as being gimbal locked.

01 14 21 13 CC Stand by a little bit, Ken. We're taking a look at the telemetry.

01 14 25 19 CC Ken, just so we can make sure we got it straight down here, could you run through again what you were doing, and then the sequence of events?

01 14 25 29 CMP Okay, Hank, I'm not real sure when this happened. I was trying to see if I couldn't pick up one of the planets in the optics, and I was using P52. And I had gone in and I was calling option 3 and then putting in planet vectors out of the Flight Plan and I tried - I thought I was going to catch, I guess it was Saturn. And it looked like I had just missed it. And I was driving around just kind of looking around to see what I could see in the sky and waiting to try and pick up Jupiter. And somewhere in there, I guess I came down to zero the optics or do something, and then I looked down and saw I had a PGNCS light. And I guess I had just recently - I guess I was about ready to give up on it and call POO; and I think I had - in fact, I think I called PCO at or just before the time I - we ended up with the GIMBAL LOCK and the NO ATTITUDE. That was just a couple of seconds or so, I guess, before I called you about it, maybe 15 seconds or so.

01 14 26 45 CC Okay, You got a GIMBAL LOCK - -

01 14 26 46 CMP I can't think of any combination of DSKY inputs - I was trying to think if I could have made some combination of DSKY inputs that might of - Had I gotten in almost the right inputs that I could have caused the problem, but I don't see where I was using any verbs or nouns that could have done this.

01 14 27 11 CC Okay, you got a GIMBAL LOCK and NO ATT. Did you get an ISS warning?

01 14 27 19 CMP No, sir; I did not.

01 14 27 22 CC ... good.

01 14 27 28 CMP And the NOUN 20s were approximately correct for both pitch and roll, although the middle gimbal angle was completely out to lunch.

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01 14 32 44 CMP Houston, Casper.

01 14 32 48 CC Go ahead, Ken.

01 14 32 55 CMP I'd like for you to think about the effects of having me go ahead and do a VERB 41 NOUN 20 to match up with the SCS. That thing's been drifting a good bit, but, in any case, maybe I can get it close enough to have a starting point to try and pick up some things. I'd been looking in the - had been looking in the telescope just before this all happened, and there's so much of this - so many of these little particles out there that chances of recognizing a star pattern are extremely dubious. I'd like to try. And maybe we can work on something like the Earth, maybe the Sun, or something like that.

01 14 33 35 MCC Go G&C.

01 14 33 38 CC Okay, stand by.

01 14 33 41 MCC Okay. Do you want to stand by on this VERB 41 NOUN 20 until you get your GIMBAL LOCK removed? Okay, CAP COMM, tell him we're working up - - Thank you.

01 14 34 12 CC Casper, Houston. We'd like you to hold up on the VERB 41 NOUN 20. We're working on a procedure to try to get rid of the gimbal lock.

01 14 34 23 CMP Okay. Did you have any data coming down at the time this all happened, or were you in the blind?

01 14 34 31 CC Roger. We had good high bit rate data, and they're pouring over that now.

01 14 34 39 CMP Okay. I'll sit tight then. Thank you.

01 14 36 44 CC Casper, Houston.

01 14 36 49 CMP Go ahead.

01 14 36 50 CC Okay. We want to try to get the platform inertial again, and what we'd like for you to do is a VERB 23 NOUN 20 ENTER, ENTER, VERB 40 ENTER.

01 14 37 07 CMP VERB 23 NOUN 20 ENTER. Then you want me to put plus ENTER into that register. Okay, that got rid of the GIMBAL LOCK light. Now you'd like for me to do a VERB 41?

01 14 37 28 CC VERB 40 ENTER.

01 14 37 33 CMP Okay. VERB 40 ENTER.

01 14 37 46 CC Okay. Our data shows the platform's inertial now, Ken.

01 14 37 57 CMP Roger. And it appears that way from here, too.

01 14 38 12 CC Okay. Ken, you can go ahead now with you VERB 41 NOUN 20.

01 14 38 23 CMP Okay. This will be a coarse align to the GDC angles, is that correct?

01 14 38 26 CC That's affirmative.

01 14 38 53 CC Ken, hold up on that VERB 41 just a second.

01 14 38 59 CMP Wilco. I'll go ahead and load it but won't enter.

01 14 39 04 CC Okay. Guidance has got a little thing they're looking at and talking to people in the back room, little discussion going on here.

01 14 39 15 CMP Okay. I won't do a thing, then. Thank you.

01 14 40 06 CC Casper, Houston. Are the GDC ball and the IMU ball completely out of sync?

01 14 40 24 CMP Well, actually, they're not that far out. They're like 10 degrees in outer gimbal and let's see the - I guess the middle gimbal is off by about 2 degrees, the inner gimbal no more than 3, lots closer to 2 degrees.

01 14 40 44 CC Roger. Copy.

01 14 40 45 CMP - - that close.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 14 47 45 CC Casper, Houston.

01 14 47 49 CMP Go ahead.

01 14 47 50 CC Okay, I think we got the agreed-on procedure here - is to go ahead with the VERB 41 NOUN 20. That's procedure - in the G&C Checklist - 7-1. And reset the REFSMMAT - REFSMMAT flag and press on through that.

01 14 48 09 CMP Okay. I guess, based on our drifts, I'm not sure that's any better, but I guess that's no worse, so I'll just go to that one, then.

01 14 48 18 CC Okay; 7-1.

01 14 48 24 CMP Okay. That's page 7-1. I understand.

01 14 56 46 CMP Hank, if it doesn't clear up, I won't be able to find any stars with no closer alignment than I have on this thing. Looks like I'm gonna have to get a - a coarser alignment by using some big objects like Earth or something like that.

01 14 57 01 CC Okay. Are those particles out there giving you a lot of trouble?

01 14 57 07 CMP That's all there is. They're just everywhere.

01 14 57 20 CMP When you combine them with the limited area that you have to look in because of the LM reflections, you find the telescope to be very unsatisfying.

01 14 58 08 CC Casper, Houston. Why don't you go ahead and try then, with the - the Sun and the Moon? You've got a filter for the Sun, right?

01 14 58 15 CMP That's affirmative.

01 15 06 49 CMP Houston, Casper.

01 15 06 53 CC Go ahead.

01 15 06 57 CMP Okay. I used the Earth and the Sun, and I got four balls 7, which I think is gonna be a significant improvement. I'd like to go ahead and see what those torquing angles turn out to be.

01 15 07 09 CC Roger. We concur.

01 15 07 13 CMP Okay. That looks about right for the amount that I had to correct for. It's - it's kind of hard to mark on the Earth because you have to guess where the - where the - the terminator really ought to be.

01 15 07 33 CMP ... torquing angles?

01 15 07 35 CC Roger, Ken. Go ahead and torque.

01 15 10 29 CMP Okay, Henry. If you have those angles, I'll torque these.

01 15 10 43 CC Ken, what was your NOUN 05?

01 15 10 48 CMP Four balls 1.

01 15 10 50 CC Roger.

01 15 10 55 CMP Okay. I'll torque these at - on the minute, 11.

01 15 10 59 CC Okay, clear to torque.

01 15 13 14 CMP Okay. It looks like we're pretty much on target now, and I don't see any reason to torque these again - unless you particularly want to.

01 15 13 30 CC Okay; we concur, Ken. Don't torque those. And we want to check a few switches. They're working on now getting a switch checklist, and then we're going to let you get some rest and smoke the data over during the night and have it stored for you in the morning.

01 15 13 45 CMP Okay. Can you give me any - Can you give me any cursory ideas of that, just the same - if there's any possibility I entered something inadvertently? Or does it take too long to sort all that out?

01 15 14 01 CC Okay. The preliminary look here - We think it's a hardware problem, Ken. Some sort of a transient problem, and when we get the data in here, we'll be able to tell a little more about it.

01 15 14 16 CMP Okay. Guess I'm sorry to hear that.

01 15 14 19 CC They - they don't think at this point that it's anything that you did, and it appears to be a transient problem, but we won't know until we take a look at it.

01 15 14 29 CMP Okay. Let me give you one other little tidbit that now seems to be somewhat more of - of interest than it was before, and that's that when I take this OPTICS ZERO to ZERO, the area around the shaft peapack [?] makes a lot of - a lot more noise than the one in the trunnion. It seems to me that it's making more noise now than it used to. When I say used to, when we first started out - when we first started out, they were very, very quiet and you couldn't even hear them running. And now they're getting noisier. And that may be typical, but it's just one more thing that - I guess we'll throw out all these things. I'll try to minimize the number the times I ZERO the OPTICS, at least with the ZERO switch. I'll use MANUAL wherever possible.

01 15 15 23 CC Okay. That only occurs when you're zeroing?

01 15 15 29 CMP That's affirmative. Well, actually, Hank, I just tried it in MANUAL. It occurs when - the noise occurs whenever I'm in an extremely high rate. You know, like using high in a max shaft rate.

01 15 15 52 CC Roger; copy.

01 15 16 37 CC Okay, Ken. We'd like to check some switches up on panel 1.

01 15 16 44 CMP Stand by a second.

01 15 17 06 CMP Okay. Go ahead, Hank.

01 15 17 09 CC Okay, we'd like to check position in FDAI SCALE.

01 15 17 13 CMP The SCALE is in 5/1.

01 15 17 16 CC Okay, SELECT.

01 15 17 20 CMP SELECT is in 1/2, the SOURCE is in ATTITUDE SET,
and the ATTITUDE SET is in GDC.

01 15 17 26 CC Okay. That's what we wanted to know. Thank you.

01 15 17 34 CMP Okay, I think I'll go ahead and get some sleep
then. Got any notes from ... yet?

01 15 17 40 CC Okay, stand by 1 sec.

01 15 18 06 CC Okay, Ken. We don't have anything else. ...

01 15 18 59 CC Casper, Houston.

01 15 19 02 CMP Go ahead.

01 15 19 04 CC Okay. You caught us on the antenna switch. We
don't have anything else for you. We'll look the
data over, and try and get some word up to you to-
morrow. It looks like to us now that you can get
a full 8 hours sleep.

01 15 19 18 CMP Okay. (Laughter) Thank you.

01 15 19 22 CC See you tomorrow.

01 15 19 27 CMP Okay, Hank. How about - how about making the
duller shift?

01 15 19 33 CC Roger (laughter).

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 21 59 11 CDR Houston, Apollo 16. Good morning.

01 21 59 56 CDR Houston, how do you read Apollo 16? Over.

01 21 59 59 CC 16, you're loud and clear. How me?

01 22 00 03 CDR I read you the same. Good morning to you.

01 22 00 07 CC How are you doing this morning?

01 22 00 10 CDR Doing great.

01 22 00 22 CDR I guess that sort of depends on what y'all can say about the old platform.

01 22 00 27 CC Roger.

01 22 00 37 CC Okay, 16. The gimbal lock and the coarse align that you had back at 38 plus 18 was caused by a CDU transient in the yaw axis. The transient was induced when the TVC relay was disabled. And this relay is normally enabled when the OPTICS is in MANUAL and disabled when you select POO, and that's kind of the situation that you're in when that occurred. And Ken had just selected POO, and he had, prior to that, been using the OPTICS in MANUAL. And they say that this type transient has been observed in CSM 117 testing, and we're presently looking at - a software workaround for LOI. And we'll get some more words to you later on this - on this same subject.

01 22 01 26 CDR Now you're talking. That's the best news I've heard today, so far.

01 22 01 41 CC Okay. And, John, we've had some problems here getting commands up to the bird - real-time commands. And we've got a command test we want to run. And - we'll be standing by. As soon as you can get ready, let us know and we'll get into it.

01 22 01 58 CDR Okay. We've got some seat flops to do and we'll let you know.

01 22 02 05 CC Roger.

01 22 02 36 CC 16, in the situation we're in now, we've only got one omni that we can read, and we can't command. So we're only getting about 11 minutes of low-bit-rate data out of every 18 while you're in PTC. It's possible - we might lose you; if so, just stand by and we'll pick you up again.

01 22 02 57 LMP Okay. We're ready for that command test, Pete.

01 22 03 02 CC Okay.

01 22 03 12 CC Okay, Charlie. We're gonna go one step at a time. First thing we want to do is UP TELEMETRY, COMMAND RESET and then NORMAL.

01 22 03 25 LMP Okay. I can give you - You want a COMMAND RESET and then NORMAL?

01 22 03 32 CC Charlie, we want the UP TELEMETRY COMMAND switch to RESET and then NORMAL.

01 22 03 42 LMP Roger. It's RESET, NORMAL.

01 22 03 48 CC Okay, Charlie. Stand by. We're gonna try some command.

01 22 04 09 CC Okay, Charlie. That apparently didn't work. We're going on in. But we want to cycle the UP TELEMETRY switch OFF for 3 seconds and then back to NORMAL.

01 22 04 22 LMP Roger. In work.

01 22 04 30 LMP Okay, you're back to NORMAL.

01 22 04 35 CC Okay. We're trying commands now, Charlie. Stand by.

01 22 04 52 CC Okay, Charlie. That apparently cleared it up.

01 22 04 59 LMP Okay.

01 22 05 03 CC And, Charlie, we've got commands again. We'll handle the antenna and the bit rate for you now.

01 22 05 09 LMP Okay, fine.

01 22 05 21 CC To repeat an old phrase, Charlie, we had a lot of people down here turning blue on this - until that - until that last little situation got cured there.

01 22 05 32 LMP Was that that IMU problem?

01 22 05 35 CC No, the - the - comm problem.

01 22 05 39 LMP Well, you could put Feindell in the backup mode and just put him up on top of the building.

01 22 06 01 CC We may have to put him up there anyway, Charlie.

01 22 06 06 LMP (Laughter) Afraid so.

01 22 18 50 CC 16, Houston. I've got about three - a couple, three updates to the Flight Plan. Whenever you're - it's convenient for you, we'll read them up.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

01 22 36 08 CMP Don, you about ready for a little status report?

01 22 36 14 CC Stand by a minute, Ken.

01 22 36 19 CC Okay, Ken. We're all set. Go ahead.

01 22 36 44 CC Okay, Ken. We're all set.

01 22 36 45 CMP Houston, Casper.

01 22 36 52 CC Casper, Houston. How do you read me?

01 22 37 10 CC Casper, Houston. How do you read?

01 22 37 32 CC Casper, Houston. How do you read me?

01 22 38 19 CC Casper, Houston. Do you read?

01 22 38 37 CMP Houston, Casper.

01 22 38 39 CC Casper, we read you loud and clear. Do you read me?

01 22 39 07 CC Casper, Houston. How do you read?

01 22 39 20 CMP Houston, Casper. Over.

01 22 39 24 CC Casper, we read you. Do you read us?

01 22 40 09 CMP Houston, if you're reading Casper, we're transmitting in the blind. We have signal strength on the meter of about 60 percent. We're not receiving you and, based on your comment about the antennas, we'll wait about 5 minutes and then try again before we change the configuration.

01 22 40 43 CC 16, you're loud and clear. Do you read Houston?

01 22 46 08 CC Casper, Houston.

01 22 46 15 CMP Roger. We lost you there for a while there, Don.

01 22 46 19 CC Roger. You're loud and clear now. Do you read me okay?

01 22 46 24 CMP Loud and clear.

01 22 46 26 CC Roger. You were loud and clear all the time. Apparently, you just lost us.

01 22 46 53 CC And, 16, the comm problem may have been on the ground. We'll try to find out and let you know in a minute.

01 22 47 09 CMP Roger.

01 22 47 19 CMP The background tone at the - the background noise that the system is making right now is a little different than it was making before, if that would help you figure out what the problem was. It's almost like it wasn't up-linking, maybe.

01 22 47 38 CC Roger, 16.

01 22 47 43 CMP Okay, Don; and, if you're ready, I'll give you some status reports.

01 22 47 48 CC Stand by just a minute, Ken.

01 22 48 14 CC Okay, Casper, go ahead with your status report.

01 22 48 22 CMP Okay. I'm using that famous old trick on how to get someone to talk to you, but every time I pick up a juice bag and get halfway down, why it seems like we are able to establish comm. So I'll start with the commander's list and I'll go through and I'll skip the menus since they're on separate pages and come back to them. So let's start with A-1: 22035; Alfa 3: 7, good; Alfa 4: none; Alfa 5: 19, 15, 18; Alfa 6: 6, 5, 6, and 3. That's a total of four. Going to Bravo. Bravo 1: 15035; 6: good — that's on Bravo 3. Bravo 4: none; Bravo 5: 10, 30, 25; Bravo 6: 2, 2, and 5. Charlie 1: 21059; Charlie 3: 7, good; Charlie 4: none; Charlie 5: 15, 30; Charlie 6: 7, 7, 5, 5, 5. Okay, and if you want the menu stuff, I'll go back to that now.

01 22 50 36 CC Okay, go ahead.

01 22 50 55 CMP Okay. For John, and that's day 2, meal B, scratch the bread and peanut butter. On meal C, scratch the frankfurters; add an orange drink.

01 22 51 50 CMP Okay, on Bravo 2. Are you still there, Don?

01 22 51 58 CC Affirmative; we're getting a lot of background noise. 16, hold off a minute - -

01 22 52 03 CMP Okay, ... keep on going.

01 22 52 04 CC - - we'll switch omnis ... Hold off a minute, 16; we'll switch omnis.

01 22 54 19 CC Okay, Casper. Go ahead.

01 22 54 26 CMP Okay, just a second.

01 22 54 39 CMP Okay, starting on - Where did you copy last?

01 22 54 44 CC Okay, we got John, day 2, meal Charlie complete, and we're ready, I guess, for Bravo.

01 22 54 54 CMP Okay, Bravo 2. On meal A, you can scratch sausage patties and - orange juice - and fruit cocktail.

01 22 55 37 CMP On Bravo, that's meal B, you can scratch turkey and gravy, vanilla pudding, bread, peanut butter. Meal C, you can scratch the chocolate pudding.

01 22 56 13 CMP Going to Charlie 2.

01 22 56 16 CC Okay.

01 22 56 19 CMP On meal A, scratch the sausage patties. Meal B, you can scratch the bread and peanut butter. Meal C, you can delete two of the frankfurters and scratch the chocolate pudding.

01 22 56 40 CC Okay, Casper, we copied all that.

01 22 56 46 CMP Okay, and a couple of other words here on the - We got ALFMED coming up; and, to date, Charlie saw some flashes the other night and not a whole heck of a lot of them last night. And I'm not sure I have seen any at all yet, and John may or may not. So, what we thought we'd do here is - We've got a little more housecleaning to do here and finish our chores. And we'll probably take a look at what we see, and if Charlie is seeing sufficient - you know, enough flashes that he's pretty sure he's

seeing things. why, we'll go ahead and run the experiment now. And if we aren't seeing a sufficient number to look like it justifies sitting here for an hour with it, why, what would you think about saving it until such time as it looks like maybe we see more of them?

- 01 22 57 45 CC Okay, Ken, we'll - we'll think on that a little. And also, I've got a note on the Nikon camera light meter here in connection with the ALFRED photography.
- 01 22 58 02 CMP Okay, stand by another second.
- 01 22 58 15 CC Ken, you don't really need to copy much, I think. If you've got the camera handy there where you can look at it, I can give it to you in a few words.
- 01 22 58 24 CMP You know one of the things we need in this program is some octopuses.
- 01 22 58 29 CC Roger.
- 01 22 58 57 CMP Okay, Don, I don't have the camera out, but how about just reading to me whatever it is you want to say. I'll write it down here.
- 01 22 59 05 CC Okay. It's not - it's probably not worth writing down except maybe a little note to remind you the - the camera was observed to hang up in the BATTERY CHECK position full down, when you hit the camera light meter ON, CHECK. And what we want you to do is - the little button on top of the camera there has a white band around the base of it - they want to make sure that white line is visible on the light meter switch button. If it's not visible, you can take your fingernail and catch the top of that button and pull out on it until the white line is visible. And then, verify that the meter is operating by holding the camera up to a light and observing the meter response to varying light level.
- 01 22 59 53 CMP Roger. We'll make sure it works before we use it.
- 01 22 59 57 CC Okay, Ken. That's all I've got on that one.
- 01 23 02 44 LMP Houston, 16.

01 23 02 46 CC Go ahead, 16.

01 23 02 50 LMP Roger. Flash, with a hot report here. Pass on to the chefs that the grits were delicious.

01 23 02 59 CC Say again, Charlie. I didn't copy that.

01 23 03 04 LMP I say, pass on to the chefs that the grits were delicious.

01 23 03 07 CC Roger; will do. And for Ken's information, the status report that we just got was excellent as far as format, readability, and everything. The - Doc said he really appreciates it.

01 23 03 25 CMP Always glad to help.

01 23 33 32 LMP Houston, 16. Over.

01 23 33 36 CC Go ahead.

01 23 33 39 LMP Okay, Pete, I'm up on biomed. How does it look?

01 23 33 45 CC Stand by 1.

01 23 34 29 CC Okay, the biomed data looks good.

01 23 34 35 LMP Okay, thank you.

01 23 34 41 CDR You can tell Charlie's still breathing, huh?

01 23 34 45 CC It looks that way.

01 23 34 51 CDR We've been suspecting it up here all along.

01 23 34 55 CC Roger.

01 23 35 44 CDR Houston, based on the burn yesterday, is the data you gave us for the SPS burn card still going to hold for LOI?

01 23 35 55 CC Stand by a minute.

01 23 36 00 CDR And the other question is, does it look like we're going to have another midcourse, and which one and how much is it?

01 23 36 07 CC Okay, we'll get back to you in a minute.

01 23 36 12 CDR Okay, thank you, Pete.

01 23 36 41 CC Okay, 16. On the burn card, we will probably have to do some more updating. We'll get to that tomorrow. And on the midcourses, midcourse 4, right now, is - looks like it's less than 1 foot per second. If it gets much bigger, we'll probably do it. But we'll advise you.

01 23 37 04 CDR Houston, 16. You're breaking up badly. How do you read us? Over.

01 23 37 16 CMP ..., Pete, you probably read us loud and clear in the ... mode ...

01 23 37 19 CMP Go ahead, Houston, ... Say again on all ... on the burn card.

01 23 38 08 CC Okay, 16, if you read. We probably will have to do some updating on that - on that pad. And we'll let you know on that and we'll update it tomorrow. And on the midcourse 4 - midcourse 4 is looking pretty small, less than 1 foot per second now. If it gets larger, we'll probably go ahead and do it, but we'll keep you advised on it.

01 23 38 43 CMP Houston, your up-link keeps fading in and out on you.

01 23 38 50 CC Roger, 16. We're switching on you.

01 23 38 51 CDR ... fading ...

01 23 39 10 CDR Houston, 16. Do you read us now?

01 23 39 12 CC I read you loud and clear. Do you read me?

01 23 39 17 CDR And I read you same. You faded out on your last transmission again.

01 23 39 23 CC Okay, hang on a minute until the comm clears up a little bit and then I'll come back to you.

01 23 39 29 CDR Okay.

01 23 39 44 CC Okay, 16. Let's try it again. On that updating the pad, we'll get that to you tomorrow. And right now, midcourse 4 looks very small, less than 1 foot per second. If it gets larger, we will probably do it, but we'll keep you advised on that.

01 23 40 01 CDR Outstanding.

01 23 40 16 CDR Just to review that SPS pressure system - as near as I can make out, it's purely - we don't actually have a DELTA-P. It's just - Of about more than 5 psi. What we do have is a gage difference. Is that not correct?

01 23 40 41 CC That's affirmative, John. There's a - there's a chamber in there - a reference chamber that's supposed to be at atmospheric pressure. It has apparently vented to a vacuum condition, which brings in about - about a 14.7-psi bias. Then there's a 5-psi meter bias on top of that.

01 23 41 01 CDR Okay, so actually, the two meters, as we look at them now, are actually balanced. Is that not correct?

01 23 41 08 CC I believe that's correct.

01 23 41 12 CDR Okay.

01 23 41 20 CC John, the actual pressures on both meters - the actual pressures are the same, although the meters are reading differently.

01 23 41 29 CDR Okay, we got the message.

01 23 44 01 LMP Houston, 16. Will we need to charge battery B, just looking ahead in the Flight Plan a little bit?

01 23 44 07 CC Just a moment.

01 23 44 36 CC Okay, Charlie, you can go ahead and start charging the battery now.

01 23 44 45 LMP Roger.

01 23 47 31 LMP Okay, Pete, BAT B is on charge now.

01 23 47 35 CC Understand. BAT B on charge.

02 00 00 25 LMP Houston, 16.

02 00 00 28 CC Go ahead, 16.

02 00 00 32 LMP Okay, Pete. We got you - Finally had time to lock out the window and you're just coming into view again and just as pretty as ever.

02 00 00 43 CC Very nice. What you looking at right now?

02 00 00 53 CC Can you tell what part of the Earth?

02 00 00 54 LMP We've got a half-Earth. Say again?

02 00 00 58 CC Can you tell what part of the Earth you're looking at?

02 00 01 03 LMP Well, we got half-Earth, and we see a landmass - see the North Pole - the north polar cap with two big swirls coming out off of it to the southwest. I can see the subsolar point very distinctly. It's a big white dot in the center towards the LM, away from the terminator. And there's a big landmass that's visible in the center. And - can't really make out exactly what it is. It's clear of clouds, though. It's the only place that's fairly clear.

02 00 01 44 CC Okay, we show you directly ober North Africa. And that's just about the terminator.

02 00 02 00 LMP Okay, you got North Africa at the terminator?

02 00 02 04 CC Just about.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 00 02 06 LMP Okay, that's what it is, then, looking at it, yeah.
 It's - it's Africa. Looks like a good storm sys-
 tem up in the Atlantic Ocean and above the subsolar
 point.

02 00 02 18 CC Roger.

02 00 02 45 LMP The blue coloring - the white of the clouds and
 the blue of the ocean, Dick. Things just stayed
 pretty constant as we move out - still really a
 spectacular sight.

02 00 06 22 CDR Houston, 16. Over.

02 00 06 24 CC Go ahead, 16.

02 00 06 30 CDR What do they think of this PTC down there in the
 trenches?

02 00 06 35 CC It's looking real good.

02 00 06 44 CDR It really does look good. I don't know who to
 congratulate, Ken or the computer.

02 00 07 13 CC I guess we'll give Ken credit for that one.

02 00 07 24 CDR Darn right.

02 00 08 31 CC 16, let us know what you think about the number
 of light flashes and whether or not it's feasible
 to try the ALFMED.

02 00 08 40 CDR Okay. That's in work right now.

02 00 08 43 CC Roger.

02 00 08 44 CDR That is, if you can work on seeing flashes.

02 00 08 50 CC Right.

02 00 08 56 CDR That's a low metabolic load.

02 00 09 01 CC Understand.

02 00 19 49 CDR Okay, Houston. We're going to start on the ALFMED now. I guess it'll take us about an hour and a half from the time we start to the time we finish up.

02 00 20 02 CC Okay. And you think you are seeing enough light flashes to make it valid?

02 00 20 09 CDR They haven't gotten around to doing that yet, but we're working on it.

02 00 20 12 CC Roger; understand.

02 00 20 13 CMP Don, Charlie saw some this morning when he got up. And so we're going to put the ALFMED on Charlie. And we will not turn it on until we start to see some flashes, and if we don't see any, we'll just terminate it. We'll wait some reasonable time, and we'll talk it over with you. We'll tell you when we're ready to go through it. That's our present plan.

02 00 20 39 CC Okay, K, we'll be standing by. And, Ken, while I'm talking to you, we've got a little more information on this platform problem and it's a fairly big mouthful, so, sometime when you get a chance when you can copy some information, give me a call.

02 00 21 00 CMP Okay. It looks like it'll be a couple of hours.

02 00 21 03 CC Roger. We don't want you to get into another P52 before we have time to talk about it.

02 00 21 10 CMP All righty.

02 00 21 18 LMP Pete, (clears throat) a little background on these flashes ...

02 00 24 02 CC 16, Houston. We missed your comments on the light flashes. You'd started to give them to us, and you were blocked out by noise.

02 00 24 13 LMP Roger, Pete. I was just telling you - the first night - during the first sleep period, whatever that was GET, I saw numerous light flashes before going to sleep, probably a - as freq - as high as

three or four a minute. The next morning, they were not as numerous as that, and then last night still not as numerous. This morning, I was perhaps seeing maybe one every couple of minutes or so. If that frequency repeats itself during this test, is that good enough to go ahead?

02 00 24 50 CC Stand by 1, Charlie.

02 00 25 03 CC Okay, Charlie. If you see one every minute or so, that's enough to go ahead.

02 00 25 09 LMP Okay.

02 00 26 01 CC And, 16. At 48:30 in the Flight Plan, there's a line that says "Synchronize mission timer to CMC clock," and it is not required.

02 00 26 11 LMP Okay.

02 00 26 12 CMP Oh, that's great. Thank you. Hey, Don, is our comm gonna be good enough the way we're going here now for you to get the marks or are we gonna - shall we count on recording them on board too?

02 00 26 28 CC You better record on board as well.

02 00 26 34 CMP Okay. You'll start the tape recorder, is that affirmative?

02 00 26 39 CC Affirmative. Call us when you're ready.

02 00 26 41 LMP Or you want us to do that?

02 00 26 42 CMP Okay. We'll do that; thank you.

02 00 26 52 CMP Okay, if at any time, the voice quality goes down, our procedures, as I understand them described, will - I'll knock off or I'll take Charlie's place here, and I'll knock off the observations and go to recording. And other than that, Charlie will be doing all the things that I was going to be doing. But, if you want us to record them in pen and ink at the same time, just give us a call.

02 00 27 20 CC Roger.

02 00 36 30 CC 16, Houston. Voice check.

02 00 36 38 CDR Loud and clear there, Pete.

02 00 36 40 CC Roger. You all were so quiet, you scared us.

02 00 36 51 LMP Okay, Pete. I just got the ALFMED on and in position, and we're gonna see if we see anything.

02 00 36 58 CC Okay.

02 00 53 33 LMP Houston, 16.

02 00 53 36 CC Go ahead, 16.

02 00 53 39 LMP Okay. I've seen five in 15 minutes.

02 00 53 42 CC Five in 15 minutes, Charlie?

02 00 53 46 LMP That's affirm.

02 00 53 50 CC Okay. Stand by a minute; we'll look at that.

02 00 53 52 CMP Okay, Don. We were just about ready to call this thing off and try it another day. And then looked like Charlie was starting to see them at - at a pretty fair rate. That five in 15 minutes was like four in the last minute or 2. And John has seen one; I have not seen any yet. But sounds like Charlie is gonna be able to see these and I'm gonna go ahead and take the photographs and get - get all set and wait for your answer.

02 00 54 26 CC Okay. We've been advised that we do want to go ahead with the ALFMED experiment.

02 00 54 33 CMP Okay. It's in work. I'll tell you when we're ready to start timing.

02 00 54 37 CC All righty.

02 00 54 41 LMP Okay, Pete. They seem to come in clusters. You get one or two right after - and then - then nothing for a while.

02 00 54 50 CC Roger.

02 00 58 07 CMP Hey, Don. Can you help us ... record our ... 12 ... 0.15, 1.2, ... at 3 feet shows Charlie in the

ALFMED with his face sticking out. I'm taking a picture from the LEB looking up towards the center couch.

02 00 58 40 CC 16, that was so garbled we didn't copy, so you're gonna have to say it again.

02 00 58 45 CMP Did you copy that, Don?

02 00 58 47 CC Negative, Ken. We were in - had a lot of background noise, and we didn't get any of that.

02 00 58 52 CMP Houston, Casper.

02 00 58 55 CC Casper, go ahead.

02 00 59 00 CMP Did you copy comments about the film?

02 00 59 02 CC Negative; we did not. We had too much background noise. Can you say again?

02 00 59 09 CMP Okay. I guess I'll write it down. I think that's faster after all.

02 00 59 13 CC Okay.

02 01 08 42 CMP Okay, Houston. We're ready to start. Could you make sure the tape recorder is running?

02 01 08 58 CC Ken, it's been running awhile. We're going to rewind it, and I'll get it back to you in a minute.

02 01 09 12 CC In the meantime, Ken, if you've got comments we'll take them on air-to-ground.

02 01 09 21 CMP Does that mean you want us to go ahead and start?

02 01 09 25 CC Affirmative.

02 01 09 33 CMP Was that Roger or Stand by?

02 01 09 36 CC Affirmative; go ahead and start.

02 01 10 12 CMP Okay, Don. We're running at 49:10.

02 01 10 16 CC Okay.

02 01 10 22 LMP MARK. Okay, a bright dot in the - in my right eye in the upper - upper left center.

02 01 10 31 CC Okay.

02 01 10 39 LMP MARK. Bright dot in the left eye, upper left - right center.

02 01 11 11 LMP MARK.

02 01 11 12 LMP MARK. The first one was a fuzzy dot in the right eye - the left eye. The second one was a bright dot in the right eye, lower left center.

02 01 11 47 LMP You copying, Houston?

02 01 11 49 CC Affirmative. We're copying.

02 01 12 02 CC DSE is now running.

02 01 12 08 LMP Okay.

02 01 12 46 LMP MARK. Light streak - white streak in the right eye, upper center - moving from up - bottom to up - top.

02 01 12 59 LMP MARK. Faint left - faint white dot in the left eye - extreme left.

02 01 15 47 LMF MARK.

02 01 15 49 LMF ... upper right eye ...

02 01 15 50 LMF MARK again. Same spot. That was a bright dot.

02 01 16 31 CMP MARK. Bright flash in upper left eye.

02 01 17 08 CMP MARK. Flash across the bottom of right eye - white dot - from right ... left to right but I doubt it. [sic]

02 01 17 32 LMP MARK. Simultaneous white dots in the right eye, upper and lower center.

02 01 20 05 LMP MARK. Right eye center a - just a bright flash.

02 01 21 52 LMP MARK. A bright flash in the lower center of the right eye.

02 01 22 42 CMP MARK. A little light dim streak in the lower right eye - lower left.

02 01 23 06 CMP MARK. Lower left - left eye, in the outboard, and it was a bright flash - looked like a streak - probably going from right to left.

02 01 24 52 LMP MARK. Bright dot, upper right, outboard, right eye.

02 01 27 41 CDR MARK. Dot - bright dot in the upper right eye, center.

02 01 28 56 LMP Okay, Houston. I've also added some very subtle things that - just very - looks like little dim flashes that I haven't been calling. They're just so subtle, I've been afraid to call them a definite mark.

02 01 29 15 CC Okay, Charlie. We copied that.

02 01 30 00 LMP MARK. Upper right eye going from left to right.

02 01 30 12 LMP Light flash.

02 01 30 25 CC Okay. And, Charlie, if you see any more of the subtle marks, how about calling them and just call them a subtle mark. We'd like to record that information.

02 01 30 35 LMP Okay.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 01 33 16 CDR MARK. Bright dot, right eye, center, upper.

02 01 33 45 CDR ... Left, right, left [?]. I got the impression it was moving toward me. Why, I don't know, but it didn't - didn't ...

02 01 34 01 CC 16, you're very weak.

02 01 34 13 CMP MARK. Subtle one, very subtle on the left eye, outboard, upper.

02 01 35 14 CMP MARK. Flash in the lower right eye, sort of a distant lightning flash.

02 01 35 41 CMP MARK. Upper center of upper right eye - bright light flash.

02 01 39 58 LMP MARK. Faint dot, lower left eye, inboard.

02 01 42 04 LMP MARK. Flash, a - a light streak in the left eye, starting at the center going to the bottom right from upper - from upper - center down to right in movement.

02 01 42 39 LMP MARK. Bright dot, center, right eye.

02 01 43 01 LMP MARK. Left eye, sort of subtle, towards inboard center, a white flash.

02 01 43 55 LMP MARK. Subtle dot - white dot - in the inboard center of the right eye.

02 01 44 03 CMP MARK again. That was the left eye. That was the center upper, white dot, left eye; both of those were left eye.

02 01 44 23 CMP MARK. Upper right - part of right eye, white flash, small.

02 01 44 51 LMP MARK. Subtle white flash, inboard upper right eye. inboard corner, that was.

02 01 45 01 LMP MARK. Same spot. A white streak.

02 01 46 15 CMP MARK. Right eye, center, white dot.

02 01 46 26 CMP/LMP MARK.

02 01 46 27 LMP White dot, center - center right; lower of the left eye.

02 01 46 34 CMP Same here. All at the same time Charlie did. Only mine were in the lower left side and not the right.

02 01 46 46 CDR MARK. Flash across the bottom of the left eye, high speed.

02 01 49 11 CDR Hey, Don. Can you tell us how we're doing on time?

02 01 49 15 CC Stand by 1; I'll let you know.

02 01 49 20 CC You've got about 20 more minutes.

02 01 49 27 CDR Okay, thank you.

02 01 49 35 LMP Don, this thing was made for about a size 6-1/4 or something head. It's really tight on me.

02 01 49 48 CC Okay, Charlie. We'll make a note of that.

02 01 49 52 LMP I'm not complaining, it's just a little tight.

02 01 49 55 CC Roger.

02 01 50 34 LMP MARK. Bright flash down at the right center of the right eye ...

02 01 51 11 CMP MARK. A dull fuzzy spot in the outboard center of the left eye.

02 01 52 05 CDR MARK. Flash in the center of the right eye - sort of like a small flash.

02 01 52 56 CMP MARK. Flash in the center of left eye, just a faint flash - much more like a dot.

02 01 56 36 CMP MARK. White dot, outboard, right eye, center.

02 01 57 09 CMP MARK. Small flash in the lower center of the right eye.

02 01 58 02 CMP MARK. Very tiny flash in the lower center of the left eye.

02 01 58 14 CMP MARK. Streak across the lower left of the left eye, on the inward side. The light's going from left to right to left.

02 01 58 39 CMP MARK. Two little dots, flashes in the upper right center of the right eye - left eye, excuse me.

02 01 59 38 CMP MARK. Small flash in the upper right center of the ...

02 02 00 08 SC ...

02 02 00 11 LMP MARK. My last mark was the upper center right eye, little flash.

02 02 00 21 LMP MARK. Small flash in the left center of the right eye.

02 02 01 04 LMP MARK. MARK. A - one - the first one was right eye, a streak going from inboard center to the upper right. Left one was a streak, pencil shaped - a pencil line, left eye from center to upper right.

02 02 02 04 LMP MARK. Very subtle flash in the light - right eye, upper cen - upper right.

02 02 02 13 LMP MARK. Another subtle one just below that, center right, right eye.

02 02 03 12 LMP MARK. Left eye, a streak starting in the center.

02 02 03 16 LMP MARK. Right eye, dot, center. The left eye was a streak starting in the center going out to the right. It increased in size as it went from right to left.

02 02 04 02 LMP MARK. Subtle dot, outboard side, center left eye.

02 02 06 26 LMP MARK. MARK. Faint dot in the right eye, center, upper, and the inboard side is a white dot in the left eye - and the second one - was in the inboard side, center.

02 02 07 09 LMP MARK. Dot, right eye, outboard center.

02 02 07 31 CMP MARK. Streak in the lower left of - left eye, moving from top to bottom.

02 02 08 29 LMP MARK. Simultaneous white dots, right and left eye. Left one was in the upper right, inboard center. Left - right one was in the inboard bottom, left.

02 02 09 24 LMP MARK. Subtle flash in the right eye, upper inboard.

02 02 09 31 CMP MARK. Flash in the right eye, right side.

02 02 10 57 LMP Houston, 16. How's the time?

02 02 11 08 CC 16, we figure the time is about up on the ALFMED experiment. We'd like to know if the motor is stopped.

02 02 11 19 CMP No, it's still running.

02 02 11 20 LMP MARK. A streak in the lower left side of the left eye, moving down.

02 02 11 28 CC Okay, Ken. Keep going until the motor stops.

02 02 11 35 CMP Okay.

02 02 11 37 LMP MARK. Thin white dot upper right, inboard, left eye.

02 02 13 18 LMP MARK. Lightning-flash-type phenomena, lower right, inboard, left eye.

02 02 14 34 LMP MARK. White dot, center, left eye.

02 02 15 22 LMP MARK. White dot, left eye, outboard, center.

02 02 15 29 CMP MARK. White dot, left eye, center.

02 02 15 41 LMP MARK. Right eye, center, inboard, a white dot.

02 02 15 48 CC Okay, Ken, we've got all the ALFMED data we need. We want you to give us a mark when you shut the motor off.

02 02 16 08 CMP Okay, Pete.

02 02 16 10 CMP MARK. ALFMED is off.

02 02 16 14 CC Roger.

02 02 18 37 CC 16, Houston. Whenever you can copy, I've got some words on the IMU problem that we had. Also some - an entry to the G&C Checklist.

02 02 18 47 CMP Okay, Don. How about standing by, would you? Stand by until we clean up all the ...

02 02 18 54 CC Roger.

02 02 18 58 CMP You're cutting out pretty bad, Don.

02 02 19 03 CC Okay.

02 02 28 05 CC 16, the PI advises on the ALFMED experiment that we got about 70 counts, and he's very happy with the results, and he wants you to verify that the clutch is in the STCW position.

02 02 28 19 CMP That's a verify.

02 02 28 23 CC Roger; thank you.

02 02 28 24 LMP Okay, great. Those things - those things are really something, Don. There were a couple of the phenomena that I had seen previously that I didn't see today, but there were some other ones today that were different too. The phenomena - the flashes leave no afterglow and they're - they're just instantaneous. All the colors are white - were all we saw. We saw no colors at all; neither John nor I. It was - every one we saw was white.

02 02 28 55 CC Roger; copy that.

02 02 32 16 CMP Okay, Don. I'm ready to copy some things now.

02 02 32 22 CC Say again, Ken.

02 02 32 23 CMP Before we get into copying stuff, let me confirm what Charlie said about that clutch. Now I listened to that thing retract before, and as soon as we went to the mid-position on the clutch - why, you can hear the plates come down. And we went ahead and rapped it once, anyhow, just to be sure, but I didn't hear anything jiggle. And we cycled it to OPERATE and then back to STCW, and it all felt normal and the - the plate travel sounded proper.

02 02 32 56 CC Okay, we copied that, Ken.

02 02 33 00 CMP Okay, and I guess my only comment on ALFMED is that I think those light flashes are made by the same guy that makes the emperor's clothes.

02 02 33 08 CC That makes what?

02 02 33 13 CMP I think they're made by the same guy that makes the emperor's clothes.

02 02 33 17 CC Roger; understand.

02 02 34 19 CMP Hey, Don, I'm standing by to copy the words you got about P52s and G&N and any of those other subjects pertaining to our operation.

02 02 34 28 CC Okay, Ken, I'll - we'll talk about the platform problem first, and I'm gonna back up and talk about the original data that we passed up because there are some small corrections to that. And then I'll - I'll try to break it down into about four shovelfuls here for you, because it's a fairly big mouthful if we try to do it all at once.

02 02 34 50 CMP Okay. You have some stuff that I probably should copy, huh?

02 02 34 54 CC Yes, I will have some items for you to copy.

02 02 35 01 CC Hold off a minute, 16. We're coming up on an omni switch.

02 02 35 10 CMP Roger.

02 02 36 53 CC Okay, 16. How do you read now?

02 02 36 58 CMP Loud and clear.

02 02 37 00 CC Okay, we'll start here on this thing. First of all, the - the problem occurs, apparently, in CSM-117 when the TVC relay changes state, either going from enable to disable or from disable to enable. And it causes an electric glitch that makes the CDUs go to 90 degrees; in particular, the yaw CDU, and therefore the CMC thinks it's in gimbal lock and goes into a coarse align mode.

The - Some of the cases that could cause this, for example, are when you go to - when you select MANUAL OPTICS, you have the TVC relay enabled and then if you go from MANUAL to AUTO, or if you hit the ZERO OPTICS switch with MANUAL OPTICS selected, or if you go from P52 to P00 with the MANUAL OPTICS selected, you will reset the TVC relay, and that can cause the glitch. This is apparently what happened last night.

02 02 38 15 CMP Okay, is it important for me to copy those things that cause this, or are you going to give me a way to prevent it?

02 02 38 21 CC Negative. You don't have to copy those. That's just background. Now we're going to talk about what you can do here in P52s and maybe subsequently in - for the LOIs and for P40s. There are two ways to approach the P52. There's a - There's a quick-and-dirty way which is to simply go to SCS CONTROL, because with SCS control, the TVC relay is not enabled. And, by doing that, you don't run the risk of generating this glitch. That's not the way, however, that the guys are recommending, because they have a procedure that they think will handle not only the P52, but the burn cases. And they'd like you to get that procedure, and you're going to have to copy that one.

02 02 39 11 CMP Okay. How about running down that list of things that causes the TVC enable to change state again? Let me - let me copy those this time.

02 02 39 23 CC Okay, will do. And - now - these cases are not all inclusive. These are just some examples that - that we can bring up to you. First of all, the TVC relay is enabled when you select MANUAL OPTICS. It is then subsequently disabled if you go from MANUAL to AUTO, or if you go to zero the OPTICS with MANUAL selected, or if you go with MANUAL - with the MANUAL OPTICS selected, if you go from P52 to P00. But these are probably not the only cases; they're probably just some examples that we know of.

02 02 40 11 CMP Okay.

02 02 40 12 CC Another important point, Ken, is that it changes state during the TVC gimbal drive check.

02 02 40 22 CMP Yes, that's what I was afraid of. Okay.

02 02 40 24 CC Okay. We're going to - This next procedure that I have to read up to you is probably going to be the one that we'll use to try to get around that. And also, we'd like you to use it in the P52s because it allows us to monitor for the glitch, and at the same time prevents the glitch from bringing your platform down.

02 02 40 44 CMP Okay.

02 02 40 47 CC Okay, if you're ready to copy - -

02 02 40 48 CMP ... - -

02 02 40 49 CC - - I'll read you up the procedures.

02 02 40 51 CMP - - ... copy this or - Okay, I'll just copy this on a scratch pad, and we'll put it in the appropriate place, if that sounds reasonable.

02 02 40 57 CC Roger. That sounds real good. Number 1, we want you to key VERB 48 ENTER and load NOUN 46, REGISTER 1. The first digit should be loaded as a 3. The rest of the numbers can be left as they are.

02 02 41 25 CMP Okay, why don't you read on at about that pace, Dor, and I'll just copy, and then I'll read it back to you?

02 02 41 31 CC Okay, the second step is key VERB 25 NOUN 07 ENTER, 75 ENTER, 1 ENTER, 1 ENTER. That sets the average g flag, but does not turn average g on. The combination of those two will prevent the CMC from going into coarse align. After you've done that, you can select P52 and use your normal alignment procedures. And, when you've completed the P52 to terminate this - EMP, we'll have you key VERB 48 ENTER, load NOUN 46 REGISTER 1 with its original value, whether that was 2 or 1 in the first digit. Step 2, we'll have you a key VERB 25 NOUN 07 ENTER, 75 ENTER, W ENTER, ENTER. That will then return your - you to the correct DAP and also reset the average g flag.

02 02 43 18 CMP Okay, that - that was, in VERB 25 NOUN 07, that was a 75 ENTER, 1 ENTER, and then zero ENTER or a 1 ENTER?

02 02 43 26 CC Zero ENTER.

02 02 43 30 CMP Okay.

02 02 43 32 CC Okay, that's the whole procedure.

02 02 43 37 CMP Okay, let me look it over here for a second. At first glance, the first thing I see here looks like - do I - should I ...?

02 02 43 58 CC 16, we're switching omnis; hold off a minute.

02 02 45 50 CC Okay, 16. How do you read now?

02 02 45 55 CMP Loud and clear.

02 02 45 56 CC Okay. We lost comm there temporarily. You can go ahead now with the readback on that any time you're ready.

02 02 46 05 CMP Okay. Did you get my questions about the VERB 46?

02 02 46 09 CC Negative, but we have a caution note that says, "Do not key VERB 46 ENTER while this EMP is in to prevent Sap - Saturn DAP actually coming on."

02 02 46 20 CC Okay, thank you.

02 02 46 34 CMP Okay, what you would do then is - we're gonna set Saturn DAP in average g in order to prevent coarse aligning in the event middle gimbal picks up spurious signals. And to do this, we set VERB 48 with a NOUN 46. Digit A is set to a 3, and we set the average g flag with a VERB 25 NOUN 07, address 75, bit 1, set it to the 1. Then we should call P52 normally, and if the glitch occurs, it'll be ignored. I assume from this if the glitch occurs some time while we're in the process of taking marks, that we get some kind of garbage out of P52, but it should be obvious. And from what you gave me on this list up at the top, it looks like normally we would not run across TVC ENABLE during that period. At the completion of a 52, we go back

into a VERB 48, and now we take NOUN 46 back to its original values. Then we reset the average g flag by taking channel 75 bit 1 to a zero, using VERB 25 NOUN 07, and the restrictions on this EMP is that we will not use VERB 46 at any time while this is punched in.

02 02 48 04 CC That's affirmative, Ken.

02 02 48 12 CMP Okay, do you have some words on how - on how we handle the P40?

02 02 48 30 CC Okay, Ken, and - in the P40 is what we're thinking about and we haven't completely decided now is we probably use this EMP before and after the TVC gimbal check, and we may move the TVC gimbal check earlier or before the burn so that we have plenty of time to get this thing in and out.

02 02 48 56 CMP Okay, that sounds like a good plan.

02 02 49 00 CC Okay, now I've got the last shovelful here if you're ready to copy.

02 02 49 06 CMP Okay, I've got my bucket out.

02 02 49 08 CC Okay, if you should lose the platform alignment, we'll do the same thing we tried last night, a VERB 23 NOUN 20 ENTER, ENTER, VERB 40 ENTER, and then go to the checklist, G/7-1, and do the rapid IMU realign.

02 02 49 44 CMP Okay, Don. If we tumble the thing again, we're going to release the platform by setting NOUN 20 to - to zeros, and we do that with the VERB 23 NOUN 20 ENTER, ENTER. Then we release the platform with the VERB 40 ENTER, and then we go through page G/7-1 and get a rapid alignment to the GDC. Now that - that assumes that what happened to us was the glitch in the middle gimbal. If I understood your conversation, it's possible to have a glitch in one of the other gimbals. Is that correct?

02 02 50 23 CC That's correct. That will not, however, get you into the - into the problem that causes the platform to go into coarse align. And also, we were advised that while this EMP is in, you shouldn't have the problem with losing the platform alignment.

02 02 50 41 CMP Okay. If we - if we get this glitch in one of the other axes - I - and we have the controls enabled, I assume one of the things we would - we'd see would be some unusual thruster activity.

02 02 50 58 CC That's affirmative, and in that case I guess all you need - -

02 02 51 00 CMP ... proper correction. Well, I'm trying to figure out what we'd do if we have a - say we're in attitude hold. If we have that glitch occur right now and - with our engines disabled, I don't think there would be any way I'd see it until I went to use some auto optics or something. And that - if we were in an attitude hold, it appears to me that I would see a - a DAP that appeared to be unstable in the axis that it was going for, or at least it would take off for some place other than where it is. And we would go to SCS momentarily, and the proper response would be a VERB 40, ENTER, and allow the CMC to zero and recount the IMU CDUs. Is that correct?

02 02 51 50 CC Right on.

02 02 52 00 CMP This TVC enable that we're talking about that's used for the gimbal drive test - now that's a function only of the gimbal drive test and not a function of the setting of the trims in P40. Is that correct?

02 02 52 15 CC That's affirmative.

02 02 52 20 CMP Okay, so, our P40 then would be something like we would go out and we'll get a gimbal drive check to you folks early, then we'll turn the gimbals back off probably, and I'm just ... what I'm ... - -

02 02 52 35 CC Omni switch coming up, 16. Stand by. Stand by, 16; we're switching omnis.

02 02 52 46 CMP Roger.

02 02 54 19 CC 16, how do you read now?

02 02 54 23 CMP Loud and clear, Don.

02 02 54 24 CC Okay. Go ahead with your question.

02 02 54 25 CMP I'm trying to give you my impression of what we're gonna be - the general approach to the burn - and we check out the gimbal drives and the gimbal trims and then, when we come into P40 for the actual burn, we would go ahead and use the SCS gimbal checks to verify all the gimbals are properly hooked up. Then we would bypass the flashing 202 with an ENTER, and we'd just let the gimbals go to trim, and everything else would be done nominally.

02 02 55 07 CC Ken, I think your general impression is right. I guess we're not yet ready to commit ourselves to a - a set of procedures. We're going to have Stu take a look at it in the simulator here, and we'll come up to you later with some detailed procedures specifically for the burn.

02 02 55 27 CMP Roger. I understand that; I just wanted to make sure I had a general understanding in case we had to do some original thinking.

02 02 55 35 CC Roger. I think we concur with what you said so far.

02 02 55 51 CMP Okay. And the other thing, that out of curiosity - if the guys in the back room, after they get through getting all the important things squared away, that they could kind of think some more about their list of things that causes this enable relay to change state. I'll compile a list of those things in case we come across something later on that we hadn't thought about.

02 02 56 16 CC Okay, Ken, we'll do that for you. And there's one last note here, that, prior to your P52s, it'd be a good idea to align the GDC just prior to going in.

02 02 56 30 CMP Yes, sir. I don't think I'll let that guy get very far away from us.

02 02 56 33 CC Roger.

02 02 56 54 CC And, Ken, I've got an update to the G&C Checklist on page 9-4 any time you're ready to copy.

02 02 57 09 CC Okay, pencil in hand.

02 02 57 13 CC Okay, on page 9-4, line 07, column A - -

02 02 57 20 CMP Yes, sir.

02 02 57 21 CC Column A, line 07, should read "76747." Line 11 should read "77552." Line 12, "77756"; line 13, "77307."

02 02 58 05 CMP Okay, I'm on page G/9-4, reading down column A. On line 7, I replace "77426" with "76747." On line 11, I replace "00214" with "77552." On line 12, I replace "77714" with "77756." Line 13, I replace "77446" with "77307."

02 02 58 49 CC That's correct, Ken.

02 02 59 10 CC And we've got, Ken, here some notes on this jet-on monitor EMP. We'd like to do a check on it at 54:25, and I can read you up the procedure for that any time you're ready to copy.

02 02 59 24 CMP Go ahead.

02 02 59 27 CC Okay, at 54:25 in the Flight Plan, we would like to add "P20 option 5," in the "LM checkout attitude"; NOUN 78, minus 09000, minus 03000, plus 25500; NOUN 79, plus 00050; NOUN 70, plus 00047. We will up link the jet-on monitor loads and, when the P20 maneuver is complete, you can do a VERB 74 ENTER. And the P20 attitude that we've selected will be the attitude that you're already in, so there is actually not a maneuver involved here.

02 03 00 49 CMP Okay, when you say when maneuver complete, - does that mean that you would want us to maneuver to the LM checkout attitude using P20, or are you going to let us go to VERB 49 for that? And then, I'll call it up and bypass the maneuver, is that correct?

02 03 01 06 CC You can use a VERB 49 for that, Ken.

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02 03 01 11 CMP Okay, I understand. A VERB 49, and then we'll call P20, and then you can command the same attitude I'm in.

02 03 01 17 CC That's affirmative.

02 03 01 18 CMP In other words, I've got the 50:18 the second time. Then you want the VERB 74, ENTER.

02 03 01 24 CC That's affirmative. Coming up on an omni switch, 16. Stand by.

02 03 03 24 CC 16, how do you read now?

02 03 03 29 CMP Loud and clear, Don.

02 03 03 31 CC Okay, the only other thing is at 56 hours, that's 56:00, we want you to terminate the jet-on monitor EMP.

02 03 03 53 CMP Okay, can you tell me what dead band you are gonna be setting in there?

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 03 04 35 CC Okay, Ken, it'll be a 1-degree dead band.

02 03 04 49 CMP Okay, you're setting me in the EMP at 1-degree dead band; is that affirm?

02 03 04 55 CC That's affirmative.

02 03 05 15 CC Ken, on the NOUN 70, I read you a - a plus 00047. You actually don't need that plus; that's an octal number.

02 03 05 25 CMP Roger. I understand.

02 03 05 29 CMP Okay, it's not clear to me - if we are going to exceed this or not; we normally would not. Do you want to try letting us drift out of the dead band and see if the monitor works?

02 03 05 55 CC Negative; that's - that's not the intent, I think. They just want to get the program in and look at it.

02 03 06 03 CMP Okay. Well, sometime before we get through, would you ask them if they would object to letting us see if that thing triggers the same response that we're used to?

02 03 06 16 CC Okay, Ken; we'd like to think that over. We'll get back to you on that.

02 03 06 21 CMP Okay, fine. Thank you.

02 03 06 23 CC Okay. Now I've still got this note that we've had since about 24 hours ago on changing the angle on that Sun wheel, and if you have that out now, we can clean that up; otherwise, I'll hold it a while.

02 03 06 37 CMP I don't have it out, but why don't you tell me what it is. I think I know what you're talking about. It's due to the REFSMMAT angles on there being changed.

02 03 06 44 CC That's affirmative. And we (belch) inked "27 degrees" on it. We should have written in "37 degrees."

02 03 06 59 CMP Okay. It turns out we're at - is inked in at 27 and it should be 37.

02 03 07 06 CC That's affirmative.

02 03 07 11 CMP Okay, thank you. I'm glad you remembered that.

02 03 07 14 CC Roger.

02 03 10 12 CC 16, terminate battery Bravo charge.

02 03 10 17 CDR Okay. Okay, it's in work.

02 03 10 24 CC Roger.

02 03 10 42 CDR What's the probability of this - glitch happening? Is it about one in a million?

02 03 10 47 CC Stand by 1

02 03 10 59 CDR Say again, Pete. You cut out.

02 03 11 01 CC 16, I guess we really don't know the answer to that. That's one of the reasons we want to get this EMP in to kind of watch for it and see if it's occurring frequently or infrequently. Omni switch, 16.

02 03 11 53 CDR Okay, Don, we're going to go ahead and punch through this P52 and we'll start with our little procedure here, and you might kind of watch us through and make sure we do it right the first time.

02 03 12 05 CC Will do.

02 03 13 23 CDR Okay, Houston. You're watching this, right?

02 03 13 25 CC That's affirmative. We're watching and you can go ahead.

02 03 13 30 CDR Okay, and what did you say the probability was of this thing happening?

02 03 13 34 CC I think we don't know the answer to that, John. That's why we want to load this software program, so we can monitor to see if that glitch is occurring frequently - or it may never occur again; we really don't know.

02 03 13 48 CDR Understand.

02 03 13 51 CMP Okay, I've got it in. I'm going to call P52.

02 03 13 55 CC Roger.

02 03 14 15 CC Can you get the GDC aligned up?

02 03 14 20 CMP Oh, yeah.

02 03 14 21 CDR You better believe it.

02 03 17 23 CMP Houston, how do you like those angles?

02 03 17 30 CC Stand by 1.

02 03 17 36 CC Look real good, 16.

02 03 17 41 CMP Do you want us to torque some that small?

02 03 17 50 CC Go ahead and torque them.

02 03 17 53 CMP Okay. We'll do it at 17 minutes. Yeah, I guess that's 51:18, excuse me.

02 03 18 07 CC Understand 18 minutes.

02 03 18 12 CMP Okay, would you like for me to return it to zero with the switch in MANUAL this time, just to see if you get that glitch?

02 03 18 22 CC Affirmative.

02 03 18 34 CDR Going to zero.

02 03 18 36 CDR MARK.

02 03 18 59 CC And, 16, we didn't see any glitch. There, we're coming up on an omni switch.

02 03 22 19 CC And, 16, that EMP that we loaded to protect the platform - we'll refer to it as EMP 509.

02 03 22 34 CDR Okay, 509; sounds familiar.

02 03 22 37 CC Roger.

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- 02 03 30 34 CC 16, if you'll go ACCEPT, we've got an up-link for you. And I've got news, if you're interested.
- 02 03 30 43 CDR Okay, here's POO and ACCEPT. And, yeah, we're interested.
- 02 03 30 48 CC Okay. Former President Lyndon Johnson is resting comfortably after he was hospitalized again following an increase in his heart rate. He's hospitalized in San Antonio. Vice President Agnew, speaking here in Houston, has asked the nation's supermarket executives to hold the line on prices. If prices for food continue to soar, Mr. Agnew hinted at mandatory Federal controls. President Nixon added a stop during his scheduled trip to Moscow. Prior to returning home, he will stop off in Poland to discuss Polish-American relations. The Moscow trip in late May is still on, despite some fears that recent developments in the Vietnamese conflict could affect the President's visit to the Soviet Union. State news: The Texas governor's race is still a hot item, but no word yet from John Connally, who said he may speak out on the wide-open race. Congressman Bob Eckhardt says the U. S. needs at least three large super ocean ports to keep in contention with the world market. He says the Galveston-Houston area is a prime superport site. And on sports news: The Astros captured their first victory of the year with a 7-2 win over the L. A. Giants. And some scores on the other games: in the American League, Cleveland 4, Boston 0; Baltimore 1, New York 0. In the National League, St. Louis 5, Philadelphia 4; Los Angeles 8, Atlanta 3. The Boston marathon, run yesterday on Patriots Day in Bean Town, was won by a 25-year-old engineering student from Finland. Strangely enough, they have omitted his name. A 33-year-old Long Island, New York, woman, Nina Kuscsik, won the special ladies division. The Los Angeles Lakers and the Milwaukee Bucks are tied 2-2 in their Western division playoffs in the NBA.
- 02 03 33 00 CDR Charlie wants to know how (laughter) - how Consolidated Jack Pine is doing.
- 02 03 33 08 CC (Laughter) Was that Consolidated Jackpot?

02 03 33 13 CDR Jack Pine.

02 03 33 14 CC Roger.

02 03 33 21 CDR Prcbably lost 3 or 4 points again yesterday.

02 03 33 25 CC Roger. Charlie, I guess I haven't got those figures handy. We'll see what we can do.

02 03 33 44 LMP If you can find out, Pete, you're a better man than I am. I've been trying to find it for 10 years.

02 03 33 50 CC Okay, Charlie. And you can have your computer back, 16.

02 03 34 10 CDR Yeah, that compensation you guys put up there really fixed that baby.

02 03 34 15 CC Yeah, seems to have.

02 03 34 18 LMP Plus Ken's marks.

02 03 37 42 CMP Don, we're gonna put off the Skylab ... until our ... and take the time to do it right. And we're gonna - gonna mix up ... snacks and try to get back ...

02 03 37 57 CC We've got an omni switch, 16. Stand by.

02 03 38 11 CMP Houston, do you read Casper?

02 03 38 24 CC You're pretty weak.

02 03 38 38 CC 16, can you read now?

02 03 38 41 CMP Yeah, I read you now. Did you copy when I commented about the Skylab food?

02 03 38 45 CC Negative.

02 03 38 55 LMP Pete, I'm back on the BIOMED. How does it look?

02 03 38 58 CC Stand by 1.

02 03 39 34 CC Charlie, they're just now starting to get it. They'll take a look at; I'll let you know in a minute.

02 03 39 42 LMP Okay, thanks.

02 03 39 49 CC Okay, you want to go ahead with your comments on the Skylab food, now?

02 03 40 10 CMP The comment I made, Don, was that, because we're behind the time line here, we - we thought we would put the Skylab food off until tonight, so we have time to do it right. And we're just going to eat snacks for now and try to get caught up a little bit.

02 03 40 16 CC Okay; we concur with that, Ken.

02 03 40 21 CMP Roger.

02 03 43 15 CC 16, we'd like to get the high gain up on this next rev. You're about 10 minutes away from it now. Do you think you can make that? If not, we can wait another rev.

02 03 43 25 LMP We'll get it to you.

02 03 43 27 CC Okay, it's PITCH, minus 40; and YAW, plus 90, 90.

02 03 44 12 CC And, Ken, you can go on your - in your checklist there down to the MSFN cue any time you're ready.

02 03 45 00 LMP Houston, 16. Over.

02 03 45 03 CC Go ahead, 16.

02 03 45 06 LMP Okay, Pete, I hit a COMMAND RESET there. I went to the - went to HIGH GAIN too soon, and we're operating now in OMNI Bravo. And give me a mark. The high gain just didn't seem to work; it looks like I ought to be able to get high gain now. I'll try it.

02 03 45 25 CC Negative. You won't be able to get it yet.

02 03 45 31 LMP Okay. Okay, you're on OMNI Charlie now.

02 03 45 47 CC 16, we'll handle the omnis until we're ready to go to the high gain, and we'll tell you when to go to high gain at the angles we just gave you.

02 03 45 59 LMP Okay, we're all set, and you're on OMNI Charlie. Will you want me to reconfigure?

02 03 46 06 CC Come back to Bravo.

02 03 46 10 LMP Okay, back to - back to Bravo. Okay, you're in OMNI Bravo.

02 03 46 21 CC Okay. Thank you, Charlie.

02 03 47 30 CC 16, would you go ahead and start the pan camera and mapping camera film cycling procedures down to the point in the checklist where it calls - where it calls for a MSFN cue?

02 03 52 57 LMP Houston, how much longer until we get the high gain?

02 03 53 08 CC A couple of minutes, Charlie.

02 03 53 13 LMP Okay.

02 03 55 04 CC Okay, 16, you can bring up the high gain.

02 03 56 13 CC 16, bring up the high gain now, please.

02 03 56 26 LMP Okay, there you go. You got REACQ and NARROW on the HIGH GAIN.

02 03 56 34 CC Roger.

02 03 57 13 CC 16, we're ready to proceed with the film cycling.

02 03 57 20 LMP Okay.

02 03 58 34 CMP Okay, the MAPPING CAMERA is coming on to STANDBY.

02 03 58 38 CC Roger.

02 03 59 08 CMP Okay, you ready for mapping camera and pan camera operations?

02 03 59 14 CC Stand by 1.

02 03 59 33 CC 16, stand by. We're checking a couple of temperatures. Okay, you can proceed, 16.

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02 03 59 47 CMP Okay. The MAPPING CAMERA is coming ON. And the PAN CAMERA SELF TEST has been hit.

02 04 01 10 CMP Okay, the PAN CAMERA MODE barber pole has gone back to gray. That took about 40 seconds.

02 04 01 15 CC Roger.

02 04 01 54 CMP MAPPING CAMERA is to OFF.

02 04 03 02 CMP Houston, do you copy Casper?

02 04 03 04 CC Read you loud and clear, Casper. Go ahead.

02 04 03 08 CMP Okay. The next item here is to take the MAPPING CAMERA to STANDBY mode, and I assume I should do that before I turn the SM/AC POWER OFF.

02 04 03 21 CC That's affirmative, 16.

02 04 03 58 CC All right, Casper, after you turn the MAPPING CAMERA to the STANDBY mode, we want you to add PAN CAMERA SELF TEST to HEATERS.

02 04 04 11 CMP Okay, you've got HEATERS now. And we're in STANDBY, and I'm about to turn the SM/AC POWER OFF unless you want me to hold it.

02 04 04 18 CC Leave it on, Casper. Leave that POWER on.

02 04 04 24 CMP Okay.

02 04 04 59 CC 16, go OMNI Bravo. You can stow the high gain.

02 04 06 25 CMP Houston, Casper.

02 04 06 27 CC Go ahead, Casper.

02 04 06 32 CMP Okay, after the film cycling, it normally calls for our taking the SM/AC POWER OFF, and you asked that we hold there. Do you want us to complete the rest of that powerdown, or do you want us to just stop there and you're going to pick it up later or - what would you have in mind?

02 04 06 49 CC We want to leave the HEATERS on for a while and the PCWER on. And we'll pick it up again later at about 58 hours, but we'll call you.

02 04 07 00 CMP Okay. We'll leave that in your care.

02 04 07 03 CC Roger.

02 04 08 21 CMP And, if you're ready, Houston, we'll go ahead and stop PTC and go over to the UV attitude.

02 04 08 30 CC Okay.

02 04 08 45 CMP It's really a shame to kill a PTC that looks as nice as this one.

02 04 08 49 CC Yeah, it does.

02 04 09 38 CC Casper, you might try killing this roll at 208, which is your next roll attitude.

02 04 09 49 CMP We're with you.

02 04 26 19 CMP Hey, Don.

02 04 26 20 CC Go ahead, Ken.

02 04 26 25 CMP Let me tell you, all our plans for peanut butter were - were correct. That's the ideal space food.

02 04 26 33 CC Roger. You guys gonna do the Skylab thing tonight?

02 04 27 39 CC 16, Houston. How do you read?

02 04 27 44 CMP Loud and clear.

02 04 27 45 CDR Loud and clear.

02 04 27 46 CC Okay, we're just doing a subcarrier voice check.

02 04 27 57 CDR Your sc - your subcarrier has good voice - -

02 04 28 00 CC Right.

02 04 28 01 CDR - - and Ken's right about that peanut butter sandwich. It's like when we were aboard ship. We can get that peanut butter sandwich when we're in too much of a hurry to do something else - to do anything else, and it works!

02 04 28 15 CC Okay. We'll pass that along.

02 04 29 33 CC Casper, I've got that list of TVC relay set and reset conditions any time you're ready to copy.

02 04 29 50 CDR I'm all pencil.

02 04 29 55 CC Okay, the conditions that set the relay are: one, SPACECRAFT CONTROL switch, CMC; OPTICS ZERO switch, OFF; and OPTICS MODE switch, MANUAL.

02 04 30 24 CDR What to MANUAL?

02 04 30 25 CC OPTICS MODE switches MANUAL. And number two, another way to set it, is start a CMC TVC gimbal drive check in P40. Okay, the different ways that it can get reset are: number one, OPTICS ZERO switch, ZERO; number two, OPTICS ZERO switch, OFF and the OPTICS MODE switch to CMC; number three, SPACECRAFT CONTROL - -

02 04 31 38 CDR Hey, Don, would you stand by for a minute, please?

02 04 31 40 CC Sure will.

02 04 31 41 CDR Let's get our UV. Give us a rough on that time and I'll come back with you.

02 04 31 45 CC Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 04 37 51 CDR Houston, 16.

02 04 37 53 CC Go ahead, 16.

02 04 37 56 CDR Okay. On your plat board, Pete, what do you show us over now?

02 04 38 02 CC Just about over Florida. Kind of down over the tip of - -

02 04 38 10 CDR Okay.

02 04 41 04 CC 16, could you verify the position of the S-BAND AUX TV switch?

02 04 41 12 CDR Yeah, it's still in SCI, waiting for you guys to tell us to finish up our film cycling checklist.

02 04 41 19 CC Understand; it's in SCI?

02 04 41 23 CMP Affirmative.

02 04 41 31 CC You can take that switch to off, but leave the PAN CAMERA HEATERS and stuff on.

02 04 41 38 CMP Okay. Well, since we - you don't want us to do the exact checklist, we'll - we'll turn the SCI off and the DATA SYSTEM OFF, or do you want the DATA SYSTEM ON? You're not reading anything now, I don't think.

02 04 41 56 CC Just leave the DATA SYSTEM ON. We've commanded it OFF on the ground.

02 04 42 03 CMP Okay; DATA SYSTEM ON.

02 04 42 07 CC Okay.

02 04 42 57 LMP Houston, with the binocs out looking at the Earth, we can see Florida and the - the real blue water around the Bahamas. On around the Gulf of Mexico, looks like you might have some clouds near Houston and on down in New Mexico and the Great Lakes up in the North, where there's lots of clouds on up north of that.

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02 04 43 20 CC Roger. It is overcast here, Charlie.

02 04 43 22 LMP ... And up in the polar icecap, there is a big broken line; it looks like a river or something running down off to the southwest. Wonder what that feature might be?

02 04 43 43 CC Does it look like - Is it a feature on the ground or a feature in the clouds?

02 04 43 55 LMP I - I thought the whole thing was just snow and ice up there; maybe it is the clouds up in - it looked like to me it's - it's just up at the North Pole in the icecap area.

02 04 44 08 CC Roger; understand. I don't - -

02 04 44 10 LMP And it's been there since we laun - it's been there ever since we launched.

02 04 44 15 CC Roger.

02 04 44 17 LMP What it appeared to me to be was some places thawed out up there, but - and I was looking at water, but that might be the clouds actually.

02 04 44 26 CC Okay. Tony is sitting here. I'll see if he knows anything about it.

02 04 44 36 LMP Okay, and that storm system that was out west of Alaska or thereabouts appears to be still there.

02 04 44 47 CC Okay.

02 04 45 06 CMP Okay, Don. I'm ready to copy the rest of those things that we sent, the TVC and the ...

02 04 45 12 CC Okay, stand by just a minute. They're adding a couple of notes to it.

02 04 45 16 CMP Sure thing. Can I read back the ... when I read back the ones that said it?

02 04 45 27 CC Say again, Ken.

02 04 45 32 CMP I'll just wait until you get it all; I was going to read back the one that sent it. Everybody's talking about those binoculars. We pulled those things out in Earth orbit as we were going over the States, and it's pretty impressive. It works out well in other places; it really does enhance things you can see.

02 04 45 53 CC Roger. Okay, I've got this list on the TVC relay set/reset conditions again, if you want to go back into that now.

02 04 46 03 CMP Okay, all set.

02 04 46 04 CC Okay. The note they added was back up on the very first thing I gave you: the number 1, conditions to set the relay. Those conditions only work in certain programs or extended verbs, and those are P20, 22, 23, 24, 52, or VERB 41 NOUN 91.

02 04 46 38 CMP Okay.

02 04 46 39 CC Okay, and I believe we'd gotten down through numbers - -

02 04 46 41 CMP Is it all options to P20?

02 04 46 52 CC Stand by a minute, Ken; we'll get you an answer on that.

02 04 46 58 CMP Okay. Go ahead.

02 04 47 00 CC Okay. While we're waiting for them to decide whether it's all options or not, I believe we got down through number 2, reset conditions.

02 04 47 11 CMP Okay. I copied the OPTICS to ZERO and the OPTICS ZERO to OFF when in CMC MODE control.

02 04 47 21 CC Okay, and that was number 2. Number 3 is SPACE-CRAFT CONTROL switch, SCS. Number 4 is THC, clockwise. Number 5 is VERB 37 ENTER, XX ENTER. Number 6 is fresh start, VERB 36. Number 7 is VERB 34 or PRO; in the sighting mark routine, R53 display. Number 8 is AUTO ENTER RCS DAP at SPS cut-off plus 2.5 seconds in P40.

02 04 48 46 CMP Okay. I didn't understand that one, Don.

02 04 48 49 CC Okay. It's the - it's what happens to you immediately following the burns. The SPS cuts off, and then 2.5 seconds later in P40, the TV relay gets reset.

02 04 49 16 CMP Okay.

02 04 49 18 CC Okay, and on the question of options, back up under set condition number 1, it's all options except number 2 in program 20.

02 04 49 36 CMP Okay.

02 04 49 39 CC And that's all of them.

02 04 49 44 CMP Okay, and I understand that this - this can happen when you either set or reset the enable relay, is that correct?

02 04 49 52 CC That's affirmative. They say it can happen going - any change of state on the TVC relay.

02 04 50 06 CMP Okay. Can you tell me if it's the change of state of the relay, or just the command to change? For instance, if we already had it in some of these things like a VERB 37, any program resets it; but if it's already in the reset position, is that a condition that's likely to trigger one of these things, or is that one of the safe conditions?

02 04 50 34 CC We - we think, Ken, it's the actual relay set/reset changing, not - not the command.

02 04 50 44 CMP Okay.

02 04 51 20 CMP Don, let me read back what you read to me, and then I'll want to mull that over for a while and see if I have any other questions.

02 04 51 27 CC Okay.

02 04 51 34 CMP Okay, and I think that, except the TV enable ...

02 04 51 43 CC 16, you're fading out.

02 04 51 53 CC 16, we are unable to read.

02 04 51 56 CMP Okay, the things that will set the TVC enable are the SPACECRAFT CONTROL switch to CMC, the OPTIC ZERO to OFF, the OPTICS MODE to MANUAL, and the CMC TVC gimbal test in P40. These things occur only if I'm in P20 options 0, 1, 3, 4; P22, P23, P24, P52; and a VERB 41 NOUN 91.

02 04 52 29 CC Okay, Ken. On that, the first three of those constitute one set of conditions; and the last one, that is, the start of CMC thrust vector control, is another condition that is sufficient by itself.

02 04 52 48 CMP Okay, understand. The first three go with those programs, and the CMC thrust vector control is sufficient by itself.

02 04 52 57 CC Okay.

02 04 53 01 CMP Did you - I don't remember if we concluded whether that was when it - the CMC sets the gimbal in preparation for the burn or only during that test.

02 04 53 12 CC I don't think that's - at least, I haven't been advised as to which set of conditions we're talking about there.

02 04 53 21 CMP Okay, now I'll read you the reset ones.

02 04 53 24 CC Okay.

02 04 53 26 CMP It's OPTICS to ZERO, OPTICS ZERO to OFF when in CMC MODE, SPACECRAFT CONTROL to SCS, translation hand controller to clockwise, and VERB 37 ENTER to XX ENTER, a fresh start, a VERB 34 or PRO when in the sighting mark display, and the AUTO engine off or AUTO TVC reset after a burn in P40.

02 04 53 58 CMP That's affirmative. There are eight different reset conditions; number 2 actually contains two separate items.

02 04 54 12 CMP That's affirmative. Can you - -

02 04 54 16 CC Okay.

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02 04 56 11 CDR Okay, Houston. We're starting the fuel cell purge and waste water dump.

02 04 56 16 CC Roger; copy.

02 05 05 52 CDR Houston, Casper.

02 05 05 54 CC Go ahead, Casper.

02 05 05 58 CDR Okay, we've got a LM/CM DELTA-P of 0.6. We'd like to go ahead and pressurize the cabin and then get ready for the LM entry.

02 05 06 10 CC Stand by 1.

02 05 06 17 CC Okay, Casper. We copied, and you can go ahead.

02 05 06 22 CDR Thank you, sir.

02 05 09 17 LMP Okay, Houston. The waste water dump is terminated at about 12 percent.

02 05 09 23 CC Okay, Charlie. We copy that.

02 05 09 38 LMP And, Tony, we're into the - equalizing the pressure CM/LM at this point.

02 05 09 46 CC Okay.

02 05 11 19 CC Apollo 16, Houston.

02 05 11 25 CMP Go ahead.

02 05 11 28 CC When you're working up there in the hatch area, I've got a test for you on that docking latch 10. When it's convenient, you might let me know when you can work on it.

02 05 11 38 CMP Okay. Why don't we wait until the guys get into the LM, and then I'll work on that while they're doing that.

02 05 11 43 CC Sounds good.

02 05 17 51 CC Apollo 16, Houston. OMNI Charlie.

02 05 17 56 CMP Okay.

02 05 28 48 CMP Okay, Houston. The Orion is on internal power at 53:28:34.

02 05 28 56 CC Okay. We copy that, Ken.

02 05 30 58 LMP Houston, 16. We're in Orion now. You've got the comm on; you should be getting high bit rate momentarily.

02 05 31 09 CC Okay, and we'd like to go to the high gain.

02 05 31 17 LMP Okay. You mean over on Casper's side? Okay.

02 05 32 22 CMP Houston. Okay. We just got some ... on Orion.

02 05 32 33 CC Okay. We have LM data.

02 05 33 48 LMP Hey, Tony, ask TELMU about this 192 package lanyard. I looked at it yesterday, and I could see red and green. It's way out and looks okay to me. Is that copacetic?

02 05 34 03 CC Okay. We'll find out. And, Charlie, we've got some changes to your Lunar Surface Checklist. Whenever it's convenient for you, we'll send them up to you.

02 05 35 01 CC Charlie, Houston.

02 05 35 03 LMP Go ahead.

02 05 35 06 CC Okay. TELMU says that's okay; no problem.

02 05 35 16 LMP That's fine, and what did you want to update? What checklist?

02 05 35 19 CC Okay, your Lunar Surface Checklist and your LM Cue Card for EVA prep.

02 05 36 02 LMP Okay, Tony. I have the Cue Cards. Go ahead.

02 05 36 06 CC Okay. On the Cue Cards, it'll be all of them, EVA-1, -2, and -3; and I have one here for post-EVA. Okay. On the EVA-1, -2, and -3, after the sentence "Read PLSS O₂ quantity to Houston," we'd like to add the line - -

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02 05 36 38 LMP Wait, wait a minute, wait; hold on.

02 05 36 42 CC Roger.

02 05 36 44 LMP Okay. I've got EVA-1 prep; now which column?

02 05 36 56 CC Okay. It's on the left-hand column, right at the bottom line; it says "Read PLSS O₂ quantity to Houston."

02 05 37 21 LMP Okay. I've got "Read PLSS O₂ quantity to Houston"; the next one is a note, "If comm is NO GO." Is that the one you want?

02 05 37 27 CC Roger. We'd like to put a line in between "Read PLSS O₂ quantity" and the note.

02 05 37 34 LMP Go ahead.

02 05 37 35 CC Okay. "SQUELCH VHF B (LMP) - full decrease."

02 05 38 06 LMP Okay. I got it.

02 05 38 09 CC Okay. And now on the EVA-2 prep Cue Card.

02 05 38 17 LMP Go ahead.

02 05 38 21 CC Okay. This is the left-hand column and this is - at the bottom, and we'll add the same line there, "SQUELCH VHF B (LMP) - full decrease."

02 05 39 05 LMP Okay. Go ahead.

02 05 39 06 CC Okay. On the EVA-3 prep, the same as EVA-2 prep.

02 05 39 46 LMP Okay. Go ahead.

02 05 39 49 CC Okay. Now this is on the post-EVA-3 Cue Card.

02 05 40 00 LMP I got it. Go ahead.

02 05 40 01 CC Okay. On the third column, one-third of the way down, it says, "AUDIO circuit breaker - CLOSE."

02 05 40 12 LMP Okay. Got it.

02 05 40 14 CC Okay. We'd like to add a line right after that, "SQUELCH VHF B (LMP) - noise threshold, plus 1-1/2."

02 05 40 44 LMP Okay.

02 05 40 45 CC Okay. The point of all of this is to increase the range of PLSS to LM, in case you're having a crew failure.

02 05 40 59 LMP What else you got?

02 05 41 01 CC Okay. It's the same sort of changes to your Lunar Surface Checklist, and I'll read them to you when you're ready.

02 05 41 13 LMP Okay, Tony. We never use that checklist in this time frame. We'll copy it in, in a little bit, okay?

02 05 41 20 CC Okay. That's fine.

02 05 42 55 LMP Houston, 16.

02 05 42 58 CC Go ahead, Charlie.

02 05 43 01 LMP Okay. I'm a little confused about your terminology, I guess. It says "SQUELCH VHF B (LMP) - full decrease." We only got one VHF B to squelch.

02 05 43 11 CC Roger; I understand that. The "LMP" was just a cue that you're the only one on the comm at the time, so you'll be the one to - to have to listen and get it down.

02 05 43 24 LMP Okay.

02 05 44 10 CC Charlie, Houston.

02 05 44 14 LMP Go ahead.

02 05 44 16 CC Okay. When you get a chance there, we would like you to read the ED VOLTAGE, both A and B.

02 05 44 43 LMP Exactly the same thing as yesterday, 37 volts, Tony, both of them.

02 05 44 47 CC Okay. Good show, and verify OFF.

02 05 44 54 LMP Roger.

02 05 45 12 CC Okay, Apollo 16. I guess that's all they need in the lunar module. At your convenience, you can power down. And could you read that tunnel index as you go through, the docking index?

02 05 45 35 LMP Strange to say, it hasn't changed any.

02 05 45 37 CC All right.

02 05 45 39 LMP It's still minus 3-1/2.

02 05 45 40 CC Okay. We copy.

02 05 45 44 LMP You going to tell me something about this latch 10, too?

02 05 45 46 CC Okay.

02 05 45 47 LMP Do you want us to do that now?

02 05 45 49 CC Yeah, it'd be a good time, if you're ready.

02 05 45 52 LMP I'm sitting here looking at it.

02 05 45 57 CC Okay. On that docking latch number 10, depress the yellow auxiliary release button, noting that the button will depress and whether it stays snapped in after being depressed. Now, the interest here is if the button will not depress, the latch mechanism is either stuck or broken. If the button stays snapped in, this indicates - or probably indicates that the latch was only partially cocked at launch - -

02 05 46 24 LMP ... It's in - -

02 05 46 26 CC - - and stayed in.

02 05 46 29 LMP It's in, and it stayed in.

02 05 46 31 CC Okay. Then, the indication there is that it was only partially cocked at launch.

02 05 46 40 LMP Well, do you want me to recock it and fire it?

02 05 46 42 CC No, they had just as soon you leave it the way it is, because if it's broken, you may not be able to - to get it off again, and then that would foul up the undocking.

02 05 46 54 LMP Sounds like a reasonable plan. Okay. I've got the aux release button pushed in, and it stayed there, and the rest of it's gonna be left as is.

02 05 47 04 CC Okay. Good show. That's it.

02 05 49 20 LMP Okay, Tony. We're going to get our suits on.

02 05 49 22 CC Okay.

02 05 55 47 CMP And, Houston, we brought LM power back to the CSM at 53:49.

02 05 55 54 CC Okay, we copy that. And Ken, we have a correction to that TVC relay set condition.

02 05 56 12 CMP Okay.

02 05 56 14 CC Okay, on the set in program P20, we read up previously that it wouldn't set in option 2. We've got a correction to that. It sets only in options 0 and 4.

02 05 56 38 CMP Understand; it sets in only options 0 and 4.

02 05 56 40 CC That's correct.

02 05 58 06 CMP Tony, I'm gonna try to get some pictures of selected portions of the suit donning on 16 millimeter. And I just checked here on the spotmeter, and it looks like the CIN is going to be marginal for this, and I'm looking at the - the BW that's available. And I wonder if anyone would object if I put it on magazine Hotel Hotel.

02 05 58 30 CC Okay, I'll check on that.

02 05 58 34 CMP Thank you, sir.

02 05 59 31 CC And, Ken, Houston.

02 05 59 36 CMP Go ahead.

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02 05 59 38 CC When you're ready for that jet monitor program,
we're ready to load it.

02 05 59 45 CMP Okay; I - I'm in P00, and I'll give you ACCEPT.

02 05 59 49 CC Okay.

02 05 59 53 CMP You've got it.

02 06 00 03 CC Okay, and I guess you'll have to go to P20 for us
to load it.

02 06 00 10 CMP Okay, you want me to be in P20 first.

02 06 00 13 CC That's affirmative.

02 06 01 51 CMP Well, that was almost right.

02 06 02 15 CMP You're in ACCEPT P20.

02 06 02 20 CC Okay.

02 06 04 37 CC Ken, Houston.

02 06 04 44 CMP Go ahead.

02 06 04 45 CC Okay. We've got an answer here on this Hotel
Hotel. You have about 10 percent available to use
now if you like, and if you use the spotmeter in-
side, you'll have to set it for an ASA of 4000.

02 06 05 00 CMP That's affirmative, thank you. I can use
10 percent.

02 06 05 04 CC That's right.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 06 08 24 CC Ken, Houston.

02 06 08 26 CMP Go ahead.

02 06 08 28 CC Okay. We've got your program loaded. You can press on with the NOUN 26.

02 06 08 35 CMP You're gonna have to stand by a minute.

02 06 08 37 CC Okay.

02 06 12 16 CMP Okay, Tony. What did you want? NOUN 26 loaded up?

02 06 12 21 CC Right. You can go ahead and call your NOUN 26.

02 06 12 28 CMP Okay. I was - We're in the LM trying to get some pictures of their suit zipping up.

02 06 12 36 CC Roger. I'll bet that's a real hassle.

02 06 12 46 CMP Yeah, it is.

02 06 14 47 CMP Okay. Tony, does that - does that look right for a NOUN 26?

02 06 14 52 CC Yeah, that looks right.

02 06 14 54 CMP Thank you. The thing that I was questioning was the R36 not sliding over to the end.

02 06 15 04 CC Stand by 1.

02 06 16 12 CC Ken, Houston.

02 06 16 17 CMP Go ahead.

02 06 16 18 CC Okay. If you'll call up VERB 05 26, it'll slide over. Right now you're not reading the third register.

02 06 16 29 CMP Thank you. Okay. You want me to do a VERB 31?

02 06 16 33 CC That's affirmative.

02 06 17 15 CC Okay, Ken. It's running.

02 06 17 21 CMP Okay, and are we gonna check out the alarm function, or are we just gonna check out the loading capability?

02 06 17 29 CC I think they've got something in mind for alarm function later, but nothing right now.

02 06 17 36 CMP Okay, thank you. I'm gonna go back over and see if I can get some pictures from the LM then.

02 06 18 01 CC Ken, Houston.

02 06 18 04 CMP Go ahead.

02 06 18 06 CC I guess they'd like an E-MOD now.

02 06 18 14 CMP You've got it.

02 06 18 16 CC Okay.

02 06 18 26 CMP Anything else before I go over to the LM?

02 06 18 34 CC Everybody is shaking their head; I guess it's okay. About the time you get to the hatch, we'll think of something.

02 06 18 43 CMP Okay.

02 06 30 16 CMP And, Tony, we used only 5 percent on - it went from 10 to 15 percent on magazine HH.

02 06 30 26 CC Okay. We copy that. And when you get back in the command module there, we'd like for you to go to BLOCK on the CM.

02 06 30 40 CMP Okay. I'm BLOCK, and Charlie's coming up on the comm, and I'm going to don my suit.

02 06 30 46 CC Okay.

02 06 30 56 LMP Houston, 16. How do you read?

02 06 30 58 CC You sound good, Charlie.

02 06 31 04 LMP Okay.

02 07 06 03 LMP Houston, 16.

02 07 06 06 CC Go ahead, Charlie.

02 07 06 09 LMP Okay. We're back in the LM - I mean, correction - back in the command module, and Ken's closing out putting the probe in right now.

02 07 06 19 CC Okay. Sounds good. And there's no hurry on this, but when Ken gets all comfortable, we've got that jet monitor test.

02 07 06 35 LMP Okay. Ken's busy. We'll give you a call.

02 07 06 38 CC Okay.

02 07 07 36 LMP 16 - Houston, 16.

02 07 07 38 CC Go ahead.

02 07 07 42 LMP Okay. Stand by.

02 07 08 02 LMP Okay. Tony, you read?

02 07 08 04 CC Sure do. Sounds - sounds good.

02 07 08 09 LMP Okay. During the - the - suit donning went okay - in fact, pretty easy until we got to the part of zip - John and I zipping up. And in my suit in the LM, zipping up, John had an extremely difficult time getting the - the restraint zipper closed across the small of my back. It was extremely tight; the only way he was able to do it, was to zip the restraint - the restraint zipper in the front first, so that the zipper would line up a little bit better, and then he got the back part closed. Now the only thing that worries me is that the suit, to me, felt like I'd grown an inch or two, and it was tight in the legs, and I didn't have the LCG on. And with the LCG and everything else, it might have built up where it would have been really bad, and we were wondering if it might be possible to - if you guys would let us let the legs out on this suit maybe a half an inch to an inch. Over.

02 07 09 27 CC Okay. We'll talk about that. Go ahead.

02 07 09 32 LMP Okay. I'm not even sure that would help, but it felt - it feels like it would to me.

02 07 09 37 CC Okay.

02 07 10 08 CC Charlie, I guess that gives us a data point - -

02 07 10 10 LMP Tony, there was no trouble at all with the - with the pressure sealing zipper or the pressure seal. It was just the - the restraint. It was just in that one place in the small of my back.

02 07 10 27 CC Okay. We copy that. I guess that gives us a data point. You grow in zero g.

02 07 10 34 LMP That's what it feels like - that I stretched out an inch or so.

02 07 10 38 CC You better watch that; you're pretty close to your 6 feet.

02 07 10 43 LMP Too late now.

02 07 11 02 LMP Okay. Tony, the hatch is back in.

02 07 11 04 CC Okay.

02 07 15 32 CMP Houston, are you still there?

02 07 15 37 CC Oh, yeah, Ken, we're still here. How are you doing?

02 07 15 44 CMP Just fine. We got the tunnel closed out, and I'm ready to copy your next procedure.

02 07 15 48 CC Okay, stand by 1.

02 07 16 32 CC Ken, Houston.

02 07 16 37 CMP Go.

02 07 16 38 CC Okay. We'd like you to disable all the B/D roll jets, and you're cycling against the stops about once every 10 minutes, and so expect that you'll get your ISS light some time in there, and when you get it, we don't - you can turn back on the jets; we'd just like to look at it a while.

02 07 17 05 CMP Okay. How about if I just go FREE?

02 07 17 15 CC Okay. I guess the FREE kills the jet monitor.

02 07 17 22 CMP Oh, okay.

02 07 19 05 CC Ken, just to verify that, if you go FREE - CMC FREE - the program doesn't monitor; if you go back to AUTO, it does. You don't have to put the program back in.

02 07 19 19 CMP Roger. I understand that. I guess I just wasn't thinking then. What I - what I did, Tony, was, rather than leave - leave two axes in control and one of them free, I put all the MANUAL ATTITUDE switches to ACCEL COMMAND, and we're still in CMC MODE, AUTO.

02 07 19 37 CC Roger. We saw that down here. It looks good.

02 07 19 42 CMP Okay. You can - you know, you can watch it all day long - whatever you want there.

02 07 19 47 CC Okay. We'll just watch.

02 07 26 11 CMP Sure enough; there it is.

02 07 26 17 CC Okay. Seems to work.

02 07 26 20 CMP And, sure enough, just like advertised, there's no status lights on - DSKY warning panel. And I'm gonna go ahead - if it's okay with you, I'll turn off the channel 11, bit 16.

02 07 26 36 CC Okay. Go ahead.

02 07 27 00 CMP While we're still outside the dead band, that's not going to work unless I cycle it FREE and back to recenter the dead band. You folks want to watch it outside the dead band for a while?

02 07 27 19 CC That's okay. I guess we're happy with it, and we'd like to go ahead and terminate it - terminate the - -

02 07 27 27 CMP Okay.

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 07 42 00 CC Okay, Apollo 16. OMNI Charlie.

02 07 50 26 CC Charlie, Houston.

02 07 50 31 LMP Go ahead.

02 07 50 33 CC Okay. On your tight suit, there, we were wondering if you could say a few words about how it felt during launch day.

02 07 50 43 LMP Well, it was a little - little tight launch day. We'd - you know, fitted it pressurized, Tony, and it felt okay then. Launch day, I thought the legs were a little tight but not much.

02 07 51 03 LMP Once we get it zipped, Tony, it feels a little tight, but pressurized it's okay. It's just the zipping part that's worrying us.

02 07 51 12 CC Understand.

02 07 51 37 CC Well, everybody is thinking about it, and we'll come back with an answer on it later. Right now I think the general feeling is that most people'd just as soon you not tamper with it unless you feel very strong about it.

02 07 51 58 LMP Well, that's our opinion, too. Our next solution, or our next question is - is maybe breaking out with the LCG and putting all the gear on and seeing how it goes with all of the gear. Our question there is, if we break into one of the LCGs right now, will it affect - get any gas in the tubes; would it affect the startup on the PLSS?

02 07 52 35 CC Okay, we'll work that one.

02 07 53 33 CC Okay, Charlie, we've looked at that LCG problem and you're right. If you break it out early, we'll probably get gas in there and never be able to get it out, and it will affect your cooling.

02 07 53 49 LMP Okay. John and I were going to break into those LCGs and sleep in them the night prior to PDI. What do you think about that idea, then?

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02 07 54 06 CC Okay; they're over there scratching their head again.

02 07 59 24 CC Ken, Houston.

02 07 59 34 CMP Go ahead. Over.

02 07 59 36 CC Okay; your rates are low enough for the PTC.

02 07 59 42 CMP Okay; thank you.

02 08 06 50 CC Apollo 16, Houston.

02 08 06 55 CMP Go ahead.

02 08 06 56 CC Okay, we'd like your onboard reading of the H₂ tank 1 pressure.

02 08 07 26 CMP 270, Houston.

02 08 07 28 CC Okay, we copy that.

02 08 08 10 CC Okay; Ken. That's - that transducer problem, probably. They've had that history of problems with that transducer. Prelaunch.

02 08 08 20 CMP Yeah, we remember that.

02 08 08 22 CC Okay.

02 08 08 30 CMP It was glitching launch day, but it looks like now it's sort of stabilized.

02 08 08 35 CC Okay.

02 08 09 34 CC Apollo 16, Houston.

02 08 09 39 CDR Go ahead.

02 08 09 40 CC Okay. We'd like you to go to OMNI Bravo, and stow the high gain. And we'll handle the switching.

02 08 09 47 CDR Okay. You have OMNI Bravo.

02 08 19 22 CMP Houston, 16.

02 08 19 24 CC Go ahead.

02 08 19 29 CMP Okay; we're getting ready to go to work on this Skylab food preparation bit, and we're trying to check out some camera settings and all. We've got 16-millimeter magazine allocated for this with CIN film in it, and by checking the most light that I can get on most objects, it looks like we'll be running with the lens wide open aperture at about 1/60 of a second. And I guess I'd like to know if you want to do that, or if you'd like to use a higher ASA and process the film differently.

02 08 20 12 CC Okay; we'll talk about that.

02 08 20 55 CMP Tony, I was just looking here, and if we go to the 18-millimeter lens, we can open it up to a - to a T-1. And that gets our speed up to about 1/250. It looks like a lot better way to operate.

02 08 21 14 CC Ken, the comm's pretty bad right now. We're having a hard time getting that. We understood that the light meter indicates that the film that was indicated to use here probably isn't going to be fast enough, and you're asking to use a faster film. But we didn't und - get there, how severe the problem was.

02 08 22 47 CMP Houston, 16.

02 08 22 50 CC Go ahead, Ken. The comm's still pretty bad, though.

02 08 22 56 LMP Okay, we were going to get started on the bistatic radar frequency check, if you're ready.

02 08 23 27 CC Okay, Charlie, I guess we'd like for you to hold off for a minute on that VHF test.

02 08 23 35 LMP All right.

02 08 23 58 CC Ken, Houston. The comm may be a little better now, if you'd go through the problem again.

02 08 24 05 CMP Okay, Tony. It looks like it's not as bright in here as we'd like to be able to get it, and we'll try - try timing it with some of the window shades up to see if we can get it a little brighter. With the cabin floodlights, it looks like 1/60 of a second is about the max I can get off of the 10-millimeter lens. And I was going to suggest

either going to the 18, which will give me a little faster shutter speed because it's got a wider aperture, or we'll take a little less photography and just do it when the Sun gives us good illumination through one of the windows.

- 02 08 24 46 CC Okay, we copy that. We'll work it.
- 02 08 24 51 CMP I think we can get more uniform photography if we did it with the window shades up and with all our lights in one fixed position. That way, we'll get a lot more photography done rather than having to wait. I really don't think you can afford to wait until the Sun's in just the right place to do your eating.
- 02 08 25 10 CC Roger. Understand.
- 02 08 25 14 LMP Okay, Tony, we're going to restow my suit, if you guys don't want us to touch it.
- 02 08 25 22 CC Right, we're not gonna worry about it tonight. We'll have some sort of an answer tomorrow. So you go ahead and stow the suit.
- 02 08 25 32 LMP Okay. And our H₂ tank pressure just went back - dropped back down to 240.
- 02 08 25 39 CC Okay. We saw that.
- 02 08 25 46 LMP Hup! It's back up to 270.
- 02 08 31 45 CC Ken, Houston.
- 02 08 32 12 CC Ken, Houston.
- 02 08 32 17 CMP Go ahead.
- 02 08 32 18 CC Okay. After much debate, I guess we can have you go ahead and use the 18 millimeter.
- 02 08 32 27 CMP Okay; thank you.
- 02 08 32 29 CC All right. If you're not already done with it.

02 08 32 32 CMP I really think we'll get the - We're - we're stowing one of our passengers here back in his suit bag.

02 08 32 40 CC (Laughter) All right.

02 08 32 41 CMP And - -

02 08 32 42 CC Okay, I - We're - -

02 08 32 43 CMP We're having - You'd be surprised just how long those kind of things take. You know, you start on something like that, and then it almost fits and you refold it, and it almost fits again, and it's only because you know it fits that you keep trying with it. Because you sure couldn't prove it by us.

02 08 33 00 CC Understand. It doesn't sound like too much fun. We'd like to reverse ourselves - -

02 08 33 05 CMP No, I didn't say that.

02 08 33 07 CC Right. We'd like to reverse ourselves on something I sent up awhile ago. It doesn't seem to be any problem with breaking out the LCGs early. They were thinking about a Skylab situation. So that won't be a constraint. As far as whether we want you to try it tomorrow, we'll work that and send it up tomorrow. But there'll be a - -

02 08 33 30 CMP Okay, I guess the only thing on that is that we've got a busy day coming, and these things just really take a long time by the time you put on the suit, and then you play with it and then if we have some adjustments to do, too, why, it's going to take a block of time.

02 08 33 45 CC Right. Understand.

02 08 33 46 CMP So the sooner the better, I guess, which I know you know already.

02 08 33 49 CC Roger. But I particularly wanted to let you know there was no problem with sleeping in it that night before.

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02 08 33 59 CMP That's a big help. Thank you.

02 08 34 02 CDR Yeah, I didn't think there was. That's what they did on Apollo 10.

02 08 34 08 CC Roger.

02 08 34 15 CC Remember Apollo 12, guys, before you do too much with that suit.

02 08 34 21 CDR Okay.

02 08 34 40 CDR Of course, the problem is going to be if we can't get it on at all. That's going to be a real problem.

02 08 34 46 CC Roger.

02 08 49 33 CC Apollo 16, Houston.

02 08 50 11 CC Apollo 16, Houston.

02 08 50 18 CC Apollo 16, Houston.

02 08 50 23 CDR Go ahead.

02 08 51 25 CC Okay. We'd like to start with the VHF test when you're ready.

02 08 51 32 CDR Okay. Give us a couple of minutes here.

02 08 51 35 CC Okay.

02 08 52 50 LMP Okay, Tony. We have - VHF ANTENNA's on LEFT, B is in DUPLEX, and the RANGING is on.

02 08 54 27 CC And we're getting the VHF?

02 08 54 37 LMP Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 09 15 54 CC Apollo 16, Houston.

02 09 16 08 CC Apollo 16, Houston.

02 09 17 02 CC Apollo 16, Houston.

02 09 17 34 CC Apollo 16, Houston.

02 09 18 36 CC Apollo 16, Houston.

02 09 18 42 CDR Go ahead, Tony.

02 09 18 43 CC Okay. We're gonna drop your S-band up-link for a little while. We'll be back in about 10 minutes.

02 09 18 55 CDR Roger; understand.

02 09 22 14 CC Apollo 16, Houston.

02 09 22 19 LMP Go ahead, Tony.

02 09 22 20 CC Okay, we're back early. We'd like you to go ahead and terminate the VHF, and, while you're over that way, we'd like you to switch the HIGH GAIN to WIDE BEAM.

02 09 22 35 CMP Roger, HIGH GAIN going to WIDE, and terminate the VHF.

02 09 22 41 CC Roger.

02 09 23 01 CMP Okay. The VHF is terminated and you got WIDE on the HIGH GAIN.

02 09 23 05 CC Okay.

02 10 07 35 CMP Houston, 16.

02 10 07 38 CC Go ahead, Ken.

02 10 07 43 CMP We're trying to work on the presleep checklist, and this little part about the OPTICS to ZERO and then the - OPTICS POWER OFF. Will any of that do these things we don't want to do with our TVC enable? How about just leaving it all like it is?

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02 10 08 01 CC Okay; we're working on it.

02 10 12 01 CMP Okay; Houston, you ready for the onboard read-out?

02 10 12 07 CC Yep. Go ahead.

02 10 12 28 CMP Houston, Apollo 16. Over.

02 10 12 32 CC Go ahead, Apollo 16. We're ready to take the read-out.

02 10 13 02 CC Apollo 16, Houston.

02 10 13 03 CMP Houston, Apollo 16. Over.

02 10 13 06 CC Okay. I guess we had a - a weak period there. Yes, we're ready for your read-out.

02 10 13 15 CMP Okay, BATTERY C is 36.7. PYRO BATTERIES A, 37; PYRO BATTERY B, 37; RCS A, 87; B, 90; C, 92; and D, 96. We're on MAIN A, 29 volts.

02 10 13 34 CC Okay; we copy that.

02 10 13 38 CMP And you'll be happy to know we completed the Skylab Food Evaluation with very few casualties.

02 10 13 45 CC (Laughter) Congratulations.

02 10 13 47 CMP And no loss of life.

02 10 13 49 CC Very good.

02 10 13 52 CMP However, it took a lot longer than we allowed for it.

02 10 13 56 CC Okay.

02 10 14 23 CC And, Apollo 16, I guess it's okay to go to that OPTICS ZERO in ZERO, which you are, and G&N POWER OPTICS, OFF.

02 10 14 33 CMP Okay. Thank you now.

02 10 14 38 CC We aim to please.

02 10 19 06 CDR Okay. Houston, are you ready for the E-memory dump? Over.

02 10 19 24 CC Okay, I guess we would just like you to skip the E-MOD.

02 10 20 55 CC And, Apollo 16; Houston.

02 10 21 30 CC Apollo 16, Houston.

02 10 22 59 CDR Houston, you ready for a good old E-memory dump?

02 10 23 03 CC Okay, John; do you copy us now?

02 10 23 08 CDR Yep, finally.

02 10 23 09 CC Okay, I think we'd like you to just skip that E-MOD tonight. We do have a couple of changes to panel 230 when you get down that way.

02 10 23 25 CDR Oh yeah; we plumb forgot about that. Okay, go ahead.

02 10 23 34 CC Okay. We'd like to - PAN CAMERA SELF TEST, OFF.

02 10 23 40 LMP That's OFF.

02 10 23 42 CC MAPPING CAMERA, OFF.

02 10 23 47 LMP That's OFF.

02 10 23 48 CC And then down there below, the SERVICE MODULE/AC POWER, OFF.

02 10 24 00 LMP Okay, and that's OFF.

02 10 24 02 CC Okay. That's all we've got.

02 10 44 09 CMP ..., 16. Can I talk to somebody about chlorine injection?

02 10 44 16 CC Okay. What's the problem?

02 10 44 26 CMP I'm not sure what the first problem is; I can give you some symptoms. I put the chlorine in, and when I screwed down on it, it seemed like it was just a little bit stiffer to screw down on than they had been before. But it wasn't obvious that it was that much different; because they're always a little tight. And when I went to take it off, I got a whole lot of water bubbling out from around

the - the port. And I couldn't tell where it came from. Seemed like it - the first thing I thought of was the same thing that happened to 15 with the nut backing off. And when I got it out, it looked like the - the bubbling seemed to stop fairly quickly, and then I - the first thing I tried to do was to tighten the collar of the adapter down tight, and right now I still have the chlorine injector adap - needle adapter still on the chlorine port. And I tightened it down by hand, and it seems like it's holding it. The chlorine ampoule itself was broken when we took it out of the injector drum. We got all of that mopped up, I wanted to get some buffer in with it - you know, the system, because it looked to me like some of the chlorine had gone in. So I started to try to put some buffer in, and it looked like it might of leaked a little bit. And then I went to take it out - out of the - take the injector out of the adapter, and when I did, it looks like it squirts fluid from two holes that are 180 apart from each other on the adapter. And I guess I don't know what those two holes are for. It looks like maybe the needle is not going in, but I'm not sure what it is, now. Do you have someone that might know how to put it together?

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 10 46 32 CC Roger; we'll talk about that. I know all about those two holes in that adapter.

02 10 46 36 CMP Okay, these are the two on the outside now.

02 10 46 37 CC Roger. I know exactly which ones you're talking about.

02 10 50 59 CC Ken, Houston.

02 10 51 02 CMP Okay, go ahead.

02 10 51 05 CC Okay, when you put that buffer in, would you verify that you left the nut all the way screwed down for the 10 minutes and that's the period when the water was coming out the two holes.

02 10 51 22 CMP No, the water comes out of those holes - Let's see now. I put the buffer in, I put it into the injector and then I put the injector into the adapter, and when I went to screw down on the injector, it looked like it was starting to seep fluid around the injector again. So I stopped, and it didn't look like it was doing any more, and I thought I would look and see. By this time, I was getting suspicious that maybe the needle wasn't open. So I decided to take the injector off of the needle adapter. I took it off, and everything looked okay. And it was when I went to put it back on, when I depressed the needle to - when you push the injector onto the adapter - that's when it looked like it squirted out of these two holes on the side and I did that several times and it repeated itself.

02 10 52 23 CC Okay, we copy that. Was the nut snugly against the ampoule when you tried to put it back on? If you backed off on the nut, it may have allowed the - it may have allowed the ampoule to slide back up in the compartment there and then you were just opening up the needle.

02 10 52 49 CMP Well, I - I thought it was down snug. If it wasn't snug, would have - would it push water out of those two side ports?

02 10 52 59 CC Yes, it sure would. I had that happen in the pre-chlorination there on the pad before launch. I had backed off on the nut and, instead of just filling up that ampoule, the water pushed the ampoule off the needle and then, once it's done that, the water just goes back around and comes out those two holes.

02 10 53 29 CMP Well, I can't say that didn't happen. The first problem occurred with the chlorine injection.

02 10 53 36 CC Right, I didn't see that on the pad.

02 10 53 42 CMP Yep. My first problem was when I went to put the chlorine ampoule in. And at some point in there when I went to take it out, I tried to get it in and it didn't look right. When I went to take it out, it started bubbling all over, and I couldn't tell where it was coming from then. And whether it came from those two holes or not, that's quite possible. I'm not sure. When I looked at the ampoule itself, after I opened up the injector, you could see that the - the bottom lug had broken, the little sliding plug in there.

02 10 54 19 CC Right. Once that thing isn't watertight anymore, you'll get leakage into that container and that'll all come out those holes.

02 10 54 27 CMP Okay. Then perhaps the only problem was the - was the one with the first ampoule breaking.

02 10 54 40 CC All right, we'll try to get you a procedure here and go back and try that buffer - -

02 10 54 45 CMP The ...

02 10 54 46 CC - - again.

02 10 54 47 CMP Say again.

02 10 54 48 CC I was going to say we'll try to get you to agree on a procedure here and then go back and try the buffer again.

02 10 54 54 CMP Okay. I guess - yeah, we could do that.

02 10 55 00 CC Okay. Hold off on that. We'll - we'll get a procedure.

02 10 55 06 CMP Okay. Is that something you want to do tonight or do it tomorrow?

02 10 55 10 CC You want that buffer in there tonight, don't you?

02 10 55 19 CMP I don't know. It's a - I - I can't vouch for how much chlorine went in. Perhaps - very little. It's up to the - the guys who have plumbing responsibilities. I - I just can't tell you how much chlorine may have gotten in.

02 10 55 34 CC Okay, we understand.

02 10 56 00 CC Okay, Ken. I - I guess we'd like you to take that buffer ampoule again and screw the nut down on it so that you think it's - it's good - good and snug in there, and then put it on the adapter and see if you can - see if it'll take the buffer. Before you - you close it all up again, you might look at the ampoule to make sure it hasn't cracked.

02 10 58 21 CC Ken, Houston.

02 10 58 57 CC Ken, Houston.

02 10 59 01 CMP Go ahead.

02 10 59 02 CC Did you get that about going ahead with the buffer?

02 10 59 05 CMP No, I didn't.

02 10 59 06 CC Oh, okay; we probably had some bad comm there. We'd like you to take a look at that buffer ampoule and make sure it isn't cracked and, if not, then to go ahead and put it in that little container and screw that nut so you feel it's good and snug and then go ahead and see if it will take the buffer.

02 10 59 28 CMP Okay. How about if I just take a brand new one? Don't we have a couple spares?

02 10 59 40 CC Okay. Yeah, they agree. Why don't you take a brand new one.

02 10 59 46 CMP Okay. And while I'm doing that, I'm just looking over the gages, and I know our onboard gaging isn't the greatest thing in RCS. Could you tell me how we stand on RCS?

02 10 59 57 CC Okay. I'll get that.

02 11 01 10 CC And, Ken, at 54 hours, you were 2 percent ahead of your RCS budget - that's 25 pounds to the good.

02 11 01 23 CMP Okay. Thank you.

02 11 01 24 CC Uh-huh.

02 11 01 25 CMP ... I guess we have a low bias in quad A and just kind of looks bad.

02 11 01 43 CC Okay. We - our bias is that you're reading 2 percent low on that.

02 11 01 56 CMP Okay.

02 11 02 52 CMP Okay. Tony, I've got the buffer in, and I noticed just a slight little spit when I put it in. That's probably residual. So I'll wait 10 minutes and then suck it out.

02 11 03 01 CC Okay. Good show.

02 11 06 05 CDR Okay, Houston. The O₂ FLOW HIGH and the cabin is pumped up to 5.7.

02 11 06 12 CC Okay. We copy that, John.

02 11 16 33 CC Ken, Houston.

02 11 16 50 CMP Okay, Tony, got that buffer in and out, and all looks normal now.

02 11 16 54 CC Okay. Good show.

02 11 17 34 CMP Houston, 16.

02 11 17 36 CC Go ahead, Ken.

02 11 17 43 CMP Okay. Looks like we've got the buffer in and water back out, and everything looks normal now.

02 11 17 50 CC Good show. If - if you didn't get much chlorine in the buffer, won't hurt anything, but it would have hurt the other way if you'd put the chlorine in without adding the buffer, so - either way, we're in good shape now.

02 11 18 07 CMP Okay. Then I guess our only problem then was just the fact that I probably broke that first chlorine ampoule some way.

02 11 18 16 CC Roger.

02 11 20 34 CMP Okay, Tony. I guess I'm ready to give you a film status report.

02 11 20 42 CC Okay. Go ahead.

02 11 20 47 CMP Okay. On magazine Victor Victor, we're on frame 21; magazine Hotel Hotel, frame 85; magazine Oscar Oscar, frame 34; November November is also 34; Juliet Juliet is 50 percent.

02 11 21 12 CC Was that 50 percent?

02 11 21 16 CMP That's 50 percent. That's affirmative.

02 11 21 18 CC Okay.

02 11 21 25 CC Okay. We copied all those.

02 11 21 31 CMP Okay, I guess we're about ready to sign off. Do you folks have any last words or any questions?

02 11 22 24 CDR Houston, we're about ready to go to sleep. You got any questions or anything you want to tell us before we shut down the comm system?

02 11 22 36 CC Okay. We're running around here to make sure there's nothing. I just read through your last system report that came around here, and everything looks nominal. Everything really looks great. Okay, I guess there's - -

02 11 22 49 CDR - - looks good to us, too.

02 11 22 50 CC Good show. And I guess there's nothing else down here. Would you like me to hum to you?

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02 11 23 00 CDR Tony, even that won't keep me awake.

02 11 23 03 CC (Laughter) Oh, yeah, it would. I'll see y'all on the Moon. I've got a day off tomorrow.

02 11 23 16 CDR Good show.

02 11 23 17 CMP Okay.

02 11 23 18 CDR Sounds good. See you tomorrow.

02 11 23 19 CC Roger.

02 11 23 20 CDR Good night.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 18 17 32 CDR Morning, Houston. How do you read? Over.
02 18 17 34 CC Good morning, 16. How are you this morning?
02 18 17 41 CDR Pretty good there.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 18 27 33 LMP Okay, Houston. The LM/CM DELTA-P is about 1.
 And, the cabin pressure being what it is, I guess
 that means that we really don't have any leakage
 up there much.

02 18 27 54 CC Roger. Copy 1 psi.

02 18 28 07 LMP Psid, Hank.

02 18 28 11 CC Stand corrected.

02 19 15 05 CMP Houston, how would you like to have a status
 report?

02 19 15 10 CC Okay, we're waiting. Go ahead.

02 19 15 16 CMP You're all 85-foot dishes, right? Ears, I mean.

02 19 15 23 CC Roger. (Laughter)

02 19 15 31 CMP All right, Henry. We'll start here on A section.
 Al; 22041; Alfa 3, 6 and 1/2, outstanding; Alfa 4,
 none; Alfa 5, 27 and 5; Alfa 6, 7, 10, and 5.
 Bravo 1 - Bravo 1, 15039; Bravo 3, 5, good;
 Bravo 4, none; Bravo 5, 37, 25; Bravo 6, 5, and
 5. Charlie 1, 21075; Charlie 3, 6, good;
 Charlie 4, none; Charlie 5, 15 and 15; Charlie 6,
 5 and - 5 and 7.

02 19 17 41 CC Okay, was Charlie 6 just two entries, 5 and 7?

02 19 17 48 CMP That's affirm. Okay, make that 5, 5, and 7.

02 19 17 57 CC Roger.

02 19 18 06 CMP And off the gourmet sheet - -

02 19 18 08 CC Stand by, Ken. We're coming up on an antenna
 switch and we'll lose comm for a few minutes.

02 19 20 10 CC 16, Houston.

02 19 20 26 CC Apollo 16, Houston.

02 19 20 42 CC Apollo 16, Houston.

02 19 20 52 CDR Okay, go ahead.

02 19 20 55 CC Okay. We're so far - You're so far out now that when we get close to antenna switching, we lose comm there for about a minute, a minute and a half. We're ready to copy the menu now; food.

02 19 21 14 CDR Okay, out menu reporter is stealing a cup of coffee. He'll be with you in a second.

02 19 21 21 CC Roger. And the surgeon compliments the reporter on the way he reads the report down.

02 19 21 39 CDR Yeah, when you've got a college education, you learn to read, and boy anything can happen after that.

02 19 21 58 CMP Okay, Henry. The happy gourmet says that for the commander - Well, we'll start with meal A. And, stand by 1.

02 19 23 01 CMP Okay, on the commander, you can delete the grits. On meal B, we - we skipped the Skylab meal as meal B and then ate it as meal C. And on that, we skipped the peanuts. And for the second meal on the day, John had a grapefruit drink, bread with peanut butter, and - I guess that's it.

02 19 23 54 CC Okay.

02 19 24 04 CMP Okay. On mine, you can start on meal A. Scratch the peaches, the scrambled eggs, four bacon squares, grits. My meal B: I had the bread and peanut butter and the grapefruit drink. On the Skylab meal, I had one of the two rye breads and - out of all this chicken spread, no one ate a third of it, that's - we probably ate a tenth of it apiece. And for Charlie, he's been good. He eats everything. None of us ate the peanuts on the Skylab meal. And for the second meal of the day, Charlie had an orange-pineapple drink with potassium, and peanut butter. And you'll be happy to know that we shared our peaches with Casper. He ate just about as much of them as we did.

02 19 25 18 CC Roger. Copy. That sounds kind of like it didn't work out too well.

02 19 25 26 CDR There's a lot of peach still on Casper's face, I'll tell you that.

02 19 25 34 LMP Hank, when you open that can, you get them all at once.

02 19 25 42 CC Charlie, you're going to have to work on those guys about the grits.

02 19 25 48 LMP Grits are good. I can't get them to eat them, though. They - I sur - ate part of John's.

02 19 26 00 CMP Okay, Hank. And maybe I missed it here, somewhere, but could you give us some words on what you plan to do about midcourse 4?

02 19 26 12 CC Okay. No midcourse 4. And, I got a couple items of news here, if you're interested in that.

02 19 26 23 CMP Okay. Is that general interest news, or like how we handle our relay setting and so forth?

02 19 26 32 CC Oh, it's just general interest stuff on - We're coming up on antenna switching.

02 19 26 40 CMP Okay, we'll catch you after that.

02 19 29 43 CC 16, Houston.

02 19 29 46 CMP Houston, you up yet?

02 19 29 48 CC Okay, 16. How do you read?

02 19 29 49 CMP Okay, Henry. How about if we stop PTC right here at this 144-degree pass?

02 19 30 14 CMP Henry, did you copy that?

02 19 30 17 CC Roger. We copied. And we got some Flight Plan updates for you, and you can stop it now if you like.

02 19 30 36 CMP Okay, go ahead.

02 19 30 39 CC Okay, repeat no MCC-4 is required, and for your information, the data there for the UV photos is good for an hour after the Flight Plan time. So there's no real rush on that one. If you're ready

to copy, we'll just charge right into these Flight Plan changes. The first one is at 70 hours and - -

02 19 30 59 CDR Okay, go.

02 19 31 00 CC 70 hours and 40 minutes. We want to write in there, "Charge BAT A," and that's, for your information, for about 3 hours and 20 minutes.

02 19 31 22 CDR Okay. At 70:40 we'll charge battery A, and that's roughly going to be in 3-1/2 hours.

02 19 31 29 CC That's affirmative. And at 71:20, we want to enter, "Load DAP with the weights and gimbal trim from MSFN, and call EMP 509."

02 19 32 03 CDR Okay. At 71:20, we'll load the DAP with MSFN weight and gimbals and call EMP 509.

02 19 32 11 CC That's affirmative. The next thing occurs at 73:55, at the sextant star check. Want to add, in parentheses, "No VERB 41. Manually - manual only with VERB 16 NOUN 91."

02 19 32 45 CDR Okay. I've got at 73:55, at the sextant star check, we'll do no VERB 41 and we'll do it manual with 16 91 as our check.

02 19 32 59 CC That is affirmative. And EECOM advises you can - -

02 19 33 02 CDR While we're on that, Henry - while we're on that one, Henry, I didn't see where we terminated 509. Do we keep it running all this time?

02 19 33 14 CC That is affirmative.

02 19 33 20 CDR Thank you.

02 19 33 24 CC Okay. And EECOM advises you can go ahead and start that battery charge now, if you want to get Charlie started on that. And, next thing occurs at 74:08. And there we do the "Do SPS cue card through gimbal drive."

02 19 34 01 CDR Okay, that's at 74:08. It's SPS cue card through gimbal drive.

02 19 34 08 CC Roger. And LOS - MSFN LOS time will be 74:18.

02 19 34 18 CDR Okay, 74:18 is LOS.

02 19 34 26 CC Okay, that's the Flight Plan changes. I have some notes now. I don't know where's the best place to copy these. I've got about nine or 10 of them here. Well, take it back. I got two notes on the use of EMP 509, and they read as follows.

02 19 34 46 CDR Okay, let me get my scratch pad out and I'll copy those first.

02 19 35 15 CDR Okay, Henry. I'm ready to copy your notes.

02 19 35 20 CC Okay. Number 1: the TVC DAP is unstable with EMP 509.

02 19 35 48 CDR Okay, understand. The TVC DAP is unstable with 509 running.

02 19 35 53 CC That is affirmative. And number 2 is, "At SPS cutoff plus 2.5 seconds, the TVC enable is de-energized." The EMP is off; thus, the platform alignment could be lost.

02 19 36 27 CDR Okay.

02 19 36 32 CC Okay, and I have some Flight Plan changes now that are concerned with DOI. The first one occurs at 7 - -

02 19 36 42 CDR Stand by a second.

02 19 36 43 CC All right.

02 19 37 32 CMP Okay, Henry. I'm ready. These are comments, or these are things to go into the Flight Plan?

02 19 37 38 CC Roger. These are Flight Plan changes, Ken. I'm sorry I didn't get this in order a while ago. It was buried in the bottom here.

02 19 37 48 CMP Okay, go ahead.

02 19 37 50 CC Okay, at 77:57, there's a group of CSM systems checks. Move those up to 77:20.

02 19 38 22 CMP Okay, we take the CSM systems checks and move them from 77:58 over to 77:20.

02 19 38 31 CC That's affirmative. Now at 77:50, "VERB 48 21101 01111.

02 19 39 00 CMP Okay. At 77:50, that's "VERB 48 into 21101 01111."

02 19 39 09 CC That's affirmative, and immediately following that, "Start EMP 509."

02 19 39 38 CMP Okay, Henry. I guess I don't quite understand the loading the - the VERB 48 into 21101, and then the next thing we do is to load a three in there. Could you have someone give me some rationale on that?

02 19 39 55 CC The difference there, Ken, is you - when you're loading that VERB 48 for the - the EMP 509, you don't PRO on that one and activate that DAP.

02 19 40 09 CMP Okay, I see what you're saying. All right.

02 19 40 13 CC In other words, we have to get the right DAP in there before we do the EMP 509. The next item is the activities that are located between 78:03 and 78:08, we want to move back to just following the P52 at 77:53.

02 19 40 43 CMP Okay. How about giving me the first line and last line on the block you're talking about.

02 19 40 48 CC Okay, that's "P30, verify DOI TIG and DELTA-Vs" through "Acquire MSFN OMNI D." Move all of that back to just following the P52, or "landing site orient" at 77:53. And in that group of activities, we want to delete that VERB 48.

02 19 41 39 CMP Okay, now what I have is - have you got any more changes to this area, and then I'll read you what I have sequentially.

02 19 41 47 CC There's nothing more on that particular page, 77 through 78 hours.

02 19 42 04 CMP Okay. Maybe I missed something here, but I have - I have not seen us - terminate 509. I'm sure we did somewhere before the LOI burn - -

02 19 42 18 CC Uh - -

02 19 42 19 CMP - - and we'll do it again.

02 19 42 20 CC We're going to get to do - in that Ken, we're going to have that on your cue card. I've got a cue card change coming up for you.

02 19 42 28 CMP Okay. All right, let me give you what I have here and then - At 77:20, I do all the CSM systems checklist items that are listed now at 77:58. At 77:50, we do a VERB 48 21101 01111. We start EMP 509. Then, at about 77:55, we do all the steps which are presently listed at 78:03 down through 78:08.

02 19 43 08 CC And that's with the exception of the VERB 48.

02 19 43 13 CMP That's right; with the exception of VERB 48.

02 19 43 19 CC Okay, that's all correct. Now, the next item is, at 78:22, we delete the sextant star check and move it back to 78:15. And it carries the same warning as we had before. No VERB 41, manual only with the VERB 16 NOUN 91.

02 19 43 55 CMP Okay, that's a sextant star check at 78:15 with no VERB 41, doing it manually and deleting the star check at 78:22.

02 19 44 04 CC That's affirmative. And the last item for this is, at 78:18 add "do SPS cue card through gimbal drive."

02 19 44 38 CMP Okay; that is at 78:18, it's "Do SPS cue card through gimbal drive."

02 19 44 45 CC Roger. And the cue card that you'll use is the same for LOI and DOI. We're going to read you those changes.

02 19 44 57 CMP Okay.

02 19 45 34 CC 16, Houston. I have your SPS burn card changes whenever you're ready to copy.

02 19 45 43 CMP Go ahead.

02 19 45 51 CC Okay. Just as a note here for yourself. You load the DAP before starting the card, and you do not change VERB 48 after starting EMP 509. Now, we tried to indicate that in the Flight Plan, and I explained that to you while ago. Okay, first step: at the top of the card, the very first item, add "EMP 509 called."

02 19 46 31 CMP Okay, at the very top of the card, it's "EMP 509 is called."

02 19 46 37 CC Roger. And down at the fifth item, where it says "Load DAP," delete that.

02 19 46 48 CMP Okay, we'll delete "Load DAP."

02 19 46 52 CC Where it says "Boresight & sextant star check," delete the "VERB 41 NOUN 91 ENTER," and make the comment: "No VERB 41, manual only with VERB 16 NOUN 91."

02 19 47 18 CMP Okay, we delete "VERB 41 NOUN 91," and we say "No VERB 41, manual VERB 16 NOUN 91."

02 19 47 27 CC That's affirmative. At the left of the card opposite "Main bus ties," where it says "54 minutes," change that to "40 minutes," and in parentheses "Minus 20 minutes."

02 19 47 57 CMP Okay, we've changed "54 minutes" to "40 minutes," and "Minus 6" to "Minus 20."

02 19 48 03 CC Roger. And down a little further where it says "55 and 5," we want to change that to "41 and minus 19."

02 19 48 21 CMP Okay. We've changed "55" to "41" and "minus 5" to "minus 19."

02 19 48 31 CC Okay, on the back side of the card - Let me read you the whole thing we want to get in there, Ken, so you'll know how to squeeze it. Right after it says "ACCEPT parentheses PRO," we want to get in there, "If glitch occurs, use RHC to stop maneuver, VERB 23 NOUN 20 ENTER ENTER, VERB 40 ENTER, VERB 62 ENTER. Manual maneuver to attitude," so you have to kind of squeeze that in there a little bit. I'll read it to you slowly now. "If glitch occurs - -

02 19 49 02 CMP Okay, stand by a minute.

02 19 49 44 CMP Okay, go ahead, Hank.

02 19 49 46 CC Okay. "If glitch occurs, use RHC to stop maneuver. VERB 23 NOUN 20 ENTER ENTER. VERB 40 ENTER. VERB 62 ENTER. Manual maneuver to attitude."

02 19 50 46 CMP Okay, now, this says that - this is after the PRO on gimbal test, and we're saying that if we - you get one of these glitches, use the RHC to stop the rates. Would there be any objection to just switching to SCS while we do the rest of this, and that's my question. Now I'll read on. It's "VERB 23 NOUN 20 ENTER ENTER," and I have a question there, is that - I got the impression from what we were saying in our previous discussion that this wasn't restricted just to the middle gimbal; it's a possibility for - for the others. And then a "VERB 40 ENTER," which will release the platform. VERB 62 will take us back. It's not - it's not clear to me, once we've put in NOUN 20 as zero, that VERB 62 is a useful number. It seems to me that I must have skipped something here.

02 19 51 54 CC Okay, I am a little puzzled about the VERB 62 needles. However, on the other item, the reason you only need a VERB 23 is that the - that zeros that CDU, which is the only one that locks you up in coarse align, and the others will reinitialize when we do the VERB 40.

02 19 52 19 CMP Okay, I guess my question, though, is that, if it can happen in each of them, the only time you do the VERB 23 NOUN 20 would be in the event that it did lock into the coarse align.

02 19 52 36 CC That's affirmative. GDO was just saying you cover all bets when you do this, and you don't have to stop and think about it.

02 19 52 46 CMP Okay, but if you had moved off in yaw, it seems to me I would be possibly introducing more error -

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 19 53 33 CC Ken, would you - would you - state your concern again so we've got a clear picture of it.

02 19 53 41 CMP Okay - maybe I'm off on a tangent. What it looked to me like is that if you pick up one of these glitches, I'm not sure that the rates are all going to be confined to just - just one axis by the time it stops, and if you then take and load register 3 and NOUN 20 to zeros, you may, in fact, be at some other middle gimbal angle than 0. So, once you do that - I guess that - that has no effect if I do a VERB 40, huh? I guess that's the - I missed that point. That merely gets me out of the coarse align, and - -

02 19 53 26 CC That - that's affirmative.

02 19 53 27 CMP - - VERB 40 will be initialized. Is that correct?

02 19 53 29 CC That's affirmative. The VERB 40 starts the whole thing running again.

02 19 54 32 CMP Okay.

02 19 54 33 CC The VERB 23 NOUN 20 gets you out of the gimbal lock, if that's to be - if that's the case.

02 19 54 40 CMP Okay. Now I'm with you. Now I guess the only other thing is that, in the event that we have the thing we had - that happened the other night and it did coarse align there, it seems to me that, before I do the VERB 40, I would want to fly back on SCS to zero middle gimbal angle. Is that correct?

02 19 55 02 CC That's affirmative.

02 19 55 09 CMP Okay. Okay, I think I understand that. Thank you.

02 19 55 23 CC The concern over using the SCS, Ken, was they were afraid you'd introduce a transient - another transient in there by the switching. However, if - you can't do - can't null it out with the RHC, you might be forced into SCS.

02 19 55 45 CMP Well, we'll sure give it a try. It's just not - Perhaps once I just get the hand controller out of detent, that'll stop it at whatever new attitude it has, and that - that ought to hold it, so that there may be no further transients. I'll try that first.

02 19 56 00 CC Roger. Are you ready to go on with changes?

02 19 56 05 CMP Yes, sir.

02 19 56 07 CC Okay, out to the side there - a little arrow, I guess, is the best way to indicate it - in other words, between "RATE, HIGH" and "EMS, NORMAL," we want to say "Terminate EMP 509."

02 19 56 50 CMP Okay, when I terminate the EMP 509, you want me to write that between RATE, HIGH and EMS to NORMAL? And it looks like the - I would do the VERB 48 back to my original values, but it looks like I would not be resetting the average g flag. Or do you want that reset anyhow?

02 19 57 16 CC Stand by, Ken.

02 19 57 32 CC Ken, the message is do a normal terminate as - as on the procedure they read up to you, and that's after you finish the gimbal drive test. That's what it's associated with. And following that - the next item - just prior to 59 minutes - I don't know how you're going to get all of this in there. You may have to write it to the bottom and show an arrow. "At minus 6 minutes, TAPE RECORDER HIGH BIT RATE, RECORD, FORWARD, COMMAND RESET."

02 19 58 09 CMP And you did not want to do that at minus 20? Is that affirmative?

02 19 58 15 CC That's affirmative.

02 19 58 21 CMP You want me to - to delete that from minus 20?

02 19 58 24 CC Yes, I omitted that, Ken; I was going back to that. Back over here at minus 20, we want to delete - scratch through "TAPE RECORDER, HIGH BIT RATE, FORWARD, COMMAND RESET." And for your info, the reason we've given this 20 minutes is, in both

LOI and DOI, that gives us about 10 minutes to watch what you're doing, watch the gimbal drive check, and if you need any help, we can give it to you from down here.

02 19 58 58 CMP Okay. That sounds like a good plan.

02 19 59 17 CMP Okay. You want the tape recorder on at minus 6 minutes.

02 19 59 20 CC That's affirmative.

02 19 59 28 CMP Okay. Go ahead.

02 19 59 29 CC Okay. Following 00:XX ECO, enter - right in there - "Be prepared for SCS takeover."

02 20 00 02 CMP Okay; I got that.

02 20 00 33 CC You ready for the next one, Ken?

02 20 00 38 CMP Yeah, go ahead.

02 20 00 40 CC Okay. Right after "TVC SERVO POWER, 1 and 2, OFF," we want to enter a little comment that says, "Prior to trimming NOUN 85, NOUN 20 should be checked against the IMU."

02 20 01 25 CMP Okay, after "TVC SERVO POWER, 1 and 2, OFF," and we'll put a note here that says, "Prior to trimming NOUN 85, check NOUN 20 against IMU," and that's because of reading the different angles of the FDAI pickoff.

02 20 01 40 CC That's affirmative.

02 20 01 45 CMP Okay.

02 20 01 51 CC Okay. Now I have changes for your SPS burn rules card.

02 20 01 59 CMP Stand by. Let me read back what I got on here.

02 20 02 07 CC Go ahead.

02 20 02 09 CMP On the SPS card, starting at the top with a note. Can you read me all right now, Hank?

02 20 02 14 CC Roger.

02 20 02 28 CMP Okay. At the top of the card, I've added a note that says, "No VERB 48 changes after entering 509." The first step on the card is "EMP 509 is called." I have deleted, "Load the DAP." Under the "Bore-sight sextant star check," I have deleted VERB 41 NOUN 91. I have replaced that with a note that says "No VERB 41 and use manual, monitor 1691." I have changed the "BUS TIE, on" time from 54 minutes to 40 minutes, and that changes "minus 6" to "minus 20." I have deleted the tape recorder line at minus 6 minutes. I've changed the time 55 to be 41, minus 5 to be minus 19, and that's all the changes I have on the front side of the burn card. On the back side, next to the "Proceed after the gimbal test option": if the - if we get a glitch, it's "RHC to stop rates, VERB 23 NOUN 20 ENTER ENTER, VERB 40 ENTER, and then VERB 62 ENTER, manually maneuver to attitude." After "RATE, HIGH," and before 59 minutes, terminate EMP 509. At minus 6 minutes, "TAPE RECORDER goes to HIGH BIT RATE, RECORD, FORWARD, and COMMAND RESET." At 00:XX, at engine cut-off, it's "Be prepared for SCS takeover." At "TVC SERVO POWER, 1 and 2, OFF," we've added a note, "Prior to trimming NOUN 85, check NOUN 20 against the IMU." And that's all the comments I have on the burn card.

02 20 04 53 CC That's a good readback, Ken, and just to reiterate, that "Terminate EMP 509" is associated with terminating the gimbal test or ending up on that.

02 20 05 07 CMP Roger. Any - I can do that any time after the gimbal test is completed.

02 20 05 12 CC That's affirmative.

02 20 05 17 CMP Okay.

02 20 05 23 CC We would prefer that termination right after the gimbal check.

02 20 05 30 CMP Yes sir. I don't want to get caught too late doing that.

02 20 05 34 CDR Okay, Houston. This procedure, it'll handle no matter what glitch we get, and I understand that. But how about some discussion of the probability of getting such a glitch. Is there any - anybody thinking about that much, down there?

02 20 06 02 CC I guess all of us have been thinking about it, John, but there's just no way we can predict whether it will happen again or not. Our gut feeling on the thing is that probably never see it again.

02 20 06 21 CDR Understand. It's very similar to the kind of thing that we had happen back in the early part of the Apollo Program with the CDUs that would make them count different. Is that not correct?

02 20 06 39 CC That's affirmative.

02 20 06 46 CDR Okay, thank you.

02 20 06 50 LMP Houston, 16. Ready to copy the SPS burn rules update.

02 20 06 55 CC Okay, the reason for these changes, Charlie, is after we watch MC-6 and look at the system pressures there, we got some new data; and, for your information, we're kind of predicting that your nominal values are going to be oxidizer 200, fuel 170, and - for your onboard readings. So based on that, we need to change these burn rules. And I believe you've already made one change to it, is that correct?

02 20 07 27 LMP Yeah, but we got - I can scratch it in again somewhere else.

02 20 07 32 CC Okay, on the fuel oxidizer press, where you put in 124 oxidizer, you want to change that to 138 oxidizer, and the fuel goes from 110 to 112. In other words, instead of 124 OX, 110 fuel, we want 138 OX, 112 fuel.

02 20 08 07 LMP Okay, copy. Go ahead.

02 20 08 09 CC Okay, for your FUEL OXIDIZER DELTA-P, the new rules are: "Oxidizer greater than fuel by 50" to "Oxidizer greater than fuel by 12."

02 20 08 36 LMP Now wait a minute, I had "50 OX less than fuel" last time.

02 20 08 48 CC Okay, but - but what - what you had before, I think, was 35 and 5, is that correct?

02 20 08 59 LMP Oh, okay. You're right, 35 and 5. Okay, go ahead again now.

02 20 09 03 CC Okay. The new ones become "50 oxidizer greater than fuel" to "12 oxidizer greater than fuel." In other words, your 35 and 5 rules go to 50 and 12. Both of them, though, "Oxidizer greater than fuel." What we're changing is the 35 to 50, and we're changing the 5 to 12 and changing the sign over there, "Oxidizer greater," instead of "Oxidizer less."

02 20 09 46 LMP Okay. What you're telling me, that's the limit; "50 - oxidizer greater than fuel" can be as high as 50 or as low as 12.

02 20 09 56 CC That's affirmative. "Oxidizer greater than fuel" in both cases. In other words, your range is oxidizer 12 to 50 psi greater than the fuel pressure.

02 20 10 12 CC Okay, and on your tight limit - -

02 20 10 14 LMP Okay.

02 20 10 15 CC - - change the oxidizer to "168 oxidizer." What - what you have there is "168 oxidizer, 153 fuel." Want to change that to "183 oxidizer, 153 fuel"; no change in the fuel.

02 20 10 51 LMP Okay, copy. Tight limits: oxidizer has to be greater than 183 and the fuel greater than 153.

02 20 10 59 CC That's affirmative.

02 20 11 26 LMP Okay, Hank. Let me give you an example here on this DELTA-Ps. Right now, I'm looking at about 170 fuel and 195 oxidizer. That says that I can go to - down to 150 - 140 on the fuel side with a constant oxidizer pressure before I reach my limit, or have the fuel pressure increase up to 178 before I reach my limit. Is that correct?

02 20 12 06 CC G&C's checking. Let him look at it, Charlie.

02 20 12 17 LMP Okay.

02 20 13 56 CC Charlie, that fuel follows DELTA-P of 50, oxidizer follows DELTA-P of 12. That was the answer I got back on that; however, on the example you gave, I thought you were right with it, except on the second part. It looked like to me you need a 12 difference there. I might of misread the thing.

02 20 14 24 LMP Okay. I was just looking at my gages here, I've got about 190 oxidizer pressure, and about 165 fuel pressure. And so that says to me that the fuel side could go up to 178 and I'd still be within the limit.

02 20 14 48 CC That's what the rules say.

02 20 14 54 LMP Okay.

02 20 15 02 CC The oxidizer could drop to 177.

02 20 15 12 LMP Roger.

02 20 15 17 CMP Roger.

02 20 15 24 CMP Hank, do we have to get a SPS press light along with - and still be within limits on these rules.

02 20 15 33 CC Stand by.

02 20 15 48 CC They're checking their cal cards now, Ken. They're going to come up with an answer on that.

02 20 15 55 CMP All right; thank you.

02 20 16 16 CDR Okay, Houston. The pressure equalization valve is coming open to equalize the tunnel pressure.

02 20 16 24 CC OMNI Alfa, 16.

02 20 16 38 CC 16, G&C advises use the pressures and not the light in regard to the burn.

02 20 16 52 CMP Roger. I'm just wondering if I'm - should expect to see it?

02 20 16 57 CC That's affirmative. You may. We think the light will come on at 202 oxidizer pressure and we're predicting you going to be running around 200.

02 20 17 36 CMP Houston, would you like to have the high gain antenna?

02 20 17 43 CC That's affirmative. Flight Plan angles, Ken.

02 20 18 31 CDR Okay, Houston. The pressure equalization valve is closed. The CM DELTA-P is 0.2 now.

02 20 18 37 CC Roger; copy 0.2.

02 20 18 47 CDR And I think that - that 0.2 is what it reads whenever it's equalized.

02 20 18 53 CC Roger; that's true.

02 20 19 12 CC And, 16, we'd also like to advise that, on the tight limits, you're within 2 psi on the low pressure side for the fuel.

02 20 19 26 CDR Okay.

02 20 19 31 CC And, 16, I have your pericynthion-plus-2 block data.

02 20 19 40 LMP Okay. Why don't you just stand by on that and let us get these photos out of the way.

02 20 19 43 CC Will do.

02 20 20 46 CMP Hey, Hank, Charlie just noticed that we're in this Moon photo attitude, and it looks like the - the Sun is just very, very close to being along our line of sight, and it looks like we have - On one of the changes, we've gone in and opened some of these settings. Could we get a verification that where we - that this is the right setup? We can't look out the window very well and tell you if we're boresighted on the Moon.

02 20 21 22 CC Roger, Ken. This is a correct attitude. We'll take another quick scan of the settings.

02 20 21 38 CC 16, Houston. Would you attempt to bring up the high gain?

02 20 22 02 LMP Okay, you've got REACQ in there. How does that look?

02 20 22 15 CC Looks good, Charlie; and, in regards to the photos, the PI says the Sun will be very close to the Moon, but that it shouldn't be in the field of view of the camera. The settings are good.

02 20 22 36 LMP Okay, we'll take them as is.

02 20 26 53 CC Hey, Charlie. I've got a message for you. Consolidated Jack Pines is way up.

02 20 27 03 LMP Great; thank you.

02 20 27 04 CDR So's Charlie.

02 20 27 26 CC 16, Houston. I'm - we're going to do the change-over now, and I'll see you later on this evening.

02 20 27 35 CMP Okay, Hank. Thank you, sir.

02 20 27 49 CDR Yeah, y'all go get some rest. It'll be a busy day later on.

02 20 27 54 CC They're already on the way.

02 20 28 02 CDR Hello there.

02 20 28 04 CC Hello there. Wanted to advise you, you can relax now. You're in good hands now with the Gold Team.

02 20 28 19 CDR Understand the Gold Team is got gone.

02 20 31 41 LMP Houston, 16. I'm ready for the block data update.

02 20 31 45 CC Say again, 16. You're very weak.

02 20 31 53 LMP Yeah, that's because my mike's about 25 inches away. How's that?

02 20 31 58 CC That's a lot better, Johnny [sic].

02 20 32 02 LMP Okay, I'm ready for the block updates.

02 20 32 06 CC Roger. Okay, Charlie, it's PER plus 2, SPS/G&N; 66363 - -

02 20 32 24 LMP Wait; hold the - hold the phone - hold the phone a minute, Pete.

02 20 32 28 CC Okay.

02 20 32 33 LMP Okay, I was on the P37. This is the P30 pad?

02 20 32 38 CC This is your abort pad. PER plus 2 abort. It's a P30 load.

02 20 32 54 LMP Okay; go ahead.

02 20 32 56 CC Okay, it's PER plus 2, SPS G&N; 66363 plus 1.21, minus 0.14; 076:26:14.49; NOUN 81's, plus 2133.7, plus 1123.3, minus 2178.1; 335, 116, 018. Rest of the pad is NA. Ullage, none. Under others: number 1, docked maneuver; 2, based on LOI REFSMMAT; 3, gimbal angles on PTC REFSMMAT are roll, 263; pitch, 017; yaw, 310.

02 20 34 33 CDR Roger, Pete; 30 pad, pericynthion, PER, plus 2, SPS G&N; 66363; plus 1.21, minus 0.14; 076:26:14.49; plus 2133.7, plus 1123.3, minus 2178.1; 335, 116, 081 - correction 018. Rest of the pad is NA. Ullage is none. It's a docked maneuver, based on the LOI REFSMMAT. On a PTC REFSMMAT, the gimbal angles are 263, 017, and 310.

02 20 35 14 CC That's affirmative, Charlie, and the yaw is 018.

02 20 35 22 CDR That's affirmative; 018.

02 20 35 24 CC Okay.

02 20 36 17 CC You can go ahead. No sweat on the alert.

02 20 36 24 CMP Roger; just going to let it time out.

02 20 38 48 CC Okay, you can go ahead and torque them.

02 20 38 50 CDR You have the torquing angles?

02 20 38 52 CC Roger; we got them. You can go ahead and torque them.

02 20 38 59 CDR Okay, I'll torque them at 39.

02 20 39 12 CDR That sure is a mighty super little platform, isn't it.

02 20 39 16 CC Yeah, it's looking real sweet.

02 21 00 29 LMP Houston, 16.

02 21 00 31 CC Go ahead, 16.

02 21 00 35 LMP Okay, Pete, how about giving us a little recap on midcourse-2 burn as far as what y'all saw as chamber pressures and interface pressures? And how did the old SPS look, versus the calibrations?

02 21 00 52 CC Roger. Stand by. We'll get it for you.

02 21 18 11 CC 16, Houston. I've got the figures on this burn that you wanted, and I guess I can start out by talking about the meter biases to make sure that we're clear on that. There's a 15-psi bias on the oxygen tank pressure. It's reading high. On top of that, there is a meter bias of 8 psi, which is also high, so that our total bias on the oxygen onboard pressure reading is about 23 psi high - oxidizer, I'm sorry. And, on the fuel, it's 7 low, total, which is a meter bias.

02 21 19 03 LMP Okay, we understand.

02 21 19 05 CC Okay. Then, with those numbers in mind, the chamber pressure during that burn was 100 psi, and the numbers that you should have read on board prior to the burn were oxidizer tank pressure 205 and fuel tank pressure 177. And, after the burn, the numbers you should have been reading were 197 oxidizer and 170 fuel. In other words, they both dropped - well, fuel - oxidizer dropped 8 and fuel dropped 7 psi during the burn. The interface pressures preburn were oxidizer 184 and fuel 187; and, during the burn, they were 168 oxidizer, 172 fuel. And, after the burn, the interfaces were oxidizer 174 and fuel 179. And all those look good to us.

02 21 20 26 CMP Roger. We got you.

02 21 20 28 CC Okay, I don't know whether you noticed your pressures during the burn. It was a pretty short burn, but the oxidizer tank should have read about 205 and the fuel tank about 175, during the burn.

02 21 20 43 CDR Charlie was watching them.

02 21 20 45 CC Okay.

02 21 20 48 LMP Okay, Pete. During the burn, when the engine came on, the pressure started down.

02 21 20 55 CC Roger. That's what - that's what should have happened. It was at 205 and 177 preburn and went to 197 and 170 postburn. That's oxidizer and fuel, respectively. And that's - -

02 21 21 12 LMP Okay, that's what we saw.

02 21 21 13 CC Roger. And that - and our guys say that's - a - that's a - The figures look real good to them. That's the kind of performance they expected.

02 21 21 28 LMP Okay, now for LOI. When the engine comes on, the helium valves open, and I can expect the pressures to rise and my gage reading for oxidizer to sit around 200 and, for fuel, to be around - 1 - 175?

02 21 21 46 CC Around 1 - that's 200 on oxidizer and around 170 on fuel, Charlie.

02 21 21 53 LMP Okay, fine.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 21 28 10 CMP Houston, Casper.

02 21 28 13 CC Go ahead, Casper.

02 21 28 18 CMP Could you have somebody put a few words together for me on what happens if the IMU gets coarse aligned while average g is still on? I'm thinking about the - at the end of the burn.

02 21 28 32 CC Okay, you - you're wondering about the situation when - if you get the glitch after the burn but while average g is still running?

02 21 28 43 CMP Yes, sir. There's no chance of terminating average g before that happens, and I'd kind of like to have some idea of what I might expect the - the navigation to do.

02 21 28 55 CC Roger. We - we'll get you an answer on that, Ken.

02 21 29 00 CMP Thank you, sir.

02 21 30 50 CC 16, Houston. Can you - can you check for us and let us know whether Ken is on the biomed? Is Ken hooked up on the biomed? We're getting some strange readings. Could be a loose sensor.

02 21 31 08 CMP It's pretty - it's pretty loose now; it's in my pocket.

02 21 31 11 CC If it's in your pocket, that might account for it.

02 21 31 15 CMP I'm not ignoring your - yeah, I'm not ignoring it; I just haven't had a chance to stop and put them on yet. I'll get to it first chance I get.

02 21 31 22 CC Roger. That's fine.

02 21 32 57 CDR Houston; over - this is 16. Over.

02 21 32 59 CC Go ahead.

02 21 33 03 CDR How's your biomed look now?

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02 21 33 08 CC Stand by a minute. We'll lock.

02 21 33 30 CC We're still getting a noisy signal on the - on the biomed, 16.

02 21 35 50 CDR Okay, Houston. We're maneuvering to the SIM bay door-jett attitude now.

02 21 35 54 CC Roger; copy.

02 21 36 03 CDR Don, how do you read me now?

02 21 36 05 CC Read you loud and clear. We copied your maneuver.

02 21 36 10 CDR Okay. Roger. I - I had to switch back to the Snoopy hat. That lightweight headset just isn't working out.

02 21 36 20 CC Roger.

02 21 36 21 CMP Okay, we're going through the SIM door-jett checklist, and I've got here a - a list of verifys - I'm on page 1-7, step 10 - and it has SM/AC POWER on, and - and we haven't been on. With your concurrence, I'll go ahead and turn it on now.

02 21 36 42 CC Stand by 1.

02 21 37 23 CC Okay, Casper, you can go ahead and turn the POWER on.

02 21 37 28 CMP Thank you, sir.

02 21 38 20 CMP Houston, I'm ready to put the PAN CAMERA POWER on to POWER.

02 21 38 45 CC Okay, 16. Stand by a minute.

02 21 38 56 CC Casper, we don't have any pan camera data yet.

02 21 39 04 CMP Okay, I haven't put the POWER on yet. I'm - the checklist says to stand by for MSFN cue. We have the DATA SYSTEM ON, the AUX TV is in the SCI, and we have SM/AC POWER on. PAN CAMERA switches are in STANDBY and OFF.

02 21 39 34 CC Okay, Casper. You can go ahead and turn the POWER on and we'll cue you when you - when to go to BOOST.

02 21 39 47 CMP Okay, POWER's coming on on.

02 21 39 48 CMP MARK. Barber pole's good; back to gray.

02 21 39 55 CC Roger; copy.

02 21 41 05 CC Okay, Casper. You're GO for PAN CAMERA to BOOST.

02 21 41 12 CMP Okay.

02 21 51 40 CDR Okay, Houston. Are we GO for SIM door jettison? Over.

02 21 51 45 CC Stand by 1.

02 21 51 52 CDR Okay.

02 21 52 02 CC 16, we're standing by to arm the SM power buses.

02 21 52 11 CMP Okay, I was going to hold up on that. I'll go ahead and give you a LOGIC POWER to jettison at this time.

02 21 52 18 CC Roger.

02 21 52 26 CMP Here comes LOGIC POWER JETT 1 to JETT and number 2, JETT.

02 21 52 36 CDR Okay, they're armed.

02 21 52 39 CC Roger; we show them armed.

02 21 52 49 CC And we're GO for door jett.

02 21 52 54 CDR Okay, understand GO for door jett.

02 21 52 56 CC That's affirmative.

02 21 58 32 CDR Thirty seconds to door jett.

02 21 58 35 CC Roger; 30 seconds.

02 21 58 53 CDR 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 -

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02 21 59 02 CDR JETT. There it goes.

02 21 59 05 CC Roger.

02 21 59 14 CDR Okay, the door went, and I don't think anything changed much from what we could tell.

02 21 59 21 CC Roger; copy.

02 21 59 48 CDR Okay, Houston, we can watch it spinning around, out both the center window and Charlie's window, and it's quite a sight every time it comes around; the bright side front really flashes.

02 22 00 00 CC Roger.

02 22 00 55 CDR Okay, Houston, that was a pretty good bang.

02 22 00 59 CC Roger.

02 22 01 01 CDR The reason it was is on account of we're standing around here in our underwear, you know. That is, helmets and gloves off.

02 22 01 10 CC Roger; copied that.

02 22 01 12 LMP And - I guess the - the sound - the sound of it was about half of what you hear when the - when you're in the LM and - and the CMP's in here and he hears the pressure reg - the pressure release valve closing on him.

02 22 01 32 CC Roger.

02 22 01 35 LMP The cabin repress valve, that is.

02 22 01 42 CMP Okay, Don. All of the SIM bay configurations have been completed if you want to take a look at the data and see if there is anything that looks funny to you, I can recheck it.

02 22 01 52 CC Okay, Casper. Stand by 1 and we'll take a look.

02 22 02 39 LMP Okay, and we're going to P52 attitude now.

02 22 02 44 CC Roger; copy. P52 attitude.

02 22 03 26 LMP Okay, the door has rapidly receded from us, and it's certainly hard to tell how far away it is, but it's plenty far away; certainly no recontact problem.

02 22 03 38 CC Roger; copied. And, Casper, the SIM bay looks okay.

02 22 03 47 CMP Roger; thank you.

02 22 03 49 CDR That's a good start. And, we used only about 15 percent; we're reading magazine BB, 85 percent remaining.

02 22 03 58 CC Magazine BB, 85 percent.

02 22 09 02 CMP Houston, 16. Our LM/CM DELTA-P is 0.2 and the pressure equalization valve is open. Our cryo systems are configured.

02 22 09 11 CC Roger; copied. LM/CM DELTA-P, 0.2.

02 22 24 59 CC 16, we've got an LOI preliminary pad and, if you'll go ACCEPT, we'll up-link data.

02 22 25 08 CDR Okay, going to ACCEPT.

02 22 26 03 LMP Houston, 16. Go ahead with your pad.

02 22 26 06 CC Roger, 16. It's LOI preliminary, SPS/G&N; 66314; plus 1.21, minus 0.14; 074:28:25.63; minus 2780.8, minus 0219.7, minus 0252.2; ROLL is all zips, PITCH 001, YAW is all zips; NOUN 44 is 0170.0, plus 0058.3; 2800.8, 06:14, 2793.5; sextant star, 16, 242.9, 27.1; the rest of the pad is NA; set stars, Sirius and Rigel; 132; 196; 006. Ullage, none. Other: LM weight, 36287; single-bank burn time, 06:28.

02 22 28 11 CDR Okay, Houston. On the P30 pad readback, preliminary LOI, SPS/G&N; 66314; plus 1.21, minus 0.14; 074:28:25.63; minus 2780.8, minus 0219.7, minus 0252.2; 000, 001, 000; 0170.0, plus 0058.3; 2880.8, 06:14, 2793.5; 16, 242.9, 27.1; Sirius and Rigel; 132; 196; 006; no ullage; LM weight, 36287; single-bank burn time 06 plus 28.

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02 22 28 58 CC Charlie, let's check DELTA-V_T. It should read at 2800.8.

02 22 29 15 LMP Okay, 2800.8. Thank you.

02 22 29 18 CC Roger; that's adjusted correct.

02 22 29 37 CC 16, you can have the computer and back to BLOCK.

02 22 29 47 LMP Back - back to BLOCK, Houston.

02 22 29 52 CC Roger.

02 22 31 13 CC And, Casper; Houston. We haven't forgotten your question about what happens if the glitch occurs while average g is running. We're still putting together a nice neat summary for you; we'll come up with it a little later.

02 22 31 31 CDR Okay, and I guess it's to tell us what the residuals are doing more than anything else and we'd like to know that.

02 22 31 38 CC Okay.

02 22 32 32 CC 16, we're still seeing intermittent data which indicates that one biomed sensor is probably loose on the CMP.

02 22 32 48 LMP Okay, Houston. You've been looking at John's biomed; Ken's getting suited up right now with his.

02 22 32 58 CDR Okay, which one is it, ZPN or heart rate? Over.

02 22 33 03 CC It's EKG, John.

02 22 33 15 CC 16, you can terminate battery A charge.

02 22 33 24 LMP Okay.

02 22 45 41 CDR Houston, Apollo 16. Over.

02 22 45 43 CC Go ahead, 16.

02 22 45 48 CDR Okay, in a minute and 40 seconds, the bias went from 100 to 101.1.

02 22 46 00 CC Roger; we copy and - -

02 22 46 01 CDR ... a hundred.

02 22 46 02 CC The G&C says that's okay.

02 22 46 08 CDR Sounds good to us, too.

02 22 46 11 CC Roger.

02 22 52 25 CC 16, Houston. Voice check.

02 22 52 29 CDR Roger; we're still here.

02 22 52 31 CC Roger; loud and clear.

02 22 54 46 CDR Houston, let me read you a note I found in the Flight Plan here right at 38 hours. Over.

02 22 54 53 CC At 38 hours?

02 22 54 58 CDR That's affirmative. I woke up after the first night and I find this note in here from Ken. It says: "John" - says - "We have had some sort of IMU or CMC hardware problem. Right after you went to sleep at 38 hours, the platform coarse aligned itself; we got it back with an Earth/Sun alignment. Fortunately, MCC had high belt [sic] rate all the time and we'll work it out tomorrow. Sleep tight." Signed, PK (laughter). And I got up the next morning and I saw that in there, and I said, "Boy, that Ken's sure got a funny sense of humor."

02 22 55 37 CC Yeah, I - I guess we would concur with that funny sense of humor. We had some guys here laugh all night.

02 22 55 50 CDR Yeah, I (laughter) I guess I didn't believe the note (laughter).

02 22 55 56 CC I - I can understand that.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

02 22 58 35 CMP Hello, Donald. Are you still there?

02 22 58 37 CC Affirmative, still with you.

02 22 58 43 CMP Okay, you want to have them take a look at the biomed data?

02 22 58 52 CC Roger, Ken. We're doing that now.

02 22 59 13 CC 16, it looks like the SIM bay temps are coming up a little. We may have to change our roll angle. We'll come up with an angle for you in just a minute.

02 22 59 24 CMP Okay.

02 22 59 25 CC And the biomode - med data looks good now.

02 22 59 31 CMP All right, sir. And just as a curiosity item, you might note that it takes - with two of us working on putting those things on, it took us 15 minutes to put the data on and get hooked up. And I guess by yourself, it takes about 20 because you've got to use a mirror to see some of that.

02 22 59 49 CC Roger.

02 23 00 16 CC Okay, 16. We want you to go to a roll of 020 with the same pitch and yaw angles that you have now. And you should be able to do the P52 in the new attitude, and the high gain should stay locked up.

02 23 00 34 CMP Roger.

02 23 01 07 CMP Okay, ...

02 23 05 53 CDR Delta ... 59 ...

02 23 06 00 CC 16, you're very, very weak. Say again.

02 23 06 12 CDR I said, we're there. I guess your temps will be stabilizing now.

02 23 06 18 CC Roger; copy.

02 23 08 48 CMP Don, how about if we go ahead and do our P52s now?

02 23 08 55 CC Okay. Go ahead, Ken.

02 23 09 00 CMP All righty, thank you.

02 23 11 06 CC Casper, would you verify that you are gonna load the - the DAP and then the EMP 509 before you do the P52?

02 23 11 16 CMP That's in work right now.

02 23 11 19 CC Roger. Thank you.

02 23 11 29 CMP Yeah, I guess you saw us get out of sequence there a little, but we're - we're back on now.

02 23 11 34 CC Roger. We understand.

02 23 13 29 CC Casper, hold up on your procedure there a minute.

02 23 13 35 CMP Okay; holding. You're pretty good. You stopped old Casper in midpunch.

02 23 14 32 CC Casper, apparently it's necessary to load the normal DAP before you load the EMP, because once you've loaded the Saturn DAP, the LM weight and that sort of thing will not be accepted by the CMC. So we'd like to have you take the EMP out, load the normal DAP, and then load the EMP back in. We should of told you about that earlier, I guess. It slipped by.

02 23 15 08 CMP Well, that's okay. I stopped and wondered about it, and then I decided I couldn't think of any reason why it wouldn't work the way we did it. Okay, we're back in sync now. Now we can start with 509. Is that affirmative?

02 23 15 20 CC You've loaded the - the normal DAP now?

02 23 15 29 CMP That's affirmative.

02 23 15 33 CC Stand by just a minute. We're looking at it.

02 23 15 45 CC Okay, Ken. It looks real good, and you can go ahead now with the EMP and the P52.

02 23 15 54 CMP Okay, will do. I kind of like this attitude you picked, Don. It's got the old Earth in the telescope.

02 23 16 02 CC Hey, wonderful - -

02 23 16 03 CMP - - ... pretty.

02 23 16 06 CC Plot board says you should be just about over Africa - -

02 23 16 08 CMP - - ... picked this attitude for esthetic reasons. Well, it's orange. I guess that - that's sort of saying something.

02 23 16 20 CC Right.

02 23 18 10 CMP Don, would you ask the guidance guys to take a look at ... I'm sure it's a typical thing, I just never noticed. I was watching the optics zero the other night, and using 1691 as the way to do that. And here again I - I watched it, and at the completion of the zero, it looks like it went to - the register 2 display now, and I'm still in zero. I just thought that was kind of curious. Is that a bit size or something?

02 23 18 40 CC Stand by 1. We'll look at it.

02 23 18 56 CMP I've taken it out of ZERO now. That's why it's counting. Then we'll go ahead with the 52.

02 23 18 58 CC I understand you're taking it out of ZERO now.

02 23 19 03 CMP It was out of ZERO when it started counting. It went from 403 up to what you see now.

02 23 19 09 CC Roger.

02 23 19 10 CMP And that's due to trunnion trip.

02 23 19 15 CC Roger.

02 23 22 23 CMP Don, is there any reason to torque these since we're getting ready to go to an option 1?

02 23 22 27 CC Stand by a minute.

02 23 22 34 CC Go ahead and torque them. And, Ken, could you check your - your mike placement? You're very, very weak.

02 23 22 59 CMP Okay, Don. Is that any better?

02 23 23 01 CC Yes, that's some better, Ken. Thank you.

02 23 23 07 CMP And we'll torque them at 23:10.

02 23 23 10 CC Roger.

02 23 31 30 CMP Don, just out of more academic interest, it turns out that the pea [?] packs and the - and the NOUN 9ls are exactly the same.

02 23 31 40 CC Roger; understand.

02 23 32 10 CMP Yeah, Don, what I was gonna say is that the - the peapacks [?] on the shaft are within - yeah - the readability of the DSKY. The trunnion then seems to be off by about 2/100, which I think is a pretty fine agreement. And for the interest of some of those people who are talking about these optics and whether they drift or not, if you can watch 1691 right now, you'll find that I'm in - the MODE is MANUAL and I'm in DIRECT, and you can watch them drift slowly. And at low rate, I'll go to RESOLVE, and they drift at approximately the same rate. There seemed to be some question about that earlier. I thought - some of the guys in the back might be interested in that.

02 23 33 02 CC Roger. Copy. Thank you.

02 23 33 32 CC Okay, Casper, for your information, although we had you going ahead and load EMP 509 prior to the P52, it was not absolutely necessary at that point because you did this P52 under SCS control. And anytime you're under SCS control, that FVC relay is not enabled. So you really don't have the problem. There's no way that glitch can get to you. But we wanted - we had to have the EMP 509 loaded eventually, so we figured we'd go ahead and let you get it in now.

02 23 34 07 CMP Okay. I understand that, and thank you very much.

02 23 34 14 CC Roger.

02 23 34 15 CMP And with all this stuff over the next few days, it wouldn't hurt to keep a list of those things down there and connect - and kind of stay with me on those things to be sure I don't get one of them out of sync.

02 23 34 28 CC Roger. We'll follow you.

02 23 46 22 CC Casper, Houston. When you get a few minutes to talk, we've got a little philosophy - philosophy on the use of the EMP 509 in lunar orbit.

02 23 46 48 LMP Okay, can you stand by just a minute, please?

02 23 46 50 CC Roger. Will do.

02 23 46 52 LMP Pete, we moved the eat period up a little bit. We're getting all the food ready here.

02 23 46 58 CC Roger. This can stand by for quite a while.

02 23 47 07 CMP Okay, I'll come back to you in about 10 minutes with all that.

02 23 47 09 CC Okay, Ken. Good enough; thank you.

02 23 54 23 CMP Okay, Don. I'm - I got some free hands now, and got my little note pad out, and I'm ready to listen and copy and discuss anything you got on this stuff.

02 23 54 31 CC Okay. I guess, Ken, the first thing we'll talk about is the use of the EMP in lunar orbit, that is when you're - when you're alone in the spacecraft. We - we do not plan to run EMP 509 continuously, primarily because if you do, you don't have gimbal lock through gimbal lock protection. What we will do is we will run it during programs that involve TVC enable relay cycling, except for P52. Now, that means that we will run it for SPS burns, and you already have the procedures for LOI and DOI, and for other burns. The procedures will stay the same except that we may change the time sequences for doing some of the items. We will also run the EMP 509 for P24 and for rendezvous, and we're having MIT verify that compatibility at the present time. We'll come back to you on those

with more details later. And during P52 with the P20 option 5, our current procedures call for going CMC, FREE. Instead of doing that, what we'll do is we'll go to this SPACECRAFT CONTROL, SCS; put the RATE switch HIGH; and BMAG MODE, RATE 2. And that way, the rate damping level is below your orb rate, and so your SCS, as far as control is concerned, will be equivalent to CMC, FREE. However, by going to SCS control, if you want to check back on that list of set and reset conditions, you'll find that by going to SCS control, we eliminate the possibility of getting this glitch.

- 02 23 56 43 CMP Okay; would you say again how we're gonna handle P - nominally P20 option 5; we will not use 509. Is that correct?
- 02 23 56 55 CC That's affirmative. We will not use 509 during P20 option 5.
- 02 23 57 03 CMP Okay. And when we come to do a P52, we will still not use the option - the 509 - we're gonna go to SCS control and use RATE HIGH and MAX DEADBAND. Is that correct?
- 02 23 57 23 CC Okay; RATE HIGH and MAX DEADBAND is okay, but G&C tells me you really - that the DEADBAND - you don't need to go to MAX, it's - it's kind of immaterial which position you put the switch in. You do need the RATE switch in HIGH, and you need BMAG MODE, RATE 2. That way you don't have an attitude control situation. You have a rate control situation, but the level is high enough that it's well above the orb rate, and so the SCS will be equivalent to going CMC, FREE.
- 02 23 58 02 CMP Okay; I understand that. Thank you.
- 02 23 58 03 CC Okeydoke; and - -
- 02 23 58 04 CMP I'll leave it in DEADBAND and RATE, HIGH.
- 02 23 58 06 CC Roger. And we'll get more details to you later on the P24 and the rendezvous.
- 02 23 58 17 CMP Okay. Doing good work.

02 23 58 37 CC Ken, there's one other comment here. If you are gonna, at some point in lunar orbit, do quite a bit of OPTICS switching, like MANUAL and AUTOMATIC and that sort of thing, we would suggest in that case that you load EMP 509 before you start playing with the optics and take it out again when you're finished.

02 23 58 55 CMP Okay; any time we're doing that - I assume that means like in - when we're doing the landmark tracking, both high and low, and it's my understanding from the comments we got now that the only time 509 can get me in trouble is if I leave it enabled during thrusting.

02 23 59 21 CC That in general is - -

02 23 59 22 CMP - - and also ... the automatic gimbal stop.

02 23 59 26 CC That's absolutely correct, Ken. Those are the two cases.

02 23 59 30 CMP All right, sir. Thank you very much. Hey, you might tell Tom Holloway that his little note pad has really come in handy. That's super.

02 23 59 40 CC He's sitting here smiling and giving me the thumbs up right now.

03 00 00 10 CMP Charlie just asked that everybody lock the doors until he finds his pea soup.

03 00 03 06 CMP Don, how about if I put off this scan ratio thing another 10 minutes?

03 00 03 13 CC Stand by 1.

03 00 03 17 CMP Okay, we're going ahead and get it out.

03 00 03 19 CC Okay.

03 00 03 21 CMP SHIELD is OFF at this time; we'll turn back in 10 minutes.

03 00 03 25 CC Roger.

03 00 05 31 CC And, 16, I've got a TEI-4 pad, if you're ready to copy.

03 00 05 41 CMP You caught us at dessert.

03 00 05 44 CC Roger; we'll stand by.

03 00 05 49 CMP Thank you, Don.

03 00 06 34 LMP Okay, Pete. Go ahead with you P30 pad.

03 00 06 39 CC Stand by just a minute, Charlie.

03 00 06 51 CC Okay, Charlie. TEI-4, SPS/G&N; 41534; plus 0.64, plus 1.35; 083:07:14.13; plus 3289.6, plus 1150.1, minus 0327.6; 181, 056, 022. The rest of the pad is NA. Set stars, Sirius and Rigel; 131; 071; 014. Ullage, two jets, 17 seconds. Under Other: 1, burn undocked; 2, assumes no DOI; 3, assumes landing site REFSMMAT; 4, with LOI REFSMMAT; roll, 179; pitch, 183; yaw, 014.

03 00 08 46 LMP Okay, Houston. TEI-4 is SPS/G&N; 41534; plus 0.64, plus 1.35; 083:07:14.13; plus 3289.6, plus 1150.1, minus 0327.6; 181, 056, 022. Sirius and Rigel; 131; 071; 014; two jets, 17 seconds. One is burn is undocked; 2, assumes no DOI; 3, landing site REFSMMAT; 4, LOI REFSMMAT; 179; 183; 014. Over.

03 00 09 20 CC That's affirmative, Charlie.

03 00 13 02 LMP Pete, 16 here. Looking through the telescope at the Earth - It's sure apparent that we live on a pretty planet. The colors are just such ... such ... such ... lot more vivid (laughter) than any of the photographs.

03 00 13 26 CC Roger. We understand. We were just sitting here enjoying some of the beauties of Earth ourselves.

03 00 13 37 CDR Somebody new serving coffee, huh?

03 00 13 42 CC That's affirmative.

03 00 13 48 CDR I'm wise to you new people.

03 00 13 56 LMP How many pots has the MOCR gone through already?

03 00 13 59 CC

We'll have to get you a count, but Jerry says it's
a new record.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

03 00 30 12 CC 16 - 16, Houston. I've got a map update, rev 1. It's at about 73:20 in the Flight Plan, and also I've got some answers to Ken's earlier question about this glitch and what if it occurs following a burn.

03 00 30 34 CMP Go ahead.

03 00 30 37 CC Okay. Map update, rev 1. LOS: 074:17:41; 180 degrees: 074:31:39. AOS with LOI: 074:50:05; without LOI: 074:42:08.

03 00 31 10 CMP Okay; 074:17:41; 074:31:39; 074:50:05; 074:42:08.

03 00 31 25 CC That's affirmative. Okay. Now, Ken, on this other question. As we understood your question, you're concerned about what happens after - at 2.5 seconds after the burn when you switch back to the RCS DAP and cycle this relay. What happens if you get the glitch, and it looks like there are two cases. Either you get a - a yaw glitch of sufficient magnitude to put you into coarse align, or you get some kind of glitch that could be in roll, pitch, or yaw but does not put you into coarse align. If you go into coarse align, the nav is no good, and the NOUN 85s are no good, and in that case, we'd like you to exit average g as soon as possible by - by exiting the program. If you're not in coarse align, the nav is good, but the NOUN 85s are still no good.

03 00 32 37 CMP Okay. Okay. We've got you.

03 00 32 42 CC Roger.

03 00 32 45 CMP Particularly in LOI, since there's no trim; that's only a problem for - for recording purposes anyhow.

03 00 32 53 CC Roger. That's correct.

03 00 32 57 CMP Okay. Thank you very much.

03 00 39 32 CC 16, Houston. I've got three items to go in the Flight Plan. At about 79:29 is the first one, and if we can get these in, that will finish up the Flight Plan updates for today.

03 00 39 49 CMP Okay. Press on.

03 00 39 51 CC Okay. At 79:29, right at the bottom of the page there, we want to add "Load EMP 509," and at 79:3 - -

03 00 40 07 CMP - - ... behind "Load NOUN 89."

03 00 40 12 CC That's affirmative. After. It should follow the "Load NOUN 89."

03 00 40 23 CMP Okay. I've added "Load 509" after "Load NOUN 89."

03 00 40 29 CC That's affirmative. And at 79:38, we want to delete the VERB 48 there, and that's not associated with the 509. That's simply because that's redundant. You're already in that DAP configuration.

03 00 40 51 CMP Okay.

03 00 40 53 CC And at - 79:42, right after the MSFN update block there, add "Terminate EMP 509 after P24 completed."

03 00 41 19 CMP Okay. "Terminate 509 after P24 completed." Now let me - Is that the last one or you got some more?

03 00 41 26 CC That's all of them.

03 00 41 30 CMP Okay. Let me read them back to you where I've got them to make sure I have it all right. At about 79:29-1/2 on the page, I've written "Load 509." I have deleted the VERB 48 which occurs at 79:38; and 79:41 - 42, I've got "Terminate 509 after P24 is completed."

03 00 41 55 CC That's correct, Ken.

03 00 41 59 CMP Okay. Thank you.

03 00 42 19 CMP And, Don, on this first rev, if we wanted to take some pictures or something, can we stick with magazine November November? I can't tell right now what that's scheduled for. Or should we use magazine Victor?

03 00 42 38 CC Stand by. We'll let you know.

03 00 42 42 CMP Thank you, sir.

03 00 44 38 CC Casper, November November looks pretty low on the pad. You should get a magazine Victor.

03 00 44 48 LMP Thank you.

03 00 44 50 CMP Okay. Thanks.

03 00 48 16 CC 16, Houston. We've got a couple more words on the LM paint-peeling problem. Apparently, it has been duplicated now in a vacuum chamber, and it does not appear to be any kind of a problem as far as the mission is concerned.

03 00 48 37 CMP Well, that's fine to hear. Thank you now.

03 00 48 40 CC Roger. It's nothing leaking; it's just the paint itself.

03 00 48 48 CMP Okay.

03 00 52 10 CDR Don, we're getting ready to start into the secondary glycol loop check.

03 00 52 19 CC Okay. We're ready to follow.

03 00 52 33 CDR Okay. The SECONDARY COOL LOOP PUMP is about to go OFF.

03 00 52 39 CC Roger.

03 00 53 45 CDR PUMP ACl's on on the SECONDARY LOOP.

03 00 53 49 CC Roger.

03 00 54 27 CDR Okay. And we see the outlet temperature decreasing.

03 00 54 29 CC Roger.

03 00 56 28 CMP Houston, 16. Are y'all satisfied with the nitrogen pressures on the SPS?

03 00 56 34 CC That's affirmative.

03 00 56 41 CMP Thank you.

03 00 58 57 CMP Houston, LM/CM DELTA-P is 0.2 again.

03 00 59 04 CC Roger. LM/CM DELTA-P, 0.2.

03 01 02 23 CDR Houston, I just got my head unlocked and wiggled it out of window number 1, and we have a half-Moon in earthshine. It is really pretty.

03 01 02 36 CC Roger.

03 01 02 38 CDR Got so many ... You can see all the - you know, you can see all the prominent features and little sharp craters like - I think I'm looking at Kepler. It's out there in the middle of the mare. It's just beautiful. And that's all earthshine.

03 01 02 53 CC Roger.

03 01 02 56 CDR Yes, and it's just about -- it's like two-thirds of the window, if I've got my hand no more than 6 inches from it. You know, on the - on the dark side, you can see a big dark disk, and I think the reason I can see it is it's the solar corona that's illuminating around the back side. And I can see a star within - well, maybe it's within a degree of the Moon's disk.

03 01 03 26 CC Roger.

03 01 04 21 CC Could we get the LMP to confirm that that's really the Moon and not the Earth you're looking at?

03 01 04 28 LMP Hey, babe, this is really the Moon. It's the most awe-inspiring sight I've ever seen in my life. Looks like the door that just hung out there in the middle of blackness. It's really beautiful, Pete.

03 01 04 42 CC Roger.

03 01 04 43 CMP And you can make out all the features on the thing. I can see ..., and you can see up into the Procellarum - and in the basins in there. You can even see the outer rings of Orientale. And you can't see the basin itself but you can see it's outer rings.

03 01 05 07 CC Sounds beautiful, Ken.

03 01 05 13 CMP And looking at our present orientation, I can tell that our new attitude will be perfect for LOI.

03 01 05 29 CC Roger.

03 01 06 57 CC Ken, just for your information - The reading that you got when you zeroed the optics on the NOUN 9ls there was considered normal, and it's like a single-bit - or less than a single-bit error. And the other thing I wanted to pass on was that this EMP 509 has been verified by MIT for use with P24 and during rendezvous.

03 01 07 26 CMP Okay, thank you.

03 01 07 50 CMP Don, we're gonna waste the two frames of VHBW. Could you tell me if it's better to - to use SS or TT?

03 01 08 01 CC Stand by.

03 01 08 33 CC Magazine TT, Ken.

03 01 08 44 CMP We copy.

03 01 10 39 CMP Okay. I'm up to three exposures on magazine TT.

03 01 10 43 CC Roger.

03 01 11 30 CMP Houston, 16. Do you have any objections to our going to the burn attitude now?

03 01 11 40 CC Stand by a minute.

03 01 11 57 CMP Was that affirmative or negative? Over.

03 01 11 59 CC Stand by 1.

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03 01 12 06 CC 16, give us POO and ACCEPT, and we'll give you your up-links, and then you can maneuver.

03 01 12 18 CMP POO and ACCEPT.

03 01 12 20 CC Roger.

03 01 14 08 CDR Okay, Houston. The reason we would like to go now is it looks to me like you can't get there without going through gimbal lock, but we want to see what the DAP wants us to do.

03 01 14 17 CC Roger. Understand.

03 01 15 12 CC Okay, 16. You can start maneuvering, and we'll help you watch the gimbal lock situation, and also, I have an LOI pad when - whenever you're ready to copy.

03 01 15 28 LMP Go ahead, Pete.

03 01 15 31 CC Okay. LOI, SPS/G&N; 66314; plus 1.21, minus 0.14; 074:28:27.22; minus 2781.6, minus 0219.6, minus 0256.2; 000, 001, 000; NOUN 44 0170.0, plus 0058.3; 2802.0, 6:14, 2794.7; sextant star 16, 242.9, 27.1. Rest of the pad is NA. Set stars, Sirius and Rigel; 132; 196; 006. Ullage, none. LM weight, 36287. Single-bank burn time, 6:28.

03 01 17 24 LMP Okay. We copy LOI, SPS/G&N; 66314; plus 1.21, minus 0.14; 074:28:27.22; minus 2781.6, minus 0219.6, minus 0256.2; 000, 001, 000; 0170.0, plus 0058.3; 2802.0, 6:14; 2794.7; 16, 242.9, 27.1. Rest of the pad is NA. Sirius and Rigel; 132; 196; 006. No ullage. LM weight, 36287. Single-bank burn time, 6:28. Over.

03 01 18 15 CC That's affirmative, Charlie.

03 01 25 37 CC OMNI Delta, 16; OMNI Delta.

03 01 28 27 CC 16, Houston. How do you read?

03 01 28 32 LMP I read you 5 by here in OMNI Delta.

03 01 28 35 CC Roger. You're 5 by also.

03 01 32 31 CC 16, Houston. Voice check.

03 01 32 37 LMP Roger; 5 by, Pete.
03 01 32 39 CC You're loud and clear, Charlie.
03 01 32 44 LMP Okay. We're going to the sextant star check.
03 01 32 47 CC Roger.
03 01 36 01 LMP ... sitting right in the middle there, Houston.
03 01 36 06 CC Roger. Very good.
03 01 56 55 CC 16, would you stow the high gain antenna, please?

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

03 02 04 21 CC 16, you're GO for LOI.

03 02 04 28 CDR 16. Roger. GO for LOI.

03 02 12 22 CMP Houston, we're preparing for the gimbal drive check.

03 02 12 25 CC Roger.

03 02 12 56 CMP Okay, we've completed the gimbal drive check. We're now going to terminate 509.

03 02 13 02 CC Roger.

03 02 13 43 CDR Okay, 509's out of there. How's it look?

03 02 13 50 CC Looks real good, 16.

03 02 13 56 CDR Okay.

03 02 15 43 CC 16, we're a couple minutes from LOS. See you on the next pass.

03 02 15 52 CDR Okay, we'll be there.

03 02 28 XX BEGIN LUNAR REV 1

03 02 51 10 CDR Hello, Houston. Sweet 16 has arrived.

03 02 51 14 CC Roger, 16. Copy you loud and clear.

03 02 51 20 LMP Okay, Pete. Super double fantastic burn. If you're ready, I'll give you a burn status report.

03 02 51 31 CC Okay, go ahead, John.

03 02 51 34 LMP Okay, DELTA-T_{ig} was 0, 615 burn - 06:15.1 burn time plus 2803.9, trim ...; residuals, plus 0.2, minus 0, minus 0.1. DELTA-V_c is minus 5.5; fuel, 376, OX, 371; 150, unbalance, decrease. Okay, at ignition, we got a momentary SPS light; then it went out. During the burn, the oxidizer pressure

read 200. The fuel side was a little bit low, and it was about 165 on my gage. After shutdown, the fuel side climbed to 170. The oxidizer went to about 202 with an SPS light, and we've still got it. Over.

03 02 52 33 CC Roger. We copied everything except the roll, pitch, and yaw, which was blacked out by some noise.

03 02 52 41 LMP Okay, the trim attitude - we did not trim. The residuals were as we gave you after the burn. Our attitude was 005, 358, 002. Over.

03 02 52 53 CC Roger. We copy.

03 02 53 01 CDR And it was a slight transient, when the second bank was lit, that I don't remember from previous burns. You might look at that data, but it was super.

03 02 53 13 CC Roger. Copy.

03 02 53 14 CMP And it appeared to me that the chamber pressure had dropped off just as we brought the second bank on.

03 02 53 25 CDR And as you can see, we're in 170.4 by 58.3 according to the old computer, and that baby just rifled it right down the line.

03 02 53 36 CC All righty.

03 02 53 37 CDR Everybody is looking out their window. And right now, we're looking right down at Crater King, and it's just as fantastic as it always has been.

03 02 53 48 CC Roger.

03 02 53 49 CDR You can see those little dark - those little dark - look like volcanic black spots up - up in the north sector of it, and you can see the central peaks with a - with a varied - very white central peaks covered by lighter gray - gray-brown material that sort of looked like somebody painted it on there with a - with a - with a paintbrush.

03 02 54 39 CMP And, Pete, your first view at Tsiolkovsky out of my window is pretty - it's a spectacular sight the

way that - looks like a marshmallow float - a central peak floating in the top of a hot chocolate.

03 02 54 55 CDR Yeah, you - it - it's like - three guys - they've each got a window, and we're staring at - at the ground. It's really - Boy, this has got to be the neatest way to make a living anybody's ever invented.

03 02 56 20 LMP Pete, 16 here. Another pretty sight we had before burn was the earthset. It - really quite a view.

03 02 56 33 CC We're all sitting here listening, Charlie. Tell us about it.

03 02 57 14 LMP Pete, you got - a - MAPPING - or the PAN CAMERA POWER's - is on?

03 02 57 21 CC Okay, PAN CAMERA POWER on.

03 02 58 00 CDR How'd the S-IVB look?

03 02 58 07 CC It hasn't happened yet, John. It's about another - 9 minutes or so.

03 02 58 25 CDR I - I trust we're not getting there the same time it does.

03 02 58 29 CC I trust.

03 02 58 33 CDR Okay.

03 02 59 41 CC It - it's going to hit on the southwest corner of Reinhold, Ken.

03 02 59 46 CDR Say again, Pete.

03 02 59 47 CC Tell Ken it's going to hit on the southwest corner of Reinhold. He should know where that is.

03 02 59 55 CDR I'm sure he does.

03 02 59 58 CMP Okay. Let me get the binoculars out here - playing with them there. It's pretty interesting. I tell you, all that time spent with Farouk sure really's going to pay off, because it does look like old home.

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03 03 00 15 CC That's good, Ken.

03 03 00 16 CMP The lawn needs mowing and all that.

03 03 00 28 CC Okay, Casper, PAN CAMERA POWER, OFF.

03 03 00 36 LMP Roger.

03 03 03 21 LMP Pete, looking out at the horizon, you can really tell you're in the highlands. The horizon is really jagged looking.

03 03 03 31 CC Looks like coming up on the Rockies, huh?

03 03 03 34 CDR Of course, we're start - we're starting to come up over the flatlands now, over the Smyth Sea. I remember a landmarking track down there on Apollo 10. It's still there. You can't really tell by looking at it that the Smyth Sea is any - any deeper or lower than the data shows it is right in the surrounding terrain.

03 03 03 59 CC Roger.

03 03 06 17 CDR The submerged craters in Smythii remind me a lot of a - coral atolls. They just got the ridges sticking up, you know, and the - and the bottoms of them appear to be flooded with the same material that's in Smyth.

03 03 06 40 CC We're digging out a map now, 16, to take a look at it.

03 03 07 42 CDR We're going to get a close-in picture of Humboldt here, as we come up, because we'll probably miss it on the next round.

03 03 07 49 CC Roger.

03 03 08 04 CDR That's real - it's really a fascinating crater, the way the dark mare has got in - sort of like a path around the edges, and - and there's a fracture pattern running across it, and it has some very prominent central peaks that are very white. But it has every contrast and color on the Moon.

03 03 08 31 CC Roger.

03 08 08 38 CDR Boy, those fracture patterns running down through it are white - appear to be white, layered fracture patterns. They look like somebody's drawn them on there with a piece of chalk.

03 03 09 38 CC S-IVB has impacted.

03 03 09 45 CDR Okay.

03 03 13 15 CDR Houston, out my window is fine now. We got Petavius with it's central dome of - a whitish cap - dome, and it's a fairly subdued crater, and the lineations running into it - the rilles or whatever they are - are just like it's drawn on the map here.

03 03 13 44 CDR Some of those central domes are exceptionally dark, and they have exceptionally dark material running down a white surface. You can see that.

03 03 16 03 CMP With the binoculars, we passed over Langrenus, and you can see blocks on the tops of the central peak, and some features that probably are there that I just haven't noticed before in that central feature. You can see an awful lot of - looks like a - the demarcation where the central feature - looks like a crack in it - has a whole ring of craters that kind of dots that boundary. And then, you see some more of those little craters up along near the top of the central lineament also. And you just don't see those kind of things stand out at you without the binoculars.

03 03 16 40 CC Roger.

03 03 16 44 CMP I could also say that the binoculars at 10 power is the maximum you can hold in your hand. You got to get yourself set up very nicely for it before you start.

03 03 16 53 CC Roger.

03 03 17 11 LMP And we're coming up over the Messier A and B Craters.

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03 03 23 26 LMP Houston, we're coming up on Theophilus now. Central peak's in the shadows, and the - As we approach the terminator, looking out towards the horizon, it really looks rugged.

03 03 23 39 CC Roger.

03 03 24 41 CC 16, if you'll give us the computer and go ACCEPT, we'll give you a REFSMMAT.

03 03 24 52 CDR You've got it.

03 03 25 55 CDR Just now looking at the Altai Scarp and, boy, it's well named in this lighting.

03 03 26 01 CC Roger.

03 03 26 07 CDR Looks like the walls are vertical. I'll admit the lighting exaggerates it, but that's how it looks.

03 03 26 12 CC Roger. Copy.

03 03 26 21 CC And, 16, we're finished with the up-link.

03 03 26 28 CMP Okay, back to BLOCK.

03 03 28 48 CMP In this lighting, you can see the Crater Descartes, and it stands out much bigger than you would expect because of the low Sun angle. And - in fact I had to look in to my map in order to make sure that was what I was looking at. And the material that runs out of it - that - that's in the area, are the things we talk about as being that bright reflective area, in this low Sun angle, has a much blockier and jumbled appearance than it does on any of the high-Sun photographs.

03 03 29 21 CC Roger.

03 03 29 22 CMP It looks very much like looking down on a clinkery - a big clinkery cinder field, but on a much larger scale.

03 03 29 30 CC Roger. Copy.

03 03 29 32 LMP Yeah, a big - a rounded surface of clinkers. It's fantastic. Boy, is that rough!

03 03 30 15 LMP Okay, Houston, as we look to the west into past the terminator, there's - a couple of degrees past the terminator, there's one bright spot [sic], a peak standing up which is west of - well, west of Kant.

03 03 30 39 CC Charlie, you're fading out.

03 03 30 40 LMP Really high ground. Say again.

03 03 30 47 CC Right after you started talking about this peak and you said something like "west of," you faded out.

03 03 31 06 CC Go ahead, Charlie.

03 03 31 45 CDR Yeah, the general opinion here is that we may be looking at part of the Smoky Mountain sticking up through some - through the shadow.

03 03 31 53 CC ...

03 03 32 25 CC Houston, 16, FAO advises you've got some extra film on magazine UU - that's VHBW, and you can use it for targets of opportunity, and you can use the CEX exposure graph and stop down one stop from what you get off the graph.

03 03 32 50 CDR Okay, I hear you.

03 03 33 33 CC And, Casper, on that last transmission - As an example, f/11 for the CEX, you should go to f/16 to use with magazine UU.

03 03 33 47 CDR Okay.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

03 03 36 52 CMP Don, I'd like to verify how we're going to do the P52 again now. Any ideas that we'll go to place the SCS CONTROLS into RATE, HIGH, and DEAD BAND is min. At the proper time, I'll - I've got the BMAGs in Rate 2, I'll go to SCS CONTROL, and then I don't have to worry about loading 509. And I'll just go ahead and do the P52. And then when we're through, I can go back to CMC CONTROL. Is that correct?

03 03 37 25 CC That's affirmative.

03 03 37 30 CMP All right, sir; thank you.

03 03 40 21 CMP Hey, Don, we're trying to set up the - the camera for the next terminator and sunrise, and I thought I understood what you told me about the settings, but I guess I don't. Can you run through that again? I guess I just as soon have you just give me the proper settings.

03 03 40 38 CC You're talking about this magazine UU that I just called up?

03 03 40 44 CMP Yes, sir; the VHBW.

03 03 40 47 CC Roger; stand by.

03 03 41 06 CC Ken, they - they're get - looking that up for us right now. And in the meantime, I'll try to give you the rule again. Maybe that'll clear it up some. You can use that CEX exposure graph that you have on board, and take the readings off of that.

03 03 41 21 CMP Roger.

03 03 41 22 CC And then simply increase the stop number one stop. For example, if the CEX exposure graph calls for f/11 and you're gonna use this magazine UU, you should go to f/16.

03 03 41 41 CMP Yeah, okay. I - I thought - I - You used an example; I thought you meant that specifically, and I couldn't make that correlate. Okay. And Charlie says this magazine is HBW instead of VHBW.

03 03 41 55 CC That's affirmative; he's right.

03 03 42 09 CC And, Casper, for the terminator photography on the next rev, we're recommending you go ahead and use magazine SS. That's Sierra Sierra.

03 03 42 23 CMP Okay; use the one we had planned on.

03 03 42 26 CC That's affirmative.

03 03 42 30 CMP Okay, thank you.

03 03 42 50 CC And, Casper, that call on magazine UU; we meant to impart to you that you can use that for targets of opportunity.

03 03 43 01 CMP Roger. Okay, thank you.

03 03 43 07 CC Roger.

03 03 51 11 CC 16, put the HIGH GAIN on AUTO.

03 04 05 52 CMP Houston, did you copy our torquing angles?

03 04 05 56 CC Affirmative. We got them.

03 04 06 01 CMP Say again, please.

03 04 06 03 CC Affirmative. We got them.

03 04 06 08 CMP Okay, Don; one comment. I'll try again and take a look at the optics in the - when we get out into the double umbra, but right now in the telescope, I - I can see the stars now, but I still can't see star patterns. Like we looked at - at Antares, and you just couldn't see the Scorpion at all. And that may be due to the extreme amount of earthshine that's being reflected off of the LM. That LM is like looking at it almost in daylight, and, good gosh, the - the Moon looks like you can see everything on there just like - it's really bright.

03 04 06 46 CC Right. Okay, Ken; we understand.

03 04 12 34 CC 16, we're about a couple of minutes from LOS. Everything is looking good, and while you're behind the Moon, we'll change shifts and pick you upon the next rev.

03 04 12 47 CDR Okay. We sure enjoyed it, and we really appreciate all of the things that you guys are doing to get us into orbit here. Man, I don't - That's the kind of help that really does it for us. Thank you much.

03 04 13 01 CC Roger; thank you.

03 04 40 XX BEGIN LUNAR REV 2

03 04 59 11 CDR Houston, 16.

03 04 59 13 CC Hello, 16; Houston. How do you read?

03 04 59 17 CDR Roger. Read you 5 by, Henry. We just got the 10,000th picture of a beautiful earthrise.

03 04 59 24 CC Outstanding.

03 04 59 33 CDR This is really some place.

03 04 59 36 CMP We had a chance to watch you get AOS that time. I know we got lots of pictures of it, but you're going to have to look at one more.

03 05 00 30 CC 16, Houston. Were you trying to transmit? We heard a little noise on the loop there and looks like our data was dropping in and out; looks good now.

03 05 00 40 CMP Negative. We weren't trying to say anything, Hank.

03 05 00 45 CC Okay.

03 05 00 56 CDR We just can't find any words. Everybody's peeking out the window here.

03 05 01 00 CC Roger.

03 05 01 03 CDR We got all the dumps completed, and we're - all the dumps are secure.

03 05 01 11 CC Copy.

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03 05 01 15 LMP And I got some pictures on the back side of -
Icarus and the - and a black of the Sea of Moscow.

03 05 01 40 LMP And the material to the north of us at the ter-
minator, we don't think we got ... for.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

03 05 09 50 LMP Okay, Houston, we have you on the high gain. How do you read? Over.

03 05 09 55 CC Okay; I read you 5 by 5.

03 05 10 00 LMP Okay, Hank, I'm turning the PAN CAMERA to MODE, STANDBY - POWER, on.

03 05 10 03 CC Roger.

03 05 11 54 LMP Hank - I'm sure they have been described before, but the most - to me, the most unique craters up here - are two that we're just going over now - that - her ejecta blanket is completely white with white interior, but with a black rim to them.

03 05 18 17 LMP Houston, 16.

03 05 18 20 CC Go ahead.

03 05 18 26 LMP Hey, Hank, how do the SPS data look?

03 05 18 28 CC Okay, we were just talking about that, Charlie. Apparently, we had a real nominal burn. Our data down here showed a burn time of 6 minutes 14.2 seconds, which is right on the money. And I got a few words on that PC drop. I understand that's completely normal for the first dual-bank burn, due to some helium bubbles that are normally trapped between the ball valves. So that wasn't unexpected for the first dual-bank burn - you shouldn't see it again. And as far as the SPS pressure lights that came on, we warned you earlier to expect that, due to the pressure surge of the tanks pressurizing, we - you were right on the 200-psi limit - that triggered it. The second pressure light you got, which is apparently still on, is due to heat soak back into the tank. So it's not unexpected either.

03 05 19 20 LMP Okay, fine. We passed that word on to you about the light. Not that we weren't expecting it, but just to tell you what had happened.

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03 05 19 28 CC Okay.

03 05 19 43 CC 16, TRACK MODE AUTO on HIGH GAIN.

03 05 19 52 CDR Okay. You got it.

03 05 21 06 CDR Houston, 16. Over.

03 05 21 08 CC Go ahead.

03 05 21 17 CDR That crater Icarus - we got the profile picture of. It's a big round crater and it has real steep walls, and the central peak is a - the central peak is a little above the crater walls, and you'll see that profile when you get the picture back. But the shape of the central peak is such that the only Earth analog I've ever seen that looked like it was sort of a shield volcano. I never saw anything like that in the - Now, I'm not saying the whole thing is not an impact, but that central peak is really unusual.

03 05 21 58 CC Roger. We copy, and we're also through with the PAN CAMERA - you can go POWER OFF on that.

03 05 23 25 LMP Houston, apparently this line of secondaries down here that cross the mare - gives you the impression that there have been a couple of great big chickens been walking across there.

03 05 23 37 CC Roger.

03 05 23 40 CDR That - that was courtesy of Charlie Duke, our airborne geologist and chicken farmer.

03 05 23 52 CC Roger. Maybe you better watch your step.

03 05 23 58 CDR I'm watching.

03 05 31 45 CMP Hank, you can tell Farouk that - those smooth areas we thought we saw around Isidorus and Capella are indeed uniquely different in texture. They are quite smooth. We'll get a chance to play with them later.

03 05 32 04 CC Hey, that sounds real interesting, Ken.

03 05 32 21 CC How are your systems checks coming?

03 05 32 26 CMP Roger; Hank. We've already finished those.

03 05 32 28 CC Okay.

03 05 34 03 CMP Henry, the amount of terminator movement in one rev is kind of dramatic up here. Last time around, Descartes just barely showed as a crater - but showed very dramatically - and now it's - as it moves out it's starting to lose some of the starkness, and I'll get a picture of this bright zone. And it sure looks right now the material that is just to the north of the crater Descartes and that stuff that we talked about going between Delambre B and Descartes A are in fact extensions of the things that go into the Smoky and Stone Mountains. They - right now - look like they have a very similar texture.

03 05 34 47 CC Roger; we copy.

03 05 37 36 CMP Hank, it sure looks like we can see Gator and Palmetto from here. It's almost straight down.

03 05 37 42 CC Does it look like the map?

03 05 37 47 CMP Well, that stuff around the outside sure doesn't look like it did at high Sun.

03 05 38 04 CC Apollo 16, Houston. If you will give us ACCEPT, we'll up-link state vector and target load.

03 05 38 14 CDR You have it.

03 05 39 10 CC Apollo 16, Houston. I have your DOI pad, your map update, and landmark pad whenever you are ready.

03 05 39 39 LMP Okay, go ahead ... with the DOI pad.

03 05 39 43 CC Roger. DOI, SPS/G&N; 41441; plus 1.87, minus 0.71; 078:33:44.39; NOUN 81: minus 0205.3, all zips, minus 0045.5; 000, 274, 000; 0058.5, plus 0010.3; 0210.3, 0:24.2, 0203.8; sextant star: 22, 204.8, 21.7. The rest of the pad's NA. Set stars, Sirius and Rigel; 131; 071; 014. Four jets, 15 seconds. End of pad.

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03 05 41 48 LMP Okay, copy. DOI, SPS/G&N; 41441; plus 1.87, minus 0.71; 078:33:44.39; minus 02053, plus all balls, minus 0045.5; 000, 274, 000; 0058.5, plus 0010.3; 0210.3, 0:24.2, 0203.8; 22, 204.8, 21.7. Rest of the pad is NA. Sirius and Rigel; 131; 071; 014. Four jets, 15 seconds.

03 05 42 35 CC Good readback, Charlie.

03 05 43 24 CC I have your map update rev 3 whenever you're ready, Charlie. It's 79:05 in the Flight Plan.

03 05 43 32 LMP All right, why don't you give me the map update and the landmark pad?

03 05 43 36 CC All righty. Map update: LOS: 78:23:17; 78:48:09; 79:10:25. Landmark pad is T-horizon: 79:34:11; 79:36:22.

03 05 44 23 LMP Roger; copy. Map update of 078:23:17; 078:48:09; 079:10:25. Landmark tracking is 79:34:11; 79:36:22.

03 05 44 41 CC Good readback.

03 05 45 56 CC 16, the computer is yours, and I have your TEI-5 pad for the updates book.

03 05 46 05 CMP Okay, Hank, before we do that - Looking at the change to the Flight Plan here, we got to load the VERB 48 to put in the proper DAP, and ... to start 509, and then go to the P52. Can we go ahead and stop the maneuver now and will this attitude clear enough things so we can get a P52 in there?

03 05 46 29 CC Stand by.

03 05 46 34 CMP I'm sorry; I didn't copy that.

03 05 46 35 CC Roger. Stand by a minute, Ken, I'll have FAO check.

03 05 46 42 CMP Thank you. I was worried about getting in the same problem we get into after undocking tomorrow, where it might take a special angle.

03 05 46 52 CC Roger. Understand.

03 05 47 10 CC Apollo 16, Houston. FAO says this is a good attitude.

03 05 48 39 CC 16, Houston. Are you ready for the TEI-5 pad yet?

03 05 48 43 LMP Roger; go ahead.

03 05 48 45 CC Okay, pad follows: TEI-5, SPS/G&N; 39838; plus 0.61, plus 1.19; 084:31:41:36; NOUN 81: plus 3525.2, plus 1247.3, minus 0086.8; 182, 056, 022; the rest is NA. Set stars: Sirius, Rigel; 131; 071; 014. Two jets, 17 seconds. Other: 1, burn undocked; 2, assumes DOI; 3, landing site REFSMMAT.

03 05 50 36 LMP Roger. TEI-5, SPS/G&N; 39838; plus 0.61, plus 1.19; 084:31:41:36; plus 3525.2, plus 1247.3, minus 0086.8; 182, 056, 022. Rest of pad is NA. Sirius and Rigel; 131; 071; 014. Two jets, 17 seconds. Other: 1 is burn undocked; 2, assumes DOI; 3, landing site REFSMMAT.

03 05 51 13 CC Good readback, Charlie.

03 05 55 21 CMP Houston, do you want to take a look at our rotated vector in P40 before we start our maneuver?

03 05 55 27 CC Roger. Stand by.

03 05 56 39 CC Your P30 looked good, Ken.

03 05 56 46 CMP Okay. The question was, do you want to take a look at the rotated vector in P40 before we start our maneuver, or can we go ahead and start the maneuver?

03 05 57 20 CDR Houston, did you miss the question?

03 05 57 25 CC Negative, but we're having trouble finding an answer.

03 05 57 30 CDR Okay.

03 05 57 48 CC 16, Houston. Go ahead and call P40, then maneuver.

03 05 58 02 CMP Okay. Have you got enough look now?

03 05 58 19 CC He's looking at it now, Ken.

03 05 58 27 CC You got a good vector, Ken. Go ahead.

03 06 06 31 CC 16, give us OMNI Delta.

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03 06 06 42 CDR Okay, you got it?

03 06 06 45 CC Roger.

03 06 09 49 CC Apollo 16, Houston. Everything looks good down here. You've got a GO for DOI, and the monitoring limits in the Flight Plan are good.

03 06 10 02 CMP Okay.

03 06 16 24 CDR Okay, Houston. The gimbal motors are on.

03 06 16 27 CC Roger, John.

03 06 19 02 CMP Okay, Houston. We're going to do the gimbal drive check.

03 06 19 06 CC Roger. We're watching.

03 06 19 27 CMP Okay; the gimbals are trimmed.

03 06 19 31 CC Roger; copy.

03 06 20 02 CMP And 509 is killed.

03 06 20 07 CC Roger.

03 06 21 15 CC 16, Houston. We're about 2 minutes from LOS.

03 06 21 25 CC Roger. Two minutes from LOS.

03 06 21 37 CC About 12 - 12 from the burn.

03 06 21 39 CDR Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

03 06 48 XX BEGIN LUNAR REV 3

03 07 10 37 CDR Okay, Houston. Nominal burn; first - first DOI
burn we ever had that was nominal.

03 07 10 44 CC Roger. That's great news.

03 07 10 46 CDR At least in our training.

03 07 10 51 CC Okay, we'll stand by for your burn report.

03 07 10 56 LMP Okay, Henry. It feels like if we had - we're
clipping the tops of the trees all through
there - what it looks like. We got a burn report
of a DELTA-T_{ig}, 0. ...all we got was 24.4, plus
two balls 06 - 2106 V_{GX}. Trim attitude 001, 272,
003; so we did not trim. Residuals were plus 0.8,
plus 0, plus 0.1; minus 2.3 DELTA-V_C; fuel 337,
OX 346. Over.

03 07 11 42 CC Roger, 16. Unbalanced?

03 07 11 48 LMP Okay, it jumped up to 200 increase.

03 07 11 53 CC Roger; copy.

03 07 11 56 LMP It never really stabilized though, Hank.

03 07 11 59 CC Okay.

03 07 12 10 CDR And a VERB 82, last look, thought we were at
10.9 perigee.

03 07 12 15 CC Roger. Copy 10.9.

03 07 12 24 CDR But I don't think it really knows. But the MSTN
really knows.

03 07 13 29 LMP Houston, 16. It appeared to us that we got an
auto shutdown.

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03 07 13 34 CC Roger, Charlie. Copy auto shutdown.

03 07 15 10 CDR You got any preliminary data, Houston?

03 07 15 14 CC Roger, John. The Doppler says stay; we're waiting on the short arc.

03 07 15 20 CDR Okay; thank you.

03 07 17 42 CC Apollo 16, Houston. You're good on the short arc. You have a stay, and we show you 59 by 10.7.

03 07 17 53 CDR Roger; 59 by 10.7. Thank you, sir.

03 07 19 13 CC 16, Houston. Can you - could you give us AUTO on the HIGH GAIN?

03 07 19 21 CDR Roger. You have it.

03 07 20 04 CMP Henry, if you remember that little real bright crater on the northern rim of Chaplygin that Stu and Farouk were talking about the other day, we - we happened to see it right up close to us as we came by on this orbit, and we got a couple of pics for you on it, and that really is an unusual little guy. And it's really beautiful.

03 07 20 29 CC Roger; copy.

03 07 20 35 CMP Probably getting carried away with all of this, but we've - we've got all kinds of things to see back there. It would really be nice to fly that kind of an orbit down low.

03 07 20 44 CC Roger.

03 07 20 49 CMP And, we're pitching down to our landmark track attitude, and this is my first chance to point the sextant at the surface, and the sextant is just as clear as a bell. It's beautiful. You can pick out little bitty features. They're just - they're just as clear. There's no fuzziness. And the telescope's the same way.

03 07 21 08 CC Hey, that's great! We ought to be able to get some good use out of that.

03 07 23 11 CC 16, OMNI Delta.

03 07 26 17 LMP Hank, out to the - my side, out window 5, there was one crater here that you could see in one section of it, it looked like some outcrop two-thirds the way up the crater wall, and some big blocks had rolled down the - into the crater floor, and you could see the boulder tracks all the way down.

03 07 26 37 CC Roger; copy. Can you locate that one?

03 07 26 42 LMP Wait a minute. No, I'm pretty lost right now. Let me see if I can figure it out.

03 07 27 11 CC Ken, while you're maneuvering there, we'd like to ask what value did you put in your EMS, and what did you get on your EMS check?

03 07 28 28 LMP Houston, 16. That crater I had, I think was in a series around Maclaurin, maybe a little bit further west than that.

03 07 28 41 CC Roger; copy.

03 07 29 40 LMP Hank, coming across the mare here, it reminds you of ... static system calcs at Edwards.

03 07 29 49 CC Roger. You're really down low, screaming across, huh?

03 07 30 24 CC 16, Houston. Did you copy the question I had about the EMS DELTA-V?

03 07 31 21 LMP Houston, the Goclenius Rille looks like large grabens with very subdued sides to them; no outcrop at all apparent from my position.

03 07 31 36 CC Roger; copy.

03 07 31 47 LMP And looking on up into the Gutenberg Rille, you can see it cross - one crater just climbs right across the crater wall.

03 07 31 57 CC Roger.

03 07 32 00 LMP And that's Gutenberg Sea. That's Gutenberg Sea, Hank, and you can see the wall is down, dropped into the rille.

03 07 32 10 CC Roger; copy. How do you read, Charlie?

03 07 32 15 LMP I'm reading you 5 by.

03 07 32 19 CC Okay. A littler earlier, I asked a question about the EMS DELTA-V. Did you copy that?

03 07 32 25 LMP Negative; we did not.

03 07 32 27 CC Okay - -

03 07 32 28 LMP It - it read minus 2.3.

03 07 32 29 CC Roger. We had a question here as to how the EMS DELTA-V check came out, and which value you loaded into the DELTA-V counter?

03 07 32 41 LMP Stand by.

03 07 32 44 CMP Can I call you in a second on that, Hank?

03 07 32 45 CC Sure thing.

03 07 32 47 CMP It was like - it was like 1.8 at shutdown because of the drift in the EMS, and I did a check, and it came out to be normal and the bias was the same. I put in the DELTA-V_T, the same thing that we've used before, but then it looked to me like the bias was in - less than half a foot per second.

03 07 33 06 CC Roger; copy. We were a little confused here because the - the value that you had at the end there was somewhere in between what we thought it ought to be, depending on which setting you put in the DELTA-V counter.

03 07 33 19 CMP Roger. It was about 1.6 or something like that at shutdown. I'll have to look back at the Flight Plan.

03 07 33 30 LMP Okay, Houston. The walls - the north wall of Capella has striations that are dipping eastward about 60 degrees or so, all the way across the north face.

03 07 33 46 CC Roger. Copy, Charlie.

03 07 33 51 LMP Okay, and also Isidorus, the same thing.

03 07 33 55 CC Roger.

03 07 34 14 CC J-2 should be on the horizon now, Ken.

03 07 34 19 CMP Roger. We got the - it's right on the horizon. Still haven't picked up the target yet. Looks like it's tracking just about right. I have Theophilus going out of the field of view now.

03 07 36 09 CC Ken, you're coming up on about 30 seconds to TCA.

03 07 36 22 LMP He has the target, Houston.

03 07 36 26 CC Roger.

03 07 38 54 CMP Big old hill down the stream from - Where you are going ...?

03 07 39 02 CDR Guess who is sneaking in marks on Gator Crater right now?

03 07 39 07 CC I wonder who.

03 07 40 26 CDR Now that's what I call OJT right there.

03 07 40 33 CC How did the landing site look through the sextant?

03 07 40 45 CDR You have to do that with the telescope, Hank.

03 07 40 48 CC Roger.

03 07 41 11 LMP I think that was the best high-speed pass I've ever made.

03 07 41 15 CC Roger.

03 07 42 42 CC 16, Houston. I have your map and pan camera photo pads for 80:35 whenever you're ready.

03 07 43 06 CMP Okay, Henry; go ahead.

03 07 43 09 CC Roger. T-start, 080:38:01; T-stop, 080:46:04. And that same pad is good for the pan camera

03 07 43 32 CMP Okay. T-start, 080:38:01; T-stop, 080:46:04.

03 07 43 40 CC Good readback.

03 07 43 42 CMP That'll be the same pad for both cameras.

03 07 44 04 CC 16, Houston. We'd like for you to go on and get in the SIM bay attitude so we can get our DSE dump.

03 07 44 13 CMP Wilco.

03 07 44 51 CMP Hey, Hank, you want me to go ahead and do this single jet authority, or use couples to go to the attitude?

03 07 44 59 CC Stand by.

03 07 45 10 CC Ken, why don't you go ahead and go coupled, then we can go single jet.

03 07 45 15 CMP Okay. Sounds like a good plan.

03 07 47 11 CC 16, OMNI Charlie.

03 07 47 58 CMP Hank, would you check on one thing for me? Would you find out if this method I've been using for reading out the maneuver times, VERB 4 NOUN 1, is in any way affected by or affects the use of program 509?

03 07 48 14 CC Will do, Ken.

03 07 48 18 CMP Thank you, sir. And I got a couple of minutes here, if you would like to go over some of those questions you had before now. I - I wasn't paying much attention.

03 07 48 33 CC Stand by, Ken. I think they got your answer awhile ago and it satisfied them, but I'll make sure.

03 07 48 40 CMP Okay. I wasn't paying a lot of attention; I was trying to pick up that landmark.

03 07 48 46 CC Do you have any comments on the landmark tracking? Did it all go smoothly?

03 07 48 52 CMP Well, except for the fact that those optics are perfect, that's really neat. The target area did not look as I anticipated. It's a - I think it's a function of the low Sun angle, but it looked to me like there were far more rims around the craters than - than what - the impression I had from looking at things on the - on the models. And I did not pick up North or South Ray; they still were in the shadows. So, I guess it's possible that I could have been on the wrong crater, but it sure looked like to me like I must have been on Gator.

03 07 49 30 CC Roger; copy.

03 07 49 32 CMP It's still - still a problem in scaling when you look at something like that, until you're sure that you have the right feel for it. But I think it's pretty obvious, and I think picking it up tomorrow will be relatively easy.

03 07 50 45 CC 16, Houston. Could you bring up the high gain, PITCH plus 35, YAW 290.

03 07 51 02 CMP Say again your yaw number.

03 07 51 03 CC Roger; 290.

03 07 51 36 CC And, Ken, there's no problem in - -

03 07 51 40 CMP Okay, Hank, and we're about - Go ahead, Hank.

03 07 51 44 CC Roger. They say there is no problem in calculating maneuver completion time, and - and it does not interfere with 509.

03 07 51 55 CMP Okay, thank you. I've been avoiding using that. All right. We're about ready to go through our solar monitor and tiedown release. You folks ready for us to do that?

03 07 52 12 CC Roger. We're ready to go, Ken.

03 07 52 18 CMP Okay.

03 07 54 23 CMP Okay, Houston. We released the tiedowns and the door and heard just a very tiny little sound on each of those activities.

03 07 54 33 CC Roger. We copy, Ken.

03 07 55 11 CMP Hank, another piece of questionable data that've collected today is - well, on our low pass on the back side there, we got our color wheel out. And we have two votes for number 17, and one vote for number 13.

03 07 55 28 CC Roger; copy.

03 07 55 30 CMP And that's over on the back side just past Chaplygin. And number 17 really isn't quite right; it's just the closest thing we have. And the same comment applies to number 13.

03 07 55 41 CDR Well, I still say 13 was right on.

03 07 55 46 CMP You'll never guess who voted for 13.

03 07 55 52 CDR The grits have affected his vision.

03 07 55 56 CC That's probably what it is, John.

03 07 56 00 CDR Right.

03 07 56 11 LMP Hey, Hank, ask Stu who he believes.

03 07 56 15 CC Will do.

03 07 59 40 CMP Okay, Hank. We have a SIM bay jett configuration, and I'm going to start deploying equipment.

03 07 59 46 CC Roger; copy.

03 08 02 01 CC Ken, you want to keep us posted on what you're doing there with the switches?

03 08 02 07 CMP Okay. I got the mapping camera door open, and the alpha cover door open, and the mapping camera's going out. And we've just gone through 1 minute of extend time, and I'm timing the first one.

03 08 02 17 CC Roger; copy.

03 08 02 19 CMP I'll do the gamma ray and mass spec booms sequentially afterwards, so I can pay attention to the times.

03 08 02 30 CMP Okay. And I've got gray on the MAPPING CAMERA, EXTEND, and that was at 1 minute and 20 seconds.

03 08 02 37 CC Roger; copy.

03 08 02 57 CMP Okay. Can you read me on VOX, Henry?

03 08 03 00 CC Roger.

03 08 03 03 CMP Okay. That's the way we'll operate. I'm going to the GAMMA RAY, DEPLOY, at this time. I'm going to hold it for barber pole plus 2 seconds, then OFF. Going to DEPLOY. DEPLOY. Barber pole now, 1, 2, OFF; and it's gray. GAMMA RAY is coming to RETRACT.

03 08 03 27 CMP MARK. Barber pole, and it's gray. Okay. Going to the MASS SPECTROMETER. DEPLOY.

03 08 03 42 CMP MARK. Barber pole, 1, 2, OFF. MASS SPEC to RETRACT.

03 08 03 48 CMP MARK. Barber pole, OFF. Okay. They're both in the RETRACT position, and everything looks normal. The X-RAY is coming ON.

03 08 04 00 CMP MARK. I've completed the gamma ray and mass spec boom deployment and retraction, and I'm ready to go ahead with the MASS SPEC, DEPLOY, if that's okay with you.

03 08 04 15 CC Roger; go ahead.

03 08 04 27 CMP Okay; it's DEPLOY on the MASS SPEC, and I'm timing it.

03 08 05 18 CC Give us AUTO on the HIGH GAIN, 16.

03 08 05 21 CMP Five seconds to stop. Okay, it's OFF on the MASS SPECTROMETER, and you have AUTO.

03 08 05 38 CMP Okay, Hank. You've got the mass spec out to 8.4 feet.

03 08 05 43 CC Roger; looks good down here.

03 08 05 45 CMP LASER ALTIMETER is coming ON.

03 08 05 49 CMP MARK.

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03 08 06 02 CMP And can I go ahead and put the MASS SPEC EXPERIMENT
ON without waiting the 3 or 4 minutes?

03 08 06 07 CC Stand by. Roger. Go ahead.

03 08 06 16 CMP Okay. MASS SPECTROMETER EXPERIMENT is coming ON.

03 08 06 22 CMP MARK. The ION SOURCE is going to STANDBY.

03 08 06 29 CMP MARK it.

03 08 09 04 CMP Can you tell how the laser is doing yet, Hank?

03 08 09 09 CC Stand by, Ken. We'll take a look. Laser looks
good, Ken.

03 08 09 21 CMP Outstanding.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

03 08 14 12 CC Apollo 16, Houston. We're about 2 minutes from
LOS.

03 08 14 18 LMP All righty. See you in a little while.

03 08 14 21 CC Roger. Over.

03 08 15 58 LMP Houston, 16. Do you read?

03 08 15 59 CC Roger.

03 08 16 04 LMP Okay, Hank. I'm up with the biomed. Take a quick
look at it.

03 08 16 09 CC Looks good.

03 08 16 15 LMP Okay. Since we are gonna put on our LCG's tonight,
I don't bit - put on the ...

03 08 42 XX BEGIN LUNAR REV 4

03 09 06 01 CC Apollo 16, Houston.

03 09 07 22 CC Apollo 16, Houston. How do you read?

03 09 07 29 CDR You're 5 by, Hank.

03 09 07 31 CC Roger. Our data down here we worked on during the
back side shows you're in 58.8 by 10.6.

03 09 07 46 CDR Okay. And while - while we were on the back side,
we had a couple of MAIN B UNDERVOLT lights.

03 09 07 55 CC Roger. Copy. You want to tell us about it?

03 09 08 03 CDR Stand by. Yeah, it was when Ken was - messing
around with the SIM bay, and he'll fill you in.

03 09 08 11 CC Okay.

03 09 08 14 CMP Yeah, we got a little behind on this sequence
already, Hank. But as soon as I turned the - had
the mapping on and it worked fine, I turned the

pan camera on, and as soon as I went to OPERATE on the PAN CAMERA, we got a MAIN B UNDERVOLT. So I turned it back to STANDBY and left it there. Charlie said he saw about 25 volts on MAIN B, and concluded I'd wait and let you take a look at it. And then we got another MAIN B UNDERVOLT at some 5 minutes or so later, and it again was momentary. By the time we looked at it, it all looked pretty normal. The only - We checked the fuel cell regulator pressures. They looked good, and I really don't have any idea what might of caused it.

- 03 09 09 02 CC Yeah. All the things we could check look okay.
- 03 09 09 06 LMP Hank, we got a - it might not even be a small anomaly, but fuel cell 3, the H₂ flow's running a little bit higher than the O₂ flow, but the regulator pressure looks fine to me. But the other two fuel cells, H₂ and O₂, match.
- 03 09 09 24 CC Roger. We copy, Charlie.
- 03 09 10 13 CDR My guess is when you dump the DSE the whole story will be right on there probably.
- 03 09 10 17 CC Okay. ... John.
- 03 09 10 23 CDR When you get the DSE translated, probably tell you what happened.
- 03 09 10 25 CC Roger. We copy.
- 03 09 11 07 CMP Hank, you really can see both the mass spec and the gamma ray booms deployed.
- 03 09 11 11 CC Roger. Understand you can see them both.
- 03 09 11 14 CMP That's affirmative. Looks like a couple of feet of the boom is about all you can see.
- 03 09 11 28 CC You've really got us puzzled with this undervolt now, because the pan camera runs off from main A.
- 03 09 11 44 CMP Yeah, we'd noticed the same thing. It - you know it may not be rational, but it just seemed like that was the - I touched one switch and got a MAIN UNDERVOLT so I took it back off again. Dact...

to even let you think about it before I ... anymore.

03 09 11 52 LMP Possible that it doesn't have any connection.

03 09 11 53 CC Roger.

03 09 12 09 CMP I still have the power on it, Hank. I've got it in STANDBY and POWER on.

03 09 12 15 CC Roger. Copy. And, Ken, I'd like to verify - is your NONESSENTIAL BUS on MAIN A or MAIN B?

03 09 12 28 CMP That's MAIN A.

03 09 12 30 CC Roger.

03 09 13 03 LMP And, Hank, last night we - I - think we got verification that we could wear the LCGs to bed tonight and be all ready to go by in the morning.

03 09 13 14 CC That is affirmative.

03 09 13 20 LMP Okay. Anybody thought any more about my suit?

03 09 13 26 CC We thought about it, and smoked it over, and we kind of think maybe we ought to do nothing unless you have some real bad trouble tomorrow.

03 09 13 39 LMP Like if we can't get it zipped.

03 09 14 07 CDR Okay. Can we use my pliers on it to pull the zipper closed?

03 09 14 53 CDR Houston. Houston, 16. Do you read? Over.

03 09 14 55 CC Roger. Reading you 5 by 5, John. Go ahead.

03 09 15 03 CDR Okay. If I have trouble closing it, can I use my pliers to get a better grip on it to pull it closed? Because it took me the better part of 20 minutes the other day to do it, and it usually takes about 2. There's a place on there in the small of Charlie's back where that thing has just separated too far apart on the restraint zipper for me to pull it closed easily. When he gets on the LCG, the FCS, and the UCD bulk in there, the suit is going to be farther apart than it was - yesterday.

03 09 16 03 CC John, we talked to Dave about that, and he said the big problem is that you can't arch your back in zero g as well. He had - he had a lot of trouble too, but on the Moon in 1/6 g he had no problem at all, because the gravity helped him arch his back. Does that sound like the problem - you just couldn't get arched back that far enough to do it?

03 09 16 30 CDR Got me there. It looked like he was arched as much as he usually is.

03 09 16 46 CDR But you're saying that if I can't do it in - in zero g, we go on down to the Moon and try it in 1/6 g?

03 09 17 00 CC Roger. That sounds pretty good, John. We - we did look at a backup procedure here, but it's a long - looks like a long thing and involves using a needle and pulling things together like you're sewing.

03 09 17 43 LMP Okay, Hank. I think to give us every benefit of the doubt that I will not - I don't plan to wear the - the FCS probably tomorrow, and I'll just use the LCG and UCD.

03 09 18 07 CC Roger. Understand, and could you give us AUTO on - the HIGH GAIN.

03 09 18 16 LMP There you go.

03 09 19 28 LMP Hank, also we would like to get permission to fill the drink bags tonight to save a few minutes also, if you think that's gonna be all right.

03 09 19 43 CC Roger. That - Go ahead and do that, Charlie.

03 09 19 48 LMP All right.

03 09 20 31 CC Ken, we can't find any connection between the pan camera and main bus A, and we were wondering - main bus B, and we were wondering if, when you got the second momentary one - undervolt - were you moving any switches at that time?

03 09 20 49 CMP That's negative.

03 09 21 13 CMP They were both momentary main bus undervolts.

03 09 21 24 CC Roger. The - the first one was momentary also?

03 09 21 31 CMP It - it could be, or it could be that the sensor is triggering at the wrong level. It could be that the sensor shifted up to something that looks reasonable. I wouldn't object - we still got the pan camera power on - I wouldn't object to ... it to operate for a second and back off - go ahead and use a couple of frames just to let you watch it.

03 09 21 54 CC Stand by, Ken.

03 09 23 29 LMP Houston, 16.

03 09 23 30 CC Go ahead.

03 09 23 34 LMP Is Tom satisfied with his GLYCOL EVAP OUT? We've got off scale, high here.

03 09 23 59 CC Stand by. Stand by a minute, Charlie.

03 09 24 21 CC 16, Houston. You're ... is at the top of the scale. You're still okay. You should now monitor RAD OUT

03 09 24 32 LMP A RAD OUT is 75.

03 09 24 36 CC Roger.

03 09 28 17 CC 16, Houston. Talked with the suit people, and they don't want you using the pliers on the zippers.

03 09 28 31 CDR I just used it to get a better grip with, not to pull the zipper, just to pull with.

03 09 28 54 CC Their concern is over side load, John. They're afraid for you to use the pliers.

03 09 29 06 CDR Okay.

03 09 29 34 CC Ken, Houston. We would like to talk to you a minute about this docking latch, if you're free.

03 09 29 45 CMP Go ahead.

03 09 29 48 CC Okay. We've got a real long procedure here. I don't think you need to copy it all down. Let me just read it through to you once, and kind of let me discuss it as we go. What we want to do is kind of get a look at the thing tomorrow and see what the condition of it is. After you disconnect the LM umbilical, we want - would like for you to open the orange LM umbilical connector cover and inspect the roller pawl. The roller pawl, we hope, is engaged in the detent, but we would like to find out if it's in the detent, or is it free, or sticking up, and you can do that by looking in the side of the latch after you remove that umbilical connector cover. Is there any question on that?

03 09 30 38 CMP Yeah. I'm not sure I know what you're looking for.

03 09 30 42 CC Okay, when you look in the side there - -

03 09 30 45 CMP - - I'm not at all sure what the roller pawl is.

03 09 30 46 CC Okay, the roller pawl is on the far left side of the latch, behind and above the auxiliary release button. And it can be identified by the roller on the tip of the pawl. The pawl is just a little arm that sticks out, and it's got a little roller on the end of it that rides on the cam that has these detents in it.

03 09 31 05 CMP Okay.

03 09 31 08 CMP Do you want to do this before we unlock it?

03 09 31 12 CC That's affirmative. And it best be done tomorrow - before you get your helmet and gloves on, of course. Just take a look at it while - perhaps while they're bringing the LM up. And if you find after we get the condition of that, if the roller is down in the detent like we suspect that it is, when you remove the yellow probe umbilical cover on the right side of the latch, we would like you to look in the right side in there and at the bungee bell crank mechanism, and see if there's any foreign-object damage or anything wedged up in there.

03 09 31 51 CMP When you say remove the cover - do you mean physically remove it from the spacecraft, or just open it up and look underneath it?

03 09 31 57 CC

Just open it up and look under there, Ken. And this is mainly - these two steps is just an inspection. We'd just like to verify the condition of the roller pawl and also the bell crank mechanism on the other side. Has nothing to do with the latch, but at least it'll give us an idea of what's wrong inside, if there is anything. It's not gonna help you in any way to prepare for unlocking it. To unlock it - after you've looked at these two things, we would like to know if the latch handle requires force to cock the latch on the first stroke - and the second stroke, if required. In other words, if the handle comes away real easy, as you recall, then the thing is already cocked. More than likely, it is gonna take some force, and we would like to verify how this works. And if it should require force, pull it down, and then we want to see that the hook comes out there inboard approximately 16 degrees. If the hook doesn't come out, then all you got to do is pull down on the handle to the full cock position, and hold it, and then just reach up and grab the hook, and pull it inboard about 16 degrees, and the hook should stay there. And then you just proceed with normal undocking.

03 09 33 20 CMP

Okay. So the kind of thing you want me to look for are information only. Is that affirmative?

03 09 33 27 CC

Right. It would help the guys down here to try to understand what - what really happened to the latch. We kind of suspect it only got one cock. But if you look in there, and look for the roller pawl on the left side and look at the bell crank on the right side, at least that would tell us that nothing is jamming it, and that the roller pawl is in the right direction - right place. Operationally though, prepare for undocking. What it really amounts to, you just use the normal procedure. You pull the latch handle down and cock it if necessary, and if the hook doesn't come back, just hold the latch handle all the way down to the full cock position and pull the hook back.

03 09 34 20 CMP

Okay. I just wanted to keep in mind what it was I needed if the time gets crowded.

03 09 34 26 CC Roger. The only this is - if there is any question on cocking, the only thing you have to do there is just pull it down and get the hook out of the way. Do you have any questions on any of that?

03 09 34 48 CMP Ah, Hank, we just ...

03 09 34 54 CMP Not - not right now. Maybe you want to get in there and look at it. I'll call and ask you for some clarification or something tomorrow. But I think I know what you mean.

03 09 35 01 CC Okay.

03 09 35 12 LMP Hank, as we came up towards the landing site, in that terrain - the general terrain to the east of us appears to me to be frothy vesicular-looking type terrain, real ... looking at this scale. Over.

03 09 35 33 CC Roger. We copy, Charlie.

03 09 35 38 LMP I'd say that was the Descartes. It has that appearance to it to me.

03 09 35 45 CC Roger.

03 09 35 51 LMP And do you have this LM DAP load for us and TEI?

03 09 35 57 CC Roger. We're working on those pads now.

03 09 36 13 CC Charlie, we'd like to get a BAT B charge going.

03 09 36 22 LMP Okay, BAT B charge going on.

03 09 36 39 LMP BAT B is charging.

03 09 37 16 CC 16, Houston. I have your TEI-12, 19 block data.

03 09 37 27 LMP Okay, stand by.

03 09 37 59 LMP Okay. Go ahead.

03 09 38 04 CC Okay. TEI-12, SPS/G&N; 39817; plus 0.61, plus 1.19; 097:45:53.09; plus 3163.2, plus 1040.3, minus 0234.0; 181, 080, 020. Rest of the pad is NA. The set stars are the same as for DOI. Won't repeat unless you want. Ullage two jets, 17 seconds; other

remarks: burn undock, assumes no circ. Longitude
of Moon at T_{ig} minus 171.47. Landing site REFSMMAT.

03 09 39 49 LMP Roger. TEI-12, SPS/G&N; 39817; plus 0.61, plus 1.19;
097:45:53.09; plus 3163.2, plus 1040.3, minus 0234.6;
181, 080, 020; NA; Sirius and Rigel; and informa-
tion is same as DOI, two jets, 17 seconds; burn
undock, assumes no circ; longitude of Moon at T_{ig}
minus 171.47; landing site REFSMMAT.

03 09 40 23 CC Good readback. And are you ready for TEI-19?

03 09 40 31 LMP You speak.

03 04 40 33 CC Roger. TEI-19, SPS/G&N; 39445; plus 0.61, plus 1.15;
111:31:49.81; plus 2909.4, plus 0785.3, minus 0224.0;
181, 100, 017. Set stars same as DOI, two jets,
17 seconds. Other: burn undocked, assumes circ;
LM to Moon at T_{ig} minus 160.09. End of pad. If
you'll give us ACCEPT, we're ready to uplink.

03 09 42 06 LMP Roger. You have it. And readback TEI-19, SPS/G&N;
39445; plus 0.61, 1.15; 111:31:49.81; plus, 2909.4,
plus 0785.3, minus 0224.0; 181, 100, 017. Sirius
and Rigel; two jets, 17 seconds; burn undock,
assume circ; LM to at T_{ig} minus 166.09.

03 09 42 38 CC That was 160.09.

03 09 42 46 LMP Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

03 09 43 15 CMP Henry, can I assume that the mission timer is in sufficient sync and that we don't need to do any updates there and that the REFSMMAT is good as is?

03 09 43 28 CC That's affirmative.

03 09 43 32 CMP Thank you, sir.

03 09 43 46 CDR Have you got the LM DAP stuff, Hank?

03 09 43 50 CC Roger. We've got it and we're up-linking now and we're also loading your EMP 509 and I have your DAP, if you're ready to copy.

03 09 44 01 LMP Go ahead.

03 09 44 02 CC Correction on that. It's not 509; it's the jet monitor. Okay, LM DAP. LM weight, 36673; CSM weight, 39329. Checklist: DPS gimbal trims are good; no trim required.

03 09 44 28 LMP Roger. Reading 36673, 39329, and the gimbals are good as is.

03 09 44 38 CC A good readback, Charlie. I have a change to your LM Timeline Book on page 1.

03 09 44 52 LMP Stand by. Is it the Timeline or Activation?

03 09 44 55 CC Timeline Book.

03 09 45 09 CC It's a change to your undocking attitude, Charlie. It says Timeline Book.

03 09 45 20 LMP Okay - okay, just had to get it out. Go ahead, page 1.

03 09 45 26 CC Okay, change undocking attitude to 0, 284, 064.

03 09 45 43 CC The reason for this is because of the docking index angle - -

03 09 45 45 LMP Roger; 0, 280 ... - Roger; 0, 284, 064.

03 09 45 54 CC Roger. That's because of your docking index angle of minus 3-1/2 degrees.

03 09 46 01 LMP Copy.

03 09 46 07 CC And I have some Flight Plan changes for you.

03 09 47 07 CC Apollo 16, Houston. We'd like to verify the position of the O₂ TANK 50-WATT HEATERS on panel 226.

03 09 47 17 LMP They are open.

03 09 47 19 CC Roger. Copy. They're open.

03 09 47 45 CC Charlie, are you ready to copy the Flight Plan changes?

03 09 47 52 CMP What kind of Flight Plan, LM or CSM type?

03 09 47 54 CC Roger. They're CSM, if you want to get them, Ken, they're for tomorrow's activities.

03 09 48 04 CMP Okay, I'm ready.

03 09 48 06 CC Okay, the first one is at 96:34.

03 09 48 23 CMP Go ahead.

03 09 48 24 CC Okay, there's a VERB 48 there. Change R-1 to read "10102."

03 09 48 40 CMP Okay, "10102" for VERB 48, R-1 at 96:34.

03 09 48 45 CC That's correct. At 96:39, write in "Load EMP 509; leave on through gimbal drive check for circ."

03 09 49 23 CMP Okay, at 39, "Load 509 and leave through circ gimbal drive check."

03 09 49 29 CC That's correct. The next change is at 97:15.

03 09 49 37 CMP Go.

03 09 49 38 CC Delete the VERB 48.

03 09 49 49 CMP Okay, deleted the VERB 48 at 97:15; and that's because we'd already set it; affirmative?

03 09 49 55 CC That's affirmative. And that also prevents you from activating that Saturn DAP. Okay, at 97:44, right after - right before - prior to the VERB 49 maneuver there, put in "Load DAP, VERB 48 (10101) (X1111)."

03 09 50 40 CMP Okay. You want to "Load VERB 48 (10101) and (X1111)." After the circ burn and ahead of the VERB 49 maneuver.

03 09 50 51 CC That's affirmative and, Ken, the computer's yours; the E-memory program's loaded.

03 09 50 58 CMP All right, sir; thank you.

03 09 51 01 CC Okay, next change is at 98:32. Prior to the comm check there, put "Load EMP 509."

03 09 51 22 CC ...

03 09 51 23 CMP Okay, prior to comm check, "Load 509."

03 09 51 26 CC Roger. And down about 98:44 after P00, add "Terminate EMP 509, after the P24 is complete."

03 09 51 50 CMP Okay, I'll terminate 509 between P00 and loading VERB 48.

03 09 51 56 CC Roger. The next change is at 100 hours 32 minutes, "Load EMP 509."

03 09 52 14 CMP Okay, at about 100:32, "Load 509."

03 09 52 18 CC Roger. And about 100:43, "Terminate EMP 509, after P24 complete."

03 09 52 41 CMP Okay, will terminate 509 after P24.

03 09 52 46 CC Okay, Ken, that's it on the Flight Plan changes. I hate to bring this up again, but they've got a change here for your SPS burn cue card.

03 09 53 02 CMP All right. What might that be?

03 09 53 06 CC Well, we had this - starting this thing 20 minutes early before so that we could help you prior to LOS, and we're convinced that you don't really need

that much time, and what we think you ought to do is get the gimbal drive test started - you know, the main buses on about 8 minutes early rather than 6 minutes. So the change is to - where we had you 40 minutes or minus 20 minutes is to change that to 52 and minus 8.

- 03 09 53 41 CMP Okay. Do I dare use my ink pen this time?
- 03 09 53 45 CC I hope it's good for the rest of the burns now, if we change that to 52 minutes and minus 8 minutes.
- 03 09 53 56 CMP Okay, that's no sweat. Thank you.
- 03 09 53 59 CC Okay, and the next one'll become 41 minutes and minus - Correction, 53 minutes and minus 7.
- 03 09 54 10 CMP Okay, 53 and minus 7 and 52 and minus 8.
- 03 09 54 15 CC Okay, now, earlier we had deleted that "TAPE RECORDER, HIGH BIT RATE" line there and added it back on the back page, and I guess now we need to move it back.
- 03 09 54 35 CMP Okay, would you settle for minus 8, so I can just leave it where it is?
- 03 09 54 39 CC Roger; that's good enough. Just do it there and delete it from the back - back side of the card.
- 03 09 54 47 CMP Okay, we'll do that.
- 03 09 55 31 CMP Hank, are we going to end up with temperatures that are low enough, or would you like for me to manually set this TEMP IN valve to a little lower temperature?
- 03 09 55 44 CC Are you talking about the oxidizer pressure, Ken?
- 03 09 55 50 CMP No, sir; the manual TEMP IN and the glycol loop.
- 03 09 55 53 CC Oh, that - EECOM advises that looks pretty good now.
- 03 09 56 01 CMP Okay, is it going to get too cold on the - on the dark side?
- 03 09 56 13 CC Stand by a minute.
- 03 09 56 32 CC Ken, EECOM says that the present setting should keep you in good shape.

03 09 57 06 CMP Hank, I guess I'd - I would like to run it cooler to get the cockpit a little cooler, if that isn't going to cause any other problems.

03 09 57 19 CC Stand by a minute, Ken.

03 09 58 28 CC Casper, Houston. We'd like to get the pan camera turned off.

03 09 58 34 CMP Okay, you just want to take - turn the power off, huh?

03 09 58 39 CC Roger, we were trying to look at - run it, but we got pretty high loads on the spacecraft now, and we're getting close to LOS and there's not going to be time to exercise it.

03 09 58 52 CMP Okay, we'll just turn it off then.

03 09 59 16 CMP Okay, Hank, we've got the PAN CAMERA POWER, OFF.

03 09 59 20 CC Roger, Ken. And did you happen to notice the retract time on the mapping camera.

03 09 59 27 CMP Yes, sir. I meant to get that in. That was - I thought it was excessive. In fact, I thought it had maybe stuck. It was about 3 minutes.

03 09 59 38 CC Roger; we copy.

03 09 59 55 CMP And, Hank, I got some - some film status to give you, if you're ready for that.

03 10 00 02 CC Stand by.

03 10 00 12 CC Go ahead.

03 10 00 17 CMP Say again.

03 10 00 19 CC I'm ready to copy, Ken.

03 10 00 25 CMP Okay. On magazine Victor, we're up to frame number 8; Sierra Sierra, frame number 13; Tango Tango, 04. November November, 36.

03 10 00 49 CC Roger; copy. Victor, 8; Sierra Sierra, 13; Tango Tango, 04; November November, 36.

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03 10 01 00 CMP That's correct, sir.

03 10 04 01 CC 16, Houston. To more evenly distribute the - the electrical loads when you get on the back side after LOS, we'd like you to take TELCOM GROUP 2 to AC1.

03 10 04 17 CMP Okay, TELCOM GROUP 2 to AC1.

03 10 04 22 CC Roger; that's after LOS. And in regard to the mixing valve, you can adjust that for an EVAP OUT temperature of 49 degrees, and you ought to be okay.

03 10 04 37 CMP Okay, is that 49 degrees the coldest temperature? Or just how did you -

03 10 04 46 CC If you adjust it right now to an EVAP out of 40 - -

03 10 04 51 CMP Okay, okay. Right now for 49.

03 10 06 07 CC Apollo 16, Houston. We'd like to get an E-MOD, if we can.

03 10 06 27 LMP On the way.

03 10 06 29 CC Roger.

03 10 06 54 CC And 16, Houston. Make sure you get the comm set up right in your presleep checklist here, or INCO says they won't be able to command the thing right and we'll have to wake you up next time.

03 10 07 11 CMP Say again, Hank.

03 10 07 15 CC Roger. They're admonishing me to tell you to be sure you follow the checklist on setting up the comm presleep.

03 10 07 27 CMP Roger. We'll do that.

03 10 08 24 CC Apollo 16, Houston. We're about 2 minutes from LOS.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

03 19 25 41 CC Apollo 16, Houston.

03 19 25 51 CC Apollo 16, Houston.

03 19 26 25 CMP How you down there this morning, Houston?

03 19 26 27 CC Just fine. How are you, 16?

03 19 26 35 CMP Changing hard.

03 19 26 37 CC Roger. Got about three short items and a SIM bay status, if you're ready.

03 19 26 50 CMP Okay. Can we hold off on the SIM bay status? And I'll copy your three short items.

03 19 26 55 CC Roger.

03 19 26 58 CC Okay. The first one is - based on our evaluation, your potassium levels are running a little low, and we'd like to recommend that you drink some orange juice this morning. Also, you've got a long day ahead of you, so we'd like to recommend that you eat a bit more food. Second item is terminate battery Bravo charge. The third item is terminate the jet-on monitor.

03 19 27 53 CMP Okay, Don.

03 19 28 02 CMP Okay, Don. Number 1, I understand your comment about the potassium low and all that jazz. We've just finished up breakfast, and I think we've eaten almost everything that the LMies have to eat. And we - we've been drinking all the drinks every day. And, if we get a chance, we'll try to get some more - get another juice bag out. We will terminate the battery B charge and terminate the jet monitor, and I understand the way to do the jet monitor is - I'll go to - I'll go to the SCS mode and key a VERB 37 NOUN 20 and then verify that NOUN 26 isn't all zeros again. And I can go back to P20. Is that correct?

03 19 28 55 CC Stand by 1.

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03 19 29 02 CC There's no requirement to go to SCS, 16.

03 19 29 09 CMP Okay. I can just call 37 20 without getting any firings?

03 19 31 10 CC 16, just to be sure we're talking the same thing - to kill the jet-on monitor, we want to do a VERB 37 ENTER, 30 ENTER, a VERB 37 ENTER, 20 ENTER, and zero the NOUN 26.

03 19 32 05 CMP Don, I can't get to the Updates Book where that's written down. Would you read it to me slowly, and I'll do that terminate right now.

03 19 32 11 CC Okay, it's VERB 37 ENTER, 30 ENTER, VERB 37 ENTER, 20 ENTER, zero the NOUN 26.

03 19 32 31 CC And, 16, you're about 1 minute to LOS, and you're looking good.

03 19 32 39 CMP Okay. And we're taking an extra orange with potassium this morning.

03 19 32 43 CC Roger.

03 19 33 06 CMP Houston, 16. Take a look at that biomed off of me and see how it looks. Over.

03 19 33 14 CC Okay.

03 19 33 20 CMP I got it reset - from yesterday.

03 19 33 28 CC Ken, still looks a little loose.

03 19 33 35 CMP Well, it's not loose.

03 19 33 40 CC We'll have to take a better look at it next time around, Ken.

03 19 33 48 CDR Okay. This is John, and the sensors are fixed.

03 19 34 01 CC We've got confusion down here on who we're monitoring, John.

03 19 34 42 CC John, the lead we're concerned with is the sternal lead - the one on your breastbone. You might jiggle it a little bit.

03 19 35 05 CDR Gee, we're doing that. It sure looks like it's all tight.

03 19 35 09 CC Okay.

03 19 35 35 CC John, you might try putting new sponges on that lead.

03 19 35 43 CDR Okay. I did that last night.

03 19 35 49 CC Okay. We'll pick you up next rev and talk about it.

03 20 06 XX BEGIN LUNAR REV 10

03 20 29 40 CC 16, this is Houston. Standing by.

03 20 29 46 CMP Hello, Jim.

03 20 29 47 CC Morning.

03 20 29 49 CMP We're in the process of a little suit donning here, and we've got one problem. I went to retract the mass spectrometer, and the gamma ray boom came in fine, but the mass spectrometer boom indicates to barber pole and has stayed barber pole about 10 minutes. I went ahead and enabled the jetts. And I'd like for you to take a look at the - at the - telemetry talkback on the boom, and see if you can suggest something for me to do.

03 20 30 15 CC Okay, we copy.

03 20 30 16 CMP Barber pole. It's a total barber pole.

03 20 30 18 CC We copy, Ken.

03 20 30 20 CMP Okay.

03 20 31 19 CC 16, this is Houston. We're wondering if you've gone through the malfunction procedure for that boom retraction on page 1-24 of the Systems Handbook?

03 20 31 31 CMP Well, I looked and didn't find one that was appropriate.

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03 20 31 35 CC Okay. I guess you're right, Ken.

03 20 31 48 CMP We're pretty busy, as you know, Jim, and so I'd really appreciate it if you could talk me through whatever steps you want.

03 20 31 53 CC Okay; understand.

03 20 32 30 CC 16, this is Houston. We'd like you to put the MASS SPEC BOOM switch to the off position. That's if it's not there already.

03 20 32 39 CMP Okay. And when I do, it goes to gray.

03 20 32 45 CC Understand, it goes to gray.

03 20 32 52 CMP That's affirmative.

03 20 35 00 CC 16, this is Houston. We had understood that you had activated all your RCS jets. We show you still in the SIM bay configuration.

03 20 35 19 CMP Okay. Thank you. I have the switches with the circuit breakers I had left out.

03 20 35 25 CC Roger.

03 20 35 38 CC 16, this is Houston. You can go normal acquisition procedures on the S-band.

03 20 35 45 CMP Okay.

03 20 36 19 CMP Jim, what did you want me to do with that high gain?

03 20 36 24 CC We wanted you to go through normal acquisition procedures.

03 20 37 19 CC 16, will you go AUTO on the HIGH GAIN?

03 20 37 26 CMP You have it.

03 20 37 29 CC Okay.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

03 20 38 14 CC Six - Never mind.

03 20 38 46 CC Okay, 16. This is Houston. We have SIM bay data now. Will you go back to RETRACT on the - on the BOOM switch?

03 20 38 59 CMP Okay. You have RETRACT, Jim.

03 20 39 10 CC Roger.

03 20 40 09 CC 16, this is Houston. Will you check the talkback on that BOOM, and tell us whether it's full barber pole or a partial?

03 20 40 22 CMP It's the same as it's been, Jim. It's a barber pole, full.

03 20 40 27 CC Okay, we copy; a full barber pole. We show it partially retracted within acceptable limits.

03 20 40 38 CMP What do you mean partially retracted? Does that mean your telemetry point has cinched closure?

03 20 40 44 CC That's affirmative.

03 20 40 49 CMP Okay, then I'll put it back into the OFF position?

03 20 40 53 CC Stand by, Ken. I think we - we want it in RETRACT.

03 20 40 59 CMP Okay, I'll leave it in RETRACT.

03 20 41 01 CC Okay, you could put the RETRACT switch back to the OFF position.

03 20 41 14 CMP Okay, RETRACT is OFF.

03 20 41 16 CC Roger.

03 20 41 19 CMP If you can watch that thing on telemetry, I can extend it enough to clear it and then try a RETRACT again.

03 20 41 30 CC Okay, let's - We're within limits, Ken. Let's hold what we have.

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03 20 41 39 CMP Okay.

03 20 43 47 CMP Okay, Jim. On the docking latch number 10, I've got some observations, if you're ready.

03 20 43 56 CC Roger. We're ready, Ken. Go ahead.

03 20 44 01 CMP Okay, when I look in under the LM umbilical connector cover, the roller cam looks normal, and everything I can see from that side looks correct. When I look under the cover on the right side - that's the probe connector cover - I look at the bungee in the - the little arm that sticks out from the bottom of the cam - when I compare it to another latch, it doesn't stick out as far; in fact, the back of this part - this inner piece of the bell crank - I can get the part number on it, and it's - it's flush; whereas, on the other end, it sticks out and it shows the pin; so it looks like it hasn't come over center. Sorry I don't have the right part nomenclature.

03 20 44 51 CC Roger; we copy.

03 20 44 52 CMP If you had a docking latch on the table there somewhere, you could see what I'm looking at.

03 20 45 33 CC Ken, this is Houston. Can you see anything that might be obstructing or interfering with that cam action?

03 20 45 42 CMP No, sir; I can't.

03 20 45 44 CC Okay.

03 20 46 28 CC Okay, 16; this is Houston. If you go to P00 and ACCEPT, we'll up-link you. Okay, just ACCEPT.

03 20 46 41 CMP You're there.

03 20 49 24 CC Okay, 16; this is Houston. You can go back to BLOCK.

03 20 49 42 CC 16, this is Houston. Did you copy?

03 20 49 47 CMP Yeah, you got it.

03 20 49 48 CC Roger.

03 20 58 51 CMP Houston, we just passed over the good landing site, and you can see the whole area. Stands out very nicely just like the model.

03 20 59 01 CC Very good, Ken. Thank you.

03 20 59 39 CMP Houston, from my present position, I can't be sure exactly where I am because I just looked out the window again but - we passed over a large crater, and it has three little domes in the bottom of it with craters in the top of them; and they look like very subtle cinder cones. I'll try to mark that guy on the way back. It's one of a cluster of two large ones and several smaller ones.

03 21 00 03 CC Roger. We copy, Ken.

03 21 01 30 CC 16, this is - Houston. Will you give us another reading on that docking tunnel index when you have an opportunity?

03 21 01 40 CMP It's still the same thing: minus 3.5.

03 21 01 43 CC Roger. Minus 3.5.

03 21 01 48 CMP Affirm.

03 21 06 07 CC 16, this is Houston -

03 21 06 09 CMP Houston, 16.

03 21 06 10 CC We have filmed the - Go ahead, 16.

03 21 06 15 CMP Okay. John and Charlie got their suits on and they're in the LM. Is there any reason they shouldn't go ahead and power up and get some cooling?

03 21 06 25 CC Stand by.

03 21 06 33 CC Okay, let's proceed, Ken.

03 21 06 38 CMP Okay, we'll proceed.

03 21 07 21 CMP Houston; Orion on internal power at 93:07.

03 21 07 25 CC Roger.

03 21 07 46 CC And, Ken, this is Houston. The reason for that undervoltage last night was that the - all the heaters just happened to come on at that particular time.

03 21 07 59 CMP Say again, Jim. We were cycling over to relief dump at the time (chuckle).

03 21 08 04 CC I'll talk to you later.

03 21 08 09 CMP Okay. Did you get my call on the LM power at 93:07?

03 21 08 14 CC Sure did; 93:07.

03 21 10 34 CC 16, this is Houston. S-BAND AUX SCI switched to OFF. Over.

03 21 10 45 CMP That's OFF.

03 21 10 47 CC Roger.

03 21 19 25 CMP Houston, can I give you some torquing angles, or did you copy them?

03 21 19 29 CC We have them, Ken.

03 21 19 33 CMP Okay, and we're in the maneuver.

03 21 19 36 CC Roger.

03 21 20 23 CC Ken, this is Houston. Our plan on the mass spec boom is to leave it where it is, and we're going to ask John and Charlie to check it after undocking, with respect to position.

03 21 20 46 CMP Okay.

03 21 20 48 CC And when I was trying to talk to you before, I just wanted to give you the word on that undervoltage which y'all had last night. The reason for that was the fact that all the heaters came on at the same time. Over.

03 21 21 05 CMP Okay, I guess maybe I jumped the gun, but it seemed to me like that - that MASTER ALARM came on instantly when I hit that switch, and it seemed like

the only prudent thing to do was to undo what I just did. I'm glad to hear that, though. Thank you.

03 21 21 44 CC And, Ken, if you're - got a few minutes there - I could give you a - a Flight Plan update, a very short one.

03 21 21 51 CMP Could - could you hold it? I'm in the middle of - suit donning and canister change.

03 21 21 56 CC Okay.

03 21 25 11 CC Ken, will you have Orion select the aft antenna?

03 21 25 19 LMP Okay, Jim. You got it.

03 21 25 22 CC Very good. We're reading you loud and clear.

03 21 25 27 LMP And you're really beautiful, too. We are on page 3-6, step 6. We'd have been a little bit further along, but we had trouble with John's zipper today.

03 21 25 38 CDR ... I tried to ...

03 21 26 09 CC Orion, will you go DOWN VOICE BACKUP?

03 21 26 54 LMP ... Casper. Over. ...

03 21 27 15 CC Casper, this is Houston. If there's anyth - thing significant from Orion, will you relay, because there's excessive noise down here.

03 21 27 26 LMP How do you read, Jim?

03 21 27 42 CC Casper, this is Houston. How do you read?

03 21 30 17 CC Orion, this is Houston. How do you read?

03 21 30 22 LMP You're 5 by, Jim. How me?

03 21 30 25 CC Roger; we're reading you. We still have a lot of noise, but we don't have the big dish up yet.

03 21 30 32 LMP Okay, we got a signal strength of about 3.9 on the aft omni.

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03 21 30 37 CC Roger. Understand 3.9 on the aft omni.

03 21 31 29 LMP Noisy, ain't it?

03 21 32 19 CC 16, this is Houston. You're 2 minutes from LOS.

03 21 32 28 CMP Okay, thank you. ...

03 21 32 51 CDR Can you read me, Charlie?

03 21 32 52 LMP Yeah.

03 21 32 55 CDR I don't read you.

03 21 32 56 LMP You don't have your audio breaker in, do you?

03 21 32 59 CDR Yeah.

03 21 33 01 LMP Did you turn on your stuff?

03 21 33 04 CDR Yeah.

03 21 33 15 LMP How's that? How's that?

03 21 33 18 CDR That's better. Okay. Thank you. What was that?
How did you fix that?

03 21 33 25 LMP I just put my mike closer to my mouth.

03 21 33 27 CDR Okay, fine. ...

03 21 33 28 LMP And talked up a little bit. I've got my MASTER
VOLUME up full.

03 21 33 31 CDR Me, too.

03 21 33 40 CDR Okay, where are you at, Charlie?

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

03 22 00 XX BEGIN LUNAR REV 11

03 22 23 06 LMP Hello, Houston. Ole Orion; how do you read?
Over.

03 22 23 09 CC Orion, this is Houston. Read you loud and clear.

03 22 23 14 LMP Okay, Jim. We're zipping right on through the
checklist. We've got the PGNS up, the docked
coarse align done, the landing gears deployed,
and the only thing we haven't done is really what
you need to see. And we're ready to start in on
the S-band checks and bring up the steerable. Over.

03 22 23 34 CC Okay, Charlie.

03 22 23 43 LMP Okay, while guidance is - Let me give you some
angles. We had a VERB 06 NOUN 20 that was done at
94:20:20. The LM angles were plus 29465, plus
28996, plus 35502.

03 22 24 12 LMP How do you read, Jim?

03 22 24 13 CC Roger; we copy. Copied the LM as plus 29465,
plus 28996, plus 35502. Over.

03 22 24 25 LMP That's affirmative. The command module are plus
00269, plus 10931, plus 00472. Over.

03 22 24 37 CC Roger. I copied plus 00269, plus 10931, plus
00470. Over.

03 22 24 48 LMP That's firm. It sounds like we've got good comm
on PRIMARY S-band and T/R and SECONDARY POWER AMP.
I'm going SECONDARY S-BAND T/R and PRIMARY POWER
AMP. Over.

03 22 25 00 CC Roger. We're standing by.

03 22 25 03 CDR We've got a lot ...

03 22 25 04 LMP Okay. I think it's my switch you're doing.

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03 22 25 08 CDR Huh? Yeah, it is. Carry on.

03 22 25 13 CC Casper, this is Houston. We want narrow on the S-band.

03 22 25 46 CDR Is that affirmative?

03 22 25 47 LMP Yeah, you can go ahead ... Okay, Jim; how do you read? Over.

03 22 25 58 CC Orion, this is Houston. Go ahead.

03 22 26 03 LMP How do you read, Jim? Over.

03 22 26 05 CC I read you, but there's a lot of noise in the background.

03 22 26 15 LMP Okay. We have PRIMARY EVAP activation time as 93:33:30; and we're standing by for the AGS abort constants. Over. Or - -

03 22 26 27 CC Roger - -

03 22 26 28 LMP - - Let's do the steerable first and get - and get you the down-link off the E-memory dump. Over.

03 22 26 36 CC Okay. We're standing by for the steerable.

03 22 26 48 CC Casper, this is Houston. Will you go AUTO?

03 22 28 24 CC Casper, this is Houston. How do you read?

03 22 28 30 CMP Loud and clear.

03 22 28 31 CC Roger, Casper. I have a PIPA bias update for you.

03 22 29 18 CC Orion, this is Houston. We want you to go LOW BIT RATE and then bring up the high gain.

03 22 29 30 LMP Okay.

03 22 29 46 CC Orion, this is Houston. The pitch should be 99 on the steerable.

03 22 30 18 LMP Okay, Houston. We got the aft omni. I can't - when I move the yaw drive, the yaw indicator does not move on the steerable, and I do not hear any grinding noise. Over.

03 22 30 34 CC Roger. I copy no response on the yaw drive.

03 22 30 41 LMP That's affirmative.

03 22 30 42 CC Roger. If you're ready, Charlie, I'll read you the AGS abort constants.

03 22 30 49 LMP Okay, go ahead.

03 22 30 50 CC Okay, 224 beginning: plus 60511, plus 29419, plus 60383, plus 00565, minus 32776, minus 54412. Over.

03 22 31 21 LMP Roger. Copy, starting with 224: 60511, 29419, 60383, 00565, 3 - minus 32776, 54412. Over.

03 22 31 41 CC Okay. On 673, it was minus 54412.

03 22 31 49 LMP Roger. That's what I got - minus 54412.

03 22 31 54 CC Good readback.

03 22 33 00 LMP Houston, Orion.

03 22 33 02 CC Go ahead, Orion.

03 22 33 06 LMP Okay. I can't seem to get the yaw out of the stowed position, minus 12 on the indicator, and I cannot hear it drive when I move this dial - just like the - in pitch I can hear it drive and the needle follows. Over.

03 22 33 20 CC I - We read you, Charlie. We want you to go through a little procedure here to essentially get you back to a start position. We want you to go to SLEW on the S-BAND. Check both S-band circuit breakers on 11 and 16. Select pitch of minus 75 and yaw of minus 12; wait 30 seconds and then go to an acquisition and we'll have some angles for you.

03 22 33 47 LMP Okay, that's where we are.

03 22 34 27 CC Casper, this is Houston. Go to ACCEPT. And, Orion, the angles for your S-band are pitch of 99 and yaw of 16.

03 22 34 47 LMP Copy 99 and 16.

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03 22 34 51 CC And, Casper, this is Houston. I have that PIPA bias for you whenever you're ready to copy.

03 22 35 02 LMP Go ahead.

03 22 35 04 CC Okay, on the PIPA bias: address 1454, data 03521; address 1456, data 76274. Over.

03 22 35 25 CMP Okay, address 1454, 03521; address 1456, 76274.

03 22 35 36 CC Okay, on the 1456, couldn't hear your readback, Ken. The data is 76274.

03 22 35 45 CMP Roger; 76274.

03 22 35 50 CC Sounded like a good readback.

03 22 35 57 CC And, Casper, this is Houston with a DAP load for you whenever you're ready.

03 22 36 19 CMP Go ahead.

03 22 36 34 CMP Go ahead, Jim.

03 22 36 43 CC Casper, this is Houston. We're finished with the computer.

03 22 36 50 CMP Okay, I'm in BLOCK, and I'm standing by.

03 22 36 57 LMP Houston, Orion.

03 22 37 15 CC Orion, this is Houston. Will you select DOWN VOICE BACKUP - -

03 22 37 17 LMP Houston, Orion.

03 22 37 40 LMP ... VOICE BACKUP. How do you read?

03 22 37 49 CC Roger. We're reading you but still excessive noise down here.

03 22 37 51 LMP Okay. Was it as noisy on the other transmitter receiver and power amp?

03 22 37 59 CC I think it was about the same, Charlie.

03 22 38 05 LMP Okay, be advised - we went through the steerable step 2 on page 3-62, and the yaw still does not indicate that it's moving, and we cannot hear a grind. Though, with those angles, I get a - that I got of 99 and minus 12, I get a signal strength of greater than 3. I went TRACK MODE to AUTO and up-link - and when I went TRACK MODE to AUTO, it sounded like the thing is setting up there just constantly oscillating and the - the pitch needle varies plus or minus 10. The signal strength stays pretty constant. In fact, no matter what position I select on the S-band antenna, the signal strength stays up around 38 or so.

03 22 38 59 CC Roger; we copy.

03 22 39 04 LMP Okay. Could we press on with the aft omni in that configuration? Over.

03 22 39 12 CC Yeah, let's press on.

03 22 39 16 LMP Okay. Can you get an E-memory dump? We're ready for the E-memory dump.

03 22 39 22 CC Stand by 1.

03 22 39 30 CC Okay, let's bypass that because we need high bit rate.

03 22 39 38 LMP Okay. You can't get high bit rate on the omni?

03 22 39 43 CC Not until we get to the - 210 up.

03 22 39 50 LMP Okay. You will bypass the up-link and we'll go on and do the - the ascent battery checkout.

03 22 40 01 CC Okay, we're ready for the battery checkout.

03 22 40 02 CDR Okay. Is it okay to do the P52 without - Okay to do the P52 as soon as we get into darkness here?

03 22 40 31 CDR Houston, can I do the P52 when I get into the darkness? Over.

03 22 40 37 CC Stand by. Okay, we're preparing a REFSMMAT for you now, John, that you'll have to put in manually. Then you'll be able to proceed.

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03 22 40 53 CDR Roger. ...

03 22 40 58 LMP Can't use that.

03 22 41 15 LMP Here's the P27 pad.

03 22 41 21 CDR Where's the G&C Checklist?

03 22 41 50 CC Okay, Orion. This is Houston. I have a - a P27 for you, one for REFSMMAT and the other's your state vector. Over.

03 22 42 05 CDR Okay; go ahead.

03 22 42 10 CC Stand by 1.

03 22 42 18 CC Orion, we - we'd like you to go back to SLEW and place the antenna at the STOW position, minus 75 and minus 12 and just leave it there.

03 22 42 31 LMP Tell them okay. We got it.

03 22 42 33 CDR Okay, we got it.

03 22 42 34 CC And, Charlie; if you're ready to copy, I have this P27 update for the REFSMMAT and state vector for you.

03 22 42 43 LMP I'm ready to copy.

03 22 42 45 CC Okay. Index is 24: 01731, 12560, 22624, 66315, 75546, 71001, 47526, 02044, 04020, 70164, 73753, 15651, 30651, 64233, 64471, 65647, 63433, 74021, 76063. Over.

03 22 44 01 LMP Okay, readback. Index 24 - index is 24: 01731, 12560, 22624, 66315, 75546, 71001, 47526, 02044, 04020, 70164, 73753, 15651, 30651, 64233, 64471, 65647, 63433, 74021, 76063.

03 22 45 00 CC Okay, that's a good readback. I have your state vector for you when you're ready.

03 22 45 07 LMP Roger. Go.

03 22 45 12 CC Okay, if you're ready, Charlie, on the state vector. Index 21: 01501, 77775, 77776, 57602, 00301, 37450, 00155, 20621, 20111, 31450, 00662, 17260, 76004, 55226, 04076, 17120. Over.

03 22 46 19 LMP Okay. State vector, 21 index: 01501, 77775, 77776, 57602, 00301, 37450, 00155, 20621, 20111, 31450, 00662, 17260, 76004, 55226, 04176, 17120.

03 22 46 59 CC Roger. On item 20 - it's 04076. Over.

03 22 47 09 CDR What you got?

03 22 47 11 LMP That's what I have, 04076.

03 22 47 13 CC Roger.

03 22 47 25 LMP Back to ...

03 22 47 29 CDR ... I can't believe it.

03 22 47 44 CC And, Orion. This is Houston. I have a sep pad whenever y'all are ready.

03 22 47 51 LMP Okay. Wait 1.

03 22 48 34 CC Orion, this is Houston with another procedure for the S-band.

03 22 48 41 LMP Roger.

03 22 48 44 CC Roger. We want you to open the S-BAND ANTENNA circuit breaker on panel 11, wait 1 minute, and then try acquisition again.

03 22 48 58 LMP Roger - -

03 22 48 59 CC After 1 minute, you close the circuit breaker and try an acquisition.

03 22 49 05 LMP Roger.

03 22 49 17 LMP It did.

03 22 49 19 CDR That is for state vector, okay?

03 22 49 21 LMP We'll get the VERB 74.

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03 22 49 24 CDR VERB 71.

03 22 49 25 LMP VERB 71 ENTER.

03 22 49 28 CDR ENTER.

03 22 49 29 LMP 24, ENTER.

03 22 49 30 CDR 24, ENTER. Doesn't say that.

03 22 49 35 LMP Okay, Houston. How do you - you load this state vector by a VERB 71, and then a 24 ENTER, then enter the numbers, right?

03 22 49 45 CDR No, that's the REFSMMAT. The - -

03 22 49 46 CC Stand by.

03 22 49 47 CDR - - state vector's the 24 ... See - see, we've got a flashing 24.

03 22 49 58 LMP Now when you do a 24, you're going to get it. The VERB 71 and then you've got 24 index.

03 22 50 12 LMP Now, starting with 1174, okay?

03 22 50 17 CC Orion, this is Houston. Roger. You should enter it just as it is read up on the pad.

03 22 50 21 CDR Understand. VERB 71; then a 24 ENTER; then a 01731 ENTER; and so on.

03 22 50 25 CC That should be correct.

03 22 50 37 LMP 01731 ENTER.

03 22 50 42 CDR Okay.

03 22 50 44 LMP 12560 ENTER.

03 22 50 47 CDR ENTER.

03 22 50 48 LMP 22624 ENTER.

03 22 50 52 CDR ENTER.

03 22 50 53 LMP 66315 ENTER.

03 22 50 57 CDR Go.
03 22 50 59 LMP 75546 ENTER. No, 755 - -
03 22 51 03 CDR 755 - -
03 22 51 04 LMP - - 46 ENTER.
03 22 51 05 CDR 46 ENTER.
03 22 51 07 LMP 71001 ENTER.
03 22 51 11 CDR ENTER.
03 22 51 13 LMP 47526 ENTER.
03 22 51 15 CDR Okay, ENTER.
03 22 51 16 LMP 02044 ENTER.
03 22 51 22 CDR ENTER.
03 22 51 23 LMP 04020 ENTER.
03 22 51 27 CDR 04020.
03 22 51 29 LMP Yes.
03 22 51 30 CDR Okay.
03 22 51 31 LMP 70161 ENTER. Wait a minute. Have to take that
back.
03 22 51 37 CDR I don't know how to do that.
03 22 51 39 LMP Okay, we'll go back and change that later. ...
73753 ENTER.
03 22 51 45 CDR 73 - -
03 22 51 47 CC Orion, this is Houston - -
03 22 51 48 LMP 7 - -
03 22 51 49 CC A reminder of a VERB 33 at the end of your entries.

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03 22 51 55 CDR Roger. Understand. We've got a hot mike down there. Go ahead. What are you on, 1207?

03 22 52 06 LMP Okay, 73 - Okay, 15651 ENTER.

03 22 52 15 CDR 51 ENTER.

03 22 52 16 LMP 30651 ENTER.

03 22 52 20 CDR ENTER.

03 22 52 22 LMP 64233 ENTER.

03 22 52 26 CDR ENTER.

03 22 52 27 LMP 64471 ENTER.

03 22 52 34 CDR Go.

03 22 52 35 LMP 65647 ENTER.

03 22 52 38 CDR ENTER.

03 22 52 39 LMP 63433 ENTER.

03 22 52 44 CDR ENTER.

03 22 52 45 LMP 74021 ENTER. 76063, ENTER.

03 22 52 53 CDR Six what?

03 22 52 54 LMP 6063 ENTER.

03 22 52 56 CDR Go.

03 22 52 59 LMP Okay, that was a mistake on 701 - Okay, now let me see, that's - -

03 22 53 07 CDR It says delete. You got to check it.

03 22 53 29 CC Okay, Orion. This is Houston. We're looking at page 1-26 in the G&N Dictionary to review the data.

03 22 53 38 CDR Roger. So are we.

03 22 53 42 LMP Okay. Now, we got one that's wrong.

03 22 53 45 CDR Yeah.

03 22 53 46 CC Yeah, we heard that, and we believe it's number 13.

03 22 53 51 LMP VERB - We concur, Jim.

03 22 54 06 CDR ENTER.

03 22 54 08 LMP ENTER.

03 22 54 11 CDR Okay. R-1 data. NOUN 15.

03 22 54 17 LMP ENTER.

03 22 54 18 CDR ENTER.

03 22 54 20 LMP One. ENTER.

03 22 54 27 CDR ENTER.

03 22 54 40 CDR ENTER. Okay. ENTER. NOUN 15. NOUN - 5 ENTER. There we go. Okay. Okay, let's review it.

03 22 55 00 LMP Okay, 0731.

03 22 55 03 CDR Yeah.

03 22 55 04 LMP Go ahead. No, John, you've got to ENTER after every one of those. VERB 1 NOUN 1 ENTER. 1173 ENTER. NOUN 15 ENTER.

03 22 55 29 CDR ENTER.

03 22 55 30 LMP Okay. Now ENTER for each one - Okay, that one's correct. Now, ENTER again. Okay, 12560. Okay, 22624, 66315, 75546, 71001, 47 - ENTER. 47526.

03 22 55 54 CDR Go.

03 22 55 56 LMP 62044.

03 22 55 58 CDR Just a moment. That ain't what it says. 02044. Okay, mark that one. That's wrong.

03 22 56 07 LMP Okay, let's change it right now.

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03 22 56 11 CDR Change data load component identifier; correct Data E. What's a component identifier?

03 22 56 33 CDR ... Okay.

03 22 56 34 CC Okay, Orion. This is Houston. Line 11 should be 02044. Over.

03 22 56 42 CDR Okay. That's what it is.

03 22 56 44 CC Okay.

03 22 56 47 CDR ... 4020.

03 22 56 50 LMP Yeah. Now that is what's wrong.

03 22 56 52 CDR Okay; we fixed it.

03 22 56 55 LMP Okay.

03 22 57 05 CDR Load component identifier.

03 22 57 08 LMP And that's 13. 13 and - I think it's NOUN, John. Hey, Jim, on the checklist, when it says "Load component identifier," we got - 13 is wrong. What do we load in there?

03 22 57 29 CC A 13 ENTER.

03 22 57 34 LMP Okay.

03 22 57 36 CDR 13. Okay. ENTER. Okay.

03 22 57 45 LMP Okay, load 70 - 70 0164 ENTER, and the next one is 15 -

03 22 58 05 CDR I don't think it took.

03 22 58 08 LMP You skipped one. Did you skip one? Hey, why don't you do the RCS pressurization ...

03 22 58 16 CDR Okay.

03 22 58 29 CC Orion, this is Houston. We'd like you to close that circuit breaker and try an acquisition on the steerable.

03 22 58 40 LMP Okay, it worked.
03 22 58 53 LMP Okay, Jim; the yaw is still not working.
03 22 58 55 CC Understand. Yaw is still not working.
03 22 59 00 LMP That's affirmative.
03 23 00 06 CDR You doing it over ...? All right, good idea.
03 23 00 32 CDR True.
03 23 00 42 CDR Okay. LOGIC B has got a needle.
03 23 00 49 CDR I'll get it.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

03 22 44 02 CC Casper, Houston.
03 22 44 07 CMP Go ahead.
03 22 44 08 CC Good morning to you. Got a couple of pads for you, Ken. I got the CSM DAP load, which is copied at 95:55.
03 22 44 22 CMP Okay, Hank. Just make sure that I get a break here about 94:49. Okay, go ahead with your pads.
03 22 44 37 CC Roger. Weight, 39298; NOUN 48, plus 0.49, plus 1.22.
03 22 44 57 CMP Okay, this is at 95:55. Weight 39298, plus 0.49, plus 1.22.
03 22 45 08 CC Roger; that's correct.
03 22 45 12 CMP And, Hank, Jim's still up on our loop.
03 22 45 16 CC Roger. He just went off, Ken.
03 22 45 21 CMP Okay. Did you get my readback?
03 22 45 25 CC That's affirmative. It was good.

03 22 45 34 CMP And we ought to orbit down here at 8 miles. This is really neat.

03 22 45 54 CMP Did you have anything else for me, Hank?

03 22 45 56 CC Roger; I had your P24 pad for about 96:45. I think we've got time to get that in.

03 22 46 04 CMP Yes, sir; let's go ahead. I'm ready.

03 22 46 07 CC Okay. The target is 16-3. T_1 , 096:43:59, 096:45:37.0, 096:46:07, 096:46:29. Attitude, 015, 296, 000; north, 03 nautical miles.

03 22 46 55 CMP Okay, Hank. I thought 16-3 was to be used only for high altitude. That's kind of a large crater, isn't it?

03 22 47 06 CC Stand by, and I'll check it.

03 22 47 08 CMP Maybe that's the only one that's in the track. Okay, let me read it back to you, and just verify that later. 096:43:59, 96:45:37.0, 96:46:07, 96:46:29; roll, 015; pitch, 296; yaw, 000; north, 3 miles on 16-3.

03 22 47 32 CC Good readback, Ken.

03 22 47 35 CMP Okay. And I'm going to go out the window here for just a minute. And I've got the VHF off so I can talk to you. If the LMs call me or something, you might give me a call.

03 22 47 47 CC Okay, will do.

03 22 50 17 CMP Okay, I'm coming up on the edge of the Kant Plateau now and, from down here, that looks like a real steep rise. That's very impressive. But there's nothing that's particularly significant about the topography or the texture. It just rises up.

03 22 50 31 CC Roger; copy.

03 22 51 08 CMP And all the surface here, Hank, has this striation effect to it. It's like we were looking at down there at - pictures of the Silver Spur and so forth. But this is on the horizontal surface. And it all has that same effect.

03 22 51 21 CC Hey, that's really interesting.

03 22 52 29 CMP Okay, Hank, we slipped by it. Coming up upside down and backwards almost vertical like this, I didn't get a very good hack at it, but I did get a - one look at it, and you can identify North and South Ray and all the features there, and got a look at that old Erastostenion [sic] Crater that's over to the southwest that shows beautiful lineaments in the photographs. And they aren't there visually from - from here. It looks like it has the same interior that all the rest of the things do. And I'll talk more about that later.

03 22 53 04 CC Roger.

03 22 53 20 CMP Okay, I'm ready to go to work.

03 22 53 26 CC Did you get any photos in there?

03 22 53 30 CMP Got just one. Just had one glance at it before it was occulted by the IM.

03 22 53 36 CC Roger.

03 22 53 45 CC Ken, did you get a Flight Plan change at a hundred hours and 20 minutes to charge battery A?

03 22 54 07 CMP No, sir.

03 22 54 08 CC Okay, I couldn't tell from here whether that'd gone up or not. That - At a hundred hours 20 minutes, we'd like to add "Charge battery A."

03 22 54 19 CMP Okay, charge battery A at a hundred hours and 20 minutes, and I'm gonna go get my helmet and gloves on here. Then we'll do a little suit circuit integrity check. Got anything that we ought to do first?

03 22 54 38 CC I'm just coming on. Did you happen to take a look at that docking latch? Okay, I've just been told that's all squared away. So I don't - don't know of anything that needs to be done now before you go ahead with the integrity check.

03 22 54 56 CMP Okay. I'm going to press into that.

03 23 02 16 CC Casper, Houston. For your information, the LM's about 4 or 5 minutes from hot fire.

03 23 02 24 CMP Okay, I'm still on a tight dead band.

03 23 02 28 CC Okay, I was just giving you a warning, in case you wanted to bring your VHF up or whatever you need to do to talk to them.

03 23 02 36 CMP Okay, thank you.

03 23 05 11 CMP Orion, Casper.

03 23 05 17 CMP Okay, Orion. I understand you're coming up on the hot fire check, and I think I'm supposed to go to a wide dead band. Can I have about 2 minutes to complete my suit check?

03 23 05 28 CMP Okay. Thank you, sir.

03 23 05 33 CC Casper, Houston. If you've got a sec there, I'd like to give you your sep pad. Stand by; I'll wait until you get through with the check.

03 23 06 06 CMP Houston, did you call Casper?

03 23 06 09 CC Roger, Ken. I'll wait until you get through with your integrity check. Give me a call when you're through, please.

03 23 06 17 CMP Okay, thank you. That's not much else I can do.

03 23 07 03 CMP Okay, I'm still in MIN DEAD BAND. Thank you.

03 23 13 50 CMP Okay, Casper's completed with a suit circuit integrity check.

03 23 13 55 CC Real good, Ken. Can you copy a sep pad now?

03 23 14 12 CMP Go ahead.

03 23 14 13 CC Roger. NOUN 33, 096:13:31.00. And your attitude is good except pitch is 105.

03 23 14 44 CMP Okay, I copy. NOUN 33, 096:13:31.00. The attitude: 000, 105, and 000.

03 23 14 56 CC Good readback, Ken. And in regard to that question you had about 16-3, your present groundtrack is about 15,000 feet south of the preplanned, and that puts 16-1 outside the acceptable limits; 16-3 is closer to the landing site, and they would like for you to go ahead and use that.

03 23 15 20 CMP Okay.

03 23 15 25 CC And I guess the message is there, Ken, just shoot the center.

03 23 15 33 CMP All right, I'll do that.

03 23 17 14 CMP Okay, I don't have it off yet, John. What happened to our hot fire?

03 23 17 24 CMP Okay, and you want B-3 off now.

03 23 17 32 CMP B-3 is off.

03 23 24 18 CMP Okay, say when you want the 620.

03 23 24 31 CMP Okay, that's plus 2.68, plus 109.19, plus 5.03.

03 23 26 26 CC Casper, Houston. We're about 2 minutes from LOS.

03 23 26 34 CMP Orion, say again, please.

03 23 26 37 CC Roger. This is Houston, Casper. We're about 2 minutes from LOS.

03 23 26 46 CMP Okay, Houston. Stand by. Break. Orion, I am in WIDE DEAD BAND, att hold. Okay, I'll go FREE when you give me the call. Break. Houston, this is Casper. Go ahead.

03 23 27 05 CC Roger, Ken. We've got about a minute until LOS. I was just telling you.

03 23 27 11 CMP Hi, gang.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

Tape 62/18

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03 23 01 11 LMP Okay, Houston. We're pressurizing RCS now.

03 23 01 14 CC Roger. Understand you're pressurizing RCS.

03 23 02 20 CC Okay, Orion. The RCS press looks good.

03 23 02 25 CDR Stay ... P52, Jim.

03 23 02 38 CC Roger.

03 23 02 48 CDR Okay, it's in.

03 23 02 55 LMP Keep pressing, John.

03 23 02 56 CDR Okay.

03 23 03 06 CDR GUIDANCE CONTROL, PGNS. ATT/TRANSLATION to
4 JETs. Okay. ATTITUDE CONTROL, three, to PULSE.
CONTROL MODE, ATT HOLD. ACA JETs, DISABLE. TTCA,
both JETs. ...

03 23 03 41 LMP Okay, Houston, we're ready for the RCS checkout.
I guess we still don't have high bit rate, huh?

03 23 04 02 LMP Houston. Over. Houston, this is Orion. Over.

03 23 04 10 CC Orion, this is Houston. Open - -

03 23 04 11 LMP Houston - -

03 23 04 12 CC - - ascent stage.

03 23 04 13 CDR - - this is Orion. Over.

03 23 04 15 CC Go ahead, Orion.

03 23 04 17 CDR They are open.

03 23 04 20 LMP No.

03 23 04 22 CDR Say again?

03 23 04 23 LMP Do you want us to open the ascent stage? No,
don't do that!

03 23 04 28 CC Stand by, Charlie.

03 23 04 29 LMP Excuse me.

03 23 04 32 CDR That's all right, Charlie. What he said, wasn't it?

03 23 04 38 LMP That ain't right. We're going to pump all the RCS into the APS tank, looks like to me.

03 23 04 51 CDR Well, I just closed it again.

03 23 04 53 LMP Good.

03 23 04 56 CC Okay, Orion. The RCS pressure is creeping up on system A.

03 23 05 09 LMP Okay, it looks all right here, Hou - Houston.

03 23 05 14 CDR Go ahead, Casper.

03 23 05 25 CDR Roger. We're not going there yet. I'll tell you when.

03 23 05 31 CC Orion, this is Houston. Do you read that system A manifold pressure?

03 23 05 38 CDR Roger. System A manifold pressure is 195.

03 23 05 46 CC Copied 195.

03 23 05 49 CDR 190. Make it 190.

03 23 05 56 CC Roger; 190.

03 23 06 06 CDR Dang, Charlie, you're a genius.

03 23 06 13 LMP I practiced this.

03 23 06 14 CDR Did you?

03 23 06 15 LMP Yeah.

03 23 06 29 LMP Okay, we got it.

03 23 06 30 CDR Did you check the other one, too?

03 23 06 31 LMP Yeah.

Tape 62/20

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03 23 06 34 CC Okay, Orion. This is Houston. Looks like RCS manifold pressure on A is creeping up again. That's why we're holding you.

03 23 06 44 CDR Okay, we - it does look like it's risen 5 pounds.

03 23 06 53 LMP ... do a P52?

03 23 06 56 CDR Okay, Ken. Stay at MIN DEAD BAND. We'll do a P52 here.

03 23 07 23 CDR Okay?

03 23 07 24 LMP Yeah.

03 23 07 25 CDR What ... in here, on this verb?

03 23 07 27 LMP Well, let's keep going. VERB 37. 52 ENTER.

03 23 07 32 CDR Go.

03 23 07 34 LMP VERB 32. Load 335 ... 2 - It should have been ... 3.

03 23 07 47 CDR Okay.

03 23 07 48 CC Orion, this is Houston. We want SYSTEM A ASCENT FEED open. And, under no situation do we want the aft ullage pressure to exceed 180.

03 23 08 02 LMP Okay. Okay, we closed it. It's - ullage pressure is 0.70, now.

03 23 08 18 CC Roger. We copy.

03 23 08 19 LMP And, RCS is 180 and we're down to 85 percent.

03 23 08 28 CDR Okay. We get what, Charlie?

03 23 08 31 LMP P52.

03 23 08 35 CDR This is the worst jam I was ever in.

03 23 08 39 LMP Eighty on the pressure.

03 23 08 42 CDR Okay, we can't do it P52, we got to do it ...

03 23 08 45 LMP Can't see it?

03 23 08 46 CDR No. How do you know?

03 23 08 47 LMP I'm looking in the AOT.

03 23 08 49 CDR Okay.

03 23 08 50 CC Orion, this is Houston. You need the - that state vector in before you do the P52.

03 23 08 58 LMP It's all in, Jim.

03 23 09 02 CDR Okay.

03 23 09 04 CC Roger. We understand you already have it in.

03 23 09 10 LMP 32 ENTER.

03 23 09 12 CDR 32 ENTER. There you go.

03 23 09 16 LMP Okay.

03 23 09 17 CDR We go on to the next display, right?

03 23 09 18 LMP No, wait a minute. Let's do it again. VERB 21
NOUN 01 ENTER. 373 ENTER. 32533 ENTER. PRO.
Okay, P53.

03 23 09 42 CDR Okay.

03 23 09 44 LMP Okay, 331.

03 23 09 54 CDR 331. ...

03 23 10 10 CDR There it is.

03 23 10 16 LMP You got it?

03 23 10 20 CDR We got to turn on the lights, Charlie.

03 23 10 22 LMP Yeah.

03 23 10 38 CDR There you go.

03 23 10 41 LMP You got a 331, yet? ENTER? Go ahead, you are cleared to mark. 33195. Go ahead. 33197.

Tape 62/22

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03 23 11 14 LMP 33 - Wait, let me recheck that. No, I don't know how you do that ...

03 23 11 29 CDR You got to ENTER it, Charlie. 33195.

03 23 11 51 CDR Okay. 33182.

03 23 12 10 CDR 33180.

03 23 12 30 LMP ... every time.

03 23 12 35 CDR Okay, you're clear to mark.

03 23 12 40 CDR 16950, ... 17007; 17078. What are you going to do? ..., Charlie.

03 23 13 35 CDR 16990. 16990.

03 23 13 56 CDR VERB 21 ENTER.

03 23 14 07 LMP Why don't you look at the ...

03 23 14 23 CC Orion, this is Houston. Will you check the RENDEZVOUS RADAR OPERATE circuit breakers on panel 11?

03 23 14 33 CDR They're open. They're open.

03 23 14 35 LMP They are open.

03 23 14 41 CDR Okay, what's the number ...

03 23 14 44 CC Roger. We copied that you said they were open, John.

03 23 15 01 CC Okay, the RENDEZVOUS RADAR OPERATE HEATER should be closed at this time.

03 23 15 08 LMP . Okay, no good. ...

03 23 15 10 CDR Okay, we're at close in STANDBY and open - in OPERATE.

03 23 15 15 LMP Okay, the RENDEZVOUS RADAR OPERATE HEATER is closed.

03 23 15 20 CC Roger. We copy.

03 23 15 25 CDR Is it two?

03 23 15 26 LMP It's just one. ... if you don't see it, we'll go to two.

03 23 15 30 CDR Okay. I sure don't - sure don't see it.

03 23 15 43 LMP Now do you see it?

03 23 15 45 CDR ... all I see is the rendezvous radar. It's stowed right there. Can't we unstow the rendezvous radar?

03 23 16 01 LMP Hey, Jim. We got the rendezvous radar in detent, too. Can we move it out of the way or can we select another star?

03 23 16 11 CC Stand by.

03 23 16 27 CC Okay. Go ahead and slew it, Orion.

03 23 16 32 LMP Okay. ... push that breaker there and let's give it 30 seconds. ...

03 23 16 52 CDR Okay, we got that ... and can't - Ken has got to have 53 ... He had to have that ... and make sure your radar ...

03 23 17 20 LMP We're still doing a P52. We'll get to you in a minute.

03 23 18 20 CC Okay, Orion. This is Houston. On this RCS problem - we want you to transfer out of system A down to a reading of 80 percent on RCS system A. We are trying to transfer out of that system to reserve your blowdown capability. We would like you to go ahead and transfer now, but do not let the aft pressure go above 180. Over.

03 23 18 49 LMP We copy.

03 23 19 06 LMP Okay, closed, 80 percent, and the aft pressure is ... 155.

03 23 19 19 CDR Okay, Charlie. ... go ahead.

Tape 62/24
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03 23 19 27 LMP Plus 260, 1 - 8 - plus 26112; plus 26121 ... 8.

03 23 20 23 CDR Plus 26117.

03 23 20 58 CDR Okay, go ahead.

03 23 21 35 CDR 261 30. ...

03 23 21 50 CDR 16017. Wait a minute. 6057 ...

03 23 22 15 CDR 16010 ..., 16092, ..., 16182. ...

03 23 22 52 CDR Okay. Houston, ... 93 - -

03 23 23 01 CC Orion. This is Houston with some words on your hot fire check. You have a GO to do that hot fire check on the back side. We'd like you to use system A. Of course, the procedure for that is to close MAIN SOV on SYSTEM B and to open the CROSSFEED so that you'll be using just system A. Over.

03 23 23 24 LMP Say that again, Jim?

03 23 23 27 CC Roger. For your hot fire check on the back side, we want you to use system A. So we'd like you to close the MAIN SOV SYSTEM B and open the CROSSFEED. Over.

03 23 23 42 LMP Roger. We copy.

03 23 23 47 CC Roger.

03 23 23 58 LMP Okay, Ken. We no longer need MIN DEAD BAND. We'd like a - ... Okay, Ken. We no longer need MIN DEAD BAND. We'd like an 06 NOUN 20.

03 23 24 20 CMP Roger.

03 23 24 21 LMP On my mark, 5, 4, 3, 2, 1 -

03 23 24 25 LMP MARK.

03 23 24 30 CMP Ninety-five percent ...

03 23 24 41 LMP I know why that was. When we torque the platform, we're in ATT HOLD, see.

03 23 24 47 CMP You didn't try to ... to go there, you - -

03 23 24 50 LMP That's right.

03 23 24 51 CDR Okay, did you get the verb? Okay, read those numbers to me.

03 23 24 58 LMP 2933 - -

03 23 24 59 CC Orion, this is Houston.

03 23 25 02 LMP - - 28925. Go ahead.

03 23 25 04 CC Roger.

03 23 25 06 CMP 491 ...

03 23 25 07 CC Assuming you get the P52 complete, you have a GO for undocking. Over.

03 23 25 14 CDR Okay. They're already completing it.

03 23 25 17 CC Okay, good.

03 23 25 18 LMP Okay, Jim. Our torquing angles - we didn't copy, but they were less than a half a degree. And our NOUN 06 is at 95:23 and 24. For command module, plus 268, plus 10919; plus 005, 00503. LM, 29338. And then my - ... gimbal, 28925, 35491. And the torque was about a minute before that on the - on the P52.

03 23 25 57 CDR Okay. ... Are we ready to go to RCS checkout?

03 23 26 02 LMP Okay; GUIDANCE CONTROL, P to A.

03 23 26 04 CDR Okay.

03 23 26 05 LMP Okay. ATT/TRANSLATION, 4 JET.

03 23 26 06 CDR 4 JET.

03 23 26 07 LMP ATTITUDE CONTROL, three, to PULSE.

03 23 26 08 CC Okay, Orion. We copied that data.

03 23 26 09 LMP MODE CONTROL, both, ATT HOLD.

Tape 62/26

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03 23 26 10 CDR MODE CONTROL, ATT HOLD.

03 23 26 12 LMP ACA/JET 4, DISABLE.

03 23 26 15 CDR ACA/JET. That's - No, this right here ...

03 23 26 17 LMP We've already gone through this.

03 23 26 19 CDR Yeah, that first part.

03 23 26 21 LMP Okay, VERB 76. Okay, Ken, we need WIDE DEAD BAND and ATT HOLD.

03 23 26 29 CDR Ken, we need WIDE DEAD BAND and ATT HOLD.

03 23 26 37 CDR We need WIDE DEAD BAND, ATT HOLD. WIDE DEAD BAND ATTITUDE HOLD.

03 23 26 53 CDR Okay.

03 23 26 54 LMP We're going to RCS checkout, Ken. VERB 76.

03 23 26 57 CMP Go.

03 23 26 58 CC Roger; we copy.

03 23 26 59 LMP Okay. VERB 11 NOUN 10 ENTER, 5 ENTER. Okay. Commander TTCA, up.

03 23 27 11 CDR Okay. TTCA 28.

03 23 27 17 LMP That's okay. It's not going to burn anything that - that ... good. And I don't - -

03 23 27 20 CDR M, L, 25.

03 23 27 21 LMP Good. Okay. I'll give you - -

03 23 27 23 CDR It's all yours, Charlie.

03 23 27 24 LMP Good. Good - -

03 23 27 26 CC Orion, you are 1 minute from LOS.

03 23 27 31 LMP Go right. Fire again. ... Left. Good one. Up forward, forward. Good one. Good. Good. Okay, let me turn the page. "PGNS rate command (cold fire), AGS pulse." CB 11, ATTITUDE DIRECT, close.

03 23 27 48 CDR ATTITUDE DIRECT, closed.

03 23 27 50 LMP VERB 77.

03 23 27 51 CDR VERB 77.

03 23 27 53 LMP VERB 75 NOUN 01 ENTER.

03 23 27 56 CDR Roger. NOUN 01 ENTER.

03 23 27 57 LMP 42 ENTER.

03 23 27 58 CDR 42 ENTER.

03 23 27 59 LMP Okay. Commander ACA to soft stop, pause ... Roll right. Okay. Here ...

03 23 28 06 CDR There you go. No, you don't. That's right. Let's roll right.

03 23 28 09 LMP Okay, left. Good number. Pitch up. Good number. Pitch down. Okay. That's a good number. Yaw right. Good number. Yaw left. Good number. You pitch up again. Good number. Okay. "AGS rate command (cold fire), 4 jet secondary coil (hot fire) check."

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

03 23 54 XX BEGIN LUNAR REV 12

04 00 17 04 CC Orion, this is Houston. How do you read?

04 00 17 09 LMP-LM Roger. 5 by, Jim, and we're sailing free.

04 00 17 16 CC Roger.

04 00 17 23 LMP-LM Okay, Jim. It was a little rushed, but we got it done. The only thing bad is that I got a pack full of orange juice.

04 00 17 32 CC Okay, we copy, and we'd like you to go through another procedure here to get the S-band locked up if you're - ready to make - take a few notes?

04 00 17 46 LMP-LM I understand. Stand by 1.

04 00 17 48 CDR-LM Stand by 1, Jim.

04 00 17 49 LMP-LM Okay, we're on hot mike still, John.

04 00 18 04 LMP-LM He told us to go ahead.

04 00 18 06 CDR-LM Okay, Jim; go ahead.

04 00 18 07 CC Roger. We wanted to - you to put the steerable at PITCH, minus 75, and YAW at minus 12. In other words, the stowed position. So TRACK MODE, SLEW, wait 30 seconds, and then go PITCH of plus 63, YAW of minus 32, and antenna S-BAND to SLEW and proceed with normal acquisition. Over.

04 00 18 38 LMP-LM O - okay, we copy.

04 00 18 47 CC And, Orion, this is Houston. We're - -

04 00 18 49 LMP-LM Hey, Ken.

04 00 18 53 LMP-LM Okay, look up over my - our right side and look at that antenna, the - the steerable, and see how it - it's moving. I'm going to move it in pitch, then in yaw. Over.

Tape 63/2
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04 00 19 15 CC And, Orion, this is Houston. We'd like to - -

04 00 19 17 LMP-LM Okay, it should be ... - -

04 00 19 18 CC - - find out what your RCS configuration is at the present time.

04 00 19 25 LMP-LM Okay, Jim, we have got - -

04 00 19 26 CDR-LM SYSTEM A and B are OPEN, CROSSFEED is CLOSED, and the ASCENT FEED's been terminated.

04 00 19 37 CC Roger; we'd like you to use system A just as long as possible. Over.

04 00 19 48 CDR-LM Okay, SYSTEM A is - SYSTEM A is now OPEN, CROSSFEED is OPEN, and SYSTEM B is CLOSED.

04 00 20 07 CC And, Orion, have you loaded the AGS abort constants yet?

04 00 20 14 LMP-LM Negative.

04 00 20 15 CDR-LM That's negative. Over.

04 00 20 17 CC Okay, understand negative.

04 00 20 18 LMP-LM We don't have the AGS up yet, Jim.

04 00 20 19 CC Roger; because when you do load those constants, we want you to load nominal values from the data card.

04 00 20 30 LMP-LM Okay.

04 00 20 35 CDR-LM ... controls nominal. Okay, we're going ahead with the DPS throttle check, Jim.

04 00 20 43 CC Okay, and, if this S-band procedure doesn't work for us, we're going to ask you to maneuver to an FDAI attitude, where the - the yaw angle will not have to change and we'll see if we can lock up in that attitude.

04 00 21 01 LMP-LM Roger. I understand.

04 00 21 10 CDR-LM What you got to do, Charlie, is ... a little bit, there, ...

04 00 21 40 LMP-LM Okay, Houston. Houston, how do you read on the steerable?

04 00 21 53 LMP-LM Okay, Houston, back on the aft omni. How do you read?

04 00 22 06 LMP-LM Houston, on the AFT omni. How do you read?

04 00 22 09 CC Orion, this is Houston. We'd like you to proceed now with this attitude maneuver, and I'll give you FDAI angles and the steerable angles.

04 00 22 21 LMP-LM Go ahead.

04 00 22 23 CC Okay, the FDAI is ROLL, 000; PITCH, 053; Yaw, 000; and the steerable angles: PITCH, plus 26; YAW, minus 12. Over.

04 00 22 43 LMP-LM Copy. 000, 053, 000; PITCH, 26; YAW, minus 12.

04 00 22 53 CC Roger.

04 00 22 58 LMP-LM Okay, John.

04 00 23 00 CDR-LM Okay, Houston, we're running through the DPS throttle check. I have 12, 51, and 100. Charlie's got 13 - 51, and 100.

04 00 23 36 CC Orion, the DPS throttle check looks good.

04 00 23 41 LMP-LM Okay, Jim, I have some NOUN 20s for you if you're ready to copy.

04 00 23 52 CC Roger; go ahead on the NOUN 20s.

04 00 23 57 LMP-LM Okay; for the lunar module, Orion. Orion, we've got plus 29603, plus 28563, plus 35951. For the command module, Casper, plus 00004 - -

04 00 24 21 CC Orion, go FORWARD omni.

04 00 24 22 LMP-LM - - plus 10556.

04 00 24 50 LMP-LM Okay, Jim. How do you read now?

04 00 24 53 CC Well, there's still excessive noise down here. Give me the command module numbers again.

Tape 63/4
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04 00 25 09 LMP-LM Okay, we're - How do you read now? We're on the FORWARD omni.

04 00 25 18 CC I can just barely read you, Charlie.

04 00 25 26 LMP-LM Okay, ... NOUN 20 for the command module. Four balls 4, plus 10556, plus 00045; that time was at 96:02:20. Over.

04 00 26 26 CC Orion, this is Houston. We hope you're at about the attitude. We'd like you to go to an acquisition here.

04 00 26 35 LMP-LM Okay, we're in attitude and we're going to give you the steerable.

04 00 27 23 LMP-LM Hey, Jim. How do you read me on the FORWARD omni? Over.

04 00 27 36 CC Charlie, I just barely read you on the FORWARD omni.

04 00 28 21 CC Orion, this is Houston. Select PRIMARY TRANSMITTER/RECEIVER.

04 00 29 27 CC Orion, Houston. How do you read?

04 00 29 33 CDR-LM Loud and clear.

04 00 29 35 CC Roger. We just barely hear you, and I have a landing site TCA for you if you're ready to copy.

04 00 29 43 CDR-LM Roger; can we now do the DPS pressurization checkout? Over.

04 00 29 54 CC Roger; we're ready for DPS press.

04 00 29 58 CDR-LM Okay.

04 00 29 59 LMP-LM Can you - Go ahead with the TCA now.

04 00 30 24 LMP-LM ...

04 00 30 26 CDR-LM I checked all that, Charlie. We're down to right there.

04 00 30 28 LMP-LM Okay, MASTER ARM, ON.

04 00 30 29 CDR-LM All checked.

04 00 30 31 LMP-LM MASTER ARM, ON.

04 00 30 34 CDR-LM Okay.

04 00 30 35 LMP-LM Okay. DESCENT PROPELLANT.

04 00 30 36 CDR-LM Two lights ...

04 00 30 41 LMP-LM DESCENT PROPELLANT ISOL VALVE, FIRE.

04 00 30 43 CDR-LM Okay, DESCENT PROP ISOL VALVE is going to FIRE.
... to PYRO.

04 00 30 46 LMP-LM HELIUM PRESS DESCENT START - -

04 00 30 48 CC Orion, this is Houston. Go to DOWNVOICE BACKUP.
Over.

04 00 30 55 LMP-LM We are in DOWNVOICE BACKUP, Jim.

04 00 30 59 CDR-LM Okay, the DPS is pressurizing.

04 00 31 03 LMP-LM ...

04 00 31 07 CDR-LM Okay, it did pressurize - 245 to 245.

04 00 31 12 LMP-LM And the ambient press is at 410 - it's a good
press.

04 00 31 38 CDR-LM I'll tell you one thing. Charlie's not going
to ... - -

04 00 31 39 CC Orion, BIOMED switch, OFF.

04 00 31 46 LMP-LM BIOMED is OFF, Jim.

04 00 31 56 CC Orion, the DPS pressurization checkout looks good.

04 00 32 02 CDR-LM Looked good to us.

04 00 32 20 LMP-LM Okay, Jim. Can you give us our TCA landing site?

04 00 32 31 CC Okay, Orion. The TCA landing site is 96:46:07.
Over.

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04 00 32 40 LMP-LM Roger; 96:46:07.

04 00 32 54 CDR-LM Okay, Charlie. I'm going to do the landing radar checkout now.

04 00 33 38 CDR-LM ... landing radar checkout. LANDING RADAR breaker's, in; TRANSPORTERS to HI MULTIPLE; SELECT, LANDING RADAR; H/H-dct; LANDING ANTENNA to AUTO.

04 00 33 52 LMP-LM That's it.

04 00 33 53 CDR-LM RADAR TEST to LANDING.

04 00 33 55 LMP-LM There we go.

04 00 33 56 CDR-LM Got them.

04 00 33 57 LMP-LM Go to LANDING.

04 00 34 04 CDR-LM RADAR TEST to LANDING; power signal light, out.

04 00 34 07 LMP-LM Okay, Jim, Houston on the steerable, I mean - listen at me - Orion on the steerable. How do you read? Over.

04 00 34 13 CC Man, we read you much better.

04 00 34 18 LMP-LM Okay, it worked that time, Jim; we got a 4.2 signal strength, and the steerable is working. I'm in TRACK MODE, AUTO.

04 00 34 25 CC Very good. I have some words for you on the RCS.

04 00 34 31 LMP-LM Okay, go ahead.

04 00 34 38 CC Okay, let's go normal configuration on your RCS and then we want you to transfer 3 percent more out of system A because we see the pressure going up on A.

04 00 34 51 LMP-LM Okay, transferring - -

04 00 34 55 CC And the caution, of course - not more than 180 on the APS.

04 00 35 04 CDR-LM Okay, the landing radar H-dot is only reading minus 17 right now. The 8000 works okay.

04 00 35 26 CC Orion, will you give us HI bit rate, please?

04 00 35 27 CDR-LM Okay, that looks good.

04 00 35 35 LMP-LM You got HI bit rate; BIOMED is LEFT.

04 00 35 38 CC Roger.

04 00 35 42 LMP-LM Jim, could we try a pitch maneuver back to the landing site viewing attitude, so we'll see if this thing tracks?

04 00 35 49 CC Stand by 1. Okay, just hold it 1. We want to get our uplinks in and then you can try that maneuver.

04 00 36 01 CDR-LM Okay.

04 00 36 13 CC Okay, Orion; let's go POO and DATA and we'll send you an up-link.

04 00 36 27 LMP-LM Okay, you've got POO and DATA.

04 00 36 29 CC Roger.

04 00 36 33 CDR-LM Okay, Houston, the landing radar test is not working properly.

04 00 36 39 CC Okay, what's the problem, John?

04 00 36 44 CDR-LM Well, it's not reading the right numbers in altitude rate and it's not reading the right numbers in VERB 63. The ALTITUDE TRANSMITTER is 3.2, the VELOCITY TRANSMITTER - VELOCITY TRANSMITTER is 3.7.

04 00 37 07 CC Okay, Orion - -

04 00 37 08 LMP-LM And, Jim, the AGS is loaded with the data card - go ahead.

04 00 37 13 CC Okay, we want you to select normal VOICE.

04 00 37 25 LMP-LM AGS is loaded with the data card numbers. Over.

04 00 37 29 CC Roger; I copied, Charlie.

04 00 37 46 CC Orion, this is Houston. Are you also showing bad data on the tapemeter for the landing radar?

04 00 37 54 CDR-LM That's affirmative.

04 00 37 56 CC Roger.

04 00 37 57 CDR-LM The H - altitude is reading right at 8000, but the velocity was only reading 15. I'll run it again.

04 00 38 04 CC Roger.

04 00 38 06 CDR-LM Can I run it while P27 is in progress?

04 00 38 10 CC Stand by on that one.

04 00 38 12 CDR-LM Yes, I'm sure I can.

04 00 38 24 CC Hold off on that landing radar check until after the - the up-link.

04 00 38 31 CDR-LM Okay. We'll go off and pull the circuit breakers.

04 00 39 00 LMP-LM Jim, we'd like to start a pitch - back down so we could see the landing site.

04 00 39 06 CC Stand by. We're still getting the up-link.

04 00 39 57 CC And, Orion; this is Houston. I have the abort pads whenever you're all ready.

04 00 40 06 LMP-LM Okay, stand by. Okay, go ahead.

04 00 40 14 CC Okay, beginning. No PDI plus 12. 098:47 all zeros; plus 0102.3, plus all zeros, minus 0050.0; 0138.0, plus 0011.0, 0113.9; 0:35; all zeros, 273; 5927.0; plus 0102.6, plus all zeros, minus 0049.4; 099:35 all zeros; 101:22:15.00. Throttle profile 10 percent for 26 seconds; full throttle for remainder; LM weight, 36673. Over.

04 00 41 19 LMP-LM Okay, Jim. That was a little bit too fast, but I think I got it all. 098:47:00.00; plus 0102.3, plus all balls, minus 0050.0; 0138.0, plus 0011.0, 0113.9; 0:35; all balls, 273; 5927.0; 012760 [sic], plus all balls, minus 0049.4; 099:35 all balls; 101:22:15.00. LM - that's throttle profile is

10 percent for 26 seconds at full throttle; LM weight, 36673. Go ahead.

04 00 42 07 CC Roger. It's a good readback. Let me just confirm that NOUN 86 DELTA V_X is plus 0102.6, and we're finished with your computer. Okay, and we need an E-MOD dump for - -

04 00 42 18 CDR-LM ... landing radar check again.

04 00 42 19 CC - - ... VERB 74. You have it.

04 00 42 25 CDR-LM You have it.

04 00 42 26 LMP-LM Okay, read that again, Jim. The - the DELTA-V_X.

04 00 42 31 CC DELTA-V_X, NOUN 86, is plus 0102.6.

04 00 42 48 CC And, Charlie, I'm ready on the PDI pad.

04 00 42 54 LMP-LM Okay, I was wrong on that. I got it now, 0102.6.

04 00 42 58 CC Okay, are you ready PDI?

04 00 43 00 LMP-LM Go ahead with the PDI pad.

04 00 43 02 CC Okay, India, 0 - -

04 00 43 03 LMP-LM You speak.

04 00 43 04 CC 098:35:04.68; 11:04, plus 0002.6; 002, 114, 340; plus 56997; PDI early, Juliett, 101:22:15.00; Kilo, 103:21 all zeros. Over.

04 00 43 45 CDR-LM Roger, Jim. Could we start a pitch attitude down to see the landing site? Are you done with our E-MOD, Jim?

04 00 43 56 CC We're finished with the E-MOD dump, but we'd just as soon get all these pads up, and we're not concerned about the landing site - down here.

04 00 44 06 LMP-LM Okay - -

04 00 44 07 CDR-LM I didn't think you were.

04 00 44 09 LMP-LM Okay, fine. I - I'm - I'm down through Kilo and I'll read back starting at India. 098:35:04.68; 11:04, plus 0002.6; 002, 114, 340; plus 56997; 101:22:15.00; 103:21:00.00. Over.

04 00 44 34 CC Okay, that's a good readback, and I have T_2 and T_3 for you.

04 00 44 41 LMP-LM Go ahead.

04 00 44 43 CC Okay. T_2 , Lima, 098:59:29.03; 105:19:45.00; T_2 at PDI, plus 24 plus 25; and T_3 , Nector, 100:42:42.86. Over.

04 00 45 09 CC Orion, will you verify AUTO on the steerable?

04 00 45 15 LMP-LM It is in AUTO.

04 00 45 17 CC Roger.

04 00 45 22 LMP-LM Okay, and reading back starting with Lima, 098:59:29.03; 105:19:45.00; November, 100:42:42.86. Go ahead with the next one. Over.

04 00 45 38 CC Okay, we're standing by for the - the landing radar checkout, John; and, of course, Charlie, you got that T_2 at PDI at 24 plus 25, and I have an AGS K-factor for you.

04 00 45 53 LMP-LM Okay, go ahead with the AGS.

04 00 45 55 CC Okay. 00090, all zeros, 00111. Over.

04 00 46 18 LMP-LM Okay, copied 9 - 90, 00, 00111.

04 00 46 25 CC Good readback.

04 00 46 29 CDR-LM Okay - okay, there's the data. It's reading all right in H-dot, but it's changing data in - in the next two registers.

04 00 46 45 CC Roger; we're looking at it down here.

04 00 46 46 CDR-LM And the tapemeter's now - and the tapemeter is now reading 480 opening, and the altitude meter would - The first time I did it, it read 8000, and it's now reading zero.

04 00 47 07 CC Okay, Orion. Let's go LO bit rate, and we're losing the steerable.

04 00 47 15 LMP-LM Roger. Jim, I don't think it's tracking in yaw.

04 00 47 44 CC Orion, we'll get back to you on the landing radar.

04 00 47 50 LMP-LM Roger.

04 00 47 56 CC And, Orion - -

04 00 47 57 LMP-LM You can see the data.

04 00 47 58 CC - - Houston, just a reminder on - to load 405 and 406 to plus zero.

04 00 48 06 LMP-LM Roger.

04 00 48 08 CC And we're ready for HI bit rate.

04 00 48 18 LMP-LM Okay, you have it.

04 00 48 19 CC Roger.

04 00 48 24 CDR-LM Okay, I'm going to terminate the landing radar test, if that's okay with y'all.

04 00 48 27 CC Roger.

04 00 48 50 CDR-LM That's negative; Houston wants them to stay locked on right now.

04 00 48 53 CC Orion, this is Houston. I have the circ pad if you're ready to copy.

04 00 50 00 LMP-LM Stand by.

04 00 50 09 LMP-LM Go ahead.

04 00 50 10 CC Okay, ignition at 097:40:17.16; NOUN 81, plus 0068.1, minus all zeros, minus 0058.0. Over.

04 00 50 29 LMP-LM Right; copy. 097:40:17.16, plus 0068.1, minus all balls, minus 0058.0.

04 00 50 39 CC Good readback.

04 00 50 47 CDR-LM Okay, we'll go ahead and go the - do the IMU fine align right now, if that's okay with you, Houston.

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04 00 50 55 CC Roger; we're standing by, John.

04 00 51 15 CC Okay, Charlie, will you - In 404, will you put minus 12345?

04 00 51 27 LMP-LM Roger.

04 00 51 29 CDR-LM Okay, Houston, when we do this attitude maneuver for the P52, we're going to lose high gain.

04 00 51 37 CC Stand by.

04 00 51 38 CDR-LM Is that all right?

04 00 51 39 CC I think we're all prepared for it.

04 00 51 42 CDR-LM Okay.

04 00 52 03 CC Okay, you can go ahead and maneuver, John - -

04 00 52 04 CDR-LM Okay, that's ...

04 00 52 05 CC - - and we want you to use the RCS system A.

04 00 52 07 CDR-LM Okay. Okay, we're using system A.

04 00 52 47 LMP-LM Okay, Houston, we have you on the aft omni.

04 00 53 29 CC Orion, this is Houston. Go LO bit rate.

04 00 53 37 CDR-LM You have it.

04 00 58 12 LMP-LM Okay, Houston. The torquing angles: minus 0.000, plus 1.39, minus 0.018.

04 00 58 27 CC Orion, we cannot read you. Will you go DOWNVOICE BACKUP?

04 00 58 58 CC Orion, go AFT omni.

04 00 59 03 CDR-LM Okay, AFT omni.

04 00 59 17 CC Okay, may - perhaps we can read the torquing angles, if you want to give them again.

04 00 59 39 CDR-LM Star - angle difference was minus four balls 5.

04 01 00 20 CC Okay, we copied your NOUN 05, but we did not get the torquing angles. I hope y'all have written them down.

04 01 01 13 CC Orion, this is Houston. We'd like to get HI bit rate again and some good voice. We'd like you to go back to that attitude which we gave you of pitch of 053 and set in the steerable angles of PITCH plus 26 and YAW minus 12.

04 01 01 30 LMP-LM Okay, we're en route.

04 01 01 32 CC And just delay the landing radar test until we get some good data.

04 01 01 38 LMP-LM Okay.

04 01 01 54 LMP-LM I guess on that landing radar - with the circuit breaker in - probably working off the ground - maybe not.

04 01 02 14 CC Go FORWARD omni, Orion.

04 01 03 09 CC Okay, Orion, let's go back to LO bit rate until we get the steerable.

04 01 03 50 LMP-LM Okay, Jim, we have you now on the steerable. How do you read? Over.

04 01 03 56 CC Oh, I read you loud and clear. You sound beautiful.

04 01 04 01 LMP-LM Okay, the P52 went super. Our torquing angles were minus 0.060, plus 0.139, minus 0.018. We torqued at 96:58:40. Over.

04 01 04 15 CC Roger; copied. On torquing angles, minus 060, plus 0.139, and minus 0 - 0.018 at 96:58:40.

04 01 04 28 LMP-LM That's Roger.

04 01 04 33 CC And you can go NORMAL voice.

04 01 04 34 LMP-LM And the AGS checkout has gone well.

04 01 04 36 CDR-LM Okay.

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04 01 04 42 LMP-LM The only thing we haven't done is rendezvous radar checkout and we'll get to that soon as Ken gets through with his burn.

04 01 04 48 CC Roger; we're recommending that rendezvous radar checkout on the back side, and landing radar checkout is the one we want to go through now.

04 01 04 56 LMP-LM All right, fine.

04 01 05 02 CDR-LM Okay, we're going now.

04 01 05 36 CDR-LM Okay, it's up and left like it's supposed to be.

04 01 05 39 CC Okay, John, when you get to the NOUN 66 - -

04 01 05 41 LMP-LM Do you reckon it could - -

04 01 05 42 CC - - 67 values, we want you to read us the tapemeter values of H and H-dot.

04 01 05 52 CDR-LM Okay, it's right on, Houston. It's 8000 at 480 off the H-dot.

04 01 06 01 CC Roger; we copy.

04 01 06 13 CDR-LM Okay, minus 495, plus 1860, plus 1331, right on, and the tapemeter is up and left and it's reading 8000 at 480. I think it was locked on the ground or something when we came over that low pass, due to our communications angle. That may be wrong, but that's - you know - it was sure acting funny.

04 01 06 34 CC Okay, it's looking good to us now.

04 01 06 39 CDR-LM Okay, we've got 3.2 on the ALTITUDE TRANSMITTER and 345 on the VELOCITY TRANSMITTER; make that 355.

04 01 06 48 CC Okay, we copy.

04 01 06 53 LMP-LM Hey, Jim, on those drink bags, I tell you, it's pretty hard to see things when you've got a helmet full of orange juice in zero gravity. It's something with that orange juice.

04 01 07 03 CC Well, you've got to drink fast.

04 01 07 08 LMP-LM You really do.

04 01 07 20 CDR-LM When do we get the 210 up, Jim?

04 01 07 28 CC Okay, acquisition on your next rev.

04 01 08 30 LMP-LM Hey, Jim, we had to turn on our window heaters for about 10 minutes per side to clear up the windows - right aft - right before undocking.

04 01 08 38 CC Roger; we copy.

04 01 08 47 LMP-LM We've been using the - we've been using the LCG pump to keep cool in here, and it's really neat.

04 01 08 53 CC We copy.

04 01 08 59 CDR-LM We've been needing something to keep cool, I'll tell you.

04 01 09 02 CC Yeah, we understand completely.

04 01 09 16 LMP-LM Jim, your up-link voice is just beautiful in every antenna we got. Over.

04 01 09 26 CC Okay, that's a good data point. Unfortunately, the down-link is very, very noisy.

04 01 09 36 LMP-LM Okay, I wonder what happened. On the check - the comm checks we did at 55 hours, of course, it was closer, but it was real good then, I thought.

04 01 09 57 CC Okay, we understand it's just a completely different situation, Charlie.

04 01 10 06 LMP-LM Okay.

04 01 10 09 CC But your voice is just crystal clear right now.

04 01 10 17 CDR-LM Roger.

04 01 12 46 CC Orion, this is Houston with some trajectory information for you.

04 01 12 56 LMP-LM Go ahead.

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04 01 12 57 CC Roger. It looks like you'll be coming in about 10 000 feet high at PDI, John, which will be about 3 to 4 seconds of hover time, and you'll be 17 000 feet - -

04 01 13 09 CDR-LM Understand.

04 01 13 10 CC - - south.

04 01 13 14 LMP-LM Okay, does that mean that we're going to be - at pitchover, we'll be steering from south to north?

04 01 13 21 CC That's affirmative.

04 01 13 25 CDR-LM Okay, so at pitchover, we'll be - you'll be targeting us right into the target, but we'll be steering from south to north. Is that based on Ken's tracking?

04 01 13 38 CC No, that's not - Negative on that one. But you'll probably be coming straight in by the time you get down to pitchover.

04 01 13 48 CDR-LM Okay, thank you. How did our landmark tracking turn out?

04 01 13 57 CC Stand by.

04 01 14 05 CC Okay, the landmark tracking looked very good, John.

04 01 14 10 CDR-LM Okay.

04 01 14 18 CC Orion, will you give us your ED BAT read-out, please?

04 01 14 27 LMP-LM The same as always, 37 volts.

04 01 14 30 CC Very good.

04 01 14 43 CDR-LM Jim, is Guidance going to have any gyro drift for us?

04 01 14 47 CC Stand by.

04 01 14 57 CC Okay, no update on that. And it looks like your - the attitude for PDI is very close to the one that we'd like for the s - steerable, so we'll try that when you come around at AOS.

04 01 15 14 LMP/
CDR-LM Okay.

04 01 15 16 LMP-LM And, Jim, on this P52. That radar has drifted up into the field of view, but it's no sweat just moving it down - It's smooth.

04 01 15 28 CC Okay, we copy.

04 01 15 39 LMP-LM And one other thing that - when we put those state vectors in there, I guess we didn't have any - the LM vector in there and my COMPUTER ACTIVITY light stayed on all the time. I finally figured out what it was and did a VERB 66 and got rid of it.

04 01 15 55 CC Okay, we concur.

04 01 15 57 LMP-LM I think - I think that's what it was.

04 01 16 01 CC Everybody's nodding their head down here - affirmative.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 00 17 24 CC Casper, Houston. How do you read?

04 00 17 32 CMP Loud and clear, and let me clean up some things, Hank, and I'll be with you in just a minute.

04 00 17 35 CC Okay.

04 00 18 52 CMP Go ahead, Orion.

04 00 19 05 CMP Okay, on your right side. Okay, I got it, and it's moving in - It looks like a combination now. It's moving though. It's oscillating at this time. Now it's steady.

04 00 23 53 CC Ken, your T_2 time is good.

04 00 23 58 CMP Okay, Hank. I'm trying to get things all
straightened up.

04 00 30 36 CC Casper, OMNI Charlie.

04 00 33 20 CMP Okay. Did you read?

04 00 33 23 CC Casper, did you call?

04 00 34 56 CMP Houston, can you read Casper?

04 00 34 59 CC Hello, Casper, this is Houston. I'm reading you.
There is a little bit of noise in the background,
Ken, but I'm reading you okay.

04 00 35 08 CMP Okay. I understand that my T_2 time is good.

04 00 35 17 CC That is affirmative.

04 00 35 21 CMP Okay. It looks like my maneuver is going to get
me there about - right now.

04 00 35 31 CC Just as predicted, huh?

04 00 35 41 CMP Amazing machine, isn't it?

04 00 35 43 CC That's pretty neat.

04 00 38 52 CC Casper, R-3 should be minus 00014.

04 00 39 00 CMP Yeah, I got out of here roll, 15; pitch, 296; 000.
Is that not correct?

04 00 39 08 CC Roger. I was looking at your NOUN 89 there and
comparing it with the value in the pad there.

04 00 39 20 CMP Oh! Thank you very much. Thank you. You've got
good eyes.

04 00 42 40 CMP It's surprising, Hank, how great things are just
looking through the telescope and I can't spend
much time over here with the naked eye ...

04 00 42 51 CC Roger.

04 00 42 52 CMP The things I'm looking at now are really not that
far from the terminator.

04 00 43 46 CC Casper, you're coming up on 10 seconds to T_1 .

04 00 43 54 CMP Thank you, sir.

04 00 44 12 CMP And we're back in the running.

04 00 44 19 CC Roger. Coming up on T_2 .

04 00 44 25 CMP Okay.

04 00 44 42 CC I told you wrong on that, Ken. It's a little while to go yet.

04 00 45 20 CC Okay, Casper, you're coming up on T_2 now in about 10 seconds.

04 00 48 44 CMP Orion, Casper. Are you ready for rendezvous radar VHF range check?

04 00 49 58 CC Casper, Houston. If you'll give us ACCEPT, we'll up-link your state vector and target load.

04 00 50 48 CMP Okay. You've got it.

04 00 51 12 CC Casper, Houston. We'd like to go on and get the circ pad up to you.

04 00 51 24 CMP Give me about 30 seconds, Hank, and I'll give you a call.

04 00 51 27 CC Wilco.

04 00 52 25 CMP Okay, Hank. I'm ready.

04 00 52 28 CC Roger. Circ, SPS/G&N; 39293; plus 0.49, plus 1.22; 097:40:17.16; plus 0068.1, minus all zips, minus 0058.0; 000, 142, 358; NOUN 44, 0067.4, plus 0051.6; 0089.5, 0:05, 0078.0. The rest of the pad is NA. Set stars, Sirius, Rigel; 131, 071, 014. Two jets, 16 seconds; quads Bravo and Delta. End of pad, and the computer is yours.

04 00 54 12 CMP Okay. Thank you very much, Hank. I'll read it back to you in just a second. Okay, and circ, SPS/G&N; 39293; plus 0.49, plus 1.22; 097:40:17.16; plus 0068.1, all zips, minus 0058.0; 000, 142, 358; 0067.4, plus 0051.6; 0089.5, 0:05, 0078.0. Sirius and Rigel; 131, 071, 014. Two jets, 16 seconds; quads Bravo and Delta. Over.

04 00 55 00 CC Good readback, Ken, and I'll give you the abort pads after you do your P52.

04 00 55 07 CMP Okay. Yeah, let's get to work on these first. Thank you.

04 00 55 43 CMP Hank, it looks like we made a little discrepancy here in the way it is now. It shows we crossed out the VERB 48 at 97:15 to get us a 10101 because we were all ready there, I thought. And that doesn't look like the case. I guess we're gonna catch it up here after the burn. It is probably okay in its present form? Is that correct?

04 00 56 08 CC That's affirmative. We went to 10102 back at 96:34, and we crossed out the one at 97:15, and we figured that same DAP, and it would hold you through the burn, and then we'll go to the new DAP after the burn.

04 00 56 29 CMP Okay. Thank you.

04 00 56 30 CC The reason is being - is because we do have 509 in there. We can't do another DAP with it running.

04 00 56 39 CMP Roger. Understand that. Thank you, sir.

04 00 56 43 CMP Just want to make sure with all the changes around in this 509 that we hadn't overlooked one.

04 00 56 47 CC Roger.

04 01 00 19 CMP Houston, what do you say we pass the GDC align for the COAS calibration maneuver and get back on the time line?

04 01 00 46 CC That's a good plan, Ken. We concur.

04 01 00 53 CMP Okay. Thank you.

04 01 04 35 CC Casper, while you're maneuvering there, would you want to copy the abort pad?

04 01 04 46 CMP All set.

04 01 04 49 CC Okay. Echo, 098:47 all zips; Foxtrot, plus 0102.3, all zips, minus 0050.0; Golf, 099:35 all zips; Hotel, 101:22:15.00; India, 098:35:04.68; Juliet, 101:22:15.00; Kilo 103:21 all zips; Lima, 098:59:29.03; Mike, 105:19:45.00; November, 100:42:42.86. End of pad.

04 01 06 30 CMP That was a super reading, Hank. I'll read back. Echo, 098:47:0.00; plus 0102.3, all zips, minus 0050.0; Golf, 099:35 all zips; Hotel, 101:22:15.00; India, 098:35:04.68; 101:22:15.00; Kilo, 103:21 all zips; Lima, 098:59:29.03; 105:19:45.00; 100:42:42.86. Over.

04 01 07 12 CC Good readback, Ken.

04 01 08 33 CC And, Casper, for your information, PIPAs and AGS look good.

04 01 08 42 CMP All righty.

04 01 12 18 CMP Orion, Casper.

04 01 12 45 CMP Orion, Casper. Orion, Casper.

04 01 12 57 CMP Roger. I take it we've deleted the rendezvous radar check. Is that good? I'm asking the question. Did we delete the - -

04 01 14 05 CC Casper, a preliminary look at your tracking data looks real good.

04 01 14 16 CMP Okay. Good. I hope it is.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 01 17 06 LMP-LM Houston, 16 - what appears to be the problem with system A. Is it a reg problem or what?

04 01 17 08 CC Yes, that's affirmative, Charlie, a reg problem.

04 01 17 14 LMP-LM Okay, will we have a - If we use up fuel - just system A for descent, is what you want us to do.

04 01 17 23 CC Stand by. We'll give you an RCS configuration for PDI when y'all come around the corner.

04 01 17 31 LMP-LM Okay. Well, we'll be back.

04 01 17 40 CDR-LM And I'd like somebody to think about this high APS pressure we have during the lunar stay. Over.

04 01 17 50 CC Okay, we're looking at that one too, John.

04 01 18 11 CC Okay, we are noticing an increase in the RCS pressure there, but we have enough ullage volume now to get the - all the propellant out.

04 01 18 26 CDR-LM Understand. Thank you.

04 01 19 08 CC Orion, this is Houston. Have you - -

04 01 19 09 CDR-LM Yes, if we're on - -

04 01 19 10 CC - - ever noticed any change in your yaw meter?

04 01 19 17 CDR-LM Jim, it's - stuck on minus 12.

04 01 19 21 CC Okay, and go ahead, John.

04 01 19 26 CDR-LM I think that if we're on hot mike when we're talking to each other, I want to apologize right now. It's probably pretty interesting. Probably not, if the comm was as bad as you said it was.

04 01 19 45 CC It was good enough for us to understand you.

04 01 19 52 CDR-LM We were afraid of that.

04 01 20 06 CC Okay, Orion. If you see that reg pressure creeping up, you could do a small maneuver, which would help the situation.

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04 01 20 15 LMP-LM Understand; we'll do that.

04 01 20 21 CDR-LM We'll do a VERB 49 for the AGS cal attitude, Jim.

04 01 20 33 CC Okay. And, Orion, we're coming up on about 2 minutes to LOS.

04 01 20 45 CDR-LM Roger; 2 minutes to LOS. See you around for PDI.

04 01 21 15 CC Orion, this is Houston. For your information, the burst disk pressure is 215 to 220 - the RCS.

04 01 21 26 LMP-LM Roger; understand. Jim, is it both systems you see climbing?

04 01 21 35 CC Just system A.

04 01 21 39 LMP-LM Just system A, right.

04 01 22 21 LMP-LM Hey, Jim, I saw the landing site as we passed over it. We're not going to have any trouble recognizing it from the rays. The rays stand out beautifully.

04 01 22 28 CC Very good. Glad to hear it.

04 01 48 XX BEGIN LUNAR REV 13

04 02 10 49 CC Orion, this is Houston; I'm reading you. We want you to stay with the omni antenna.

04 02 11 11 CC Orion, this is Houston. How do you read?

04 02 11 44 CC Orion, this is Houston. How do you read?

04 02 12 13 CC Orion, this is Houston. How do you read?

04 02 12 44 LMP-LM Hey, Ken. Go off ... please.

04 02 12 58 CDR-LM Houston, Orion. Over.

04 02 12 60 CC Orion, this is Houston. We read you rather weak. How do you read us?

04 02 13 06 LMP-LM Roger; you're 5 by 5. And command module did not reach circ. And we're standing by to - for y'all's decision with him. Over.

04 02 13 15 CC Roger. Understand you standing by. We want you to stay with the omni and we'll be requesting high bit rate shortly.

04 02 13 24 LMP-LM Roger.

04 02 13 26 CC And we're ready for high bit rate now.

04 02 13 28 LMP-LM Copy no circ.

04 02 13 29 CC We copy, no circ.

04 02 13 33 CDR-LM ... high bit rate.

04 02 13 35 CC Okay. Anticipate a waveoff for this one. We'll set you up for the next one.

04 02 13 42 CDR-LM Okay.

04 02 14 19 LMP-LM Hey, Ken's right out in front of us, maybe about a - 600 feet, so we have a visual on him.

04 02 14 32 CC Okay. We copy.

04 02 14 34 CDR-LM What attitude do you want us to go to for bit.

04 02 14 41 CC Stay right where you are, John. You're coming - comm's fairly good.

04 02 14 46 CDR-LM Okay.

04 02 14 49 CC Orion, will you confirm forward omni?

04 02 14 56 CDR-LM Roger. That's what you have, forward omni.

04 02 16 58 CC Orion, this is Houston. We'd like you to go back to normal RCS configuration.

04 02 17 07 CDR-LM Roger.

04 02 17 15 LMP-LM Jim, be advised we had a couple of RCS REG A lights on the back side, and flipping the system - it went out.

04 02 17 33 CC Roger. We copy, Charlie.

04 02 19 12 CDR-LM Houston, how do you read. Over?

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04 02 19 17 CC Orion, this is Houston. Read you loud and clear.

04 02 19 22 LMP-LM Okay. I don't think we're going to have a - remeeting problem here, but we're pointed right at him and as I look at him on my LPD - Ken is out at 46 degrees and about - oh, I'd say 800 or 900 feet, maybe a thousand.

04 02 19 55 CC Roger. Can you see those booms that had the problem?

04 02 20 05 LMP-LM Everything is retracted in the SIM bay.

04 02 20 09 CC Okay, we copy.

04 02 27 21 LMP-LM Houston, 16.

04 02 27 23 CC Okay, go ahead, 16.

04 02 27 24 LMP-LM All right, Jim. You guys working on some more pads and stuff for us?

04 02 27 32 CC Oh, yes, we are, Charlie, and when you get a chance we'll take your AGS cal, if you have those.

04 02 27 39 LMP-LM Yes, sure do. Stand by.

04 02 27 44 CDR-LM We'd like to pitch down to keep Ken in sight. Is that possible?

04 02 27 49 CC Okay, you're clear.

04 02 27 55 LMP-LM Okay, starting with 540, minus 008, plus 001, plus 002, plus 006, plus 05 - correction plus 045, minus 088, and the initial numbers were the same as on the Data Card Book.

04 02 28 14 CC Okay, beginning, it was a readback, beginning at 540, minus 008, plus 001, plus 002, plus 006, plus 045, minus 088, and the initial values were the same as on the card. Over.

04 02 28 33 LMP-LM That's affirmative.

04 02 28 36 CC Okay. And on your RCS situation, we suspect that the burst disk went back side. We'd like to make sure that the system A pressure, when the source pressure in system A gets down to 500 psi, we'd like you to close off system A. Over.

04 02 28 56 LMP-LM Roger.

04 02 29 07 LMP-LM When you say source pressure, you mean helium?

04 02 29 09 CC Affirmative.

04 02 29 13 LMP-LM Okay, Jim, the helium is holding right up there. It's 2400 and that was where it was before we started getting those RCS lights. The pressure never has gone above about the 205, 210 maybe.

04 02 29 27 CC Yeah, we copy.

04 02 31 55 LMP-LM - Jim, give us a call when you want us to go to AFT omni.

04 02 31 58 CC Roger. We sure will, Charlie.

04 02 32 20 LMP-LM You got any LOS time for us?

04 02 32 45 CDR-LM Ken, is your transponder on?

04 02 32 53 LMP-LM Okay.

04 02 32 59 LMP-LM Okay. We're gonna try our radar lockup here again.

04 02 34 34 CC Okay, Orion. Let's go LO bit rate.

04 02 36 37 CC Orion, will you go HI bit rate, again?

04 02 36 41 CC Orion, go AFT omni.

04 02 36 48 CDR-LM We have AFT omni, Jim.

04 02 36 50 CC Roger.

04 02 37 33 CC Orion, go LO bit rate.

04 02 37 35 CDR-LM We have LO bit rate.

04 02 37 50 LMP-LM We have an RCS REG A light, Jim. We're going to ...

04 02 37 52 CC Orion, go A simplex, Ken's trying to call you.

04 02 38 00 LMP-LM Go ahead, Ken.

04 02 38 31 CC Orion, go FORWARD omni.

04 02 38 34 CC Orion, FORWARD omni.

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04 02 41 40 CDR-LM Hey, that sounds pretty good. Houston, how do you read Orion? Over.

04 02 41 48 CC Read you loud and clear, Orion.

04 02 42 47 CDR-LM Houston, this is Apollo 16. ... PDI. We'd like to try.

04 02 42 56 CC Orion, this is Houston, if you're calling.

04 02 43 02 CDR-LM Roger. We wonder if there is any possibility of an answer on - We're going to do a P52 and get ready for another PDI. Over.

04 02 43 21 CC Stand by. We'll tell you.

04 02 44 10 CC Okay. Orion, this is Houston. You can go ahead with your P52, John, we're thinking of having you all try to get back closer together on the back side if your - point of approach. And we'll have some more words to you on that. And if later we decide for the PDI, we'll have another procedure for you.

04 02 44 36 CDR-LM Okay. Understand.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 01 18 38 CC Casper, Houston. We have a GO for circ. And, as a little reminder there, don't forget to terminate the EMP after the burn.

04 01 18 50 CMP Okay; the EMP will be terminated after the gimbal drive check. Is that affirmative?

04 01 18 56 CC That's affirmative.

04 01 19 02 CMP All righty. Thank you, sir.

04 01 20 41 CC Casper, Houston. We're about 2 minutes from LOS.

04 01 20 48 CMP Okay, Hank. Thank you, sir.

(NO COMM FOR 51 MINUTES)

04 02 11 13 CC Casper, Houston. How do you read?

04 02 11 16 CMP Okay; they're locking up on me. Hello, Houston. This is Casper Bar [?] now. We did not do circ, and I'd like to talk about the TVC servo loops.

04 02 11 29 CC Understand. No circ.

04 02 11 33 CMP That's affirmative. Presently, about a mile ahead of the IM. And I'd like to talk about a TVC servo loop problem.

04 02 11 51 CC Okay, Ken. Go ahead.

04 02 11 55 CMP Okay, and - and break in and tell me as soon as you get the DS - get ready to dump the DSE, so you can take a look at what I'm talking about, and I'll leave the antenna MANUAL and WIDE until you do. Okay; the text is that we came up to the burn time and I was going through the gimbal checks. Number 1 servo started normally, checked out. I switched to - clockwise on the THC to perform the secondary gimbal check and started them - they looked normal. I set the pitch trim normally, and I went to set the yaw trim; I've just been checking that the trim lock [?] worked, and I got divergent oscillations on the yaw trim indicator, and you could feel them in the spacecraft. So I switched to the - SERVO POWER to the number 2 SERVO to AC1/MAIN A, tried that. That had no effect. Then I cycled through looking at - at the gimbal - with the AUTO DRIVE switch in number 1, number 2 in AUTO. Every time I selected number 2, by some means, I had the same results. Then I tried SCS in AUTO, and as soon as I would excite some motion in the secondary yaw servo, why it would go unstable again. I then tried using the G&N to drive the gimbal, and I did the first half of the gimbal drive in servo loop 1, then switched to the servo loop 2 for the second half, and again the same instability showed up. Based on the rule of four servo loops, I canceled circ. I had no other indications in the cockpit, no warning lights, no - no other abnormalities.

04 02 13 58 CC Roger. We copy - -

04 02 14 01 CMP ... was in fact running, but I don't think that could have had any effect when SCS was going.

04 02 14 10 CC Roger. Could we get you to go to the AOS attitude, Ken, so we can dump the data?

04 02 14 20 CMP Yes, sir. Will do.

04 02 14 25 CMP How about if I just give you the high gain from right here?

04 02 14 31 CC Okay, if you think you can get it up.

04 02 15 30 CMP Okay; I've got you a solid lock on the high gain.

04 02 15 40 CC Casper, Houston. We'd like to verify that - -

04 02 15 41 CMP ... So I can keep the LM in sight.

04 02 15 54 CC Casper, we'd like to verify that the - that the oscillations were on servo loop number 2. Is that correct?

04 02 16 00 CMP That's affirmative. Servo loop number 2, yaw only.

04 02 16 08 CC Roger. And servo loop number 1 is okay?

04 02 16 11 CMP That's affirmative.

04 02 16 18 CC And did I read that the first time through the servo checks, they were okay? And then when you started to set the yaw trim, the oscillation started, and that once you had the malfunction, it occurred in - -

04 02 16 31 CMP No, sir. No, sir. Primary loop checked out normally. Secondary loop never checked out in yaw servo.

04 02 16 40 CC Roger; copy. And that was both - -

04 02 16 43 CMP ... started normally, and it's - Go ahead, Hank.

04 02 16 49 CC Roger. And that occurred both in SCS and G&N, is that correct?

04 02 16 56 CMP That's affirmative. And I tried both AUTO and RATE COMMAND in SCS.

04 02 17 21 CC And, Ken, We'd like to confirm that was a divergent oscillation. Is that correct?

04 02 17 28 CMP That's affirmative.

04 02 19 08 CC Casper, Houston. We'd like for you to run another gimbal drive check in the yaw axis on both SCS and G&N, and let us take a look at it.

04 02 19 18 CMP Okay; I'm prepared to do that right now if you're ready.

04 02 19 24 CC Ready to go.

04 02 20 13 CMP Okay; I'm bringing the BUS TIES on.

04 02 20 30 CMP-CM Okay, and SERVO POWERS 1 and 2 are on in the loop configuration. Are you ready for me to start the gimbals?

04 02 20 41 CC That's affirmative, Ken. Go ahead.

04 02 20 51 CMP Okay, here comes - You just wanted to look at the yaw. Here comes YAW number 2. There it is, and it's oscillating now, and it's damped out, and that's in AUTO. I'll switch it to number 2, and number 2 in AUTO. I'm now going to move the thumb-wheels, and it - Well, now it's - there it goes - now it's oscillating, and it's divergent, and I'm turning the GIMBALS OFF. Okay, YAW GIMBAL number 2 is OFF. I'll hold this configuration.

04 02 32 50 CMP That's affirmative. It is.

04 02 33 07 CMP Okay.

04 02 34 03 CMP John, you want to try to initialize VHF ranging while we're above it?

04 02 34 35 CMP Orion, Casper.

04 02 34 45 CMP Would you like to try and check out our VHF at the same time?

04 02 34 49 LMP-LM Okay.

04 02 35 02 CMP Sounds very garbled. If you can read me, Orion, you're extremely garbled and making a pulsing noise sound.

04 02 35 51 CMP Orion, do you read me on B DUPLEX?

04 02 37 10 CMP Orion, do you read Casper? Orion, do you read Casper?

04 02 37 31 CMP Houston, Casper.

04 02 37 33 CC Casper, Houston. Go ahead.

04 02 37 39 CMP Roger. It looks like I'm losing comm with Orion. Could you ask them to go back to A SIMPLEX?

04 02 37 45 CC Wilco.

04 02 38 03 CMP Okay; you were just about unreadable. I don't know if you could pick me up on that other configuration, but that didn't work at all. Yeah, but it was coming through completely garbled - unintelligible. Okay. Okay; and if no voice in 30 seconds, we'll come back to A SIMPLEX. Okay, how do you read me now? You're still very scratchy, hardly make you out at all. Yeah, that's pretty bad. That's not much better; it's not near like what we got before. Let's go back to A SIMPLEX.

04 02 39 16 CMP Hey, you sound good now.

04 02 40 00 CMP Hey, Charlie.

04 02 40 18 CMP Okay, you want to turn your light on when it gets dark? And how about let's try a little ranging here, before we go into the darkness?

04 02 40 25 CC ... Capcom - -

04 02 40 26 CMP - - comm now - you're on - on configuration for ranging.

04 02 40 30 CC Hey - am I - Hey, Jerry, am I on your loop? Okay. Hey, on - on this conversation here, I ran this rendezvous from the miniball.

04 02 40 45 CMP Hey, Stuart, you're on air-to-ground.

04 02 40 48 CC Sorry about that, Ken.

04 02 40 51 CMP Hey, Charlie, let's - hey, Charlie, how about let's try out this ranging? You're in the ranging configuration, right? Okay, stand by for about 30 seconds until I try to lock up.

04 02 41 34 CMP Okay, I've got you at 0.36; 0.38; 0.36, bouncing around. How does that compare? It doesn't really.

04 02 45 24 CMP Gee, I think so. Might as well keep an eye on it, looks like we're getting ready to go in the dark here. Could you wait until we get in the dark so I can look at you? Right now, I've got the Sun right smack in my eyes.

04 02 45 40 CMP Did you get any words out of Houston? I haven't heard a word from them.

04 02 45 50 CC Casper, Houston. We're working on a problem down here.

04 02 45 57 CMP Roger, Henry. I understand that; but I'm not bugging you. We'll stay off the loop.

04 02 46 02 CC Okay, we've got the data down, and we've got the strip charts, and we're taking a look here and see if we can't find some way to get around it.

04 02 46 11 CMP Okay. I know if there's a way, you'll find it.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 02 49 59 LMP-LM Houston, I gave you AFT omni.

04 02 50 29 CC Orion, go AFT omni.

04 02 50 33 LMP-LM Orion is in AFT omni.

04 02 50 36 CC Roger. Copy.

04 02 52 26 CC Orion, go FORWARD omni.

04 02 54 29 CDR-LM ... registering 10.

04 02 54 43 CDR-LM Yeah, the ... was off 10.

04 02 58 35 CC Orion, go AFT omni.

04 02 58 40 LMP-LM Orion, AFT omni.

04 03 02 40 CC Hello, Orion and Casper. This is Houston.

04 03 02 46 CDR-LM Go ahead, Houston.

04 03 02 47 CC Roger. It looks like we're not going to have a decision on this rev, and we do have the capability of spending about five rev's in this configuration before we have to make that decision. We would like y'all to move into a stationkeeping position, and you should be at the closest point of approach at about 100 hours. And we're recommending a CSM active to move into a position and to stationkeep. And we're going to run some simulations down here on this TVC problem, and we'll get back to you.

04 03 03 22 LMP-LM Roger.

04 03 03 30 CC Casper, this is Houston. You copied, too, didn't you?

04 03 03 34 LMP-LM Roger. He reads you.

04 03 03 35 CC Okay.

04 03 05 16 LMP-LM Go ahead.

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04 03 06 04 LMP-LM That -

04 03 06 56 CC Orion, this is Houston. We want to try another procedure here to improve our comm. We want you to select SECONDARY POWER AMPLIFIER.

04 03 07 08 LMP-LM Okay, ... SECONDARY POWER ...

04 03 08 25 CC Orion, this is Houston. Will you confirm that you changed power amplifiers?

04 03 08 32 LMP-LM That's affirmative.

04 03 08 36 CC Roger. Copy.

04 03 09 07 CC Orion, let's go HI bit rate.

04 03 09 27 LMP-LM You have HI bit rate.

04 03 09 28 CC Roger.

04 03 10 23 LMP-LM Hey, Jim; Orion. Could we close off main B in this crossfeed system A?

04 03 10 30 CC Stand by.

04 03 10 35 CC Orion, we're happy with your present RCS configuration.

04 03 12 22 CC Orion, this is Houston. And if - you're in P00; if you'll go to DATA, we'll send you a state vector. Over.

04 03 12 34 CDR-LM Roger. You have it. Go ahead.

04 03 12 35 CC Roger.

04 03 15 01 CC And, Orion, we're 2 minutes from LOS.

04 03 15 17 LMP-LM Copy, Jim. And we're going to - UPDATA LINK to OFF.

04 03 15 43 CC Orion, we're finished with your computer.

04 03 15 49 LMP-LM Roger. Thank you much.

(NO COMM FOR 50 MINUTES)

04 03 47 XX BEGIN LUNAR REV 14

04 04 05 22 LMP-LM Houston, Orion. How do you read?

04 04 05 23 CC Orion, this is Houston. Read you loud and clear.

04 04 05 29 LMP-LM Roger. Same old Jim. We're about 0.7 mile out from Casper now.

04 04 05 40 CC Say again, Charlie. We still have excessive noise down here.

04 04 05 48 LMP-LM I say our range to Casper is about 0.7 mile.

04 04 05 54 CDR-LM And he's opening at 2-1/2; he put in some posigrade velocity to go up and above and come down and get with us.

04 04 06 06 CC Okay, we copy.

04 04 06 15 CDR-LM The total is slight [?].

04 04 06 51 CC Okay, 16; this is Houston. We still do not have an answer, but people are working very feverishly.

04 04 07 04 LMP-LM Orion. Roger.

04 04 07 05 CDR-LM Okay, thank you. It'll probably be awhile before we get stationkeeping anyway.

04 04 07 16 CC Roger.

04 04 07 56 CC Stand by, Ken.

04 04 08 24 LMP-LM Houston, Orion.

04 04 08 25 CC Go ahead, Orion.

04 04 08 30 LMP-LM Okay, we got a RCA SYSTEM A REG light. Pressures: HELIUM is looking like 2300; the PROPELLANT is at 210; the FUEL MANIFOLD and OX MANIFOLD is - Correction, make it 215 - or 220. And everything else looks pretty good. Pressures are holding up like you think the ... is gone?

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04 04 09 01 CC Roger. It - it looks that way to us, Charlie.

04 04 09 04 CC Yes, Casper; this is Houston. Read you loud and clear.

04 04 09 08 CMP Okay.

04 04 10 11 CC Roger. We copy, Ken.

04 04 11 08 CC Orion, this is Houston. We're wondering where you got the estimate of 0.7-nautical-mile range?

04 04 11 18 LMP-LM We got the rendezvous radar locked on, if you want us to - Or you want us to turn it off?

04 04 11 23 CC No, that's fine.

04 04 12 01 LMP-LM Houston, Orion. John and I have been talking about - if we get to land this thing, we'd like to - probably ought to think about going to sleep first and then we'd get up in a full EVA tomorrow.

04 04 12 15 CC Roger. We - we concur down here.

04 04 12 34 CC Okay, Casper; this is Houston. We're recommending that you null the line-of-sight rates and fire 5 feet per second toward the LM.

04 04 13 03 CC We copy you, Ken.

04 04 13 35 CC Okay, Ken, we show you coming up on perilune now, so you'll be affecting your apolune.

04 04 13 48 CC That's affirmed.

04 04 14 13 CC Okay, that sounds good, Ken.

04 04 14 36 CC Roger. We were hoping that - -

04 04 14 54 CC We think your state vector was fairly accurate, Ken. And you'll be at perilune in 15 minutes.

04 04 15 22 CC That's affirmative.

04 04 15 47 CC Ken, can you give us your position relative to the LM?

04 04 16 05 CDR-LM Yeah, he's - he's ahead of us, and I show him about - level and 6500 feet out and opening at 3 feet a second.

04 04 16 23 CC Okay, we copy your position as ahead, below, and about 1 nautical mile.

04 04 16 33 CDR-LM And he's opening at 2-1/2 on 1678.

04 04 16 38 CC Roger.

04 04 16 40 CDR-LM And 3 feet a second on the tapemeter.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 02 48 03 CMP Stand by a second.

04 02 48 12 CMP Was doing temporary battle with our friend, the trash bag. I have you, visual. Tallyho.

04 02 48 39 CMP Okay. I'll keep you in sight.

04 02 49 09 CMP That old probe is really nice.

04 02 50 43 CC Casper, Houston.

04 02 50 48 CMP Go ahead, Houston.

04 02 50 50 CC Okay. We're getting set up for another gimbal drive check, Ken, and what we want to do is go through a complete gimbal drive check by the numbers, and have you tell us as you do each thing and especially in relation to the - the yaw thumb-wheel, which way you're moving it and how many degrees and - and what's happening. And we'll give you the word when we're ready to start that. We've got to get some things configured down here.

04 02 51 16 CMP Okay. Was attitude - How about looking ahead to see if this attitude is going to hold throughout the test?

04 02 51 23 CC Okay, I'll check it.

04 02 51 27 CMP Thank you.

04 02 51 33 CC The attitude is good, Ken.

04 02 51 38 CMP Okay.

04 02 54 10 CC Okay, Ken. We're ready to go. Do you think VOX might make it easier for you?

04 02 54 20 CMP Yes, sir. I'll go to VOX now and, Orion, are you still working on your 52?

04 02 54 31 CMP Okay. I'm going to have my head in the cockpit here for a while, but if Mr. Keppler isn't a high school dropout, why, we won't hit anyhow.

04 02 54 46 CMP Okay, Houston. Here we go. I'm gonna run over the switch configuration that I've got in the cockpit. We're going to do this - everything except calling P40, or do you want to call P40 for something?

04 02 55 01 CC We don't need P40.

04 02 55 03 CMP ... you do not want P40. Okay, here we go. I got - The circuit breakers are all checked over on panel 8. The only ones that are out are RCS LOGIC, the PROBE, and the stuff on the bottom rows that don't matter. Okay. The switches for SCS are in LIMIT CYCLE, OFF; DEAD BAND, MIN; RATE, LOW. I've got the ROTATION POWER at AC. DIRECT are OFF. I've got my BMAGs. I'm going to ungage them now. They're unged. I'm going to SCS CONTROL. Okay. Now I'm going over and catch the - the bus ties. Here comes BUS TIE, A/C. It's on. B/C is on. Gimbal power number 1 to AC 1, number 2 to AC 2. START PITCH GIMBAL number 1.

04 02 56 14 CMP MARK. And YAW GIMBAL number 1.

04 02 56 19 CMP MARK. I have a thumbwheel drive. I'm driving it from zero to minus one-half to plus one-half, which is the trim. The YAW thumbwheel is at plus one-half. I'm going to take it to zero and back up to 1, and will set it at 122. It runs smoothly in both directions. I'm making an MTVC check in PITCH. There's a little plus PITCH, a little minus PITCH - that's good - a little minus YAW, a little plus YAW. That's good and stable. I'm going to CMC CONTROL.

04 02 56 55 CMP MARK. I have no MTVC. I'm going clockwise on the translation hand controller.

04 02 57 01 CMP MARK it. I still have no MTVC. I'm bringing on the PITCH 2 GIMBAL -

04 02 57 08 CMP MARK. I'm checking the thumbwheel down to zero, up to 1, back to one-half. The YAW thumbwheel is going over to ... and I don't - Let me try it again. There it goes. Had the MOTOR on; now I'm turning it OFF. I'll turn it on one more time. ... it's stable. I'm taking the trim, which is now set at a little over 1 on the thumbwheel, down towards zero. I move it slowly. It gets a little dynamics, and then it stops. I'm going to take it down to zero at about this rate. It oscillates, and now it's diverging, and I'm turning the GIMBAL MOTOR OFF. I'm going to hold in this configuration.

04 02 57 54 CC Roger. Copy.

04 02 59 13 CC Ken, what we would like for you to do now is crank up the YAW 2 GIMBAL again to that stable condition, and then let's see what MTVC does to it - see if that will excite the oscillation.

04 02 59 28 CMP It did last time. I now have the GIMBAL on again, and I'm going to give it a little YAW, and there it goes. Coming OFF -

04 02 59 36 CMP MARK.

04 02 59 38 CC Roger. Copy.

04 02 59 49 CMP Would you like to take a look at it in ACCEL COMMAND?

04 02 59 53 CC Stand by.

04 02 59 59 CMP Understand. Stand by.

04 03 00 04 CC Roger. Ken, go ahead and let's try it in ACCEL COMMAND.

04 03 00 15 CMP Okay, and it's diverging all on its own in ACCEL COMMAND. I didn't put any inputs into it.

04 03 00 22 CC Roger. Copy.

04 03 02 38 CC Hello, Orion and Casper. This is Houston.

04 03 02 47 CC Roger. It looks like we're not going to have a decision on this rev, and we do have the capability of spending about five revs in this configuration before we have to make that decision. We would like y'all to move into a stationkeeping position, and you should be at the closest point of approach at about 100 hours, and we're recommending a CSM active to move into a position and to stationkeep. And we're gonna run some simulations down here on this TVC problem, and we'll get back to you.

04 03 03 32 CC Casper, this is Houston. You copied, too, didn't you?

04 03 03 37 CC Okay.

04 03 03 38 CMP Roger. I'm with you. I still have the - some of the gimbal motors on and the bus ties. Want to stand by on that?

04 03 03 43 CC Okay, Ken. We'd like to try one more thing. There's a remote possibility that the RHC may be inducing some noise or transients into the system. We'd like you to kill all power to the RHC. Cut off both AC and DC, and repeat the gimbal check in AC ACCEL COMMAND and see if the gimbal takes off.

04 03 04 09 CMP Okay. I've got - I secured the hand controller by just taking NORMAL 2 POWER to OFF, and the rest of the POWERS were OFF. I'm in ACCEL COMMAND on YAW, and I'm going number 2 up to START, and it's in ACCEL, and it's stable. Would you like for me to try the thumbwheels?

04 03 04 34 CC Stand by 1.

04 03 04 35 CMP And with a little excitation from the thumbwheel, it took off again.

04 03 04 39 CC Roger. Understand.

04 03 05 09 CC Ken, for that rendezvous, we're suggesting you use the procedure you worked on there in the simulator. Just move it in, and when you're that close, you approach.

04 03 05 19 CMP Okay, Hank. Will do that. Thank you.

04 03 05 23 CC Let me see if there's anything else they want to do with this gimbal thing before we shut it down? Stand by 1.

04 03 07 30 CC Casper, Houston. We'd like for you to try, for our data, one more YAW primary - YAW secondary G&N servo loop check - gimbal check.

04 03 08 09 CMP Henry, did you say primary and secondary on this G&N drive?

04 03 08 14 CC Negative. Just - just the secondary loop. I didn't mean to say primary.

04 03 08 21 CMP Okay. Can I turn the other three gimbal motors off?

04 03 08 27 CC Say again. You were blocked out.

04 03 08 32 CMP I say, I'd like to turn the other three gimbal motors off if we don't need them.

04 03 08 37 CC Roger. Go ahead and turn those off.

04 03 08 50 CMP Okay. I'm now in - I'm in S - in CMC CONTROL. I'm setting up 204, and I have program 509 loaded. I'm starting GIMBAL number 2 YAW. Okay. It's stable now. I'm going to do a PROCEED on 204.

04 03 09 16 CC Roger.

04 03 09 49 CMP Well, doesn't look like I got anything that time.

04 03 09 52 CC I suspect you've got to be in G&N or CMC CONTROL, haven't you?

04 03 10 01 CMP Okay. Let's try it again. Go back over everything.

04 03 10 30 CMP Okay. I'm coming up. I'm going to start it again. I'm going to try it. Now, as soon as I turn - Well, by golly, it - it damped itself there. It started out wild, and it's settled down. Now I'm going to PROCEED on 204.

04 03 10 45 CC Roger.

04 03 09 53 CMP Plus 2, and it's oscillating. Minus 2, and it's oscillating about 1 degree each, and it's oscillating in the center. It is not divergent, however. Well - now it's gone to trim, and it's oscillating about plus or minus - almost 2 degrees - or plus or minus 1 degree. I'm going to turn it OFF -

04 03 11 14 CMP MARK.

04 03 11 19 CC Roger. Copy.

04 03 12 14 CC Casper, Houston. You can go ahead and shut down the gimbal motors, and turn off the TV servo loops - TVC servo loops, and clean it up.

04 03 12 26 CMP All right, sir. I'll power down. Thank you.

04 03 13 12 CC Casper, Houston. I've been advised that the average g kills your EMP.

04 03 13 23 CMP Okay. Thank you.

04 03 14 48 CC Casper, Houston. We're about 2 minutes from LOS, and when you come around next time, in that rendezvous, just come up on the best omni, and then we'll get high gain from there.

04 03 15 02 CMP Okay, Hank. And is there anything else you can think of we can do - we might try and take a look at? Otherwise, we'll just be stationkeeping at 100 feet or so.

04 03 15 18 CC We can't think of anything else down here, Ken.

04 03 15 25 CMP Okay. Thank you, sir. See you in a few minutes.

04 03 16 35 CC Ken, for your info, we up-linked a new vector to the LM, and we weren't able to get yours in. So there will be a small difference - a couple feet per second.

04 03 16 45 CMP Okay.

(NO COMM FOR 50 MINUTES)

04 04 06 08 CMP John, I think that total is still slightly retrograde.

04 04 06 18 CMP Yeah, you - I - I'm thinking maybe I ought to go put some more in there. What do you think?

04 04 06 31 CMP Okay.

04 04 06 50 CC Okay, 16. This is Houston. We still don't have an answer, but people are working very feverishly.

04 04 07 18 CC Roger.

04 04 07 25 CMP That only shows 9.2. Why don't we get them to get an arc on this? I guess I'd like to know how good my vector was to start with.

04 04 07 38 CMP Say again? I'm sorry; I can't hear you.

04 04 07 49 CMP I know, but my state vector is good. How good is it? That's what I'd like to know from Houston.

04 04 07 55 CC Stand by, Ken.

04 04 08 04 CMP Roger. I'm trying now.

04 04 08 25 CC Go ahead, Orion.

04 04 08 56 CMP Houston, do you read Casper?

04 04 09 00 CC Roger. That looks that way to us, Charlie.

04 04 09 02 CMP Houston, do you read Casper?

04 04 09 04 CC Yes, Casper. This is Houston. Read you loud and clear.

04 04 09 08 CMP Okay. Look like we got a - that 100 hours was a bad time, and I tried to close at him before he realized that it was all minus X. I put in about 3-1/2 foot per second and got to checking. That didn't look like the right thing to do. So I took about 3 of that out, and - I'm doing that, Jim - and so I took about 3 of that out, and I put in a half foot per second radial at about 100 hours and 5 minutes. And I put in the rest, took 2 foot per second posigrade at about 100 hours and 6 minutes.

And at about 100 hours, then I put in 3 - it was about - roughly retrograde. And my computer now shows 16.5 by 9.2. And I had a good state vector when I started, and that's probably a good value - whenever you get a short arc or something on me.

04 04 10 11 CC Roger. We copy, Ken.

04 04 11 07 CC Orion, this is Houston. We're wondering where you got the estimate of 0.7-nautical-mile range.

04 04 11 24 CC No, that's fine.

04 04 11 30 CMP Yeah, I show us now at about 0.9 mile. Is that correct?

04 04 11 38 CMP Okay. And still opening?

04 04 12 14 CC Roger. We - we concur down here.

04 04 12 33 CC Okay, Casper; this is Houston. We're recommending that you null the line-of-sight range - -

04 04 12 38 CMP - - ... Go ahead.

04 04 12 39 CC - - and fire 5 feet per second toward the LM.

04 04 12 46 CMP Okay. That's still going to be mostly retrograde, it looks like. That's how I got in this place to start with.

04 04 13 02 CC We copy you, Ken.

04 04 13 06 CMP Okay, I'm going to hold. Can you guys get a short arc going on my trajectory?

04 04 13 35 CC Okay, Ken. We show you coming up on perilune now, so you'll be affecting your apolune.

04 04 13 47 CMP You show me coming up on perilune?

04 04 13 49 CC That's affirmative.

04 04 13 50 CMP Roger. My state vector shows 19 miles up, and we're not - I'm just passing Smythii. Is that - Does that sound reasonable, that we shifted that much in orbital track?

04 04 14 13 CC Okay. That sounds good, Ken.

04 04 14 27 CMP Okay, I guess I'd like for you to - to summarize again where I stand. I'm a little bit confused now, Jim.

04 04 14 35 CC Roger. We were hoping that - -

04 04 14 40 CMP ... I'm just passing Smythii, and my altitude according to my computer - Was my state vector a little bit off to start with?

04 04 14 52 CC We think your state vector was fairly accurate, Ken. And you'll be at perilune in 15 minutes - -

04 04 15 00 CMP Okay. Then there's still a discrepancy in - Okay, that makes more sense. All right. Because I'm presently at 19 miles, and I think that's probably a good estimate. All right. If I do - Do you want me to thrust towards the LM now, because I'm approaching perilune. Is that affirmative?

04 04 15 21 CC That's affirmative.

04 04 15 26 CMP Okay. Now I'm - This is using up a great deal of RCS which is going to violate the next line. Is this preferable to trying to do a regular rendezvous now?

04 04 15 45 CMP ... could you - -

04 04 15 46 CC Ken, could you give us your position, relative to the LM?

04 04 15 56 CMP Yes, sir. I'm ahead of him and slightly below, and I show a - a mile on the EMS, and I don't know what John has on the radar.

04 04 16 23 CC Okay. We copy your position as ahead, below, and about 1 nautical mile.

04 04 16 31 CMP That's affirmative.

04 04 16 37 CC Roger.

04 04 17 08 CMP Okay, Jim. To make sure there's no confusion, I haven't done anything yet.

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04 04 17 17 CC Okay. Stand by.
04 04 17 22 CMP Thank you, sir.
04 04 17 44 CC Okay, Casper. This is Houston. We're convinced
that we want you to fire directly at the LM about
5 feet per second. We want to get a positive
closing rate.
04 04 17 58 CMP Okay. That's in work.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 04 16 44 CC Okay. Stand by.

04 04 17 34 CMP Okay. On the - on the COAS, I've got him BORE-SIGHTED there, and he's 35559 from local vertical.

04 04 17 44 CC Okay, Casper. This is Houston. We're convinced that we want you to fire directly at the LM, about 5 feet per second. We want to get a positive closing rate.

04 04 19 45 CC Roger. We copy.

04 04 19 56 CC Ken, we show you in FREE. Okay.

04 04 21 11 CC Orion, let's go LO BIT RATE.

04 04 21 18 LMP-LM You have it.

04 04 22 11 CC Go.

04 04 22 34 CC Casper, this is Houston. Hold up on that RCS maneuver.

04 04 22 44 CC Hold up, Ken. Okay. Hold it there.

04 04 24 00 CDR-LM We'll be into ... the verb.

04 04 24 25 CC We need a range and range rate reading now.

04 04 24 31 CDR-LM 10,000 feet, closing at 3 feet a second, and we have a line-of-sight rate.

04 04 24 44 CC Roger. We copy.

04 04 25 01 CC Yes, Casper. This is Houston. You should null the line-of-sight rates.

04 04 25 16 CC Roger. Keep a positive closing rate.

04 04 25 38 CDR-LM Okay. Thrust down, and I'll tell you which way the needle moves. ...

04 04 25 49 CDR-LM That's the wrong way, Ken. Were you thrusting? Okay, thrust away from the Moon. That's doing it. Little more.

04 04 26 13 CDR-LM You didn't get it corrected, Ken. All right. It's just not moving very much at all. No, you - It's going to be expensive, Ken, to do this, but you - you're going to have to thrust up.

04 04 26 38 CDR-LM Okay. You don't have it nulled. That's - you've got full ...

04 04 26 58 CDR-LM Three - 3 feet a second, closing. You're at 66 RC. Affirmative.

04 04 27 14 CDR-LM You've got it to 3 milliradians. You've got it to 2 milliradians. You've got it to 2 milliradians. Now you've got it, Ken. You killed it.

04 04 27 59 CDR-LM Not according to my needles.

04 04 28 31 CDR-LM Three and a half feet a second, and you're at 6300 feet.

04 04 29 14 CDR-LM Okay. Your rates are nulled, essentially.

04 04 29 47 CC Orion, request you select the SECONDARY TRANSMITTER/RECEIVER.

04 04 30 24 LMP-LM Okay, Houston. How do you read now?

04 04 30 28 CC I read you loud and clear, Orion.

04 04 30 32 LMP-LM Okay. You're 5 by. How's the problem looking?

04 04 30 53 CC 16, no answers yet. We're still looking at it.

04 04 31 42 CDR-LM Okay, Ken. You're at 5600 feet, closing at 4 feet a second.

04 04 32 10 CC Okay, Orion. This is Houston. We would like you to open the PRIMARY POWER AMP circuit breaker on 16.

04 04 32 23 LMP-LM It's open, Jim.

04 04 32 24 CC Roger.

04 04 32 45 CC Okay, Orion. Let's go HI BIT RATE.

04 04 32 52 LMP-LM Roger. You have HI BIT RATE.

04 04 32 54 CC Roger.

04 04 33 20 CDR-LM Okay, Ken. You're getting a line-of-sight rate. You're going to have to thrust a little toward the Moon.

04 04 33 32 CC Okay, we can't hold HI BIT RATE. Request you go back to LO BIT RATE, Orion.

04 04 33 43 CDR-LM Needles didn't move, Ken. That's the right direction.

04 04 34 02 LMP-LM That sounds pretty good, Ken.

04 04 34 23 CC Orion, this is Houston. Could you give us a range and range rate read-out?

04 04 34 30 CDR-LM Okay; 4900 feet, closing at 5.

04 04 34 35 CC Okay; 4900, closing at 5.

04 04 34 53 CDR-LM You got the line-of-sight rates nulled now, Ken.

04 04 36 19 CDR-LM Yes, they're nulled right now.

04 04 36 36 CDR-LM How much are you using?

04 04 37 13 CC Stand by, Ken.

04 04 37 17 CDR-LM Okay, well, you're at 4000 feet now, at 5 feet a second, Ken. And - and - and your line-of-sight rate is starting to build a little in the other direction. You've got it now.

04 04 37 54 CC Orion, this is Houston. Is the CSM above you or below you? We hope he's directly ahead.

04 04 38 07 CDR-LM He's at 45 degrees above us.

04 04 38 11 CC Forty-five degrees above.

04 04 38 15 CDR-LM Above the local vertical.

04 04 38 18 CC Roger.

04 04 38 29 CDR-LM And, he's got a - a 5-foot-a-second closing rate, and his line of sights are nulled on the radar.

04 04 38 34 CC Roger.

04 04 39 33 CDR-LM You've really got them killed.

04 04 40 05 CDR-LM That seems like a fair setting.

04 04 40 50 CDR-LM Okay, Ken. You're going to have to thrust down a hair.

04 04 41 13 CDR-LM Looks pretty good. Still 5 feet a second. Still off 3-1/2 feet a second now at 3000.

04 04 41 26 CDR-LM Roger.

04 04 41 32 CDR-LM Okay. You've - you're gonna have to thrust a little more to kill that rate the same way.

04 04 41 48 CDR-LM Okay. That got a lot of it, but not all of it. Okay. You got most of it.

04 04 41 58 CC Okay, Casper. This is Houston. You might pick up a temperature caution light on your quads, but it's no consequence.

04 04 42 14 CC Affirmative, Ken. I think it's thruster activity.

04 04 42 29 CC Orion, this is Houston. Will you give us another range and range rate, John?

04 04 42 35 CDR-LM Yep. They're at 3100 feet, at 3-1/2.

04 04 42 40 CC Roger; 3100, at 3-1/2.

04 04 42 44 CDR/LM Roger. At an angle of 68 degrees to local vertical now.

04 04 42 49 CC Understand; 68 degrees.

04 04 43 33 CDR-LM Okay, Ken. You got a sight rate going to the south according to my needles.

04 04 44 02 CDR-LM Holding - holding the vertical, and it's holding right on. You're at 3000 feet, at 3 feet a second. 2800 feet.

04 04 44 25 CDR-LM Yeah, you're gonna get there. You now have 2 milliradians to the south. Yep.

04 04 44 51 CDR-LM Yeah, that's got most of it.

04 04 45 13 CC Go ahead.

04 04 45 21 CDR-LM ... vertical ... still 2 milliradians. Okay. That's got it, Ken.

04 04 46 26 CDR-LM No, you're not - you're not - You don't have any rate yet. According to my needles.

04 04 47 03 CC Orion, this is Houston. We want you to get the rendezvous radar and the tracking light off as soon as it's feasible. To conserve power.

04 04 47 15 CDR-LM Roger. We will. It's not too feasible right now.

04 04 47 20 CC Yeah, we understand.

04 04 47 39 CDR-LM Just a hair, Ken. Okay. You're at 2400 feet at 2.

04 04 48 29 CDR-LM Ken, our needles don't show it.

04 04 49 29 CDR-LM Yeah, I don't show any, and I've got you bore-sighted in ATT HOLD, and I don't show any motion there either, Ken.

04 04 49 42 CDR-LM Just a little south, Ken.

04 04 50 06 CDR-LM ... Whoa, Ken. You got it.

04 04 50 32 CDR-LM Yeah, you have. Yeah, don't worry about it.

04 04 51 21 CDR-LM Be sure and put a second on the tapemeter. It isn't closing very fast.

04 04 51 33 CDR-LM Okay. Say when and how much.

04 04 51 45 CDR-LM Okay.

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04 04 52 01 CDR-LM Okay. You're at 2000 feet at 2.

04 04 52 19 CDR-LM There you go. It worked.

04 04 53 03 CDR-LM Okay, fine.

04 04 53 14 CDR-LM You're getting over behind us, Ken. You're going to have to - to thrust toward us a little more.

04 04 53 23 CDR-LM You're at 2000 feet, but it's hardly closing at all.

04 04 53 44 CDR-LM Okay.

04 04 53 55 CDR-LM Now you're starting to build a rate to the north.

04 04 54 08 CDR-LM Yeah, I - I don't think they're quite as good.

04 04 54 23 CDR-LM Yep, 3 feet a second; 2000 feet. 1800 feet now.

04 04 55 39 CDR-LM Okay, Ken. There, you are moving north definitely.

04 04 55 50 CDR Okay.

04 04 56 15 CDR-LM Say again?

04 04 56 18 CDR-LM That's affirmative; 2 feet a second.

04 04 57 28 CDR-LM Okay, you've got 4 milliradians to the north. You're at 1500 feet now.

04 04 58 11 CDR-LM Okay; well, now, you have -

04 04 58 33 CDR-LM Do you see me at all?

04 04 58 50 CDR-LM Still 2 feet a second, Ken. We're about 1400 feet now.

04 04 59 08 CDR-LM Okay, and I show you with 4 milliradians to the north, and I see you're drifting slowly toward the ...

04 04 59 25 CDR-LM Okay, you're ...

04 04 59 36 CDR-LM Yeah, you're still 3 milliradians to the north.

04 04 59 53 CC Orion, this is Houston. We're showing about 10 minutes to LOS, and I have some words for you on our general plan when it's convenient.

04 05 00 06 CDR-LM Go ahead.

04 05 00 08 CC Okay. When you come up on AOS on the next rev, rev 15, we'll give you a GO or NO GO for another try, and we'd be looking at PDI on rev 16, and at that time, we'd have pads for you and procedures. Over.

04 05 00 29 CDR-LM Okay. Fair enough.

04 05 00 39 CC And, Casper; this is Houston.

04 05 00 46 CC Roger. We want you to verify that you're in auto DUMP on the water; that's PRESSURE RELIEF in the number 2 position. That's vertical. And if you have an opportunity to get away from the controls there, we'd like you to manually dump the water to 10 percent on the back side. That should require about 17 minutes. Over.

04 05 01 19 CC Okay. We copy.

04 05 01 27 CDR-LM Okay, Ken. The line-of-sight rate is starting to - Have to thrust down a little - I mean, up a little.

04 05 01 40 CDR-LM That fixed it.

04 05 01 52 CDR-LM Two feet a second. You have it. You're at a thousand feet now, approaching ... Don't worry about it.

04 05 02 41 CDR-LM You've got it.

04 05 02 51 CC Orion, this is Houston. We'd like you to configure for RCS Bravo only. Over.

04 05 02 58 LMP-LM Roger. We'll open the CROSS FEED and pull MAIN QUAD A.

04 05 03 12 LMP-LM We're configured.

04 05 04 15 CDR-LM Okay, about 990 feet now.

04 05 04 38 CDR-LM 970. ... the line-of-sight rate.

04 05 04 56 CDR-LM Can you see our light yet?

04 05 05 28 CDR-LM Okay, see if you've got it coming down ...
04 05 06 14 CDR-LM ...
04 05 06 30 CDR-LM ... you haven't rolled ... last ... Okay.
04 05 06 48 CDR-LM ... 800 more feet.
04 05 07 14 CDR-LM Yeah, they're about ...
04 05 08 29 CC All right, 16. This is Houston. We're showing about 2 minutes to LOS. Now, if you'll give us a range and range rate, and, Ken, perhaps you could repeat it for us.
04 05 08 43 CDR-LM Okay; 710 feet, closing at 2 feet a second. Rates ... are nulled.
04 05 09 14 CC Roger. We copy down here. Thank you.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 04 17 08 CMP Okay, Jim. To make sure there's no confusion, I haven't done anything yet.
04 04 17 18 CC Okay. Stand by.
04 04 17 23 CMP Thank you, sir.
04 04 17 46 CC Okay, Casper; this is Houston. We're convinced that we want you to fire directly at the LM at about 5 feet per second. We want to get a positive closing rate.
04 04 17 58 CMP Okay. That's in work.
04 04 19 38 CMP Okay. It looks like the DAP isn't stable now. How about if I give it a VERB 46?
04 04 19 45 CC Roger. We copy.
04 04 19 53 CMP Is that a good idea?
04 04 20 02 CC Ken, we show you in FREE.
04 04 20 06 CMP I am now, but I wasn't.

04 04 20 09 CC Okay.

04 04 20 11 CMP Does that mean I'm clear to do a VERB 46? Okay. Well, that still didn't work. I think maybe I've had one of those transients. For some reason, every time I pick up CMC AUTO, this thing starts doing maneuvers.

04 04 20 58 CC Orion, let's go LO BIT RATE.

04 04 21 12 CMP Okay. I've got it under control, Jim. I had a bad DAP.

04 04 22 00 CMP Okay; we'll ... 5 feet per second directly at the LM.

04 04 22 34 CC Casper, this is Houston. Hold up on that RCS maneuver.

04 04 22 37 CMP Okay. I've put in 3 feet per second.

04 04 22 38 CC Hold up, Ken.

04 04 22 47 CC Okay. Hold it there.

04 04 22 48 CMP ... Okay. Holding at 3.

04 04 24 10 CMP ... thrust down be towards the Moon or down as you see it? Okay, I guess I am. Houston, do you want me to go null line of sight all the way in?

04 04 24 25 CC We need a range and range rate reading now.

04 04 24 28 CMP ...

04 04 24 48 CC Roger; we copy.

04 04 24 49 CMP Roger, Charlie. I am standing by for instructions for best ...

04 04 25 05 CC Yes, Casper; this is Houston. You should null the line-of-sight rates.

04 04 25 13 CMP Okay, do you want me to keep them nulled and go all the way in? Is that the idea?

04 04 25 17 CC Roger. Keep a positive closing rate.

04 04 25 24 CMP Okay. It's likely to be expensive, but we'll do that.

04 04 25 30 CMP Okay, you're going to have to - Your needles are better than mine, why don't you tell me what to do there, John.

04 04 25 44 CMP Wilco. That's sure toward the Moon. That's affirm.

04 04 26 20 CMP How's that now? Okay, that's a good place to stop. Okay, I just need some gouges to when I got it nulled. How's that? Okay, what's my range rate? Okay, still - still going down?

04 04 27 35 CMP Okay.

04 04 27 55 CMP Looks to me now like I'm drifting the other way. Okay, I'll believe your needles.

04 04 28 25 CMP Range rate.

04 04 28 35 CMP Okay.

04 04 29 01 CMP Is the rate starting to build now? I'm trying to calibrate the dead band activity here so I can tell what the rate - when it's really a rate and when it's just dead banding. Okay, thank you.

04 04 29 47 CC Orion, request you select the SECONDARY TRANSMITTER and RECEIVER.

04 04 30 12 CMP Okay, Houston. Orion says that they have already selected the SECONDARY.

04 04 30 29 CC Read you loud and clear, Orion.

04 04 30 54 CC 16, no answers yet. We're still looking at it.

04 04 31 48 CMP Okay.

04 04 32 10 CC Okay, Orion. This is Houston. We'd like you to open the PRIMARY POWER AMP circuit breaker on 16.

04 04 32 25 CC Roger.

04 04 32 46 CC Okay, Orion, let's go HI BIT RATE.

04 04 32 54 CC Roger.

04 04 33 29 CMP Okay, let me try this.

04 04 33 32 CC Okay, we can't hold HI BIT RATE. Request you go back to LO BIT RATE, Orion.

04 04 33 38 CMP Is that the right direction?

04 04 33 51 CMP Okay, that's up for me - it looks like it ought to be down for you.

04 04 34 03 CMP Okay.

04 04 34 23 CC Orion, this is Houston. Can you give us a range and range rate read-out?

04 04 34 34 CC Roger. 4900 closing at 5.

04 04 35 00 CMP Okay. Man, this is expensive.

04 04 36 18 CMP Rates nulled again, John? Okay - They are going to keep building this way, and do we have some - some fuel point at which to cut off and switch over to LM power. Well, it's really showing, and I don't know how much more we're going to see on the way in and I'm reading - of course, these gages don't tell you exactly what it is, but I have - That's 65 percent showing on B. And all this stuff is going to be in the - in the ... Houston, you got any thoughts on a cut-off point on the RCS?

04 04 37 15 CC Stand by, Ken.

04 04 37 22 CMP Okay, hopefully, that's most of it.

04 04 37 54 CC Orion, this is Houston. Is the CSM above you or below you? We hope he's directly ahead.

04 04 38 11 CC 45 degrees above.

04 04 38 18 CC Roger.

04 04 38 34 CC Roger.

04 04 38 43 CMP And they look like they are killed completely on the optics too. Going to need your tracker light here in a minute. We're just getting a little glinted sunlight now.

04 04 39 00 CMP Okay. Thank you.

04 04 39 31 CMP Boy, those rates look steady as they can be.

04 04 39 51 CMP Okay, and since we are going to get rendezvoused in the dark - I guess we'll just come up alongside and hold stations.

04 04 40 09 CMP All right, sir.

04 04 40 57 CMP That's down to your right. Yes ... Yes, that's what I mean, you would thrust - you would thrust up. Okay. I think I got it killed again.

04 04 41 18 CMP What's the closure rate now? Three and a half feet per second. Okay, all I've got's the tracking light; I've lost the rest of your image.

04 04 41 58 CC Okay, Casper. This is Houston. You might pick up a temperature caution light on your quads, but it's of no consequence.

04 04 42 09 CMP Okay. Yes, I see B is up high. Is that due to the thruster activity?

04 04 42 14 CC Affirmative, Ken.

04 04 42 15 CMP Or is that due to heater fail-on?

04 04 42 19 CC I think it's thruster activity.

04 04 42 21 CMP Okay. Roger.

04 04 42 28 CC Orion, this is Houston. Will you give us another range and range rate, John?

04 04 42 39 CC Roger. 3100, or 3-1/2. Understand. 68 degrees.

04 04 43 49 CMP Okay. Let's watch that for a minute before I start working on it, because we haven't had any plane component before.

04 04 43 58 CMP How's the line-of-sight rate doing now? Holding? Okay, and range rate?

04 04 44 17 CMP Okay. Now we must be going in the right direction then. Yeah.

04 04 44 39 CMP Okay, I'll take some of that out. That means I go to the south, right?

04 04 44 49 CMP How's that? Right direction?

04 04 45 32 CMP Okay.

04 04 46 22 CMP Okay, it looks like I'm picking up a rate in the opposite direction in the - - the in-plane component. Okay. All right.

04 04 46 43 CMP This is very much like the simulator where, because of the dead band lags, it looks like it takes a long time to pick up one of those rates.

04 04 47 04 CC Orion, this is Houston. We want you to get the rendezvous radar and the tracking light off as soon as it's feasible, to conserve power.

04 04 47 21 CC Yes, we understand.

04 04 47 36 CMP Okay, it looks like I may be a little more to the south.

04 04 47 46 CMP Okay.

04 04 48 24 CMP How about that rate to the south? It looks like it's building again. Okay.

04 04 49 23 CMP Hey, I show quite a drift rate now, John. Do you still show no out of plane?

04 04 49 44 CMP Okay. It looks like it's pretty good bet. I'm going to take some of that out.

04 04 49 59 CMP Can you tell if I'm going to - maybe I put that in the wrong direction, although I'm sure that that was the right - South is to your left, isn't it? Okay, we're going the right way, then.

04 04 50 29 CMP John, we've been going the right direction all along, then.

04 04 50 34 CMP It appears to be I'm still a little bit out of plane. I guess that's the sensitivity of the rendezvous radar.

04 04 51 17 CMP Okay; how's my closure rate?

04 04 51 24 CMP Well, that's what I was just wondering. There could be a little more plus-X.

04 04 51 32 CMP Okay, I'm going to put in a foot plus-X. Okay? As long as we are using brute force, we might as well.

04 04 52 00 CMP Okay, that's about a foot.

04 04 52 22 CMP How about that?

04 04 52 56 CMP I can see the LM in earthshine now.

04 04 53 19 CMP Okay, what's my range rate now?

04 04 53 24 CMP Okay, give me another foot.

04 04 53 34 CMP Okay, there's another foot per second.

04 04 54 04 CMP I don't think those ... are as good as we're using them in here.

04 04 54 12 CMP It looks like I need to start reversing my in-plane direction.

04 04 54 20 CMP Okay, do I still have a positive closure rate?

04 04 54 27 CMP Okay.

04 04 55 42 CMP Okay, I'm getting you centered back up in the COAS.

04 04 56 13 CMP Okay, do you guys still have a closure rate? Do I still have a closure rate? Okay. Looks like the old EMS is just sort of sitting here looking at itself.

04 04 57 15 CMP Okay, I'm going to go ahead and use the EMS - I mean the COAS on the sync because that's working out pretty good in here. Seems to be a more sensitive indicator of out of plane.

04 04 57 51 CMP Okay. Just barely drifting in the COAS. It's pretty good here.

04 04 58 33 CMP Yes, sir, in earthshine I can see the whole LM now. I'm afraid we're going to run out of earthshine here before we get it completed. How's the closure rate now? Okay.

04 04 59 03 CMP Man, that Moon in earthshine is really something. -- Roger. I didn't quite get it stopped. That looks to me like that's fixed. You still show some residuals? Okay.

04 04 59 54 CC Orion, this is Houston. We're showing about 10 minutes to LOS, and I have some words for you on our general plan, when it's convenient. Okay, when you come up on AOS, on the next rev, rev 15, we'll give you a GO or NO GO for another try, and we'd be looking at PDI on rev 16. And at that time, we'd have pads for you and procedures. Over.

04 05 00 38 CC And, Casper; this is Houston.

04 05 00 43 CMP Go right ahead.

04 05 00 46 CC Roger. We want you to verify that you're in AUTO DUMP on the water. That's PRESSURE RELIEF in the number 2 position. That's vertical. And if you have an opportunity to get away from the controls there, we'd like you to manually dump the water to 10 percent on the back side. That should require about 17 minutes. Over.

04 05 01 08 CMP Okay. I am in AUTO DUMP and I'll have to wait until we get in daylight to go down there, I think.

04 05 01 19 CC Okay, we copy.

04 05 01 20 CMP I show about full, but I guess it isn't.

04 05 01 41 CMP Okay. How's my closure rate? Okay.

04 05 02 01 CMP How's the out of plane? All right.

04 05 02 50 CC Orion, this is Houston. We would like you to configure for RCS Bravo only. Over.

04 05 04 19 CMP All righty.

04 05 04 50 CMP No, that's what I was looking to see, because we're going to lose earthshine here in just a minute.

04 05 05 39 CMP Yeah, I'm not sure if that was the same ... you're talking about.

04 05 05 49 CMP Does that fix it? Right? It's really strange, it was sitting here in the COAS here, right in the middle.

04 05 06 18 CMP You're upside down compared to me, and when you say down you mean you're going - you're going down on me - is that correct?

04 05 06 52 CMP Okay. It still doesn't seem like it does much. Okay; I show a line-of-sight rate that's essentially killed.

04 05 08 04 CMP One-four. Yes, sir. How much? Okay, I can see your image is about 2 degrees, now.

04 05 08 29 CC 16, this is Houston. We're showing about 2 minutes to LOS, now, if you'll give us a range and range rate, and, Ken, perhaps you could repeat it for us.

04 05 08 47 CMP Did you copy that, Houston? The range is 710 feet, 2 feet per second, rates nulled. Houston, did you copy Casper?

04 05 09 12 CC Roger; we copied down here. Thank you.

04 05 09 19 CMP Okay.

04 05 09 36 CMP Uh huh. Let me turn my spotlight now.

04 05 09 54 CMP Yeah, I can tell I got you, but it's a poor competitor for earthshine.

04 05 10 03 CMP Beg your pardon. Roger. It will all of a sudden look very nice.

04 05 10 26 CMP

You can rendezvous under these conditions very nicely, the problem being that you've got to keep referring to the reticle to get some kind of range, because there's just no - you still don't have enough good depth perception to tell where you are.

04 05 10 47 CMP

Okay, in order to have good comm, - man, you just disappeared - got the spotlight on. I tell you, the spotlight isn't nearly as good as earthshine. I'm really surprised.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 05 45 XX BEGIN LUNAR REV 15

04 05 59 34 CC Orion, this is Houston.

04 05 59 36 CC Roger. I have some switches and circuit breakers we want you to take care of to try to improve the comm situation. I'll give them to you as soon as you're ready to copy.

04 05 59 47 LMP-LM Go ahead.

04 05 59 48 CC Okay, we want on panel 12, TRACK MODE switch, OFF; on panel 16, PRIMARY TRANSMITTER/RECEIVER circuit breaker, open; S-BAND ANTENNA HEATER circuit breaker, open; S-BAND ANTENNA COMM circuit breaker, open; and PRIMARY S-BAND POWER AMPLIFIER, open. Then on panel 11, AC BUS S-BAND ANTENNA, open. Over.

04 06 00 15 LMP-LM Okay. Turn off the TRACK MODE on 12 - TRACK MODE, OFF. Is that right, Jim?

04 06 00 35 CC That's right, TRACK MODE switch, OFF, on panel 12.

04 06 00 48 LMP-LM Okay, you'll have to find another name for that switch. Oh, okay, we got it.

04 06 00 56 CC It's been a long day. And did you copy those circuit breakers, Charlie?

04 06 01 07 CDR-LM Yeah, he's got them; we're getting them now.

04 06 01 10 CC Okay, and you do have a GO for another try here at PDI on rev 16. And I have some words on that problem with the TVC whenever y'all are ready to copy.

04 06 01 26 LMP-LM Well, I'm all ears, I don't know about Ken.

04 06 01 28 CDR-LM Go to it.

04 06 01 34 CC Okay. Orion can always tell Casper what his problem is, but it looks like an open circuit in the rate feedback and your servo loop. We've run exhaustive tests down here, on the west coast and east coast on controllability aspects and structural aspects,

and everything looks satisfactory. On Apollo 9, we ran - a similar test was run, as you probably remember. And if such a - such a problem did occur up there, you could expect oscillations, of course, with the gimbal, but you could expect a steady attitude, would be a limit cycle. So we're convinced down here that we have a satisfactory control mode if we have to revert to that one. Over.

04 06 02 27 LMP-LM Understand ...

04 06 02 38 CC Ken, I hope Casper copied.

04 06 02 41 LMP-LM Okay, Jim, one thing - -

04 06 03 02 CC That's affirmative, Ken.

04 06 03 32 CC Okay. The answer to that, Ken, is negative.

04 06 03 43 LMP-LM Jim, could you go through that switch list one more time - CB list one more time a little bit slower?

04 06 04 00 CC Okay, Charlie. On that circuit breaker list, on panel 16, it was PRIMARY TRANSMITTER and RECEIVER, S-BAND ANTENNA HEATER, S-BAND ANTENNA COMM, PRIMARY S-BAND POWER AMP. And then on panel 11, it was just one, AC BUS S-BAND ANTENNA. Over.

04 06 04 15 LMP-LM Okay. We got them all.

04 06 04 24 CC Okay, understand that's complete.

04 06 04 29 LMP-LM That is complete. Roger.

04 06 04 31 CC Okay. Let me give you some words on the general plan here in this rev. We want to get the pads up to you, then we'll up-link, and then we want you to do a P52 option 1. And then you'll pick up in the Timeline Book at circ.

04 06 04 51 LMP-LM Roger; copy.

04 06 04 54 CC And some more information, if you'd like to copy it; I have sunset at 102:35:50 and perform 400 plus 3 after the P52. And for the P52 use the same stars as the P52 in the Timeline Book. And, of course, after the up-links to you - VERB 47. Over.

04 06 05 24 LMP-LM Roger. We copy all of that. One thing - you want us to do option 3 before the option 1?

04 06 05 34 CC Negative; just the option 1.

04 06 05 40 LMP-LM Okay. Okay, we're ready to copy.

04 06 05 45 CC Okay. We're standing by for the pads.

04 06 05 57 LMP-LM And - -

04 06 05 58 CC Orion, will you turn S-BAND RANGING switch OFF?

04 06 06 06 LMP-LM RANGING is OFF.

04 06 06 08 CC Let's go HI BIT RATE.

04 06 06 16 LMP-LM You are HI BIT RATE. Is Casper going to get a little sep maneuver here?

04 06 06 21 CC Yes, we'll be giving that, and I have T_2 , T_3 aborts - pads, if you're ready to copy, Charlie.

04 06 06 33 LMP-LM Stand by. Okay. Go ahead.

04 06 06 36 CC Okay. Lima, 104:42:16.64; 111:03:30.0; T_2 at PDI plus 24 plus 54; and then T_3 , Nectar, 106:25:11.81. Over.

04 06 07 03 LMP-LM Roger. Say Lima and Mike again.

04 06 07 12 CC Okay. Lima is 104:42:16.64. Over.

04 06 07 21 LMP-LM Copy that. Also Mike.

04 06 07 26 CC Okay. Mike is 111:03:30.00. Over.

04 06 07 37 LMP-LM Okay. Copy T_2 would be PDI plus 24:54. And we have Lima, 104:42:16.64; 111:03:30.00; November, 106:25:17.81. Over.

04 06 07 54 CC Roger; on November there, it's - the seconds, 11.81. Over.

04 06 08 02 LMP-LM Copy, 11.

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04 06 08 06 CC And I have the PDI pad when you're ready.

04 06 08 12 LMP-LM Go ahead.

04 06 08 14 CC Okay, here's India first. 104:17:23.29; 11:04 plus 0003.6; 002, 114, 340; plus 56980. Juliett 107:05:45.00. Kilo, 109:04:30.00. Over.

04 06 09 04 LMP-LM Copy PDI pad. 104:17:23.29; 11:00 plus 0003.6; 002, 114, 340; plus 56980, 107:05:45.00; 109:04:30.00. Over.

04 06 09 26 CC Roger. And now I have the NO PDI PLUS 12. Orion, we've turned the biomed off.

04 06 09 46 LMP-LM Okay, go ahead. Okay, you got the old biomed off.

04 06 09 48 CC Okay. And here's NO PDI PLUS 12. 104:30: all zeros; plus 0102.3; plus all zeros; minus 0050.0; 0138.4, plus 0011.4, 0113.9; 0:35; all zeros, 271; 0870.0; plus 0102.6, all zeros, minus 0049.4; 105, 18, all zeros; 107, 05, 45.00. Throttle profile 10 percent for 26 seconds. Full throttle for remainder. Over.

04 06 10 56 LMP-LM Roger; copy. Give me the NOUN 42 begin. Over.

04 06 11 02 CC Roger. NOUN 42. 0138.4, plus 0011.4, 0113.9. Over.

04 06 11 14 LMP-LM Roger. Copy 104:30:00.00; plus 0102.3; plus all balls; minus 0050.0; 0138.4, plus 0011.4, 0113.9; 0:35; 000, 271; 0870.0; plus 0102.6, plus all balls, minus 0049.4; 105, 18, 00.00; 107, 05, 45.00. Over.

04 06 11 54 CC Good readback, Charlie. I have AGS abort constants when you're ready.

04 06 11 59 LMP-LM Stand by. Okay, I'm ready to copy.

04 06 12 08 CC Okay, Orion. We're going to hold up. We've got to get some high bit rates. Orion, select DOWN-VOICE BACKUP.

04 06 12 44 LMP-LM Houston, how do you read DOWNVOICE BACKUP? Over.

04 06 13 00 CC Orion, this is Houston. I read you very, very weak. We want you to go to POO and DATA. We're gonna send you some up-links, and we do not want you to transmit until the up-links are complete.

04 06 13 17 LMP-LM Understand. We have POO and DATA.

04 06 14 32 CC Orion, we want you to go to DOWNVOICE BACKUP.

04 06 17 16 CC Orion, this is Houston with the new sep pad and circ pad whenever you are ready.

04 06 17 25 LMP-LM Okay. We're still getting up-link.

04 06 17 31 CC Okay, no transmissions here.

04 06 17 41 CC You guys should maintain radio silence up there.

04 06 24 08 CC Okay, Orion. We have the up-links in, and I'm ready to give you the AGS abort constants.

04 06 24 17 LMP-LM Okay, stand by. Go ahead.

04 06 24 24 CC Okay, beginning with 224 plus 60529, plus 29402, plus 60406, plus 00572, minus 32664, minus 54401. And we want you to reload 373 with plus 08574 and change 254 to plus 08817. Over.

04 06 25 06 LMP-LM Okay, Jim. We copy starting with 224, 60529, 29402, 60406, 00572, 32664, 54401. Load 373 with plus 08574; 254 plus 08817. Over.

04 06 25 36 CC That's a good readback, and, of course, 662 and 673 are minus.

04 06 25 42 LMP-LM That's affirmative.

04 06 25 49 CC Okay, and I have the sep pad and circ pad if you're ready.

04 06 25 54 LMP-LM Go ahead.

04 06 26 07 CC Okay, sep pad is at 102.30, all zeros. And on this circ pad, ignition 103:21:42.43; NOUN 81 plus 0069.1, plus all zeros, minus 0043.5. Over.

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04 06 26 28 LMP-LM Okay. Hopefully, that's a sep pad. Ken got 103:21:43; plus 0006.9 - correction, plus 0069.1, minus all balls, minus 0043.5. Over.

04 06 26 50 CC Roger. That's the - the circ pad. The other - the first one was the sep pad.

04 06 26 57 LMP-LM Okay, just the T_{ig}. Okay, we're gonna get to work - start loading these AGS stuff.

04 06 27 05 CC Okay, and after you load those AGS abort constants, you'll be clean to pick up on the Timeline Book at the circ burn.

04 06 27 17 LMP-LM Roger. After the P52.

04 06 27 27 CDR-LM Ask them for a new DAP load or new DAP weight - it doesn't make any difference.

04 06 27 33 LMP-LM Why don't - why don't you do that, John, while I - -

04 06 27 35 CDR-LM Okay.

04 06 27 38 LMP-LM - - I think we're all right, but I got to load this stuff.

04 06 27 39 CDR-LM Houston, do we have a new LM DAP weight?

04 06 27 41 CC Stand by.

04 06 27 43 CDR-LM Or is that worth fooling with?

04 06 27 48 LMP-LM ... when we pitch up like this, I feel like I'm going backwards - in an orb or in an inertial pull.

04 06 28 06 CDR-LM Kind of got your ...

04 06 29 10 CC Orion, this is Houston. We'd like you to open AC BUS A TAPE RECORDER on panel 11.

04 06 29 17 CDR-LM Okay. It's coming open.

04 06 29 22 CC And I have a PIPA bias for you - -

04 06 29 23 CDR-LM Okay, it's open.

04 06 29 24 CC - - when you're ready to copy.

04 06 29 30 LMP-LM Stand by. Whew. Go ahead.

04 06 29 40 CC Okay. Address 1456. Data, 03141. Over.

04 06 29 54 LMP-LM Okay, 156. Say again the data.

04 06 29 56 CC 03141. Over.

04 06 30 04 LMP-LM Roger; 1456 address, 03141.

04 06 30 07 CC Good readback.

04 06 30 08 LMP-LM We're entering that now. VERB 21 NOUN 0 -
NOUN 01 ENTER, 1456 ENTER, load 0314 - 03141.

04 06 30 31 LMP-LM Good number, I guess, huh? ...

04 06 30 50 CC Orion, this is Houston. We'd like you to open the
UP DATA LINK circuit breaker on panel 11 and go to
NORMAL voice configuration.

04 06 31 01 LMP-LM Roger. DATA LINK.

04 06 31 28 LMP-LM Okay, Houston; Orion. How do you read NORMAL
voice? Over.

04 06 31 30 CC Very good. Much better, Charlie.

04 06 31 35 LMP-LM Okay.

04 06 31 42 CDR-LM Okay. Can you say something about our trajectory
now? Are we still 17,000 feet south and the same
as before?

04 06 31 51 CC Stand by, John. We'll have some words for you.

04 06 31 56 CDR-LM Okay.

04 06 32 07 CDR-LM And I assume you want to use both systems for PDI,
both RCSs.

04 06 32 13 CC We're still talking about that down here, John.

04 06 32 19 CDR-LM Okay.

04 06 32 45 CC Orion, this is Houston. At the present time, it
looks like you will be coming in 16,000 feet high
and about 20,000 feet south.

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04 06 32 54 CDR-LM Okay, understand. 16,000 high and 20,000 south.

04 06 33 01 CC Roger.

04 06 33 04 LMP-LM Jim, John and I are just laughing. We'd like to go back to the sims, please.

04 06 33 14 CC So would we.

04 06 33 21 LMP-LM Glad you turned the biomed off.

04 06 33 42 CDR-LM Houston, okay to do that P52 now?

04 06 33 54 CDR-LM Houston, are we clear to do the P52 now?

04 06 33 59 CC Roger; as soon as you're in darkness, John. Well, just an advisory, it's option 1.

04 06 34 05 CDR-LM Understand. Option 1 and we're going to gyro torque it.

04 06 34 12 CC Roger.

04 06 39 06 LMP-LM Jim, entered the P52. We've got you on the AFT omni now.

04 06 39 09 CC Roger. We copy.

04 06 39 19 LMP-LM That new REFSMMAT was pretty close to the old one - just a couple of degrees, right?

04 06 39 22 CC Affirmative.

04 06 39 32 LMP-LM Man, when those jets turn on, Jim, nobody had ever commented before, but it really horses this old thing around.

04 06 39 40 CC Roger.

04 06 39 59 CC Okay. Orion, this is Houston. We have another procedure we wanted you to try for the comm problem.

04 06 40 07 LMP-LM Go ahead.

04 06 40 08 CC Okay, we want you to open the SECONDARY POWER AMPs circuit breaker on panel 11. And, of course, you'll lose comm when you open that; and then after 1 minute, close it, and then we'll reestablish comm.

04 06 40 28 LMP-LM Roger; copy. We'll do that after John finishes marking.

04 06 40 37 CC Okay.

04 06 43 47 CC Orion, this is Houston. How do you read me?

04 06 43 51 LMP-LM Loud and clear.

04 06 43 55 CC Oh, you're loud and clear too.

04 06 44 02 CC Roger; could you give us the - your NOUN 93s? We'd - had lost data at that point.

04 06 44 10 LMP-LM Yeah, sorry about that, Jim. Here they are: the star angle difference was 4 balls 1, minus 4 balls 1; our torque angles were minus 0.067, plus 0.108, plus 0.050; torqued at 104:42:25.

04 06 44 31 CC Roger. Copied down to NOUN 93 is minus 0.067 plus, 0.108, plus 0.050. Over.

04 06 44 42 LMP-LM That's affirmative.

04 06 45 30 CDR-LM Hey, Houston, I don't know where Ken is at this point when we missed up into our P52. I trust he is still keeping an eye on us.

04 06 45 40 CC I hope so too.

04 06 45 41 CDR-LM Hey, Ken.

04 06 46 20 CC And, Orion; this is Houston. Just a reminder on the 400 plus 3, and a VERB 47.

04 06 46 31 LMP-LM Roger; we already did that.

04 06 46 33 CC Okay; very good.

04 06 47 14 CC Charlie, this is Houston. Could you put your mike a little closer? Your volume seems to be a little lower than - than John's.

04 06 47 26 LMP-LM Okay; how's that?

04 06 47 28 CC That's better.

04 06 47 32 LMP-LM Okay; I had one of them up. Every time I turn my head I get orange juice.

04 06 47 39 CC Roger.

04 06 47 50 LMP-LM It's delicious, Jim, but it's better in your mouth than floating around the cockpit.

04 06 47 55 CC I know what you mean. I wish I had some.

04 06 48 00 LMP-LM As a matter of fact, I've already had an orange shampoo with the helmet on.

04 06 48 09 CC I guess that's better than no shampoo.

04 06 48 15 LMP-LM Yeah, I think you're right. Jim, we were really impressed with that landing site from 10 miles, anyway, it sure looks exactly like the LMA.

04 06 48 32 CC Okay, Charlie. We're kind of curious about the orange juice problem. Did you have a - a bag failure?

04 06 48 39 LMP-LM Well, I think it must be the valve. The command module water had a lot of air bubbles in it and when I - of course, when I put my suit on, it sort of compressed everything. And every time my mike comes by and grabs the - the valve, it bends it down just slightly, which is - which is enough to cause some to squirt out due to the pressure from the suit. Over.

04 06 49 04 CC We copy.

04 06 49 10 CDR-LM I have the same problem all the time in one g.

04 06 49 15 LMP-LM Yeah, at one g though, you bend over and it's on your visor and you can lick it off.

04 06 49 59 LMP-LM Casper, Orion transmitting VHF A SIMPLEX. How do you read?

04 06 50 09 CC Charlie, this is Houston. We're kind of concerned about how much - -

04 06 50 11 LMP-LM Casper, Orion - -

04 06 50 13 CC - - orange juice might have spilled out. We're concerned about the amount that might have got in the suit loop and its effect on the LiOH canister.

04 06 50 25 LMP-LM Jim, most of it, for some reason floated up under my helmet - I mean my Snoopy hat, and I'm pretty sticky around the temples and all; and I don't think anything - most of it stuck right in my helmet. And the suit loop flow is not enough to drive it down under - into the suit. And I don't feel like I'm wet at all down in that area. Over.

04 06 50 49 CC Okay; thank you, Charlie.

04 06 51 03 CDR-LM Yeah, I don't - I don't think there is any of it in the suit loop to amount to anything. Looking at Charlie, I can tell where most of it is.

04 06 51 27 LMP-LM Yes, Ken, I was just seeing how you read. We're all set to go for your circ. Okay, what kind of sep maneuver did you do? All right, thank you.

04 06 51 55 CC Orion, let's try BIOMED, LEFT.

04 06 52 04 LMP-LM Okay, you got John's arrhythmia.

04 06 52 05 CC Roger.

04 06 52 53 LMP-LM Houston, Orion. I'd like to confirm that in system A we have enough ullage volume to get all the propellants out of the tank. Over.

04 06 53 02 CC That's not correct, Charlie, we'll give you the exact number here shortly.

04 06 53 12 LMP-LM Okay, we're still looking at 2000 - about 2100 psi on the helium.

04 06 54 37 CC Orion, this - this is Houston. In answer to your question, Charlie. If you were to lose source pressure right now, you could get 35 percent out.

04 06 54 50 LMP-LM Okay; well, we only have 50 - 50 percent remaining.

04 06 54 55 CC Understand. And that 35 percent is enough to complete this mission.

04 06 55 02 LMP-LM Okay. If we could - Do we have a double failure here on the two regs and that loop?

04 06 55 07 CC That's affirmative.

04 06 55 14 LMP-LM Okay. So what's holding us is that check valve that unseats at 2 - about 225 and reseats at 212?

04 06 55 25 CC That's correct, Charlie. And really you have - should have about 60 percent in that system. Your gage has an error in it.

04 06 55 35 LMP-LM We copy. Roger; we copy.

04 07 01 26 LMP-LM Houston, Orion.

04 07 01 27 CC Go ahead, Orion.

04 07 01 31 LMP-LM Roger, Jim. We watched Ken's waste water dump, and I can see why that thing really gives FDO fits. It really comes out of there like a water hose.

04 07 01 44 CC Okay; we copy.

04 07 01 45 LMP-LM And we took a picture of it, or two, and I hope they come out and show you that. We had pretty good lighting.

04 07 01 54 CC Good; we hope you have some good pictures of it. And we're showing about 2 minutes and a half to LOS.

04 07 02 03 LMP-LM Roger; AOS time, please.

04 07 02 06 CC Stand by.

04 07 02 23 CC AOS for rev 16 is 103:51:25.

04 07 02 27 LMP-LM Roger.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 05 59 14 CC Pull the plug.

04 05 59 22 CDR-LM We got AOS. Let's wait.

04 05 59 28 CC Orion, this is Houston.

04 05 59 30 CDR-LM Hello, Houston.

04 05 59 31 CC Roger. I have some switches and circuit breakers we want you to take care of to try to improve the comm situation. I'll give them to you as soon as you're ready to copy.

04 05 59 48 CC Okay, we want on panel 12, TRACK MODE switch OFF; on panel 16, PRIMARY TRANSMITTER/RECEIVER circuit breaker, open; S-BAND ANTENNA HEATER CIRCUIT breaker, open; S-BAND ANTENNA COMM circuit breaker, open; and PRIMARY S-BAND POWER AMPLIFIER, open. Then on panel 11, AC BUS S-BAND ANTENNA, open. Over.

04 06 00 36 CC That's right, TRACK MODE switch, OFF, on panel 12.

04 06 00 56 CC It's been a long day. And did you copy those circuit breakers, Charlie? Okay; and you do have a GO for another try here at PDI on rev 16. And I have some words on that problem with the TVC whenever y'all are ready to copy.

04 06 01 31 CDR-LM I've got my pencil ready.

04 06 01 36 CC Okay, Orion can always tell Casper what his problem is, but it looks like an open circuit in the rate feedback and your servo loop. We've run exhaustive tests down here on the west coast and east coast on controllability aspects and structural aspects, and everything looks satisfactory. On Apollo 9, we ran - a similar test was run, as you probably remember. And if such a - such a problem did occur up there, you could expect oscillations, of course, with the gimbal, but you could expect a steady attitude. It would be a limit cycle. So we're convinced down here that we have a satisfactory control mode if we have to revert to that one. Over.

04 06 02 38 CC And I hope Casper copied.

04 06 02 42 CMP Okay, Casper copied that. I - I guess I'd like to know, is that thing going to diverge up to a point and then cease to diverge? Does it become neutrally stable at some - some amplitude, Jim?

04 06 03 02 CC That's affirmative, Ken.

04 06 03 07 CMP Okay, that must be some number bigger than the one I looked at, and the other question - only other question I had is: "Is there any connection between this, in your mind, and the - and the longer duration gimbal ON times?"

04 06 03 31 CC Okay, the answer to that, Ken, is negative.

04 06 03 38 CMP Okay, sounds good. Thank you.

04 06 04 04 CC Casper, Houston. We're on two loops now.

04 06 04 13 CMP Okay, Henry. Thank you.

04 06 04 16 CC Hey, Ken, I've got a couple other words about that if you'd like to listen.

04 06 04 26 CMP I surely would, Stu.

04 06 04 27 CC Okay. Most of the cases where they appeared to be diverging to you and you shut it off the motor, would short, and some of them was just very close to the point at which it became stable. And on some of the - the longer ones, we did see the stability, but those that you called as diverging were short of reaching this stable point. It appears that the controllability is not going to be any problem when - If you would have to burn with this, according to the stroking tests on 9, you'll get a lot of - of oscillations and you'll feel the spacecraft shaking, but the attitude will not be changing. You'll probably see the rate needles moving around a little bit. And just for your info also, most probably do the burns with the 90 degree roll, so we'll have a - so we'll have the redundancy in the - in the yaw axis platform consideration.

04 06 05 43 CMP That sounds like a good plan. Now, I guess if I'd have been a little smarter, we'd have pressed on on schedule.

04 06 05 49 CC No, I don't think so, Ken. They - they appeared to be diverging and it was a - it was a true divergence as far as you could tell. It - it was just, in most cases, just short of becoming stable.

04 06 06 09 CMP Okay, I tell you - you know the difference in this and the simulator, where you can really feel it move, and this old dog was really wagging its tail.

04 06 06 14 CC Yes. You know, Jim was talking about the Apollo 9 test, and he said that - that they really - you really feel it in the spacecraft. But this thing is stable. They have - they've really checked that out, and it'll rattle and roll a little bit, if you have to use it, but it's stable.

04 06 06 37 CMP Sounds good. Once again, the ground earns their pay.

04 06 06 56 CMP Okay, Hank, I guess I'm in need of a general outline of where we intercept the Flight Plan. And it looks like one of the things I'll be needing is a - some kind of a separation burn from Orion again, so that I'm not setting here blasting it into his face. And then I'll need a certain burn pad. And after that, I'll - I guess we just sort of stumble along and try to pick up some landmark tracking and things like that.

04 06 07 27 CC Okay - -

04 06 07 28 CMP My fuel is kind of low.

04 06 07 33 CC Okay, of course, as you know, we're working the Flight Plan now, and Hank's got the - the pads for you. And I just wanted to make one other comment now. Do you have any other questions - do you have any reservations about this duty, because we sure want to get - get your concurrence? But everything looks like it's - it's go.

04 06 07 58 CMP Okay. Did somebody fly one of these in the CMS?

04 06 08 02 CC Well, it's been flown on the hardware evaluator.
But - -

04 06 08 11 CMP Okay, I just want to get - if anyone's - -

04 06 08 13 CC Yeah.

04 06 08 14 CMP - - run one of these things in the manual MFVC or
something like that.

04 06 08 22 CC Okay, yeah. They - it's been flown in all three -
three modes, Ken, G&N, SCS AUTO and MFVC. It's
also been flown on the - -

04 06 08 35 CMP Roger.

04 06 08 36 CC - - on the hardware evaluator, and - and, of course,
we did have the stroking test on Apollo 9, where
it was flown in front, and pretty much duplicated
this exact problem as far as cycles per second,
so forth.

04 06 08 55 CMP All right, sir. I'm happy.

04 06 08 59 CC Very good. And Hank's got some good words here for
you here.

04 06 09 06 CC Okay, Ken. I have your - -

04 06 09 07 CMP Thank you very much.

04 06 09 08 CC - - sep pad for you. You'll use normal sep pro-
cedures. In other words, you'll be below the LM,
facing it, and back away with your minus-X
thrusters. I'll read you your new pad, if you're
ready to copy.

04 06 09 23 CMP Okay, just a second. I got my pad book handy.

04 06 09 47 CMP Okay, I'm ready for a little sep pad.

04 06 09 57 CC Roger. NOUN 33, 102:30, all zip; attitude
000, 357, 000.

04 06 10 10 CMP Okay, this is sep. That's at 102:30:00;
attitude 000, 357, and 000.

04 06 10 22 CC Good readback, Ken.

04 06 10 24 CMP And this is to be a - a 1-foot-per-second radial inward.

04 06 10 33 CC That's affirmative.

04 06 10 47 CMP Okay.

04 06 11 05 CC And I have your circ pad for you now, Ken, if you're ready to copy.

04 06 11 17 CMP Okay, go ahead.

04 06 11 18 CC Roger. Circ, SPS/G&N; 39095; plus 0.49, plus 1.19; 103:21:42.43; NOUN 81, plus 0069.1, all zips, minus 0043.5; 000, 139, 358; 0068.0, plus 0053.1; 0081.6, 0:05, 0070.1. The rest is NA. Sirius and Rigel; 131, 071, 014. Two jets; 16 seconds; quads Alfa and Charlie. And in comments: manually roll 90 degrees from pad attitude for burn, except the final attitude and trim in P40.

04 06 13 08 CMP Okay. Let me ask one question before I read it back. I assume that I would be outsmarting myself if I went through the 90-degree roll in the VERB 49 maneuver rather than going to zero roll. I'm looking for ways to kind of be stingy with the RCS.

04 06 13 32 CC Stand by 1.

04 06 13 37 CMP Let me read you the pad back now and then ask you the questions, Hank.

04 06 13 40 CC Okay.

04 06 13 44 CMP Okay, it's circ, SPS/G&N; 39095; plus 0.49, plus 1.19; 103:21:42.43; plus 0069.1, all zips; minus 0043.5, 000, 139, 358; 0068.0, plus 0053.1; 0081.6, 0:05, 0070.1. Sirius and Rigel; 131, 071, 014. Two jets, 16 seconds; quads Alfa and Charlie. Manually roll 90 degrees for burns.

04 06 14 35 CC Good readback, Ken.

04 06 15 27 CMP And would you like for me to go to A/C ROLL for the normal roll coming up to control?

04 06 15 33 CC Ken, there's too much noise. Can you say it again.

04 06 15 39 CMP Would you like for me to go to A/C ROLL for normal roll control also?

04 06 15 43 CC Stand by. That's affirmative, Ken. Go to A/C ROLL.

04 06 15 54 CMP Okay.

04 06 16 11 CC Ken, we're trying to work in a P52 here, and we're checking that attitude, and then we'll give you what we think is best as far as that maneuver.

04 06 16 22 CMP Okay.

04 06 17 20 MCC Hey, tell him not to talk now, because they're hitting the data then every time now in DOWNVOICE BACKUP.

04 06 18 41 CC Casper, Houston. Between now and sep we're not going to do anything. In the meantime, FAO is working on a - whether the burn attitude is going to be good for your P52 or not. So just go ahead, get sep out of the way and we'll have some words for you then.

04 06 18 59 CMP Okay, looks like I could use a new state vector, too.

04 06 19 04 CC Roger. They are working on the vectors now.

04 06 19 10 CMP Okay, will it do me any good to load - Yeah, I can go ahead and load this thing and let them put in a new vector later. Is that correct?

04 06 19 19 CC Say again.

04 06 19 23 CMP Is it okay to go ahead and load P30 and then put in a new vector afterwards, or is it best to wait until I get the vectors in?

04 06 19 31 CC Stand by a minute, Ken.

04 06 19 42 CC Ken, go ahead and sep. We'll up-link after sep.

04 06 19 47 CMP Okay, thank you.

04 06 20 57 CMP How about if I do this 90 degrees to that attitude to save - save the maneuver. I'll have to go pretty fast to get there.

04 06 21 08 CC I guess I didn't understand your question, Ken.

04 06 21 09 CMP I'm almost 90 degrees to that attitude and I could do it. Instead of pointing and doing it along the X-axis, suppose I come down and do this 90 degrees out and do it with the B/D thruster? Put in that 1 foot per second?

04 06 21 29 CC Stand by, Ken.

04 06 21 32 CMP That'd get me a - a pitch attitude of 085 - or 087, excuse me.

04 06 23 26 CC Okay. Now, he loaded - he loaded his P30 and you're looking at - -

04 06 23 50 CMP Stu, you were on air to ground. I've loaded P30, and I have flown to 90 degrees from the attitude in order to save that extra high-speed maneuver to get there. And I'm going to burn it along the Z-axis. It'll be towards the Moon, which is our check, and I'll take it from 1 foot per second to 2 foot per second as per the normal procedures, except I'll be using the Z-translation.

04 06 24 26 CC Okay, Ken. We concur as long as it's 1-foot down radial.

04 06 24 31 CMP Okay, it'll be 1 foot towards the Moon, and we'll still count from 1 to 2 foot per second on the NOUN 85.

04 06 24 40 CC Roger.

04 06 26 15 CC Casper, you a GO for sep.

04 06 26 25 CMP Okay; go for sep. Thank you, sir.

04 06 27 27 CC Just to clarify, Ken. You're going to burn the NOUN 85 to zero.

04 06 27 36 CMP Negative; the NOUN 85 will go to plus 2. It was loaded so that it would point you in the other

direction, and by taking it this way, I'll - the dummy load we put in was a - a minus, and we normally burned it to a plus 2. I'm going to burn towards the Moon, which is going to make this come out to be plus 2.

04 06 28 37 CMP We originally put in a vector. We wanted to burn radially inward, and we put in a vector that was - would cause you to point radially outward on the calculations and then we just burned it to a larger number. So P40 wouldn't - wouldn't cause you to turn around and point 180 from where you were when you undock.

04 06 28 58 CC Roger; copy.

04 06 29 03 CMP Do you have any reservations?

04 06 29 07 CC Long as you get a foot toward the Moon.

04 06 29 12 CMP Okay. We can do that.

04 06 29 33 CMP Okay. Inside of 30 seconds.

04 06 30 38 CMP Okay; how's that?

04 06 30 48 CC Looks okay, Ken.

04 06 32 43 CC Casper, Houston. If you'll give us ACCEPT, we'll up-link.

04 06 32 50 CMP You have it.

04 06 32 59 CC And, Casper, when you get through with the up-link, we want to go to an attitude of 000, 060, 000 and do a P52.

04 06 33 17 CMP Okay, 000, 060, and 000 and a P52, option 3. And I take it that I should enter 509 just before the P52, and leave it in until after the gimbal drive check in P40. The same procedure we had last time. Is that affirmative?

04 06 33 40 CC That's affirmative.

04 06 33 44 CMP All righty.

04 06 36 31 CC Casper, the computers are yours.

04 06 36 38 CMP Thank you.

04 06 37 46 CC Casper, Houston. We're trying to troubleshoot the LM communications problems and it will help if you go to omni Alfa.

04 06 45 30 CC Casper, we have a NOUN 93.

04 06 45 39 CMP Okay.

04 06 45 41 CC And, Ken, what we would like for you to do is pick up in the Flight Plan at 97:07, and with the circ preps, and just step on through that, procedure-wise, and be sure you do the VERB 49 after the circ. I have a change in your pad attitude - -

04 06 46 02 CMP You said VERB 49, what first to take?

04 06 46 06 CC Roger. Right after the circ burn, want to be sure you do the VERB 49. And, to get it into the landmark tracking attitude, we're going to do the high-altitude landmark tracking. And we've got a change to your pad attitude for your circ. We're going to go ahead and give you an attitude that has the 90 degrees in it, so the VERB 49 will be more efficient. And the new attitude is 090, 139, 358.

04 06 46 39 CMP Okay; 090, 139, and 358. I'm on my way now. And I'll get myself into the proper tracking attitude if we don't get all those things worked out.

04 06 46 50 CC Roger. And we want to make sure you don't bypass the final trim in P40, in that attitude.

04 06 46 59 CMP That's affirmative. I will take the final trim.

04 06 47 03 CC Roger. And somewhere in here I need to give you the new abort pads, whenever you can get the chance to copy them.

04 06 47 10 CMP Okay. Let me get the maneuvers started, and let me get myself squared away and get the time line in my head and then I'll give you a call.

04 06 47 16 CC Okay; whenever you're ready.

04 06 48 32 CMP Okay, Hank; and one question that comes to my mind is, do you want the secondary yaw gimbal brought on the line or not?

04 06 48 47 CC Stand by, Ken. I'll get you an answer on that one.

04 06 49 18 CC Okay, Ken, what we'd like for you to do is leave the secondary gimbal motors off until you have finished the gimbal drive check, then bring the secondary gimbal motors on, and do a normal burn. And if you have to, go ahead and down grade, down mode, if you have to to arrest some kind of a bad rate or something.

04 06 49 42 CMP Okay. I'll not do - I'll do the gimbal drive check with the secondary in pitch - unless - Are they in the same package? It seems like they're in separate packages. The secondary in yaw is the one I'll bring on after the gimbal drive check.

04 06 49 59 CC That's okay, Ken.

04 06 50 01 CMP Or would you rather just not exercise it. It's macht's nicht to me.

04 06 50 09 CC It's your druthers, Ken. If you want to do it that way, that's fine.

04 06 50 19 CMP Okay. It'll just verify that I've got everything else hooked up properly. I'd like to keep as close to the normal procedures as I can. Hey, you did copy the P52 things?

04 06 50 31 CC Roger. It looked good. And Orion's trying to call you on VHF.

04 06 50 38 CMP Okay, I had turned them off while we were doing our chatter. Let me get to them.

04 06 50 44 CMP Orion, Casper.

04 06 51 25 CMP Orion, did you call Casper?

04 06 51 33 CMP Okay. We'll give it a try again. I did a 1-foot-per-second radial in towards the Moon.

04 06 52 29 CC And, Ker; in addition to the pads, I also have you LOS and AOS time.

04 06 52 45 CMP Okay.

04 06 53 47 CC Casper, Houston. How do you read?

04 06 53 52 CMP Loud and clear.

04 06 53 53 CC Okay, we lost you there a minute.

04 06 53 59 CMP Okay. Do you want another omni?

04 06 54 04 CC Stand by.

04 06 54 59 CC Casper, Houston. We're about 9 minutes from LOS, and I sure would like to get these pads up whenever you get a chance.

04 06 55 09 CMP Okay. Can I catch them when we get AOS, Hank? These are all the abort pads, right.

04 06 55 17 CC Okay. And - but let me give you the LOS and AOS.

04 06 55 24 CMP Okay; go ahead.

04 06 55 25 CC Roger. LOS is 103:04:51; AOS, 103:51:25. Are you interested in sunrise?

04 06 55 42 CMP No, sir. That's all right, thank you. Yeah, let me concentrate on making sure that it all goes well in time, Hank. And I'll pick up those abort pads at AOS.

04 06 55 52 CC Roger.

04 06 56 03 CC Omni Delta, 16, or Casper.

04 06 57 43 CMP And, Houston; Casper.

04 06 57 49 CC Go ahead.

04 06 57 55 CMP One thing on the plus side, Hank, is Charlie took a look at the mass spec and says that it's all inside and buttoned up.

04 06 58 05 CC He said the mass spec is all inside and buttoned up?

04 06 58 11 CMP Yes, sir.

04 06 58 12 CC Okay. I'll relay that.

04 06 58 26 CMP Okay; and I took the trim maneuver in P40 and it put that bias to attitude B, 90 degrees roll, 139 pitch, and 1.7 in yaw, and that's about right, considering the roll.

04 06 58 44 CC Roger.

04 07 01 54 CC Casper, Houston.

04 07 01 58 CMP Go ahead.

04 07 02 00 CC Roger. You have a GO for circ, and when you come up on - at AOS next time we'd like you to come up in the landmark tracking attitude that is giving us 98.22. That's a little different from the VERB 49 maneuver that's called out right after the circ burn. It's different in roll. In fact, you should be in attitude 000, 276, 000. And we want you to do your VERB 49 to that attitude: 000, 276, 000, rather than a roll of 060 as it calls for there right after the circ burn.

04 07 02 41 CMP Okay. I'll pick you up on the best antenna.

04 07 02 46 CC Roger. Omni D, Omni Delta.

04 07 02 51 CMP Okay, thank you, Hank.

04 07 02 58 CC Ken, we'd like to know if you did a purge when you did the waste water dump.

04 07 03 05 CMP A purge? A fuel cell purge? No, sir.

04 07 03 10 CC Okay, copy. You didn't purge fuel cells.

04 07 03 15 CMP No, that's correct.

04 07 04 29 CC Ken, if you can work it in, don't jeopardize the burn. Maybe after the burn you can get a urine dump and purge on all those things so we can get the sim bay going later. That's okay, but if you can't work it in, don't - don't jeopardize anything.

04 07 04 47 CMP Okay, I'll get you a purge in there, anyhow.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 07 45 XX BEGIN LUNAR REV 16

04 07 53 15 CDR-LM Hello, Houston; 16 here.

04 07 53 17 CC Orion, this is Houston. How do you read?

04 07 53 23 CDR-LM Loud and clear, Jim.

04 07 53 25 CC Okay. I have a couple of comm procedures for
you - -

04 07 53 27 CDR-LM Okay. Jim, I - -

04 07 53 29 CC - - on panel 12, will you get the FUNCTION switch
to RANGE; and on panel 11, UPDATA LINK circuit
breaker closed.

04 07 53 41 CDR-LM UPDATA LINK is closed, FUNCTION switch to RANGE.

04 07 53 45 CC Roger. And I'm standing by for your report.

04 07 53 49 LMP-LM And, Jim - Okay, we got the ascent bats on at 103:42.
The ED bats are go at 37 volts.

04 07 53 58 CC Roger; copy. The ascent bats 103:42, and ED bats
are good. And I have a PDI ephem update - -

04 07 54 07 CDR-LM And we were on inverter 2 for a while.

04 07 54 12 CC Copied. You were on inverter 2.

04 07 54 13 LMP-LM Go ahead.

04 07 54 14 CDR-LM Go ahead.

04 07 54 15 CC Okay - -

04 07 54 16 CDR-LM Just for a little while.

04 07 54 17 CC - - India, 104:17:24.66; DEDA 231, plus 56990.
Over.

04 07 54 34 LMP-LM Copy. 104:17:24.66; plus 56990, for 231.

04 07 54 42 CC Good roadback.

04 07 54 54 LMP-LM hey. Was that 56991 or 0, Jim?

04 07 54 58 CC 56990.

04 07 55 02 LMP-LM Okay.

04 07 55 15 LMP-LM Do we have an up-link, Jim?

04 07 55 19 CC Roger. If - You have POO. If you go to DATA, we'll send you some up-links'.

04 07 55 27 LMP-LM Okay. You have it, POO and DATA.

04 07 55 29 CC Okay. They're on their way.

04 07 56 23 CC And, Orion, this is Houston with a few words for you on RCS ignition.

04 07 56 33 CDR-LM Okay. Go ahead.

04 07 56 35 CC Roger. John, you can anticipate a slight roll transient at ignition because of c.g. position; and, on the RCS, of course, we'll want normal configuration. And your RCS quantity system A is off because of the high pressure in that system. It's off by about 13 percent.

04 07 56 56 CDR-LM Okay.

04 07 56 57 CC In other words, you have 13 percent more than indicated.

04 07 57 01 CDR-LM Understand.

04 07 57 33 CC Orion, do you have a VERB 33 on the DSKY?

04 07 57 38 CDR-LM That's affirmative.

04 07 57 40 CC Okay. Let's do an ENTER on that.

04 07 57 49 CC We've lost high bit rate. We have one more - -

04 07 57 50 CDR-LM VERB 33 entered.

04 07 57 52 CC - - one more up-link to send.

04 07 57 57 CDR-LM Okay.

04 07 59 24 CC Orion, will you turn the FUNCTION switch OFF?

04 07 59 32 CDR-LM FUNCTION is OFF.

04 07 59 33 CC Roger.

04 07 59 36 LMP-LM Which one, Jim?

04 07 59 37 CC That's the S-BAND FUNCTIONS.

04 07 59 44 LMP-LM All of them?

04 07 59 46 CC Oh, negative. The one - the RANGING switch.

04 07 59 51 LMP-LM Okay. It's going OFF.

04 08 00 18 CC Orion, this is Houston. We want BATTERY 3 OFF
now - -

04 08 00 24 CDR-LM Roger.

04 08 00 25 LMP-LM Roger.

04 08 00 26 CC - - to put a little more load on the ascent bats.

04 08 00 34 LMP-LM Roger. BATTERY 3 is OFF.

04 08 00 37 CC Roger.

04 08 01 42 LMP-LM Jim, could we yaw right a little bit and point
that omni right at you, would that help?

04 08 01 48 CC Stand by.

04 08 03 07 LMP-LM Okay. Any words on that up-link, Jim?

04 08 03 10 CC Why don't you put in that yaw maneuver; yaw right
20 degrees, that might help.

04 08 03 19 LMP-LM Roger.

04 08 03 32 CDR-LM Here's yaw right 20.

04 08 03 34 CC Roger.

04 08 03 35 LMP-LM Okay. And how about reading that up to me, and I'll copy it down.

04 08 03 38 CC Looks like we're getting good data now, Charlie. Stand by. We're up-linking now.

04 08 04 25 LMP-LM Okay, Jim. I think we'll start the - John says we'll start the PDI from zero yaw since the omni is pointing right at you. That be better for you?

04 08 04 35 CC Stand by.

04 08 04 39 CC Okay, Orion. We're finished with your computer.

04 08 04 47 LMP-LM Okay.

04 08 05 19 CC Okay, Orion. This is Houston. That zero yaw looks okay.

04 08 05 25 LMP-LM All right. Fine, thank you.

04 08 06 48 LMP-LM Can call P63, John. How do you read us VOX, Jim?

04 08 06 52 CC Loud and clear.

04 08 06 55 CDR-LM Read loud and clear on VOX. Okay?

04 08 06 58 CC Yes, sir, John. You're loud and clear.

04 08 07 04 CDR-LM Ten minutes.

04 08 07 07 LMP-LM Okay. Let's check the DPS configuration card. CB(11): DECA GIMBAL AC - closed.

04 08 07 13 CDR-LM It's closed, and DECA POWER's closed.

04 08 07 16 LMP-LM CB(16): DISPLAY/ENGINE OVERRIDE - LOGIC, closed.

04 08 07 19 CDR-LM SCS? Yeah, go.

04 08 07 20 LMP-LM STAB/CONTROL, all closed except the AEA.

04 08 07 22 CDR-LM All closed except the AEA.

04 08 07 24 LMP-LM Okay, 25 degrees a second.

04 08 07 26 CDR-LM 25 degrees a second.

04 08 07 27 LMP-LM THROTTLE CONTROL - AUTO/COMMANDER.

04 08 07 29 CDR-LM AUTO/COMMANDER.

04 08 07 30 LMP-LM ATT/TRANSLATION of 4 JETS.

04 08 07 31 CDR-LM 4 JETS. Balance COUPLE - ON. ENGINE GIMBAL, ENABLE.
DESCENT ENGINE COMMAND OVERRIDE, OFF.

04 08 07 35 LMP-LM OFF. Go.

04 08 07 37 CDR-LM ABORT/ABORT STAGE, reset. DEAD BAND, MIN. ATTITUDE
CONTROL, three, to MODE CONTROL. PGNS, AGS - AUTO.

04 08 07 43 LMP-LM Go.

04 08 07 44 CDR-LM Okay.

04 08 07 45 LMP-LM PRO.

04 08 07 46 CDR-LM On HI MULT, LANDING RADAR/COMPUTER; MONITOR, the
PGNS. PGNS - GUIDANCE; AGS - MODE SELECT.
ALTITUDE/ALTITUDE RATE. SUPERCRIT PRESSURE, 1220;
AMBIENT PRESSURE, 390.

04 08 08 00 LMP-LM Okay.

04 08 08 12 CC Orion, you can configure for normal RCS configura-
tion now.

04 08 08 21 CDR-LM Okay. SYSTEM A is on.

04 08 08 23 CC Roger.

04 08 08 32 LMP-LM Hey, Jim. We got an RCS A REG light when that
went on. The pressures are good, though.

04 08 08 36 CC Roger.

04 08 08 47 LMP-LM Okay, John. We - The DET is set. Okay. FDAI -
verified the FDAI:011.

04 08 09 06 CDR-LM Have to trim it up a little bit.

04 08 09 14 LMP-LM VERB 40 NOUN 20, please.

04 08 09 22 CDR-LM Got it, Charlie.

04 08 09 23 LMP-LM Okay.

04 08 09 25 CDR-LM ...

04 08 09 34 LMP-LM AGS and PGNS are aligned. 410 is - At the zero.
400 plus 1 going in. And the needles deflect - 433.

04 08 10 04 LMP-LM Amazing. How do you read, Jim?

04 08 10 06 CC Loud and clear.

04 08 10 12 LMP-LM Okay.

04 08 10 13 CDR-LM What happened?

04 08 10 23 LMP-LM Okay. We are clear down to 5 minutes. At 5, we
close the LANDING RADAR breaker.

04 08 10 30 CDR-LM Right.

04 08 10 47 CDR-LM Starting a little high ... Based on the ..., it
will probably be double at first ***

04 08 11 11 LMP-LM The old Earth is sure pretty.

04 08 11 17 CC Orion, bring battery 3 on at - at minus 5.

04 08 11 24 LMP-LM Roger; copy.

04 08 11 37 LMP-LM *** pull me right up under my - little ***

04 08 11 50 LMP-LM Okay. 05:36, John. Everything looks great.

04 08 12 01 LMP-LM Hey, Casper. How do you read? Over.

04 08 12 07 LMP-LM ...

04 08 12 10 CDR-LM Okay. Five minutes, LANDING RADAR breaker is
going closed.

04 08 12 16 LMP-LM BAT 3 is ON.

04 08 12 17 CDR-LM ALTITUDE TRANSMITTER is 3.4 almost; VELOCITY
TRANSMITTER is 0.82.

04 08 12 29 CC Say again the reading on the velocity, John.

04 08 12 31 CDR-LM - - ... transmitting.

04 08 12 35 LMP-LM 3.8.

04 08 12 39 CC Roger. Copy 3.4 and 3.8.

04 08 12 44 CDR-LM Correct.

04 08 13 09 CC Orion, you're GO for PDI.

04 08 13 14 LMP-LM Roger, GO for PDI.

04 08 13 20 CDR-LM Okay. PRO for the final trim.

04 08 13 23 LMP-LM Go. ... Looks better than it did. Go ahead.
ENTER. ENTER. Go. My watch is set and wound.

04 08 14 05 CDR-LM Eject [?]. About a second off here.

04 08 14 11 LMP-LM Okay. Stand by for 2 minutes, John.

04 08 14 15 CDR-LM Roger.

04 08 15 12 CDR-LM Okay, good.

04 08 15 16 LMP-LM Target about 10 miles, it looks like.

04 08 15 20 CDR-LM ...

04 08 15 23 LMP-LM Okay, 2 minutes. MASTER ARM, ON.

04 08 15 29 CDR-LM Switch, MASTER ARM is ON. Two lights, Houston.

04 08 15 31 CC Roger. Copy, two lights.

04 08 15 33 LMP-LM PGNS in MODE SELECT. 367 is in. Next thing is
at 30 seconds, John. Turn the page.

04 08 16 08 LMP-LM Hey, Jim. You want us to turn the ranging back on?

04 08 16 13 CC Negative.

04 08 16 16 LMP-LM Okay. We're in VOICE BACKUP.

04 08 16 21 CC Roger.

04 08 16 38 CDR-LM 50 seconds.

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04 08 16 48 LMP-LM Okay. At 30, we hit ENGINE ARM then we - 30 seconds, ENGINE ARM goes to DESCENT, then we ullage.

04 08 16 56 CDR DSKY's blank; PRO.

04 08 16 59 LMP-LM Okay. ENGINE ARM, DESCENT.

04 08 17 02 CDR-LM ARM is DESCENT. ALTITUDE light and VELOCITY light.

04 08 17 05 LMP-LM Okay. There's no ullage plux-X.

04 08 17 07 CDR-LM Okay.

04 08 17 14 LMP-LM If no ignition, just START pushbutton if we get ullage.

04 08 17 19 LMP-LM Ullage -

04 08 17 20 CDR-LM Auto ullage.

04 08 17 23 CDR/
LMP-LM PRO.

04 08 17 28 LMP-LM Okay. Engine START.

04 08 17 29 CDR-LM Engine START. DESCENT ENGINE COMMAND OVERRIDE is on.

04 08 17 32 LMP-LM Stick your throttle in min.

04 08 17 35 CC Roger. We copy.

04 08 17 36 CDR-LM All right.

04 08 17 39 LMP-LM DESCENT ENGINE COMMAND OVERRIDE; MASTER ARM, OFF.

04 08 17 42 CDR-LM MASTER ARM is coming OFF.

04 08 17 45 LMP-LM Stand by for throttle up; thrust-to-weight is okay.

04 08 17 49 CDR-LM 22, 23, 24, 25, 26 -

04 08 17 53 CDR/
LMP-LM Throttle up!

04 08 17 54 CDR-LM On time!

04 08 17 55 LMP-LM Feel that beauty come on!

04 08 17 56 CC Roger; we copy.

04 08 17 57 LMP-LM Okay, thrust-to-weight is good - 66,000 feet.
They were right on.

04 08 18 18 LMP-LM ... looking at a minute. Hey, Jim. At pitchover,
do you want me to go AFT omni or stay FORWARD?

04 08 18 26 CC Stay FORWARD and you've got a GO at 1.

04 08 18 31 CDR-LM Roger.

04 08 18 32 LMP-LM Hey, we're way high, John; we got to get down.
Way high on the H-dot.

04 08 18 36 CDR-LM All right. Just a minute, Charlie. Down to
45 already.

04 08 18 55 LMP-LM ... look good - passing 1:30.

04 08 18 58 CC Okay, Orion. I have a 169 for you - -

04 08 19 02 LMP-LM Double H-dot almost - -

04 08 19 03 CDR-LM Go ahead.

04 08 19 04 LMP-LM Go ahead.

04 08 19 05 CC Plus 00800.

04 08 19 12 LMP-LM Plus 00800. 100 feet ...

04 08 19 17 CC And you've a GO for - -

04 08 19 18 CDR-LM ... enter - -

04 08 19 20 LMP-LM ... Excuse me, John.

04 08 19 21 CDR-LM Okay, that's entered. It's entered.

04 08 19 27 CC And you're GO at 2.

04 08 19 28 LMP-LM ...

04 08 19 30 CDR-LM Really looking good.

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04 08 19 31 LMP-LM Okay. We're going to have to yaw out here at 3.

04 08 19 41 LMP-LM I can take that out when we get ...

04 08 19 47 LMP-LM AGS and PGNS are tracking right on, Jim.

04 08 19 49 CC Roger.

04 08 19 50 LMP-LM Within a tenth of a foot a second.

04 08 19 52 CC Roger.

04 08 20 05 CDR-LM At 3 minutes, propellants - -

04 08 20 15 LMP-LM Pressures are holding good in the DPS.

04 08 20 20 CDR-LM All oxidizer pressures look good.

04 08 20 24 CC Orion, you're GO at 3.

04 08 20 26 LMP-LM ... 3.

04 08 20 27 CDR-LM Roger; GO at 3.

04 08 20 31 LMP-LM I'll check the ED batteries one more time.

04 08 20 41 LMP-LM And they're still 37 volts, Jim.

04 08 20 43 CC Roger; we copy.

04 08 20 45 CDR-LM VELOCITY light is out, Charlie.

04 08 20 46 LMP-LM Okay.

04 08 20 47 CDR-LM Wrong transmitter, probably.

04 08 20 52 LMP-LM We got a ***

04 08 20 54 CDR-LM Watch it now.

04 08 20 57 LMP-LM ... ***

04 08 20 59 CDR-LM Cutting out, Charlie.

04 08 21 02 LMP-LM I say, there's no way to get the ALTITUDE light at this high.

04 08 21 15 LMP-LM *** minutes - -

04 08 21 26 CC Orion, you're GO at 4.

04 08 21 28 LMP-LM We're 50,000.

04 08 21 30 CDR-LM Look at that! ALTITUDE and VELOCITY lights
are out at 50K!

04 08 21 34 LMP-LM Isn't that amazing? Copy that, Houston?

04 08 21 38 CC We copy.

04 08 21 40 CDR-LM Look at that data, Houston. When do you want to
accept it?

04 08 21 48 CC Okay, you have a go to accept.

04 08 21 56 LMP-LM Okay. It's in.

04 08 21 59 CC Roger.

04 08 22 19 LMP-LM AGS and PGNS will be getting off a little bit in
altitude now. Update.

04 08 22 28 LMP-CM At 5 minutes. Coming in like gangbusters.

04 08 22 32 CC Orion, you're GO at 5.

04 08 22 39 CDR-LM Roger.

04 08 22 51 LMP-LM 39,000. Hey, look at that - 136 feet difference
now. ***... radar.

04 08 23 06 CC AGS is tracking about 1000 high.

04 08 23 10 CDR-LM Roger. You get there.

04 08 23 14 LMP-LM Six minutes, we should be at 32,000 *** - -

04 08 23 16 CDR-LM 35 - not back on profile, but almost.

04 08 23 17 LMP-LM - - ...

04 08 23 24 CC Orion, you're GO at 6.

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04 08 23 25 CDR-LM ...

04 08 23 26 LMP-LM 45 percent. Right on.

04 08 23 28 CDR-LM Right on. Roger.

04 08 23 55 LMP-LM Okay. At 6:30, should be at 30,000.

04 08 23 58 LMP-LM MARK it, 32,000. Looking pretty. Okay. Looking good, John.

04 08 24 07 CDR-LM That Sun angle is getting down there.

04 08 24 15 CC Throttle down 7 plus 23.

04 08 24 16 LMP-LM ... right on. ... now.

04 08 24 22 CDR-LM Understand, 7:23. .

04 08 24 23 CC Roger. And you're GO at 7.

04 08 24 27 LMP-LM Coming in.

04 08 24 28 LMP-LM MARK it - 7 minutes. Roger, go. 10⁴ down, 28,000. Still about 1000 high, looks like.

04 08 24 37 CDR-LM Well, it's starting to look pretty good.

04 08 24 39 LMP-LM Yes. 223 *** setting up ready, the AGS ready at 14K. Then I do a 360 and then turn the camera on. Breaker is in.

04 08 24 54 CDR-LM Throttle down. On time.

04 08 25 00 CC Roger.

04 08 25 01 LMP-LM It was right on time, wasn't it?

04 08 25 05 LMP-LM How are you reading, Jim?

04 08 25 07 CC Loud and clear.

04 08 25 11 LMP-LM Okay. You were clipping a little bit, John.

04 08 25 13 CDR-LM Okay.

04 08 25 22 LMP-LM 21,000, coming up on 8 minutes.

04 08 25 25 CC Orion, you're GO at 8.

04 08 25 27 CDR-LM I can see the landing site from here, Charlie.

04 08 25 28 LMP-LM Amazing. Okay. GO at 8, John's got a visual.

04 08 25 33 CC We copy.

04 08 25 34 LMP-LM 130. We're right on, John. Right back on profile.

04 08 25 49 LMP-LM How does it look, to you?

04 08 25 50 CDR-LM We're right in there.

04 08 25 52 LMP-LM Okay, standing by to update the AGS. Had a little roll steering here.

04 08 25 59 CC Monitor DESCENT 1.

04 08 26 03 CDR-LM Roger. DESCENT 1.

04 08 26 09 LMP-LM Hey, Jim. We got about a 3-degree roll command in.

04 08 26 12 CC Roger.

04 08 26 16 LMP-LM Okay. ENTER, 360, minus 01 72, 0 ENTER, 367 is coming up, and I'm starting the clock - I mean the camera.

04 08 26 29 CC GO at 9.

04 08 26 30 LMP-LM Okay. We're out at 12,000, John. GO at 9. Coming down at 182, a little steep. Hey, we're going to be right on. It's just about right on, maybe 10 feet - 10,000 feet. Stand by. Okay, 64, at 8200. PRO -

04 08 26 55 CDR-LM Pitchover.

04 08 26 56 LMP-LM Pitchover. Hey, there it is. Gator, Lone Star. Right on!

04 08 27 00 CDR-LM Call - call me the things, Charlie.

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04 08 27 01 LMP-LM Okay. 40 - 38 degrees.

04 08 27 02 CDR-LM Okay.

04 08 27 03 LMP-LM Palmetto and Dot, North Ray. Looks like we're going to be able to make it, John. There's not too many blocks up there.

04 08 27 12 CC Orion, you're GO for landing.

04 08 27 16 LMP-LM Okay, 4000 feet, 4 - -

04 08 27 17 CDR-LM Okay. GO for landing.

04 08 27 19 LMP-LM - - 42 LPD. Okay, 3900 feet.

04 08 27 20 CDR-LM Okay. Two to the south, Charlie.

04 08 27 26 LMP-LM Okay. It's in. Okay, 42 - 41 LPD, 3000 feet on profile.

04 08 27 31 CDR-LM Okay. There's - we're coming right down - It's going to be a little past -

04 08 27 39 LMP-LM 41 LPD.

04 08 27 42 CDR-LM Okay.

04 08 27 43 LMP-LM 2000 feet, 60 on profile.

04 08 27 44 CDR-LM Okay.

04 08 27 51 LMP-LM Okay, 42 LPD. Couple of more in. 1400 feet, 44 down. Looking good. Okay, out of a 1000 feet - Right on profile. 54 LPD, dropping out the bottom now. 800 feet, 30 down.

04 08 28 13 CDR-LM Okay, Houston. We're going to be just a little long -

04 08 28 15 CC Roger.

04 08 28 16 CDR-LM - - but we're just now abeam of Double Spot.

04 08 28 22 CC Copy.

04 08 28 24 LMP-LM Okay, 23 - 22 down at 500 feet.

04 08 28 25 CDR-LM Okay.

04 08 28 29 LMP-LM Some big blocks over here to the left, John.
Okay, 300 feet, 15 down.

04 08 28 33 CDR-LM Okay. Okay. Take over, Charlie.

04 08 28 39 LMP-LM Okay. Okay, fuel is good: 10 percent. There
comes the shadow. Okay, 200 feet, 11 down. Give
me a couple of clicks up. Okay, 5 down at
130 feet, 2 forward.

04 08 28 59 LMP-LM LO MULT. Drifting. Okay, looking good. Perfect
place over here, John, a couple of big boulders.
Not too bad.

04 08 29 08 LMP-LM Okay, 80 feet, down at 3. Looking super. There's
dust.

04 08 29 14 LMP-LM Okay, down at 3, 50 feet, down at 4. Give me
one click up. You're backing up slightly.

04 08 29 22 LMP-LM Okay, 2 down. Stand by for contact. Come on,
let her down. You leveled off. Let her on
down. Okay, 7 - 6 percent - plenty fast.

04 08 29 36 LMP-LM CONTACT. Stop. Boom! PRO. ENGINE ARM. Wow!
... man! Look at that!

04 08 29 50 CDR-LM PRO. ENGINE ARM. Descent Engine Command Override.
Okay, 413.

04 08 29 51 LMP-LM Check the APS.

04 08 29 52 CDR-LM Well, we don't have to walk far to pick up rocks,
Houston. We're among them. Open, close, open,
close.

04 08 30 00 LMP-CM Old Orion is finally here, Houston. Fantastic!

04 08 30 12 CC Sounds great.

04 08 30 13 CDR-LM ... I can look right out to the left and see - -

04 08 30 15 CC Let's go AFT omni, Orion.

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04 08 30 19 CDR-LM - - Double Spot. And we're about - -

04 08 30 21 LMP-LM Okay, you got it.

04 08 30 22 CC That's better.

04 08 30 23 CDR-LM Okay. We're forward to the north of - forward and to the north of Double Spot. I would guess about 200 meters to the north and maybe 150 meters to the west. It's not flatlands, though, Houston.

04 08 30 42 CC Roger. I copy 200 meters north - -

04 08 30 43 LMP-LM ...

04 08 30 44 CC - - of Double Spot and about 150 meters west.

04 08 30 46 CDR-LM Man, I could see, the - I could see - all the way to the ground. Just like flying the LLTV, piece of cake.

04 08 30 58 CC That's good.

04 08 31 00 LMP-LM Ascent pressures look good. Okay, ASCENT HELIUM MONITOR, cycle; I did. O₂ ASCENT ... Fantastic! Perfect precision. As plain as one on the plains of Descartes. ...***

04 08 31 16 CDR-LM I better go easy on this LANDING RADAR circuit breaker, huh?

04 08 31 19 LMP-LM Okay, now don't - Okay, that's the right one. The camera's off. Ha, ha! Hey, it sure ain't flat, John. Wow! There's that ridge to the north.

04 08 31 33 CDR-LM Yes. Sure is.

04 08 31 35 LMP-LM All we got to do is jump out the hatch and we got plenty of rocks.

04 08 31 38 CDR-LM Houston, boy, it sure looks like you could make - I see Crown Crater from here; I can see Ray Crater from here. Not a - Boy!

04 08 31 49 LMP-LM I almost had apoplexy, that PROGRAM alarm, and that's your radar breaker.

04 08 31 54 CDR-LM Charlie's about had (laughter) Charlie's got nothing but a ridge to look at.

04 08 31 59 CC Sounds beautiful, John. Wish I were there.

04 08 32 02 LMP-LM There's a ridge out in - there's a ridge out in front of us, too, John.

04 08 32 07 CDR-LM Yes. There's a ridge in front of us, one to the side of us, and my guess is that we're in a subdued old crater that's got a lot more craters.

04 08 32 16 CC Roger. We copy.

04 08 32 18 CDR-LM What a neat place (laughter).

04 08 32 21 LMP-LM Say, Jim, this ridge in front of us does look like a subdued crater and it may be the raised rim about 50 meters in front of us, about, oh - 4 or 5 meters tall. About 30 or 40 percent of the surface is covered with boulders that are maybe half a meter in size. On out in front of us and to the right, where we landed, there were - -

04 08 32 45 CDR-LM Wait a minute, Charlie. We gonna stay, Houston?

04 08 32 48 CC Stand by.

04 08 33 02 CC Everything's looking okay up to this point, John. We'll give you a final word here shortly.

04 08 33 14 CDR-LM Okay. We were coming down pretty good until I hit the STOP button, and then it fell out - You know, the engine stopped.

04 08 33 22 CC I know exactly what you mean.

04 08 33 29 CDR-LM It's really nice to have your shadow out there; that's a good help. It's a good altitude gage.

04 08 33 37 LMP-LM John, that was super.

04 08 33 50 LMP-LM *** ... Batteries all looking good, EPS is looking good, ascent quantities are looking - -

04 08 33 58 CDR-LM The way these rocks are laid in here out my window; I'd guess they come from South Ray. There's some biggies out there. We've got - right out in front

of us about 100 meters, at my 10:30 position - I've got one that must be 3 meters across.

04 08 34 17 CC Orion, you're stay for T-1.

04 08 34 22 CDR-LM Understand.

04 08 34 23 LMP-LM Okay, stay for T-1. P68, John, and I'll get the AGS going. 414 plus 2 is in, 400 to 4.

04 08 34 40 CDR-LM Hey, Jim, hats off and a case of beer to FIDO. I'll tell you, that targeting was just beautiful. Boy! You guys just burned us right in there. That was superb.

04 08 35 02 CDR-LM *** where it says we are, I believe it.

04 08 35 05 LMP-LM Hey, Jim, our NOUN 43s are minus 896 - -

04 08 35 08 CC We have them, Charlie.

04 08 35 10 LMP-LM - - plus 15 52. The engine STOP reset?

04 08 35 14 CDR-LM The engine STOP reset.

04 08 35 16 LMP-LM Okay. PRO?

04 08 35 17 CDR-LM PRO.

04 08 35 18 LMP-LM Call P12.

04 08 35 24 CDR-LM Go on in there ... ***

04 08 35 27 LMP-LM Okay. Stay time for T-2 is 10 - 104 - plus 42 plus 16.64. PRO.

04 08 35 52 LMP-LM Those numbers are good.

04 08 35 53 CDR-LM Those numbers are good?

04 08 35 54 LMP-LM Yep ***

04 08 36 00 CDR-LM It's Auto.

04 08 36 01 LMP-LM Auto.

04 08 36 03 CDR-LM Go.

04 08 36 09 LMP-LM Okay; PNGS MODE CONTROL, NOUN 33, you got.
6 minutes, we're counting down.

04 08 36 16 LMP-LM Boy, this is really a nice place.

04 08 36 18 CDR-LM Feel that 1/6g, Charlie.

04 08 36 20 LMP-LM *** restraint harness has got me anchored.

04 08 36 24 CDR-LM Oh, that's what the trouble is.

04 08 36 29 LMP-LM Okay, the AGS are set, 410 - standing by. Man,
that was a sup!

04 08 36 54 CDR-LM It's just about level, we're not going to have a
bit of trouble getting out - -

04 08 36 57 LMP-LM Yeah, it's going to be ...

04 08 37 00 CDR-LM But it sure is not - it's not smooth - it's not
that FF [?] smooth, Houston.

04 08 37 08 CC Say again, John.

04 08 37 12 CDR-LM It's not that FF [?] smooth; we're in the middle
of a block field.

04 08 37 16 CC Roger; we copy.

04 08 37 17 LMP-LM There's Crown Crater up there. ... little blocks.
We may have squashed a few. And, Jim, we got
Crown Crater out - John's left window about
9 o'clock.

04 08 37 34 CC Roger.

04 08 37 37 LMP-LM And just looking at it from here, I don't think
the Rover's going to have any trouble going up
that hill.

04 08 37 41 CC Glad to hear that.

04 08 37 45 LMP-LM I could be wrong - slopes tend to fool you.

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04 08 37 48 CDR-LM It looked good going North Ray, too. There were some big blocks on the rim but not - the tracks just looked good.

04 08 37 54 LMP-LM It looked good, huh?

04 08 37 55 CDR-LM Yes. Um-hum.

04 08 38 24 CDR-LM ... ray. Turn on the water for a second, Charlie.

04 08 38 30 LMP-LM Okay, that's a good idea.

04 08 38 50 LMP-LM That shadow is not as long as I thought it was going to be. It looks like we're right on top of the ground.

04 08 39 00 CDR-LM Yeah, we didn't - we - it's not very far.

04 08 39 15 CDR-LM Man, we got a lot of rocks, that's for sure.

04 08 39 22 LMP-LM How's it looking, Jim?

04 08 39 24 CC It's still looking good. We're just standing by here - -

04 08 39 27 CDR-LM I wish I could tell you what kind of rock - I wish I could tell you what kind of rocks those are, Houston. But some of them are very white - and doggone, if I could see; I'm not close enough to them, but - and I see one white one with some black; can't tell whether that's dirt or not on it. But it could be a white breccia, ... such a thing.

04 08 39 51 CC We copy.

04 08 39 52 LMP-LM Every one of them are angular, too, John.

04 08 39 54 CDR-LM Yeah, they're all angular. They're out of South Ray, I believe.

04 08 39 58 LMP-LM There's a pretty one over there, without any dust on it at all. Out about 50 meters, by those three little craters.

04 08 40 16 CDR-LM In fact, Houston, when I told you that I thought this terrain might be very spectacular, boy, I was just kidding. It really is something looking at that mountain. That is a big mountain, Charlie.

04 08 40 30 LMP-LM Yeah, we're within 2 minutes, John. Let's - I agree with you. It is really - ...

04 08 41 03 CC Orion, you're stay for T-2.

04 08 41 08 LMP-LM Roger.

04 08 41 09 CDR-LM Super -

04 08 41 10 LMP-LM Thank you.

04 08 41 14 LMP-LM Stay for T-2. Let's go to POO, and then ICS PTT.

04 08 41 26 CC Okay, Charlie, when you get the Surface Checklist, I have some changes that we want to take care of.

04 08 41 36 LMP-LM Stand by.

04 08 41 40 CDR-LM There probably are a few, aren't there?

04 08 41 43 CC Yeah, there are a few and we'll have a few more in order to conserve power to give you maximum stay time.

04 08 41 47 CDR-LM Outstanding.

04 08 41 56 LMP-LM That one-sixth g is a lot nicer when you take the restraint harness off.

04 08 42 44 LMP-LM Houston, are we GO for DPS vent?

04 08 42 49 CC That's affirmative. Go ahead.

04 08 43 14 CDR-LM Okay, Houston, MASTER ARM's ON, two lights.

04 08 43 16 CC Roger.

04 08 43 20 CDR-LM DESCENT VENT's ... DESCENT VENT, FIRE.

04 08 43 23 CC Roger.

04 08 43 30 CC Our first change to the Surface Checklist - occurs on 1-2, and copied MASTER ARM, OFF.

04 08 43 41 LMP-LM Okay, go ahead.

04 08 43 45 CC CLOSE DESCENT REG 1.

04 08 43 53 CDR-LM DESCENT REG 1, CLOSED.

04 08 43 57 CC Charlie, did you say you were ready to copy the changes?

04 08 44 03 LMP-LM Yes, sir; go ahead.

04 08 44 05 CC Okay, on 1-2 - in the right column there, about halfway down - the S-band pitch and yaw set, you can scratch that and the business about peak. In other words, we're going to stay with the omni. Over.

04 08 44 23 LMP-LM Okay, I copy.

04 08 44 27 CC Okay, the next change is on 1-3, down at the - the bottom of the page on the battery reconfiguration. Instead of "BATTERY 2, OFF," we want "BATTERY 3, OFF/RESET." Next line down, "BATTERY L" should be "CDR" instead of "LMP" and then, of course, the talkback should be "CDR" after that. Next line down should be "BATTERY 4, OFF/RESET." Over.

04 08 45 00 LMP-LM Okay, we copy all that. BAT 3, OFF/RESET; BAT LUNY to commander; talkback commander; BAT 4, OFF/RESET. Over.

04 08 45 11 CC Okay, then the next page is on circuit breakers, 1-4. The first change is on the first row there, on panel 11, S-BAND ANTENNA. The third one down there from the left should be open. And then, on the second row, when - MISSION TIMER on the second row should be open. And then drop down to the fourth row - LGC DSKY should be open.

04 08 45 50 LMP-LM Okay, copy. S-BAND ANTENNA open, first row. Second row, MISSION TIMER open. Third row - fourth nothing. Fourth row, LGC DSKY open.

04 08 46 00 CC That's correct. Okay. Next page, 1 - -

04 08 46 08 LMP-LM Is that everything?

04 08 46 10 CC - - 5. No, I've got one - a couple more, probably. Okay, on 1-5, on the fourth row, panel 16, INVERTER 2 open. Over.

04 08 46 26 LMP-LM Okay. INVERTER 2 open. We got INVERTER 2 powering the AC right now.

04 08 46 32 CC Okay. Well, part of our power-saving program is to - not have the AC powered up, on the surface.

04 08 46 42 LMP-LM Okay. That's fine.

04 08 46 45 CC And the next change - -

04 08 46 46 CDR-LM Somebody's got ...

04 08 46 48 CC And the last change is on page 1-7, on the right column there, about four lines down. We want "INVERTER" - instead of "INVERTER, 2," we want "INVERTER, OFF." Over.

04 08 47 05 LMP-LM Okay. We copy "INVERTER, OFF."

04 08 47 10 CC And then - last change is on 1-8, the left column. We want "TRACK MODE, OFF," and "S-BAND" should be to "Best omni," which I believe is the one you have selected right now.

04 08 47 31 LMP-LM Okay, we get "TRACK MODE, OFF," "S-BAND to best omni."

04 08 47 34 CC And that's the end of the changes up to that point.

04 08 47 40 LMP-LM Okay, Jim, are we going to press on with the first rev checklist?

04 08 47 45 CC Yes, go ahead. And be advised that your stars should be good as published.

04 08 47 55 LMP-LM That sounds pretty good.

04 08 50 15 CC Okay, Orion. I have some more changes to that Surface Checklist whenever it's convenient for - for someone to copy.

04 08 51 26 CC Orion, how do you read? Houston.

04 08 51 30 LMP-LM Loud and clear.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 07 52 13 CC Casper, Houston.

04 07 52 20 CMP Hello, Houston. Casper did it this time.

04 07 52 23 CC Hey, good show, you want to give us a report?

04 07 52 35 CMP Okay. Okay, the burn was on time and for the right duration. And the residuals were plus 0.2, plus 0.2, and 0. That was after a trim, and the attitude for those residuals was 161.38, 132.96, and 0.12. DELTA-V_C was minus 8.5; the oxidizer is 32; the fuel is 34; and the decrease-increase is pegged at decrease, probably because of the short duration. The burn required a trim. The original residuals were plus 1 and plus 0.6 and plus 0.7. So I had to roll in order to take out the Z components.

04 07 53 46 CC Roger; and would you give us the trim attitude again, please.

04 07 53 59 CMP Okay, I'll give you again the trim attitude, and this is for these 210 residuals. That's after trimming, that was 161.38, 132.96, and 0.12.

04 07 54 14 CC Roger; copy.

04 07 54 33 CMP And, Hank, I did complete the fuel cell purge.

04 07 54 38 CC Roger; copy. You completed fuel cell purge. And I would like to get up a P24 pad to you.

04 07 54 47 CMP Standing by.

04 07 54 51 CC Roger. It's 16-3. T₁ is 104:19:11; 104:24:01; 104:25:41; 104:26:29; north 3 nautical miles.

04 07 55 22 CMP Okay. That's 104:19:11; 24:01; 25:41; and 26:29; north 3 miles.

04 07 55 31 CC Good readback, Ken. And I'd like to get a Flight Plan change to you there at 98:45 in your Flight Plan.

04 07 55 53 CMP Go ahead.

04 07 55 54 CC Okay. At this point, we want to delete the VERB 49 to the 52 - the P52 attitude. We're deleting the P52; it's not required. At this time, we would like you to go to P20, option 5, plus-X SIM bay.

04 07 56 18 CMP Okay. Following the completion of the tracking, we'll go to P20 option 5 and plus-X. I presently have EMP 509 running, and I will terminate it following the P24.

04 07 56 33 CC That's affirmative. And also, I have the abort pads for you that I didn't get up before.

04 07 56 42 CMP Okay, go ahead.

04 07 56 44 CC Roger. Echo, 104:30 all zips; Foxtrot, plus 0102.3, all zips, minus 0050.0; Golf, 105:18:00.00; Hotel, 107:05:45.00; India, 104:17:23.29; Juliet, 107:05:45.00; Kilo, 109:04:30.00; Lima, 104:42:16.64; Mike, 111:03:30.00; November 106:25:11.81.

04 07 58 22 CMP Okay, Hank. Starting with Echo, 104:30 all zips; Foxtrot, plus 0102.3, all zips; minus 0050.0; Golf, 105:18:00.00; Hotel, 107:05:45.00; India, 104:17:23.29; Juliet, 107:05:45.00; Kilo, 109:04:30.00; Lima, 104:42:16.64; Mike, 111:03:30.00; November, 106:25:11.81. Over.

04 07 59 10 CC That was a good readback, Ken. And Stu would like to give you some words on the rendezvous.

04 07 59 16 CC Okay, Ken. I got a couple of comments about - in the event of a PDI abort as far as the rendezvous scheme. And you might want a sheet of paper there to jot down a couple of things.

04 07 59 30 CMP Okay; I got a little corner here.

04 07 59 31 CC Okay, we're going to do the navigation in SCS. In other words, the marking routine; and we'll use the CMC to maneuver us into the burn attitude and set us up for the tracking. We'll burn in SCS, and there are three places through here that you can activate that relay, if you're using the normal procedures. Now we've got some detailed procedures we won't read to you now. If we get in that

situation, we'll talk to you a bit. But the three times that you want to watch out for are: Don't place the SPACECRAFT CONTROL in CMC with the OPTICS MODE in MANUAL. I think you're probably pretty familiar with that one. Don't respond to the 204 display with SPACECRAFT CONTROL in CMC. And if you make a burn, you'll probably be trimming it with G&N. And wait until you've got your VERB 16, your NOUN 85 display up before going back to CMC. And we can talk about it in detail, like I say, later if we need it. We've run a couple of these and they go pretty smooth.

04 08 00 53 CMP Okay, Stu. The way I understand the scheme is that for attitude holding, while we're doing navigation, we'll do it in SCS; and when we're ready to go to work, why, we'll do CMC maneuver to the burn attitude, and we'll make the burn in SCS to avoid this relay again. Then, we don't ever want to go to CMC control with the OPTICS in MANUAL, and we don't want to respond to 204 with the CMC command. And the third one, I didn't copy.

04 08 01 32 CC Okay. If you do a burn in your SCS, you - depending on what you've done there, Ken, you'd probably end up with your flashing 99 display. And we want to make sure that you go on to your NOUN 85 display, before you go to CMC. Then go ahead and trim the G&N residuals.

04 08 01 57 CMP Okay, Houston. Roger, I understand. We don't want to go through that transient at the end of the P40, certainly.

04 08 02 06 CC Righto. And that one thing, too - -

04 08 02 08 CMP If they do not respond to 204, Stu - if they don't respond to that, do you mean don't even ENTER on it? Go by past it?

04 08 02 16 CC That's exactly what I mean. Don't ENTER on it. Of course, you'll be doing the SCS burn, but don't ENTER on that, or you will activate that relay - until you put the spacecraft to SCS control.

04 08 02 32 CMP Okay; as long as it's in SCS control, though, I can by pass the 204 with no problem.

04 08 02 37 CC That's affirmative, Ken. If you're in SCS control, that relay - the power is interrupted, that - the power to that relay goes through the SPACECRAFT CONTROL switch, and it's got to be in CMC.

04 08 02 51 CMP Okay.

04 08 02 52 CC And one other point now I'd like to clarify, Ken, is that for your tracking - see after you go to your track attitude, CMC will start you off on a rate drive, and then go to SCS CONTROL and go to MINIMUM IMPULSE and PITCH, and just every now and then, you might have to flip it - like between PPI [?] and midcourse 1, it just took one MINIMUM IMPULSE time and kept me right up around the 22 degrees trunnion.

04 08 03 24 CMP Roger. Sounds like you've been working, too.

04 08 03 28 CC No, you've been doing all the good work there, Ken.

04 08 03 38 CMP Doesn't sound like you guys have gotten any sleep, if you've checked out all these things, plus today's problem. Whoever put that story together today deserves a life supply of whatever he wants.

04 08 03 50 CC Watch what you say, Ken. You don't want to over-load your pocketbook there. And, hey, I'll give you back to Hank.

04 08 04 01 CMP Okay; thank you, Stu.

04 08 04 03 CC Roger.

04 08 04 23 CC Casper, Houston. I'd like to remind you to get your RHC DIRECT POWER OFF.

04 08 04 32 CMP Thank you, sir.

04 08 06 02 CMP Hank, seems to me I still have my LOGIC POWER OFF from early this morning. Maybe I missed where it comes back on. This is the panel 181 LOGIC. You got any words on where you think that ought to be?

04 08 06 21 CC Okay; Ken. You can leave it OFF for now. And after we get into SIM bay attitude, after landmark tracking, we're gonna bring up some of the SIM bay.

04 08 06 30 CMP All righty.

04 08 07 15 CC Casper, Houston. We're GO for PDI on the CSB side.

04 08 07 23 CMP Okay.

04 08 11 24 CC Casper, I have a mapping camera and pan camera photo pad for you, if you can squeeze it in now - between now and T₁.

04 08 11 40 CMP What do you show for T₁? Maybe I'm out of whack.

04 08 11 43 CC Roger. I've got about 7-1/2 minutes to go.

04 08 11 51 CMP Okay, looks like this attitude is gonna be just about the one for T₁ then, eh?

04 08 11 59 CC Roger.

04 08 12 05 CMP Let me hold off until I get this thing loaded, then.

04 08 13 19 CC Casper, Houston. We're showing a difference here between your actual CDUs and your final CDUs.

04 08 13 42 CC You're looking good now, Casper.

04 08 14 28 CMP Okay, Hank. Tell me again what you just said about the CDUs.

04 08 14 34 CC Okay, we're getting some bad data down here, so really we can't be sure. It looks like you ought to be about 28550. Is that right?

04 08 14 46 CMP Correct.

04 08 14 47 CC It looks good from here now, Ken.

04 08 14 54 CMP Okay.

04 08 15 22 CMP And, Hank, I'm gonna turn my VHF transmission on. I'll be listening to you, but I won't be answering until after they land.

04 08 15 32 CC Roger. Copy.

04 08 18 59 CC Casper, coming up on 10 seconds to T₁.

04 08 22 53 CC Casper, coming up on time for DAC ON.

04 08 23 58 CC About T₂, Casper.

04 08 33 00 CMP Henry, I'm standing by to copy. Do you want me to take DEAD BAND ... this option 5, or a WIDE?

04 08 33 09 CC Stand by, Ken. I'll get an answer for you, and we're working on whether we got a stay or not on T-1.

04 08 33 18 CMP Okay; sounds like you did pretty good.

04 08 33 21 CC They did a beautiful job.

04 08 33 40 CC Ken, we'll want NARROW dead band on that. We got a camera pass coming.

04 08 34 19 CC Casper, Houston. Orion is stay for T-1.

04 08 34 27 CMP Okay. Thank you.

04 08 34 43 CC And, Ken, while you're maneuvering with this P20 attitude, I'd like to tell you about the Flight Plan. We want you to go - to do everything that's in the Flight Plan through doffing your PGA up to what's in your Flight Plan at 99:20. And then, we're in the process of getting you a whole new thing to operate from. And I have you a mapping camera and pan camera photo pad.

04 08 35 13 CMP Okay. Yeah, I don't mind taking the suit off. And, okay; want to give me those pads now?

04 08 35 22 CC Okay. Mapping camera: T-start 105:29:27; T-stop 108:2 - -

04 08 35 36 CMP Wait a minute, now. Wait a minute. Hank, I don't have any place to write these things, I don't think. I've got to go look for them. Thank you.

04 08 35 44 CC Okay.

04 08 35 48 CMP What's the best place to work from? The basic time line with the real GETs?

04 08 35 55 CC I'll tell you what our overall plan is, Ken. We want to get in a - the camera passes tonight. They're terminator passes - the - before we lose the opportunity, because the terminator's moving. And then we're gonna do a clock sync somewhere during the night, and scrub and get back on the Flight Plan. We're gonna scrub out about 6 hours of stuff.

04 08 36 22 CMP Okay. Tell you what, I got a page here that I can work on. Why don't you give me a summary of the next couple hours, here? And I'll just write something in the Flight Plan here.

04 08 36 37 CC Okay. Stand by. I'll see if I can get something worked out for you.

04 08 36 43 CMP Go ahead with the camera pads. Yes, I ought to have those, they'll come up on the next rev.
Yes ...

04 08 36 56 CC Casper, Houston. You're almost unreadable. I'll have to wait until we get a little better comm.

04 08 37 50 CMP Is that better comm now?

04 08 37 52 CC Hey, that sounds much better. We're putting together a little summary here for you.

04 08 38 01 CMP Okay.

04 08 40 16 CC Casper, Houston. Could you bring up the HIGH GAIN? PITCH, plus 41; YAW, 228.

04 08 42 50 CC Casper, Houston. I have your little rundown for the next rev, if you're ready to copy.

04 08 42 57 CMP Okay; all set.

04 08 43 00 CC At 105:20, MC/LA cover, open; 105:23 MC, EXTEND; 105:28 LA, ON; 105:29 PC, STAND BY; STEREO, POWER, OPERATE; T-start; MC, M is MOTION; Increase, barber pole/ON; MC, ON; T-start; 105:50 AOS; 105:50, same time, SIM bay activation, NS, deploy to 8.4 feet at 61 seconds; GR, deploy to 7.5 feet

53 seconds; that's 53 seconds. Then MS, EXPERIMENT, ON; Ion source, STANDBY; AP - should be ALPHA P/XR, COVER OPEN; XR ON; 105:59, TC MODE STANDBY (P-stop), POWER OFF (MSFN-Q).

04 08 46 41 CMP Okay. You ready for a readback on that, or have you got some more to fill in?

04 08 46 45 CC Go ahead and read that back, and then I'll give you your pad.

04 08 46 51 CMP Okay - -

04 08 46 52 CC Stand by there, Ken.

04 08 46 54 CMP - - if it will help you any, I'll be glad - -

04 08 46 56 CC Would you give us POO and ACCEPT? We'll up-link your state vector while you're doing that.

04 08 47 05 CMP How about if I just give you ACCEPT?

04 08 47 07 CC That'll do fine.

04 08 47 14 CMP What I was gonna suggest, if it'll help you - do whatever's easiest - I'll be glad if you want to give me the code and tell me to have it - have the SIM bay in a particular code by a given time.

04 08 47 28 CC Okay. That's a good idea.

04 08 47 29 CMP Then, when we get on the front side, I'll just sort of hustle around and do whatever you suggest until we get back to a written Flight Plan. I do need about 20 minutes here somewhere to get my suit off and get the cockpit stowed. It looks like a disaster area.

04 08 47 51 CC Okay. I concur in that. I'd like to give you the pads now if you're ready.

04 08 48 00 CMP All set.

04 08 48 02 CC Okay; mapping camera pad is T-start, 105:29:27; T-stop is 108:28:13. Pan camera, T-start, 105:29:27; T-stop, 105:59:27. And they just pointed out they made an error here at 105:29 in your Flight Plan. The IMAGE MOTION should come

ON after T-start with the mapping camera. That was a procedural error.

04 08 48 59 CMP Roger. I understand that; no sweat.

04 08 49 07 CMP Okay, let me read back what I have. 105:20, you want the mapper door open; at 23, you want to extend it. At 28, the LASER ALTIMETER comes ON; 29 we get PAN CAMERA to STANDBY, STEREO, and POWER; to OPERATE at P-start, which is 05:29:27. The MAPPING CAMERA comes ON at 105:29:27. The IMC comes ON, and we put it to barber pole, on the IMAGE MOTION. At 50, we'll get AOS, and we'd like to have SIM bay activation. It's my understanding you'd like for me to hold SIM bay activation until we're within AOS.

04 08 49 51 CC That's affirmative.

04 08 49 52 CMP MASS SPEC BOOM deployed to 8 feet, which is 1 plus 01. I got your answer, thank you. GAMMA RAY deployed to 7 and a half feet. That's 53 seconds. The MASS SPEC EXPERIMENT ON, and the ION SOURCE is STANDBY. The ALPHA X-RAY door comes open; the X-RAY goes ON. At 59:27, the PAN CAMERA MODE goes to STANDBY, and the POWER comes OFF when you give me a call.

04 08 50 16 CC That's a good readback, Ken.

04 08 50 21 CMP Okay. I think we've got it made. We may get caught up yet.

04 08 50 34 CC Okay. And I guess when we start bringing that on, Ken - -

04 08 50 36 CMP ...

04 08 50 37 CC - - and we ought to bring the S-BAND AUX TV to 5, so we can get the data.

04 08 50 45 CMP Okay. Any harm in my doing that now so we don't forget it?

04 08 50 49 CC Go right ahead.

04 08 50 53 CMP Okay. You've got it. And when we get AOS next time, I'm content to - while we're reading things up, I'll be prepared to copy some things. And I'll be prepared to hop around and reconfigure whatever you need in real time.

04 08 51 11 CC Okay. That's real good, Ken. Go ahead and get your suit off and get comfortable.

04 08 51 16 CMP Okay. I'll - I'm just about to the point where I'll take my comm carrier off so I'll be off comm here for about 10 minutes. What's LOS time?

04 08 51 30 CC Casper, we have LOS in about 12 minutes, somewhere around 03.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 08 51 40 CC Okay - -

04 08 51 41 LMP-LM - - we're starting on page 1-2, Jim.

04 08 51 43 CC Okay. We want you to power down, of course, and do as much as you can, you know, as fast as you can, and if it's convenient for someone to copy the - the rest of the changes in the Surface Checklist. You probably gathered that we want y'all to sleep first.

04 08 52 02 LMP-LM That suits us.

04 08 52 04 CDR-LM You probably gathered we'd like to.

04 08 52 05 CC So would we.

04 08 52 08 CDR-LM Yeah. It's been a hard day's night for you, too.

04 08 52 10 CC You deserve a good sleep.

04 08 52 39 LMP-LM Jim, I feel exactly like I thought I was. I really want to get out, but I think that discretion is the better part of the valor here.

04 08 52 48 CC Good. Glad you - glad you think that.

04 08 52 58 CDR-LM Man, it's really tempting though. It really looks nice out there.

04 08 53 48 LMP-LM Okay, Jim. If you didn't get them, my 047 on the AGS was plus 37566; 053 with minus 73667.

04 08 54 00 CC Give me those values again, Charlie. I didn't copy them.

04 08 54 05 LMP-LM Plus 37566; minus 73667.

04 08 54 10 CC Roger. I copied.

04 08 54 29 CC Okay, Orion. We're ready to terminate the vent on the oxide.

04 08 54 37 LMP-LM Okay. It's going closed. OX VENT's barber pole.

04 08 54 42 CC Roger.

04 08 55 27 LMP-LM Jim, would you like to - guys like to take 1 amp with the power and let me see if I can get this steerable going. That landing might have knocked something loose.

04 08 55 38 CC Stand by.

04 08 55 57 CDR-LM Cracked Charlie's fillings; we know that.

04 08 56 12 LMP-LM After you fly with Navy pilots for 3 years, you know - you know what the feeling is.

04 08 56 14 CC Yeah, I know it exactly. I think we'd like for you to try to get the - the steerable up, if you can.

04 08 56 26 LMP-LM All right; we'll do that.

04 08 58 02 LMP-LM Okay, Jim. It didn't work. I was looking at the shadow, and the pitch goes around nicely. You can watch it move. It oscillates quite a bit before it damps, but the yaw I can't get to move at all, so I guess it's belly up.

04 08 58 18 CC Okay. And we assume you got all the necessary circuit breakers in, AC and DC?

04 08 58 24 LMP-LM Roger. I put the S - AC BUS S-BAND in, and I put the S-BAND COMM in, and the pitch moves fine, but the yaw does not move.

04 08 58 35 CC Okay. We copy.

04 08 58 41 LMP-LM I'm going to power it back down.

04 08 58 43 CC Okay.

04 08 59 04 CC Okay. And, Charlie, when you get a chance, if you're free, we can - I can give you the - the rest of the changes coming up here in the next few hours.

04 08 59 14 LMP-LM Okay. John is marking on out there, and go ahead. I'll copy.

04 08 59 20 CC Okay. I don't want you to, you know, introduce any light there that might hurt John, but the first change - and we're recommending perhaps you want

to tear out a blank sheet of paper there so you can write down the sequences and the page number of these things, so you won't be confused.

- 04 08 59 48 LMP-LM It just so happens that the back of the Data Card Book is blank. Go ahead.
- 04 08 59 52 CC Okay. Sequence number 1 is on page 1-9, and that's "Configure cabin for stay," and that should occur about 105:10. And if you'll look at page 1-9, if you have it handy. Over.
- 04 09 00 17 LMP-LM Stand by. Okay. I got it.
- 04 09 00 24 CC Okay. You're aware that you won't have your mission timer, so we're going to have to keep you on time here. At - at - you see the "Eat period" there in the right column? We want to skip that until y'all get your suits off. And we - the next sequence is number 2, of course, and that's on page 2-1, and you can turn to that page, and that should occur at about 105:38. And we'll keep you on time. And at the - that's "Cabin prep for EVA," just to get things stowed properly, and then at the bottom of 2-1, go to page 3-4. Over.
- 04 09 01 11 LMP-LM Okay. Copy 2-1. Then finish that page and go to the - to 3-4.
- 04 09 01 18 CC That's right. And then, of course, sequence 3 is on page 3-4, and that's "Doff suits." And that "Doff suit" should occur at about 105:58, and, at that point, y'all be in a position in there where you can eat, and we can brief you on - on the rest of the surface plan. Over.
- 04 09 01 46 LMP-LM Roger. That sounds super, Jim. We'll press on with that - those changes, and in this briefing, we'd like a word about what our lunar stay looks like and et cetera.
- 04 09 01 59 CC Okay; we understand.
- 04 09 02 00 LMP-LM Sure y'all can get all that.
- 04 09 02 04 CDR-LM For some reason, it's remarkable, but once you sit down up there, the comm just clears up beautifully.

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04 09 02 10 CC Very good. Okay. Let's terminate the - the fuel vent, Orion.

04 09 02 36 CDR-LM FUEL VENT's barber pole.

04 09 02 38 CC Roger.

04 09 02 48 CDR-LM Okay, Houston. You want to torque it?

04 09 02 51 CC Stand by.

04 09 03 02 CC Roger. Go ahead and torque, Orion. They look very good - -

04 09 03 04 CDR-LM My angle ... Okay. Boy, these are really neat optics. The - the Earth is in the window, and I'm looking right at the star. That's really good.

04 09 03 30 CC Orion, this is Houston. I have some torquing angles for you for the IMU.

04 09 03 38 CDR-LM Roger. Go.

04 09 03 40 CC Okay. X is 286.25, Y is all zeros, Z is 087.57. Over.

04 09 03 55 LMP-LM 286.25, all balls, 087.57.

04 09 04 00 CC That's good readback.

04 09 04 07 LMP-LM Okay, Jim. My 544 is 5 - through 546. 544 changed quite a bit. It's minus now 0.116. 545 is plus 052. 546 is minus 0.068. That was after the cal. Before the cal, they were plus 006, and plus 045, minus 088. Over.

04 09 04 30 CC Roger. I have them, Charlie.

04 09 04 37 LMP-LM And I guess we're ready for the E-memory dump.

04 09 04 41 CC Stand by.

04 09 04 43 CDR-LM Say when, Houston.

04 09 04 54 CC Okay. We're ready for the E-memory dump.

04 09 05 00 LMP-LM It's on its way.

04 09 05 02 CC Roger.

04 09 05 06 LMP-LM And, Jim, that AGS lunar align for a couple of minutes there put me within about - less than a 1/2 a degree from the PGNS.

04 09 05 15 CC Roger. We copy.

04 09 05 33 CC Orion, you're stay for T-3.

04 09 05 38 CDR-LM Roger. Stay for T-3.

04 09 06 16 LMP-LM Okay, Jim. The AGS is powered down.

04 09 06 18 CC Okay. I copy.

04 09 08 26 CDR-LM You really want to do this, don't you, Houston?

04 09 08 34 CC Go ahead, Orion.

04 09 08 43 CC Orion, this is Houston. Say again - -

04 09 08 47 CDR-LM It worked. It worked.

04 09 08 52 CC What was that, John? What worked?

04 09 08 55 CDR-LM Goes right into GIMBAL LOCK.

04 09 08 58 CC Okay. Good - good show.

04 09 09 03 CDR-LM Yeah, I thought you'd like that.

04 09 09 09 LMP-LM That's a sad feeling, just to watch that thing go over.

04 09 09 51 LMP-LM And, Jim, the old ED BATS are hanging in there at 37 each.

04 09 09 58 CC Okay. We copy, and I have a T-17 through T-21 when you're ready to copy.

04 09 10 06 LMP-LM Go ahead.

04 09 10 07 CC Okay. T-17: 106:25:05.65. T-18: 108:23:36.87. T-19: 110 plus 22 plus 08.13. T-20: 112 plus 20 plus 39.04. T-21: 114 plus 19 plus 10.65. Over.

04 09 10 53 CDR-LM Okay. T-17: 106:25 plus 05.65. Then 18 is 108:23:36.87. 19 is 110:22:08.13. 20 is 112:20:39.04. 21 is 114 hours 19 minutes and 10.65 seconds.

04 09 11 25 CC Good readback.

04 09 11 29 LMP-LM Jim, I got a question for you. I'm on page 1-5, my circuit breaker powerdown. Row 3, it has us pushing in the - leaving the PRIMARY S-BAND and the COMM, POWER AMP, and TRANSMITTER/RECEIVER closed. We have them open right now. What would you prefer?

04 09 11 51 CC Stand by.

04 09 12 07 CC Okay. Charlie, leave those open.

04 09 12 19 LMP-LM Roger. And also the S-BAND ANTENNA is open, and I'll leave that open. How about the CABIN FAN CONTROL? Do you guys want that one closed?

04 09 12 29 CC Stand by.

04 09 12 53 CC Orion, go ahead and open that CABIN FAN CONTROL.

04 09 13 01 LMP-LM Roger. It's open.

04 09 14 57 LMP-LM Jim, in my 2 o'clock position about - right on the rim of that little ridge we described earlier, there's a - a fresh little crater that is about 10 meters across, and it - it's just loaded with little 30, 40 centimeter blocks around it. Over.

04 09 15 24 CC Okay, we copy.

04 09 15 34 LMP-LM Looks like you can see these blocks in the walls of that little crater. Looks like the thing is gonna be pretty blocky in the regolith.

04 09 15 45 CC Roger. We copy.

04 09 16 10 LMP-LM Houston, it really is bright outside. The - the surface looks almost white to me.

04 09 16 38 LMP-LM Okay, Jim. We're about to power down the AC.

04 09 16 41 CC Roger.

04 09 18 05 CDR-LM You want these MESA HEATERS on HI, Houston?

04 09 18 10 CC Stand by.

04 09 18 33 CC Stand by. We're thinking about it.

04 09 19 10 CC Roger, Orion. Keep the MESA HEATERS on HI.

04 09 19 20 CDR-LM MESA HEATERS on HI.

04 09 22 29 LMP-LM Houston, the checklist says put FUNCTION from RANGE to RANGE. It's in all three steps. How do you want it?

04 09 22 39 CC I'm not reading you very well. Something you just did has caused a lot of noise down here.

04 09 22 45 LMP-LM We turned the POWER AMP OFF.

04 09 22 57 CDR-LM ... configure ...

04 09 23 03 CC Okay, Orion, you better turn the POWER AMP back ON, so we can hear you a little better.

04 09 23 26 LMP-LM How do you read now, Jim?

04 09 23 28 CC Loud and clear, Charlie.

04 09 23 32 LMP-LM Okay. We'll leave the POWER AMP on - or in SECONDARY. Do you want the FUNCTION switch to RANGE, just as checklist calls? It's in OFF/RESET now.

04 09 23 42 CC Stand by.

04 09 24 04 CC Okay, Orion. You can go to RANGE on that.

04 09 27 42 LMP-LM Jim, Houston. Over.

04 09 27 46 CC Go ahead, Charlie - -

04 09 27 47 LMP-LM Correction. Jim, Orion (laughter).

04 09 27 50 CC Go ahead, Charlie.

04 09 27 51 LMP-LM It was a long day here. Could - yeah, could we doff the suits before we do the cabin configuration and all?

04 09 28 06 CC Okay. That's fine with us - with us, Charlie. Go ahead.

04 09 28 11 LMP-LM Oh, hello there, Tony.

04 09 28 14 CDR-LM Yeah, that ...

04 09 28 16 CC Yeah, good evening fellows. Outstanding job.

04 09 28 18 LMP-LM Thank you.

04 09 28 19 CC Really nice.

04 09 28 23 CDR-LM Man, wait until you see the rocks of this place.

04 09 28 25 CC I've been listening to you. It sounds great.

04 09 28 27 LMP-LM Tony - -

04 09 28 29 CDR-LM It's going to be enough to make geophysicists sit up and crow.

04 09 28 33 CC (Laughter) You've already done that.

04 09 28 35 LMP-LM You've never seen so many rocks - you never - you never seen so many rocks, Tony. Some biggies, too.

04 09 28 42 CC Really sounds fine. I'm getting green again. I tell you I wasn't green about 3 hours ago. I'd say y'all earned your pay today.

04 09 29 04 CDR-LM All those guys in the trenches, that figured out all that, earned their pay today, I'll tell you that.

04 09 30 07 LMP-LM Hey, Tony. Tell John Covington that this thing is a piece of cake compared to his lightweight training unit.

04 09 30 15 CC (Laughter) Okay. I'll sure do that. He's running around here somewhere.

04 09 30 22 CDR-LM You should see. Charlie just picked up his 130-pound backpack with one hand.

04 09 30 38 LMP-LM Be advised, Tony, we changed our mind on doffing suits. Since we got some stuff behind the engine - ascent engine, we're gonna go through the normal configuration. We're doing the cabin configuration for stay now.

04 09 30 50 CC Okay. We copy that.

04 09 43 02 CDR-LM Okay, Houston. We're down to getting rid of the armrest. By the time we get this jettison bag full, I don't know if we're going to be able to open the door.

04 09 43 13 CC Right. I know what you mean.

04 09 43 26 LMP-LM Okay, Tony. My passive - my personal dosimeter reads 21109.

04 09 43 35 CC Okay; 21109.

04 09 43 51 CC When I went through that jettison business, I felt like I was throwing away half the cabin.

04 09 43 59 CDR-LM Mine is 22050, Houston.

04 09 44 02 CC Okay; 22050.

04 09 44 24 CDR-LM Okay, Houston. Before we do the ETB part of the cabin prep, we are going to take our suits off.

04 09 44 29 CC Okay.

04 09 44 35 CDR-LM If we'd been smart, we'd have took them off at the first part of this thing.

04 09 44 42 CC (Laughter)

04 09 45 30 CC Before you get your suits off there, you may want to bring that 500 millimeter forward from behind the engine cover there.

04 09 45 46 LMP-LM Tony, we're ahead of you. We already did that. And we got everything out from back here, and I'm putting up the ISS now, and we'll be - John's getting his stuff off.

04 09 45 58 CC Good show.

04 09 53 18 LMP-LM Okay, Tony. We've got three of us in here now, and John's out of his suit.

04 09 53 25 CC And, I assume, all three are walking around.

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04 09 53 41 LMP-LM No, not exactly. One of them is sort of lying there.

04 09 55 08 LMP-LM Tony, are y'all getting the HI bit rate data here now?

04 09 55 19 CC Yes, we do, Charlie.

04 09 55 25 LMP-LM Okay. John should be back up here.

04 09 55 29 CDR-LM Okay. I read you, Tony.

04 09 55 31 CC Very good, John.

04 09 55 42 CDR-LM I guess our opinion of this operation right about here is that - is that the coolant is really marginal in the suits, and we'd like to get permission to get a shot of cold water through the suit loop - even with the power down situation, to keep us from sweating so much. Would that be okay? Whenever we're doing something in the suit - work in the cabin?

04 09 56 16 CC Okay. We have to talk about that here.

04 09 56 26 CC Yeah. There's no problem with that, John.

04 09 56 38 CDR-LM Well, thank you. Just a shot, you know, like maybe 30 seconds worth, then quit.

04 09 57 10 CC Orion, Houston.

04 09 57 18 CDR-LM Go ahead, Tony.

04 09 57 20 CC Okay. On your CABIN GAS RETURN, we'd like to go to AUTO.

04 09 57 28 CDR-LM Roger. AUTO on the CABIN GAS RETURN.

04 09 57 32 CC Okay. And on the SUIT GAS DIVERTER, to CABIN.

04 09 57 45 CDR-LM Okay, it's PUSH - CABIN.

04 09 57 46 CC Okay.

04 09 58 37 CDR-LM Okay, Houston. We've got an ECS H₂O SEP light. Isn't that because we - we got to go to SEP 2 or something while we're in this mode?

04 09 58 54 CC Copy, John. We're working it.

04 09 59 06 CDR-LM Yeah. The SUIT GAS DIVERTER valve is chattering; it's making a sort of a purr.

04 10 00 08 CC Okay, John. We'd like you to switch water separators.

04 10 00 32 CDR-LM Okay. We're in pull to SEP 2.

04 10 00 35 CC Okay.

04 10 03 31 CDR-LM Okay. We've still got a WATER SEPARATOR light in here.

04 10 03 36 CC Okay. We copy that.

04 10 03 45 CDR-LM We've got the - let me tell you what our configuration is here. We're in PULL: SEP 2. The CAB GAS RETURN is in AUTO. We're on primary LiOH cartridge. The SUIT CIRCUIT RELIEF is in AUTO. We're in PUSH to CABIN, and our hoses are stowed against the bulkhead.

04 10 04 03 CC Okay. We copy that.

04 10 04 18 CC Okay, John. Separator speed is slowly climbing up there. It looks like it will make it up all right. It's just a bit slow.

04 10 04 27 CDR-LM Okay, fine.

04 10 05 26 CC Orion, Houston.

04 10 05 30 CDR-LM Speak, Tony.

04 10 05 34 CC Okay. I - they're thinking you may have the water-in-the-hose problem. They'd like you to drain the hoses down towards the floor. Maybe we can get some of that out of there. They'd also like you to hold your hand over the blue hose, to make sure you're getting good flow.

04 10 06 31 LMP-LM Okay, Tony. I'm back up. How do you read?

04 10 06 32 CC Five by, Charlie.

04 10 06 36 LMP-LM Okay. This ECS on the PUSH to CABIN, it sounds like to me that it - there's a - a flapper valve or something chattering back in there that is sort of - perhaps stagnating the flow in the loop.

04 10 06 58 CDR-LM Yeah, that's what it sounds like to me, too.

04 10 07 16 CC Okay. Are you getting flow out of the blue hose?

04 10 07 30 LMP-LM That's affirmative.

04 10 07 34 CDR-LM We're getting it out of there, but I feel the same way that Charlie does. It's got something trapped in there.

04 10 07 38 CC Yeah. Okay.

04 10 07 40 CDR-LM It - it's coming out in pulses. Matter of fact, I - I can make it play - I can make it play what it sounds like for you. (Valve noise) Now what you hear there is the microphone - is the mike, right up against the hose and the hose blowing against the microphone. It's not a constant thing. It just sort of chatters like some valve in there is not doing its thing.

04 10 08 28 CC All right. We heard that, John.

04 10 08 45 CDR-LM Charlie's is the same way.

04 10 08 49 CC Okay, John. We'd like to go back to EGRESS on the SUIT GAS DIVERTER, and give us a mark when you do it.

04 10 08 58 CDR-LM Okay. 3 2 1 -

04 10 09 00 CDR-LM MARK. Okay. That's EGRESS on the SUIT GAS DIVERTER.

04 10 09 06 CC Okay.

04 10 09 11 CDR-LM Flow's good in SUIT GAS DIVERTER.

04 10 09 14 CC Okay. We copy.

04 10 09 26 CC Okay. We understand. All your noise went away?

04 10 09 34 CDR-LM Yes. It doesn't chatter any more in the - in the PUSH to CABIN valve.

04 10 09 41 CC Okay.

04 10 11 46 CDR-LM Okay. The SUIT SEPARATOR light is off now, of course.

04 10 11 50 CC Okay.

04 10 12 05 CDR-LM Charlie's got the 500 configured and it works, which I'm not surprised since it was stowed like it was expected to hit like a - hit a lot harder than we could.

04 10 12 19 CC Okay (laughter).

04 10 12 25 CDR-LM One of those 30g bags.

04 10 12 32 CC Well, it's nice to have a camera work.

04 10 12 57 CC Okay, John. At your convenience, we'd like to go back to SEP 1.

04 10 13 11 LMP-LM You got it.

04 10 13 13 CC Okay.

04 10 15 45 CDR-LM Okay, Houston. I'm up to frame number 30 on mag A, Charlie's camera, and I just finished shooting sort of a partial pan out the front window. Man, this place is - it's - it's - it's not anywhere flat around here.

04 10 16 06 CC Very good, John. A-30.

04 10 16 12 CDR-LM It's - it's rolling terrain. And I - I really don't believe we're going to have any trouble at all getting up on the side of that hill, although the slope - I don't know - the slopes up toward Crown look like maybe 20 degrees. We'll have to take that very carefully.

04 10 16 31 CC Roger. What about - -

04 10 16 36 CDR-LM That first ridge is pretty - is like about 10 degrees, but from there up to Cinco and Echo, it gets rather steep there.

04 10 16 45 CC How about boulders?

04 10 16 48 CDR-LM It is just like - it is like we described, as very ridgy on Stone - Stone Mountain. Boulders - well, we landed in a block field, you know.

04 10 17 07 CC Right. Can you see any up on Stone?

04 10 17 14 CDR-LM No. Sure don't. Yeah. Maybe there is. When we get closer to it, we'll be able to tell better. I see some funny shadows up on top of it.

04 10 17 25 CC Any problems in trafficability out on the EVA-1 direction?

04 10 17 27 LMP-LM Tony, I - -

04 10 17 34 CDR-LM It's gonna be a piece of cake, I think.

04 10 17 37 CC Beautiful.

04 10 17 40 LMP-LM Tony - Tony, the problem looks like finding a flat spot to deploy the ALSEP. It's just hummocky, rolling terrain with 4- or 5-meter ridges.

04 10 17 57 CDR-LM Yeah, 100 meters from here, it's going to be on the side of a hill.

04 10 18 01 LMP-LM We can probably put it over the left there, John. Tony, I looked out - down to about 4000 feet, assessing North Ray area. There were some large blocks, maybe 5 percent of the surface up around the rim, but as you look back towards Palmetto, they really petered out in a hurry, and I think we're going to be in good shape going that way.

04 10 18 27 CC Good show.

04 10 18 32 LMP-LM One final comment here until I get back to work. About in my 1 o'clock position, about 30 meters out, just beyond the LM shadow, about twice as far as the LM shadow, there is a secondary crater with a large meter-sized block still in it. It looks like it formed the secondary, and it's got

black and white - the top 3 percent or 5 percent of the block is black and white. Apparently, below that is solid white. Over.

- 04 10 19 03 CC Very good.
- 04 10 19 07 LMP-LM And those black and white blocks - you can see them all over the place.
- 04 10 19 13 CC Is the crater round, or is it oblong? Can you get a direction?
- 04 10 19 22 LMP-LM Yeah. It looks like to me it came from South Ray. It's oblong, stoved in towards Palmetto - just like those ones down at the Cape that they dug out with a bulldozer.
- 04 10 19 35 CDR-LM I guess I have to stick to my earlier guess that we were about - maybe 200 meters north and 100 meters long past Double Spot, the northernmost crater of it. But we'll see as soon as we get out, because this is the first place I was ever at on a geology trip that I thought I knew where I was when I started.
- 04 10 20 03 CC Oh, come on. You always got it.
- 04 10 20 08 CDR-LM After about 2 or 3 hours, we always got it.
- 04 10 20 17 CC Are you through with your cabin prep there?
- 04 10 20 27 CDR-LM Charlie's loading the ETB. Can't but one guy do that at a time because it's too crowded over there.
- 04 10 20 32 CC Roger. Okay. The one thing we would like you to see if you could decide before you get out is where you would put ALSEP.
- 04 10 21 19 CDR-LM Well, we'll keep looking at it, but the trouble is, right in front of us, about 50 meters, there's a ridge, and I don't know what's on the other side of that ridge. Out about 100 meters, I can see a lot of blocks, and - but I can't tell whether there are craters out there or not, because we're at zero phase. I just don't think we could make a prediction at this point.
- 04 10 21 45 CC Okay. We copy that.

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04 10 22 19 CDR-LM Those blocks around South Ray are about the - the widest blocks I've ever seen, around the rim of that one.

04 10 22 33 CC Okay. And, John, about the time we saw that separator spinning down, we saw a rise in the suit loop pressure. We'd like you to confirm that you connected the suit - the suit hoses, blue to blue and red to red. The stowage on the wall.

04 10 22 53 CDR-LM Tony, that's affirmative. Blue to blue and red to red.

04 10 22 58 CC Okay.

04 10 22 59 CDR-LM ... was on the wall. Now they are disconnected. The blues are disconnected at this point.

04 10 23 04 CC Okay. We copy.

04 10 25 11 CC Just to put your mind at rest a little bit about EVA-1, we're looking at a pretty nominal EVA-1. We'll probably give you some new targets for the UV camera, and we can do that real time, and we won't have the TV when you get out. We'll get it when you get the LCRU up. But otherwise, it looks pretty - pretty nominal right now.

04 10 25 43 CDR-LM Roger, Tony.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 08 51 30 CMP Okay. I may not be back up for that, but, if not, I'll just execute this Flight Plan.

04 08 51 45 CC Roger; Ken, and good work.

04 08 51 48 CMP You guys did all the work today. I tell you, if we ever get a chance to look out that window, it's gonna stand you on your ears. That earthshine is as spectacular as any of the other things, which is much to my surprise.

04 08 52 00 CC I hope, with our position now, we can get on to doing some looking.

04 08 52 13 CMP

Yeah, well - I cheated a little bit there, and we didn't really have an awful lot to do while we were just spinning around. And some of those low revs came up with some very interesting observations. In particular, the one that strikes me most vividly is the fact that - if you remember all of those apparent lineations we saw in Silver Spur in the places around Hadley in the pictures. Those same kind of things appear all over the surface of the Moon down low. It's just everywhere I look in the area where there's any topographical relief. They go in all different directions. I haven't been able to sort out if there's some preferred direction or some reason for it. What - what I did happen to notice as I came across Theophilus on one of those passes was that you see this in the walls of Theophilus - that's on the interior - and in the places where there are craters around the outside or some kind of - looks like some fracture or something of that nature that goes across Theophilus or into it. You see what looks like a reflection in that these patterns - if you had a crater on the rim - these patterns would sorta show up like you would expect from a shock pattern. They would be radial and concentric to that crater. And these little lines seem to take that kind of a twist and then the fact that some of them go along with topographic highs. I'll see if I can get some photos. I didn't take any photos on this stuff because I didn't have a chance, but I looked out and saw some of these things, and they're just everywhere.

04 08 53 50 CC

That sounds like a real interesting observation there, Ken.

04 08 53 58 CMP

Okay. I'm going to get my suit off, and if I don't catch you at LOS, I'll see you at AOS.

04 08 54 02 CC

Okay.

04 08 54 18 CC

The computer is yours, Ken.

04 09 42 XX BEGIN LUNAR REV 17

04 09 53 13 CMP Hello, Houston. Casper.

04 09 53 18 CC Casper, Houston. How do you read?

04 09 53 22 CMP Loud and clear.

04 09 53 40 CC Casper, Houston. We need barber pole plus three on the camera.

04 09 53 44 CMP ... pole - three.

04 09 53 58 CMP You have it. And would you remind me when you get about 30 seconds from PAN CAMERA to stop.

04 09 54 05 CC Will do.

04 09 54 10 CMP Okay.

04 05 54 20 CMP I want to mark something on my chart, and then I'll talk to you for just a minute.

04 05 54 25 CC Roger.

04 05 54 53 CMP Okay. And I put BATTERY A on CHARGE at 105:35.

04 05 55 04 CC Roger. Copy.

04 05 55 31 CMP I've got you at the window now; but it looks like half of you have gone away. It's all black.

04 05 55 42 CC I hope we're in the sunny half.

04 05 55 48 CMP Oh, I bet you're in the dark half. Aren't you? That shows how long it's been since you've been outside.

04 05 55 56 CC It has been awhile.

04 05 56 09 CMP As I came over, I finally got squared away; and as I came across King, I had the binoculars out. And, sure enough, on the central peaks down there - the things we've been debating for so long about whether they were streaks or outcrops or what

they were - are large blocks, which are on the - the central peaks. Most of the blocks seem to lie on the eastern side of the peaks; however, there are a few blocks on the western side - enough that you can tell that the reason they look dark is they cast pretty long shadows because they're pretty huge blocks. The floor looks like it's - looks like an old mud flow. It's really a strange looking floor. It's got lots of flow bands and patterns in it. In the crater rim to the west, on the interior shows at least three distinct shades of this gray. The upper one is the same color as the surface, which is a light - sort of a darker gray. Then there's a light gray band, which runs parallel to it. And then the dark band again below that. And the light band is, perhaps, a quarter of the depth of the crater wall. To the north and west of King, I ran into some things that looked like the same sort of swirls we've been looking at up around Al-Biruni and around Reiner Gamma. These two are in the highlands. And with the binoculars, it's my impression that these probably have a certain amount of relief - topographic relief - with them. But they look - when you look straight down on them, they look exactly like the other things we've been looking at. And I took a quick picture of that thing, and I put it on magazine Victor. And if you'll keep a record of these things, Ed, that one is on Victor at exposure - oh, excuse me, it's magazine November November; and that's exposure 41.

04 09 58 23 CC We got that, Ken. And, Casper, could we get HIGH GAIN, AUTO?

04 09 58 37 CMP You've got AUTO, now.

04 09 58 46 CMP And it's oscillating. Suppose I go back to - there it is. Okay. I had a little tone in my headset that was beeping very softly, and the signal strength was doing the same thing.

04 09 59 09 CC Roger. You want to go BLOCK on the computer, Ken. And we show your OPTICS still in MANUAL. And, Ker, you're about 10 seconds from PAN CAMERA, OFF.

04 09 59 23 CMP Okay. The computer's in BLOCK. Okay.

04 09 59 30 CC I was a little late with that one.

04 09 59 35 CMP (Laughter) Okay. No sweat. We got it done. I'll check the OPTICS. And when you're ready, I'll start configuring the SIM bay.

04 10 00 03 CMP And, Hank, would you verify that it's okay to take the OPTICS and put them to CMC - or to zero them. I sure don't want to take any chances with it.

04 10 00 18 CC Okay. It's okay. They say nothing will happen.

04 10 00 31 CC And, Ken, we've got a little trouble with the HIGH GAIN. We need to go back to REACQ.

04 10 00 42 CMP Okay. I'm in REACQ. Want to go back to AUTO now?

04 10 00 47 CC Stand by. Okay. Cleared to go to AUTO.

04 10 01 06 CMP Okay. AUTO it is. You got a good one that time. And if you're ready, I'm ready to start deploying things here.

04 10 01 16 CC Okay, Ken. Would you stand by? We're waiting for Oso [?] to get his data.

04 10 01 24 CMP Oh, very well.

04 10 01 39 CMP Dum-de-dum (singing).

04 10 03 11 CC Ken, while we're waiting here, how did your extend time go on the mapping camera?

04 10 03 18 CMP I didn't time it that time, Hank. I - sorry.

04 10 03 22 CC Okay.

04 10 03 27 CC Casper. PAN CAMERA POWER, OFF.

04 10 03 34 CMP Okay. PAN CAMERA POWER is OFF.

04 10 03 36 CMP MARK it.

04 10 03 44 CC Oso [?] has his data now. We can proceed with boom deployment.

04 10 03 55 CMP Okay. We button this up. Okay, the first one you'd like is a - how about a mass spec for 61 seconds?

04 10 04 13 CC That's affirmative.

04 10 04 17 CMP Okay. Going to DEPLOY - -

04 10 04 20 CMP MARK.

04 10 05 22 CMP DEPLOY is OFF this time.

04 10 05 25 CC Roger. You're clear to start the gamma ray out.

04 10 05 40 CMP Gamma ray is going out.

04 10 06 34 CMP Gamma ray is stopped.

04 10 06 39 CC Okay, Ken. And could you give us barber pole plus 4 on the MAP CAMERA.

04 10 06 45 CMP Okay. That should be one more step. Right?

04 10 06 48 CC That's affirmative.

04 10 06 52 CMP All right. You've got it. Okay, now the MASS SPEC experiment is going to ON. The ION SOURCE is going to STANDBY.

04 10 07 25 CMP ALPHA PARTICLE and X-RAY DOOR is coming OPEN - -

04 10 07 28 CMP MARK. And it's good.

04 10 07 58 CMP And the X-RAY is coming to ON - -

04 10 08 02 CMP MARK.

04 10 08 30 CC ... somebody looks real good right now a - like to read you up a TEI-26 pad block data.

04 10 08 42 CMP Okay. Would you stand by just a second while I get some food going here?

04 10 08 46 CC Okay.

04 10 09 43 CC Ken, for your information we're planning on your retirement - to rest that is, at 109:30, the nominal time.

04 10 09 52 CMP I'm glad you clarified that.

04 10 10 02 CMP I hope you realize I'm too young to retire.

04 10 10 05 CC Roger.

04 10 10 14 CMP Can you tell me anything about the status of the surface guys? Are they gonna get at least two EVA's out of this?

04 10 10 28 CC I think the plan is now, Ken, for two EVA's. They are busy buttoning up the LM now and getting ready to get some sleep. They're gonna move the EVA times - at least the first one's gonna be tomorrow morning about 10:30 Central, I think.

04 10 10 46 CMP Okay.

04 10 10 48 CC And we're gonna change our shifts around too, so I'll be on again in the morning, and then Stu'll get it in the afternoon.

04 10 11 00 CMP Okay. All right, now I got something soaking here. I'll be ready to copy. Okay. Go ahead.

04 10 11 15 CC All rightee. TEI-26, SPS/G&N; 38726; plus 0.72, plus 1.33; 125:14:27.47; plus 3170.3, plus 1101.6, minus 0310.1; 181, 089, 021; rest of the pad, NA. The set stars are the same as on your circ pad; same attitude; ullage, two jets, 17 seconds; other, Lambda of the Moon at Tig, minus 179.02 end of pad.

04 10 12 40 CMP Okay. That's a TEI-26, SPS/G&N; 38726; plus 0.72 plus 1.33; 125:14:27.47; plus 3170.3, plus 1101.6, minus 0310.1; 181, 089, and 021; Sirius and Rigel were the angles off the circ pad; two jets, 17 seconds; Lambda 179.02, and that's a minus.

04 10 13 09 CC Good readback, Ken.

04 10 13 31 CC Okay, Ken; we're gonna leave you alone and let you eat now. We've still got about 49 minutes to LOS. And at your convenience, sometime a little later, we'd like to get the crew status report from this morning, which was omitted.

04 10 13 47 CMP (Laughter) Okay. That's gonna take some book-keeping; I'll work on that. Sure would rather look out the window, Hank.

04 10 13 59 CC Did anybody ever give you some words on the undervolt last night?

04 10 14 07 CMP Yes. The words we got were that I inadvertently attempted to get the pan camera on the same time the heaters all came on and - I guess the transient was just - just too much.

04 10 14 22 CC Roger. That's - that's the story as I get it.

04 10 14 23 CMP Is that the way you understand it?

04 10 14 25 CC Right. That's affirmative.

04 10 14 30 CMP Okay, well - I'm sorry we missed those photos, but it - it sure seemed like the prudent thing to do at the time.

04 10 14 41 CC We concur.

04 10 17 53 CMP Henry, another thing that turns out to be a - a pretty nice little gadget is these nets that are in the stowage compartments. Particularly when you get in the food locker when it's about half full. Things are able to stay under some semblance of control. And that's a mighty nice thing.

04 10 18 22 CC So those are working out real good, huh?

04 10 18 26 CMP Yes, it sure is. That's been a very - help.

04 10 18 42 CC And, Ken you don't have to acknowledge. Look our plans are in the morning first thing to give you a clock sync and get back into the Flight Plan.

04 10 19 42 CMP That sounds like a good plan.

04 10 21 09 CMP Oh, one thing you've got to be careful of up here is - when you go to look outside, you kind of have to watch it because you get your - you get too greedy and you get your nose up against the window. About one breath is all it takes, and it's all fogged over.

04 10 21 25 CC Roger. I understand.

04 10 21 27 CMP I think our humidity must be running fairly high.

04 10 21 37 CMP I'm passing over a nice little guy right now and would guess - oh, I haven't been paying any attention to where I am - looks like I must be - probably looking the the north at - somewhere around the - Guts - Gutenberg uplands. And I'm passing over a little crater that's got another large fill in the center and nice big crater in top of him, a little crater chain around it. And as I said earlier, everything out here has this linear pattern or these lineaments and it doesn't matter whether it's a flat surface, a horizontal, vertical, inside of a wall of a crater - they all seem to have it in one form or another.

04 10 22 35 CC Okay, Ken. If - if our plot board up here is right, you ought to be in - coming up on landing site.

04 10 22 48 CMP Okay. Let's see.

04 10 23 03 CMP Oh, maybe I'm out the wrong window here.

04 10 23 34 CMP You're right, Henry.

04 10 24 28 CMP And, if you'll remember that little black dot that we drew on our map and talked about. There's a little black spot about in the right area, and I don't have my map so I just looked out at it. But I'll come back next time and take a look and - sure like it is something - entirely different texture.

04 10 24 48 CC Are you talking about right in the area of the landing site?

04 10 24 53 CMP In the - in the landing site area, but not in the landing site - traverse regions. But that little dark thing looked like a - a possible cone that was out to the - north and to the west. There's a little black dot out there that looks like there may be something that's - that is distinctive. And next time I come over, I'll be better prepared to look for it.

04 10 25 19 CC Okay. I remember that one, that was in the edge
of the plotter, wasn't it?

04 10 25 26 CMP Yes, sir.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 10 25 30 LMP-LM Roger, Tony.

04 10 27 24 LMP-LM Okay, Tony. I've got the EVA maps out and as I -
as I can see - gather here, we got two - two maps
and one return chart. Is that what you agree with?

04 10 27 40 CC I'll see; wait a second.

04 10 28 21 CC Okay, Charlie. That looks good here.

04 10 28 28 LMP-LM Okay. I'm going to leave the - optimistically
leave the walking traverse maps in the cabin.

04 10 28 34 CC All right.

04 10 31 45 LMP-LM Okay, Tony. The ETB is stowed over in my corner.

04 10 31 49 CC Okay, very good.

04 10 32 08 LMP-LM And you know in training, I could barely lift this
thing, and this 1/6, it's one finger.

04 10 32 21 CC This tells me we should do more work on the Moon.

04 10 32 26 LMP-LM Oh, I'll say.

04 10 33 31 LMP-LM How's the ECS looking to you now, Tony?

04 10 33 34 CC Right now, it's looking pretty good.

04 10 35 19 LMP-LM Okay, Tony. We've done all of your sequence here.
We got the suits off and stowed, the cabin con-
figured, and I guess we're ready to go to an eat
period and bed down. Okay?

04 10 35 33 CC Okay. I've got a little bit of a checklist change
I'd like to read up to you here when you're ready.
It's in the Surface Checklist.

04 10 35 42 LMP-LM Go ahead.

04 10 35 45 CC Okay. This debriefing with Houston will be at
106:28. The time now is 106:35, so we're real
close on that. Your eat period is to start 106:43.
And then the PLSS and O₂ and H₂O recharge we'll

skip. The feedwater recharge we'll skip. On to the next page. The presleep at 107:28, and we'll skip the - the computer work there, that first line under presleep. And the rest period will begin at - and the rest period will begin at 107:53; and number 8, the next - the next step will be at 115:53. That will be postsleep. Again, in that section, three-quarters of the way down the page, we'll skip the computer work. And the eat period will be at 116:18.

- 04 10 36 54 LMP-LM Stand by. Hey, you lost me, Tony. Okay. Here we go on page 3-7, postsleep. Go ahead.
- 04 10 37 03 CC Roger. Postsleep on page 3-7. Step 8 there - or my number 8 - is at 115:53, that's postsleep. And then three-quarters of the way down that page under postsleep, there is some computer work, PRO, VERB 37 ENTER. We'll drop all of that. Eat period will begin at 116:18, and the last line on that column is top-off PLSS O₂, we'll delete. Okay.
- On the EVA-2 planning with Houston, we'll skip all that, and then we'll don suits on the next page 3-8. We'll don suits at 117:03. Okay, and at the end of that page - -
- 04 10 37 54 LMP-LM We copy.
- 04 10 37 57 CC Okay, and at the end of that page we'll go to page 2-5.
- 04 10 38 07 LMP-LM Okay.
- 04 10 38 08 CC Okay, and we'll prep for EVA-1 at 117:53, and then - from then on, we're nominal.
- 04 10 38 26 LMP-LM Okay. At 2-5, what was the time?
- 04 10 38 29 CC 117:53.
- 04 10 38 36 LMP-LM Okay, copy. Let me go through this now. Okay. We've doffed the PGA, we're - EVA debriefing with Houston comes next as step 2. Step 3 is the eat period.
- 04 10 39 00 CC Okay, Charlie.

04 10 39 01 LMP-LM Turn the page. Step 4 - go ahead.

04 10 39 05 CC Okay. Just to get our steps numbered straight here, I guess assigning numbers to these things. Debriefing with Houston is step 4, eat period is step 5. And the times you read were right, and then the presleep is step 6 and the - each number goes on from there.

04 10 39 26 LMP-LM Okay. Presleep is 6, then we wake up for post-sleep, and that's number 7.

04 10 39 33 CC Roger. Rest period is number 7.

04 10 39 36 LMP-LM And we got a - oh, okay, rest period is 7. I see. Okay. And then 8 is postsleep.

04 10 39 46 CC That's affirmative.

04 10 39 50 LMP-LM And skipping the computer activity stuff, number 9 is the eat period, and we delete the top-off the PLSS; we turn the page, we skip - well, we skip EVA-2 planning; we turn the page and that step, don suits, is next.

04 10 40 11 CC Right; that's number 10.

04 10 40 13 LMP-LM And that's step 10. Okay. Then we go to 2-5, and we're just about back to nominal, then.

04 10 40 23 CC Roger. And that's step 11 on 2-5.

04 10 40 28 LMP-LM Copy.

04 10 40 32 CC Okay, have a good meal.

04 10 40 36 LMP-LM Okay, Tony. Let's - let's do the debriefing. We don't really - I'd like to describe for a LM window description. We had so much practice at that, I'd like to see how I could do.

04 10 40 50 CC Have at it. We'll take any words you've got. We expended all our questions a few minutes ago with John, and in fact I didn't even have to ask any; he just answered them all, so - but press on.

04 10 41 04 LMP-LM Okay. Looking out at 12 o'clock on the horizon, there is a very hilly subdued region - well, let's say hilly terrain at 12 o'clock that goes on out of view around to 11. It's a rolling with white pockmarked craters there, and I'd say that's maybe 50 to 100 meters above the surrounding terrain where we are. As you move around from 1 to 3 o'clock approaching the - at about 1 o'clock, I would say we can see maybe a kilometer or so, but it might be very deceiving on that distance and we see more rolling terrain similar in albedo. It's a light gray with fresh craters being white. As we come on to 3 o'clock - 2:30 to 3 - the near ridge that was on our map so that blocks out North Ray and Stone Mountain is, correction, Smoky is really there and it's about a - oh, a 3- to 4-degree slope, and the ridge maybe goes up 10 to 15 meters. As we come into the near field at 12 o'clock (clears throat) it, excuse me, at about - in front of the LM maybe 50 to 100 meters, there's this other low ridge that we described, beyond that we can see a depression or - and then it rises again to another ridge, which is probably - goes into Spook Crater. I think I can see Spook on the horizon at about my 12 o'clock position. As we - that is boulder covered. The largest boulder I see is perhaps 2 to 3 meters in (clears throat) width, and they're angular and those are - there are three of those boulders, and one is at 12. The other two are over at about - on that second rise away from us at about 1:30, and I'd say those boulders and smaller down to 1 meter cover maybe 1 percent of the surface. The trafficability out that way looks good as far as boulders go. It's going to be up and down though. As we come into 2:30 from 50 to 150 meters, I've already described that bright fresh crater with the small blocks around it, more cobbles really. Beyond that, there are two other craters, which sort of trend into this depression that runs north-south here. There's a - a boulder beyond that at 2:30, which is partially buried. It has a good fillet on the south side, to the north side, and to the east side, there's no fillet at all. As we come on into 3 o'clock in the near field, I see a good size crater, perhaps 30 meters to 50 meters at 2 o'clock on the inboard side, that's my side of this ridge, and we have maybe 10 percent of the surface covered with blocks of less than half a meter. Over.

- 04 10 44 26 CC Very good, Charlie. Where again was this boulder with the fillet?
- 04 10 44 33 LMP-LM It's at about 2:30, maybe a couple of hundred meters out, and it's on the in - on this side of the ridge that trends east-west here, that blocks out Smoky.
- 04 10 44 45 CC Okay. Could it be sliding down the ridge, and that's why the fillet's on the south?
- 04 10 44 52 LMP-LM That - that might be the reason. I was just going to say, it's downslope so that might have been what happened.
- 04 10 44 58 CC I got you.
- 04 10 45 00 LMP-LM Though - though the slope doesn't appear that steep, Tony.
- 04 10 45 05 CC Okay. How about the Buster area? Can you identify that?
- 04 10 45 10 LMP-LM Boy, that's really - We sure saw it on descent. I don't see it right now. There's a bright ray - a bright crater to the right, maybe 50 meters of what I think is Spook, which is probably Buster, but I really wouldn't swear to it.
- 04 10 45 31 CC Okay. Can you tell boulders over there?
- 04 10 45 37 LMP-LM There's not a one, as far as I can see.
- 04 10 45 40 CC Okay.
- 04 10 45 45 CC Very good, Charlie. You're right up to your old peak.
- 04 10 45 49 LMP-LM Coming down on - Okay, coming down, Tony, on descent it looks - as John has described, there's a distinct ray pattern across our landing site from South Ray, and the boulders get - effectively disappear by [sic] we get to Palmetto. And then they don't reappear again until almost the flank of North Ray. You can see that depression that trends southward out of North Ray, and you can see the ridge line that I think will be an excellent way

to climb up to North way - Ray in the Rover. Now this was all from 5000 feet, so I might be a little off on that, but at least the general impression was good. We could see Dogleg, we could see Cat; all of the craters that were on the stops were plainly visible. Hopefully, they'll be so when we start navigating on the ground.

- 04 10 46 48 CC Very good. You were mentioning the boulders and the rays from South Ray. The ray itself, could you map out what extent it was, or was it just the whole general area?
- 04 10 47 02 LMP-LM It was a pretty wide ray coming across here. I would say from - It goes from our position perhaps to Spook. And maybe behind us maybe another 100 meters or so.
- 04 10 47 15 CC Very good. How about left-right extent, did it go all the way back to South Ray?
- 04 10 47 23 LMP-LM Well, you'll have to ask John that. I didn't - couldn't see out that way. As we - The biggest block that I saw was one we flew over which is maybe 100 meters to 200 meters behind us, and it looked like Volkswagen size.
- 04 10 47 41 CC Very good.
- 04 10 47 47 LMP-LM John is off comm momentarily. He'll be back up in a little bit, and I'm going to start the chow.
- 04 10 48 05 LMP-LM And, Tony, I wouldn't give you 2 cents for that orange juice as a hair tonic; it mats it down completely.
- 04 10 48 11 CC Well, that might be the point. We'd like to go your suit GAS RETURN back to CABIN. Give it a try.
- 04 10 48 23 LMP-LM Okay. We'll try it in CABIN. We also tried this in orbit and we got the same sound, Tony. We're going to CABIN now.
- 04 10 48 29 LMP-LM MARK.

04 10 48 30 LMP-LM Okay, it gives us the same sound.

04 10 48 40 CC Okay, we'd like to go back to EGRESS.

04 10 48 45 LMP-LM Hey, Tony. I tell you what it is. I just opened the CABIN GAS RETURN and it stopped it. What it was is that the CABIN GAS RETURN check valve is not working right. The flow is great now.

04 10 49 14 LMP-LM Our configuration is SUIT GAS DIVERTER, PUSH-CABIN, and CABIN GAS RETURN to OPEN, and everything sounds normal.

04 10 49 25 CC Okay. We'd like to leave you that way.

04 10 49 33 LMP-LM Okay. Have you guys got a suggestion of what meal you want us to eat?

04 10 49 51 CC We're working that one.

04 10 50 08 CC Okay.

04 10 50 13 LMP-LM I got day 5, meal B.

04 10 50 15 CC I guess we'd like you to just go ahead with your first lunar meal. I guess that deserves some champagne, I don't know.

04 10 50 26 LMP-LM Well, like John said earlier, we're definitely not going to get scurvy; we've got so much orange drink here.

04 10 50 34 CC Roger.

04 10 51 19 LMP-LM Okay, Tony. We're going to eat day 5, meal B.

04 10 51 30 CC Okay. Was that Dog?

04 10 51 38 LMP-LM Bravo, as in "boy."

04 10 51 39 CC Roger.

04 10 52 30 LMP-LM Houston, John finally found his spoon.

04 10 52 34 CC Very good.

04 10 53 09 CDR-LM Hello, Tony. Back on comm. Tony?

04 10 53 25 CC Go ahead.

04 10 53 30 CDR-LM I can't see how far the rays ... I just assumed that. This is a blocked view we're in from South Ray. It goes about 100 meters out at 10 o'clock and goes over a ridge and disappears. The next time I see it, it's at South Ray, which is, you know, pretty far away from here. South Ray is a doggone interesting crater. I wish - I wish we could get to it. The boulders on the west rim of it are just thick and white as they can be, and in the middle of it - you know, on your map where it looks like it's a depression - there appears to be a brown - a sort of a gray patch of dirt or something that was thrown out of - out of that side of it. And then on the north, there's another ray of very white boulders coming out of it. Of course, we could see the ray pattern long before pitchover. At 22,000, I was able to get my nose up against the window and see the clue to where we were was South Ray. Because at 22,000 and at 60-degree pitch angle, we couldn't even see Stone Mountain or any of the things in the rear, but you just didn't have any doubt in your mind that that big crater, and the way the pattern went, you work your around the pattern - I used the same gages to find out where we were going to land that we used on the LMA. The inverted "V" off of Stubby; Cove, Trap, Stubby, Wreck, Trap, and it works into Cove, Hidden Valley, and into Spook and from Spook off those small craters into Double Spot. And, I think we ended up landing right by one of the smaller craters that sort of - sort of form a hook off the side - the north side of Spook, going back into Double Spot, and I think we're about 50 meters from it at 9 o'clock, but - -

04 10 55 44 CC Very good. How about the albedo?

04 10 55 46 CDR-LM I can't - -

04 10 55 48 CC How about the albedo?

04 10 55 55 CDR-LM Tremendous - tremendous difference in albedo. On the North Ray is pure white - South Ray is pure white, and it blends into a gray, and then over here by us, it's almost totally gray. I guess

you - you just get the feeling that these rocks may have come from somewhere else. There's a big subangular rock that I see at 10 o'clock, no, at 11 o'clock at about 100 meters, that I would sure like to go over and look, because it looks like it's just one big piece of whatever rock it is.

- 04 10 56 36 CC Charlie, I was wondering about - -
- 04 10 56 37 CDR-LM Oh, and I do happen to see a white glass in the bottom of it.
- 04 10 56 42 CC I was wondering about the albedo on your surface chart, on the strips and things, whether the ray - the rays are as obvious as they are on the high Sun angle chart that you're carrying, or whether they look very much different at the low Sun angle.
- 04 10 56 58 CDR-LM No, they're not, I don't think. I can - I can see from here down to - Survey Ridge and it is - the albedo on there is a lot lighter. It's a general gradual downslope from our landing point to Survey Ridge, and it looks like it drops maybe a hundred meters and then starts to go right back up Smoky Mountain. I guess you could see on a contour map where the low spot is.
- 04 10 57 37 CC Okay.
- 04 10 57 38 CDR-LM But there are some strange looking craters over there on Stone Mountain, and the albedo contrast is really - really pronounced in those craters. There's some - It may be a function of shadow, we better wait until we get over there. I hesitate to say, they almost look like bit - Well, they must be impact craters, I guess.
- 04 10 58 07 CC Okay. I was just wondering about whether you could recognize whether you're on a ray by albedo as well as the boulder content.
- 04 10 58 20 CDR-LM I think you're going to be able to; but, boy, you're not going to pick up a contact; it's just going to - it's - you know, it just tails out into something.
- 04 10 58 30 CC Outstanding, that's better than I thought.

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- 04 10 58 36 CDR-LM You're not going to be able to work across the contact. But you mainly would do it by the white boulders in the ray, I think. I can see, on ridge lines - from here, I can see three different rays out of South Ray, I believe. Have to go down there and look at them to make sure. They seem to be riding on the ridge lines, although that's probably deceptive because I can't see down in the - I can't see down in the rolls.
- 04 10 59 05 LMP-LM Tony, one other comment from my side, distances are pretty deceiving here for me. I'm looking out over John's shoulder, and it looks like to me you could throw a rock into South Ray from our present position; which is, I know, impossible. A second comment has to do with the orbital, since we got so muck [sic] so much look at the ground sailing around waiting to come down. Everywhere that we could see - everywhere we saw the ground, which is just about the whole sunlit side. In the crater walls and on the ridges, you had to - we had the same lineation that the Apollo 15 photography showed on Hadley Delta and Hadley Mountains. It was really remarkable how in the crater walls primarily, and in the ridges, and it gave you the impression that it was a fracture pattern that was all trending parallel to the - concentric around the craters, in the craters and - on the ridge, though they were sort of either parallel to the ground or at some depth, be what that may. Over.
- 04 11 00 26 CC Okay, very good.
- 04 11 00 31 CDR-LM And I'm looking out here at Stone Mountain, and I got a picture of it, and it looks like it's got - looks like somebody has been out there plowing across the side of it. The benches just look like one sort of terrace right after another, right up the side. And they sort of follow the contour of it right around.
- 04 11 00 51 CC Any differences in the terraces?
- 04 11 00 58 CDR-LM No, Tony, not that I can tell from here. Those terraces could be rays out of Stubby or something like that.

04 11 01 06 CC Okay. You mentioned two different rock types.

04 11 01 10 CDR-LM I can see - I can see Stubby has a - Right at the edge of Stone, Stubby has got much steeper walls going off of Stone Mountain than I originally imagined it. It's - I don't think Stone Mountain came up to Stubby and stopped.

04 11 01 40 CC Okay. You think Stubby is punched into the edge - -

04 11 01 47 CDR-LM Well, that's my guess from here but there again, it's - the thing is so steep that the whole side of Stone Mountain right now from a good half of it is in shadow.

04 11 01 59 CC Okay. Go ahead, Charlie. One thing, you mentioned two rock types - the black and white ones and then the all white ones. Do you see anything else?

04 11 02 13 LMP-LM Yes, there was one right out in front of the LM here, just right down at the - just to the right of the footpad that looks like a breccia to me, Tony. Or - either that or an indurated regolith. We'll tell you when we get out.

04 11 02 30 CC Okay.

04 11 02 45 LMP-LM Tony, we'll give you an analogy of what that black and white rock looks like. It's really a gray and white and looks like a granitic rock with very large crystals to it, though I kind of doubt that.

04 11 03 05 CC Outstanding. You're really whetting our appetites.

04 11 03 13 CDR-LM There are really some interesting rocks out here. I see some that are pure snow white, and we've got the whole run - we've got the whole run of them. It's hard to tell at this Sun - at this sunlight, which is so bright on the surface, just exactly what color these things are, even with the naked eye. You know, it's very deceptive. I swear I see one out there with some pink in it, but we'd better wait until we get out. We'll pick it up and make sure.

04 11 03 42 CC Roger. I understand.

04 11 03 48 LMP-LM What do you call tomato soup made with cold water, Tony?

04 11 03 52 CC Awful.

04 11 04 00 LMP-LM John says cold tomato soup.

04 11 04 36 CC Hey, Charlie. When you get a chance, could you take a look at that ridge at 12 o'clock, which you described as 50 to 100 meters out, and see if that continues on around 010 and 9?

04 11 04 50 CDR-LM Yes, it does.

04 11 04 53 CDR-LM Okay, continues on around to my side.

04 11 04 57 LMP-LM John's original observation was that we look like we're in a big old subdued crater, and that's really what it looks like, Tony.

04 11 05 05 CC Okay.

04 11 05 14 LMP-LM Man, those black and white rocks really look interesting, Tony. I just can't wait to grab one of those.

04 11 05 24 CC I tell you, Charlie, we feel the same way.

04 11 05 28 LMP-LM In fact - In fact, the impression you get is that it's - it almost looks like the color of labradorite.

04 11 05 37 CDR-LM Oh, Charlie.

04 11 05 56 LMP-LM Tony, I guess it's really a bluish cast, instead of - instead of real black to me, but in this Sun it looks bluish.

04 11 06 05 CC Right, we understand.

04 11 06 14 CDR-LM Well, we'll bring you a small one of each. I'll tell you one thing, I'm glad we brought the rake, because we - we really can do it.

04 11 06 21 CC Very good.

04 11 06 25 CDR-LM We can get a rake sample out. We can get a rake sample out in front of the - the lunar module with one scoop.

04 11 06 33 CC Okay. And when you get a chance, we'd like you to stow those hoses. I guess we don't have enough friction in there, and the water separators are running wild. Okay. And if you can pull yourselves away from the window there, we'd like you to hold to the schedule of starting presleep in about 20 minutes.

04 11 07 11 CDR-LM How can we start presleep in 20 minutes when we haven't even gotten to eat yet, Tony? For goodness sake.

04 11 07 21 CC Okay. Hey, the back room gave you a bravo on your descriptions there.

04 11 07 39 LMP-LM I'm like a little kid on Christmas Eve, Tony.

04 11 07 42 MS ...

04 11 07 47 LMP-LM It really is neat to have a gravity field around to set stuff on. That is really the cat's meow. (Laughter)

04 11 07 59 LMP-LM Okay. The hoses are hooked back up, Tony. You should see some decrease in the separator.

04 11 08 04 CC Okay.

04 11 08 12 CC I think I know how you feel, Charlie. I'm pretty turned on myself.

04 11 12 38 LMP-LM Tony, how is Casper doing?

04 11 12 42 CC Say again, Charlie.

04 11 12 48 LMP-LM How is Casper doing?

04 11 12 52 CC Everything's fine up there. I just looked over occasionally. You've been keeping me so occupied here, but they've got no problems.

04 11 13 00 CDR-LM Super.

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04 11 13 07 CDR-LM Boy, you can't imagine how nice this 1/6 gravity is. This is the first time I've been able to eat soup without knowing whether I was going to eat it or take a bath in it.

04 11 15 04 LMP-LM And, Tony, John and I'd just like to give our thanks to the backroom guys and everybody that worked so hard on Casper's problem, giving us a chance to get here.

04 11 15 18 CC Roger, Charlie. I think everybody around here appreciates their job.

04 11 15 37 CDR-LM Gee, I'm sure glad somebody was able to come to that conclusion, because it sure looked black there for a while, didn't it?

04 11 15 44 CC You betcha.

04 11 16 01 CDR-LM I'd like to get somebody to put into words to the big Sim Troop in the sky and tell Him to let's make it a little more nominal from here on out.

04 11 16 09 CC I'm all for that.

04 11 16 13 CC That was too much like a sim.

04 11 19 58 CC Orion, Houston.

04 11 20 04 CDR-LM Go ahead, Tony.

04 11 20 05 CC Would you verify that the O₂ demand REGs are in CABIN?

04 11 20 17 CDR-LM That's verified.

04 11 20 22 CC Okay. We copy that. It looked like the pressure was dropping down a little bit.

04 11 21 07 CC And while you're eating there, I might brief you on a couple of things. At about 108 hours, which is about time you'll be going to bed there, the RCS pressure will build up to the point where you'll get an RCS light again. And just reset, there's nothing to worry about. And then sometime just before you wake up in the morning, you may very well get a second caution light and alarm when the thrust pressure - helium thrust pressure

gets built back up to 1700. And if you go to helium monitor on the TEMP/PRESS gage there, that'll go away. There's no way we can inhibit that.

04 11 21 54 CDR-LM Okay, Tony. Thank you.

04 11 21 58 CC Okay.

04 11 21 59 CDR-LM Okay. In other words, we're going to wake up twice tonight already, huh?

04 11 22 05 CC Yeah, probably. The first one should go off before you get to bed, though. But that second one will probably come on before - just before you should wake up.

04 11 22 17 CDR-LM Okay. How much - how much sleep from the time when we start to bed do you want us to get?

04 11 22 29 CC Eight hours.

04 11 22 34 CDR-LM Understand, an 8-hour rest period.

04 11 22 42 LMP-LM Okay, Tony. We're about to fill the drink bags, and what we're going to do is refill the ones we had this morning, and use just with - just plain water. Over.

04 11 23 20 LMP-LM Copy that, Tony?

04 11 23 22 CC I already copied that. We're just trying to figure out - I wonder why you're not using the Gatorade? ... or orange juice ...

04 11 23 34 LMP-LM Well, we drank one bag. Okay, we drank one bag. The stuff we filled from the command module this morning we drank. And that leaves us with two bags for two subsequent EVAs. And we could fill one of the other bags and just drink water on the third or whatever you want us to do.

04 11 24 00 CC Oh, we don't care. Do whatever you want there. Water's fine.

04 11 24 08 LMP-LM Yeah, I think we'd rather save the fortified stuff till the last.

04 11 24 15 CC Okay. We understand.

04 11 31 39 LMP-LM Okay, Tony. What's our GET right now?

04 11 31 44 CC 107:31.

04 11 31 48 LMP-LM Okay. What - Who do you want on biomed tonight?

04 11 31 56 CC Okay, Charlie. It's your turn.

04 11 32 01 LMP-LM That's what I was afraid of. Okay. You've been looking at me since landing so we'll just stay right here.

04 11 32 12 CC Okay. Okay, while you're worrying about that, your comm configuration for the night will be S-BAND POWER AMPLIFIER, SECONDARY, as present. The TELEMETRY will be LO, VOICE will be DOWN VOICE BACKUP, RANGE will be OFF and as I said you're on biomed.

04 11 32 41 LMP-LM Okay, starting - go through that again.

04 11 32 44 CC Okay, it's S-BAND POWER AMPLIFIER, SECONDARY as present, TELEMETRY, LO, VOICE will be DOWN VOICE BACKUP, RANGE, OFF and you're on biomed.

04 11 33 06 LMP-LM Okay, Tony, we have DOWN VOICE BACKUP, biomed lights, TELEMETRY, LO. How did you read?

04 11 33 18 CC Okay, you're pretty weak there for a second Charlie. Try it again.

04 11 33 25 LMP-LM Okay, DOWN VOICE BACKUP, 1, 2, 3, 4, 5, 4, 3, 2, 1. Over.

04 11 33 31 CC Okay, that's much better.

04 11 38 04 CC Charlie, Houston.

04 11 38 10 LMP-LM Go ahead.

04 11 38 11 CC Okay, at your convenience I have some changes to your emergency lift-off checklist in the Surface Checklist. Just give me a call when you're ready to take it.

04 11 38 25 LMP-LM Stand by.

04 11 38 59 LMP-LM Okay, Tony, I'm ready to copy, if you'll give me a page.

04 11 41 02 CC Okay, it's in the Surface Checklist 11-1.

04 11 41 16 LMP-LM Okay, you speak.

04 11 41 19 CC Okay, on the PGNS activation - it's down in the bottom left-hand side. The last entry there is "PRO and hold in STANDBY light off." Cross that line out. And add the line underneath CB or circuit breaker panel 11, "LGC/DSKY, close."

04 11 42 01 LMP-LM Okay, go ahead.

04 11 42 03 CC Okay, on the second column, they have a correction to the checklist, it says "Circuit breaker 16" - "Circuit breaker panel 16 and INVERTER 1, close." That should read "Circuit breaker panel 11 INVERTER 1, close." Then we'd like to insert - -

04 11 42 21 LMP-LM Okay, got it.

04 11 42 23 CC Okay, and we'd like to insert underneath that line "Circuit breaker panel 16, INVERTER 2, close, and INVERTER switch to 2."

04 11 42 42 LMP-LM Okay, INVERTER to 2, and cross out INVERTER 1.

04 11 42 51 CC Right. Okay on 11-2, underneath on the left-hand upper side you have asterisk CB 11 and 16, underneath that line write in "P ephemeris update if available for MSFN."

04 11 43 33 LMP-LM Okay, is that an up-link or do we load?

04 11 43 37 CC Stand by.

04 11 43 58 LMP-LM Okay, Tony, John thinks it's VERB 25 907 ENTER, 1706 ENTER, and don't load the ephemeris, and I think that's correct.

04 11 44 31 CC Roger, Charlie; that's correct.

04 11 44 38 LMP-LM Okay, go ahead. Any other words.

04 11 44 40 CC Right. On - I've got on your circuit breaker configuration here, I've got some that will be open and you might as well note that they will be open and that's okay. So on 11-3 panel 11, first line there, S-band antenna will be open.

04 11 45 11 LMP-LM Keep going.

04 11 45 13 CC Okay. And on 11-4, fourth line, panel 16, S-band antenna will be open.

04 11 45 28 LMP-LM Okay, go ahead.

04 11 45 30 CC Okay, and we go on to 11-6 now. You have the setup for your steerable antenna and you can just cross all that; and that's the end of it.

04 11 45 44 LMP-LM Okay. We copy all of those updates. The only one I don't understand is on 11-1, on the PGNS activation, ... we crossed out the PRO and added an LGC/DSKY closed and right before that it says LGC/DSKY closed.

04 11 46 09 CC Okay. You're right. That's an error on our part. Just cancel out our addition.

04 11 46 17 LMP-LM Okay. No problem. I just thought maybe something went by me, there.

04 11 46 21 CC Right.

04 11 46 23 LMP-LM Okay, Tony, if that's everything, we're ready to go to bed.

04 11 46 26 CC Good show.

04 11 47 15 CC Okay, we're through with everything here, and we're all set to let you go to bed. You're going to bed, I'll have you know, a whole 6 minutes early. I guess the government can allow you to have that time off.

04 11 47 30 LMP-LM Okay. I'll be on comm. John will be off comm, and we're going to turn off the lights now.

04 11 47 42 CC Okay. We'll see you tomorrow, and we're sure looking forward to it.

04 11 47 52 LMP-LM Hey, so are we. Guess what. You turn all the lights off and it doesn't get dark. It's daylight outside. Hey, Tony, one final word. Our ECS configuration for sleep is PUSH-CABIN, CABIN GAS RETURN in AUTO, and the rest of the thing as advertised. Over. Correction - CABIN GAS RETURN, OPEN.

04 11 48 43 CC Okay, that looks good here.

04 11 49 19 LMP-LM Okay, Tony, we'd like to thank everybody for the great job of regrouping, and getting back to what seems to be pretty nominal from now on; and we'll see you in the morning. I guess you can give us a reveille call over the squawk box here. Over.

04 11 49 38 CC Okay, I'll sure do that. I'll come in and I'll whistle something here.

04 11 49 45 LMP-LM All right. Good night.

04 11 49 46 CC Good night.

04 11 52 14 LMP-LM Houston, Orion.

04 11 52 17 CC Go ahead, Charlie.

04 11 52 22 LMP-LM Well, I guess I can't stop talking. One final observation, Tony, is that due to the lack of dust that we had on landing and the fact that we can see blocks embedded in the side of these craters, here, I kind of got the distinct impression that the regolith is not too thick around here, and we ought to maybe think about where would be the thickest place to - in order to get the drill in. Over.

04 11 52 53 CC Okay. That's a good observation. From the films you've seen of other descents, do you think the dust was less than any of the others?

04 11 53 03 LMP-LM Well, John will have to really comment on that, but as far as my side goes, the little I looked out there was by far - we could see - or, I could, on my side, see right on down through it - the dust film.

04 11 53 18 CC Okay, and from your - listening to your descent, it sounded like you picked it up about 90 feet.

04 11 53 26 LMP-LM It was a little bit less than that. It was about 80, maybe 75.

04 11 53 41 CC I have a feeling you and I could just sit up all night and talk about this.

04 11 53 47 LMP-LM Well, that's all you're going to hear from me.
Good night.

04 11 53 51 CC (Laughter) Okay, good night.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 10 26 56 CMP I tell you, it sure is impressive how much - how much the scenery changes as the Sun angle changes and how rapidly that goes down.

04 10 27 43 CMP Your plot boards show me over Albategnius, you say?

04 10 27 46 CC Say again.

04 10 27 50 CMP Does the plot board show me over Albategnius?

04 10 27 54 CC That's affirmative.

04 10 27 59 CMP Okay. Now let me tell you a little something here. Just to the north and mostly to the west of Albategnius, the ground - and I think in the higher Sun it's going to look like - look a lot like Imbrium sculpture but not here. It has the mottled effect and the same appearance that the Descartes area had at the same Sun angle yesterday. And that's almost directly south of - it's a little south and a little bit to - of Ptolemaeus, and it's a little bit to the east of Alphonsus.

04 10 28 49 CC Roger. You ought to be coming up on a terminator now. Is that right? Pretty close to it?

04 10 28 58 CMP Yes, sir. My view is disappearing rapidly.

04 10 30 03 CC You should be over Ptolemaeus now.

04 10 30 43 CC Casper, for your information, everything in the SIM bay is looking good now.

04 10 30 55 CMP Okay. I just saw something that - I really don't know what to make - I'm in the - I think the spacecraft is just about in the dark, but not quite. We've passed the ground terminator, and I'm looking out of window number 3 down towards the ground. I'm

trying to get a preview of what's coming in earth-shine. And there's a bright flash that's going along out there. At first, I thought there was something that was on the deck, but it's apparently a piece of debris that's in orbit with us. It's sitting there, tumbling over and flashing.

04 10 31 43 CC It's traveling along with you.

04 10 31 46 CMP It moves across the ground, so it must be a piece of debris. Yeah.

04 10 32 15 CMP As a matter of fact, I look around now and there's quite a few of those.

04 10 32 21 CC Can you get any idea how far away they are - -

04 10 32 48 CMP - - Depends on what effect that has on - No, I can't, Hank. It's just a piece of something that's out there, and it's tumbling so that it gives you an occulting reflection. No field at all for it, but it's moving in approximately the same velocity that we are.

04 10 33 02 CC Ken, in reference to your observations of Crater King, we got some ideas about those swirls that are northwest of King. And we'd like for you to get a comparison of those with the swirls of Ibn Yunus. And I wonder if those also have topographic expression?

04 10 33 27 CMP Okay. I'm too - I'll have to do that some other time, because today I'm too far south to see those things up by Ibn Yunus. I can just barely see up to Neper.

04 10 33 39 CC Roger.

04 10 33 43 CMP But we sure need to keep that in mind.

04 10 33 46 CC And another thing you might be thinking about if you get an opportunity on some round is to get us a description of the area north of Crater King, including the Soviet Mountains.

04 10 33 58 CMP Yeah. I was thinking of looking at that. I really hadn't planned to spend much time on King this time. I was going to just kind of look at the - look at the ole crater there. But, got so interested in it that - it looked like there's another crater that's just to the east of King that has, say, a little bisected, central feature just like King. You know the thing that makes that - that little Y-shape. And it looks the same way. That's kind of - kind of interesting, I thought.

04 10 34 44 CC Yeah. I guess we hadn't seen that in the photos.

04 10 41 58 CMP I guess, Hank, I ought to be passing Flamsteed now.

04 10 42 05 CC Roger. That looks right.

04 10 42 12 CMP It's really impressive how much you can see in the dark.

04 10 42 27 CMP I don't believe you can see as much now as you could last night. Of course, partly we're - I'm higher now than I was when I looked at it last night. And the Earth is noticeably smaller, so I guess it's getting - it's losing it's reflective ability rather rapidly.

04 10 42 52 CC Roger.

04 10 42 55 CMP I was also very impressed with the way you could see the - the LM outline in earthshine. That was something I had not anticipated. Last night as we came across - well let me see what it was - it starts with an H - over on the western rim. Hevelius. Yeah. We drove across that last night, and you could really see the floor patterns in that beautifully.

04 10 44 49 CMP Okay, Hank. Let's see. I owe you a crew status report from this morning. Right?

04 10 44 56 CC Roger.

04 10 45 00 CMP Okay. Let's see if I can give you that thing now.

04 10 45 30 CMP Okay. Alfa 1, 22047; Alfa 3, 6; Alfa 4, negative. Bravo 1, 15044; Bravo 3, 6; Bravo 4, negative. Charlie 1, 21095; Charlie 3, 7; Charlie 4, 1 Second.

04 10 46 24 CC We copy, Ken.

04 10 46 28 CMP Okay. Now I'm going to try to go down the menus here. We're looking for day 4. Is that correct?

04 10 46 42 CC Affirmative.

04 10 46 48 CMP Okay. On commander, meal A, you can delete the mixed fruit, and meal B, you can delete pea soup; meal C, delete chicken stew and add a chocolate pudding. For me, you can take meal A and delete the mixed fruit. You can delete the bread and jelly. On Bravo, you can delete the pea soup, meatballs. On Charlie, you can delete the chicken stew, and I guess that takes care of those things. The reason for so many of these - we all deleted these canned things, because we got them all over the spacecraft last time, and we decided that we really couldn't afford to do that again.

04 10 48 13 CC Roger. We copy.

04 10 48 18 CMP Okay. And let me find Charlie's here.

04 10 49 02 CMP Okay. Here's Charlie's. And on meal A, you can delete mixed fruit and jelly. Meal B, you can delete sugar cookies. Meal C, you can delete the pudding and the chocolate bar.

04 10 49 26 CC Roger. Copy.

04 10 51 01 CMP Now we're coming across Hevelius again, and I can see Grimaldi and a couple of fractures that go across its rim. You can really see a lot of detail here. You can see the rilles, you can see - as everybody pointed out, the - they look like ribbons that are just dropped down, and they go all the way across the crater like Hevelius. And it looks like they go out from ..., and they come down - in fact, they go all the way down to Grimaldi. And just before they get to Grimaldi, they run into a crater. And it looks like they might have been filled a little bit. In fact, it looks the same way that some of the rilles that dot the Fra Mauro, look like they've been filled in. Then there is a very smooth patch that's lined up with this graben that runs from there to Grimaldi. No, I'm sorry.

I'm calling Riccioli, Grimaldi. The crater I'm talking about now is Riccioli, and it's got quite a few fractures that run out. And it looks like a flow pattern. It looks just like looking down on a - on a long tongue of lava like we've seen terrestrially. I don't mean to infer that there is lava, but I'm just saying that it has the same appearance. It is coming out of the northeastern corner of Riccioli. And it has what looks like little ripple patterns on it, like you'd expect for flow bands, but they aren't quite as arcuate, and they don't take quite the same - the same concentric pattern that you'd expect from a flow front. But this little crater coming down from Hevelius - the rille it comes down to there and then it hits the crater, and then it gets a very, very smooth spot. And then it runs in and you can see continuations of these lineaments right on across Riccioli.

04 10 53 07 CC

Roger. That sounds real interesting.

04 10 53 11 CMP

Riccioli has quite a few elongate little craters around it. Several of them that are - elongate - and one of them is quite long. I'd say it's maybe - it's curved and looks like it's maybe 10 kilometers long. And it has just a slight arc to it. But, it is a very elongate feature. Now, we are moving into material that's very hilly and I don't see a lot of small craters. I don't see a lot of bright ones. You can see bright rims in here quite well. The things that do stand out to the west of Riccioli are the very dramatic cross cutting graben-type rilles. They cross, in one place here, almost 90 degrees to each other. Looks like I am looking at a very subdued old basin. And, these things go across the hills and right on across the basin floor. And, I'm not sure, but I would guess that some of these things - other lineaments I am seeing - they're running toward the northeast or more than likely things coming out of Orientale. I should be coming in towards the outer rim of the Orientale Basin. You get the same kind of impression of - at the terminator when the earthshine runs out as you do when sunshine runs out. The only thing it's different is you don't - you don't get to see quite as much of the - everything is a lot more subdued. And, you don't get shadows that are nearly as long. Or, at least not as bright.

There's also, running down here - there is one ridge and I am sure I am looking in a ridge instead of a graben. I've got grabens and cut it. But this thing has a bright line on it that looks like a ridge that runs northeast, southwest along with some of the graben. And, it seems it's one of the first big ridges I've seen that cuts up over a highlands clump of material. That's all just to the - just to the west of Riccioli.

04 10 55 29 CC Roger. Copy.

04 10 55 35 CC Ken, we have - -

04 10 55 36 CMP Okay, Houston, we are getting ready to - -

04 10 55 42 CC Ken, we've got your Flight Plan here - -

04 10 55 43 CMP Go ahead, we're ready for LOS, so - -

04 10 55 47 CMP Okay. Do you have time to read it to me?

04 10 55 50 CC I think so; if you are ready to copy.

04 10 55 56 CMP All right. Can you tell me where I should start?

04 10 56 00 CC Okay. LOS will be at 107:02. Approx - -

04 10 56 07 CMP Okay. Should I be in the Flight Plan or should I be writing in something separate?

04 10 56 11 CC I think you better write in something separate.

04 10 56 17 CMP Okay, stand by. Okay, shoot.

04 10 56 20 CC Okay. 107:02 LOS. And approximately 107:10 - approximately 8 minutes after LOS, configure DSE - stop HIGH BIT RATE, COMMAND RESET, FORWARD. 107:21, sunrise. 107:25, O₂ HEATERS 1 and 2, AUTO. O₂ HEATERS, three, OFF. 107:38, IMAGE MOTION, INCREASE. Barber pole, plus 3. 107:48, AOS. 107:57, PAN CAMERA, STANDBY - STEREO, POWER. 107:58, 13 - This is your T-start. PAN CAMERA, OPERATE. MASS SPECTROMETER, ION SOURCE, ON. At the same time - right after you get the PAN CAMERA.

108:04, IMAGE MOTION, INCREASE, barber pole, plus 4. T-stop. 108:28:13 - that's also T-stop for the mapping camera, which read up - I read that up to you earlier. It's PAN CAMERA, STANDBY at T-stop. PAN CAMERA, OFF MSFN cue. MAPPING CAMERA, OFF (T-stop). Wait 30 seconds. MAPPING CAMERA, STANDBY. IMAGE MOTION, OFF. LASER ALTIMETER, OFF. MAPPING CAMERA, RETRACT. MAPPING CAMERA LASER ALTIMETER COVER, CLOSED. 108:40, MASS SPEC, DEPLOY. GAMMA RAY, DEPLOY. 108:50, return to the Flight Plan, at last. And pick up with the P20 and follow on with those activities through you presleep checklist and - I've already - the only thing different there is I've already given you PDI-26 pad.

04 11 00 21 CMP Outstanding. You guys really do good work. Okay, I think I've got everything here. I didn't have any questions about it. You want me - How much time do we have? I don't know whether it's worth trying to read back or not?

04 11 00 36 CC Okay, we've got 2 minutes to LOS. You don't have to read back. I think - -

04 11 00 42 CMP Okay, here goes. 107:02, LOS. 107:10, configure DSE - stop HIGH BIT RATE, COMMAND RESET, FORWARD. 21 is sunrise; 25, O₂ heaters, 1 and 2 to AUTO. O₂ HEATERS tank, three, off. 38, IMC, INCREASE; barber pole, plus 3. 48, AOS; 57, PAN, STANDBY - STERO and POWER. 58, 13 - PAN CAMERA to OPERATE; MASS SPEC ION SOURCE, ON. 04, that's 108:04, IMC to barberpole, plus 4. 28, 13, T-stop for PAN CAMERA to STANDBY and MAPPING CAMERA to OFF. Thirty seconds, then to STANDBY, IMC, OFF. LASER ALTIMETER, OFF; MAPPING CAMERA, RETRACT. MAPPING CAMERA COVER, CLOSED. At 108:40, MASS SPEC to GAMMA RAY to DEPLOY. 108:50, return to the Flight Plan.

04 11 01 32 CC Good readback, Ken.

04 11 01 37 CMP Okay. Outstanding.

04 11 01 42 CC Okay, we got less than a minute to go. Stu will see you on the other side.

04 11 01 59 CMP All right, Hank. Thank you very much. You've done a good day's work. See you tomorrow evening.

04 11 02 05 CC Roger.

04 11 41 XX BEGIN LUNAR REV 18

04 11 52 32 CMP Houston, are you there?

04 11 52 34 CC Roger, Casper. Houston standing by.

04 11 52 39 CMP Well, hello there.

04 11 52 45 CC And, Casper. We'd like you to have - go back to REACQ on the high gain, please.

04 11 52 53 CMP Okay. Every time I try that it looks like it does worse. Well, it's holding in there this time, I guess.

04 11 53 33 CC And, Ken. Sometime, at your convenience, we'd like to have you push on your biomed sensors. Getting a little noise on the data. Just like to see something cleared up.

04 11 53 51 CMP Okay. I'll get to that in just a minute. I'm flapping right now with some - trying to make up the things we missed here. And I just finished putting most of Sharonov and Mendeleev on magazine November November. And I'll try to pick up the one that ... if you'll tell me I can do it on November November.

04 11 54 20 CC Okay, stand by.

04 11 55 33 CC And, Casper. Could you give us a frame number on November November.

04 11 55 41 CMP Okay. How about - ah - 145?

04 11 55 49 CC Okay, 145. I believe that.

04 11 56 10 CMP And, don't let me forget things like this pan camera thing coming up, because I am sitting here getting camera set up. I am going to try to get the earthshine sequence in this trip, too.

04 11 56 23 CC Okay. Roger. We'll give you a call.

04 11 56 43 CC And, Ken, it's about time now. Within the next 15 seconds or so, if you want to get the PAN CAMERA, STANDBY STEREO on POWER.

04 11 56 54 CMP Okay, thank you, sir. STANDBY, STEREO, POWER. You've got it.

04 11 57 00 CC Roger.

04 11 57 06 CMP Well, I'll tell you. Just a little reminder like that can go a long ways toward getting something done in here.

04 11 57 13 CC Jolly good. We'll try to please.

04 11 57 45 CC Okay, Ken, you're 30 seconds from the T-start time on the pan camera.

04 11 57 56 CMP Okay.

04 11 58 05 CC Ten seconds, Ken.

04 11 58 15 CMP And, you've got it.

04 11 58 17 CC Okay. Roger - -

04 11 58 19 CMP Barber pole in gray and away she goes.

04 11 58 20 CC Very good and ION SOURCE, ON.

04 11 58 27 CMP ION SOURCE, ON.

04 11 58 28 CMP MARK.

04 11 58 32 CC Okay. And, Ken, on those last November November, we'll give you 30 frames on that one.

04 11 58 45 CMP Okay. I guess it was scheduled for another magazine, but I just don't have time to change it.

04 11 59 00 CC No sweat. You got 30.

04 11 59 02 CMP Okay. That should be plenty. And, I got the magazine XX loaded in the Hycon, and I am ready to go to work on that as soon as we get in the darkness.

Well, maybe that won't work, because I guess you
got a P52 and things coming for me.

04 11 59 17 CC

Stand by on that.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 12 00 15 CDR-IM Tony, you guys missed it by about 10 minutes.
The RCS REG A light just came on.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 11 59 16 CC Stand by on that, Ken.

04 11 59 30 CC Okay, Ken, what we'd like for you to do after this Sunside pass, after you finish up here, is to get a good night's sleep. We're not showing you anything scheduled after that.

04 11 59 46 CMP Okay, I thought there was a P52 or something I was supposed to get as soon as it got dark. I'll - I can sneak that in there, too. I hate to see us miss very much of the things that we almost did.

04 12 00 00 CC No, Ken. This - It's not scheduled. The last thing you need to - -

04 12 00 02 CMP Well ...

04 12 00 03 CC - - do is 108 plus 50, where you go in to do the activities there in the flight plan; you go right into the presleep checklist and we'll see you in the morning.

04 12 00 18 CMP Oh, okay. Outstanding. Very good. Thank you.

04 12 00 22 CC Roger.

04 12 02 09 CC Okay, Casper, if we can have the HIGH GAIN to AUTO; please, sir.

04 12 02 16 CMP You've got it.

04 12 02 21 CC Okay.

04 12 02 35 CMP Can you look in your plotboard and tell me approximately what my longitude is right now?

04 12 02 45 CC Oh, Ken, it's probably about 70 East, something like that. You're just coming across the western rim of Symthii there.

04 12 03 03 CMP Okay, good enough.

04 12 03 44 CMP Yes, here comes our old friend, Langrenus.

04 12 04 03 CC Okay, Ken, we need barber pole ... - -

04 12 04 05 CMP I guess you need a little barber pole, don't you? Okay, that should be 1 plus what we have.

04 12 06 24 CMP Hey, Stu, if I put 30 frames on this Crozier, I won't get that first strip of Kant - Andel. You think about doing away with the intervalometer and taking the pictures with less overlap and try to squeeze it all onto this one mag?

04 12 06 46 CC Okay, stand by. Let's take a look at that, Ken.

04 12 06 51 CMP Okay, I got a couple of minutes before I start.

04 12 06 55 CC Okay.

04 12 07 29 CMP Oh.

04 12 08 07 CC Okay, Ken, you can go ahead and disregard the intervalometer and try to get them both on that same mag.

04 12 08 17 CMP Okay, thank you very much. I'm all set up to come up on Crozier.

04 12 08 23 CC Okay.

04 12 15 41 CMP Well, it looks like I ran out anyhow. I got 165 and the magazine's empty, and I just finished the strip of Crozier.

04 12 15 54 CC Okay, I copy that.

04 12 16 21 CMP That's on magazine November November.

04 12 16 26 CC Okay.

04 12 16 30 CMP And I'll go see if I can get Papa Papa out here real fast.

04 12 17 16 CMP Okay, Papa Papa is out and loaded. I'll try to pick up Descartes to Andel with it.

04 12 17 24 CC Roger.

04 12 22 07 CMP Stu, there is a definite textural similarity between the material or the bright spot by Descartes Crater and the things around Stone Mountain. However, it is a lighter albedo. It's a shade lighter and the line of demarcation seems to come along the long crater.

04 12 22 38 CC Okay. We got that.

04 12 23 48 CMP And another strange sight over here, I think it's Andel, that's where I'm supposed to be ending the strip. But there's another crater here that looks like it's flooded, except this same flooded material seems to run up on the outside. You can see a definite patch of this stuff that's run down inside an old crater. And that material at least lays on top of it, but it lays on top of things that are outside and higher. It's a very strange operation. I guess we'll have to wait and let someone that knows what they're talking about look at the pictures.

04 12 24 25 CC All righty, Ken. Sounds real interesting.

04 12 24 31 CMP Man, this is unbelievable. It's really something. Everywhere you turn, there's something new. And let's see if we can get in the old SS on Ptolemaeus here.

04 12 26 13 CMP Well, I'll tell you what. I'm going to have to skip Ptolemaeus. The terminator is still on the rim.

04 12 26 22 CC Okay.

04 12 26 23 CMP Just for kicks, though, I'm going to show you one on frame SS that is really fascinating. And I'm just on the eastern rim of Ptolemaeus. I mentioned it last time. I'm going to take a little strip of these.

04 12 26 44 CMP And then see if I can get - yeah, that ought to be good enough. Okay, I took - I took it up to 20 frames, and I used about five of these on SS. And what I took it of was - This material that's on the eastern rim of Ptolemaeus has the same textural appearance in the - low that we saw in the Descartes formation, that being the stuff coming from the crater Descartes running north yesterday. An entirely different appearance than the rest of the terrain in the low Sun. I think there may be some interesting comparison there.

04 12 27 32 CC Okay, Ken. Got that. And you're approaching 30 seconds to - the - -

04 12 27 42 CMP Okay, going to end up pan camera off here somewhere.

04 12 27 45 CC Roger; on my mark, you'll be 25 seconds.

04 12 27 49 CC MARK. And, Ken, just turn the cameras off there. Then, before you continue on with those steps, I want to say something about those procedures on down at the bottom. I'm showing 6 - 7 seconds.

04 12 28 08 CMP Okay.

04 12 28 14 CC And -

04 12 28 15 CC MARK. I show T-stop. That's the pan camera and mapping camera.

04 12 28 18 CMP Okay, they are STANDBY and OFF. I'll wait 30 seconds before I take the IMAGE MOTION, OFF. Hey, thank you, Stu, that was a big help.

04 12 28 30 CC Roger. And - I would - We're going to delete, on those procedures there, the MAPPING CAMERA, RETRACT; and the MAPPING CAMERA/LASER ALTIMETER COVER, CLOSE. We're going to leave those out all night, and we'll have a - a plan tomorrow on how we're going to handle the mapping camera.

04 12 28 51 CMP Okay. You do want the LASER, OFF, though. Is that correct?

04 12 28 55 CC That's affirmative.

04 12 29 02 CMP Okay, the LASER is OFF now. The MAPPING CAMERA going to STANDBY and the IMAGE MOTION is coming OFF.

04 12 29 08 CC Jolly good.

04 12 29 18 CC And, Ken, a couple of other items. We're going to let the bat A charge all night, so we'll just leave that as is.

04 12 29 30 CMP Okay. Those batteries kinda put in a day's work, too, today.

04 12 29 36 CC Roger.

04 12 30 03 CMP Okay, I see that we're going to have AOS on the next pass before we get - before the sleep period starts, so I think I'll wait and give you my film summary at AOS, if that's okay. It'll take me that long to sort it all out, I'm afraid.

04 12 30 23 CC That's okay, Ken.

04 12 30 29 CMP All I was planning to give you was how much was left in each mag.

04 12 30 35 CC Say again, Ken.

04 12 30 39 CMP All I was planning to give you, Stu was how much is left in each magazine.

04 12 30 43 CC Hey, that's jolly.

04 12 32 28 CC And Casper; Houston.

04 12 32 31 CMP Okay.

04 12 32 33 CC Okay I got a couple of things.

04 12 32 35 CMP Go ahead.

04 12 32 36 CC Ken, one is we would like to delete that film status report. We would like for you to start your rest period just as soon as you can after LOS and let us pick up any talking about the film or anything like that for tomorrow.

04 12 32 54 CMP Oh, very well. You is the boss.

04 12 33 00 CC And another thing, we're noticing indications here that your screens - on your O² return hoses and also the suit circuit return valve. You might take a look at those tonight and see if they need a little cleaning.

04 12 33 18 CMP Okay, I've been cleaning the suit circuit return screen every night and it's been getting pretty dirty, so I'll check it again today and the other hoses, I've got a - since I didn't have a screen for the inlets, I capped the inlets and just used the outlets to keep stuff from - We got so much junk here, I didn't want to get stuff inside the hoses down through the suit fans and to clog up the other filters - -

04 12 33 43 CC Okay.

04 12 33 44 CMP - - So I put the interconnects on the inlets and just let the air blow out of the hoses and take it all in through the suit circuit return. That might give you a little higher pressure rise.

04 12 33 57 CC Okay, we - we concur with the configuration and - but we have noticed the O₂ flow creeping up slowly, indicating that it would probably need a little housecleaning on that screen.

04 12 34 10 CMP Yes, sir; thank you very much. I'll catch that baby.

04 12 34 13 CC Okay.

04 12 34 15 CMP I'll tell you, this is - A man shouldn't get paid for doing this.

04 12 34 20 CC Yes, it really sounds great, Ken. I think - I think the difference in the Earth crescent sure must make a difference, the way you're talking of earthshine versus the way I saw it.

04 12 34 32 CMP Oh, it's fantastic. You can see the whole thing. It's really something. I'm going to try that - that's the reason I wanted to try and get these earthshine pictures in this time before the Earth gets any smaller. Because it really isn't nearly as dramatic tonight as it was last night, and I don't know whether that's the altitude or what.

04 12 35 01 CMP But if I - let's see, we want to run these booms out and what else? Got to turn the PAN CAMERA, OFF. Okay, if you'll give me a call on those.

04 12 35 11 CC Roger. I'm watching for you on the boom deploy, Ken. You got a little less than 5 minutes.

04 12 35 20 CMP Okay, I'll - You know something else that I'm not real sure about. It sure looks to me as though the earthshine is not as bright on this mare. I guess it's just this mare that's over around Fra Mauro and so forth is just darker, and maybe it's my night adaptation that hasn't taken affect yet, but I got the distinct impression that that band's [?] a lot brighter when you get over to the western limb.

04 12 35 52 CC Okay, got that, Ken.

04 12 35 57 CMP I don't think I understand that.

04 12 36 17 CMP I tell you, I thought this was kind of appropriate here. A few minutes ago, I was playing Berlioz' Symphonie Fantastique and looking at this fantastic sight and floating along here, and it's just unbelievable it's so much fun.

04 12 36 31 CC Yes, it sure sounds like it; in fact, we were catching a little of your music occasionally there. Didn't sound as good as (laughter) "Ridin Old Paint", but I guess it'll do.

04 12 36 47 CMP Well, I've been listening to "Old Paint" kind of music for 3 days of PTC. But it was good "Old Paint," I'll have to admit. I enjoyed it.

04 12 37 12 CC And, Casper; Houston.

04 12 37 15 CMP Go ahead.

04 12 37 19 CC Okay, would - What we'd like to do now, Ken, is go ahead and put out the booms now and, as soon as you have them out, go ahead and start the - start your P20 running right now. It looks like we might be cramped a little bit to get your up-links in, so we want to make sure that we get - all of the up-links completed here.

04 12 37 44 CMP Okay. In other words, you want me to cancel the earthshine?

04 12 37 52 CC Yes, that's what we are saying, Ken. We're just afraid we might be cutting it kind of tight on the up-link.

04 12 38 00 CMP All right, that's in work.

04 12 38 02 CC Okay.

04 12 38 51 CC Okay, Ken, and we can take the PAN CAMERA POWER to OFF. The lens is stowed.

04 12 38 58 CMP Okay. PAN CAMERA POWER is OFF.

04 12 39 02 CC Okay.

04 12 40 27 CMP Okay, and I guess I might as well go ahead and put the booms out, hadn't I?

04 12 40 31 CC Roger. We'd - we'd like to have those out and, as soon as you complete that, let's go ahead and do the - go into the P20 that we're showing at 108 plus 50. Let's don't wait for that.

04 12 40 46 CMP Okay, I'm already going there.

04 12 40 47 CC Oh, okay.

04 12 40 49 CMP I'm doing a manual roll to get over there and spin it around.

04 12 40 54 CC Okay, very good.

04 12 41 06 CMP And I guess I'd like to have a SIM bay configuration - what - what you think I should have at the end of - while I get ready to go to bed, what mechanical and electrical status, and let me cross-check it to make sure I haven't forgotten something.

04 12 41 22 CC Okay. We'll get that for you.

04 12 42 02 CMP Holy smokes.

04 12 45 06 CC And Casper, Houston. We've got that SIM bay configuration when you're ready.

04 12 45 13 CMP Okay, go ahead.

04 12 45 15 CC Okay, it is your normal sleep configuration, with a change in the first digit of the top line. We're going to change that 0 to a 1. You will now have a configuration, minus lllll; second line is normal, 01222.

04 12 45 40 CMP Okay, minus all 1s; 01222. Thank you, sir.

04 12 45 44 CC Roger. And we'd like - -

04 12 45 45 CMP And just looked at the inlet screens and you're right, they're - Go ahead.

04 12 45 50 CC Okay, I copied your - your bit on the screens and we'd like B/D ROLL for sleep tonight.

04 12 46 00 CMP Okay, you'd like to do a B/D ROLL. Okay. How does the general RCS picture look?

04 12 46 10 CC We're in - we're in good shape, Ken. We're down a little on the Flight Plan, but we're riding 168 above the above the red line. We're - On the Flight Plan, we're down a minus 133.

04 12 46 32 CMP Okay.

04 12 46 35 CC And - -

04 12 46 36 CMP Eventful afternoon.

04 12 46 40 CC It'll all get done. You're doing a great job, Ken.

04 12 46 49 CMP Well, I'm just real sorry about that delay this afternoon. I wish I had known more about it. I'd already decided that if it was - if it was just oscillatory and stable, I was going to take it.

04 12 47 07 CC Yes; well, I tell you, the - the traces on those up to the time that you turned off the gimbal motors were just a classic divergent curve, right out of the textbook.

04 12 47 19 CMP Yes. Yes, I couldn't believe it when I saw that thing. Thought I was back in Floody's simulator.

04 12 47 32 CC Yes, I think there has been a lot of people talking about SIM sup today. Wish we could just forget this one.

04 12 47 43 CC But, hey, I got a couple other reminders here while we're chatting. I'd like to remind you on your presleep checklist that we'll not bump up the cabin tonight.

04 12 47 55 CMP Okay, thank you.

04 12 48 18 CC And, Ken, a couple other - or one other item here, you might get a leg up on your presleep checklist and check the OPTICS POWER, OFF, at your convenience.

04 12 48 34 CMP Okay, I'll get that stuff in just a minute.

04 12 48 38 CC Okay, I wasn't trying to hurry you, I just wanted to toss in a little reminder there.

04 12 48 45 CMP Yes, thank you. I think I left it on last night.

04 12 48 50 CC That isn't what I was trying to say, Ken.

04 12 48 56 CMP (Laughter) Well, you know what was going on last night and this morning. Everything you said was true. I got a garbage can in here that's bigger than me.

04 12 49 10 CC Roger.

04 12 50 20 CC And we'd like to have Omni Charlie now, Ken; and, when you get to attitude, you can reacquire with high gain.

04 12 50 28 CMP Okay. Hey, that is better.

04 12 51 25 CMP Hey, Stu, I kinda turned the - Hank off this morning when he tried to give us a - SIM bay status report, because it just wasn't - this morning wasn't a convenient time, but I'd be very happy to hear one of those tomorrow to see what people are finding out.

04 12 51 43 CC Okay. We'll give you a good one tomorrow.

04 12 52 00 CC Okay, Ken. Just at this appearance, it appears that everything is swinging along all right with them, but we'll have you a good scientific read-out on it tomorrow.

04 12 52 13 CMP All righty.

04 12 52 49 CMP Hank said something about a - about the clock update. Are we going to do that tomorrow or tonight?

04 12 52 57 CC That'll be done tomorrow, Ken. What we'd really like for you to do is get to - get to resting. Go into your sleep period just as soon as you can here.

04 12 53 12 CMP Roger; I'm working on the presleep checklist now.

04 12 53 15 CC Okay.

04 12 58 28 CC Casper, Houston. Would you give us the high gain just as soon as you can and go ACCEPT.

04 12 59 43 CC Okay, Casper, if you'd give us WIDE BEAMWIDTH and ACCEPT, please. We're about a minute and a half from LOS.

04 12 59 56 CMP Okay, you've got ACCEPT. You want WIDE and AUTO or what on BEAM?

04 13 00 03 CC Roger. That's WIDE and AUTO, Ken.

04 13 00 34 CC Okay. Ken, if you can read, we'd like for you to go back to BLOCK and - and load your jet monitor routine manually.

04 13 39 XX BEGIN LUNAR REV 19

04 13 48 01 CMP Houston, Casper.

04 13 48 04 CC Casper, Houston. Go ahead.

04 13 48 15 CC Go ahead, Casper.

04 13 48 29 CMP Houston, Casper.

04 13 48 31 CC Go ahead, Casper.

04 13 48 45 CC Go ahead, Casper. This is Houston.

04 13 49 27 CC Casper, Houston. How do you read now?

04 13 49 33 CMP Loud and clear, Don.

04 13 49 35 CC Okay.

04 13 49 39 CMP Okay, I'm ready to give you ACCEPT.

04 13 49 43 CC Okay. Go ACCEPT. We're ready to up-link.

04 13 49 51 CMP Okay, standing by. And I'd like to verify the cryo configuration with you and make sure that - I'll leave a battery A on charge overnight. There's no lithium canister change tonight and it looks like when you get the up-link in and I give you a VERB 74, we'll be through.

04 13 50 16 CC I believe that's right. Stand by 1.

04 13 51 55 CC Casper, Houston. We - we concur with battery A, will stay on charge all night. There's no LiOH change. And on the cryo configuration, the O₂ and H₂ tanks 1 and 2, auto; tank 3, off.

04 13 52 20 CMP Okay. That's just what we have.

04 13 52 24 CC Roger.

04 13 57 09 CC Casper, Houston. We need an E-MOD and you can turn in for tonight.

04 13 57 18 CMP Okay. She's coming at you, bit by bit.

04 13 57 28 CC Roger.

04 13 59 01 CC Okay, Casper. We recommend you go B/D ROLL, and that winds it up.

04 13 59 12 CMP Yeah, thank you very much.

04 14 00 07 CMP Okay, Don, I guess that's it. I'll see you folks tomorrow.

04 14 00 10 CC Okeydoke, Casper. Pleasant dreams.

04 14 00 17 CMP You must know somebody to get a shift like this.

04 14 00 20 CC Say again, Casper.

04 14 00 25 CMP You must know somebody to end up with a shift like this.

04 14 00 29 CC I'm afraid you're right.

04 14 00 37 CMP Well, have lots of coffee anyhow. Good night.

04 14 00 40 CC Good night.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 15 38 XX

BEGIN LUNAR REV 20

REST PERIOD - NO COMMUNICATIONS

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 16 32 45 LMP-LM Hello, Houston; Orion. Over.

04 16 32 50 CC Orion, Houston. Go ahead.

04 16 32 57 LMP-LM Hey, you know, a bit ago we had a little MA - RCS problem The system A ... now shows a 10 to 15 percent quantity. Is that what you guys were expecting? Over.

04 16 33 14 CC That's affirm - that's affirmative.

04 16 33 20 LMP-LM Okay. If y'all are happy, we'll ... and go back to sleep.

04 16 33 26 CC Say again, Charlie. You're very garbled.

04 16 33 34 LMP-LM Okay. If you guys are happy, we'll go back to sleep.

✓ 04 16 33 50 CC All right, Charlie. We've got one circuit breaker we want you to open. Stand by a minute. The RENDEZVOUS RADAR, OPERATE, panel 11, row 3, under HEATERS.

04 16 34 09 LMP-LM Okay, we got it. Good night.

04 16 34 15 CC Roger. Thank you.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 17 36 XX BEGIN LUNAR REV 21

04 19 35 XX BEGIN LUNAR REV 22

REST PERIOD - NO COMMUNICATIONS

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 19 49 37 LMP-LM Houston, Orion.

04 19 50 19 LMP-LM Hello, Houston; Orion.

04 19 50 21 CC Good morning, Charlie; it's nice to hear your voice.

04 19 50 28 LMP-LM Nice to hear you guys. We're up. Did you guys have a site handover about 20 minutes ago?

04 19 50 35 CC Hold on, I'll check. Okay; yes, I guess we did. Why, did you get keying there?

04 19 50 51 LMP-LM Okay, you dr - Well, you dropped the up-link a little bit - dropped the up-link in a big blast of static and - that's why I faked out the EKGs - that's why I faked out the EKG about 20 minutes ago.

04 19 51 09 CC Okay. The docs over here say yeah, you did.

04 19 51 18 LMP-LM Yeah. Okay. Let me give you - Stand by.

04 19 51 49 LMP-LM Okay, Tony. If you're ready for the crew status report, I'll give it to you.

04 19 51 54 CC Okay, we're ready; go ahead.

04 19 51 58 LMP-LM Okay. For John on day 5, meal B; scratch the rye bread. He did not eat the rye bread. Ate everything else, and add a food stick into that also. For his - for my meal, I ate everything but the rye bread, and add a drink bag and a food stick. That's the EVA beverage. Add that and the food stick. For medication, John had none, and he got 7-1/2 hours of good sleep. And for me, I had a Seconal and I slept for about 6-1/2 or 7 hours, I think; and it was real good. Over.

04 19 52 58 CC Okay; we copy that. Sound real fine. You mean you got John to eat one of those food sticks?

04 19 53 06 LMP-LM Believe it or not.

04 19 53 08 CC Outstanding.

04 19 53 16 LMP-LM In fact, he was sleeping so great that we just had - I just woke him up just a second ago, as a matter of fact. I couldn't stand it any longer.

04 19 53 33 CC Very good. Now you're right on the time line. It's wake up time.

04 19 53 56 LMP-LM Houston, we're ready to copy our lift-off times. Over.

04 19 54 05 CC Okay. Stand by 1.

04 19 55 02 CC Okay, Charlie. We've got the block data for the LM lift-off, LM Timeline Book.

04 19 55 22 LMP-LM You speak.

04 19 55 23 CC Okay. T-22, 116:29:51; T-23, 118:28:22; T-24, 120:26:55; T-25, 122:25:28; T-26, 124:24:00; T-27, 126:22:32. This assumes GET update of 00:11:48, and Ken will be getting that update in about 2 hours.

04 19 56 27 LMP-LM Understand. Starting with the 22, 116 plus 29 plus 51; 118 plus 28 plus 22; 120 plus 26 plus 55; 122 plus 25 plus 28; 124 plus 24 plus 00; 126 plus 22 plus 32; and then assume the GET update of 11 minutes and 48 seconds for Casper. Over.

04 19 56 54 CC Okay. That's a good readback. And we have an update to your Lunar Surface Checklist.

04 19 57 03 LMP-LM Go ahead.

04 19 57 05 CC Okay; on 11-1.

04 19 57 14 LMP-LM Go ahead.

04 19 57 15 CC Okay; I guess we were too quick last night in crossing out that PRO, "Hold until standby light off." We'd like you to put that back in.

04 19 57 27 LMP-LM Okay. Don't worry, we'd of done that. Thank you much.

04 19 57 32 CC Okay; and then on page 11--2.

04 19 57 44 LMP-LM Stand by.

04 19 57 45 CC Okay.

04 19 57 56 LMP-LM Go ahead.

04 19 57 58 CC Okay. Under that T_{ephemeris} update, we'd like to have the note, "T_{ephemeris} to be used only in the event of LGC/CMC clock sync is required." And for the registers; R1, 00011; R2, 13346; R3, 25621.

04 19 58 38 LMP-LM Okay; say R1 and R2 again.

04 19 58 40 CC Okay; R1, 00011; R2, 13346.

04 19 59 01 LMP-LM Okay; note is "T_{ephemeris} to be used only in event of LGC/CMC clock sync." R1, 00011; R2, 13346; R3, 25621. And that's what we got loaded, or is that what we'd load if we wanted to sync up?

04 19 59 28 CC Okay; that's what you'd have to load to sync up after they fix the CSM time.

04 19 59 35 LMP-LM Okay; thank you much.

04 19 59 37 CC Okay; and that's the end of that. And I'll brief you on the traverse whenever you're ready.

04 19 59 42 LMP-LM Let John get on the comm. It'll be a couple of minutes. We're going into the eat period, and we'll give you a call while we're eating.

04 19 59 53 CC All right.

04 20 12 46 CDR-LM Hello, Houston. Good morning.

04 20 12 48 CC Good morning, John.

04 20 12 57 CDR-LM Did you work all night through, Tony?

04 20 12 59 CC No, no. I've - I've been home and sacked out.

04 20 13 06 CDR-LM Good. Okay. Go ahead with your EVA stuff.

04 20 13 10 CC Okay. Now these are the back room's best guess. That Spook sampling may be compromised by that ray from South Ray that you described, and since we're mostly interested in local Cayley on EVA-1, you'll probably have to spend a little time trying to differentiate between secondaries coming in from South Ray and local material. You described most of the Ray material as being very angular. One of the clues may be rounded blocks, for local material. At Flag, again, you may have that same problem, since we couldn't see over there, we really couldn't tell, and we don't want you to feel bound to Plum Crater there at Flag; if there's another place on the rim of Flag where you're more likely to get local material, feel free to head for it.

04 20 14 15 CDR-LM Okay; will do. But the color of the ray material is a pretty good job; it's all right.

04 20 14 24 CC All right. And there's - and the LM site - -

04 20 14 26 CDR-LM That is the way it - -

04 20 14 29 CC I'm sorry, John; go ahead.

04 20 14 35 CDR-LM It sure looked all white at ... over there.

04 20 14 39 CC Right. And I guess we'd like you to go ahead on a normal EVA - EVA-1 there, and not worry too much about the local blocks in the LM - ALSEP area. We'll try to pick them up at the end of EVA-1 or at station 10 in EVA-2.

04 20 14 59 CDR-LM Roger.

04 20 15 01 CC And, again, on the traverse itself, we'll skip the TV getting out, since we won't have AC and all and the high gain, and so you don't have to worry about deploying the TV and tripod, and we'll leave the TV for Charlie when he gets the LCRU out. We will need a few more words during the ALSEP deploy or, correction - during the LRV deploy, since we won't be able to watch it. And, our best guess on an ALSEP area is still sort of northwest of you there, but it will be completely up to you; whatever looks best. And again, the use of the UV camera, we'll - -

04 20 15 42 CDR-LM Okay.

04 20 15 43 CC We'll give you real-time updates on that.

04 20 15 48 CDR-LM Okay. I guess we're going to have to put the UV a little closer to the vehicle because of the current. Probably - probably won't make a lot of difference there.

04 20 15 59 CC Okay. And if you guys are all for it and everything, we're still trying to crowd in three EVAs.

04 20 16 11 CDR-LM What do you mean, are we all for it? (Laughter)

04 20 16 15 CC Well, I just thought I'd give you a chance to vote - to put your vote in.

04 20 16 25 CDR-LM I'm not for crowding it in, but let's do three of them!

04 20 17 08 LMP-LM Tony, Charlie. Please pass on to the ALFMED PI in the Science Room that you can see those light flashes on the lunar surface just like translunar coast, and you can also see in the lunar orbit. During the sleep periods. Over.

04 20 17 28 CC Okay, did you notice any change in frequency?

04 20 17 34 LMP-LM They're about the same as the - they're less than that experiment we ran, but they were about the same as they were in lunar orbit.

04 20 17 42 CC Okay; understand. They were less than in the experiment, but about the same as in orbit.

04 20 17 51 LMP-LM Yes, and I think there was about, let me see, I maybe saw 10 before I went to sleep, and I think I got to sleep pretty fast. So, they aren't really too numerous, but you can see them.

04 20 18 06 CC Okay, very good.

04 20 42 16 CDR-LM Okay, Houston. We think we're down to 117:03 now. What time have you got?

04 20 42 25 CC I'm sorry, John. Say again?

04 20 42 28 CDR-LM I say, we're down to 117 hours and 3 minutes.
We're ready to don suits. What time have you got?

04 20 42 36 CC 116:42.

04 20 42 38 CDR-LM Okay. We're going to go ahead and do it, with the
understanding that when we get them donned and get
the PLSS on, we'll be dressed and go ahead and get
out, because we don't have a very good way to keep
time in here.

04 20 42 53 CC Okay; understand. We do have a procedure here.
We'd like for you to mess with your steerable
antenna a little bit, there.

04 20 43 07 CDR-LM Okay, do you want to do that now?

04 20 43 11 CC If you're ready.

04 20 43 15 CDR-IM We're ready.

04 20 43 18 CC Okay. Circuit breaker panel 11, AC BUS B, S-BAND
ANTENNA, closed.

04 20 43 26 CDR-LM It's closed.

04 20 43 27 CC Okay. Panel 16, on the COMM, S-BAND ANTENNA,
closed.

04 20 43 35 CDR-LM Closed.

04 20 43 37 CC DISPLAYS, closed.

04 20 43 40 CDR-LM DISPLAYS, closed.

04 20 43 41 CC And HEATERS, S-BAND ANTENNA, closed.

04 20 43 47 CDR-LM S-BAND ANTENNA HEATER breaker, closed.

04 20 43 49 CC Okay. On the steerable manual controls, match
the indicated angles.

04 20 43 57 CDR-LM Okay.

04 20 44 01 CC Okay; the TRACK MODE to SLEW.

04 20 44 14 CDR-LM TRACK MODE to SLEW.

04 20 44 15 CDR-LM Stand by a second, please.

04 20 44 43 LMP-LM I think it might be working, John. It just - I just got a jump on my needle here.

04 20 44 51 CDR-LM On the yaw needle?

04 20 44 52 LMP-LM Yes. It's always been stuck on 12 before, and now it's on minus 75. But it doesn't look like it's 75 out there. Of course, you don't know with the pitch.

04 20 45 15 CDR-LM Okay; what do you want to do with it now, Houston?

04 20 45 18 CC Stand by 1 on that. We're working on another problem here.

04 20 45 28 CDR-LM Working another problem?

04 20 45 30 CC Okay. We'd like you to close INVERTER 2 circuit breaker, and select INVERTER 2.

04 20 45 40 LMP-LM Okay, you got it?

04 20 45 44 CDR-LM That's what I was afraid of. Now it's back to 12.

04 20 45 51 CC Okay; we'll press on with the procedure here. We had the TRACK MODE to SLEW, set the PITCH control knob fully counterclockwise.

04 20 46 02 CDR-LM It is.

04 20 46 04 CC Okay; TRACK MODE, OFF.

04 20 46 10 CDR-LM It's OFF.

04 20 46 12 CC Okay, now set both PITCH and YAW knobs fully clockwise.

04 20 46 21 CDR-LM It is.

04 20 46 23 CC Okay; go to TRACK MODE, SLEW.

04 20 46 31 CDR-LM Okay.

04 20 46 32 CC Let us know.

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04 20 46 33 CDR-LM And the antenna didn't move.

04 20 46 39 CC Okay; we understand. It did not move.

04 20 46 45 CDR-LM Negative, either in pitch or yaw.

04 20 47 02 CC Okay. Look on your panel 16, and see if the S-BAND ANTENNA circuit breaker is open or closed.

04 20 47 10 CDR-LM It's closed.

04 20 47 24 LMP-LM What a bunch of bull.

04 20 47 33 CDR-LM Doggone that ...

04 20 47 36 CC Okay; we're just going to back out of that procedure. Let's go TRACK MODE, OFF.

04 20 47 48 CDR-LM ... yaw then, Charlie.

04 20 47 51 CC And match indicator to angles; TRACK MODE switch, SLEW.

04 20 48 01 CDR-LM Tony, with the TRACK MODE to OFF, both indicators are minus 75.

04 20 48 10 CC Okay.

04 20 48 20 CC Okay. Set your PITCH at 180 and YAW at minus 12.

04 20 48 32 CDR-LM It's set.

04 20 48 35 CC Okay. And go through, and we'll pull the circuit breakers that you have set for this procedure. That's on panel 11, S-BAND ANTENNA, CLOSED. Pull it open.

04 20 48 48 CDR-LM Okay, it's open.

04 20 48 49 CC Okay. On 16, S-BAND ANTENNA, open.

04 20 48 51 CDR-LM Okay, Tony.

04 20 48 54 CC Okay, John.

04 20 48 57 CDR-LM Go ahead.

04 20 48 58 CC Okay, the S-BAND ANTENNA, open.

04 20 48 59 CDR-LM Go ahead.

04 20 49 00 CC Okay. DISPLAYS, open; and the HEATERS, open.

04 20 49 04 CDR-LM It's open.

04 20 49 05 CC Okay. INVERTER 2 circuit breaker, open; and INVERTER 2, OFF.

04 20 49 14 CDR-LM Roger. That's done.

04 20 49 16 CC Okay, let's press on with your suits.

04 20 49 21 LMP-LM Okay, Tony. What are the nominal angles for lockon error and on this attitude?

04 20 49 32 CC I'll get those.

04 20 49 41 CDR-LM Okay. ...

04 20 49 47 CC Okay. The 180 and minus 12 we gave you should be a good angle. And that's for photography, not for lockon. We're going to have you take a picture of it when you get out.

04 20 50 07 CDR-LM Roger. When Charlie moves the needles in yaw, he can get it to oscillate it in - plus or minus what? - plus or minus 3 degrees. The antenna doesn't sound like it's moving. It sort of sounded jiggly.

04 20 50 39 CDR-LM What are you doing now, Charlie?

04 20 50 50 CC Okay, John and Charlie. We'd like you to press on with the - the EVA work. If we mess with that S-band any more, we'll do after the EVA. I've got a note here. I don't know whether it's right or not, but it says that you won't be able to hear the yaw motor.

04 20 51 16 CDR-LM Okay; but Charlie is looking at it out the window, and it's not moving.

04 20 51 22 CC Okay. There's a latching mechanism in the thing there that should have released when the thing was

unstowed, and we're going to try to have you take a picture of it. There's a lever that pokes out there, and we can tell from the picture whether that lever - whether that latch released. And there should be a little bit of flop in there so - -

04 20 51 38 CDR-LM I understand.

04 20 51 40 CC Maybe we could drive it a little bit.

04 20 54 26 CDR-LM You should see me hold up this 50-pound pressure suit with one hand while Charlie is unzipping it with one hand. That's really neat.

04 20 54 38 CC Right. Bring some of that one-sixth g back here.

04 20 54 51 CDR-LM Yeah. You Earth people don't know how nice this is.

04 20 55 39 CDR-LM Where are we going to stow them?

04 20 58 29 CC Charlie, Houston.

04 20 58 36 CDR-LM Charlie is putting on his suit. I'll talk to you.

04 20 58 38 CC Okay. If it's not too late on Charlie's helmet there, the ... people just want to make sure that he washes it out with water to get that orange juice out before he puts that antifogging stuff in there.

04 20 58 55 CDR-LM It's never too late to do something like that. We'll do it.

04 20 58 58 CC Okay.

04 20 59 02 CDR-LM You could've done it - last night, you ass. They want you to wash it off with water before you put the antifog in there. Did you wash it?

04 20 59 10 LMP-LM Huh?

04 20 59 27 CC Roger, John. We copy that.

04 20 59 36 CDR-LM What did I say?

04 20 59 47 CC Roger. We're just noting your hot mike.

04 20 59 57 CDR-LM Are we on mike?

04 21 00 01 CC Yes, you sure are.

04 21 01 26 CDR-LM Do you all want to be in DOWN VOICE, or do you want to go NORMAL voice?

04 21 01 32 CC Stand by 1.

04 21 05 09 CDR-LM Charlie's PRD reads 21111 - 2 and four 1's.

04 21 05 20 CC Okay; 2 and four 1's.

04 21 07 08 CC Orion, Houston.

04 21 07 16 LMP-LM Go ahead.

04 21 07 19 CC Verify AFT omni.

04 21 07 24 CDR-LM AFT omni, Charlie.

04 21 07 28 LMP-LM We're on AFT omni.

04 21 07 30 CC Okay.

04 21 13 04 CC Orion, Houston.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 21 12 39 LMP-LM ... Break it, because there's no way for a human being to get the crinkle out of there because he ain't got three hands. Four hands would do a good job. Two to hold - one to pull on the zipper and two to hold the crinkle ...

04 21 13 04 CC Orion, Houston.

04 21 13 09 LMP-LM Go ahead.

04 21 13 10 CC At your convenience, we'd like you to switch LiOH canisters and jettison the used one.

04 21 13 22 LMP-LM Okay.

04 21 13 24 CDR-LM You want to switch the LiOH canisters and jettison the used ones.

04 21 13 28 CC And we have some changes to your Surface Checklist and your EVA Cue Cards.

04 21 13 38 LMP-LM No, but they go in.

04 21 13 41 CDR-LM Report, Charlie - -

04 21 13 42 CC A - -

04 21 13 44 CDR-LM Go ahead.

04 21 13 47 CC And leave the brackets for the LiOH canister.

04 21 13 52 CDR-LM Understand, leave the brackets for the LiOH canister.

04 21 13 55 CC That's affirmative.

04 21 14 00 CDR-LM Okay.

04 21 14 06 LMP-LM Okay, go ahead with the changes.

04 21 14 11 CC Okay, on your EVA-1 Cue Card.

04 21 14 18 LMP-LM Go ahead.

04 21 14 19 CDR-LM Plug in your water, Charlie.

04 21 14 21 CC On the right - -

04 21 14 22 CDR-LM Now, don't give me that ...

04 21 14 24 CC Okay, on EVA-1 prep, right-hand column, third line. It says "COMM: MODULATE - FM."

04 21 14 37 LMP-LM EVA-1 prep, right-hand column. Okay. "MODULATE - FM."

04 21 14 47 CC Okay.

04 21 14 48 LMP-LM What did you want to change it to?

04 21 14 49 CC Right. We want to delete the "MODULATE - FM" and delete "POWER AMPLIFIER - PRIMARY."

04 21 14 59 LMP-LM Okay.

04 21 15 00 CC Okay, about halfway down that column under comm, it says "TELEMETRY BIOMED - OFF."

04 21 15 13 LMP-LM. Yep.

04 21 15 14 CC O - -

04 21 15 15 LMP-LM Yep.

04 21 15 16 CC Okay, delete that "TELEMETRY BIOMED - OFF," and two lines later, it says "RECORDER - ON." Delete that line also.

04 21 15 24 LMP-LM Okay. What else?

04 21 15 34 CC Okay, stand by a second.

04 21 15 44 CDR-LM ... quarter. Yeah.

04 21 16 04 LMP-LM Yeah, that's right.

04 21 16 06 CDR-LM It's hard to beat.

04 21 16 07 LMP-LM ...?

04 21 16 11 CDR-LM No, they want to do it now. Okay, Houston, we're in secondary. On that LiOH canister, Charlie's changing now.

04 21 16 28 CC Oh, okay.

04 21 16 31 CDR-LM You do that, Charlie. It'd be so much easier.

04 21 16 34 LMP-LM What CDR comm have you got?

04 21 16 56 CC Okay, John, on the back side of that EVA-1 and the EVA post.

04 21 17 04 CDR-LM Okay.

04 21 17 06 CC Okay, it's on the bottom half of the card, left-hand column, third line up. It says "TELEMETRY BIOMED - LEFT."

04 21 17 17 CDR-LM Okay.

04 21 17 18 CC Delete that line.

04 21 17 30 CDR-LM Okay.

04 21 17 31 CC Okay, go to your Surface Checklist, page 3-4.

04 21 17 39 CDR-LM Okay, Surface Checklist, page 3-4.

04 21 17 51 CDR-LM Go ahead.

04 21 17 54 CC Stand by 1. Okay, left-hand column, near the bottom of the page, it says "On Houston cue: TELEMETRY PCM - LOW." Delete that line. And delete - and delete the next line, "S-BAND VOICE - DOWN VOICE BACKUP." Delete that also.

04 21 18 20 CDR-LM I wasn't going to stick it in there until you got that thing and it's shut, Charlie.

04 21 18 25 LMP-LM Okay.

04 21 18 26 CC Okay, John. We've got very poor comm; we're going to drop the - drop the link for a minute here. We'll be back in a minute.

04 21 18 34 CDR-LM Okay, I missed all you said about that page 3-4. You read me?

04 21 18 43 CC Roger. I do now. I'll come back to you in a minute, and we'll do 3-4 again.

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04 21 18 49 CDR-LM Okay. Philosophically speaking, I would like to get all these changes in before one or the other of us puts on a pressure suit because - because the - we're in an - energy conservation mode of operation, and I'd like to keep it that way.

04 21 19 04 CC Right. I sure do agree with you, John.

04 21 19 56 CDR-LM Okay. Okay, Houston, the LiOH canister is changed, and we're back on primary.

04 21 20 07 CC Okay, we copy.

04 21 20 19 CDR-LM ... Charlie? Okay, Charlie's got his suit on and he's all laced up, and he's got a shot of water.

04 21 20 33 CC Very good.

04 21 20 35 CDR-LM Yeah, it was terrific; how I know it. Want to go ahead with the checklist changes or you want to - me to don my suit?

04 21 20 46 CC I'm trying to get an answer here.

04 21 21 53 LMP-LM Got it in? ... around here.

04 21 21 57 CDR-LM Roger.

04 21 22 05 LMP-LM Yeah, ... over with my suit.

04 21 22 10 CDR-LM Okay.

04 21 22 58 CC Okay, John, on the checklist.

04 21 23 06 CDR-LM Go ahead.

04 21 23 08 CC Okay. On page 3-4, the bottom left-hand two lines. "TELEMETRY PCM - LOW" and "S-BAND VOICE - DOWN VOICE BACKUP."

04 21 23 20 CDR-LM ...

04 21 23 22 CC Delete both lines.

04 21 23 24 CDR-LM Surface Checklist, Charlie.

04 21 23 32 LMP-LM We copy.

04 21 23 33 CC Okay, on the right-hand column of 3-4, the third line from the bottom, it says "CABIN GAS RETURN - AUTO." Change that to "OPEN."

04 21 23 46 CDR-LM ... Flight Data File. ... Flight Data File.

04 21 24 00 CC Did you get that, Charlie?

04 21 24 04 LMP-LM I copy.

04 21 24 05 CC Okay, on page 3-6, the fifth line from the bottom in the left-hand column. It says "CABIN GAS RETURN - AUTO." Change that to "OPEN" also.

04 21 24 26 LMP-LM Okay, Tony.

04 21 24 29 CC Okay, we've got it for now. Later on, we'll have to change the cue cards for EVA-2 and 3 and - but that's - that's the extent of the checklist change. We've got one note here for you. We're going to have a - a change to the material - the - the gear that you bring up during the - during the transfer on the EVA-1, and I'll catch you before you go up and remind you about it.

04 21 24 54 LMP-LM Okay, thanks. ... put a ... on it, and we'll ... later.

04 21 24 59 CC Okay, good show.

04 21 26 03 CDR-LM ... verify.

04 21 26 10 LMP-LM I hope I won't ever have to do that.

04 21 26 23 LMP-LM Here's ... center.

04 21 26 26 CDR-LM Okay.

04 21 26 27 LMP-LM Okay, 14 ... Hey?

04 21 26 33 CDR-LM Yeah.

04 21 27 13 CDR-LM Okay. It's off first.

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04 21 27 34 LMP-LM Bigger than me.

04 21 27 37 CDR-LM You're not as big as I am.

04 21 27 47 CDR-LM Okay.

04 21 28 28 CDR-LM Okay, Houston, going off comm.

04 21 30 18 LMP-LM Tony, ... John ...

04 21 30 30 CC Charlie, you're very weak. Say again.

04 21 31 32 LMP-LM ... it's up.

04 21 35 26 LMP-LM ... How do you read? Over.

04 21 35 37 CC Orion, Houston. Go ahead.

04 21 35 41 LMP-LM ... Okay. You guys reading us?

04 21 35 45 CC You're very weak, Charlie.

04 21 35 51 LMP-LM How's that?

04 21 35 58 CC You're still weak. I think we can copy you, though.

04 21 36 04 LMP-LM Okay, look. We're going to probably have some trouble with the comm here, Hank. Are you sure you want to stay in DOWN VOICE BACKUP or - just exactly what? We're ready to go into the ... on the Lunar Checklist - the Lunar Surface Checklist, and John's got his suit on. And we're gonna put the PLSS's on.

04 21 36 35 CC Okay. We think this is the system with the best signal margin; I guess we'll have to stay with it.

04 21 36 47 LMP-LM Okay, you'd better think about - on the PLSS comm check. We're thinking maybe we could sort of go with ... you guys when we get out on the surface.

04 21 36 59 CC Right. How are you copying us, Charlie?

04 21 37 09 LMP-LM You're loud and clear, Tony.

04 21 37 10 CC Okay.

04 21 37 12 LMP-LM Have been, all through this procedure.

04 21 38 33 CC And, Charlie, we'd like to remind you to dry out your helmet pretty good before you put that antifog on.

04 21 38 39 LMP-LM ...

04 21 38 45 CDR-LM ... Charlie. You want me to check the OPS, right?

04 21 38 53 LMP-LM ...

04 21 39 11 CDR-LM Okay, Charlie. You've got 6000 pounds of thrust pressure. ... think it makes any difference.

04 21 39 30 CDR-LM No matter whose you get out, it's going to be cluttered.

04 21 39 33 LMP-LM Right.

04 21 39 55 CDR-LM There you go, Charlie.

04 21 40 07 CC Okay, Orion. We're going to have a site handover; maybe our comm will get a little bit better.

04 21 40 14 CDR-LM Okay. Hey, and look what I forgot to do. ... yet.

04 21 40 44 CDR-LM Charlie, you can - -

04 21 40 47 LMP-LM Zip?

04 21 40 48 CDR-LM Yeah.

04 21 41 39 CC Orion, Houston. We'd like to try the NORMAL voice; maybe it'll help.

04 21 42 38 CC Orion, Houston. How do you copy us?

04 21 42 54 CDR-LM Loud and clear.

04 21 42 58 CC Now, we can hear you down there, but you are too weak to use there. Stand by 1. We better go back to a DOWN VOICE BACKUP.

04 21 43 43 CDR-LM ... have to.

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04 21 43 57 CDR-LM Yep. Okay.

04 21 44 06 LMP-LM ...

04 21 44 07 CDR-LM I think it's all right, Charlie.

04 21 44 12 LMP-LM Houston, Orion. DOWN VOICE BACKUP. How do you read?

04 21 44 17 CC You're very weak there, Charlie. We'll have to press with it this way.

04 21 44 46 CDR-LM Okay, Charlie. Why don't you read them up there? ... OPS check for ... values. Yep. ... OPS check ... I don't understand that - pressure.

04 21 45 19 CDR-LM What are you doing?

04 21 45 21 LMP-LM ...

04 21 45 26 CDR-LM Okay.

04 21 45 32 LMP-LM You're out of sync.

04 21 45 34 CDR-LM Yeah, we're out of sync, but you're supposed to be going back up there.

04 21 45 42 CDR-LM My what? Plug it into this thing? Yes.

04 21 46 07 CDR-LM Okay. There you go. Unstow your boots, purge valve to purse, stow IV gloves in boot bottom compartment.

04 21 46 26 LMP-LM ...

04 21 46 27 CDR-LM Okay. !

04 21 46 35 CDR-LM Two up. I'm sorry, Charlie. Haste makes waste.

04 21 47 13 CDR-LM Fee's like it's on, Charlie.

04 21 47 31 CDR-LM Okay.

04 21 47 49 CDR-LM Charlie, you got hold of a foot some way ... in your gear.

04 21 47 58 LMP-LM Okay.

04 21 48 00 CDR-LM There we go.

04 21 48 40 CDR-LM See what happened, Charlie?

04 21 48 41 LMP-LM ... just here?

04 21 48 42 CDR-LM Yeah.

04 21 48 44 LMP-LM The other ...

04 21 48 57 CDR-LM Yeah? Okay. Got it. Okay. Yeah, I can't believe it. Okay. Unstow - LMP OPS, remove pallet, stow in jett bag.

04 21 49 26 LMP-LM Okay. ...

04 21 49 30 CDR-LM Okay.

04 21 50 08 CDR-LM Okay. Whew. Let's go - either go on spacecraft hoses or use the water. Let's go on spacecraft hoses, okay? So do I. Why don't we run the water?

04 21 50 38 LMP-LM ... have to switch the ... to off.

04 21 50 42 CDR-LM Yeah. And don't take long. One of them. Okay. Okay. That's good, isn't it? Cool it.

04 21 51 10 LMP-LM ...

04 21 51 18 CDR-LM Okay, that should do it.

04 21 51 22 LMP-LM ... Oh, I ...

04 21 51 25 CDR-LM ...

04 21 51 42 CDR-LM Here's your tissue.

04 21 52 03 LMP-LM Here.

04 21 52 05 CDR-LM ...

04 21 52 20 CDR-LM ...

04 21 52 36 CDR-LM You'd better give me your scissors ... I'm over here on the ...

04 21 53 31 LMP-LM Here's one for you and one for me. First stuff I've spilled since I've been here.

04 21 53 54 LMP-LM Okay, Tony. We're down to 1585 on the ...

04 21 54 07 CC Charlie, this is Houston. We're having a hard time copying you. John's a little bit better there. Would you check that your mikes are up to your mouths or have John say it?

04 21 54 19 LMP-LM Okay, Tony.

04 21 54 30 CDR-LM Our mike is up to our mouths - mouth.

04 21 54 33 CC Okay, that's a little better.

04 21 54 48 CDR-LM Okay. Okay.

04 21 55 06 LMP-LM Okay, ...

04 21 55 52 LMP-LM How we doing on the time line, Tony?

04 21 55 59 CDR-LM Tony, how are we doing on time?

04 21 56 04 CC Looks like you're a little bit ahead right now.

04 21 56 10 CDR-LM Okay.

04 21 56 23 CC Your comm check should come in about 25 minutes.

04 21 56 30 CDR-LM Okay. We don't really have a feeling for that even though we've probably got a watch here; we're not - we're not able to watch it.

04 21 56 38 CC Roger. I understand that. When you get a chance, we'd like to put the lunar battery on the LMP's bus.

04 21 56 47 CDR-LM Understand. Lunar bat on the LMP's bus.

04 21 56 52 CC Right. If you want to, I'll just read the procedure.

04 21 56 55 CDR-LM They want the lunar bat on your bus, Charlie. Okay, go.

04 21 56 59 CC Okay. The steps we've got here are BAT 2, OFF/RESET, talkback barber pole; BAT L - LMP, ON, talkback LMP; BAT 2, OFF/RESET, talkback barber pole.

04 21 57 18 CDR-LM Charlie says that'll drop power - on the commander's bus. Probably won't hurt anything.

04 21 57 26 CC Okay.

04 21 57 31 LMP-LM Is that okay with you guys to do that?

04 21 57 48 CDR-LM What are you hinting there, Charlie?

04 21 57 50 LMP-LM ... LMP ...

04 21 57 57 CDR-LM Okay. How come you're not talking to them?

04 21 58 05 LMP-LM Can you hear me?

04 21 58 06 CDR-LM No.

04 21 58 08 CC Yeah, Charlie. We're just not - not reading you well enough to understand what you're saying there.

04 21 58 30 LMP-LM ...?

04 21 58 31 CDR-LM No.

04 21 58 33 LMP-LM How do you read now, Tony?

04 21 58 36 CC I can hear you, Charlie, because I know what you're saying. But if you say anything different, I'm sure I wouldn't be able to copy.

04 21 58 44 CDR-LM Let me cover up my mike.

04 21 58 47 LMP-LM How do you read now, Tony?

04 21 58 49 CC About the same.

04 21 59 04 CDR-LM Do I sound pretty bad too, Tony?

04 21 59 10 CC Say again, John?

04 21 59 15 CDR-LM Do I sound pretty bad? I must. What we're trying to find out is if we have a comm problem before we start getting into this any further.

04 21 59 27 CC Right; we understand. Would you verify that you've done the battery management on 3-9?

04 21 59 38 CDR-LM You did the battery management, right?

04 21 59 40 LMP-LM Yeah, it's done.

04 21 59 44 CDR-LM That's completed, Houston. Stow jett bag. Here we are. EV gloves, attach watch to EV gloves. Stow LEVA bags.

04 22 00 06 CDR-LM Yeah. ... going to have go to unstow LEVA bag. Stow CDR's OPS on the forward engine cover.

04 22 00 28 LMP-LM Houston, do you read FORWARD omni any better? Over.

04 22 00 32 CC Stand by 1.

04 22 00 42 CDR-LM Okay. Tie jettison bag; stow on the aft engine cover.

04 22 00 54 CC Okay, Charlie. I guess we'd like you to go back to AFT.

04 22 01 00 CDR-LM They want you to go to AFT, Charlie.

04 22 01 04 LMP-LM Okay, on AFT omni now.

04 22 01 19 CDR-LM Okay. It must be unlocked, Charlie.

04 22 01 36 CDR-LM Yeah, you pull those ends, right?

04 22 01 43 LMP-LM ... push in, push in ... way in.

04 22 02 01 CDR-LM Yep. I don't think - no, it won't push anymore than that. See, it won't ride up over this thing here. We'll do it whenever we get there.

04 22 02 20 LMP-LM If we can get it open.

04 22 02 21 CDR-LM Okay, but - We can get it open. You don't get the handle all the way open. It'll never come any further than this, Charlie.

04 22 02 28 LMP-LM You sure about that?

04 22 02 30 CDR-LM No, that's unlocked right there. Have to remove that ...

04 22 02 46 LMP-LM ...

04 22 03 03 CDR-LM All right.

04 22 03 04 LMP-LM ...

04 22 03 05 CDR-LM Okay.

04 22 03 06 LMP-LM ...

04 22 03 13 CDR-LM All right ... is good.

04 22 04 55 CDR What is this thing around the backup, Charlie?

04 22 05 11 CDR-LM ... another shot of water.

04 22 05 24 LMP-LM ...

04 22 05 25 CDR-LM Yeah.

04 22 05 43 LMP-LM ...

04 22 05 44 CDR-LM Nope.

04 22 05 45 LMP-LM ... battery connected. Okay.

04 22 05 50 CDR-LM Whoa, Charlie. Roll me the water, please.

04 22 05 58 CDR-LM Okay. PLSS battery connection is locked. This PLSS battery is locked. Battery cable is locked. Antenna's locked. Straps are unstrapped.

04 22 06 35 CDR-LM Sure makes a difference. Oh, for goodness sake. All right, Charlie. I had no idea that was going to happen. Okay. Have you got that? It's too far down. What? Yeah. That's awful weird, isn't it?

04 22 07 11 LMP-LM ...

04 22 07 12 CDR-LM Huh? ... around that way, Charlie.

04 22 07 19 LMP-LM Okay.

04 22 07 20 CDR-LM Okay.

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04 22 07 36 CDR-LM There we go. Okay. Hoses are above the lower strap.

04 22 07 49 LMP-LM ...

04 22 07 51 CDR-LM Okay. ... hoses ...

04 22 08 06 LMP-LM ...

04 22 08 12 CDR-LM Okay. You're all set.

04 22 08 13 LMP-LM ... correct ...

04 22 08 16 CDR-LM Yeah.

04 22 08 32 CDR-LM In and lock. In and lock.

04 22 08 43 LMP-LM Yeah. Connect RCU to PGA and upper straps.

04 22 08 55 CDR-LM Okay, Charlie. Fan is off, off. Comm is off, pump's off.

04 22 09 06 LMP-LM Okay. ...

04 22 09 18 CDR-LM Oh, look at that.

04 22 09 31 CDR-LM Okay, here's the tag. Shall we put it on the PLSS? Where's your ...?

04 22 09 40 LMP-LM I got it.

04 22 09 45 CDR-LM Okay.

04 22 10 11 LMP-LM Houston, what site have you got on that ...?

04 22 10 18 CDR-LM ...

04 22 10 21 CC Charlie, I can hear you talking, but I can't copy it.

04 22 10 28 CDR-LM ... Can you hear me, Tony?

04 22 10 35 CC Yes, John, I can, if you talk slowly and right into the mike.

04 22 10 43 CDR-LM Okay, that's what I'm doing.

04 22 10 46 CC Okay.

04 22 10 47 CDR-LM Okay, Charlie's got his PLSS on.

04 22 10 51 LMP-LM Okay, Tony. You've got Charlie. I've got my PLSS on. Over.

04 22 10 58 CC Very good. We copy that, Charlie.

04 22 11 26 CDR-LM Okay.

04 22 13 12 CDR-LM Okay. Okay, the battery is in and locked. The battery is locked. PLSS controls are all off. OPS is locked, the controls are clear, and the hose is locked.

04 22 13 34 CDR-LM See how that thing takes a set? Folded up in there - that jobber right there, Charlie? Wadded it up behind you, like you did.

04 22 13 57 CDR-LM Huh?

04 22 14 13 CDR-LM ... Turn it up, Charlie. I can't believe it. Here, let me take that thing off.

04 22 14 29 CDR-LM Turn around this way. Can you turn around this way?

04 22 14 54 CDR-LM Okay, turn around this way. ... Whew! Yeah. Yeah.

04 22 15 28 CDR-LM Feels neat.

04 22 15 50 CDR-LM How're you doing? Okay.

04 22 16 00 LMP-LM Is your ...?

04 22 16 02 CDR-LM Yeah, right here.

04 22 16 45 CDR-LM Okay.

04 22 17 03 CDR-LM Okay. Get the RCU ...

04 22 17 12 LMP-LM RCU ...

04 22 17 27 CDR-LM How about another shot, Charlie? More. ... Okay. ...

04 22 18 32 CDR-LM Okay, can you get my hose?

04 22 18 34 LMP-LM Yeah.

04 22 19 26 CDR-LM Strap right here.

04 22 19 29 LMP-LM Okay.

04 22 19 35 CDR-LM There's one little ..., Charlie.

04 22 19 45 LMP-LM ... cap?

04 22 19 46 CDR-LM Okay, plus ...

04 22 20 06 CDR-LM Should we have the RADAR STANDBY breaker in or out, Houston?

04 22 20 09 CC Say again, John.

04 22 20 13 CDR-LM Should the RADAR STANDBY breaker be in or out?

04 22 20 17 CC Okay, we'll check.

04 22 20 22 LMP-LM Okay, Tony, we are starting the PLSS comm check momentarily. Over.

04 22 20 29 CC Okay, you're very weak but readable, Charlie.

04 22 20 35 CDR-LM Okay. AUDIO MODE, S-BAND to T/R, ICS to T/R, RELAY to ON, MODE to VOX, VOX SENS PTT max. Okay, it says VHF A to T/R and VHF B to RECEIVE. Comm, VHF A TRANSMITTER to VOICE; A RECEIVER, ON ... RECEIVER, OFF: A RECEIVER, ON; B TRANSMITTER, OFF; B RECEIVER, ON. SQUELCH VHF - VHF A and B noise thresholds, plus 1-1/2. Something else. VHF ANTENNA to EVA.

04 22 21 32 CC And, Charlie, we'd like that RADAR STANDBY breaker closed.

04 22 21 39 CDR-LM Okay, it's closed.

04 22 21 48 CDR-LM EVA, UPLINK SQUELCH, ENABLE. ... mine goes off. UPLINK SQUELCH, ENABLE. Okay, S-BAND - my S-BAND to T/R; ICS to T/R; RELAY to OFF; MODE, VOX, max; A to T/R, RECEIVE. Okay.

04 22 22 45 CDR-LM ... lock. Okay.

04 22 22 58 CDR-LM Charlie's AUDIO breaker's closed. Okay, going to A. Wheel. You get a tone on, a vent flag P, a press flag O, and O₂ mom. J, a PLSS O₂ pressure gage rated 85 percent. Check with me and Houston.

04 22 23 27 CDR-LM Charlie, I don't read you.

04 22 23 31 LMP-LM ... Houston, how do you read your LMP?

04 22 23 35 CC Charlie, we hear you. You've got a squeal in the background though.

04 22 23 42 LMP-LM Yeah, I know. How do you read now? Over.

04 22 23 53 LMP-LM Can you read anything?

04 22 23 56 CC Yeah, we're copying you, Charlie. I didn't hear the squeal that time, though.

04 22 24 04 LMP-LM No, we're - -

04 22 24 09 CDR-LM ... I know what it is. You're not ...

04 22 24 23 CDR-LM Okay. You're not keying at all.

04 22 24 26 LMP-LM Houston, am I keying? Over.

04 22 24 30 CDR-LM You are now.

04 22 24 31 CC Yes, you are, Charlie. How do you copy us? You sound better than you did on LM comm.

04 22 24 58 CDR-LM Yes.

04 22 25 37 LMP-LM Okay, how do you read now, Houston?

04 22 25 40 CC Okay, you're weak but readable, Charlie.

04 22 25 47 LMP-LM Okay, my microphones were full of orange juice, and I cleaned them out, and I think I'm okay now.

04 22 25 55 CDR-LM Every time you turn your head, you're keying it.

04 22 25 57 CC Okay. We copy that, Charlie.

04 22 25 58 LMP-LM ... I can't help it.

04 22 26 02 CDR-LM Oh.

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04 22 26 06 LMP-LM Nothing we can do about it now.

04 22 26 10 CDR-LM Okay.

04 22 26 12 LMP-LM Okay, we were reading ...

04 22 26 13 CDR-LM Okay.

04 22 26 14 LMP-LM CB 11, COMMANDER AUDIO, open.

04 22 26 19 CDR-LM Okay, COMMANDER AUDIO's open.

04 22 28 24 LMP-LM Close your AUDIO breaker. VHF A to OFF, and B to OFF. PLSS PTT to maintain?

04 22 28 34 CDR-LM Right.

04 22 28 36 LMP-LM We go to - we go to B?

04 22 28 43 CDR-LM There's B.

04 22 28 44 LMP-LM We have a tone, a vent flag, and a press flag, and a PLSS O₂, rated 85.

04 22 28 52 CDR-LM Okay. ... PLSS O₂'s reading about 98.

04 22 28 59 LMP-LM ... Over.

04 22 29 07 CC Say again, John - Charlie.

04 22 29 11 LMP-LM How do you read? Over.

04 22 29 16 CC We're copying you, but you're weak.

04 22 29 21 LMP-LM Okay. We're reading you 5 by. My PLSS is on. Comm check with the LMP. You do the comm check now.

04 22 29 37 CDR-LM Hello, Houston. How do you read? Over.

04 22 29 39 CC Okay, John. You're - you sound good but again you're weak also.

04 22 29 47 CDR-LM Okay, I'm hollering as loud as I can. And my microphones are right in my mouth.

04 22 29 53 CC Right. I can hear it bounce against your tonsils.

04 22 29 59 CDR-LM Okay. We - we're going to AR now. How do you read now, Houston?

04 22 30 09 CC Okay, just like before.

04 22 30 14 CDR-LM Do you read Charlie?

04 22 30 16 LMP-LM Okay, Houston. You're coming in beautifully, Tony, 5/5.

04 22 30 20 CC Very good. Actually, your comm is better now than - for both of you - than it was when it was on the LM.

04 22 30 28 LMP-LM Okay, great. Okay.

04 22 30 33 CDR-LM Let's read.

04 22 30 36 LMP-LM Okay, Houston. My O₂ quantity is 100 percent.

04 22 30 41 CDR-LM So's mine - So is mine, about 99.

04 22 30 45 LMP-LM ... B to pull, decrease.

04 22 30 48 CC Okay, we copy that.

04 22 30 49 LMP-LM Okay. S-BAND MOD to PM, GO.

04 22 30 59 CDR-LM Not bad. All ready.

04 22 31 01 LMP-LM Okay, Houston. You don't - y'all have telemetry now?

04 22 31 07 CC Negative; we don't.

04 22 31 10 CDR-LM Let's get some cooling in here.

04 22 31 13 LMP-LM Okay, it says verify comm and telemetry. There's no way we can do that, is there?

04 22 31 28 CC Okay, no, we don't expect it until you get on the LCRU.

04 22 31 34 LMP-LM Okay, fine.

04 22 31 38 CDR-LM Okay, cold, as required. Circuit breaker 16, CABIN ECS REPRESS, closed, verify.

04 22 31 44 LMP-LM Go.

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04 22 31 47 CDR-LM REPRESS, closed, verify. SUIT FAN DELTA-P to open

04 22 31 50 LMP-LM Go.

04 22 31 51 CDR-LM SUIT FAN DELTA-P number 2. That ain't right.

04 22 31 54 LMP-LM SUIT FAN 2?

04 22 31 56 CDR-LM SUIT FAN 2, open.

04 22 31 57 LMP-LM Okay.

04 22 32 00 CDR-LM SUIT FAN selector to 2. Verify ECS caution and WATER SEP lights come on in about a minute.

04 22 32 11 LMP-LM Okay.

04 22 32 12 CDR-LM SUIT GAS DIVERTER, PULL to EGRESS. Verify.

04 22 32 15 LMP-LM Go.

04 22 32 16 CDR-LM CAB GAS RETURN to EGRESS. Verify.

04 22 32 18 LMP-LM Go.

04 22 32 19 CDR-LM SUIT CIRCUIT RELIEF to AUTO. Verify.

04 22 32 21 LMP-LM Go.

04 22 32 22 CDR-LM Okay; 102 hours, OPS - OPS connect, LMP first. SUIT ISOLATION valve, actuate - no, we don't have that yet. ... goes to SUIT ISOL, though. At both of them. Okay, let me get at your OPS hose. ...

04 22 32 47 LMP-LM It's hot in here.

04 22 32 48 CDR-LM Yeah.

04 22 32 53 LMP-LM There's a SEP light.

04 22 32 55 CDR-LM Okay. Got a WATER SEP light, Houston.

04 22 32 59 LMP-LM ... on that.

04 22 33 02 CDR-LM Okay.

04 22 33 08 LMP-LM ... purge valve.

04 22 33 11 CDR-LM Okay.

04 22 33 12 LMP-LM Verify closed, lock pin in, and in low flow.

04 22 33 16 CDR-LM That's verified. ... for you, Charlie.

04 22 33 20 LMP-LM ... purge valve in PGA, red on red.

04 22 33 22 CDR-LM Okay.

04 22 33 24 LMP-LM PGA diverter valve to vertical. ...

04 22 33 29 CDR-LM Thank you, Charlie.

04 22 33 38 CDR-LM We're in lock.

04 22 33 40 LMP-LM Okay. Now we repeat it.

04 22 33 42 CDR-LM Okay. Hey, why don't you sock up some water.
We need ... cool.

04 22 33 50 LMP-LM Yeah, just a minute.

04 22 34 02 CDR-LM Okay. Don't get your tea in your mike again,
Charlie.

04 22 34 08 LMP-LM How's that?

04 22 34 09 CDR-LM That's better.

04 22 34 10 LMP-LM Yeah, I'll just - -

04 22 34 11 CDR-LM Okay.

04 22 34 38 LMP-LM And locked?

04 22 34 42 CDR-LM Okay.

04 22 34 49 LMP-LM Got it. No? Got it. Lock pin is in in.

04 22 34 58 CDR-LM Okay.

04 22 35 02 LMP-LM And locked.

04 22 35 03 CDR-LM Okay.

04 22 35 05 LMP-LM Get us a drink and I'll get us some cooling.

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04 22 35 08 CDR-LM Okay. That's pretty smart, Charlie.

04 22 35 31 CDR-LM Okay.

04 22 35 50 CDR-LM Brace this here for a little bit, Charlie.

04 22 36 01 LMP-LM Hey, you're doing it.

04 22 36 08 CDR-LM Okay.

04 22 36 09 LMP-LM Okay, I'm turning off the water.

04 22 36 11 CDR-LM Okay. Let's see. We could still do that. First do that ... Let's keep doing it until we get down here.

04 22 36 19 LMP-LM Okay, PLSS fan, on; position mikes.

04 22 36 23 CDR-LM Fan's on; mike is positioned. Okay.

04 22 36 26 LMP-LM Fan is on. Vent Flag is clear.

04 22 36 30 LMP-LM Mine hasn't yet.

04 22 36 33 CDR-LM Mine did.

04 22 36 35 LMP-LM Don helmet; check drink bag position. Don LEVA's and lower protective visor. Secure tool harness.

04 22 36 42 CDR-LM Okay. Take this helmet to the very back.

04 22 37 30 CDR-LM Can you get it, Charlie?

04 22 37 33 LMP-LM ... over here, John.

04 22 37 35 CDR-LM Yeah. Here, let me try to get it on when it - try to get it on whenever you get it down where I can see it. Oh, man, that's going to get you with it ... juice.

04 22 37 53 CDR-LM Give it a try.

04 22 37 57 LMP-LM Nope.

04 22 38 00 CDR-LM ...

04 22 38 03 LMP-LM Make sure the belt goes down all the way in the back here.

04 22 38 06 CDR-LM That's what it is, right there.

04 22 38 07 LMP-LM Bet it feels like, right over there. Same place
as yesterday, right there?

04 22 38 15 CDR-LM Yeah. ... separate.

04 22 38 20 LMP-LM ... probably gained weight ... you ...

04 22 38 28 CDR-LM This comm is beautiful, isn't it?

04 22 38 30 LMP-LM Yeah. ...

04 22 38 32 CDR-LM Let me put it on for you, so I can see what you - -

04 22 38 35 LMP-LM Okay.

04 22 38 37 CDR-LM Just hold your head back. Get it over your head
first. Watch out for your mike. Here you go.
Get that inside.

04 22 38 46 LMP-LM Okay. I think you got it, John. ... Okay, now
we don the LEVAs.

04 22 38 59 CDR-LM Okay.

04 22 39 01 LMP-LM Okay, I'll put yours on first.

04 22 39 06 CDR-LM Careful we don't drop those gloves.

04 22 39 08 LMP-LM Yeah, I know it. We'd be - in sad shape. I
got it. The old red stripes.

04 22 39 33 LMP-LM That looks pretty good, John.

04 22 39 35 CDR-LM Okay.

04 22 39 39 LMP-LM Got it down on back? It is Velcroed.

04 22 39 42 CDR-LM Okay.

04 22 39 46 LMP-LM You think my old long arms here will get mine
out? This too.

04 22 39 50 CDR-LM All righty.

04 22 40 02 CDR-LM Almost got it, Charlie.

04 22 40 04 LMP-LM Okay. Sorry. You're a little topheavy with this
PLSS, aren't you?

04 22 40 11 CDR-LM Not really. I feel a little bit - ..., you know?

04 22 40 36 CDR-LM Hey, can you carry that?

04 22 40 40 LMP-LM Okay.

04 22 40 41 CDR-LM ... turn around?

04 22 40 46 LMP-LM Man, is that water cold! Whoo, whoo!

04 22 40 48 CDR-LM Feels good doesn't it?

04 22 40 49 LMP-LM Mm-hmm! Okay, we got - can we - hey, can you get my tool harness straps?

04 22 40 56 CDR-LM Yep. Okay, there's one.

04 22 41 04 LMP-LM Okay.

04 22 41 08 CDR-LM Get the other one?

04 22 41 11 LMP-LM Okay.

04 22 41 17 CDR-LM Got it?

04 22 41 19 LMP-LM Okay. Hold on. Got this one. And it's Velcroed down.

04 22 41 30 LMP-LM Do the other one.

04 22 41 35 CDR-LM And it's Velcroed down.

04 22 41 37 LMP-LM Okay, LCG cold - we got that. And we'll open the PUMP, and we can disconnect the hoses, and then connect up the PLSS hose.

04 22 41 44 CDR-LM Okay.

04 22 41 46 LMP-LM Okay, PUMP is open.

04 22 41 47 CDR-LM Okay.

04 22 41 48 LMP-LM ...

04 22 41 49 CDR-LM Got it.

04 22 41 51 LMP-LM ... hose, huh?

04 22 41 52 CDR-LM Yeah. Would you throw that back up in there? I
threw it the other way.

04 22 41 59 LMP-LM Yeah. Boy, those things are ..., aren't they?

04 22 42 01 CDR-LM Here, Charlie. They won't bother you, will they?

04 22 42 04 LMP-LM Okay. No. Uh-uh, sir.

04 22 42 05 CDR-LM Is yours? Why not put it back there on the wall?

04 22 42 08 LMP-LM Yeah, I am. Okay, it's on the wall. Okay, so's
yours. ... extra 4 inches on this hose? Super.
Push.

04 22 42 28 CDR-LM Okay, come in. Guess what?

04 22 42 35 LMP-LM ...

04 22 42 37 CDR-LM Charlie. (Laughter)

04 22 42 40 LMP-LM Go ahead. Try me.

04 22 42 44 CDR-LM In, and locked.

04 22 42 54 LMP-LM Okay, we got your hoses to the ECS handhold.
Okay, helmets, visors aligned and locked.

04 22 43 01 CDR-LM Aligned and locked.

04 22 43 02 LMP-LM O₂ connectors, three, locked.

04 22 43 03 CDR-LM O₂ connectors have been locked. I checked yours,
Charlie.

04 22 43 06 LMP-LM Okay, purge valve's locked.

04 22 43 08 CDR-LM Purge valve's locked.

04 22 43 10 LMP-LM Okay.

04 22 43 11 CDR-LM Water connector's locked.

04 22 43 13 LMP-LM Water's locked; we just checked.

04 22 43 14 CDR-LM Comm connector's locked, too.

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04 22 43 15 LMP-LM Okay, go to vertical.

04 22 43 17 CDR-LM Vertical.

04 22 43 19 LMP-LM We verify CB configuration. You can turn the page.

04 22 43 23 CDR-LM Okay.

04 22 43 26 LMP-LM Couple minutes away.

04 22 43 27 CDR-LM Charlie, these ...

04 22 43 38 CDR-LM Wow, verify these CB configurations.

04 22 43 41 LMP-LM Okay.

04 22 43 45 CDR-LM Can you read all this, Houston?

04 22 43 48 CC We sure can, Charlie. We're following you pretty well.

04 22 43 53 CDR-LM I'm John. (Laughter) That's yours.

04 22 44 00 LMP-LM Yes. I forgot I left my white overgloves back here. Want it on?

04 22 44 45 LMP-LM ... fell out somewhere.

04 22 44 57 CDR-LM Okay. My gloves are on and locked, Charlie.

04 22 44 59 LMP-LM Okay. I haven't even started mine, yet. Wait a minute.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 21 33 XX

BEGIN LUNAR REV 23

04 21 53 30 CC Good morning, Casper. Up and at them.

04 21 55 15 CMP Hello, Houston. Are you there this morning?

04 21 55 19 CC Good morning, Casper. How are you feeling this morning?

04 21 55 25 CMP Swinging.

04 21 55 29 CC You get a good night's rest?

04 21 55 34 CMP Sure did. That's the best sleep I've had since I've been in here.

04 21 55 38 CC Hey, that sounds great. Whenever you're ready to get a few things done before your eating period, let me know.

04 21 55 49 CMP Okay. If you get some things for me to copy, I'll get started on that. Then we can catch up on the crew status when we get a chance.

04 21 55 59 CC Okay. Before we get started, Ken, could you terminate the bat A charge?

04 21 56 10 CMP No sooner said than done.

04 21 56 33 CC Okay, Ken, how about let's starting with the Flight Plan changes for a couple of revs here and get that out of the way?

04 21 56 52 CMP Say, just a second. Let me check the test meter.

04 21 57 08 CMP Okay, the battery compartment is sitting right at 1.5 volts. So, I guess the next time we go to do a dump and stuff, it wouldn't hurt to vent that, too.

04 21 57 19 CC Roger. Copy.

04 21 57 35 CMP Okay. Let's go.

04 21 57 37 CC Okay. The - the first item is right here at the wakeup, 118 hours. We have already terminated the bat charge. We want to - we don't need to write all this in. I'll just tell you what we want to get from you is a film status report, which we didn't pick up last night. And, a little bit later here, we want to up-link the lift-off time. The first item really comes at 118:15 and there we want to put, "Sync mission timer to CMC clock." And that is a VERB 5 NOUN 1 ENTER, 1706 ENTER. And then T^{ephem} verification by MSFN. Copy on MSFN cue. I guess you're familiar with that procedure, aren't you?

04 21 58 30 CMP Yes, sir.

04 21 58 32 CC Okay, and they got a note here where we copy out three registers at the time - at the proper time. Okay, the next item is 118:55 - delete the charge battery B.

04 21 58 52 CMP Okay. Battery charge B charge is deleted.

04 21 59 06 CC Okay, at - stand by a minute, Ken.

04 21 59 21 CC Okay, Ken, that should get you through the next couple of revs. We are just gonna follow the Flight Plan. The - How about now let's set up our cryo configuration. We would like to verify the - that we're using the 100-volt heaters on O₂. That's on panel 226, I believe.

04 21 59 54 CMP Okay, that's verified.

04 21 59 59 CC Okay, and back on panel 2, we want O₂ HEATERS 1 and 2, AUTO, and 3, OFF.

04 22 00 11 CMP That's verified.

04 22 00 12 CC H₂ HEATERS 1 and 2, OFF.

04 22 00 22 CMP Okay, H₂ HEATERS 1 and 2, OFF.

04 22 00 26 CC Roger. And H₂ fans, 1 and 2, OFF, and 3, AUTO.

04 22 00 37 CMP Okay. FANS in tank 3 are AUTO.

04 22 00 53 CC Okay, Ken, we got a message that says, "Do not vent the battery compartment."

04 22 01 02 CMP Okay. I won't do that.

04 22 01 06 CC Okay, the next item - We are wondering if you got the screens on the suit hoses. Those screens are normally stored in the PGA bags during launch and we don't know whether you ever got those on or not. If you didn't, you can put those on and get increased circulation in the cockpit, there.

04 22 01 30 CMP Okay. No, we sure didn't. I plugged up the inlet side so that it wouldn't get dirt in them and then he put the screens on. I'll - I'll do that.

04 22 01 41 CC Okay, just make a note to yourself there to get that done. Okay, I'll tell you a little bit about SIM Bay status here. Mapping camera is working fine; no anomalies. The only problem we had was that retract. And our plan on that is that we are going to leave the mapping camera out except when we are doing coupled RCS. The laser altimeter has fired 663 times since launch. But it is starting to miss now about 20 percent of the time on the altitudes. Pan camera's working fine; no anomalies. We've got a margin of 58 frames. I forgot to give you margins on the mapping camera. We're 452 frames ahead there. Mass spec is performing good. And the extend/retract performance is good except that the boom is hanging up near full or retraction. You are aware of that. However, the boom has been verified safe for SPS burns. The gamma ray is getting good data. The gain is stable and has excellent resolution. Boom performance is nominal. X-ray and alpha particles are both good.

04 22 03 07 CMP Okay. Have they seen anything unusual on any of their data yet?

04 22 03 13 CC That's negative, Ken. And, if you will give us ACCEPT, we'll get on with your state vector updates. Stand by - That's clock update.

04 22 03 23 CMP You got them.

04 22 03 40 CC And, for your information on planning, we're not going to reschedule any extra mapping camera or pan camera passes today to make up for what we missed yesterday. We're just going to go with the Flight Plan.

04 22 03 55 CMP Okay.

04 22 03 58 CC And - in regard to the booms, we are gonna do - follow the nominal extension and retractions for the mass spec, except we are going to try to get the retractions done during AOS, so we can watch it.

04 22 04 19 CMP Okay, that sounds good, and - was the mapping camera retract time really as long as I thought it was?

04 22 04 33 CC Stand by.

04 22 04 41 CC That's affirmative, Ken. They got 03:15 on their data down here.

04 22 04 49 CMP Okay.

04 22 04 53 CC And, in regard to your EKG, sometime when you get a chance here, we want you to service the - the leads there. Want you to doff your harness, replace the sponges and tape, and don it again.

04 22 05 09 CMP Okay, that's about - that's about a 20-minute job.

04 22 05 14 CC Just whenever you can work it in. No real rush there - -

04 22 05 17 CMP ... piecemeal, if I get a chance.

04 22 05 50 CC And, Ken, consumables status looks just about like it was when you went to bed last night. Nothing really to report there. And I guess, we can go ahead and start on your postsleep checklist and we'll be standing by for your crew status report and SIM status report.

04 22 06 13 CMP Okay, I'll have that for you in just a minute.

04 22 09 17 CMP Okay, Hank. I am ready for our little crew status update. Then, - let's see. You want me to take the MASS SPEC, ION SOURCE, to STANDBY now?

04 22 09 29 CC Roger, Ken. Go ahead.

04 22 09 39 CMP Okay, it's in STANDBY. I'll get - PAN CAMERA MODE is in STANDBY and the POWER is coming ON -

04 22 09 47 CMP MARK.

04 22 09 48 CMP Barber pole, back to gray. Okay, ready for a little crew status.

04 22 09 58 CC Roger; go ahead.

04 22 10 07 CMP Okay, Bravo 1, 15048; Bravo 3, 6-1/2 - the best yet; Bravo 4, none. On the menu side, the happy gourmet says that meal A for CMP was a large orange juice with potassium. Meal B was - and then breakfast, a chocolate bar, sugar cookies, and another citrus beverage with potassium. Meal C - chicken and rice, two orange drinks, fruit cocktail, pineapple fruitcake. I got - I guess yesterday morning - for the commander, you can delete the peaches, you can delete the grits on the LMP. You can delete the peaches, you can delete the eggs, and you can add an extra orange-pineapple with potassium.

04 22 11 49 CC Okay, Ken. We got all that.

04 22 14 14 CC Casper, Houston. You're cleared for PAN CAMERA POWER, OFF. The lens is tucked.

04 22 14 27 CMP Okay, I'll get that in just a second.

04 22 15 36 CMP PAN CAMERA POWER is OFF.

04 22 15 38 CC Okay.

04 22 15 53 CC And, Ken. We are up - up-linking the state vector to you now.

04 22 16 00 CMP Okay.

04 22 18 45 CC Casper, Houston. The computer is yours.

04 22 18 51 CMP Okay, thank you, sir.

04 22 21 00 CC Casper, Houston. Whenever you get a chance, we can take the GAMMA RAY SHIELD, OFF and the MASS SPEC ION SOURCE, ON.

04 22 21 09 CMP MASS SPEC ION SOURCE is ON; the GAMMA RAY SHIELD is OFF; SHIELD is OFF.

04 22 21 18 CC Roger.

04 22 22 31 CC Ken, no need to acknowledge, but give us a call when you get ready to sync your mission timer.

04 22 22 38 CMP Okay, I'm trying to catch this photograph of Davy, and I'm almost over it now.

04 22 23 13 CMP It looks to me like I'm not going to be able to get it because the terminator isn't quite far enough over this time. I guess we're far enough off on our basic here.

04 22 23 32 CC Okay, you say Davy hadn't moved out into the light, yet?

04 22 23 40 CMP No, the terminator is lying just to the west of Ptolemaeus. I can see the highlands and I think I see probably the first crater chain - first of the craters in the chain. And, in fact, that may be Davy G. But the rest of it is still in the shadow.

04 22 24 02 CC Roger.

04 22 24 03 CMP I guess I will have to let that one go today. Okay, well, let's get back to where you were.

04 22 24 43 CMP Yeah, what's happening here, Hank. It looks like we are a little bit early, but it still looks like those times would have been - these times probably weren't gonna quite hack it anyhow.

04 22 24 55 CC I am a little bit puzzled by this, too, Ken. That should have been good.

04 22 24 57 CMP Okay, and I am ready. Okay, let's see. We need to catch up on T_{ephem}, right?

04 22 25 08 CC That's affirmative.

04 22 25 21 CMP Okay, that's what I show on 1706.

04 22 25 33 CC Okay, Ken. We got the numbers. It looks good.

04 22 25 50 CMP Okay, and I copied them down. Well, we can sync the mission timers to that, huh?

04 22 26 00 CC That's affirmative.

04 22 29 05 CC Ken, in regard to that Davy thing - I was just talking to Spence and he says that the - that was the correct time and that - that - where they call officially the terminator. And the photo setting should have worked. But it sounds like from what you said, it may have been a little too dark.

04 22 29 27 CMP (Laughter) There's nothing but hard shadows down there where Davy is. Maybe - maybe the rim of Ptolemaeus there's - and Alphonsus, and that area is a little higher than we calculated because it wouldn't have to be off by much in order to keep you from - from missing it. I - after we talked about it there - why, looked out the side to the south, and it looked like further south in the mare. The terminator did go out a little further. So, I think we got caught by elevation.

04 22 29 59 CC I suspect that's the case, Ken.

04 22 30 08 CMP Okay, I'll whip into a little P52 here.

04 22 31 03 CMP Hey, Hank.

04 22 31 31 CMP Well, there's the old Earth, again. And it's getting smaller. I think it's not sanforized.

04 22 31 36 CC Roger (laughter).

04 22 31 46 CC Ken, in your postsleep, did you terminate the jet monitor?

04 22 31 52 CMP Oh, hey - no. Let me write that out on my post-sleep checklist right now. They wrote that in as an extra item yesterday, and I forgot it this morning.

04 22 32 20 CMP It sure pays to have you guys watching.

04 22 32 24 CC Well, I just happened to think of that one, and I got to thinking about your P52, using SCS, and then I wondered about the jet monitor program.

04 22 32 39 CMP For that one, you get the award for the year. That was smooth.

04 22 33 14 CC And, Ken. Whenever you get a chance, GAMMA RAY, SHIELD, ON. When you get through with this.

04 22 33 30 CMP Okay, GAMMA RAY SHIELD is coming ON -

04 22 33 33 CMP MARK it.

04 22 38 14 CC Okay, Ken. We got the 93. You are clear - -

04 22 38 16 CMP Okay, you folks have the angles.

04 22 38 17 CC - - to torque.

04 22 38 19 CMP Okay, I'll do it at 10.

04 22 38 58 CC And, Casper; Houston. Got a little update to you there for that dead band test. We'd like to change the 5 degrees to 2-1/2 degrees.

04 22 39 09 CMP Okay. Make that 2-1/2.

04 22 39 53 CC And, Ken. Since we updated the clock, we need to update the time on the T_{ig} for the TEI-26. The rest of the TEI-26 pad's good. So, whenever you are ready to copy, I'll read you the new T_{ig}.

04 22 40 09 CMP Okay. Just a second. Let me get my GDC here. This GDC is working a lot better. When we started out, I made a drift check on it, you know - right after insertion, and it was drifting pretty readily. And now, this thing will go for 6 hours and be off

less than 10 degrees. I guess it just - maybe once it got warmed up, it just sort of stabilized, and it's really - really doing a good job now.

04 22 40 43 CC Hey, that sounds real great.

04 22 40 48 CMP Yeah, it is particularly nice to know (laughter).

04 22 41 25 CMP Okay. Why don't you give me a new time for TEI-26?

04 22 41 29 CC Roger. T_{ig} is 125:26:15.47.

04 22 41 49 CMP Okay, that is 25:26:15.47.

04 22 41 56 CC Roger. That's 125.

04 22 42 10 CMP Yeah - yeah, 125. Thank you.

04 22 42 40 CMP And I got the PURGE LINE HEATERS on.

04 22 42 45 CC Roger; copy.

04 22 42 46 CMP And, about now, suppose I give you - try to give you a rundown on the film.

04 22 42 52 CC Okay. Go ahead, Ken.

04 22 42 54 CMP Didn't use any of the - we didn't use any of the UV film yesterday - that's magazine Oscar Oscar. Magazine Sierra Sierra reads 20 frames. I'm just going to have to go through the film locker here and pull out mags and tell you what's on them.

04 22 43 26 CMP Okay, November November is completed.

04 22 44 33 CMP And, Victor - we're only up to 8.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

04 22 44 45 CDR-LM Okay, my ... are all right, Charlie.

04 22 44 50 LMP-LM ... I haven't started mine yet. Wait a minute.

04 22 44 55 LMP-LM You don't see one of those white gloves down there anywhere, do you?

04 22 45 05 CDR-LM No, I sure don't, Charlie.

04 22 45 10 LMP-LM On the floor anywhere?

04 22 45 15 CDR-LM No, I don't see one.

04 22 45 17 LMP-LM Ah, here it is.

04 22 45 22 LMP-LM That could be the ... Flash Gordon with those - with those ... on.

04 22 45 43 LMP-LM I can barely get the old fingers in them.

04 22 45 47 CDR-LM Let me do it for you, Charlie.

04 22 45 49 LMP-LM Let me try this one. Then you can ... Okay, now push. Can you push it?

04 22 46 08 LMP-LM Now wait a minute. Okay. I'll push the top one, you push the bottom one.

04 22 46 10 CDR-LM Okay. There we go.

04 22 46 11 LMP-LM Okay.

04 22 47 13 LMP-LM Super job, John. Thank you.

04 22 47 23 CDR-LM Okay. Wait a minute.

04 22 47 28 CDR-LM The washer's a little loose, but that's okay.

04 22 47 30 LMP-LM Okay. PLSS lock is locked, ... adjusted, the PDA ... on. Okay, verify PLSS converters in. Yours in?

04 22 47 42 CDR-LM Yes.

04 22 47 48 CDR-LM It's in, Charlie.

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04 22 47 52 LMP-LM Okay. Okay, pumps on.

04 22 48 02 LMP-LM Okay. Go ahead.

04 22 48 04 CDR-LM Hey, that's good cooling.

04 22 48 08 LMP-LM I don't understand why I can't get cool now.

04 22 48 10 CDR-LM Circulate that cool water in you.

04 22 48 11 CDR-LM Okay, PLSS REGS A and B to EGRESS.

04 22 48 13 LMP-LM EGRESS.

04 22 48 14 CDR-LM Okay. PLSS O₂ ON.

04 22 48 15 LMP-LM Okay.

04 22 48 30 CDR-LM Okay. ... 31 to 34.

04 22 48 43 LMP-LM Coming up. Hey, I got it.

04 22 48 48 LMP-LM Okay, fine.

04 22 48 55 CDR-LM ... 31 to 34, Charlie.

04 22 48 57 LMP-LM Okay. What about the O₂ flag? What does it say?

04 22 49 03 CDR-LM Don't say nothing. Says O₂ flag ... 3740.

04 22 49 08 LMP-LM Okay.

04 22 49 15 CDR-LM Yeah. Happy days.

04 22 49 16 LMP-LM Yeah.

04 22 49 52 CDR-LM Okay, Charlie. Let's do the ... check.

04 22 49 54 LMP-LM Okay. I'll get yours off.

04 22 49 57 CDR-LM Let me see if I can get it. I got it.

04 22 50 00 CDR-LM Grabbing the wrong valve, there.

04 22 50 01 LMP-LM Who me?

04 22 50 02 CDR-LM No, I did it.

04 22 50 04 CDR-LM Okay, I'll start in a minute.

04 22 50 06 CDR-LM Houston, can you give us a mark at the end of a minute?

04 22 50 08 CC Roger. I started the clock when you said it was off.

04 22 50 15 LMP-LM Okay, mine's off.

04 22 50 16 CDR-LM Charlie, is yours off?

04 22 50 27 LMP-LM Boy, mine's tight as a drum, John.

04 22 50 30 CDR-LM Yes, and mine's leaked about ... some.

04 22 50 40 CDR-LM Started at 382; it's down to about 372 now.

04 22 50 47 LMP-LM Mine jumped about a tenth also.

04 22 50 50 CDR-LM Boy, that feels good.

04 22 50 52 LMP-LM That pressure point on the leg went away, John.

04 22 50 56 CDR-LM There's no pressure, huh?

04 22 51 02 LMP-LM Hey, when's the minute up, Tony?

04 22 51 03 CC Okay, there's the minute now.

04 22 51 05 CDR-LM Took a long time.

04 22 51 10 CDR-LM Okay. I'm down to 37.

04 22 51 12 LMP-LM Okay. Mine dropped off 1 and 1/2, Tony.

04 22 51 18 CC Say again yours, Charlie?

04 22 51 21 LMP-LM 0.15. ...

04 22 51 37 LMP-LM Feels like it's on to me. Back over a little bit - -

04 22 51 41 CDR-LM It's on off.

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04 22 51 42 LMP-LM Say again?

04 22 51 43 CDR-LM It's not on.

04 22 51 50 LMP-LM Okay; check mine off.

04 22 51 54 CC Okay, Orion. We're GO for depress.

04 22 52 00 LMP-LM Roger. GO for depress.

04 22 52 09 CDR-LM Yours is off, Charlie.

04 22 52 10 LMP-LM Okay. Okay, read them.

04 22 52 18 CDR-LM Okay. Circuit breaker ECS, CABIN REPRESS to open.

04 22 52 20 LMP-LM Okay. Don't need to close the COMM TV breaker, I guess.

04 22 52 25 CDR-LM No. Huh-uh.

04 22 52 26 CDR-LM Okay, CABIN REPRESS valve to CLOSE.

04 22 52 28 LMP-LM Okay, go.

04 22 52 30 CDR-LM Overhead abort dump valve open and auto at 3-1/2.

04 22 52 33 LMP-LM Okay. I'll get this one.

04 22 52 35 CDR-LM Okay. You got it open, Charlie?

04 22 52 41 LMP-LM Not yet. ...

04 22 52 47 CDR-LM Here we go.

04 22 52 48 LMP-LM Okay.

04 22 52 50 CDR-LM That's 4 and 1/2, 4, 3 and 1/2 -

04 22 52 56 CDR-LM MARK.

04 22 52 57 CDR-LM Okay, close. Okay. Charlie's at 3 and 1/2; my own suit circuit is locked up at 4.3. That's true. Okay, ... pressure gage is ... 5. ... dropping down slowly. Okay.

04 22 53 29 CDR-LM Go ahead and open the dump valve, Charlie.

04 22 53 31 LMP-LM Okay. Ready?

04 22 53 32 CDR-LM Yeah.

04 22 53 33 LMP-LM Okay. Here we go. It's open. There.

04 22 54 00 LMP-LM It's on and ...

04 22 54 01 CDR-LM Yeah.

04 22 54 06 LMP-LM Okay. Pressure's at 1, Houston.

04 22 54 10 CC Say again, Charlie.

04 22 54 15 LMP-LM Cabin pressure is down to 1.

04 22 54 20 CC Roger. We copy.

04 22 54 29 CDR-LM A few minutes after we started that, we were supposed to be able to open the forward hatch.

04 22 54 36 LMP-LM Now we're down to 0.5, 0.4.

04 22 54 46 CDR-LM You gonna put that back to auto before we get out, Charlie?

04 22 54 49 LMP-LM What does it say?

04 22 54 54 CDR-LM Better not. If that thing closed and we had a leak, we'd be in trouble.

04 22 55 03 CC No, you want to leave one in open, there.

04 22 55 07 LMP-LM We got it. The overheads are open.

04 22 55 09 LMP-LM Okay, John. It's 0.2. You ought to be able to open that gate. Here she comes. She's coming open. I've got the handle down.

04 22 55 30 CDR-LM I know it.

04 22 55 31 LMP-LM There it is. Hatch is open, Houston. Wait a minute, wait a minute. Okay, I got it. Look at that air - Look at that stuff stream out of there.

04 22 55 46 CDR-LM Yeah.

04 22 55 47 LMP-LM Okay. Okay, forward hatch open. PLSS open. Partially opened forward hatch. You get it?

04 22 56 09 CDR-LM Can you get it?

04 22 56 10 LMP-LM Now.

04 22 56 13 CDR-LM There it is.

04 22 56 14 LMP-LM Okay, it's off.

04 22 56 20 LMP-LM That'll be easy. ...

04 22 56 25 CDR-LM Get the water?

04 22 56 29 LMP-LM Yeah. I think so. ...

04 22 56 35 CDR-LM Turn around, Charlie. ...

04 22 56 38 LMP-LM I'm just trying to turn around. You're in front of me. Okay, there we go.

04 22 56 56 LMP-LM I think it's on, John.

04 22 57 03 CDR-LM ... Charlie's ... is on your mark. Okay, it's on, Charlie.

04 22 57 13 LMP-LM If you'd turn sideways, Johnny, we'd - -

04 22 57 16 CDR-LM If I could turn sideways, I'd be half as big as I am.

04 22 57 19 LMP-LM Okay. You'll have to turn sideways to get out.

04 22 57 20 CDR-LM I know it.

04 22 57 21 LMP-LM Okay, let's rest until the feedwater pressure comes out.

04 22 57 33 CC We don't have any telemetry here.

04 22 57 41 LMP-LM Oh, yeah?

04 22 57 46 CDR-LM I believe you can take your visor down, Charlie.

04 22 57 48 LMP-LM How long is it supposed to take to get the feed-water to start feeding the cooling?

04 22 58 00 CC About 4 minutes.

04 22 58 42 CDR-LM Do you want me to throw out the checkback, Charlie?

04 22 58 46 LMP-LM I'll give it to you. Okay?

04 22 58 51 CDR-LM Don't think we can get it past ...

04 22 58 53 LMP-LM Okay. Fine.

04 22 58 55 LMP-LM You can't get back in that corner? No, sideways, like I am. You can't - you ain't going to be able to get out unless you can get around. There you go.

04 22 59 08 CDR-LM Baby, that's as far as I go.

04 22 59 13 LMP-LM So do I, but that's what we're going to have to do. Okay, you get out and I'll put in the - -

04 22 59 22 CDR-LM ... you do, too.

04 22 59 28 LMP-LM Hey, yours just cleared, very minor. Didn't mine clear?

04 22 59 33 CDR-LM You don't have any flags, Charlie.

04 22 59 37 LMP-LM Okay, Houston, the H₂O flags have just cleared.

04 22 59 42 CC Okay. We copy that.

04 22 59 52 LMP-LM Okay, shall we go to intermediate on the cooling and see if it's working.

04 22 59 57 CDR-LM It's working.

04 23 00 05 LMP-LM Houston. Can we go to intermediate on the cooling?

04 23 00 14 CC Roger. That's okay.

04 23 00 20 LMP-LM I feel mine working.

04 23 00 21 CDR-LM I do, too.

04 23 00 22 LMP-LM Okay, Houston, are we ready to get out? We're ready to get out.

04 23 00 31 CC Okay. Let's go.

04 23 00 34 LMP-LM Here we go. Hey, why don't you go out, John?

04 23 00 37 CDR-LM Take care of the ETB, Charlie.

04 23 00 39 LMP-LM I'll give you that when you get out. Okay?

04 23 00 40 CDR-LM Got to get my PLSS antenna, right?

04 23 00 42 LMP-LM No, not quite - not now. That comes later. Okay, kick your feet out. Okay, your PLSS is over on - partially over under the perch. Come this way a little bit. Okay. You've got your PLSS hung up. Your right corner is on the door over there. Throw your rear end - There you go. You got it.

04 23 01 23 CDR-LM Okay, Charlie.

04 23 01 24 LMP-LM Okay. Can you stand on the porch?

04 23 01 28 CDR-LM Yeah, wait a minute. I'll get the ETB now.

04 23 01 31 LMP-LM Okay, that's the jett bag.

04 23 01 33 CDR-LM Okay, let me get it.

04 23 01 41 LMP-LM Okay. Okay. There you go.

04 23 01 47 CDR-EVA Okay. Houston, I'm standing out on the porch. I've got the ETB in one hand, and we're just sort of looking around here. My golly, what a view. I can see the big boulders Charlie was talking about.

04 23 02 06 LMP-LM How far back is it?

04 23 02 15 LMP-LM Hey, Houston. How do you read me? Over.

04 23 02 24 CC Okay. You sound good there.

04 23 02 28 LMP-LM Okay; Johnny's I guess about out.

04 23 02 31 CDR-EVA Yeah, I'm about out, Houston.

04 23 02 33 CC Very good.

04 23 02 34 CDR-EVA I'm on the porch. I'll take the old ETB, and go down the steps here, Charlie.

04 23 02 43 LMP-LM Okay.

04 23 03 02 CDR-EVA Boy! Isn't that nice? I tell you, the ETB is hanging right in there. I'm setting it on the ground.

04 23 03 14 LMP-LM Are you on the ground?

04 23 03 16 CDR-EVA No, the ETB is, though.

04 23 03 18 LMP-LM It's touching the ground?

04 23 03 19 CDR-EVA Yes. ...

04 23 03 20 CC And, John, verify you got the MESA.

04 23 03 26 CDR-EVA Oh, yeah. I've got to get the MESA. Excuse me.

04 23 03 39 LMP-LM There goes the MESA.

04 23 03 40 CC Roger.

04 23 03 41 CDR-EVA I'm going to check the vehicle where it hit the bottom, Charlie.

04 23 03 43 LMP-LM I saw it. ...

04 23 03 45 CDR-EVA Okay. Oh, boy.

04 23 03 51 LMP-LM Hey, John, hurry up.

04 23 03 54 CDR-EVA I'm hurrying. Okay.

04 23 04 05 LMP-LM There you are, our mysterious and unknown Descartes. Highland plains, Apollo 16 is gonna change your image. I'm glad they got old Brer Rabbit, here, back in the briar patch where he belongs. Okay,

RECORDER's OFF. VOX S-BAND to max, UTILITY FLOODS
are OFF. SIDE PANELS are OFF. Here I come, babe.

04 23 04 34 CDR-EVA Okay. Jett bag is going under the engine bell.
I don't see any - Oh, look at those beautiful
rocks. I don't see any particular - Yep, we
roped the probes off, going straight down. The
probes are all standing straight up.

04 23 04 54 LMP-LM Okay, great.

04 23 04 55 CDR-EVA Oh, is this ever neat, Charlie!

04 23 04 57 LMP-EVA Okay, I'm out - almost.

04 23 05 02 CDR-EVA Well, don't come out until you see what we - see
what we just passed over.

04 23 05 06 LMP-EVA It was a big rock, I tell you.

04 23 05 09 CDR-EVA No, it was a big hole.

04 23 05 10 LMP-EVA A big hole, huh?

04 23 05 11 CDR-EVA You ain't going to believe this.

04 23 05 13 LMP-EVA Okay. Close the hatch.

04 23 05 15 CDR-EVA Okay. ...

04 23 05 23 LMP-EVA Okay, Tony, how far do you want me to close the
hatch?

04 23 05 29 CC Okay. Just pull it snug, Charlie.

04 23 05 32 CDR-EVA How far do you want it closed about, Charlie?

04 23 05 34 LMP-EVA What'd he say?

04 23 05 36 CDR-EVA Just pull it snug.

04 23 05 38 CDR-EVA Okay, I'm gonna open the MESA here. ...

04 23 05 43 LMP-EVA Hot dog, is this great!

04 23 05 46 CC Sounds great.

04 23 05 58 LMP-EVA Okay, John. You can see the - you can see in the shadows just great.

04 23 06 03 CDR-EVA Yep.

04 23 06 05 LMP-EVA Wow! Look at that landing. You almost got a big rock with the - about a 50-centimeter rock with the right leg - the left leg. That was a slight miscalculation on the ECB.

04 23 06 22 CDR-EVA Yes.

04 23 06 24 LMP-EVA Fantastic. That's the first foot on the lunar surface; it's super, Tony. Okay, Tony, we're making little footprints here about 1/2-inch deep, not kicking up really very much. We're going to have to pull that MESA up, John; that's too low.

04 23 06 49 CDR-EVA Yeah, I know it.

04 23 06 55 LMP-EVA Let's do that.

04 23 06 57 CDR-EVA Okay; let me get these blankets down.

04 23 06 59 LMP-EVA Okay. Boy, is this ever superb.

04 23 07 09 CDR-EVA I'll - I'll pick it up.

04 23 07 15 LMP-EVA Okay. How do you want it? About right here?

04 23 07 24 CDR-EVA Wait a minute. You got to loosen this here thing.

04 23 07 25 LMP-EVA I know it.

04 23 07 40 CDR-EVA Wait a minute, Charlie, let me get it.

04 23 07 42 LMP-EVA Okay.

04 23 07 52 LMP-EVA Boy, the view of Stone Mountain, Tony, is superb. Look at that hole we almost landed in.

04 23 08 01 CC The MESA blanket, John, that you usually fold up and put away there, we'd like you to put it over the TV until you use the TV.

04 23 08 14 CDR-EVA Roger.

04 23 08 16 LMP-EVA Getting that thing, John?

04 23 08 20 LMP-EVA Doesn't it come off, straight up?

04 23 08 24 CDR-EVA Looks like to me it comes up.

04 23 08 28 CDR-EVA Houston, how do you get this MESA blanket thing up?

04 23 08 31 LMP-EVA Tony, we need to jack the MESA up and we can't get the lock off.

04 23 08 42 LMP-EVA The MESA is touching the ground. The old low ...

04 23 08 49 CC You should be able to just pull up on it there.

04 23 08 56 CDR-EVA Okay. That's what I thought.

04 23 08 59 CDR-EVA Is it taking in?

04 23 09 01 LMP-EVA Hey, you want me to pull up on the black - the black stripe, don't you? The black?

04 23 09 07 CDR-EVA Wait a minute, Charlie, take up on the MESA and let me roll this cord.

04 23 09 10 LMP-EVA I just did that, John.

04 23 09 12 CDR-EVA You're not - you're not pulling back, you're pulling - Charlie - pull down that way. Tighten up the cord. Pull down.

04 23 09 20 LMP-EVA Right here?

04 23 09 21 CDR-EVA No, right - just pull in a straight line.

04 23 09 24 LMP-EVA Okay.

04 23 09 25 CDR-EVA See what I'm talking about?

04 23 09 27 LMP-EVA Yeah.

04 23 09 28 CDR-EVA Don't fall down, now.

04 23 09 36 LMP-EVA Looks like it's hung up on the side here.

04 23 09 39 CDR-EVA It's not working?

04 23 09 43 LMP-EVA Not yet.

04 23 09 44 CDR-EVA Well, the heck with it. Let's go on.

04 23 10 02 LMP-EVA Well, I can't get it.

04 23 10 03 CDR-EVA You want to move out of the way and let me see?

04 23 10 05 LMP-EVA Yeah.

04 23 10 06 LMP-EVA Tony, don't you just pull straight up on the black line?

04 23 10 22 CC We're checking on that, Charlie.

04 23 10 34 CDR-EVA There's some block you have to release, Charlie.

04 23 10 37 LMP-EVA I think so, too.

04 23 10 47 LMP-EVA John, let's see if we can do it with this. Why don't you see if you can pick it up.

04 23 10 54 CDR-EVA Look at that red line on there, where it was supposed to be at.

04 23 11 01 CDR-EVA Okay; I'll pick up - I'll pick up the MESA. Okay?

04 23 11 04 LMP-EVA Okay, let me see if I can get this thing here - We need to take - okay, I got it. Why don't you - No, I've got it. Why don't you see if you can pull that string line up. There you go. Keep going.

04 23 11 20 CC Charlie, there should be a green strap that you should be able to pull up on that'll lift it.

04 23 11 28 CDR-EVA Okay, Charlie. Keep lifting.

04 23 11 30 LMP-EVA Okay.

04 23 11 31 CDR-EVA Is that enough?

04 23 11 32 LMP-EVA Keep going.

04 23 11 33 CDR-EVA Buddy, that's great.

04 23 11 34 LMP-EVA Okay. Okay, we got it, Tony.

04 23 11 38 CC Outstanding.

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04 23 11 47 CDR-EVA Okay, blanket is loose ... MESA blanket and TV tripod, unstow and deploy. Okay, we'll put the white blanket over there for such time as we use it.

04 23 12 02 CDR-EVA How far is the LRV, Charlie? Well, we've gotta get our PLSS antennas up.

04 23 12 08 LMP-EVA Okay, here -

04 23 12 09 CDR-EVA Don't need that!

04 23 12 11 LMP-EVA Well, we've got to get it out of the way.

04 23 12 13 CDR-EVA Okay.

04 23 12 14 LMP-EVA Get this other stuff, then.

04 23 12 27 LMP-EVA Yeah, I put your antenna up.

04 23 12 29 CDR-EVA Okay.

04 23 12 43 CDR-EVA Partially out.

04 23 12 46 CC And we'd like an EMU check from both of you.

04 23 12 54 LMP-EVA Okay, I got clear flags, 94 percent, and 3.8, min cooling.

04 23 13 01 CDR-EVA I got clear flags.

04 23 13 19 LMP-EVA Well, Houston, here we are. Sleepy little Descartes. Boy, the old Cayley Plains are really something. Tell you, there are rocks all over the place, as we described.

04 23 13 33 CDR-EVA At least 92 percent.

04 23 13 34 LMP-EVA Hey, Johnny, come on.

04 23 13 35 CDR-EVA Eighty-five.

04 23 13 36 LMP-EVA Go get my antenna.

04 23 13 37 CDR-EVA Okay.

04 23 13 38 CC Okay; you were doubling; we didn't get the CDR's EMU.

04 23 13 46 LMP-EVA Ninety-five percent.

04 23 13 48 CDR-EVA Did you see it, Charlie?

04 23 13 51 LMP-EVA Yes, I saw it.

04 23 13 59 CDR-EVA Duck, Charlie.

04 23 14 00 LMP-EVA Sir?

04 23 14 02 CDR-EVA Duck.

04 23 14 03 LMP-EVA Okay; thanks.

04 23 14 06 CDR-EVA I'm going to get the drill out.

04 23 14 10 LMP-EVA Man, I never saw that big hole back there.

04 23 14 13 CDR-EVA Yes, that's what I was telling you about.

04 23 14 15 LMP-EVA Tony, right behind the LM here, there's a - within 3 meters of the foot - of the minus-Z footpad there's a - a hole, a crater - there's a crater that is probably 10 meters deep - 5 meters maybe, but 30 degrees for angles on the side. Okay, the drill is out - the drill is out and the - it runs. ...

04 23 14 56 CC Very good.

04 23 15 03 CDR-EVA Charlie, I'm gonna offload the LRV, I guess.

04 23 15 05 LMP-EVA Okay, you be inspecting it.

04 23 15 19 LMP-EVA And all four stems are out.

04 23 15 21 CC Okay.

04 23 15 30 LMP-EVA Tony, if I get 20 feet back to - do the - the pan from the SEQ Bay here, I'm going to fall in that big hole.

04 23 15 47 LMP-EVA Okay, ETB to table.

04 23 16 03 LMP-EVA Okay, aft chassis all parallel. The ... are not pre-released. Release from the thermal blanket. The walking hinge latches are locked.

04 23 16 19 CDR-EVA Yes, how about that. You mean the one - -

04 23 16 26 LMP-EVA Okay; Tony, the paint beneath the - on this side also, below the steerable antenna is peeled off just like on the other side. I don't see anything wrong with this steerable, I guess it just won't work.

04 23 16 43 CC Okay.

04 23 16 44 LMP-EVA Had to reset both ... - -

04 23 16 48 CC Charlie, we'll have some pictures for you to take of the steerable later, but we'll get that when you take your pan.

04 23 16 56 LMP-EVA Yes, I was planning on that. Okay, John. Got your walking hinges fixed, huh?

04 23 17 05 CDR-EVA Yes, it takes both straps.

04 23 17 06 LMP-EVA Here, I'll help you on this other side. Man, what a beautiful landing. I'm glad you weren't 10 feet - whew me, you were going for it - you were landing, going for it -

04 23 17 20 CDR-EVA That was worry - was worrying me.

04 23 17 23 LMP-EVA Okay; here's your strap over here, John.

04 23 17 25 CDR-EVA Okay.

04 23 17 36 LMP-EVA Hey, that looks - that big rock under there looks like a vesicular basalt to me. The black one.

04 23 17 51 LMP-EVA Tony, the engine bell is about 6 inches off the - off the ground and it's not crushed at all.

04 23 18 00 CC Okay.

04 23 18 01 CDR-EVA Okay, Tony, here we go.

04 23 18 14 LMP-EVA I'm going up the porch, Tony, to get the Rover. What a pretty machine.

04 23 18 24 CDR-EVA I'll just run over here and grab this spring, Charlie, and pull on it a little. Okay, both those - if you got - On your spring up there, there's tension on it, right?

03 23 18 43 LMP-EVA Yes.

04 23 18 44 CDR-EVA Okay, let's just make sure that I checked all these things.

04 23 18 46 LMP-EVA Okay.

04 23 18 47 CDR-EVA Go to the left side for deployment, reel out straight, three or four strokes, contingency fuel to LM strut, walking hinge latches engaged - Verify those one more time - forward, aft, and center chassis parallel, left and right outrigger cables taut; verify your outrigger cables taut up there - -

04 23 19 04 LMP-EVA Both of them okay.

04 23 19 08 CDR-EVA - - All right. Reel out tape, right side, and back away from the deploy area. Okay, Charlie? Ready?

04 23 19 14 LMP-EVA Yes.

04 23 19 17 CDR-EVA Okay, here we go.

04 23 19 19 LMP-EVA We're loose, Houston.

04 23 19 20 CDR-EVA The bottom pins released, too.

04 23 19 32 CC Very good.

04 23 19 36 LMP-EVA Bouncing around. Man, it's great. Isn't that neat?

04 23 19 40 CDR-EVA That's got to be nice.

04 23 19 45 LMP-EVA Good or not, this is like in the training building. The only thing we don't have, Tony, is the linoleum on the floors.

04 23 19 52 CDR-EVA Let's grab the surface here, Charlie.

04 23 19 56 CC We'll try to fix that, Charlie.

04 23 20 00 CDR-EVA ... wait a minute. Pulling?

04 23 20 01 LMP-EVA Yeah, I'm pulling.

04 23 20 02 CDR-EVA Okay. This is much easier than it was before. Don't pull so hard, I guess. Can't believe that big hole back there.

04 23 20 17 LMP-EVA John picked up the exact bottom of this whole crater!

04 23 20 25 CDR-EVA There weren't any flat places around here, Charlie.

04 23 20 29 LMP-EVA Yes, but anywhere else we would have landed, we would have been on a great big slope.

04 23 20 34 CDR-EVA Okay, there goes the front wheels. And the back - the aft chassis is released too, I think.

04 23 20 39 CC Very good.

04 23 20 40 CDR-EVA The wheels didn't lock into place, there. We'll have to go up there and get the ... and push them up. Okay, you hold that and let me run up and do that.

04 23 20 48 LMP-EVA Okay.

04 23 20 52 CDR-EVA The wheels didn't lock, Houston.

04 23 20 54 CC Okay; we copy that.

04 23 20 57 CDR-EVA There goes one. Charlie got one. Is it in, Charlie?

04 23 21 05 LMP-EVA Yes, it is. Okay. And the hinge pin - this hinge pin isn't in either. But we'll get that.

04 23 21 14 CDR-EVA Okay, see if the other one is in. See if you can't get it. Okay; stop pull.

04 23 21 27 LMP-EVA John, I went just out of minimum on my cooling unit, and it feels a lot better.

04 23 21 30 CDR-EVA Okay; I'll try that in a second here.

04 23 21 33 LMP-EVA Did it get out of the walking hinges?

04 23 21 36 CDR-EVA No, I don't think so, Charlie.

04 23 21 40 LMP-EVA Okay, see what it did. It didn't look like to me it did. It didn't get in there.

04 23 21 54 CDR-EVA Yes. Yes, it's sitting - Yes, it's sitting in something there, Charlie.

04 23 21 57 LMP-EVA Okay, they are in.

04 23 21 58 CDR-EVA Yes. It looks to me that - -

04 23 22 02 LMP-EVA Wait a minute.

04 23 22 03 CDR-EVA This one is not in over here.

04 23 22 05 LMP-EVA Are you sure?

04 23 22 06 CDR-EVA Yep.

04 23 22 08 LMP-EVA You just took it out of this one over here - set it up - Okay; this one's in.

04 23 22 15 CDR-EVA But just don't run off with it, Charlie.

04 23 22 16 LMP-EVA I'm not.

04 23 22 17 CDR-EVA Okay, this one's in. Okay, this one's in.

04 23 22 23 LMP-EVA Okay. Okay, keep going.

04 23 22 30 CDR-EVA Don't you want to pull, Charlie?

04 23 22 34 LMP-EVA No, it says release pull at aft ... of your lock, and that's what I did.

04 23 22 35 CDR-EVA Okay, it just stepped out of those walking hinges.

04 23 22 38 LMP-EVA I know, and it's bouncing on us.

04 23 22 41 CDR-EVA Those walking hinges are no longer any good anyway, after we get down to this point. Okay, now sit down ... it's bouncing out.

04 23 22 50 LMP-EVA Yeah, keep pulling. Watch that big rock there.

04 23 22 53 CDR-EVA Oh, I see what you mean.

04 23 22 54 LMP-EVA About a 50-centimeter boulder right next to the minus-Y footpad, angular.

04 23 23 03 CDR-EVA Hey, Charlie, do you want me to keep pulling?

04 23 23 05 LMP-EVA Yes, keep pulling until you hit the grade - the - until we get the weight off of these things.

04 23 23 19 CDR-EVA You got to pull it away, Charlie.

04 23 23 24 LMP-EVA There she comes.

04 23 23 26 CDR-EVA Roger. I can pick that beauty up right off the ground with this little cable. Do I keep pulling?

04 23 23 32 LMP-EVA Yeah. Can you get that - Okay, that's it, John.

04 23 23 37 CDR-EVA How are the cables - slack enough?

04 23 23 38 LMP-EVA Yeah, that's great.

04 23 23 39 CDR-EVA Let's go get it.

04 23 23 40 LMP-EVA Okay, here, you'll need this.

04 23 23 41 CDR-EVA Wait a minute, that rear wheel isn't locked.

04 23 23 44 LMP-EVA Oh, we'll get that. Okay, you lock that side. I'll pull these pins. Okay, this one's not locked out, either. Okay, now it is. This hinge pin is in.

04 23 24 04 CDR-EVA And this hinge pin is in. That - that - I think this is locked. Oh.

04 23 24 10 LMP-EVA Watch out!

04 23 24 12 CDR-EVA Turn the car over.

04 23 24 13 LMP-EVA I know it.

04 23 24 16 CDR-EVA Okay, Charlie, now you come back up here and help me.

04 23 24 23 LMP-EVA Oh, boy, that cooling is so much nicer. Okay, in we go.

04 23 24 30 CDR-EVA Hey, wait a minute, let me get a little further away from it in case it springs off the -

04 23 24 37 LMP-EVA Hey, you're doing pretty well with that deep-knee-bend stuff.

04 23 24 41 CDR-EVA Yes, I already picked up a rock to see if it was possible.

04 23 24 43 LMP-EVA Yeah, I saw you ...

04 23 24 46 CDR-EVA Although you got to maintain your c.g.

04 23 24 49 CC Okay.

04 23 24 54 LMP-EVA Tony, are you copying all this?

04 23 24 57 CC We sure are. We're all ears. Sure wish we had the TV.

04 23 25 05 LMP-EVA Well, we'll get it for you in a minute. Sorry about that steerable, but ... breaks. Okay, the Rover is within 2 feet of being on the ground. Ah, the old machine.

04 23 25 22 CDR-EVA I believe we're a little upslope here. I get the feel I - if I let go of it, it'll run under the vehicle.

04 23 25 29 LMP-EVA Yes, I do, too. (Laughter) Okay, there we go, John. It's on the ground, Houston.

04 23 25 34 CC Okay.

04 23 25 35 CDR-EVA Gonna throw out, Charlie?

04 23 25 36 LMP-EVA John.

04 23 25 41 CDR-EVA Just like in training, the checklist changes pages on you automatically.

04 23 25 45 LMP-EVA Is that right?

04 23 25 50 CDR-EVA Get that rear hinge off of there.

04 23 25 52 LMP-EVA Wait a minute. I got to get the tapes, John.
I want to make sure I got everything. Okay, pull
left pin, pull reel, pull saddle release. Okay.
Here's the saddle release coming down ...
Outstanding!

04 23 26 09 CDR-EVA There you go! Let's pick this baby up and turn
it around.

04 23 26 13 LMP-EVA Okay. Ah, look at that!

04 23 26 17 CDR-EVA Wait a minute, Charlie. Let me get these cables
off the front of it. I forgot about them.

04 23 26 20 LMP-EVA Okay. You're all tangled up in that cord, John.
Your right foot - your left foot. Okay. There
it is; it's off. Watch that pin there.

04 23 26 51 CDR-EVA Pick her up.

04 23 26 53 LMP-EVA Here we go. We are upslope.

04 23 26 59 CDR-EVA Yeah. Doesn't amount to a hill of beans. That's
good. Hey, let's get around so you won't be
looking in the Sun, John.

04 23 27 06 CDR-EVA No, I'm not looking into the Sun.

04 23 27 08 LMP-EVA You're gonna be, sitting in the seat.

04 23 27 10 CDR-EVA Sharp thinking, Charlie.

04 23 27 15 LMP-EVA Okay.

04 23 27 17 CDR-EVA There you go. You're going to have a little tricky
footing with that ALSEP. Okay, old geology pallet
post, release. You got to get the containers ...
to put these two pins in.

04 23 27 33 LMP-EVA Okay, I'll get it.

04 23 27 46 CDR-EVA Well, we're doing fine there on them fenders. Looks
good.

04 23 27 52 LMP-EVA Makes you proud to be an American, Tony; an experi-
ence like this.

04 23 27 59 CC I agree with you, Charlie.

04 23 28 02 LMP-EVA This one's in, now.

04 23 28 04 CDR-EVA Yeah, but it's out over here. Sock it to me.
Don't push it in, if it's already in.

04 23 28 10 LMP-EVA No, I just want to check your line.

04 23 28 12 CDR-EVA No, come on, give me a hand. We don't need to do
that. Beautiful.

04 23 28 27 CC Understand all the hinge pins are in?

04 23 28 33 LMP-EVA We're getting them in.

04 23 28 39 CDR-EVA I think yours is out. ... I think there's one out
on your side a little. No, it's in.

04 23 28 46 LMP-EVA In?

04 23 28 47 CDR-EVA Yeah. Okay. Both in on my side. Okay, I'm gonna
get the seat.

04 23 28 59 LMP-EVA ... Velcro so hard, I pulled - Houston, I can pick
up the whole vehicle with that piece of Velcro
around it.

04 23 29 08 CDR-EVA ... thing that holds the seat down. Me and Charlie
just picked the vehicle up. (Laughter) Ho ho.

04 23 29 16 CC You just don't know your own strength.

04 23 29 24 CDR-EVA The people that put Velcro in don't know its
strength, that's the message, Tony. ...

04 23 29 39 LMP-EVA Okay, seatbelts up.

04 23 29 56 CDR-EVA *** This thing -

04 23 30 00 LMP-EVA Going a million miles, John.

04 23 30 02 CDR-EVA Look at that.

04 23 30 04 LMP-EVA Here's your seatbelt.

04 23 30 06 CDR-EVA Okay. Seatbelt is up, locked.

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04 23 30 09 LMP-EVA Hey, can you take it over there and drape it over so you won't get all tangled up with two seatbelts?

04 23 30 15 CDR-EVA Take the other one, too?

04 23 30 16 LMP-EVA No, this is yours.

04 23 30 19 CDR-EVA ... (Laughter). Don't want to even think about that.

04 23 30 25 LMP-EVA Okay, we - next is the console.

04 23 30 27 CDR-EVA Okay, let's get it. Okay. Wait a second, Charlie, I -

04 23 30 42 LMP-EVA Okay, mine is out; rotate it 90.

04 23 30 50 CDR-EVA Okay, rotate 90.

04 23 30 54 LMP-EVA Okay.

04 23 30 55 CDR-EVA Beautiful.

04 23 30 57 LMP-EVA In and locked.

04 23 30 59 CDR-EVA Lock.

04 23 31 02 LMP-EVA ***cators are coming out. Okay, we're removing the pins from the ***cator. John, what's that black thing over there?

04 23 31 27 CDR-EVA Over where, Charlie?

04 23 31 28 LMP-EVA Right in front of my seat. That little black thing.

04 23 31 31 CDR-EVA *** Front of your seat? That jobber there?

04 21 31 35 LMP-EVA Yeah. No, right in front of - under your - doesn't matter, but I was just wondering what it was. It was a little black thing.

04 23 31 51 CDR-EVA There's a little black thing, under ... Houston, we just found one of those little black things.

04 23 32 00 LMP-EVA A little black disk. It looked like it's probably a bumper guard. Something in the stowage area, Tony. But it's no consequence. Man, can you thing - sling things a long way. Look at that. Went into

that crater. Too bad there isn't something to lean on. I have a tough time kneeling in this suit.

04 23 32 36 LMP-EVA Okay, yours is - mine is - yours is down there in the Velcro.

04 23 32 39 CDR-EVA Okay.

04 23 32 40 LMP-EVA Fender's out.

04 23 32 43 CDR-EVA Okay.

04 23 32 44 LMP-EVA ... belts, tripod, tools, erect footrest, verify front hinge pins, extend front fender. Okay. Okay, I'm going to get the - the camera.

04 23 32 54 CDR-EVA All righty.

04 23 32 55 LMP-EVA *** the pans. Ya-hoo! Tony, this is so great you can't believe it!

04 23 33 01 CC Oh, I believe it, Charlie. When you get in the middle of your pictures there, you might give me a call and I'll instruct you on some more we'd like.

04 23 33 18 LMP-EVA Okay. Need an LRV checkout.

04 23 33 42 CDR-EVA Let's see, brake on - -

04 23 33 46 LMP-EVA Okay, Tony; I'm starting with mag Alfa at 3 - count 39.

04 23 33 52 CDR-EVA Okay, Houston. I'm starting the LRV checkout.

04 23 33 54 CC Okay. And, Charlie, 39.

04 23 34 02 CDR-EVA Circuit breakers all going closed except AUX and NAV. My personal impression is I'm sitting up higher in this - in this seat right now than I did in that 1/6g rig that we made, if you can believe such a thing.

04 23 34 27 CC Understand.

04 23 34 32 LMP-EVA Okay, Tony. I'm gonna be about 60 - 30 - make it 20 meters behind - between the minus-Y - the plus-Y and the minus-Z. I can't - if I get right into the SEQ Bay, I'm in that big hole.

04 23 34 57 CC Okay, that's fine.

04 23 34 58 CDR-EVA Okay, Houston. The AMP-HOURS on - AMP-HOURS on number 1 say 125, and the AMP-HOURS on number 2 are off-scale low, and the VOLTS on number 1 are 85 and the VOLTS on number 2 are off-scale low.

04 23 35 23 LMP-EVA *** We haven't lost that battery.

04 23 35 26 CDR-EVA Nobody's reading, if have it. Maybe we lost the - and the - Both the FORWARD and REAR MOTOR TEMPERATURES are off-scale low and -

04 23 35 44 LMP-EVA Okay, pan's complete.

04 23 35 46 CDR-EVA And the BATTERY TEMPERATURES are off-scale low.

04 23 35 53 CC Okay, and we'd like you to take pictures of the ablated paint, Charlie.

04 23 36 00 LMP-EVA Okay, I'll do that. I'll do it at f - at f/8, at about 15 feet.

04 23 36 11 CC Okay, we'd like f/8 at 250, and f/11 at 250 of all of the ablated surfaces.

04 23 36 20 LMP-EVA Okay. If I can bend back that far, Tony (laughter).

04 23 36 28 CC Okay.

04 23 36 34 LMP-EVA Tony, you can see the striations caused by the descent plume. It's running, John!

04 23 36 42 CDR-EVA Look at it go, would you, Charlie.

04 23 36 44 LMP-EVA You've got all your steering. It's great!

04 23 36 47 CDR-EVA Ah, this is going to be some kind of different ride!

04 23 37 02 LMP-EVA The Rover is running, Houston.

04 23 37 05 CC Okay, and when you're over at the S-band, we have a couple of more pictures of that one.

04 23 37 11 LMP-EVA I just got it, Tony.

04 23 37 14 CC Okay, there's a particular surface on it we're interested in.

04 23 37 21 LMP-EVA Stand by. Okay, just a minute.

04 23 37 26 CDR-EVA Let's ride through a few of these little craters here, Ch - Charlie. You know it's hard to get - it's hard to get to where you are from here.
(Laughter)

04 23 37 39 LMP-EVA Okay, the ablated paint surfaces - There were only two, and it's the two above the ascent tank. John, you were coming absolutely straight down when you hit. Okay, Tony, go ahead with the S-band.

04 23 37 54 CC Okay, we want you to take a picture of the white side of the yoke. The yoke has a black side and a white side. And on the white side, we want 1/250, f/5.6, f/8, and f/11.

04 23 38 13 LMP-EVA Okay, I've got the f/8 and f/11. I'll do the 5.6 one.

04 23 38 17 CC Good show.

04 23 38 21 LMP-EVA John, you're sure going slow.

04 23 38 23 CDR-EVA Yeah, the wheels are skidding, Charlie.

04 23 38 25 LMP-EVA Okay, your rear steering's off.

04 23 38 27 CDR-EVA Huh?

04 23 38 28 LMP-EVA You don't have any rear steering.

04 23 38 30 CDR-EVA Is that what the problem is?

04 23 38 31 LMP-EVA Yeah.

04 23 38 32 CDR-EVA I thought you said both steerings were working?

04 23 38 33 LMP-EVA It looked it to me, but it's not now.

04 23 38 36 CDR-EVA You know why it's not working?

04 23 38 37 LMP-EVA We don't have a battery.

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04 23 38 39 CDR-EVA Huh?

04 23 38 42 LMP-EVA Shift into the other battery.

04 23 38 50 CDR-EVA How's it doing now?

04 23 38 53 LMP-EVA Nope. Front's working, but the rear's not.

04 23 38 58 CDR-EVA Well, I just checked BUS B and BUS D. We don't -
Okay, let me go to primary. That make any
difference?

04 23 39 08 LMP-EVA Nope. Rear steering's not working.

04 23 39 10 CDR-EVA Okay. I'm gonna park it anyway. We can't trouble-
shoot it now.

04 23 39 14 LMP-EVA Okay, could you - That's good; that's a good
position. Okay, Tony. The rear steering is not
working.

04 23 39 20 CC Okay, we copy that.

04 23 39 33 LMP-EVA Okay, Tony, the pan is complete. The struts - the
LM just looks super. It - it's in perfect posi -
perfect shape. No problem. The soil around here
is very fine grain. Dusty, much like all the
regolith that we've seen samples of from the other
sites. The rocks are scattered. Perhaps 20 or
30 percent of the surface is covered by boulders up

whole place; meter to 2-meter size, covering perhaps
70 percent of the surface.

04 23 40 12 CDR-EVA Charlie, I ought to be able to get a nav align from
right here. Okay, I got the LRV parked by the
MESA. And, except for the rear steering, it works
pretty good.

04 23 40 25 LMP-EVA I don't understand that.

04 23 40 28 CDR-EVA Don't ask me to check if the rear coupling's been
pulled. Don't ask me to do that. No. That -

04 23 41 07 LMP-EVA Yeah. You might give a word.

04 23 41 11 CDR-EVA Oh, I'm looking at a rock here that's got all kinds of dark clasts in it, and ... and - that's got to be a breccia. Too many different kinds. Yeah. It is.

04 23 41 27 LMP-EVA Hey, Tony. Looking at Stone Mountain. You see some lineations in it that are parallel to the - to the local terrain - or to the normal surface, and they follow the contour lines. And they might be - it looks to me it might be just some ridges - small ridges in it. They're scattered about. I say scattered about, that's not any good at all. They are about - look like a couple of meters wide or so, and - and the same distance - -

04 23 42 05 CDR-EVA (Laughter)

04 23 42 06 LMP-EVA - - and separation. What is it, John?

04 23 42 13 CDR-EVA (Laughter) Pulled the top out of the MESA blanket (laughter). Okay, Houston. I'm about to deploy the old UV here. The guy that invented Velcro didn't know his - his own strength. *** get this blanket back.

04 23 42 33 CDR-EVA Okay, Houston, I'm going back to midway between INTERMEDIATE and MINIMUM. I was in MINIMUM when I was driving the - old Rover, and it seemed to be pretty good.

04 23 42 45 LMP-EVA Oh, you dirty LCRU, come out of here! Power struggle.

04 23 43 07 LMP-EVA Now I can't bend the ... Look at that bag tear away. Outstanding! Thought I wouldn't be able to do that one.

04 23 43 24 CDR-EVA Okay, the UV camera is - is sitting in the Quad III pallet, and it looks normal in every respect to me. Let's see if we can get it out of there. Oh, oh, oh, oh.

04 23 44 03 CDR-EVA Look at that, Charlie!

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04 23 44 10 LMP-EVA You got it!

04 23 44 11 CDR-EVA Look at me carry it! I'm carrying it over my shoulder! Ha ha ha!

04 23 44 17 LMP-EVA I guess we don't have to worry about dust getting on it.

04 23 44 23 CDR-EVA Boy, 1/6g is the neatest environment you can find for this kind of work.

04 23 44 44 CDR-EVA Okay, Charlie. I'm gonna put it over here by the - by the strut, and - just like it shows on my picture there, and maybe - maybe right even with bottom strut.

04 23 45 00 LMP-EVA Okay.

04 23 45 01 CDR-EVA We'll just have to watch where we throw things. Oh, oh, oh, is that nice!

04 23 45 32 LMP-EVA Astro, make connectors. I'm an astro ...

04 23 46 04 CDR-EVA Okay, Houston. All three wheels are down and locked on the camera.

04 23 46 14 CC Okay.

04 23 46 19 CDR-EVA Charlie?

04 23 46 20 LMP-EVA What?

04 23 46 21 CDR-EVA Do you know where I'm gonna have to put this contraption?

04 23 46 23 LMP-EVA Where?

04 23 46 24 CDR-EVA Right here. According to my picture. Okay, now, Tony, if I put it parallel to the shadow, is that due west?

04 23 46 36 CC That's close enough to due west. It'll be about 3 degrees off.

04 23 46 43 CDR-EVA Well, I can - No, I just set it 3 degrees some way or another.

04 23 46 47 CC Okay, bias it north slightly.

04 23 46 52 CDR-EVA Okay. A little north bias.

04 23 47 04 LMP-EVA Well, Tony, I tell you one thing, that's the hardest job order, getting that crummy connector on there. Whew. Okay.

04 23 47 36 CDR-EVA Okay, Houston, the BATTERY TEMPERATURE is reading 100 degrees F, which it was reading before - that's the one the other one always reads.

04 23 47 45 CC Okay, that sounds good.

04 23 47 47 CDR-EVA And I'm setting the battery out - The battery is going out in the Sun with the temperature plate up. No, down.

04 23 48 12 CDR-EVA Now it's up.

04 23 48 39 CC And, John, when you get to the first setting, I've some new settings for you.

04 23 48 46 CDR-EVA I thought you might have, Tony. Okay. ***ploy legs, point camera down-Sun, embed, stabilize, remove battery pins, azimuth pin. Okay. Plate pin. Okay.

04 23 49 20 LMP-EVA Hey, Tony, now that we got this little beauty pressurized, the suit just feels perfect.

04 23 49 27 CC Good show. Okay, we give credit to the tailor.

04 23 49 41 LMP-EVA I'll give credit to Clyde and Troy and those guys and everybody who helped me get it fitted right.

04 23 49 47 CC Right.

04 23 49 48 LMP-EVA A little doubtful there the first time in the LM, but -

04 23 49 59 LMP-EVA Well, your magnet still works, Houston.

04 23 50 03 CC (Laughter) Now we got a data point, magnets work on the Moon.

04 23 50 15 LMP-EVA Okay, where we are: the low gain antenna is coming in on my checklist, Tony.

04 23 50 22 CDR-EVA Charlie, I forgot to put in the AUX circuit breakers over there. Push it in.

04 23 50 26 LMP-EVA AUX circuit breaker going in.

04 23 50 28 CDR-EVA Okay. That'll save us some trouble.

04 23 50 36 LMP-EVA I really can't believe you got that UV out so easy. Isn't that a - isn't that nice?

04 23 50 42 CDR-EVA I was really worried about that one, babe. Okay, the camera points down-Sun. Protective cover.
...

04 23 51 13 LMP-EVA Ah. Here it's like in the training building!

04 23 51 19 CC Aw, come on. I doubt that. That's got to be better - -

04 23 51 20 LMP-EVA Tony, you ... look anywhere but - Well, I mean the gear's working exactly like we - and I'll tell you, those guys - Covington and all of them and Jerry ... and Bob Kain and that group are all - ... - they were all slave drivers, but it's really paying off, I'll tell you.

04 23 51 54 LMP-EVA The low gain is connected. Did a - Thought it should say ... but it ain't, it's the LCRU. Okay, install ***U, erect - connect low gain, install high gain. That's what I thought.

04 23 52 35 LMP-EVA Ha! This is so easy. ...

04 23 53 18 LMP-EVA Okay, low gain antenna - High gain is installed.

04 23 53 34 LMP-EVA Okay, John, here comes the picture. Ah-ha-ha! Man, Tony, I locked it the first time.

04 23 53 44 CC Outstanding. That's got to be a first.

04 23 53 49 LMP-EVA It is for me.

04 23 54 01 CDR-EVA Okay, the old bubble person has got the bubble right in the middle.

04 23 54 05 CC Okay.

04 23 54 10 CDR-EVA Okay, set target number one. Azimuth 14 and elevation 48, and say again what you want me to make it, Tony.

04 23 54 16 CC Okay, we'd like to make the azimuth 98.

04 23 54 26 CDR-EVA Ninety-eight?

04 23 54 28 CC Right, we're changing targets.

04 23 54 29 CDR-EVA That ain't even close. Yeah, okay (laughter).

04 23 54 37 CC And the elevation is 28. And watch the film advance as you turn the power on.

04 23 55 00 CDR-EVA And turning it to azimuth just completely destroyed whatever level it had. Ninety-eight and what now?

04 23 55 10 CC Ninety-eight and 28.

04 23 55 26 CDR-EVA Ninety-eight and 28. Okay.

04 23 55 35 LMP-EVA Well, Tony, the old Earth is boresighted in the sight.

04 23 55 39 CC Outstanding.

04 23 55 45 LMP-EVA ... right on, babe; I think. Oops. Hey, you really got to bend back to see that beauty. Y'all are right overhead. Okay, TV.

04 23 56 34 LMP-EVA Okay, Tony, I turned the power switch o - When I unstowed it, the power switch was on. I turned the power switch off on the TV.

04 23 56 41 CC Okay.

04 23 56 51 CDR-EVA Okay, Houston, will you go with this bubble just broke off on one side, or do you want to level it every time?

04 23 56 59 CC Is it off the case?

04 23 57 03 CDR-EVA Yeah, it's off the case.

04 23 57 04 CC Okay, that's fine. Let's just l - as long as it's off the case.

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04 23 57 11 CDR-EVA Okay.

04 23 57 39 CDR-EVA Okay, now, all you want me to do on this first one is turn the power switch on, right?

04 23 57 43 CC Right. Power switch on, and watch the film advance as you come on so you can tell us how many degrees.

04 23 57 52 CDR-EVA Okay, it looked like it was better than 90. That's about all I can say about it - maybe 100 or 110.

04 23 57 58 CC Okay. Let's just leave it there.

04 23 58 06 CDR-EVA Okay, ... VHF?

04 23 58 11 LMP-EVA Is that what that is?

04 23 58 12 CDR-EVA Yeah.

04 23 58 13 LMP-EVA Ah, so. I can hear it, John.

04 23 58 26 CDR-EVA Okay, I guess that tells us something about the camera operation.

04 23 58 29 CC Right, the mode change worked.

04 23 58 34 CDR-EVA Yep. Well, I don't know it - that'll probably be in a minute or 2 - like 2 and a quarter minutes. Okay. I'm gonna -

04 23 58 48 LMP-EVA Boy, is this ever a neat operating environment. Isn't it?

04 23 59 16 LMP-EVA Okay, Tony, I'm reading - on INTERNAL, S-band is 26, TEMP is 14, power is 22. Over.

04 23 59 40 CDR-EVA Oh, oh, oh, oh, oh.

04 23 59 41 CC Okay, we copy.

04 23 59 42 CDR-EVA Look here, Charlie.

04 23 59 43 LMP-EVA Yeah.

04 23 59 46 CDR-EVA I can carry it over my head (laughter).

04 23 59 52 LMP-EVA Man, that guy that put on the Velcro - finally.

04 23 59 58 CDR-EVA He gets paid double time, Charlie.

05 00 00 00 LMP-EVA I'll tell you.

05 00 00 01 CDR-EVA For every strip.

05 00 00 05 LMP-EVA It's amazing. The LCRU blankets are 100 percent open.

05 00 00 17 CC Okay.

05 00 00 19 LMP-EVA Going to EXTERNAL. Mode switch to 2.

05 00 00 37 CDR-EVA I'll be darn if that - if the old quad III pallet didn't go on like it was supposed to.

05 00 00 43 LMP-EVA Man, Tony, you ought to have it, you got 4 ohm on the signal strength. Look at that!

05 00 00 59 CDR-EVA ... HTC.

05 00 01 06 LMP-EVA You getting a signal, Tony?

05 00 01 08 CC Ah, we're working it.

05 00 01 12 LMP-EVA Okay, you got 4 ohms, you got int - EXTERNAL, and your mode switch is 2, and the POWER is 2 - correction, the - I didn't check the power. The A - S-band - the POWER is 12 - 14. Over. Correction, make that 18.

05 00 01 38 CDR-EVA Oh, don't tell me.

05 00 01 40 LMP-EVA What?

05 00 01 44 CDR-EVA Finally happened.

05 00 01 46 LMP-EVA What?

05 00 01 47 CDR-EVA I pulled a wire loose, Charlie.

05 00 01 48 LMP-EVA Uh-oh.

05 00 02 10 CDR-EVA Okay, ...

05 00 02 41 LMP-EVA Houston, how do you read?

05 00 02 45 CC Stand by a second, Charlie. Okay, it's looking pretty good. Don't have a picture here in the room yet, but we're getting data.

05 00 02 54 LMP-EVA Okay, fine. Okay. The DAC is coming out.

05 00 03 07 CDR-EVA ... as far as keeping an eye on us, you guys would rather be outside than inside, wouldn't you?

05 00 03 13 LMP-EVA Okay, Tony, the camera - the TV camera is pointed right down at the ground, forward of the Rover.

05 00 03 21 CC Hey, our comm just improved 900 percent. That's beautiful.

05 00 03 46 LMP-EVA Uh-oh, look at that.

05 00 03 48 CDR-EVA (Laughter)

05 00 03 49 LMP-EVA Did you get that pin out, John?

05 00 03 51 CDR-EVA Which one, Charlie?

05 00 03 52 LMP-EVA The one that you broke the wire on.

05 00 03 54 CDR-EVA No, I haven't, but I'll w - I'll work it later.

05 00 03 57 LMP-EVA What is it to?

05 00 03 59 CDR-EVA I don't know. Wait a minute. Think it's to the ...

05 00 04 21 LMP-EVA Man, I tell you, if my - if this - my Christmas stocking looked like this ETB, I'd be saved. Okay, magazine P, the X is in the - in the middle, and the frame - the frame is lined up.

05 00 04 36 CC Okay, magazine Papa.

05 00 04 46 CC Hey, Charlie. Verify the TV power switch is off.

05 00 04 54 LMP-EVA Stand by.

05 00 05 01 CDR-EVA Got it, Charlie.

05 00 05 06 LMP-EVA You mean the LM power switch or the one on the TCU?

05 00 05 10 CC On the TCU.

05 00 05 14 LMP-EVA Okay, I'll shoot it to ON. Okay, momentary on, back to center.

05 00 05 23 CC Okay.

05 00 05 34 CC Hey, we've got a picture!

05 00 05 38 LMP-EVA Yea!

05 00 05 39 CDR-EVA Of the ground, no doubt.

05 00 05 40 CC Of the ground.

05 00 05 41 LMP-EVA Let's hear it.

05 00 05 44 CDR-EVA Yeah. That's nice looking ground.

05 00 05 48 LMP-EVA Okay, the camera is running! The 16 millimeter is running!

05 00 05 52 CC Outstanding.

05 00 05 53 CDR-EVA I can't believe it.

05 00 05 55 LMP-EVA Actually - Okay, getting the other DAC out.

05 00 06 06 CC This mission's full of firsts.

05 00 06 13 LMP-EVA Little firsts, but they're - mean something - -

05 00 06 18 CDR-EVA Oh, is this easy to do in 1/6 gravity.

05 00 06 20 LMP-EVA - - personally, anyway.

05 00 06 23 CDR-EVA I really like it. This is about the neatest thing I ever saw. Okay.

05 00 06 51 LMP-EVA Hey, you're looking at me with the big eye.

05 00 06 53 CC Right, the big eye's on you, Charlie.

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05 00 06 57 CDR-EVA Trying to see if you're nervous, Charlie.

05 00 07 10 LMP-EVA Can't just throw those bags over there like I used to; they bounce into the dirt.

05 00 07 14 CDR-EVA Yeah.

05 00 07 19 LMP-EVA How's the picture, Tony?

05 00 07 21 CC Very good picture. Beautiful; outstanding color.

05 00 07 32 LMP-EVA Super.

05 00 07 33 CC You're in living color.

05 00 07 35 LMP-EVA Okay, I'm putting on magazine Bravo. Okay, magazine Bravo is going on the commander's camera. I just tried to blow off the dust, Tony. And it's starting at frame count number 4.

05 00 07 53 CC Okay.

05 00 07 54 CDR-EVA That won't work, Charlie.

05 00 07 55 CC Bravo 4 and keep count of how many times you blow off the dust.

05 00 07 56 LMP-EVA - - John. Well, I don't - it didn't work, so -

05 00 08 04 CDR-EVA Oh, look, this thing says "Lock" on it, Charlie.

05 00 08 08 LMP-EVA Okay, this goes to the other seat.

05 00 08 11 CDR-EVA Charlie, that tells you what to do!

05 00 08 13 LMP-EVA How about that? (Laughter) A new first. This is so super. Oh, boy. Okay, three HEDC, two D sacks, and 500 under the seat. And look at all of the little goodies. Uh-oh. Old Velcro man did it again.

05 00 08 35 CDR Got you, huh?

05 00 08 48 LMP-EVA Oops. Aw, come on out of there. No.

05 00 09 13 CDR-EVA I tell you, Houston. I'm just cool as a cucumber, and this Sun is so bright you can't believe it.

05 00 09 18 CC Outstanding.

05 00 09 36 LMP-EVA Okay, as you can tell on the big eye, we're loading up the - unloading the P - the ETB into the commander's seat.

05 00 09 49 CDR-EVA Hey, the vice is in, Charlie.

05 00 09 51 LMP-EVA Super. John, I don't know if this film is gonna really balance in here; I can't get it wedged in like I did.

05 00 10 00 CDR-EVA No, I don't think - I don't think -

05 00 10 11 LMP-EVA How do you read, John? You're cutting out.

05 00 10 13 CDR-EVA Loud and clear, Charlie; I'm talking to myself.

05 00 10 16 LMP-EVA Oh, okay.

05 00 10 37 CDR-EVA By golly, we did it again.

05 00 10 39 LMP-EVA What?

05 00 10 40 CDR-EVA I would never've thought that on the Moon, we'd run into each other right here at the seat, but we do it - we did in practice every time.

05 00 10 46 LMP-EVA Every time.

05 00 10 48 CC Well, you're consistent.

05 00 10 55 LMP-EVA That's those time line guys for you. Do this EVA two or three more times, I may get it down. The Sun compass goes under your seat, map's going over in mine. And here comes the big eye, the 500.

05 00 11 17 CDR-EVA Oh, that's a clean dust brush, Houston, but I don't think it's gonna last. (Laughter) You can - You can tell that the dust brush hangs in there pretty good; pick up the front of the rover to see if the dust brush is latched.

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05 00 12 04 LMP-EVA Okay.

05 00 12 13 CDR-EVA Okay, Charlie, where's the rake? There it is.

05 00 12 15 LMP-EVA Look up there under the doomaflicky.

05 00 12 18 CDR-EVA Oh, yes, the old doomaflicky's got it.

05 00 12 32 CDR-EVA Look at that, Charlie.

05 00 12 39 LMP-EVA Okay. Get our little camera fixed here with that blanket that always fell off.

05 00 12 56 CDR-EVA Isn't that swell? The - the rake is on and locked, Charlie.

05 00 13 01 LMP-EVA Super. *** TB back to the MESA.

05 00 13 11 LMP-EVA Okay.

05 00 13 55 LMP-EVA Sorry I blocked your picture there, Tony.

05 00 14 07 CDR-EVA Old Fredo is to be congratulated for thinking of how to put this rake in.

05 00 14 12 LMP-EVA Yeah, that's a new first.

05 00 14 14 CDR-EVA Durn right. That's good stuff. Save us a lot of work later on.

05 00 14 30 CDR-EVA Okay, that's about the size of it.

05 00 14 34 LMP-EVA Ah, the old maps. Which old map do you want to look at, John? Hmm. Just like training. Good picture of Hadley Rille. I'm just teasing, Houston.

05 00 14 50 CDR-EVA Looks like we're down some, I guess, on the time line already.

05 00 14 54 LMP-EVA Are we? Tony, are we down?

05 00 14 58 CC No, you're right on the time line.

05 00 14 59 CDR-EVA Probably pretty even.

05 00 15 02 LMP-EVA Okay. I thought we were moving along pretty good.

05 00 15 05 CDR-EVA So did I.

05 00 15 08 CC You're doing just fine.

05 00 15 09 CDR-EVA You got - you got the ETB unstowed?

05 00 15 13 LMP-EVA Yeah, it's all done, John. Cameras are up.

05 00 15 17 CDR-EVA Disre - discard LCRU pallet. Okay, you gonna back - go inside?

05 00 15 21 LMP-EVA I've got to get the pallet out.

05 00 15 23 CC Hey, Charlie, don't throw that pallet out, we'll hold that for later.

05 00 15 29 LMP-EVA Okay.

05 00 15 30 CC We'll get that at the end of the EVA.

05 00 15 34 LMP-EVA Super.

05 00 15 37 CC And you can skip all the ingressing parts and go on after that.

05 00 15 46 LMP-EVA Okay, the SRC's next. John, why don't you unpack the SRC. It's on the right side.

05 00 15 53 CDR-EVA Okay, I'll get it.

05 00 15 55 LMP-EVA And I get the core stems and stuff to my seat.

05 00 16 07 CDR-EVA How come we can afford to skip that? I disremember. Oh, there's nothing - there's nothing up there?

05 00 16 14 LMP-EVA Well, the only reason we had to go in there was to change to power down, see.

05 00 16 18 CDR-EVA Oh, okay. Right.

05 00 16 19 LMP-EVA And we can get the other - the other stuff is just food and - -

05 00 16 21 CDR-EVA Okay. Yeah, all right. Fine.

05 00 16 22 LMP-EVA - - stuff like that.

05 00 16 24 CDR Okay. I got you. I thought it was something on that order. (Laughter) One small step for Charlie is one giant leap for me. I'm looking dead level with him - with the table on the - (laughter).

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

04 22 44 03 CMP On the 35 millimeter, I used the - well, we didn't finish up that CIN roll that the ALFMED was on; it's the same status it had then, but I had to take it out in order to get X-ray X-ray put in - the earthshine, which we didn't get last night, and if we're gonna get it, we ought to get it right soon because that Earth is getting considerably smaller. The - I had to take that CIN mag out, unfortunately. And I'll go through the 16s here. I used portions - two of them, one for the undocking sequences and one for the landmark tracking.

04 22 46 24 CMP And magazine Charlie Charlie, I'm showing 60 percent; that's 60.

04 22 46 59 CMP And on magazine - Bravo Bravo, I have 80 percent.

04 22 47 16 CMP I think that should be all of the film, Hank.

04 22 47 18 CC Okay. We got it, Ken.

04 22 47 33 CC And, Ken, I've got one more Flight Plan update for you.

04 22 47 39 CMP Okay. Go ahead.

04 22 47 48 CC Stand by 1 minute.

04 22 48 57 CC Ken, I'll read this change up to you next time. About what it amounts to is we're going to delete the bistatic radar and in its place, we're going to put an oblique photo pass. And I - I'll catch you on the next rev with it. We got about 4 and 1/2 minutes to LOS.

04 22 49 16 CMP Okay.

04 22 50 34 CC Casper, Houston. We lost comm there a little - a little while. We're about 3 minutes from LOS, and everything's looking good. Have a good breakfast, and we'll see you on the next rev.

04 22 51 41 CC Casper, Houston.

04 22 51 46 CMP Go ahead.

04 22 51 47 CC Roger. We show your MANUAL ATTITUDE in ACCEL COMMAND.

04 22 52 10 CMP Well, thank you. I wonder how - how that one happened. I tell you it's pretty easy to kick a switch when you're rolling around in here. You chase a piece of the Flight Plan away from you or you kick a camera, and that's not an unusual thing to happen. I appreciate you telling me about it.

04 22 52 32 CC Roger.

(NO COMM FOR 40 MINUTES)

04 23 32 XX BEGIN LUNAR REV 24

04 23 41 32 CMP Hello down there.

04 23 41 35 CC Hello, Casper.

04 23 41 41 CMP We're still here.

04 23 41 44 CC Roger. How did everything go?

04 23 41 46 CMP Sure do feel a lot better. (Laughter) I got quite a bit done on that little back-side section there.

04 23 41 57 CC Hey, that sounds great. First thing off the bat here, Ken, we'd like to get a bat B charge going.

04 23 42 09 CMP Okay. Stand by.

04 23 42 51 CMP Okay, you've got it.

04 23 42 54 CC Roger. And for your info, Ken, the E-MOD we got last night looks good.

04 23 43 09 CMP Okay. Thank you.

04 23 43 17 CC And, Ken, I got a few items for you whenever you're ready to work them in. I've got a mapping camera photo pad, a Flight Plan update, and an update to your erasable loads, and a G&C checklist, whenever you can get a break from eating there.

04 23 43 34 CMP (Laughter) Okay, I'm just getting a good start on that. And I'll copy those as we go along here. If you'll give me a couple of minutes to get some things going.

04 23 46 21 CMP Okay, Hank. I'm ready to copy.

04 23 46 26 CC Okay. We'll start with the Flight Plan changes. And the first one's at 123:26.

04 23 46 42 CMP Okay.

04 23 46 43 CC Incidentally, Ken. Did you get the urine dump and purges out on the last back side?

04 23 46 50 CMP That's affirmative.

04 23 46 52 CC Okay. At 123:26, we're going to delete the maneuver to bistatic radar attitude; we're going to delete the bistatic, as we told you earlier. At the top of the next column there, about 123:32, delete all of that where you configure the S-band. Following that, delete the - or the VHF. Following that, delete the S-band; delete the P20 following that. In fact, delete everything in that column. And delete the bistatic radar over to the right-hand side at the bottom.

04 23 47 30 CMP Okay.

04 23 47 32 CC Okay. Now back at 123:26, we want to add in there this 40-degree south oblique - a P20 option 5; 40-degree south oblique photo attitude. Parenthe - see - see - parentheses 123:31. Your NOUN 78 is plus 270.00, plus 087.75, plus 180.00. NOUN 79, plus 000.50; attitude 182,000 underlined slash 080, 000. Set HIGH GAIN PITCH 10, YAW 350 for AOS acquisition.

04 23 48 59 CMP Okay, Hank. I copy 40-degrees south oblique, replacing the bistatic radar; P20 option 5 at 123:31; NOUN 78, plus 270, plus 87.75, plus 180. NOUN 79 is 0.50, giving me an attitude of 182, 080, and 000. And the PITCH 10 and YAW 350 for acquisition.

04 23 49 24 CC That's a good readback. And on the next page, you can delete the bistatic radars in both columns. And at 124 - wait, take it back - let's go back to the previous page - lost something there; 123:31. We want to add, at 123:31 - -

04 23 49 48 CMP Okay.

04 23 49 49 CC IMAGE MOTION, ON; MAPPING CAMERA, ON, T-start; and IMAGE MOTION, barber pole plus 3, and then ON.

04 23 50 10 CMP Okay. Do you have a T-start time?

04 23 50 13 CC We'll get that up to you in a pad; that's still a long ways away.

04 23 50 19 CMP Okay.

04 23 50 22 CC Then over at 124:32, we want MAPPING CAMERA, OFF at T-stop.

04 23 50 33 CMP Wait a min - one - wait a minute. Say - say the time again.

04 23 50 36 CC 124:32, on the next page.

04 23 50 43 CMP Okay.

04 23 50 44 CC Mapping - -

04 23 50 45 CMP Got it.

04 23 50 46 CC MAPPING CAMERA, OFF, T-stop; wait 30 seconds; MAPPING CAMERA to STANDBY; and IMAGE MOTION, OFF.

04 23 51 02 CMP Okay.

04 23 51 03 CC And could you give us AUTO on the HIGH GAIN?

04 23 51 08 CMP You've got it.

04 23 51 10 CC Okay, and the last change is at 125:06, the following page. Delete the P52, about 125:06 there.

04 23 51 23 CMP Got it. That sure is a super little platform, isn't it?

04 23 51 28 CC Boy, it's a beauty.

04 23 51 42 CC Okay. I have a - a mapping camera photo pad.

04 23 51 58 CC This pad goes at 121:35, approximately.

04 23 52 11 CMP Okay.

04 23 52 13 CC All righty. T-start is 121:32:18; T-stop, 122:32:08.

04 23 52 30 CMP Okay; 121:32:18, 122:32:08.

04 23 52 38 CC And the last item I have for you is a change to your erasable loads and the G&C - -

04 23 52 43 CMP Okay, just - just a second, Hank, let me write those down.

04 23 53 11 CMP Okay. I got a pad for the erasables. All right, let me find that. I just wanted to write the T-stop times down before I got away from them.

04 23 53 23 CC Okay. This is in your G&C Checklist on page 9-4.

04 23 53 31 CMP Okay. I'm going after it. I've got it.

04 23 53 40 CC All righty. In column A, OID 05 change 03773 to read 03521.

04 23 53 52 CMP Whoop, whoops. I missed that, Hank.

04 23 54 00 CC Okay.

04 23 54 01 CMP I guess I'm going to have to do one thing or the other. I can't talk and eat at the same time.

04 23 54 04 CC Okay. Whenever you're ready, we'll - you - If you don't want to do it now, just holler.

04 23 54 11 CMP Okay. Let me finish this eat period.

04 23 54 14 CC Okay.

04 23 54 17 CMP I got - I got carried away with trying to get ahead.

04 23 55 06 CMP Hey, Hank. If you got time while I'm - while I can listen, and - how about telling me if there's - you got any words on the general EVA plan for the surface and - guys are doing.

04 23 55 23 CC Okay. The guys are outside now on the surface. They got the Rover deployed and they're checking it out. And they're going to try to do the nominal number 1 EVA plan. As - About as far as we can predict in the future right now is through - doing the second EVA tomorrow. We don't know how consumables are going to hold out for the - for the thing. We're going to have to take a look at it - whether there's a possibility of the third one or not. Right now, I'm not so sure.

04 23 55 56 CMP There - there still is some chance, huh?

04 23 55 59 CC Well, it doesn't look too bright, but they're looking at it.

04 23 56 15 CMP Have they got the ALSEP out yet? Or does that come after the Rover?

04 23 56 19 CC That comes after the Rover.

05 00 02 37 CC Casper, Houston. Just a little reminder - about time for - to open the alpha particle X-ray cover.

05 00 02 47 CMP Okay. I'll - Thank you, sir.

05 00 02 57 CMP ALPHA cover, OPEN -

05 00 02 58 CMP MARK. And it's gray.

05 00 07 47 CMP Okay, Hank. I'm ready to copy your erasable updates.

05 00 07 57 CC Say again, Casper.

05 00 08 02 CMP I'm ready to copy the erasables.

05 00 08 05 CC Okay. In column A there - column alpha - OID 05.

05 00 08 12 CMP This is on 9-4.

05 00 08 14 CC That's affirmative. A - -

05 00 08 18 CMP Okay.

05 00 08 19 CC The old data should read 03773. The new data there should be 03521.

05 00 08 34 CMP 03521.

05 00 08 37 CC That's affirmative. Column A again. OID 07 reads now 76747; new data, 76274.

05 00 08 55 CMP Okay. It now reads 76274.

05 00 09 00 CC Roger. Column Bravo, OID 04. Now reads 13353; new data, 13347.

05 00 09 18 CMP A, 13347.

05 00 09 22 CC Column Bravo, OID 05. Old data, 00041; new data, 65620.

05 00 09 42 CMP Okay. New data, 65620. That's column Bravo, 05.

05 00 09 48 CC That's correct, Ken, and that's all of that. I hate to go back, but along about 125:06, when we deleted that P52, we should have deleted the P00 that went right ahead of it.

05 00 10 10 CMP

Okay. Let me come back to that in just a second. I'm passing over Madler now; and, if you remember, we talked about that funny - bright ray pattern - how it seemed to have a funny shape that it - it took off in one direction and then it made a straight line in the other. Well, there's a textural difference in the ground that's underneath that bright material. It's a - It looks like it's - more like highlands - kind of overlay that's on top of a regular mare material. And it does, in fact, go along those - that line of demarcation that we see, and it seems to overlay the - the mare-type, and it's - it doesn't go very far to the south and it doesn't go very far to the west. It's right along that line where you see it. And then there's a little wrinkle - a little cluster of craters and ridges that goes along with the - line of - that goes between Madler and that bright-rayed crater with an excluded zone to the south of them - or that's to the southeast. I just remembered that question, and I wanted to pop that in. There's also a crater directly south of Theophilus that has a - a dark halo around it, and maybe we'll get a better look at it later. He's about one crater diameter south of Theophilus, and it's about the size of the little crater in the northern end of Theophilus. And when I say dark, it's really just sort of a - of a little darker brown than the rest of the material. And it's in the middle of an area that's kind of wrinkled. Then there's another little crater just to the north and east of that that has three - a cluster of three craters around his northern rim. And he, too, has a dark halo, and his dark halo is about one and a half crater diameters, and the larger one to the south is about one and a half crater diameters. Okay. Let's go back and - you said something about - working on a P52, and then I deleted that, and I should have deleted a P00 that went with it?

05 00 12 33 CC

That's affirmative, Ken. We didn't catch that until after we called it up. It's the 125:06 there. We deleted a P52 and we should also delete the P00. Just keep the place ...

05 00 12 46 CMP

Okay. That's deleted. All right. And I'm going to try to get a hack on the landing site as we come across it.

05 00 12 58 CC Roger; and - -

05 00 12 59 CMP Were you able to copy reasonably on VOX?

05 00 13 02 CC Yes, sir. I'm reading you 5 by 5.

05 00 13 09 CMP Okay. I wasn't sure how much it might be clipping on you.

05 00 13 19 CMP I've got the camera ready for our pictures of Alphonsus, and it appears to me I ought to be able to catch Alphonsus and the Davy Crater chain at the same time. They ought to both be in the Sun this time.

05 00 13 32 CC Hey, that's real good, Ken.

05 00 13 39 CMP Okay. We're steaming along here and I just passed Kant; and I tell you, these things aren't nearly as dramatic as they were down in that low pass. When you came over the Kant Plateau down low, it really looked like the ground was coming up. And I'm crossing the Crater Descartes and that bright area; and, again, that surface of that bright area doesn't look nearly as distinct as it did in the low Sun. I have the landing site in the binoculars now. I can look down into South Ray, and it really is a jumbled thing. I can see one bright layer, then a dark layer, then a bright layer, and then a dark layer on the south - or on the west side. And on the south, it looks like some of the same. And I can't see into the shadows very well to the north. I'm looking over at the - Well, let's see here. I'm over - around the - I've got Double Spot in the binoculars; and let's see if I can see anything in that area.

05 00 14 40 CC Can you see the LM?

05 00 14 48 CMP Well, I was hoping I could say yes, but I don't think I do. Let us go back here and - It looks like there is one little ridgeline that goes around a - a - It'd be that first crater that they come up to. It's Flag or Spook. I'm upside down in my thinking that way, too. I've got the Cinco Craters and - Those terraces that we talked about that were over in - in Stone Mountain don't stand out very well from here. Looks to me like

you've got a lot of the same lineations that we've seen in the other places - looks like some slumping further around than where they're going to be going up. I don't think they'll be able to recognize terraces as such.

05 00 15 46 CC

Roger.

05 00 15 49 CMP

The - the - the northwest - I mean northeast - correction - side of that extension of Stone Mountain has what I would have called slumping if it were on the inside of a crater.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 00 16 44 LMP-EVA (Laughter) Yeah, I did get it a little high.

05 00 16 46 CDR-EVA Yeah, Charlie.

05 00 16 50 LMP-EVA Okay, Tony. That prissy precision Young, was coming right straight down when he hit. We didn't move an inch on those footpads.

05 00 17 04 CC Very good, then. Would you verify that you got the sunshield on the TV camera?

05 00 17 11 LMP-EVA Not yet; we'll get it.

05 00 17 13 CC Okay.

05 00 17 15 LMP-EVA That was gonna be part of the pallet stuff; I'll get it. I don't know whether John can reach it or not.

05 00 17 20 CDR-EVA That was going to be part of taking it out to the table, but we just skipped that part.

05 00 17 23 LMP-EVA Oh, that's right; yeah, we did. Cam ... closed.

05 00 17 31 CDR-EVA There goes that shield thing that came off.

05 00 17 34 LMP-EVA What shield thing?

05 00 17 35 CDR-EVA That thing down there.

05 00 17 37 LMP-EVA That's okay.

05 00 17 41 CDR-EVA Make it hard to close the box later on.

05 00 17 45 LMP-EVA Guess what?

05 00 17 46 CDR-EVA What, Charlie?

05 00 17 48 LMP-EVA I can't reach - Look at me, John.

05 00 17 57 CDR-EVA Yeah?

05 00 17 58 LMP-EVA Look at that. I just pole-vaulted off into the - the MESA to get that beauty.

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05 00 18 09 CDR-EVA Charlie, what do I do with the SRC? You've got that piece of paper on you.

05 00 18 13 LMP-EVA Okay, the SRC; it just says "Seal control sample in SCB, to left-hand tool carry."

05 00 18 19 CDR-EVA Okay.

05 00 18 21 LMP-EVA I dropped the sunshield, John. I've got it, now.

05 00 18 27 CDR-EVA Filled with dirt?

05 00 18 28 LMP-EVA Tried to blow the dust off, Tony, but it didn't work.

05 00 18 33 CC Okay; that's two.

05 00 18 43 LMP-EVA Okay; hold the camera there, Tony, and I'll put the sunshield on.

05 00 18 47 CC Okay.

05 00 19 00 LMP-EVA Okay. It looks pretty good to me.

05 00 19 02 CC Outstanding here.

05 00 19 04 LMP-EVA It's on straight. How about you? Okay.

05 00 19 11 CDR-EVA Okay.

05 00 19 12 LMP-EVA Hey, John.

05 00 19 14 CDR-EVA *** able.

05 00 19 16 LMP-EVA *** box.

05 00 19 18 CDR-EVA *** on there.

05 00 19 21 LMP-EVA Got to keep those MESA blankets on this west side closed. I - the Sun's on that side of the MESA.

05 00 19 29 CDR-EVA Hey, you gonna deploy that thing?

05 00 19 31 LMP-EVA What thing?

05 00 19 32 CDR-EVA That critter.

05 00 19 33 LMP-EVA I'm gonna get the control sample in.

05 00 19 34 CDR-EVA Okay, I'll get the flag.

05 00 19 35 LMP-EVA Okay. And it works. You can spin it right up, John. Just like we started doing in training. Okay, while you're getting the flag, I'll go open the ALSEP door.

05 00 19 49 CDR-EVA Okay.

05 00 19 51 LMP-EVA You know, another 10 feet back, and that - we'd had a terrible time with that ALSEP.

05 00 19 57 CDR-EVA That's why - that's why I was glad I could see the ground.

05 00 20 00 LMP-EVA Yeah. Did you see that big thing coming down?

05 00 20 03 CDR-EVA You bet ya.

05 00 20 04 LMP-EVA Man, I sure did.

05 00 20 05 CDR-EVA While we were moving forward there toward the ... a little, or trying to.

05 00 20 28 LMP-EVA *** we go. Yea! It came open! Ha ha!

05 00 20 34 CDR-EVA What came open, Charlie?

05 00 20 35 LMP-EVA The ALSEP doors. Okay, your DESCENT switch is on, Houston. DESCENT TEMP MONIT - DESCENT ECA MONITOR. And we will remove the experiments package.

05 00 20 53 CC Okay.

05 00 20 54 LMP-EVA This ALSEP is right at eye level, To - Tony.

05 00 20 58 CC Very good.

05 00 20 59 LMP-EVA Exactly eye level.

05 00 21 01 CC And, John, we'd like the LiOH can in the Sun.

05 00 21 07 LMP-EVA Boy, that's heavy.

05 00 21 10 CC Oh, correction - -

05 00 21 11 CDR-EVA Want the LiOH can in the Sun - -

05 00 21 15 CC Negative. In the center of the MESA cavity. Sorry.

05 00 21 19 CDR-EVA Yeah, I know that.

05 00 21 21 CC Okay.

05 00 21 22 CDR-EVA Don't let me forget it.

05 00 21 23 CC Okay.

05 00 21 28 CDR-EVA That was what I was supposed to do before we do this, huh? ...

05 00 21 35 LMP-EVA Stealing your thunder back here, John. I'm taking all the ALSEP stuff out.

05 00 21 49 CDR-EVA Never seen it fail.

05 00 21 51 LMP-EVA What happened?

05 00 22 23 LMP-EVA Tony, I'm going out for the Olympics. I just slung that little - that little - carry bar on the ALSEP package, the crooked one, about 200 meters, it looked like. There goes the other one. *** a real winner on the hammer throw. Look at that beauty go! Just created my own secondary. How are you doing with the flag, John?

05 00 22 55 CC Outstanding, Charlie. I'm sure you'll hold the record now.

05 00 23 04 LMP-EVA I doubt that. Maybe for the Cayley Plains Saturday afternoon shindig.

05 00 23 35 CDR-EVA You really should set the flag up on a hill, Charlie, but there just ain't one.

05 00 23 40 LMP-EVA I know, John.

05 00 23 43 CDR-EVA I'll put it right here. Big rock.

05 00 23 50 LMP-EVA Are you setting it up now?

05 00 23 51 CDR-EVA Yeah.

05 00 23 52 LMP-EVA Okay, wait a minute; I'll run and come get the camera. Can't pass that up.

05 00 23 56 CDR-EVA That's all right. That's got it.

05 00 24 05 LMP-EVA Wait a minute. I'm - You're not getting away from there without me getting your picture.

05 00 24 08 CDR-EVA Charlie, we can get that in a minute, okay?

05 00 24 11 LMP-EVA I got it. Here we go. Come on. You get that LiOH canister and I'll get the camera.

05 00 24 16 CDR-EVA Okay. That's fair enough.

05 00 24 20 LMP-EVA You are black from the knees down already.

05 00 24 23 CDR-EVA I know, I had to go - I've been on my knees twice to do things. No way to avoid it. That's why I'm glad the pressure suit bends.

05 00 24 36 LMP-EVA Okay, Tony. We're starting the LMP's camera for the flag.

05 00 24 41 CDR-EVA Houston, I'll ad - I'll admit - I'll admit I forgot that the LiOH canister was supposed to be out and I missed that step, but I'm sure glad your first attempt to tell me to put it in the Sun was - -

05 00 24 57 CC Yeah, that was my error, John.

05 00 24 59 CDR-EVA - - a baddie.

05 00 25 02 LMP-EVA And, Tony, the Rover tracks are just - we're barely sink - they're barely sinking in!

05 00 25 08 CC Yeah, we can see that.

05 00 25 09 LMP-EVA You can't put it too far down in the middle of the -

05 00 25 15 CC Say again, John?

05 00 25 16 CDR-EVA Okay, there it is.

05 00 25 19 LMP-EVA Okay, I got it in there now. Hey, John, this is perfect, with the LM and the Rover and you and Stone Mountain. And the old flag. Come on out here and give me a salute. Big Navy salute.

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05 00 25 35 CDR-EVA Look at this.

05 00 25 40 CC That's a pretty outstanding picture here, I tell you.

05 00 25 42 LMP-EVA Come on; a little bit closer. Okay, here we go. A big one. Off the ground once more. There we go.

05 00 25 54 CDR-EVA *** bet.

05 00 26 05 CDR-EVA I'd like to see an Air Force salute, Charlie, but I don't think they salute in the Air Force.

05 00 26 08 LMP-EVA Sure we do.

05 00 26 09 CDR-EVA (Laughter)

05 00 26 10 LMP-EVA And fly high and straight and land soft.

05 00 26 13 CDR-EVA Okay, Charlie, say when.

05 00 26 15 LMP-EVA Here we go.

05 00 26 16 CDR-EVA Do it again.

05 00 26 17 LMP-EVA One for you. Okay, wait a minute; one more.

05 00 26 19 CC ... This looks like a good time for some good news here. The House passed the space budget yesterday, 277 to 60, which includes the votes for the Shuttle.

05 00 26 30 CDR/LMP- Beautiful. Wonderful. Beautiful.
EVA

05 00 26 33 LMP-EVA Tony, again I'll say it, with that salute, I'm proud to be an American, I'll tell you. What a program and what a place and what an experience.

05 00 26 42 CDR-EVA And I'll say it too.

05 00 26 43 CC So am I.

05 00 26 44 CDR-EVA The country needs that Shuttle mighty bad. You'll see.

05 00 26 49 LMP-EVA I just want to say thank you - -

05 00 26 50 CDR-EVA What do you want to do with this camera, Charlie?

05 00 26 53 LMP-EVA Put it on the left floor - right seat, my seat.
No, on your left - It's got to go under your seat.
I'm sorry.

05 00 26 59 CDR-EVA Okay.

05 00 27 14 CDR-EVA Okay, both cameras are going under my seat, Charlie,
in case you look for them.

05 00 27 18 LMP-EVA Okay, I don't need one.

05 00 27 28 CDR-EVA Okay, the MESA blankets are all closed, Houston.
Or getting that way.

05 00 27 33 CC Okay.

05 00 27 38 CDR-EVA LiOH canister is - in the - and the ... box is
sitting on the table. And I'm sure that's okay.

05 00 28 25 CDR-EVA You know, we hardly kick up any dirt at all,
Charlie. Just hardly any.

05 00 28 31 LMP-EVA I know. Hey, John, I'll let you put this together.
I'm really - think I know how to do it, but I don't
want to foul it up.

05 00 28 38 CDR-EVA Here you go.

05 00 28 39 LMP-EVA Everything else is ready. The - -

05 00 28 40 CDR-EVA Okay, Houston, we're over by the MESA. You can't
see us. I'm putting the UHT together, and Charlie's
got both packages down. And now Charlie's going
for his hot stuff.

05 00 29 16 CDR-EVA Look at that, Charlie.

05 00 29 29 LMP-EVA I think that's good, John. Okay; I need this one
right here.

05 00 29 34 CDR-EVA Okay, I'll leave the other one up here.

05 00 29 36 LMP-EVA Okay. Okay, I got the dome removal tool, Tony.
And it's on.

05 00 30 06 LMP-EVA Hoo-boy. Scared me for a minute.

05 00 30 09 CC Okay, while you're standing still, how about an EMU check?

05 00 30 18 LMP-EVA Okay, I got a - -

05 00 30 19 CDR-EVA What makes you think we're standing still?

05 00 30 23 LMP-EVA (Laughter) I'm clear flag, 75 percent, just about min cooling, and 38.

05 00 30 30 CC Okay; we copy.

05 00 30 37 CDR-EVA I threw that?

05 00 30 41 LMP-EVA John, I threw a thing all the way over those double craters over there.

05 00 30 45 CDR-EVA Okay, I'm going to reset the far UV. I've got the top off the hot package. Let me move this around so you don't run into it.

05 00 30 58 CC Okay. And I have some new settings here, too.

05 00 31 04 CDR-EVA Okay.

05 00 31 10 LMP-EVA Look out. Here it comes. Hot stuff.

05 00 31 13 CDR-EVA Charlie's got it.

05 00 31 22 CDR-EVA Okay, what's your new settings now?

05 00 31 25 CC Okay, they're 56 and 76.

05 00 31 31 CDR-EVA Okay. Going to RESET.

05 00 31 37 CDR-EVA MARK. It's loaded. It's pointed, and it's taking imagery now.

05 00 31 46 CC Okay. I'll warn you when we get to 2 and a quarter minutes.

05 00 31 55 CDR-EVA Okay; 56 and 76.

05 00 31 59 CC That's affirmative.

05 00 32 05 LMP-EVA Okay, Tony, the RTG is fueled.

05 00 32 08 CC Very good.

05 00 32 28 LMP-EVA Okay. You can't believe how good that water tastes. I'm gonna take a break a couple of seconds, Tony.

05 00 32 43 CC Okay; good show.

05 00 32 44 CDR-EVA 56 and 76?

05 00 32 46 CC That's affirmative.

05 00 32 51 CDR-EVA Okay.

05 00 32 54 LMP-EVA How's the old heart rate looking?

05 00 33 00 CDR-EVA 76. Okay. Houston, the Earth is maybe - the Earth is r - is maybe a quar - it's right in the middle!

05 00 33 20 CC Outstanding. You did a good down-Sun alignment.

05 00 33 25 CDR-EVA I can't believe it. I mean, the crescent is right in the middle of that scope. I might move it a half of a degree, but I wouldn't move it any more.

05 00 33 40 LMP-EVA Man, I'll tell you.

05 00 33 42 CDR-EVA Okay, here's the - -

05 00 33 43 CC Okay, Charlie, and you're okay.

05 00 33 46 CDR-EVA - - RESET. Let's go for it.

05 00 33 48 LMP-EVA Okay. I just wanted to rest. I'm starting the old - -

05 00 33 52 CC Right, just take it easy. There is no hurry.

05 00 33 53 LMP-EVA - - I'm going out where this - Man, look at that breccia, John! Right there. This big, subrounded - -

05 00 34 03 CDR-EVA Okay. It's remoded, Houston.

05 00 34 05 CC Okay. You should have your 2 and a quarter minutes, so any time you want to go on.

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05 00 34 12 CDR-EVA Okay. RESET. Film advance: 3, 4, 5, 6, 7, 8, 9, 10, 11 - -

05 00 34 28 LMP-EVA Uh-oh.

05 00 34 29 CDR-EVA - - 12, 13, 14, 15. RESET. Okay, Houston; it did something besides - it moved before I reset it that time.

05 00 34 40 CC That's okay, John; just press on.

05 00 34 43 CDR-EVA It was - -

05 00 34 46 CC Do you mean the camera moved?

05 00 34 47 CDR-EVA Reset. Yeah. When I did the 15 seconds and then the reset, it reset again. It was moving, like it wanted to take ima - like it wanted to go back to IMAGERY. Now it's - now it's - now it's going back to - okay, now it's going back to the Earth - it's going back to SPECTROSCOPY. Does that sound all right to you guys?

05 00 35 31 CC Okay, it should only have done that - Did you reset at the beginning of the 15 seconds?

05 00 35 42 CDR-EVA That's - that's affirmative.

05 00 35 46 CC Okay, that's probably the problem there. That thing should have been crossed out on your check-list to do that reset.

05 00 35 54 CDR-EVA Okay.

05 00 35 56 CC Okay, hold on a second; we'll regroup here.

05 00 36 04 CDR-EVA You want to do it again?

05 00 36 16 CC Okay, John; when it comes back to DIRECT, - -

05 00 36 19 CDR-EVA How you coming, Charlie?

05 00 36 20 CC - - go ahead and watch for that film advance, and then time 15 seconds from the film advance. Don't do a reset when it comes back to DIRECT.

05 00 36 30 CDR-EVA Okay.

05 00 36 37 LMP-EVA Houston, I got about 20 meters away, and the RTG package fell off. It hit the dirt with a ton - like a bomb. It got a little dusty, but the fins are okay and all the experiments seem to be intact.

05 00 36 55 CC Good show, Charlie.

05 00 36 56 CDR-EVA Houston, will - will not the - We want to make sure - we want to make sure we knock the dust off those connectors before we take the caps off of them.

05 00 37 03 LMP-EVA I agree.

05 00 37 06 CC How did this come off that thing?

05 00 37 08 LMP-EVA Okay, it seems to - -

05 00 37 10 CDR-EVA Okay.

05 00 37 13 LMP-EVA Okay, it seems to be locked now, Tony. I don't know what happened - it just - I pushed on it back at the LM but it - -

05 00 37 19 CDR-EVA 3, 4 - -

05 00 37 20 LMP-EVA - - just popped off.

05 00 37 21 CDR-EVA - - 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, RESET. Can't reset again, 3, 4, 5, RESET. RESET.

05 00 37 39 CC Outstanding, John.

05 00 37 40 CDR-EVA Okay. It's not turning. Maybe - I think we got it that time.

05 00 37 46 CC Good show. We'll go into a mode change in a few seconds now, but that's okay.

05 00 37 56 CDR-EVA Yeah, there it goes. Gonna be able to hear that little rascal working all over the Moon.

05 00 38 08 CC (Laughter)

05 00 38 10 CDR-EVA Okay, I'm going to shift the COSMIC RAY panel.

05 00 38 14 CC Okay.

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05 00 38 15 CDR-EVA And close the sequence bay door. That red ring.

05 00 38 28 LMP-EVA Taking a break.

05 00 38 33 CC Good show, Charlie. Don't - don't strain yourself there. Just take it easy.

05 00 38 35 LMP-EVA Hey, Tony I'm - -

05 00 38 39 CC In fact, just stand there for a while.

05 00 38 40 LMP-EVA I just climbed a - a little ridge.

05 00 38 45 CDR-EVA Okay, Houston. You won't believe this. The red ring pulled off the COSMIC RAY panel.

05 00 38 50 CC (Laughter) Did the top slide down?

05 00 38 52 CDR-EVA ... panels are exposed. There's the top exposed with a bunch of slides in there and glasses and a - a black thing and, you know, I think that's what you mean, isn't it?

05 00 39 06 CC Right. That's right. So it worked out okay.

05 00 39 11 CDR-EVA All righty. (Laughter) I can't - don't know my own strength.

05 00 39 16 LMP-EVA Man, Tony, this is a real - this ray pattern extends back about 200 meters or maybe more to the east and goes as far as we can see off to the - west, which is maybe another 200 meters. I can see Smoky Mountain now, and I can see Dome. Kenesol(?) is plainly visible with a big - two big craters on its flanks. And if you look toward Smoky, I see some big craters up on the top, but I can't see Ravine or any - or North Ray yet.

05 00 40 02 CDR-EVA Okay, Houston. You want to do the LCRU switch to MODE 1 and - or what do you want to do? And - -

05 00 40 10 CC That's affirm; we want to go to MODE 1.

05 00 40 15 CDR-EVA Okay, going to MWVB and position it ECW.

05 00 40 23 CC John, we'd like a bat 2 check on the way out to the ALSEP site, and you do that by turning your LEFT FRONT and RIGHT FRONT DRIVE POWERS to BUS C.

05 00 40 36 CDR-EVA Okay.

05 00 40 46 LMP-EVA Look at the size of that rock. Tony, it's about a 2-meter boulder, I just passed. Okay, John.

05 00 40 56 CDR-EVA Okay, the NAV breaker is going in, and we are reading - in the Sun shadow, we are reading 1 degree south. Pitch is zero. And roll is half a degree right.

05 00 41 23 CC Okay, we copy that. We'll give you a torquing angle in a minute. And would you confirm the seq bay doors are shut?

05 00 41 31 CDR-EVA Sequence bay doors are shut, and we're pointed up about 2 degrees.

05 00 41 36 CC Okay; pitch up 2.

05 00 41 37 CDR-EVA I see Charlie over - Charlie's down - down there to the southwest. Can I go RESET on this thing to clear these numbers off before 2 minutes?

05 00 41 54 CC Yeah, we can go RESET.

05 00 41 58 CDR-EVA Say again?

05 00 42 00 CC Yes, go RESET.

05 00 42 01 LMP-EVA ... on the first part. Tony, I think that the best place here for the ALSEP is to the LM 11 o'clock position, and I'll let John give you the range. But it's up on the top of a dome, and it's fairly flat, and I think John can drive about 290, maybe 28, down over a ridge for the - for the thumper. There's just not any flat places here, Tony, I - I - I can't - This is the flattest I can find.

05 00 42 45 CC That sounds good, Charlie; and, John, it's 266.

05 00 42 53 CDR-EVA Understand 266.

05 00 42 57 LMP-EVA Okay, Tony. The regolith hasn't changed any out this far. We still have numerous rou - subrounded to angular blocks in the - partially buried. Here's a secondary. Here's a big boulder, the one I described, that's 2 - 2 meters across with about a 50-centimeter fillet above the - -

05 00 43 28 CDR-EVA Hey, Houston, say again what you want me to do to this thing to check out the rear steering - check out the battery?

05 00 43 33 CC Okay. We'd like you to just start out with the LEFT FRONT and the RIGHT FRONT DRIVE POWERS on BUS C. If the battery 2 isn't working, you shouldn't go anywhere.

05 00 43 46 CDR-EVA Okay, LEFT FRONT, RIGHT FRONT POWERS on BATTERY C, and 266 on the GYRO TORQUE.

05 00 44 01 LMP-EVA Tony, I'm looking at this - this big rock, and it's a two-rock breccia. The matrix is a black rock - blackish to bluish - with some very fine, submillimeter-size crystals.

05 00 44 17 CDR-EVA Hey - hey, Houston. You won't believe this. Now our AMP-HOURS on battery 2 are up, and they're reading (laughter) 118 and the - and the battery - and the battery VOLTS are reading 62. You want the whole business before we start out? The AMP-HOURS on 1 are 118; on 2, 118; 68 volts; 68 volts; no AMPS, of course; and 82 degrees on the MOTOR TEMPs, and offscale - 82 degrees on the BATTERIES, and offscale low on both MOTOR TEMPs.

05 00 44 52 CC Okay, we copy that.

05 00 44 54 LMP-EVA I don't understand that.

05 00 44 56 CDR-EVA I just did something. Oh, that - that's all right.

05 00 45 07 LMP-EVA John, it sure looks like we're on a more than 2-degree landing slope, but it's not.

05 00 45 12 CDR-EVA Let's don't read that battery check now that we got all those good readings, Houston.

05 00 45 16 LMP-EVA Turn on your rear steering, John.

05 00 45 19 CDR-EVA Okay, I - I've had that on, Charlie.

05 00 45 21 LMP-EVA Okay, it's working. It's working.

05 00 45 23 CC Okay, if everything's working - -

05 00 45 24 CDR-EVA Maybe it just needs to sit around and heat up.

05 00 45 32 LMP-EVA Okay, Tony, back to this rock. The small frags in it are whitish in color with a small sub-millimeter crystal - millimeter-size crystals of - it looked like brass olivine in the white matrix - in the white clasts, let's say. And it's a biggie; it's right near the ALSEP. We'll get a picture for that. It'll show up in the pan.

05 00 46 02 CC Okay, John, we'd like you to go ahead and drive out on battery - -

05 00 46 09 CDR-EVA Yes, it's gonna be - Okay, you want me to pull BAT A and B circuit breakers?

05 00 46 13 CC No, negative. Just put the LEFT FRONT - -

05 00 46 17 CDR-EVA You - you want me to - -

05 00 46 18 CC - - RIGHT FRONT to BUS C.

05 00 46 20 CDR-EVA - - BUS - okay. LEFT FRONT and RIGHT FRONT are on BUS C.

05 00 46 29 LMP-EVA It's moving.

05 00 46 31 CDR-EVA Yeah, it's going like a champ.

05 00 46 33 CC Good show; everything looks good.

05 00 46 34 LMP-EVA Okay, you're kicking up a - You got a small rooster tail, John, but not very much of one.

05 00 46 42 CC And, could you give us an AMP reading while you're driving?

05 00 46 45 CDR-EVA Man, I tell you - yeah, AMP-HOURS are 18 AMP. Okay, I'm only - I'm not doing very many clicks. Twenty-two on the front and exactly nothing on the oth - on the - on two and nothing on the other one. Charlie - -

05 00 47 07 CC Okay; we copy.

05 00 47 09 CDR-EVA - - there's just hardly any place that hasn't got craters around here. Is that where you want to put the ALSEP?

05 00 47 13 LMP-EVA This is the levelest spot I could find.

05 00 47 16 CDR-EVA I tell you, Houston, there's just no place that's not got craters and things around it. Think 290 from here, huh?

05 00 47 28 LMP-EVA Yeah, I'm about cross-Sun here.

05 00 47 34 CDR-EVA Okay, he's out - we're 1/10 on the range in distance.

05 00 47 39 CC Okay, we copy that, and sometime when you're stopped, we can go back to normal.

05 00 47 45 CDR-EVA Maybe right over in here, Charlie, right here.

05 00 47 48 LMP-EVA Huh?

05 00 47 49 CDR-EVA Is that too close to the -

05 00 47 51 LMP-EVA Is that 290?

05 00 47 52 CDR-EVA No, let me show you 290. Like this.

05 00 47 58 LMP-EVA Okay; that's okay.

05 00 48 00 CDR-EVA It's right down in this hole, is what it is.

05 00 48 04 LMP-EVA I can move it over here another 30 feet or so. You'll be all right.

05 00 48 07 CDR-EVA Okay, do that. Oh boy, I tell you, this place is full of holes, Houston. And rocks.

05 00 48 43 CC John, when you were back at the COSMIC RAY, did you happen to notice what the TEMP label read?

05 00 48 51 CDR-EVA No, I forgot. I forgot.

05 00 48 54 CC Okay.

05 00 48 55 CDR-EVA Want to go back and get it? Be just a second in the Rover here?

05 00 48 58 CC No, negative.

05 00 49 03 CDR-EVA Okay.

05 00 49 16 CC And, John, when you get a chance, you can go back to normal configuration on the Rover.

05 00 49 24 CDR-EVA Okay.

05 00 49 25 LMP-EVA How does that look out there, John?

05 00 49 27 CDR-EVA (Laughter) It looks like everything else around here: full of holes.

05 00 49 31 LMP-EVA I know it, and lots of craters.

05 00 49 33 CDR-EVA Lots of craters.

05 00 49 35 CDR-EVA We're not lacking for them, Houston.

05 00 49 44 LMP-EVA Tony, the - this is just an indescribable experience. I'll tell you.

05 00 49 52 CC I bet it is, Charlie. Hey, what's the difference between a hole and a crater?

05 00 50 02 LMP-EVA Beats me.

05 00 50 11 CDR-EVA Man, this has just got to be - if the - if the number of craters are any indication, this has got to be old material (laughter). Even the craters have craters.

05 00 50 44 LMP-EVA Man, I am black already, from the knees down.

05 00 50 52 CDR-EVA Okay, have you got the Central Station lined up?

05 00 50 55 LMP-EVA East-west.

05 00 50 57 CDR-EVA Yeah. You going to - you gonna deploy your - your drill down there, huh?

05 00 51 06 LMP-EVA To the south. Okay, you need to park -

05 00 51 11 CDR-EVA I'll park over there by that rock, Charlie. Heading 180?

05 00 51 16 LMP-EVA Yeah, that - that'd be good.

05 00 51 18 CDR-EVA 195.

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05 00 51 19 LMP-EVA Yeah, that'll be good. Great.

05 00 51 22 CDR-EVA I tell you why I'll park over by that rock, because it drops off like a - (laughter).

05 00 51 56 LMP-EVA We're sort of dusty here, and, man, we're -

05 00 51 58 CDR-EVA Okay, and we're -

05 00 52 02 LMP-EVA Tony, I'm tapping the RTG fins to get the dust off of them, and it's flak - it's coming off real good.

05 00 52 10 CC Okay, very good.

05 00 52 16 LMP-EVA I'm sorry about dropping that thing, Tony, but I - golly - -

05 00 52 19 CC No, we understand.

05 00 52 20 LMP-EVA It appeared locked to me, but it just came sailing off of there.

05 00 52 26 CC It's going outstanding, Charlie.

05 00 52 38 CDR-EVA Okay, Houston. And the seatbelt worked, I'm pleased to report. Oh boy. Near as I can make it to 60 foot, Charlie.

05 00 52 56 LMP-EVA Hey, that looks great, John. That's perfect. Well, my moment of truth is about to arrive.

05 00 53 15 CDR-EVA It sure looks sandy to me, Charlie.

05 00 54 49 CDR-EVA Charlie, does that thing look like it's pointing at the Earth? I don't - -

05 00 54 53 LMP-EVA Can you see the Earth?

05 00 54 55 CDR-EVA No.

05 00 54 56 LMP-EVA It looks pretty close, to me. It's almost vertical.

05 00 55 01 CDR-EVA There we go. There it is. Oh, you little rascal, no wonder I couldn't find you.

05 00 55 11 LMP-EVA It's not very big.

05 00 55 12 CDR-EVA I got it. It's beautiful. You ought to - Houston, you ought to have it now. It's beautiful.

05 00 55 22 LMP-EVA Is Hous - Houston reading you, John?

05 00 55 24 CDR-EVA Houston, do you read? Over.

05 00 55 25 CC Now we're copying you 5 by, and we got a picture.

05 00 55 31 CDR-EVA Okay; fine.

05 00 55 34 LMP-EVA Tony, I'm stopping a little short on the AL - on the heat flow electronics because I - if I go on out, I'd be in a little crater and you couldn't get it leveled. Over.

05 00 55 58 CDR-EVA That thing - that little crater might be - that little crater just might be what-you-call-it, you know?

05 00 56 16 LMP-EVA I think we may have come a little further than we thought we were going to, Houston. I see Double Spot back there and - or what looks like Double Spot - and we're a good ways past that.

05 00 56 35 CC Okay; we copy that.

05 00 56 40 CDR-EVA Let's see, there's the craters.

05 00 56 48 LMP-EVA Okay.

05 00 57 00 LMP-EVA John, we're not much off, I'll tell you.

05 00 57 04 CDR-EVA Yeah, I hope not, Charlie.

05 00 57 13 CC John, did you happen to notice what heading you were driving on the way out to the ALSEP site?

05 00 57 20 CDR-EVA I wasn't watching it, to be honest with you. I was trying to keep sight of old Charlie. You can get lost down here.

05 00 57 36 LMP-EVA Coming.

05 00 57 46 CDR-EVA Okay, the TEMP labels on the RTG package say ... release.

05 00 58 18 CDR-EVA There we go. Here comes that beauty.

05 00 58 35 LMP-EVA Boy, I'll tell you, John, getting your alignments up here is gonna be something.

05 00 58 48 CDR-EVA Okay. We'll work that problem, Charlie, when the time comes.

05 00 58 51 LMP-EVA Okay, Tony, the old idiot-proof decal has made it - The probe is in the left hand, and the wires are not crossed.

05 00 59 05 CC Very good.

05 00 59 19 CDR-EVA Okay; the temperature - the shorting plug is pulled and the temperature reading is reading about like - Golly, I can't believe it. It's reading (laughter) - it's reading about like three-quarter scale.

05 00 59 39 LMP-EVA Tony, let me give you a question here. The down-Sun heat probe is gonna be within 2 meters of a - of about a 5-meter crater. Over. That's maybe a meter deep. Is that okay, or do you want me to move it?

05 00 59 57 CC Can you move it to a crater-free area?

05 01 00 03 LMP-EVA Yes, I can, but it will be - it'll be more towards the - the porta - the portable - I mean the LSM.

05 01 00 12 CC Okay, we'd like to do that.

05 01 00 16 LMP-EVA Okay. Now the one - the one up-Sun is perfect, straight up-Sun.

05 01 00 22 CC Very good.

05 01 00 34 LMP-EVA Yeah, this is a super place right here for this up-Sun one. Okay, here we go with a big drill coming up. Down into the crater he goes. There's a secondary. Little one. *** like the big eye is looking at something else.

05 01 00 54 CDR-EVA Yeah.

05 01 00 58 LMP-EVA Boy, John, I'm gonna need about 23 gallons of water. This stuff tastes good.

05 01 01 08 CDR-EVA Okay, that connector is made, somehow. And - -

05 01 01 15 LMP-EVA Okay; drill.

05 01 01 18 CDR-EVA Back over here and straighten out the line.

05 01 01 22 CC Now, when you're standing over the Rover there, could you read off the heading?

05 01 01 25 LMP-EVA Well, I almost tried - oh, yeah, we're - heading is 1 - bearing to the LM is 033, the heading is 195.

05 01 01 36 CC Okay; 195.

05 01 01 41 LMP-EVA Roger.

05 01 01 55 CDR-EVA It's hard to believe.

05 01 01 57 LMP-EVA What's that, John?

05 01 01 59 CDR-EVA That line between the - see it - Central Station and the ALSEP is gonna float in the air.

05 01 02 07 LMP-EVA Yes, it's really - things are really stiff, aren't they?

05 01 02 10 CDR-EVA Yeah. Okay, the collar is locked on the Central Station. I'm gonna get the subpallet here.

05 01 02 33 LMP-EVA Oh, I did it again. Wrong end. Get in there. Okay, the handle is in. So. Here comes the old ... here.

05 01 03 17 CDR-EVA Houston, do you want us to tilt that package - That RTG package is okay with dirt on its floor, isn't it? Does it need to be all white?

05 01 03 24 CC Okay, we'll work that. No, it doesn't have to be all white.

05 01 03 31 CDR-EVA Okay. That's my first question of the day. Okay.

05 01 03 34 CC Our first answer.

05 01 03 36 CDR-EVA I didn't think you'd have thermal problems.

05 01 03 42 LMP-EVA Tony, the - the drill tripod deployed just as advertised.

05 01 03 51 CC Very good.

05 01 04 06 LMP-EVA I knew I was gonna do that. I knew it.

05 01 04 23 CC I see it doesn't stand up any better there than it does here, does it?

05 01 04 29 LMP-EVA No. And I dropped the core tap. But I recovered those smartly. I'm getting where I can bend down in that suit, Tony. When I first started off, I was going head over heels, but now - Look at that stupid thing. There. Okay, one more pin. ... Lock the collar, and the drill is loose. Come the core stems. Walking into a little 3-meter crater here, Tony, you can see. Really dig in when you go into those craters.

05 01 05 47 CC Man, that is a rocky place, isn't it?

05 01 05 49 LMP-EVA Boy, my suit feels good. Sure is. Hey, John, will I be in your way right here?

05 01 06 00 CDR-EVA For what?

05 01 06 02 LMP-EVA I'm gonna have to drill away from that crater. Tony, I'm about 4 or 5 meters away, is that okay? From that crater I described?

05 01 06 08 CC That sounds good.

05 01 06 12 LMP-EVA Okay, we'll start drilling right here, then.

05 01 06 21 CDR-EVA Well, I - I don't think - that won't be any problem. The only thing goes down past there is the LSM.

05 01 06 28 LMP-EVA That's what I thought.

05 01 06 29 CDR-EVA And we may have to deploy the LSM out behind the ALSEP anyway to get it from going down in that little crater there. I think 50 foot will put me right in that hole. What do you think of that, Houston, if I deploy the ALSEP behind the - I mean, deploy the LSM behind the - Charlie's thing here? Can y'all see this on the tube?

05 01 07 05 CC Stand by a second, John.

05 01 07 15 CDR-EVA You know, John, you need about two patches of Velcro. It'd hold the whole thing. You got about 95 - There it comes.

05 01 07 32 CDR-EVA Okay, level and align ... experiments package, by eyeball.

05 01 07 38 LMP-EVA Man, can you throw things a long way up here.

05 01 07 43 CC Okay, that's okay, John. We understand you had to deploy it almost due west of the RTG?

05 01 07 51 CDR-EVA Right.

05 01 08 08 CC Okay, and we need about 30 feet between that heat flow hole and the LSM.

05 01 08 26 CDR-EVA Understand. We'll give you that.

05 01 08 31 CC Very good.

05 01 09 13 LMP-EVA Whoo; finally got it, Tony.

05 01 09 15 CC Very good.

05 01 09 20 LMP-EVA For a minute there I was worried. Okay. I can stab it into the ground about - Okay, are you guys ready? Here we go.

05 01 09 35 LMP-EVA MARK. Hey, that beauty is going right in.

05 01 09 40 CC Outstanding.

05 01 09 49 LMP-EVA Guess what?

05 01 09 50 CC It slowed down.

05 01 09 51 LMP-EVA It's not going in. Something hard in there.

05 01 10 07 LMP-EVA Whatever it was, we got through it, Tony. It's speeding up again.

05 01 10 10 CC Okay, good show.

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05 01 10 13 LMP-EVA Right on down now. It's super now. It must have been a rock. I'm s - I'm sure the regolith is covered with - -

05 01 10 25 CC Very good, Charlie.

05 01 10 27 LMP-EVA Okay, and first, the long stem is in.

05 01 10 32 CDR-EVA Golly, Charlie. Help me when you get finished.

05 01 10 37 LMP-EVA Okay, that ain't gonna work.

05 01 10 55 LMP-EVA Okay, Tony, the foot masy is not gonna work.

05 01 10 58 CC Yeah, we were watching.

05 01 11 00 LMP-EVA Gonna have to use the wrench.

05 01 11 01 CC Okay.

05 01 11 32 LMP-EVA That works like a champ.

05 01 11 34 CC Right. That new wrench is pretty slick.

05 01 11 39 LMP-EVA Yeah, it is.

05 01 11 45 CDR-EVA Why aren't you open? (Laughter)

05 01 11 53 CDR-EVA *** fall over drill.

05 01 12 06 CC Ah, Charlie, such form.

05 01 12 11 LMP-EVA How about that? I'm going out for the ballet when I get back. You learn another line of work up here. Hey, that was fantastic news about the House passing the bill, Tony. It really started a great day today for us.

05 01 12 41 CC We sure agree.

05 01 12 47 LMP-EVA Okay. Man, you can't believe how happy I am that went in there.

05 01 12 56 CDR-EVA Tony, he's very happy.

05 01 13 11 CC Mark's pretty happy too.

05 01 13 17 LMP-EVA Yeah.

05 01 13 37 LMP-EVA There we go. Okay. Here we go, second one.

05 01 13 41 LMP-EVA MARK. Look at that beauty go. Look at that beauty stop. Look at that beauty go again.

05 01 13 55 CC Okay, give it time to clean the flute.

05 01 14 01 LMP-EVA I'm not leaning on it. It may appear that I am leaning on it, Tony, but I guarantee you I am not.

05 01 14 08 CC Okay, we understand.

05 01 14 11 LMP-EVA Okay. It's run into something hard down there. I can feel the torque, but whatever it is, it's going through it. Yep, it was through it. It's probably some - just some rocks down there in the regolith, Tony. You know, it looks - I bet it's just like the side of that - that fresh crater we saw back near the LM.

05 01 14 50 LMP-EVA Oh boy, thank goodness for that wrench. Never would be able to do that with the foot masher. Here we go again. ...

05 01 15 18 CC Oh, beautiful!

05 01 15 36 LMP-EVA Okay.

05 01 15 44 CDR-EVA Almost got it.

05 01 15 48 LMP-EVA Hey, John, it looks great. How can you get that thing leveled out there? Amazing.

05 01 16 11 CDR-EVA Okay, it's level, but the Sun reading is 0 - 064-1/2. Is that okay, Houston?

05 01 16 26 LMP-EVA MARK.

05 01 16 28 CC Okay, Charlie. Say that again, John.

05 01 16 34 CDR-EVA 064-1/2. I pointed it at that thing that said Sun, but that sure wasn't - didn't do it. I guess you can handle that.

05 01 16 48 LMP-EVA Tony, it bogs down as it goes down through rocks and things. Now it's getting really hard. It - it's giving me a lot of torque. Just at the - the third stem is just about in.

05 01 17 14 CDR-EVA Okay, Houston; switch 5 is clockwise.

05 01 17 20 LMP-EVA MARK. Okay, I'll - I'll call it quits on that one, Tony.

05 01 17 33 LMP-EVA Are you reading, Houston?

05 01 17 35 CC We copy that.

05 01 17 46 CC Okay, John, we understand you have the skirt out?

05 01 17 52 CDR-EVA That's affirmative.

05 01 17 54 CC Okay.

05 01 17 56 CDR-EVA Can't you see it on the TV?

05 01 17 57 CC We're just now coming around there. Okay, that 064 will be fine, then.

05 01 18 02 CDR-EVA It ought to blind you.

05 01 18 48 CC John, do you remember where the bubble was on the top of the PSE?

05 01 18 54 CDR-EVA In the middle.

05 01 18 56 CC Very good. I should have known.

05 01 19 02 CDR-EVA ... said he won - We couldn't come back unless we put the bubble in the middle. Oh, I was afraid of this.

05 01 19 10 LMP-EVA What's wrong.

05 01 19 11 CDR-EVA The - Charlie?

05 01 19 12 LMP-EVA Uh-huh?

05 01 19 14 CDR-EVA This thing pulled so hard that it pulled the Central Station.

05 01 19 17 LMP-EVA Yeah. Can't you realign it later?

05 01 19 20 CDR-EVA Yes, that's a thought.

05 01 19 22 LMP-EVA That - that was my problem with the RTG package, I -

05 01 19 52 CDR-EVA There, it's okay. Just that first bunch that we didn't get.

05 01 20 01 LMP-EVA Yeah. Okay, Tony, I now have the right-handed rammer.

05 01 20 41 LMP-EVA And, Tony, Mark has his first one all the way in to the red mark on the Cayley Plain.

05 01 20 50 CC Outstanding. The first one in the highlands.

05 01 21 08 CDR-EVA Ask him what we're going to do if the temperature shows like it does at - at Hadley.

05 01 21 21 LMP-EVA Okay, the second one. The thermal cover is in to the second red mark. And, Tony, the - the probe is out of the ground up to B-8 - right at between - right on the line between B-7 and B-8.

05 01 21 37 CC Okay; Baker 7 and 8.

05 01 21 45 CDR-EVA Charlie.

05 01 21 46 LMP-EVA What?

05 01 21 47 CDR-EVA Something happened here.

05 01 21 48 LMP-EVA What happened?

05 01 21 49 CDR-EVA I don't know. Here's a line that pulled loose.

05 01 21 57 LMP-EVA Uh-oh.

05 01 21 58 CDR-EVA What is that? What line is it?

05 01 22 02 LMP-EVA That's the heat flow. You've pulled it off.

05 01 22 05 CDR-EVA I don't know how it happened. Pulled loose from there?

05 01 22 12 LMP-EVA Yes.

05 01 22 14 CDR-EVA God almighty.

05 01 22 17 CDR-EVA Well, I'm wasting my time.

05 01 22 20 CDR-EVA I'm sorry. I didn't even know - I didn't even know it.

05 01 22 32 CDR-EVA It's sure gone - -

05 01 22 34 CC Did the wire or the connector come off?

05 01 22 36 CDR-EVA - - our first catastrophe. It broke right at the connector.

05 01 22 42 LMP-EVA The wire came off at the connector.

05 01 22 45 CC Okay, we copy.

05 01 22 50 CC Okay, I guess we can forget the rest of that heat flow.

05 01 22 55 LMP-EVA Now, if I go do the - Ah, rats!

05 01 23 02 CDR-EVA I'm sorry, Charlie. You know it.

05 01 23 08 LMP-EVA A bunch of spaghetti over there.

05 01 23 11 CC Boy, we can sure see that on TV. It looks like a mess!

05 01 23 26 LMP-EVA Well, tell Mark we're sorry. Is there no way we can recover from that, Tony?

05 01 23 34 CC I'm sure we're working it.

05 01 23 41 LMP-EVA I go over and get the - -

05 01 23 47 CC We understand that the cable came off the connector, and we've got just the free end of the cable, is that right?

05 01 23 54 CDR/
LMP-EVA Right.

05 01 24 53 CDR-EVA Okay.

05 01 25 36 LMP-EVA Okay, starti - starting on the deep drill.

05 01 25 46 LMP-EVA MARK.

05 01 25 51 LMP-EVA MARK. That one went in like gangbusters!

05 01 26 04 CC Okay, we copy that, Charlie, and hold back on that drill a little bit. It'll probably try to auger in on you a bit.

05 01 26 12 LMP-EVA Okay, I will. Yeah, that penetration rate was a little fast. Thanks for reminding me. Tony, if there is some way we could get that connector off of there, we might be able to take the be - take the whole - the electronics - Naw, we can't do that either; the whole thing's hooked up.

05 01 27 15 CDR-EVA Okay, the LSM is on the surface. I'm going to deploy the Central Station.

05 01 27 19 CC Okay.

05 01 28 48 CDR-EVA These - these wires have - they have life - memory in them, and they just - they stay crinkled up in odd - odd manners here. I didn't realize that.

05 01 29 00 CC Roger, John; we can sure see that.

05 01 29 21 LMP-EVA Okay, Tony; I had a tough time getting the - the bit off of the - off the first stem. Got a little dusty in there, but I got it cleaned out.

05 01 29 36 CC Okay.

05 01 29 52 LMP-EVA Uh-oh.

05 01 29 55 CDR-EVA *** it, Charlie?

05 01 29 56 LMP-EVA *** Fell down.

05 01 30 17 LMP-EVA There we go.

05 01 31 41 LMP-EVA I bet you that looks like a comedy of errors on the tube, - got a little dusty.

05 01 31 47 CC Now, it's coming along fine there, Charlie.

05 01 31 56 LMP-EVA The problem is that the - the bit won't stay in
the - stuck in the ground, and when I try to get
this stuff on, it spins the whole - the whole deal,
instead of the - -

05 01 32 33 CC That's a new one.

05 01 33 11 LMP-EVA That d - that drill is so good it - it's hard to
get off.

05 01 33 18 CC Right.

05 01 33 19 LMP-EVA I mean, not the drill but the bit - the wrench.
Okay, second one going in, Tony.

05 01 33 24 LMP-EVA MARK.

05 01 33 32 CC Right. Don't hurry it.

05 01 33 33 LMP-EVA I'm holding back on it this time.

05 01 33 34 CC Good show.

05 01 34 16 LMP-EVA MARK. Okay, the second one went in with no prob-
lem, Tony.

05 01 34 24 CC Good show.

05 01 34 34 LMP-EVA Man, what a place.

05 01 34 54 CDR-EVA Okay, the Central Station is erected.

05 01 34 58 CC Okay. And you're GO for the shorting switch when
you get there.

05 01 35 09 CDR-EVA Okay.

05 01 35 47 LMP-EVA That baby just doesn't want to come off.

05 01 36 47 LMP-EVA Okay, last one going on, Tony.

05 01 36 49 CC Okay.

05 01 36 50 LMP-EVA Then we'll see if we can get that beauty out of
the ground.

05 01 36 57 CC Ah, think positive, Charlie.

05 01 37 04 LMP-EVA Boy, that's all - all t - all - all the sections are like that first one, pull it - right out of the ground. But I don't think that's true.

05 01 37 52 LMP-EVA I tell you, this ain't the cleanest place I've ever been in my life. Ooh. Dust is everywhere.

05 01 38 19 LMP-EVA Okay, last one, Tony.

05 01 38 21 LMP-EVA MARK.

05 01 38 23 CC Okay.

05 01 38 28 LMP-EVA And I feel a little - a little clutch slippage, but not much.

05 01 38 34 CC Okay. Just take it slow and easy.

05 01 38 38 LMP-EVA Slowly going in. What I'm doing is letting it do the work.

05 01 39 42 CC Right, Charlie. Remember to spin it free - -

05 01 39 44 LMP-EVA MARK.

05 01 39 45 CC - - spin it free for 15 seconds without letting it go down if you can.

05 01 39 51 LMP-EVA I am. I was just going to see if I was down far enough.

05 01 39 54 CC Okay. Beautiful. Don't strain yourself there, Charlie.

05 01 40 13 LMP-EVA I'm not. I think I better use the r - the jack.

05 01 40 22 CC Okay.

05 01 40 23 LMP-EVA When I - when I was - when I was spinning it free, Tony, it - I felt like it was going to come right on out, but it's sort of hung up now.

05 01 40 35 CC Okay, we understand.

05 01 40 36 LMP-EVA I got it down about one stem width and - length.

05 01 40 40 CC Okay.

05 01 41 16 LMP-EVA For some reason, that thing is hard to unscrew off -
There we go. Hey, Ji - Tony, I'll save the drill
just in case we can - y'all can come up with an
answer on that heat flow.

05 01 41 34 CC Okay.

05 01 41 45 CC And, Charlie, when you get that core out, we would
like you to measure the hole with the rammer
jammer.

05 01 41 52 LMP-EVA Yeah, I am. Okay, right in here, Tony; we really
sink in on that cr - rim of that little crater.
How's your TV?

05 01 42 12 CC Excellent. Outstanding.

05 01 42 17 LMP-EVA Good.

05 01 42 24 CC And if you get tired there, Charlie, just take a
break.

05 01 42 29 LMP-EVA No, I'm - I feel good. *** know how good I look.

05 01 42 48 CDR-EVA Hey, Houston. I think the ant - the sha - the
antenna is aligned and pointing at you.

05 01 42 55 CC Okay, John.

05 01 43 03 CDR-EVA And it's level, believe it or not.

05 01 43 16 CC And, Charlie, Deke says you don't look any better
than normal.

05 01 43 24 LMP-EVA (Laughter) If the boss says that, I agree with
him; yes, sir.

05 01 43 32 CDR-EVA Okay, Houston. We're going to push the shorting
switch.

05 01 43 36 CC Okay.

05 01 43 42 CDR-EVA Okay, the amps go to zero on the gage. Is that
what they're supposed to do?

05 01 43 45 CC That's affirmative.

05 01 43 47 CDR-EVA And switch 1 is going clockwi - switch 1 is going clockwise. Switch 5 is going counterclockwise.

05 01 44 04 LMP-EVA Okay, Tony. The top of the core - deep core has got cap number A.

05 01 44 10 CC Okay, deep core, cap A. And, John, we've got a good ALSEP.

05 01 44 18 CDR-EVA Yeah, I knew it was a good one. Gee whiz. Okay, I'll ... the LSM here.

05 01 45 31 LMP-EVA Well, you can't believe it, Tony, but that beauty is coming out.

05 01 45 34 CC Outstanding. And we've proved the lever principle again.

05 01 45 49 LMP-EVA Yep.

05 01 46 50 LMP-EVA ... Hey, I've learned something. Let the suit do the work for you.

05 01 46 53 CC Very good.

05 01 46 54 LMP-EVA Oh, this is a beauty.

05 01 47 35 CC Looks like it's a good thing we had that jack.

05 01 47 40 LMP-EVA I think so. I think maybe John and I'd have been able to pull it out, but it would have been a battle.

05 01 48 51 CC Hey, Charlie, take it easy. Let's rest for a minute.

05 01 48 57 LMP-EVA Okay, how's the old heartbeat?

05 01 48 59 CC You're up to about 140.

05 01 49 04 LMP-EVA Okay. Doesn't feel like hard work. Still can't pull that beauty out. I got it out 6 feet.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 00 18 02 CC Okay, Ken, you got about a couple of minutes to go before the terminator photos.

05 00 18 09 CMP Okay, I'm getting set up now, trying to get myself oriented to the best window. I tell you, I know it's not supposed to make any difference that if you're going backwards or not, but it sure does.

05 00 18 20 CC Roger.

05 00 18 38 CMP Okay. There's Albategnius, and he's got a nice Cayley floor and a whole bunch of the - like a concentric ring, but I can't - Yeah, by golly, there's a concentric ring in that thing just like there is in the mare. And - It goes most of the way around. Some places it's overlain with the - like the crater Klein hides it.

05 00 19 36 CMP Okay. The - the floor of Alphonsus is still quite shadowed.

05 00 19 48 CC Okay, Ken, and we're coming up on a site handover. We may lose comm for a second!

05 00 19 56 CMP Okay.

05 00 20 21 CMP Hank, are you still here?

05 00 20 22 CC That's affirmative.

05 00 20 27 CMP Okay, looking at Alphonsus, I'd say that there's this a - well, you can see this obvious little band that we talked about that runs north and south through there. And that's an entirely different texture than what you see on the material on either side of it. But it is the same on either side. Looking from north to south, I don't see anything that's - I can really call - I couldn't - that says there's any topographic relief going from south to north. There's no demarcation that's evident that's different at all. Although there is some of this material that's in the south that runs towards the crater center that does, indeed, look like it might - might be tapering down and thinning out. I'll come back to that in just a minute. Let me pick up Davy.

05 00 21 51 CMP Well, I tell you. We aren't going to get Davy on this pass either.

05 00 21 55 CC Still in the shadows?

05 00 22 01 CMP Sure is. You can just see the shadows run - oh, gosh, I'd say a - *** er of a - a quarter of a crater diameter of the size of Ptolemaeus out. And it goes to just about where - Davy G isn't obvious. I think I've got Davy G, but that's not - not obvious that I can. And - and then the rest of it just disappears. Even the central peak in Albatrajious [sic] doesn't show.

05 00 22 51 CC I wouldn't have expected that one.

05 00 22 57 CMP No, no. Neither would I. Well, another day.

05 00 23 46 CMP Hey, and, Henry, the frame number on magazine SS is now 25.

05 00 23 52 CC Roger; copy 25.

05 00 24 03 CMP Okay, I'll get a lil - canister change.

05 00 28 55 CC Casper, Houston. The rate in your Flight Plan about not starting until 121:05 is still good.

05 00 29 04 CMP Okay, Henry. Thank you, sir.

05 00 36 54 CC Casper, Houston. Forgot to ask you. Did you see anything on that last back-side pass that's worthy of commenting on?

05 00 37 08 CMP No, sir; I did not. I didn't even get my head out of the cockpit.

05 00 37 14 CC Roger.

05 00 50 20 CC Casper, Houston. We are about 2 minutes from LOS and everything is looking good. If you don't have anything else, we'll see you on the other side.

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05 00 50 32 CMP Okay, Hank. And, I'm all set up to take the
Gum Nebula, and I've checked the star patterns,
and they all work out just fine. So, I'll see
you at AOS.

05 00 50 41 CC Good show.

(NO COMM FOR 40 MINUTES)

05 01 30 XX BEGIN LUNAR REV 25

05 01 39 03 CC Casper, ... wide on HIGH GAIN.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 01 49 28 LMP-EVA John, is that going to be all right next to that rock?

05 01 49 33 CDR-EVA I don't have any idea, Charlie. Sure hope so, because there ain't much other place to put it. If it ain't next to the rock, it's going to be in that hole right next to it.

05 01 49 41 LMP-EVA Yes, I see what you mean.

05 01 49 45 CDR-EVA This isn't the world's greatest place to - deploy an ALSEP. I'll tell you that.

05 01 50 08 CC John, how far are you from that rock?

05 01 50 14 CDR-EVA It's about - 3 feet. You want to move it farther than that? How far do you want to be? I'll pick it up and move it.

05 01 50 23 CC Okay. We're thinking about that.

05 01 50 39 CC John, I guess they would like you to try to move it away from that rock and - on the distance, just as - just as far as you can without getting - getting it in trouble there - jerking it around.

05 01 50 54 CDR-EVA Okay, can I pick it up by its ... ? If I promise to be real careful with it?

05 01 51 04 CC Okay. They have reevaluated the whole thing and decided since you left it they guess they didn't want it very badly, and they said just leave it where it is; it looks fine.

05 01 51 13 CDR-EVA Okay. I - I can probably get down on my knees and get - it's underneath its little box - -

05 01 51 17 CC And, Charlie.

05 01 51 18 CDR-EVA - - but it's level, and -

05 01 51 22 LMP-EVA Yes?

05 01 51 23 CC On that hole, there, instead of putting the rammer-jammer down it, I guess we would like to put the second heat flow probe down the hole and then measure it with the rammer-jammer, how far it went, and just leave the heat flow probe in the hole. Did - does it reach over there?

05 01 51 41 LMP-EVA The probe?

05 01 51 42 CC That's right, the heat flow probe.

05 01 51 45 LMP-EVA Or the - no, I don't think it will reach, Tony.

05 01 51 50 CC Okay, then, just go ahead and measure the hole.

05 01 51 52 LMP-EVA Y'all going to give up on the heat - are you going to give up on the heat flow?

05 01 51 57 CC Well, we'll probably have to; haven't got a firm - firm decision, yet.

05 01 52 04 LMP-EVA I'd like to save that stuff until - you make a firm decision.

05 01 52 10 CC Okay. Well, by putting it down in the hole, they were going to use it for heat flow hole.

05 01 52 22 LMP-EVA I'd rather drill one. I don't think it'll reach. I'll try it, but -

05 01 52 29 CDR-EVA Okay. The L - the LSM is level and aligned. The Sun is right in the middle of the - the shadow.

05 01 52 37 CC Okay. We copy that, John. Very good.

05 01 52 43 CDR-EVA I mean the Sun is right in the middle of the alignment marks.

05 01 52 46 CC Okay.

05 01 52 55 LMP-EVA How about that, Tony?

05 01 52 56 CC Outstanding!

05 01 52 57 LMP-EVA Did you see that?

05 01 52 58 CC I'd say the hole stayed open.

05 01 53 00 LMP-EVA That - that - All the way down, I just dropped the
rammer into it - it just fell in.

05 01 53 07 CC Okay.

05 01 53 10 LMP-EVA Look at that.

05 01 53 16 CDR-EVA Okay, Charlie. We're about ready to go with the
geophones here.

05 01 53 19 LMP-EVA Wait a minute. I got the most beautiful thing
here. I got to pick this up - before I lose it.

05 01 53 46 CC Blow on it.

05 01 53 50 LMP-EVA Huh?

05 01 53 51 CC Blow on it.

05 01 53 53 CDR-EVA What did you say, Tony?

05 01 53 56 LMP-EVA Yeah. I was going to.

05 01 54 13 CDR-EVA Come on, Charlie.

05 01 54 14 LMP-EVA I'm coming. Let me put this over here.

05 01 54 46 LMP-EVA Tony, on the rim of that little crater, as I walked
through there, there was a - underneath the rego-
lith, there was a white area. I kicked up some
very white soil, about 3 centimeters down.

05 01 55 09 LMP-EVA And I forgot the camera.

05 01 55 10 CC Roger.

05 01 55 11 CDR-EVA Bringing it. Hey, Charlie. I got it.

05 01 55 18 LMP-EVA Okay. I'll get it; let me have it.

05 01 55 24 CDR-EVA Whoa, Charlie.

05 01 55 25 LMP-EVA Huh? How's that?

05 01 55 29 CDR-EVA Watch out for those cables.

05 01 55 30 LMP-EVA Okay. I am (laughter).

05 01 55 36 CDR-EVA That's - that's pretty good.

05 01 55 39 LMP-EVA Okay, Tony. I - I put the - stuffed the geophones stake in, by just pushing on it about - oh - about - a foot. You - y'all better think about that two-tenths cone penetration; it stopped 10. It looks like the 5 would be the best all the way out. I think I'll just go right up to the hilt with it, too.

05 01 56 10 CC Okay. We copy.

05 01 56 15 CDR-EVA Watch out, Charlie.

05 01 56 16 LMP-EVA Okay. I was just waiting to get the - dumb heat thing.

05 01 56 31 LMP-EVA Dumb things just stand up - the wires - everything just stands up off the ground about 6 foot - 6 inches here.

05 01 56 40 CDR-EVA Boy - never thought of that - we should - we should - we never thought of that.

05 01 56 50 LMP-EVA Okay. I got it.

05 01 57 02 CDR-EVA This is gonna be the trick of the week. Get it, Charlie. Not only does he have the geophone in - in the ground, he's got it buried in the ground.

05 01 57 15 LMP-EVA Super. Okay. This is going to be a lot easier than carrying that big - other backpack.

05 01 57 24 CDR-EVA Keep an eye on this, Charlie.

05 01 57 26 LMP-EVA I got you. I got you.

05 01 57 27 CDR-EVA Okay. Now I'm going out and parallel these tracks.

05 01 57 29 LMP-EVA Okay. Let me make sure - -

05 01 57 30 CDR-EVA You want the hammer?

05 01 57 31 LMP-EVA No, go ahead. I just want to - -

05 01 57 34 CDR-EVA You don't need the hammer - we don't need the hammer.

05 01 57 35 LMP-EVA I know it.

05 01 57 36 CDR-EVA The other stake is over there.

05 01 57 37 LMP-EVA Oh, okay. In the - in the - the pallet?

05 01 57 40 CDR-EVA Yeah.

05 01 57 41 LMP-EVA Okay. I'll get it. Sounds like the camera remodeling.

05 01 57 47 CDR-EVA Yeah. Make sure that it's not pulling too hard on that wire back there.

05 01 57 53 LMP-EVA No, it's great, John.

05 01 57 55 CC Yeah, Charlie. I think you need a camera.

05 01 57 59 LMP-EVA Yeah, I'm going to get one. I'll go run get it now.

05 01 58 02 CC Okay.

05 01 58 03 CDR-EVA No, Charlie. Watch and see where this line comes out.

05 01 58 06 LMP-EVA Okay. I'd better do that, Tony. I'll get the camera.

05 01 58 09 CC Okay. Fine.

05 01 58 11 LMP-EVA Just a minute. Okay?

05 01 58 12 CC No hurry.

05 01 58 15 LMP-EVA We know we need a - Okay. You're walking a little bit sideways, John; you're pulling against it with your left side. There you go. Looking good, John. The geophone's still in, and the stake is looking good. Going great.

05 01 59 02 CDR-EVA Trouble is, a guy - the average guy doesn't realize how far 100 meters is.

05 01 59 07 LMP-EVA I know it.

05 01 59 09 CDR-EVA Especially me.

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05 01 59 12 CC Roger; 2 inches at a time like that, it's a long way.

05 01 59 19 LMP-EVA Ah, the footprints in the Moon. Can't believe it.

05 01 59 24 CC Ah, that's all right. They'll probably erode away in about 4 billion years.

05 01 59 28 LMP-EVA The regolith -

05 01 59 31 CDR-EVA What's that, Charlie?

05 01 59 33 LMP-EVA What's what?

05 01 59 34 CDR-EVA That thing hanging up there?

05 01 59 35 LMP-EVA No, it's okay. Man, that's a long way, John. Stake is still up.

05 01 59 44 CDR-EVA Okay.

05 01 59 45 LMP-EVA Keep going. Okay, there's a double one.

05 01 59 46 CDR-EVA There's a double one.

05 01 59 47 LMP-EVA There's a double one. Run around, and get in front of you here.

05 02 00 01 CDR-EVA There they come.

05 02 00 02 LMP-EVA There they come.

05 02 00 03 CDR-EVA Here we are.

05 02 00 04 LMP-EVA Okay, here we are.

05 02 00 16 CDR-EVA Got it?

05 02 00 24 LMP-EVA Wait a minute.

05 02 00 26 CDR-EVA Okay. That's right - We have to put that in before we put the stake in.

05 02 00 29 LMP-EVA Yeah, I can't do it - anything till I get that in.

05 02 00 39 CDR-EVA Come on. Guess what? Beautiful, Charlie.

05 02 00 55 LMP-EVA Okay, that one's buried too, Tony.

05 02 00 58 CDR-EVA Charlie, buried the geophones.

05 02 01 01 CC Okay.

05 02 01 03 LMP-EVA Pull it out this way.

05 02 01 04 CDR-EVA It pulled out this way.

05 02 01 05 CDR-EVA No, that's right.

05 02 01 06 LMP-EVA No, you want it this way, don't you?

05 02 01 07 CDR-EVA No, that's right. That's right.

05 02 01 08 LMP-EVA Yeah.

05 02 01 11 CDR-EVA Not so hard!

05 02 01 12 LMP-EVA Why?

05 02 01 13 CDR-EVA Liable to cut the line.

05 02 01 14 LMP-EVA Oh no, it's all right. You're probably about to.
You're all right.

05 02 01 20 CDR-EVA Get the flag open, so we can see it.

05 02 01 21 LMP-EVA Yeah. Sorry. Okay. I'm going to get a camera.
You all set?

05 02 01 25 CDR-EVA Yep.

05 02 01 26 LMP-EVA Watch out. You got it crooked, John. Whoop.
Right here on this side, your right.

05 02 01 34 CDR-EVA Yeah, Okay. Thank you.

05 02 01 35 LMP-EVA There you go.

05 02 01 36 CDR-EVA Thank you.

05 02 01 37 LMP-EVA Yes, sir. About to get it again. There you go.
Okay. The stake's holding fine. Adios.

05 02 01 48 CDR-EVA Adios.

05 02 01 57 CDR-EVA It's a far cry from that -

05 02 02 03 LMP-EVA Hey, John. You got to wait. They got to change out your air hose.

05 02 02 07 CDR-EVA Charlie.

05 02 02 09 LMP-EVA Where's the - Hey, Tony, where is the Bendix air compressors?

05 02 02 14 CC It doesn't look right with them not out there.

05 02 02 23 CDR-EVA I'll tell you this 1/6 gravity feels a lot better.

05 02 02 32 LMP-EVA Tony, when I first started with that jack, I thought the thing - The ground was so soft, I thought the thing had failed like it did in the last training, but it had not. It just worked great.

05 02 02 43 CC Outstanding.

05 02 02 52 LMP-EVA How about that pace, huh?

05 02 03 21 LMP-EVA Dadgummit.

05 02 03 29 CDR-EVA Well, I'll say one thing - the force to deploy this thing I can sense is exactly the same as it was in one g - and I keep wondering when the power wire is going to bust.

05 02 03 46 LMP-EVA Okay, Tony. I have LMP's camera.

05 02 03 50 CC Okay.

05 02 04 01 LMP-EVA The back of - the bottom of the bit is with Bravo - and I'm going back out and take some pictures.

05 02 04 11 CC Okay.

05 02 04 12 LMP-EVA John has disappeared over the horizon!

05 02 04 22 LMP-EVA Hey, John. How about an EMU status check? Your - you pulled out your pin on your purge valve.

05 02 04 23 CDR-EVA I'm - doing okay - 70 - 50, 60, 70, 3 percent is
what I read.

05 02 04 47 LMP-EVA Okay. Well you must - you still must be locked.
Your pin's out - I'll put - I picked it up, and
we'll put it back - it's under your seat.

05 02 04 54 CDR-EVA Okay.

05 02 04 55 LMP-EVA Right next to the Rover.

05 02 04 56 CDR-EVA Well, we'll get it.

05 02 04 59 LMP-EVA Hey, you out there?

05 02 05 00 CDR-EVA Yeah, I'm out here. Wait a minute until I stick
up the flag.

05 02 05 05 LMP-EVA Okay. All ALSEP taken at f/11, 1/250.

05 02 05 31 CDR-EVA I guess that's a pretty straight line, Charlie.

05 02 05 33 LMP-EVA Looks straight to me, John. Okay, here's your
picture.

05 02 05 38 CDR-EVA Wait a minute. I haven't got the flag up.

05 02 05 40 LMP-EVA Okay.

05 02 05 41 CC Charlie, we'd like you - -

05 02 05 42 LMP-EVA Tony, there's a -

05 02 05 43 CC - - to put John's pin back in.

05 02 05 47 LMP-EVA All right, I'll go get it; just a moment.

05 02 05 56 LMP-EVA Man, that sky is black.

05 02 06 05 LMP-EVA Okay, Houston. Ready for the first ALSEP - it's
set on zero; we'll go to 1 - ready for the first
geophone to fire. Are you all set for that,
Houston?

05 02 06 16 CC Stand by 1.

05 02 06 20 CDR-EVA No.

05 02 06 24 LMP-EVA Tony, the PSE skirt has some dust kicked on it,
on the north side a little bit -

05 02 06 31 CDR-EVA Blow it off, Charlie.

05 02 06 32 LMP-EVA Oh, I can't do that.

05 02 06 33 CC Okay. I guess we're going to have to have you
stand still for a little bit here while we cali-
brate something. While you're doing that, how
about an EMU check, and did you get that pin back
in?

05 02 06 45 CDR-EVA I'm 100 yards from Charlie.

05 02 06 46 CC Understand.

05 02 06 48 CDR-EVA That's 100 meters. 3.85 is - I'm on - I'm between
MINIMUM and INTERMEDIATE on the cooling. I got
73 percent and no flags. You want me to run on
back to Charlie and get that?

05 02 07 09 CC Negative.

05 02 07 16 CDR-EVA It must have pulled out on the geophone somehow.
Where did you pick it up, Charlie?

05 02 07 21 LMP-EVA Right next to your - to Rover.

05 02 07 25 CDR-EVA Huh!

05 02 07 29 CC Okay, John. We're ready for the thumper.

05 02 07 30 CDR-EVA You sure it isn't yours.

05 02 07 31 LMP-EVA No, it's yours.

05 02 07 34 CDR-EVA Okay.

05 02 07 35 LMP-EVA Okay, Tony. I got 60 percent. I'm all clear, my
pressure gage is - on the flags, my pressure gage
is 3.8.

05 02 07 43 CDR-EVA Okay, Charlie. Hold still.

05 02 07 45 LMP-EVA I'm still.

05 02 07 48 CDR-EVA 4, 3, 2, 1 -

05 02 07 51 CDR-EVA FIRE. Ha, ha, ha. Look at that.

05 02 08 06 CDR-EVA Okay, Charlie. Hold still.

05 02 08 09 LMP-EVA Okay.

05 02 08 10 CDR-EVA Number 2, Houston. 4, 3, 2, 1, fire. No, let
me try that again.

05 02 08 33 CDR-EVA 4, 3, 2, 1 -

05 02 08 38 CDR-EVA FIRE, fired. Okay, Charlie.

05 02 08 50 LMP-EVA Okay.

05 02 08 53 CC Hey, John. We got an outstanding signal here; it
looks great!

05 02 09 00 CDR-EVA Okay. It's shaking the ground. Number 3, Houston.

05 02 09 07 LMP-EVA I'm steady.

05 02 09 14 CDR-EVA 4, 3, 2, 1 -

05 02 09 17 CDR-EVA FIRE.

05 02 09 25 CC Roger: You got a beauty there, John.

05 02 09 27 CDR-EVA Okay, Charlie.

05 02 09 28 LMP-EVA Okay.

05 02 09 42 CDR-EVA Number 4, Houston.

05 02 09 49 CDR-EVA 4, 3, 2, 1 -

05 02 09 52 CDR-EVA FIRE.

05 02 10 02 CC Charlie, when you get a minute there, we got a
couple of questions.

05 02 10 04 CDR-EVA Okay.

05 02 10 08 LMP-EVA Go ahead.

05 02 10 10 CC We would like for you to look at the end of that heat flow cable that was broken off and tell us how far from the heat central station it broke, and also describe the end of the broken cable - if you can get that in between when John's walking.

05 02 10 26 LMP-EVA Hey, John. Stand by a minute, let me stand up here.

05 02 10 31 CDR-EVA Okay, Charlie, Number 5, Houston. You ready to go still, Charlie?

05 02 10 36 LMP-EVA No, wait a minute. Let me get up, and then I'll hold still. Okay, go ahead.

05 02 10 41 CDR-EVA Okay.

05 02 10 44 CDR-EVA 4, 3, 2, 1 -

05 02 10 49 CDR-EVA FIRE.

05 02 11 01 CDR-EVA Sound doesn't travel too good in a vacuum. I don't hear a thing, but it jumped. Okay, Charlie, I'm going to the next station now.

05 02 11 12 LMP-EVA Okay, Tony, the - I'm going to be still, John, so you just go ahead.

05 02 11 18 CDR-EVA Okay, number 6.

05 02 11 23 CDR-EVA 5, 3, 2, 1 -

05 02 11 27 CDR-EVA FIRE.

05 02 11 29 LMP-EVA Okay, Tony, the cable is broken off right at the connector. And it's - I can - there's about an inch and a half of silver material right in my hand at the end of the broken piece, and, as I look at the cable, it's right at the - the connector, rather; it's right at the connector - broken off right there. Over.

05 02 11 54 CC Okay. We copy that.

05 02 11 57 CDR-EVA Number - number 7, Houston.

05 02 12 01 CC How does the connector look? Is there any damage on it?

05 02 12 09 CDR-EVA Okay.

05 02 12 10 CDR-EVA 4, 3, 2, 1 -

05 02 12 13 CDR-EVA FIRE.

05 02 12 29 LMP-EVA Tony, there's no damage on the connector. Over.

05 02 12 32 CC Okay.

05 02 12 38 CDR-EVA Number 8, Houston.

05 02 12 45 CDR-EVA 4, 3, 2, 1 -

05 02 12 49 CDR-EVA FIRE.

05 02 12 59 CDR-EVA Okay. Am I holding still long enough?

05 02 13 07 CC Yes.

05 02 13 16 CDR-EVA Number 9, Houston.

05 02 13 25 CDR-EVA 4, 3, 2, 1 -

05 02 13 29 CDR-EVA FIRE.

05 02 13 31 CC Okay.

05 02 13 49 LMP-EVA Tony, as I look up to Smoky Mountain, you can see more - large blocks up on the flank of Smoky Mountain. It, on the face, it's the side next to the south, the North Ray Crater.

05 02 14 04 CDR-EVA Number 10, Houston.

05 02 14 10 CDR-EVA 4, 3, 2, 1 -

05 02 14 13 CDR-EVA FIRE.

05 02 14 18 CDR-EVA Hey, Tony, did you get my question about am I holding still long enough?

05 02 14 22 CC Yes, you're holding still long enough.

05 02 14 28 CDR-EVA Okay.

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05 02 14 32 LMP-EVA Are you moving, John?

05 02 14 33 CDR-EVA Yeah.

05 02 14 34 LMP-EVA Okay.

05 02 14 50 CDR-EVA Houston, do you want - answer me, do you want me to do one by the geophone, or do I skip that one? The central geophone? There's a white thing by it.

05 02 15 02 CC The one right by the central geophone; yes, we do want.

05 02 15 08 CDR-EVA Okay.

05 02 15 11 CC The one we don't want is the next one around the cable.

05 02 15 16 CDR-EVA Yeah, okay. I remember now.

05 02 15 20 LMP-EVA Wait a minute, John.

05 02 15 30 CDR-EVA Okay.

05 02 15 31 LMP-EVA Okay.

05 02 15 35 CDR-EVA Houston.

05 02 15 38 CDR-EVA 4, 3, 2, 1 -

05 02 15 42 CDR-EVA FIRE.

05 02 15 48 CC Okay, we're sure getting good signals here, John.

05 02 15 57 CDR-EVA Okay. The next one we skip because it has got a black wire on it.

05 02 16 18 CDR-EVA Hey, number 12, Houston.

05 02 16 25 CDR-EVA 5, 3, 2, 1 -

05 02 16 29 CDR-EVA FIRE.

05 02 16 49 LMP-EVA Number 13, Houston.

05 02 17 03 CDR-EVA 4, 3, 2, 1 -

05 02 17 06 CDR-EVA FIRE.

05 02 17 09 LMP-EVA It's firing, Babe, I'll tell ya.

05 02 17 11 CDR-EVA Good. Getting me all dirty.

05 02 17 14 CC Great. Not great it's getting you all dirty,
great it's working.

05 02 17 24 LMP-EVA Okay, Tony, one of the lit - one of the arms of
the LSM, when I pull the sunshade, the arm to the
northwest - does not lock.

05 02 17 42 CDR-EVA Well, lock it, Charlie.

05 02 17 43 LMP-EVA How do you do that? By pushing down?

05 02 17 46 CC Charlie, they don't lock.

05 02 17 47 CDR-EVA No, it doesn't lock. They don't lock.

05 02 17 51 LMP-EVA But I can't unravel this sunshade; it pulls up the
arms. Go ahead.

05 02 17 59 CDR-EVA Okay.

05 02 18 03 CC Okay, if you - if you can't get that out there - -

05 02 18 05 CDR-EVA Number 14.

05 02 18 06 CC - - just leave the sunshade down.

05 02 18 10 CDR-EVA Okay, 4, 3, 2, 1 -

05 02 18 35 CDR-EVA Number 15, Houston.

05 02 18 38 CC Okay.

05 02 18 41 CDR-EVA 4, 3, 2, 1 -

05 02 18 54 CC Charlie, I guess we'd just like you to leave the
sunshade alone; let's - just let it hang there.

05 02 19 01 LMP-EVA I got it. It was wrapped around - a couple of
times. I didn't touch the little bit level. It's
okay.

05 02 19 07 CC Okay.

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05 02 19 14 LMP-EVA Wait a minute, John. Okay.

05 02 19 16 CDR-EVA Okay, number 16, Houston.

05 02 19 19 CDR-EVA 4, 3, 2, 1 -

05 02 19 23 CDR-EVA FIRE.

05 02 19 33 CDR-EVA Okay.

05 02 19 50 CDR-EVA Okay, number 17, Houston.

05 02 19 53 LMP-EVA Just a minute, John.

05 02 20 02 CDR-EVA Ready, Charlie?

05 02 20 03 LMP-EVA Yeah, go ahead.

05 02 20 04 CDR-EVA Okay, number 17 again, Houston.

05 02 20 07 CC Okay.

05 02 20 08 CDR-EVA 4, 3, 2, 1 -

05 02 20 12 CDR-EVA FIRE.

05 02 20 25 LMP-EVA Okay.

05 02 20 26 CC And, Charlie, while you're taking the pictures and all, verify the area around the central station is policed up.

05 02 20 37 LMP EVA Okay, I will.

05 02 20 40 CDR-EVA Number 18, Houston.

05 02 20 48 CDR-EVA 4, 3, 2, 1 -

05 02 20 51 CDR-EVA FIRE.

05 02 20 58 CC And we're still getting good signals.

05 02 21 05 CDR-EVA Okay. Coming up on the last one. And I see the black thing; skipping that one. Going up here by the central station. The 5 at the white line next to the first geophone.

05 02 21 27 CC Okay, and, after you fire this one, we'd like you to stand still until we give you the go.

05 02 21 35 CDR-EVA All right.

05 02 21 36 LMP-EVA Wait a minute, John. Okay. Go ahead.

05 02 21 41 CDR-EVA Okay, Houston. Last one.

05 02 21 46 CDR-EVA 4, 3, 2, 1 -

05 02 21 51 CDR-EVA FIRE.

05 02 22 18 CC Okay. You can go.

05 02 22 19 CDR-EVA They got to be kidding.

05 02 22 22 LMP-EVA Okay.

05 02 22 26 CDR-EVA Was the signal reverberating that long?

05 02 22 28 CC Right. It really rings down.

05 02 22 40 LMP-EVA All finished. Good show. Tony, ain't there some way we can fix that heat flow?

05 02 22 48 CC Looks pretty bad there, Charlie. We - we suggest you just not worry about it there. You got a good ALSEP, and the other experiments are working fine.

05 02 23 02 LMP-EVA Well, that - all those hours. Okay. We got all the pictures except for the ones John's supposed to take of the mortar package. And I'm skipping the heat flow ones. And we're up to magazine - we're 100 - 102 on - 101 on magazine Alfa.

05 02 23 33 CC Okay.

05 02 23 41 LMP-EVA Okay. I'm going to get the hockey stick, John.

05 02 23 47 CDR-EVA Okay. I'm going ... clockwise here to mate the beast.

05 02 23 55 CC Okay, Charlie. Do you have that pin in John's suit yet?

05 02 24 00 LMP-EVA I'm going to get it right now.

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05 02 24 02 CC Okay.

05 02 24 07 LMP-EVA Coming - coming your way.

05 02 24 08 CC Roger. Seeing you coming.

05 02 24 13 LMP-EVA What's the - what's the heart rate when I'm going like this, Tony?

05 02 24 16 CDR-EVA About 10.

05 02 24 19 CC Okay, you're going about 110 right now.

05 02 24 24 LMP-EVA Am I? Thank you.

05 02 24 27 CDR-EVA Well, what's mine?

05 02 24 32 CC John, you're about 80.

05 02 24 36 CDR-EVA That figures.

05 02 24 41 LMP-EVA See that right there, Tony?

05 02 24 44 CC Yep, sure do.

05 02 24 49 CDR-EVA Okay, the old central station is all cleaned up.

05 02 24 53 CC Good job.

05 02 24 54 CDR All the junk is gone somewheres.

05 02 24 57 LMP-EVA Did you see what I held just in front of the camera, Tony?

05 02 25 00 CC Yeah, we sure did.

05 02 25 04 LMP-EVA It was a solid piece of glass, spherical, and part of it's broken away, but it really - really most unique piece of glass I've ever seen in all the samples. I think -

05 02 25 23 CC Outstanding, Charlie. I thought you had the ball on that OPS or that purge key.

05 02 25 33 LMP-EVA No, it's a solid piece of glass.

05 02 25 37 CC Fantastic.

05 02 25 42 LMP-EVA And it was right out here by the drill.

05 02 25 51 CDR-EVA Okay, Charlie. I'm going to deploy this -

05 02 25 54 LMP-EVA Okay, wait a minute. Let me get this thing in, and I'll go back and start on that heat flow. I mean the - Can you step away so I don't get these cables?

05 02 26 05 CDR-EVA What is it you want to do?

05 02 26 07 LMP-EVA I got to get this in.

05 02 26 08 CDR-EVA Oh. Gosh, it is in, isn't it? Can you see it?

05 02 26 17 LMP-EVA Yeah.

05 02 26 23 CDR-EVA How did I do it is what I'd like to know. Manual dexterity test of the year. I'll bet - -

05 02 26 33 LMP-EVA Okay, it's in.

05 02 26 34 CDR-EVA I'll bet I - when I undid my seatbelt, I pulled it off.

05 02 26 37 LMP-EVA Probably.

05 02 26 38 CDR-EVA I'll bet you 100 dollars.

05 02 26 39 LMP-EVA Okay, Tony. That is back in - in the commander.

05 02 26 42 CC Good show.

05 02 26 48 LMP-EVA These Rover tracks are amazing. They just barely -

05 02 27 01 LMP-EVA Oh, heck. Gah.

05 02 27 48 CDR-EVA My gosh, Houston. Even though we were over the hill, the thing is within about a foot of being lined up.

05 02 27 56 CC Outstanding, John.

05 02 28 00 CDR-EVA And for the geophones to be in the same line, it'll have to go with a Sun angle of 3, 33.

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05 02 28 10 CC Okay.

05 02 28 24 CDR-EVA I need the thumper pack. Excuse me.

05 02 28 34 LMP-EVA Boy, that beauty almost didn't want to come loose, Tony. But we got it.

05 02 28 56 CC Charlie, what was the cap on the bottom end? We missed that.

05 02 29 02 LMP-EVA Baker.

05 02 29 04 CC Okay.

05 02 29 06 LMP-EVA It's all full, Tony.

05 02 29 08 CC Outstanding.

05 02 29 36 LMP-EVA Okay. Bravo -

05 02 29 43 LMP-EVA Delta and Baker on the bottom.

05 02 29 54 LMP-EVA You're losing a little bit out of the third section here. Get the cap on.

05 02 30 14 LMP-EVA And Echo is on the bottom of the third section. Over.

05 02 30 18 CC Okay. We copy that.

05 02 30 25 CDR-EVA Man, the trick of the week, getting this wrench off of here.

05 02 30 36 LMP-EVA Am I in focus right here, Tony?

05 02 30 39 CC Yeah, you look fine.

05 02 30 43 LMP-EVA That's amazing; that camera is so good.

05 02 30 51 CC The lens must be like a pinhole camera.

05 02 30 56 LMP-EVA Yeah, okay. I'll go put these stobs, these cores, back out there.

05 02 31 08 CDR-EVA And I'm unable to get one of the legs of the mortar package deployed here for some reason.

05 02 31 27 LMP-EVA Okay, Tony. Do you want me to save the drill?

05 02 31 30 CC Yeah, why don't you just leave it setting [sic] there?

05 02 31 35 LMP-EVA In case you guys come up with something?

05 02 31 46 CDR-EVA Okay.

05 02 31 57 CDR-EVA Boy, am I filthy.

05 02 32 36 LMP-EVA Okay, John, I'm going to start configuring over here for some geology.

05 02 32 41 CDR-EVA Okay.

05 02 32 42 LMP-EVA And I'll - -

05 02 32 43 CDR-EVA Be there as soon as I can, Charlie.

05 02 32 44 LMP-EVA - - put your bags on and et cetera, et cetera.

05 02 32 57 CDR-EVA Houston, I can see why I can't deploy this third leg, but I - I can't seem to do anything about it. Would you take two out of three legs?

05 02 33 07 LMP-EVA You want me to come help, John?

05 02 33 09 CDR-EVA Well, Charlie, it's a question - I can't get this gear around this angle in here. It's just - I mean I don't know how it got the way it is, but unless I got it around the angle, it won't deploy.

05 02 33 27 CC Which leg was it, John?

05 02 33 32 CDR-EVA The third leg on the mortar pallet. Will you take three out of four?

05 02 33 41 CC Well, if it won't come out, I guess we're stuck with it.

05 02 33 47 CDR-EVA Well, I don't see anyway with my gloves and - if I took my gloves off, I could get it out, but I ain't going that far.

05 02 33 55 CC Okay, we'll just go with three, John.

05 02 34 03 LMP-EVA Sure I can't help, John?

05 02 34 04 CDR-EVA No, there's nothing we - nothing you can do unless we could pull it. It won't come out, and there is no way to pull it without a - hmm, pair of pliers - without a screwdriver.

05 02 34 22 LMP-EVA No, we ain't got one of those.

05 02 34 24 CDR-EVA No, three out of four will work.

05 02 34 28 LMP-EVA By golly, they ought to be satisfied with that. They ... go with that - -

05 02 34 30 CC Yes, John, we're satisfied with three. Let's just go with that.

05 02 34 35 CDR-EVA Okay. And going in the ground at 333.

05 02 36 16 CDR-EVA Okay. The mortar pallet is in and flat, and the level is still, no.

05 02 36 34 CDR-EVA Shoot, it's to now about 3 - between - 330.

05 02 36 43 CC Okay, John.

05 02 37 02 LMP-EVA Okay, Tony. I'm going to get a couple of grab samples out here in front of the Rover about 15 feet. Look like typical rocks that are in this area. One of them - they're mostly dust covered here, but I can pick up a couple that are whitish, and I'll get a couple of cross-Suns before.

05 02 37 28 CC Sounds good, Charlie.

05 02 37 58 CDR-EVA Okay. The mortar package is in place - oh, dear. The - the mortar package - the pallet is level. The mortar package is not quite level; it's just off the edge of being level.

05 02 38 21 CC Okay. Understand. The bubble is free of the case, though?

05 02 38 26 CDR-EVA Yes, it is.

05 02 38 28 CC That's fine.

05 02 38 29 CDR-EVA Reasonably enough.

05 02 39 14 CDR-EVA Okay. I'm going to raise the rad - radio antenna - red flag.

05 02 40 01 CDR-EVA And it's up.

05 02 40 37 CC Charlie, you might want to slow down a little bit.

05 02 40 42 LMP-EVA Yeah, I am. My problem was I fell down - and with this camera on, it's hard to get up. I'm okay.

05 02 40 53 CC Okay.

05 02 40 55 CDR-EVA I can't believe how full of holes this place is - a general comment. You got the camera, Charlie?

05 02 41 02 LMP-EVA No, it's on the central station.

05 02 41 03 CDR-EVA Oh, yes. I remember the last time we put it on the central station, the thing collapsed, and then you left it over at the car.

05 02 41 15 LMP-EVA Okay, bag 351, Tony, has got a - a grab sample.

05 02 41 24 CC Okay, and, John, after - -

05 02 41 26 LMP-EVA And, I wouldn't even take an after for you - you'll never -

05 02 41 30 CC After taking pictures of the mortar package there, we would like a picture of that last thump imprint.

05 02 41 38 CDR-EVA All righty.

05 02 41 42 CC I'm sorry, Charlie. Go ahead.

05 02 41 43 LMP-EVA Oh, my first rock. Houston, I was just saying my first rock - even though I had to fall down to get it.

05 02 42 13 LMP-EVA Tony, I'm taking this lens brush and cleaning off this camera.

05 02 42 18 CC Okay.

05 02 42 39 CDR-EVA Charlie, this camera here is kind of dusty.

05 02 42 42 LMP-EVA Well, I think it's just the outside. I looked at the lens; it looked clean.

05 02 42 47 CDR-EVA Yes, I think this one -

05 02 42 55 LMP-EVA Hey, the lens in this one is clean, too; good.

05 02 43 03 CDR-EVA I can't believe this - this dirt.

05 02 43 20 CDR-EVA Okay. What settings do you want on that, Houston?

05 02 43 24 CC Cross-Sun on it. Normal cross-Sun.

05 02 43 31 CDR-EVA You want a stereopair?

05 02 43 32 CC That'd be fine.

05 02 43 37 LMP-EVA (Cough)

05 02 43 38 CDR-EVA Okay.

05 02 43 41 LMP-EVA (Cough). ... old orange juice went down wrong.

05 02 44 14 CDR-EVA Boy - -

05 02 44 15 LMP-EVA Tony, I'm going over to this crater and get you some of this white soil. I think it is coming off of this rock here, but it looks like caliche. I never thought I'd use that word up here, but that's what the coating looks like. Right here. Right here.

05 02 44 34 CDR-EVA Let me see that.

05 02 44 35 LMP-EVA Come and look at it, John. It might be just a total white rock; it - The cross-Sun, oh, man, are your settings going to be something terrible.

05 02 44 49 CDR-EVA Where did you see it?

05 02 44 51 LMP-EVA See it - right there.

05 02 44 53 CDR-EVA Yeah. Now we've had a bag failure - already; that thing. The little pull tab came off; we can still use it, though.

05 02 45 09 LMP-EVA Here, hold this for me.

05 02 45 13 CDR-EVA Okay. Charlie, you got my camera?

05 02 45 15 LMP-EVA Yeah, and it's filthy. Get a little shovel - shovelful of that stuff.

05 02 45 25 CDR-EVA Gosh, Charlie, it does look like caliche.

05 02 45 27 LMP-EVA Doesn't it look like caliche?

05 02 45 28 CDR-EVA Yeah, but it's just a bunch of white frags, I believe.

05 02 45 33 LMP-EVA I'm going to get this rock here, too.

05 02 45 36 CDR-EVA Put that in there?

05 02 45 37 LMP-EVA No, go ahead. I'll get another bag for that.

05 02 45 40 CDR-EVA I feel ill-equipped to help you here.

05 02 45 49 CDR-EVA Okay, that - sample of white material is going in bag 355, Houston.

05 02 45 55 CC Okay, bag 355.

05 02 46 09 LMP-EVA Okay, John, I got your pictures.

05 02 46 13 CDR-EVA Charlie, what are you doing with the dirt? You just threw it all over yourself.

05 02 46 17 LMP-EVA I didn't mean to - the rock fell out.

05 02 46 20 CDR-EVA You got to clean off your lens - my lens before we can start here.

05 02 46 23 LMP-EVA No, I cleaned it off already.

05 02 46 25 CDR-EVA Okay.

05 02 46 28 LMP-EVA Okay, Tony. It's a white matrix in this rock with some clasts - it's a one-rock breccia. One of the clasts just fell out. But it really looks like a caliche matrix. Sort of friable.

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05 02 46 49 CDR-EVA Come on, Charlie.

05 02 46 50 LMP-EVA I'm - What do you mean, "Come on?"

05 02 46 53 CDR-EVA Oh - What do you want to do with these samples?

05 02 46 56 LMP-EVA Put them in this HTC right here.

05 02 46 58 CDR-EVA Okay. This number 2 one?

05 02 47 00 LMP-EVA Yeah. That's the one that's going on somebody's back.

05 02 47 04 CDR-EVA Okay.

05 02 47 06 LMP-EVA It's got the core tubes in it, so it probably goes on your back.

05 02 47 13 CDR-EVA Okay, Houston. The geology config here.

05 02 47 20 LMP-EVA How are we doing on the time line, Tony?

05 02 47 21 CC Okay. You're just about right on.

05 02 47 28 LMP-EVA Okay. This white rock - that I picked up is in bag 373.

05 02 47 33 CC Okay, 373.

05 02 47 39 LMP-EVA It really works when you spin them up, Tony; it's great.

05 02 47 52 LMP-EVA Okay, John. I got to change the mag on my camera. Can you give it to me?

05 02 48 00 CDR-EVA Affirmative.

05 02 48 04 LMP-EVA What are you going to do - clean me off? Or clean off the old camera?

05 02 48 07 CDR-EVA Naw, I gonna clean up the camera. Wait a second; let me put this down - down right here. Okay. I - I wanted to clean the camera off, too. Get that dust out of there, or we'll never get the mags in. Okay.

05 02 48 35 LMP-EVA Hey, thanks. How about cleaning yours off too -
yours I got really filthy - -

05 02 48 38 CDR-EVA Did you change your mag off - on it?

05 02 48 40 LMP-EVA Huh? No, just dust it off. Can you get my gloves
a minute, John?

05 02 48 47 CDR-EVA Can I get your gloves?

05 02 48 48 LMP-EVA Just clean them a minute. There you go - just to
get that loose stuff off.

05 02 48 54 CDR-EVA Okay.

05 02 48 57 LMP-EVA Okay, that's good; thank you.

05 02 49 06 LMP-EVA Hey, Tony. Magazine Alfa is going out with 110.

05 02 49 11 CC Okay. We copy that.

05 02 49 12 CDR-EVA Now me.

05 02 49 16 LMP-EVA Dust everywhere, John.

05 02 49 21 CDR-EVA That - that's what they say, all right.

05 02 49 27 LMP-EVA Okay. Magazine Golf is going on at frame
count 2.

05 02 49 30 CC Okay, Golf, 2.

05 02 49 31 CDR-EVA Not a bit on the lens, though.

05 02 49 32 LMP-EVA I know it.

05 02 49 35 CDR-EVA Fantastic.

05 02 49 41 LMP-EVA Third blow, Tony.

05 02 49 50 LMP-EVA Okay, Golf runs.

05 02 49 52 CC Okay.

05 02 49 53 LMP-EVA Everything's looking good.

05 02 49 54 CC Very good.

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05 02 50 06 CDR-EVA Okay, Charlie, which bag do you want?

05 02 50 10 LMP-EVA I got to get - there's a set of bags over here.

05 02 50 13 CDR-EVA Okay, 65, 6, 7, or 8 setting there. I'll get you one.

05 02 50 16 LMP-EVA I'll get them - they're already - I got to load you up.

05 02 50 19 CDR-EVA Okay. Did you get these cap dispensers - You don't need - We don't need those, do we?

05 02 50 24 LMP-EVA I put them in there on the - I think we got two core tubes.

05 02 50 29 CDR-EVA That big - that big rock right there is a breccia - look at all those clasts in there.

05 02 50 33 LMP-EVA I know it - most of them in here are breccias.

05 02 50 34 CDR-EVA Yeah.

05 02 50 40 LMP-EVA I picked up one.

05 02 50 43 CDR-EVA Yeah, that's about a two-rock breccia there.

05 02 50 47 LMP-EVA Okay, I see you on this side. John, you know you lost your little plate? Tony, on that one bag dispenser - that - on John's camera - the little ring came off of it, and the bags are just dangling loose, but we'll be able to use it still.

05 02 51 11 CC Okay.

05 02 51 12 CDR-EVA Oh, man. Look at that.

05 02 51 13 LMP-EVA What? Look at what?

05 02 51 17 CDR-EVA Come here and help me get this bag up here.

05 02 51 19 LMP-EVA Oh, I'm sorry. I thought you wanted me to look at something.

05 02 51 27 CDR-EVA It would be easier to do that without the - You fall down, Charlie?

05 02 51 30 LMP-EVA Yeah, I fell down. Sorry.

05 02 51 36 CDR-EVA I believe it.

05 02 51 37 LMP-EVA I'm filthy, huh?

05 02 51 39 CDR-EVA Yeah, can you - can you bend over very much?

05 02 51 41 LMP-EVA Yeah. There we go. How's that?

05 02 51 48 CDR-EVA If you'll - We got to walk this way a little here, so I can bend over without bumping into the Rover ...

05 02 52 05 CDR-EVA Boy.

05 02 52 17 LMP-EVA That's what I tried to do, and that's when I fell down.

05 02 52 20 CDR-EVA Oh.

05 02 52 23 LMP-EVA Let's see, the area is pretty well policed up over there. I'll - when I come back to get the core tubes, I'll pick it up.

05 02 52 32 CDR-EVA I can do that good, too.

05 02 52 35 LMP-EVA It's a good place to do the Grand Prix out - out here - you could polevault yourself right over to Stone.

05 02 52 44 CC Okay, understand.

05 02 52 47 LMP-EVA In fact, Tony - looking up-Sun towards the eastern part of Stone Mountain, you cannot see those lineations, but, as we look across-Sun those lineations are there - -

05 02 53 00 CDR-EVA Can you bend over some, Charlie?

05 02 53 03 LMP-EVA Yeah, and they - they trend sort of upslope to the northwest, or to the - -

05 02 53 09 CDR-EVA Okay.

05 02 53 10 LMP-EVA Got it?

05 02 53 11 CDR-EVA Got you.

05 02 53 12 LMP-EVA Okay.

05 02 53 17 CC Yeah, it's funny. It turns the same as Hadley.

05 02 53 22 LMP-EVA Yeah, it does exactly. And it goes right up over the ridge, a ridge line and back down the ridge - the one with - the one that's got Cinco craters on it, and then back down into the ridge where -

05 02 53 39 CDR-EVA Boy, Charlie, it's - looks like we could just - Smoky and Stone Mountain look like they're 10 feet away from us.

05 02 53 44 LMP-EVA I know it. You'd just run right over there.

05 02 53 52 LMP-EVA The thing wouldn't stay on a minute ago; now it won't come off.

05 02 53 55 CDR-EVA Now, you can't get it off.

05 02 54 02 LMP-EVA Maybe if I unlock it. That might be the problem.

05 02 54 16 LMP-EVA Turn around.

05 02 54 17 CDR-EVA Which way?

05 02 54 18 LMP-EVA To your right. Other right. There you go. No, you're right. Okay. Now bend over. Now I got the strap. Stand by.

05 02 54 37 LMP-EVA Just a moment.

05 02 55 12 LMP-EVA Okay. You got it.

05 02 55 13 CDR-EVA Okay.

05 02 55 15 LMP-EVA Let's go.

05 02 55 16 CDR-EVA Do it.

05 02 55 18 LMP-EVA Okay, Tony, our heading was 195. Hadn't changed.

05 02 55 23 CC Good show.

05 02 55 24 LMP-EVA Mounting up.

05 02 55 25 CC Okay. We'd like a full set of readouts here, and we'd also like to verify that you have the - the front drive on bus A. DRIVE POWER.

05 02 55 39 LMP-EVA FRONT DRIVE is on bus A and - yeah, I changed that back a while back.

05 02 55 46 CC Roger.

05 02 55 53 CDR-EVA Okay. We're going to MODE switch 1. Will that mess you up on getting this front-drive stuff?

05 02 56 01 CC No, that's okay.

05 02 56 03 CDR-EVA Houston, we're going to MODE 1. Okay? Okay?

05 02 56 05 CC Okay.

05 02 56 10 LMP-EVA Okay, do y'all want to be checked with before we do that, or you just want to go ahead and do it?

05 02 56 37 CDR-EVA You ready to go, Charlie?

05 02 56 38 LMP-EVA Not yet.

05 02 56 43 CDR-EVA ... there.

05 02 56 45 CC Okay, John. Our best guess is a heading of 274 for the first leg; 0.7 kilometers should take you past Buster there - and just north of Spook.

05 02 56 58 CDR-EVA Okay.

05 02 57 14 LMP-EVA Okay, babe. Here I come - the old Rover for the first time. Oops.

05 02 57 30 LMP-EVA Man, am I sitting up in the air!

05 02 57 39 LMP-EVA Did you get your seat belt done? John?

05 02 57 46 CDR-EVA Yeah. Got it hooked to something, Charlie.

05 02 57 52 LMP-EVA Okay, wait a minute.

05 02 57 56 CDR-EVA Okay, Houston. You want the readings, right?

05 02 58 00 CC Right.

05 02 58 02 CDR-EVA Or do you? We got 118 ampere-hours, batteries are up to - to 90 and 90. The - forward and rear motor temps are off-scale low; amps are zero; and the volts are 68. And we're on our way.

05 02 58 23 CC Outstanding.

05 02 58 29 CC Do you now have the NAV bearing and range.

05 02 58 32 CDR-EVA Suppose we do. Okay. 3-33-033 is the bearing; the range is 0.1.

05 02 58 44 CC Okay. We copy that.

05 02 58 45 CDR-EVA Hasn't changed any, has it?

05 02 58 46 LMP-EVA No, it hasn't changed any.

05 02 58 48 LMP-EVA Okay, Tony. Looking off to the northwest there, you can see - see South Ray Crater with just tremendous amount of blocks on it with some black streaks, and here we go. Heading 274, John.

05 02 59 06 CDR-EVA Okay.

05 02 59 08 LMP-EVA And it's going to be a piece of cake taking pictures from here, Tony. There's a big crater. There's about 10 meters off to your left there, John.

05 02 59 15 CDR-EVA I see it, but -

05 02 59 17 LMP-EVA A deepy one over here. Four clicks an hour Tony and -

05 02 59 25 CDR-EVA Charlie, you hit my arm.

05 02 59 26 LMP-EVA Excuse me.

05 02 59 28 CDR-EVA I'll end up in that big crater. So mad.

05 02 59 32 LMP-EVA Okay at 043, at 0.2, just beyond the ALSEP, there are two twin craters; the biggest one's to the north, got blocks in it, up to 6 - 50 centimeters, and it's about 5 meters deep.

05 02 59 50 CDR-EVA Say again what your best guess is to this thing?

05 02 59 53 CC A heading of 274.

05 02 59 57 CDR-EVA 74, huh?

05 03 00 00 LMP-EVA Now one thing I can't do is see the map.

05 03 00 02 CC Okay, I'm not sure that heading is good. That was based on an earlier estimate of where ALSEP was, and your bearing now may make that wrong. It's pretty much if you go west you are going to hit Spook.

05 03 00 17 CDR-EVA That's what we're doing, going west. I'm not sure we didn't - I'm not sure that's not it right there, Charlie.

05 03 00 25 LMP-EVA Where?

05 03 00 26 CDR-EVA Right there. That couldn't be it, could it?

05 03 00 29 LMP-EVA I don't see it. Man, this is the only way to go, riding this Rover.

05 03 00 37 CC Right. Only way.

05 03 00 44 LMP-EVA You can hear the motors going, Tony. Okay, we're still in this boulder field, on a heading of 300 now just naviga - navigating around a couple of craters, and they are very angular. All of them look the same - these breccia clasts with a dark matrix with white clasts. Biggest one I've seen is about - oh, in the 12 o'clock position of the Rover, and we're 065.2 and it's - about a meter across. Tony, we seem to be riding across a ridge top that trends east-west. Off to the left, it drops off drastically, about maybe a 5- to 10-degree slope into a valley which is probably Hidden Valley.

05 03 01 40 CC Very good.

05 03 01 43 LMP-EVA And white - and north - and South Ray Crater is spectacular in our 10 o'clock position, and we're 072 at 0.3 now.

05 03 01 54 CC Do you have the speed amps?

05 03 02 00 LMP-EVA Huh?

05 03 02 03 CDR-EVA What did he say?

05 03 02 04 LMP-EVA I don't know.

05 03 02 05 CC Could we have the speed and the amps?

05 03 02 09 LMP-EVA Okay, you're 5 -

05 03 02 15 CDR-EVA We got to go around this, Charlie.

05 03 02 16 LMP-EVA Yeah, you're 5 kilometers an hour, and the amps are oscillating about between 10 and 20.

05 03 02 24 CC Okay.

05 03 02 36 LMP-EVA How's it driving, John? Pretty easy?

05 03 02 38 CDR-EVA Darn good.

05 03 02 40 LMP-EVA Hey, man. We could just go, babe. I'm really cinched into this - moose.

05 03 02 43 CDR-EVA Yeah, but I don't know with these holes if we ought to do that or not.

05 03 02 48 LMP-EVA This seatbelt is great. It seems to be taking it with no problem. We are at 6 kilometers an hour now, Tony, 0.4, still nothing new to report. Maybe more cobbles in this area now. In fact, there are. The regolith is more cobbly in appearance, still angular. Maybe 40 percent of the surface is covered with cobbles that are 10 centimeters.

05 03 03 20 CC Okay. We copy that.

05 03 03 21 CDR-EVA Look at that one.

05 03 03 27 CC And we're right on the time line.

05 03 03 28 LMP-EVA We see some small fresh craters. Okay, meter size, that show some very fresh - at least, perhaps it's induration - indurated regolith. That's what it looks like, because it's - the little hard clods are the same inside the craters as on the rim.

05 03 03 57 CC Okay.

05 03 04 00 LMP-EVA At our 11 o'clock position, we're at 089 for 0.4. We have two very bright, small craters that are 2 - 3 meters across, and we see some whitish material down below in the walls of the craters there. They're about 25 meters off.

05 03 04 23 CC Okay, Charlie. Those rocks that you collected - were they - were they all breccias, or could you tell?

05 03 04 29 CDR-EVA Charlie, you hit my arm.

05 03 04 32 LMP-EVA I'm not sure, Tony. I think they were breccias, but they were sort of really dust covered, so I couldn't tell you, really.

05 03 04 40 CC Okay, understand. And have you seen any rocks that are - you're certain aren't breccias?

05 03 04 50 CDR-EVA Quit hitting my arm!

05 03 04 54 LMP-EVA Negative. I haven't seen any that I'm convinced is not a breccia.

05 03 04 58 CC Okay.

05 03 05 03 LMP-EVA Okay. We're going generally west now, and at our 1 o'clock position on a heading of 270 at a bearing of - we're 091 at 0.5 - we're in another predominant - another distinct ray field, ray pat - ray, let's say - boulder field. We sort of passed out of one, and we're in another one. And it's - we're getting the - Go ahead, John.

05 03 05 31 CDR-EVA Think that to the south of us is Spook?

05 03 05 36 LMP-EVA It could be.

05 03 05 41 CC Roger. You should be just about - -

05 03 05 42 LMP-EVA No, Spook's about - let's see - at 0.6, we should be at Spook, huh? Let's see. Spook is at 100 at 0.9. Not there yet. We're only 0.6, Tony. Okay. This ray field has the same pebbles and cobbles and some good secondaries here.

05 03 06 13 CC Right, that summary you got there, Charlie - -

05 03 06 15 LMP-EVA John's just doing great driving - driving this moose.

05 03 06 17 CC - - is the point by Buster; you should be coming up to the edge of Spook, the eastern edge of it.

05 03 06 28 LMP-EVA Okay. Turn left, John, and let's go look at that - look down over there. Boy, Tony, there is some excellent little secondaries with the indurated regolith in them and on the rim. The biggest one is a couple of meters.

05 03 06 44 CC Very good.

05 03 06 50 LMP-EVA You know that might have been Spook right back there. That was a pretty big crater.

05 03 06 56 CDR-EVA It sure was.

05 03 06 57 LMP-EVA Right back there, John. Boy, it's really hard - There's an interesting rock. A layer - layered, really dust covered, like a regolith, I mean a - turn left, John. There's a crater over there, a big one.

05 03 07 18 CDR-EVA Boy, that is a biggie.

05 03 07 20 LMP-EVA That's it. That's got to be - and here - Buster's right over here, with blocks - some blocks around it, to my right.

05 03 07 27 CC Outstanding.

05 03 07 28 LMP Boy, that is a biggie. Okay, here is Spook and it's 089 at 0.7.

05 03 07 36 CC Okay.

05 03 07 38 LMP-EVA And that is a biggie (laughter).

05 03 07 41 CDR-EVA We're not - we're looking - we're almost completely past it; we're not right even with it. Where'd you say Buster is?

05 03 07 48 LMP-EVA I thought it was right over here, John.

05 03 07 51 CC Is the rim of Spook -

05 03 07 52 LMP-EVA Right straight ahead here. Negative, it's real subdued, Tony.

05 03 08 01 CC Okay, do you see any ledges or anything in the area - inside the Spook?

05 03 08 09 LMP-EVA No, we sure didn't. We're driving on, now. I think we're coming up on the rim of Buster, and we've got some - a real good boulder field around Buster.

05 03 08 21 CC Okay, good show.

05 03 08 24 LMP-EVA With some frags that we'll be able - that we'll be able to get off. The biggest boulder's a meter - cobbles - it's real good for raking here. Here it is, John. That's it, Buster, there it is. Okay, in Buster, Tony, I can see some huge boulders in the bottom of that thing. Man, John.

05 03 08 45 CDR-EVA That is a big crater.

05 03 08 49 LMP-EVA How big is Buster, Tony?

05 03 08 51 CDR-EVA 40 meters.

05 03 08 53 CC About 40 meters.

05 03 08 54 LMP-EVA That's bigger than Buster.

05 03 08 56 CDR-EVA That's Buster, 50 meters. It's 150 feet, Charlie.

05 03 09 01 LMP-EVA Okay. That's Buster, then.

05 03 09 03 CDR-EVA Yep, sure is.

05 03 09 04 LMP-EVA And, Tony, we've got some - 5-meter boulders in the bottom of it. Some real big ones. The biggest, 5 meters, and the whole bottom is covered; we're going downslope now.

05 03 09 19 CC Okay, there should be a scarp around there someplace.

05 03 09 20 LMP-EVA That's going to be great, Tony. We'll be at - Okay, we see it. Over to the - our 2 o'clock position, and it's - it - it looks like the rim of a crater, but I think it's a scarp.

05 03 09 36 CDR-EVA What's the heading from here to - oh, man.

05 03 09 41 LMP-EVA Okay, we want to head - just keep going west.

05 03 09 44 CDR-EVA 26 something, Charlie.

05 03 09 46 LMP-EVA We want to get 100 degrees at about point - that's station 2. Wait a minute; we want 96 at 1.5. It's about 280. I'm about to freeze. I have to turn my water down. Okay, Tony. Most of the rocks that we've seen look breccias to me. We're making good time at about 7 kilometers an hour. Off to the right, what I thought was a scarp was - turned out to be a crater on the side of a ridge that runs east-west.

05 03 10 25 CDR-EVA Driving down-Sun in zero phase is murder.

05 03 10 27 LMP-EVA It is, isn't it?

05 03 10 29 CDR-EVA It's really bad.

05 03 10 33 LMP-EVA We're out to 089 at 1.0, Tony.

05 03 10 36 CC Okay.

05 03 10 39 LMP-EVA Can you - making great time, though. Okay, and in this area, the regolith is real smooth. The block - the - the cobble population is distinctly smaller and we're - eek! I hope that's Spook. How big is Spook, 300 meters? There it is, there's the Buster, I mean, there's Flag. We're here; you - you did it!

05 03 11 06 CDR-EVA (Laughter) It sure is, isn't it?

05 03 11 07 LMP-EVA We are here.

05 03 11 08 CC Well, congratulations.

05 03 11 09 LMP-EVA Okay, 088 at 1.0 is - Hey, we stop, John, about 40 meters from Plum.

05 03 11 23 CDR-EVA Hey, now, I don't see Plum.

05 03 11 24 LMP-EVA There it is, right there.

05 03 11 26 CDR-EVA That's Plum?

05 03 11 28 LMP-EVA Yeah.

05 03 11 30 CDR-EVA I ain't even on the rim.

05 03 11 32 LMP-EVA Well, it is; it's - yeah, it is, - it's right - we're - the rim is right here. We're on top of the rim.

05 03 11 39 CDR-EVA Okay.

05 03 11 40 LMP-EVA Hey, stop. We're - it's going to be terrible walking on this thing. Why don't we go turn around and go back up on the rim where it's level?

05 03 11 49 CDR-EVA Suits me.

05 03 11 53 LMP-EVA This is a steep slope here. Okay, Tony. It didn't seem like there was that much distance between 300 meters since Flag. That's not 300 meters. Is that 300 meters right there?

05 03 12 14 CDR-EVA Charlie, you got me. I can't tell.

05 03 12 18 CC Okay. Could we have another range and bearing, please?

05 03 12 24 CDR-EVA Okay. 087 at 1.1.

05 03 12 36 LMP-EVA Well, that's a big crater anyway.

05 03 12 38 CDR-EVA Yeah, it looks to me like we're due north of South Ray Crater right now. I can look down there, and I feel like I'm bisecting it. No, we're not due north of it, not according to shadow.

05 03 12 50 LMP-EVA Get the map out here.

05 03 13 09 CDR-EVA Okay, we'll - Let's get off and start working.

05 03 13 14 LMP-EVA Okay, it was 0.9 - it was 0.6 between Buster and - that's got to be Buster.

05 03 13 24 CDR-EVA Right there, huh? That -

05 03 13 34 LMP-EVA Okay -

05 03 13 35 CDR-EVA That's a 40-meter crater.

05 03 13 36 LMP-EVA Over here?

05 03 13 37 CDR-EVA Yes.

05 03 13 38 LMP-EVA Yes; that's what I'm thinking.

05 03 13 39 CDR-EVA It'll do - not waste any more time thinking about it.

05 03 13 42 LMP-EVA Okay, let's do it. Okay, Tony. We're going to call this Flag.

05 03 13 48 CDR-EVA Let me park the thing - -

05 03 13 50 LMP-EVA Okay.

05 03 13 51 CDR-EVA - - heading south. You want to get off?

05 03 13 52 LMP-EVA No, go ahead.

05 03 13 57 CC Okay. And - -

05 03 14 03 LMP-EVA It has all the characteristics - I don't - We must have landed -

05 03 14 08 CDR-EVA Park it here.

05 03 14 14 CC When you're brushing off the crew there, would you get the TV lens, please?

05 03 14 19 CDR-EVA You bet.

05 03 14 28 LMP-EVA I tell you, when you go to get on this thing, you better turn your cooling down or you'll freeze.

05 03 14 31 CDR-EVA Yes, should have gone to middle cooling.

05 03 14 33 LMP-EVA Me too.

05 03 14 34 CDR-EVA I forgot all about it. Okay.

05 03 14 40 LMP-EVA Okay, Tony. What we've got here is a - We think we're - Plum Crater is sitting right on the rim - on the outer rim of - Flag, and it's - what appears to me to be 200 meters - pretty big crater - we call Flag, and this is an identical spot for -

05 03 15 12 CDR-EVA Another big one right back here ...

05 03 15 14 LMP-EVA See that big one back up there that we called - This might be Halfway, this one right here.

05 03 15 20 CC All right, our - -

05 03 15 22 CDR-EVA This one here?

05 03 15 23 LMP-EVA Yes, this one right here.

05 03 15 25 CC Our measurements say that - -

05 03 15 26 LMP-EVA Say again.

05 03 15 27 CC - - you should be pretty near Halfway.

05 03 15 31 CDR-EVA Okay, why don't we get back and try some more, Charlie?

05 03 15 34 LMP-EVA Okay, I agree.

05 03 15 40 CDR-EVA I did it again.

05 03 15 42 LMP-EVA What.

05 03 15 44 CDR-EVA Pulled out the thing. Get that for me, Charlie.

05 03 15 51 LMP-EVA Yes.

05 03 15 59 CDR-EVA I know what it is - every time I plug - put the -

05 03 16 03 LMP-EVA Belt on, huh?

05 03 16 04 CDR-EVA Belt on, it pulls it - it tightens down the belt, it pulls my -

05 03 16 09 LMP-EVA Can you push against me?

05 03 16 10 CDR-EVA Yeah.

05 03 16 11 LMP-EVA No, wait. Just stand up. Just - Let me get down-slope, and you get upslope.

05 03 16 17 CDR-EVA Okay, be careful.

05 03 16 27 LMP-EVA There it is. You're moving away from me. Can you prevent that? Okay, it's back in.

05 03 16 49 LMP-EVA Man, it all looks the same, doesn't it?

05 03 16 52 CDR-EVA Sure does.

05 03 17 24 LMP-EVA Okay, Tony. Based on your knowledge of our position, give us - give us where you think Flag is.

05 03 17 32 CC Okay. It looks like Plum Crater would be almost due west of you about 200 meters.

05 03 17 42 LMP-EVA Okay. I'm hooked, John. Roger.

05 03 17 54 CDR-EVA Well, I'm not.

05 03 17 55 LMP-EVA You twisted a little bit. Turn it clockwise, counterclockwise - other way. There you go.

05 03 18 02 CC I'd loop around halfway to the south.

05 03 18 03 LMP-EVA That got it.

05 03 18 05 CDR-EVA That's what we're doing.

05 03 18 07 LMP-EVA I think that's what we're doing. It's pretty - we - we got a little depth-size problem here and I think we'll figure it out here in a little bit.

05 03 18 19 CC Very good. Understand.

05 03 18 24 LMP-EVA And this - this crater here is probably South - correction, Halfway, with a smaller one on the side.

05 03 18 37 CC Roger.

05 03 18 39 LMP-EVA I tell you that is a bigger crater than that, though.

05 03 18 44 CDR-EVA Okay.

05 03 18 46 LMP-EVA You in? Excuse me, John. Okay, we're underway again, Tony.

05 03 18 55 CC Okay.

05 03 19 04 LMP-EVA Can you go to the right, John? There's a pretty fresh batch, dead ahead. That's about a tenth of a kilometer across there, though; that's a big crater right there.

05 03 19 21 CDR-EVA Yeah, I don't think it's a 300 meterer.

05 03 19 35 LMP-EVA I feel real - faith in this thing; open her up a little bit.

05 03 19 42 CDR-EVA I can't see where I'm going, Charlie.

05 03 19 49 LMP-EVA Here we go. Okay, Tony, we left that Halfway, and we're now en route to - Halfway and Buster looked about the same size. Is that right according to y'all's calculations?

05 03 20 03 CC That's right, Charlie.

05 03 20 04 CDR-EVA That's right, Charlie. Halfway - -

05 03 20 05 CC That's just about right.

05 03 20 09 LMP-EVA Okay, well, that's what that was - was Halfway.

05 03 20 13 CC Okay.

05 03 20 14 LMP-EVA John, it takes those little bumps - oh, it won't take that one, but it'll take those little ones just great.

05 03 20 27 LMP-EVA Okay, Tony, we're at 086, 1.2. We're coming into another block-ray field up ahead of us about 50 meters or so, with angular blocks. The area we have here now is almost cobblefree, except perhaps less than 1 percent of the surface.

05 03 20 47 CDR-EVA Yes, it's clearing up.

05 03 20 51 LMP-EVA And now we're - there's - there's another ray we're coming in out of South Ray, which definitely out of South Ray, you can see it trending right on in to South Ray.

05 03 21 00 CC Outstanding.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 01 50 07 CC Casper, Houston. Could you bring up the HIGH GAIN - according to the Flight Plan?

05 01 51 48 CC Casper, Houston.

05 01 51 52 CMP Hello there.

05 01 51 54 CC Hello; how's things going?

05 01 51 55 CMP I been trying, Hank. ... I don't know. That - that acquisition there wasn't as smooth as I thought it might be. I tried to get you using manual to tweak it up a little bit and that didn't seem to help much. Maybe I'm not helping at all, maybe I'm hurting.

05 01 52 34 CMP I saw one thing that was - that was new about the zodiacal-light world. You don't realize that that stuff is actually reasonably bright until - you get yourself well dark-adapted then you sit up there long enough to recognize it. But almost - almost immediately after - oh, I'd say within - certainly within 5 minutes and maybe a little sooner after LOS, there was enough zodiacal light or solar corona - whichever is the proper technical name - that you could see a distinct horizon. And it just got more distinct right up until sunrise. I never did see any prominences or anything like that. I kind of thought that maybe we would, but I guess those are too small a scale. But, just prior to sunrise, you see a lot of long streaks and that's - well, I say just prior - that's like just a few seconds before sunrise. All of a sudden, you get these very prominent rays coming out and then the Sun's right there. You don't want to be looking at that.

05 01 53 41 CC Roger; copy - -

05 01 53 42 CMP But it is right - right pretty to watch that stuff at night.

05 01 53 51 CC Sounds like a real pretty sight. INCO says that - that they saw you in NARROW when you were trying to bring the HIGH GAIN up and that you'd have a little better luck with WIDE.

05 01 54 08 CMP Okay, you're right. I looked down at the Flight Plan and saw a REACQ and NARROW. And then I went back to MANUAL. I - I may have had it in NARROW all along. Thank you.

05 01 54 37 CC Ken, I got a - a - zodiacal-light, mapping camera photo pads for you, and TEI-32 block data.

05 01 54 49 CMP Okay. Stand by. I'm going to get my books.

05 01 54 55 CC If you want to start with the photo pads, the zodiacal light you copy at 123:12.

05 01 55 10 CMP Okay, I got that and I also kind of got intrigued back along about - back along about King was the first chance I had to get all squared away again from the - the low-light-level stuff, so I didn't get a chance to look at as much back there as I had hoped, but - back around King, pretty interesting stuff again - was looking at a crater and some of the beds and things that are in it - apparent beds - and I'm convinced now that we're not seeing beds at all. Through the binoculars, it looks like those things are dark material and light material that slumped together, and why they formed shelves like that I don't have any idea, but you can't trace them through - if they are stratigraphy, then they are indeed - not only have you had horizontal stratigraphy but you've had a great deal of vertical fractures that's caused these things to slide in different proportions. Because there's no continuous horizontal strata and you don't realize that until you look at it in detail. Okay, I got my Updates Book out and I got my Flight Plan here, so you can take the photo pad just if you like.

05 01 56 24 CC Okay, the first one is - the zodiacal light at 123:12; T-start is 123 - -

05 01 56 34 CMP I got it.

05 01 56 38 CC -- 09:38

05 01 56 44 CMP Okay, 123:09:38.

05 01 56 49 CC Okay, the next one comes at 123:32. There's not a block there for that one because we added that in. But T-start for the mapping camera is 123:31:12; T-stop is 124:31:02.

05 01 57 16 CMP Okay, Hank. I just got 31:12 for the start time. I'm writing that in. I don't have a pad and T-stop - tell me again please.

05 01 57 26 CC T-stop: 124:31:02.

05 01 57 33 CMP Okay.

05 01 57 37 CC And the next map - mapping camera pad is at 125:30.

05 01 57 49 CMP 125:30. Okay.

05 01 57 53 CC T-start is 125:30:05; T-stop, 126:29:55.

05 01 58 08 CMP Okay, 125:30:05, 126:29:55.

05 01 58 12 CC Good readback.

05 01 58 14 CMP Let me mark that before you give me any more.

05 01 58 44 CMP Okay, go ahead.

05 01 58 46 CC Are you ready for the TEI-32 block?

05 01 58 51 CMP Yes, sir.

05 01 58 53 CC Okay, TEI-32: SPS/G&N; 38709; plus 0.72, plus 1.33; 137:12:07.88; NOUN 81, plus 2922.0, plus 0699.7, minus 0120.2; 181, 110, 015; rest of the pad's NA. The set stars, same as circ, two jets, 17 seconds. Other: lambda Moon at T_{ig} - minus 161.32, and and landing site REFSMMAT.

05 02 00 20 CMP Okay, TEI-32: SPS/G&N; 38709; plus 0.72, plus 1.33; 137:12:07.88; plus 2922.0, plus 0699.7, minus 0120.2; 181, 110, 015. Set stars same as circ; two jets, 17 seconds; lambda, minus 161.32; and this is the landing REFSMMAT.

05 02 00 53 CC Good readback, Ken.

05 02 02 31 CMP Hank, can you give me any coordinates on the LM estimated position?

05 02 02 38 CC I'll work on that, Ken. And did you take any earthshine photos?

05 02 02 45 CMP No, sir. I - I tried to get them in last night and we decided they'd close up shop before I could get them in.

05 02 02 54 CC Okay - -

05 02 02 55 CMP And, I tell you it's going down. It was much more dramatic the first night than it was last night and it's not as dramatic tonight on the nightside passes. So, if you can find a place to put it, that is one thing I'd like to get. The sooner the better.

05 02 03 12 CC Okay. FAO advises that if you didn't take any earthshines that magazine X-ray X-ray is - which is - I think already have on the Nikon is good for the zodiacal light rather than changing to Yankee Yankee. And on this next rev - -

05 02 03 28 CMP Yes, sir; I'd planned to do that.

05 02 03 31 CC On next rev, you could - if you want to take some earthshine, they suggest window 4 and take away.

05 02 03 44 CMP Window 4.

05 02 03 53 CMP Okay. I guess I'll have to check the attitude. Do they - if I take the zodiacal light on X-ray X-ray, you'd - do they have a recommended magazine?

05 02 04 03 CC Stand by.

05 02 05 21 CC Okay, Ken. I've got a film story for you. If you choose to do the earthshine, use mag XX and window 4 and the target should be about - You should see it about 122:42. If you don't do the earthshine, you can go ahead and use XX for 30 - the zodiacal. If you do the earthshine, of course,

with the XX, you need the YY per Flight Plan for the zodiacal.

05 02 05 50 CMP Okay. I don't think it'd be prudent for me to try and get the earthshine and the zodiacal light on the same rev.

05 02 05 58 CC Okay. Copy. And the Surgeon is still anxious to see you sometime find a place to change out the sensors.

05 02 06 09 CMP Roger. I understand that.

05 02 06 24 CMP Hey, do you need them all changed, Hank, or can you send me to one so I don't have to waste time with all that stuff? You got to break out each one of those little things by itself and keep track of it. It - it takes a good 20 minutes if you change out the whole sensors.

05 02 06 36 CC Stand by 1.

05 02 07 11 CC Ken, the surgeon says he can't tell which - which one of the sensors is dead, so before we take off here and do them all, why don't you try pressing down on them and let him - let him watch his data - maybe we can find out which one is the dead one. Press them one at a time.

05 02 07 27 CMP Okay. Let me - okay. I'll start on the ground. I'm pressing the ground now.

05 02 07 45 CC Okay. That didn't do it.

05 02 07 51 CMP Okay. I'll go to the - the sternal.

05 02 08 11 CC That seemed to make it worse, Ken.

05 02 08 16 CMP That's making it worse?

05 02 08 18 CC Yes. That's probably the culprit, but let's - -

05 02 08 19 CMP Well, maybe that's my problem.

05 02 08 20 CC - - try the third one while you're at it.

05 02 08 24 CMP Okay.

05 02 08 44 CC That makes the trace a lot better, Ken. I imagine it's the third one there.

05 02 08 52 CMP Okay. I'll try changing those two out.

05 02 08 56 CC Okay.

05 02 09 40 CMP Boy, I'll tell you. That - that little Sun-angle change - old North and South Ray really stand out now. You couldn't miss those for anything.

05 02 10 00 CC And, Ken, for your information, John and Charlie are almost through getting the ALSEP out.

05 02 10 10 CMP Okay. Sounds good. Like an EVA should.

05 02 10 16 CC Roger.

05 02 10 22 CMP I know that's a bad one, but you know that's about all I can do for you today. That's probably safer than having you tell me jokes.

05 02 10 49 CMP Okay. With the binocs on the area now, I'm looking down into North Ray Crater and South Ray and the interior structures of those two don't look quite the same. There's a lot more light and dark material in the South Ray; but that may be caused by the fact that it's just a - it really has been a fresher-appearing crater all around. The areas - trying to see if I can see any shadows or anything - There's a bright spot down there, but I think that's just a double spot itself. I don't see anything with the binocs that I could say I could see - I can't stabilize them quite that well. Coming down the traverse route from - where they're going across Survey Ridge - I don't think Survey is going to be easy to spot. And when you get down - there is one definite terrace - Looks like the - looks like Stone Mountain is formed with one, two, three terraces, but they are much larger than the kind of things that we were drawing on the map. The rest of that is very fine subtle lineations. The area around North Ray, particularly up along the area that they were going on the EVA - I can see it now, and it almost looks like that little pile of material that runs up to

the south of their track and I'll give you some coordinates on that. I'm looking at my chart a - oh, let's see, 9 Charlie - yes, let's look at chart 9 Charlie. And there's - this is a pretty lousy picture, but if you'll remember at a point about CY by 79, if you'll draw a line there and then draw a line down to about CU and 81, that's a - that represents a ridge, which shows up in the photographs. And looking down on it vertically, that looks like sort of a flow of material that runs up over the lip of North Ray and down into it. And it shows some craters on it, but it almost looks like a flow that runs up and down into North Ray rather than being some of the other kinds of things we've talked about. And I didn't have much time, I'll try to concentrate on that on the next rev.

05 02 13 31 CC Roger. Good show, Ken.

05 02 13 55 CC Ken, do you want the LM coordinates in lat-long or do you want it in coordinates on 9 Charlie?

05 02 14 03 CMP Oh, I'd like to have it in 9 Charlie kind of coordinates. That's about the only thing I have to reference to.

05 02 14 08 CC That's what I figured.

05 02 14 09 CMP Let me see here if I can get - can get one last chance on our old friend that - Maybe and maybe see if he's decided to show his face this time. Don't let me forget the mapping camera, that comes about the same time.

05 02 14 57 CC Casper, could you give us AUTO on the HIGH GAIN?

05 02 15 04 CMP Yes, sir. You have AUTO.

05 02 15 58 CMP I tell you, Hank, I think that the terminator got hung up here on a high mountain or something. It doesn't look like it's moving as much as it is everywhere else on the Moon.

05 02 16 09 CC Roger. Is Davy still in the dark?

05 02 16 14 CMP Well. I'm not to it yet, but it sure - I don't see anything beyond it. That's a - Hey, old Alphonsus and Arzachel show up nicely. And here comes the crater chain, by golly. Yes, but much to my amazement, but the peak in Albategnius is still - is in daylight.

05 02 18 04 CMP Oh, I see what's happened now. There's a - there's a little hill that's shielding - I - I see where Davy Crater Chain is now. And it's right in the middle of a big long shadow that's being cast out there. And it's shielding that whole area because Davy and Davy Y show up nicely. And Davy G is easy to see. But the chain itself, I can just make out, and I'll take a picture - well, this is a skewed angle. I don't know if I can get it to show you, but - they sure must not have much of a lip on them if they don't show. But, by the time we see them, they may be in a fairly high Sun.

05 02 19 00 CC Roger; copy, Ken.

05 02 19 07 CMP I'm taking a strip this time, anyhow, because it'll show all the area around Davy. And there are some craters in there - an awful lot of them that have absolutely no rims, which seems to me - it looks entirely different than what you see and what you think of. These things are all very subdued. They just drop in. And you see glows - in the low Sun, you see the - you see the far lip before you see the near lip of the crater. Although there are a few that have raised rims and they - they kind of are the exception here instead of the rule. Whereas most low-Sun-angle places we see are - I'll take a shot down just a little bit to the south there, and there the average is rimmed craters and very few rimless ones.

05 02 19 56 CC Roger, Ken. And you're about 20 seconds from T-stop on the mapping camera.

05 02 20 02 CMP Okay. Going to it. Thank you.

05 02 20 28 CMP Okay; the MAPPING CAMERA is OFF. I'll wait 30 seconds.

05 02 20 40 CMP And, Hank, this system is really good. I don't have to give a second thought to - to what's going on. And just by not having to watch that clock, it just frees your hands to go do everything else that you want to do. It really - on the back side, I get all bent out of shape with myself because I get - I get behind. I start - You just don't have a chance to do anything except those items which are timed A, B, C and do them in exactly the sequence that they give you.

05 02 21 11 CC Roger. The only hitch to this is I get interested in what you're saying and I might forget.

05 02 21 20 CMP (Laughter) Well (laughter), just remember, they go on your card, the back side goes on mine.

05 02 21 31 CC Actually, though, I got a bunch of guys backing me up.

05 02 21 38 CMP Well, I tell you, this place is so fascinating that you just - you just don't dare let anything go by. It's - You know, I think you could stay here a lifetime, and never see it all. I guess that's - that's kind of a silly statement because it's true in almost anywhere you go. It sure is dramatic. At first glance, particularly the back side looks like an old gypsum plant. It just looks like someone's poured stuff all over it, and just made it - and just tried to hide it, camouflage things. The more you look at it, then you start to pick out subtle differences. Unfortunately, I'm not smart enough to know what these things mean, but I'm sure that we got some folks down there that certainly do. Maybe if we get enough data, why, they can piece it together.

05 02 22 39 CC Are you in STANDBY now with that MAPPING CAMERA, Ken?

05 02 22 45 CMP Yes, sir. I went to STANDBY and took the IMAGE MOTION, OFF.

05 02 22 48 CC Okay, thank you.

05 02 22 50 CMP Thank you. I forgot to tell you about it.

05 02 23 12 CMP Paul, let me give you the reading on magazine SS before I forget it. I'm now at 35.

05 02 23 18 CC Roger; 35.

05 02 23 21 CMP And I guess we could - I guess we could sort of say we have filled the - the Davy square. I don't think we ought to keep trying that. Get a chance, why, we will, but I'm not going to keep trying after it.

05 02 23 59 CMP And the zodiacal light I'll keep on - keep on XX.

05 02 24 05 CC Roger; XX.

05 02 26 02 CMP ... for 20 seconds - ... zodiacal light.

05 02 26 13 CMP Oh, I'm sorry. I was playing my tape recorder back to myself.

05 02 28 09 CC Ken, are you free right now?

05 02 28 17 CMP Say again, Hank.

05 02 28 19 CC Roger. Are you free right now? Are you doing something?

05 02 28 24 CMP I'm setting up the camera for the zodiacal light. What do you need?

05 02 28 29 CC Okay. I was just thinking. In case we lose comm, there is one little change. After we get LOS, where you have to configure the DSE, since we've added then this mapping camera pass - oblique, we want to get HIGH BIT RATE instead of LOW BIT RATE.

05 02 28 48 CMP Okay. Let me write that down. Figuring it says LOW, and you want me to go HIGH. Okay; and if you'd remind me of that just before LOS.

05 02 29 05 CC Roger; intend to - and - in regard to your comments about King, was there any other thing back - on the back side that you had of interest?

05 02 29 21 CMP I - I found a couple of items back - mostly to the - I think almost all of the things that I

had a chance to look at this time were to the - to the west of King. Between there and about AOS, I had a chance to look at the swirls, and to look at King - and a - and a crater - I first felt like I'd found - my first comment was that if there's ever a crater on the Moon that's got stratigraphy exposed, that's got to be it. And I hope that's wrong because there wasn't anywhere I was looking. And I took a picture of that one, and there was another little bright-rayed guy - a little splashed-out crater that looks like so many of the bright-rayed ones, except that it seems like he's built up on a mound. Got this - got this nice mound with this real bright crater in the center of it. And all the bright-rayed material is splashed around it. That too was - that was about south of Fleming, I think - somewhere in that neighborhood.

05 02 30 30 CC Okay; we'll see if we can locate it.

05 02 37 08 CMP Hey, Hank.

05 02 37 11 CC Go ahead.

05 02 37 14 CMP Would you tell me - confirm how many frames are on the magazine XX. Is it 70, total?

05 02 37 24 CC Stand by.

05 02 38 21 CC Ken, should be 48 total frames on the mag, and we show you 42 remaining.

05 02 38 36 CMP Forty-eight total. Okay.

05 02 38 50 CMP Okay; so I can take eight frames on this thing and still have plenty for the zodiacal light?

05 02 39 20 CC That's correct, Ken.

05 02 39 24 CMP Okay; there's 1. This stuff isn't - just isn't as bright as it was even yesterday of - The first night it was really something.

05 02 39 46 CMP There's number 2. And number 2 was not a part of a strip, but rather an interesting graben that runs through a crater. And I'm coming up on - I believe this is Grimaldi.

05 02 40 04 CC Roger. We show you north of Grimaldi.

05 02 40 24 CMP Why, that's where I recognized that - that double crater feature. Let's see -

05 02 40 41 CMP You're right, I'm west. It's Riccioli.

05 02 40 49 CC Can you see Riccioli C? That looks like in the map a double - a double-ring crater.

05 02 40 56 CMP Yes, sir. Yes, sir. That's the one I thought was north of Grimaldi, and that's what I'm looking at here. Okay; this is the area where - I don't know if I can get a photo of the things I saw last night that were really interesting. They had some - it's not as bright - not sure I can see it all. Yeah, there it is. I don't know if this is gonna.

05 02 41 31 CMP Okay, my third one here in this sequence was taken of the - of the crossed grabens in Grimaldi. And, as I commented before, when you look out in the dark, you get a very dramatic terminator, just like you do from the earthshine, just like you do from the - ... shine. And there's a place - I'll try to get a picture of this, because it shows - there's this bright thing on the horizon, which is obviously a big mountain chain and I would - It sticks up quite a number of degrees above the horizon. Okay; I guess that's - that's all I'm gonna try to take in this sequence and I'll get back to the - I'll take one up to the north here. There's some more interesting things. We'll still be safe.

05 02 42 54 CMP Okay; okay, I'm now on frame 13. So that was frames whatever we had before up through 13. And I'm going back now to the zodiacal light configuration.

05 02 44 51 CMP Sure do get some interesting sensations when you try to float around in a dark cockpit here, and you run into a camera or something, and you try to figure out what it was that just tapped you on the back.

05 02 45 01 CC (Laughter) Roger.

05 02 45 17 CMP Okay; we're in configuration for zodiacal light.

05 02 45 33 CMP Did you want me to do this at 123:05, on time?
Is that correct?

05 02 45 40 CC Ken, I guess you just don't start earlier than
that.

05 02 45 47 CMP I'm talking about the DSE now.

05 02 46 19 CC Casper, Houston. Configure the DSE at 123:06.

05 02 46 26 CMP 123:06, okay.

05 02 46 37 CC I guess you can do that, and then start your
zodiacal light any time after that.

05 02 46 45 CMP The zodiacal light has to start on this pad time,
I think.

05 02 46 51 CC You're correct.

05 02 47 13 CMP Hey, Hank, if you run into Plenty [?] around
there somewhere, you might tell him that - ask
him to tell Stoner and Temple that all those
hours they put in configuring the CMS so that
it'd have the right stowage and all the little
goodies'd be in place, has certainly paid off.
Man, I can run around, and I can reach for
things and get it all done without - without
feeling like I'm pressed for time. And it's
thanks to their keeping that thing in flight
configuration.

05 02 47 42 CC Okay. I'll relate that, Ken.

05 02 49 40 CC Casper, Houston. You're looking good at LOS,
and you got about a minute to go. Don't forget
your DSE.

05 02 49 48 CMP Okay. Thank you very much. See you in about
40.

05 02 49 51 CC Roger.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 03 19 30 CDR-EVA Yes, this is the South Ray - that's that big South Ray Crater - Ray, down here, I think.

05 03 19 50 CC Right.

05 03 19 55 LMP-EVA You can see Eden Valley. You can see partially into Stubby. The Cinco Craters are very visible up there on the side.

05 03 20 20 CC Is there any albedo difference when you're in a ray or just the cobbles and boulders?

05 03 20 25 CDR-EVA No, it's albedo.

05 03 21 37 LMP-EVA There is no mistake in your mind when you're in a ray because of the blocks.

05 03 21 42 CC Okay.

05 03 21 43 LMP-EVA And the surface is a little bit lighter - the regolith. Blocks are very angular.

05 03 21 53 CDR-EVA I'd like to sort of tack. I can see a lot better. Just a little north or a little south.

05 03 21 59 CC Do you see both the white and the black and white, here?

05 03 22 05 LMP-EVA It's mostly gray, Tony, with a - There's a big crater over there, John.

05 03 22 10 CDR-EVA That's it.

05 03 22 11 LMP-EVA Okay, that's it. We're coming into the south of Plum. Okay, this is probably Plum right over here - No, I guess not. Plum is 40 meters; that's not nearly 40 meters.

05 03 22 32 LMP-EVA Okay, Tony, I think we finally found Spook, here - or Flag, rather.

05 03 22 36 CC Okay, did you notice that scarp that's mapped that you should have driven across?

05 03 22 43 LMP-EVA No, didn't see it. It's all hilly and scarp here (laughter).

05 03 22 49 CC Okay, do you notice a trend to the scarp? They all seem to be northeast.

05 03 22 57 LMP-EVA Yeah, that's probably pretty close - northeast.

05 03 23 06 LMP-EVA Okay, here - That's got to be it, John. But I don't see Plum. Unless this is it right here.

05 03 23 13 CDR-EVA This is it right here, Charlie.

05 03 23 15 LMP-EVA We are on the rim of it. Okay, we got to park on the other side about 40 meters up, do a 180 left. Well, Tony, we finally found it at 087 and 1.4.

05 03 23 29 CC Good show. That's where it should be.

05 03 23 34 LMP-EVA Okay. You guys had us mapped just right then.

05 03 23 38 CDR-EVA Man, you can't believe this territory.

05 03 23 44 LMP-EVA It's all up and down. We're gonna be a little close here, John, but that's okay.

05 03 23 54 LMP-EVA Okay. Tony, we're parking right on the rim of Plum. Dismounting.

05 03 24 02 CC Okay.

05 03 24 08 LMP-EVA Okay, your readings are 180, 088, 2.0, 1.4, 115, 115, 115. Amps are zero. Volts are 70, 68, 68, 100, 100. Rear motors all scale low; forward motors all scale low.

05 03 24 30 CC Okay, we copy. You should be about 40 meters from Plum. Is that right?

05 03 24 36 LMP-EVA No, we're not; we're right on the rim, if that's okay with you.

05 03 24 41 CC That's okay.

05 03 24 42 LMP-EVA You can - you can -

05 03 24 43 CDR-EVA You'll be able to see everything we do.

05 03 24 44 CC Okay.

05 03 24 46 LMP-EVA Okay. For some reason, I'm not bouncing out of this thing like I thought I would.

05 03 24 49 CC Are you still in the ray material there at Plum?

05 03 24 55 LMP-EVA No.

05 03 24 57 CC Good. We don't want to be.

05 03 25 00 LMP-EVA The ray material is just - the ray material is about 50 meters to the east of us, Tony.

05 03 25 06 CC Outstanding.

05 03 25 08 LMP-EVA Okay. We saw the boulders at Buster; we saw the northeast - we didn't see the northeast star. Okay, I got the displays, I'm going to get the pan up on the rim of Flag Crater. Yeow! Is that some crater, Tony! Whew! It's a smooth crater, very subdued, but it's really steep, and the - there's some smaller craters 10 meters or so on the side.

05 03 25 49 LMP-EVA I can't even see the bottom where - right where we are.

05 03 25 57 CDR-EVA That is spectacular.

05 03 26 00 LMP-EVA Okay, Tony. The sides are steep enough to cast a shadow from the Sun, so you can estimate from what our Sun angle is what the walls of that are.

05 03 26 10 CDR-EVA Hey, is it okay if I turn you around to dust the snow out of your eyes, there?

05 03 26 15 CC Okay.

05 03 26 18 CDR-EVA Okay.

05 03 26 21 LMP-EVA Okay, Tony. To the north side of Spook, right on the - I keep calling it Spook - on Flag is a crater right on the inner rim, that has some blocks in it that are not too big, cobble size, I'd say.

05 03 26 40 CDR-EVA That help any, Houston?

05 03 26 43 CC We don't have a picture yet.

05 03 26 46 LMP-EVA And -

05 03 26 47 CC We don't have a picture yet.

05 03 26 48 LMP-EVA Those ridges in, too.

05 03 26 51 CC Charlie, don't fall in that thing.

05 03 26 53 LMP-EVA I'm not gonna fall in it.

05 03 27 05 LMP-EVA Boy, anybody that judges Cayley Plains as a flat-land (laughter).

05 03 27 11 LMP-EVA It's crazy ... Tony, the sides of this thing get pretty steep. I'm not going to get down too far, I can't see the bottom of it. And it's getting so steep I don't want to go any farther. Okay -

05 03 27 34 CC Sounds like a good idea, Charlie.

05 03 27 36 LMP-EVA On the southwest flank of Plum - on the southwest flank of Plum, we have a buried boulder, and it's about a meter across. And that's the only boulder we see of any consequence here at Plum. In Spook - in Flag, on the southwest rim about halfway down into the crater, we see a block that's sticking out, that's very angular, that's maybe 2 meters across, and it's in an area of whiter albedo. It's probably a buried block. I wouldn't call it bedrock. I see nothing that looks like bedrock.

05 03 28 15 CC Okay, how far down from the rim are you?

05 03 28 18 LMP-EVA Hey, John, ... Halfway.

05 03 28 23 CC Okay.

05 03 28 28 LMP-EVA A rake soil coming up.

05 03 28 30 CC Okay.

05 03 28 32 LMP-EVA And that's done at - up on Flag. I can do some sampling and radial along Flag. Oh, there's a great place for the rake, see, right up there?

05 03 28 48 CDR-EVA Yeah, we don't even -

05 03 28 50 LMP-EVA 12 o'clock? Yeah, I got the rake. Let's see, that's all I need. I can shovel -

05 03 28 57 CC Okay, big eye is alive.

05 03 28 58 CDR-EVA Okay; let's go.

05 03 29 02 LMP-EVA Ah so, here we go! Hey, we're going up to where it's more cobbly, Tony, to get the rake sample. It's pretty smooth right here.

05 03 29 18 CC Okay, the rake sample should be one crater diameter away from Plum. And it doesn't have to be -

05 03 29 24 CDR-EVA From Plum?

05 03 29 25 CC Right. And it doesn't have to be too cobbly there.

05 03 29 29 LMP-EVA Okay. Okay, well, this - this is about it then, John.

05 03 29 35 CDR-EVA Yeah, but I don't think any of - the rocks from here may have come from Plum, but they may be some other place, too.

05 03 29 42 LMP-EVA Well, let's do what they want us to do.

05 03 29 45 CDR-EVA All right.

05 03 29 47 CC Right; the intent was to get other things than Plum right there -

05 03 29 49 CDR-EVA How about right out there, in my shadow? There's some right there that might be - -

05 03 29 55 CDR-EVA I'm sure going to get them.

05 03 29 59 LMP-EVA Okay, down-Sun, 11-footer -

05 03 30 03 CDR-EVA Right here, Charlie?

05 03 30 05 LMP-EVA Yeah, that's fine.

05 03 30 08 CC And, John, if you get a chance, could we get a frame count from you?

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05 03 30 16 LMP-EVA Hey, Tony, I'm at 50, magazine Bravo.

05 03 30 20 CC Okay.

05 03 30 22 CDR-EVA Okay, I'm at 10, magazine Bravo. Charlie, you're standing in the shadow.

05 03 30 32 LMP-EVA Sorry, I'm moving. Man, it's so easy to get around up here.

05 03 30 38 CDR-EVA Okay, let's do it.

05 03 30 40 LMP-EVA There's the locator. And we'll start the old rake, for the first time. Get that beauty right there. Look at it come through that regolith, would you?

05 03 30 56 CC Charlie, Houston. We'd like for you to check your primary water valve.

05 03 31 00 LMP-EVA Go ahead.

05 03 31 02 CC Make sure it's open.

05 03 31 08 LMP-EVA Okay, I'll let John check it. I'm feeling good. Nice and cool. Can you check it?

05 03 31 15 CDR-EVA Yeah. Wait a minute. I'm not sure it was all the way open. Yeah, it's open, Charlie; it's all the way open.

05 03 31 33 CC Okay, we copy that.

05 03 31 35 CDR-EVA Houston; it's open all the way.

05 03 31 38 LMP-EVA Yeah, I feel good cooling, Tony. Move out and let's get around out of the way there. Another rake. Okay, Tony, we got about -

05 03 31 50 CC Okay, Charlie. We think you're about to run out of primary feedwater; stand by for the tone. Just press on there.

05 03 31 58 CDR-EVA Okay.

05 03 31 59 LMP-EVA Already? Is that - is that right?

05 03 32 04 CC That's affirmative.

05 03 32 06 LMP-EVA Go to MIN cooling. Okay, y'all been expecting it.

05 03 32 19 CDR-EVA All the way up is MIN, isn't it, Houston?

05 03 32 21 CC Yeah.

05 03 32 24 LMP-EVA Hey, man, I'm losing all of those.

05 03 32 26 CDR-EVA Yeah.

05 03 32 27 LMP-EVA There's three little ones. Two little ones, now.

05 03 32 36 CDR-EVA Hey, better get another one.

05 03 32 54 CDR-EVA There's a pretty good one.

05 03 32 57 LMP-EVA John, there's a glassy one right there. I can't tell what the other ones are.

05 03 33 02 CDR-EVA I can't either. They're all dust coated. Do you want me to go low or high or what?

05 03 33 07 LMP-EVA No, that's fine.

05 03 33 10 CDR-EVA Okay.

05 03 33 12 LMP-EVA Okay, Tony, we got about a half a sackful going in bag -

05 03 33 16 CDR-EVA 373.

05 03 33 18 LMP-EVA 372.

05 03 33 20 CDR-EVA 372.

05 03 33 22 LMP-EVA 372 with three rakes. Over.

05 03 33 24 CC Okay, we copy that. 372.

05 03 33 30 LMP-EVA And there were lots of smaller ones, but they got - more smaller ones but they fell through the tines.

05 03 33 38 CC Okay, we copy. I take it the soil isn't too cohesive here.

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05 03 33 46 CDR-EVA Hold the bag for a second.

05 03 33 50 LMP-EVA No, they're just small.

05 03 33 51 CC Roger.

05 03 33 55 LMP-EVA If we'd picked another place - I can't get the top off.

05 03 34 01 CDR-EVA That's right.

05 03 34 03 LMP-EVA Did you get it?

05 03 34 05 CDR-EVA Yeah, I got it.

05 03 34 06 LMP-EVA Okay.

05 03 34 15 LMP-EVA Okay, John, if you'll step aside, I'll get a soil sample. Okay, there's the tone, Tony.

05 03 34 27 CC Okay.

05 03 34 29 CDR-EVA Want me to get your AUX water ON? Want me to get it, Charlie?

05 03 34 33 LMP-EVA AUX, I got it. AUX water is ON.

05 03 34 36 CC Okay.

05 03 34 43 LMP-EVA Hey, how much soil, Tony?

05 03 34 45 CDR-EVA Kilo.

05 03 34 46 LMP-EVA Kilo, huh. That's what I thought.

05 03 34 48 CC That's right. One kilo.

05 03 34 54 LMP-EVA That's about a kilo. One more scoopful?

05 03 34 56 CDR-EVA Yeah. A little one.

05 03 34 59 LMP-EVA Okay.

05 03 35 02 LMP-EVA Rock.

05 03 35 06 CDR-EVA Almost looks like black soil.

05 03 35 10 LMP-EVA Okay. Man, it's really soft here, Tony, on the rim. You don't sink far, but when you walk on it, it gets very -

05 03 35 23 CDR-EVA That's the last time I do that with soil.

05 03 35 25 LMP-EVA When you rake it (laughter) - Did it come out? ... You mean? Look at that gnomon already, would you? Look at the color chart?

05 03 35 35 CDR-EVA Dropped dirt all over it (laughter). We'll just have to be more careful.

05 03 35 40 LMP-EVA Okay, this is 354. Going in bag 354, Houston.

05 03 35 44 CC Okay, 354.

05 03 35 49 LMP-EVA Hey, Tony, is the feedwater pressure coming back up again?

05 03 35 53 CC That's affirmative.

05 03 35 58 LMP-EVA Okay; I don't feel it. We ought to start from here, John, and do a radial sampling in towards Plum.

05 03 36 04 CDR-EVA Okay.

05 03 36 05 LMP-EVA Okay, why don't you go ahead and get started and I go get the shovel. Okay?

05 03 36 08 CDR-EVA All right.

05 03 36 17 LMP-EVA Tony, I went to MINIMUM on my coolant.

05 03 36 19 CC Okay, we copy that.

05 03 36 23 LMP-EVA Hey, was that about what time you expected or was I - am I using it faster than normal?

05 03 36 30 CC Ah, you're using it just a hair faster. We'll probably take a couple minutes off the EVA, but it's nothing real bad.

05 03 36 39 LMP-EVA Okay, I feel like what happened is that I've been on - a little bit more than minimum cooling. About pushed the Rover over.

05 03 37 12 CDR-EVA Well -

05 03 37 14 CC Charlie, Houston. We don't want you to stay in MIN cooling if you need more cooling than that. You don't really buy anything, you just store it and have to pay it off later.

05 03 37 25 LMP-EVA Understand. Understand. I was just telling you what the circumstances were.

05 03 37 30 CC Okay.

05 03 37 36 LMP-EVA Thank you for the reminder.

05 03 37 42 LMP-EVA What are you picking up? That little old thing?

05 03 37 45 CDR-EVA Charlie, that's as good as any of them.

05 03 37 47 LMP-EVA (Laughter) It looks like it is gonna come apart, though, to me.

05 03 37 52 CDR-EVA It might. There's three or four samples right there we can get.

05 03 37 57 LMP-EVA I'm just trying to turn my feedwater on a little bit. I'll get these in the shovel.

05 03 38 02 CDR-EVA Okay.

05 03 38 04 LMP-EVA If you don't get out of that - If you don't get that thing in the - -

05 03 38 16 CC Okay, are all of these rocks looking pretty much the same?

05 03 38 21 LMP-EVA They are all covered, Tony.

05 03 38 22 CDR-EVA All got covers.

05 03 38 25 CC Okay.

05 03 38 27 LMP-EVA Dust.

05 03 38 31 CDR-EVA What do you need, Charlie?

05 03 38 32 LMP-EVA Bag.

05 03 38 34 CDR-EVA Okay.

05 03 38 35 LMP-EVA One.

05 03 38 41 CDR-EVA They're angular.

05 03 38 43 LMP-EVA All angular, though, I'll tell you that. Here's one with a white streak, looks like a caliche streak through it. Leave it. That's all; it's a white rock.

05 03 39 05 LMP-EVA You have four samples, John. Is that good enough?

05 03 39 08 CDR-EVA Yeah. That's in bag 371, Houston.

05 03 39 11 CC Okay; 371.

05 03 39 15 LMP-EVA Get the locator.

05 03 39 25 LMP-EVA Hey, wait a minute; we need a soil from there.

05 03 39 28 CDR-EVA Okay. Put this in your bag.

05 03 39 34 LMP-EVA Okay; come on over.

05 03 39 46 LMP-EVA Man, that crater. That is really something. Tony, on the west side of Flag, there is a small crater maybe 2 to 3 meters across; it's real fresh, has some real bright rays, and you can see a blocky interior. Wait a minute, John, just let me shoot. There you go.

05 03 40 07 CC We copy that, Charlie.

05 03 40 10 LMP-EVA Okay. And that's about a third of the way down from the rim. Wish we could see the bottom.

05 03 40 17 CDR-EVA That's going in bag 363, Houston. 363.

05 03 40 21 CC Okay, 363.

05 03 40 26 CDR-EVA Let me get up to that, Charlie.

05 03 40 29 LMP-EVA Okay, I'll move.

05 03 40 31 CDR-EVA I'll have to get it from the other side.

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05 03 40 42 CDR-EVA Okay.

05 03 40 45 LMP-EVA Okay. Here's one right here, John, that'll make a good one. See that one right there by that footprint? That's a good sample size. About 5 centimeters across?

05 03 41 02 CDR-EVA That one right?

05 03 41 04 LMP-EVA No, that one right here to the right of my shadow. See, right there. Let me show you. Okay.

05 03 41 10 CDR-EVA Right there.

05 03 41 12 LMP-EVA Right here. See?

05 03 41 14 CDR-EVA Okay.

05 03 41 16 LMP-EVA Okay. It's an angular subangular rock, Houston, 5 centimeters. I can see some white clast shining through it.

05 03 41 30 CDR-EVA Bet it's dust covered again.

05 03 41 32 LMP-EVA It's all - everything here is dust covered.

05 03 41 43 LMP-EVA Got that beauty.

05 03 41 45 CDR-EVA That's enough.

05 03 41 56 CDR-EVA Okay, Charlie.

05 03 41 59 LMP-EVA Okay, Tony, it's a white matrix; it's a breccia, looks like, white clast with some greenish-looking, very small millimeter-sized phenocryst in a black matrix.

05 03 42 15 CC Okay, we copy that.

05 03 42 16 CDR-EVA Goes in bag 364, Houston.

05 03 42 18 CC Okay, 364.

05 03 42 31 CDR-EVA Okay. Let me get that soil sample.

05 03 42 34 LMP-EVA Yeah, wait a minute. Let me get out - bounce out of the way here. Uh-oh, John - fell off.

05 03 42 42 CDR-EVA You're bouncing too high.

05 03 42 43 LMP-EVA No. Did you close - -

05 03 42 44 CDR-EVA I'll get it. No. I didn't close the top.

05 03 42 46 LMP-EVA Oh.

05 03 42 48 CDR-EVA And I didn't stuff it down in there.

05 03 42 57 CDR-EVA Just about fell down.

05 03 43 04 LMP-EVA I got you. Got it. Two-man job.

05 03 43 15 LMP-EVA Tony, it's really spongy here. The regolith is just real loose and noncompacted if that's a - unconsolidated is the word I'm searching for.

05 03 43 29 CC All right; we copy. Can you see where the TV is pointed?

05 03 43 35 LMP-EVA Yes. It's pointed down towards South Ray.

05 03 43 38 CC Right. Over to the right on the edge of Plum there, looks like there might be rock with some phenocryst in it. If you're over that way, you might look around and see if you see something like that. It may have just been dust on it.

05 03 43 52 LMP-EVA Okay, there's a big rock on - that I've already described. Did you get the ... there, John.

05 03 43 59 CDR-EVA Yes, I've got the

05 03 44 02 LMP-EVA Okay, coming up.

05 03 44 17 LMP-EVA Bags are a pain, aren't they? Okay.

05 03 44 24 CDR-EVA It's going in bag 356, Houston. Soil sample.

05 03 44 31 CC Okay, 356.

05 03 44 41 CDR-EVA And after this - -

05 03 44 45 LMP-EVA Okay.

05 03 44 52 CDR-EVA Okay, Houston. I'm on frame count now 24.

05 03 45 02 LMP-EVA Hey, there's one right on the rim we can get.

05 03 45 06 CDR-EVA Okay.

05 03 45 07 LMP-EVA There's a good size one right over here by my footprint. Actually, I took pan 1 where pan 2 should have been. Okay, looking down into Plum, Tony, there is some cobbles and things on the inner rim. But they aren't very large - maybe 30 centimeters or so is the biggest.

05 03 45 28 CDR-EVA Want to get some of these here, Charlie?

05 03 45 30 LMP-EVA Yeah, that's great. That definitely is a breccia right there, John.

05 03 45 34 CDR-EVA Yes, see the clast in it.

05 03 45 35 LMP-EVA Yes.

05 03 45 38 CDR-EVA I forgot - I even forgot to ask locator on that last.

05 03 45 41 LMP-EVA No, wait a minute, I think ... That's the way that thing - the way that color chart is so covered with dust, it won't matter anyway.

05 03 45 52 CDR-EVA I know - I'll clean it off. Go out and get this one. How we doing on time, Tony?

05 03 46 10 CC Okay, you've got about 23 minutes left, here.

05 03 46 15 LMP-EVA Twenty-three! Hum.

05 03 46 19 CC Roger.

05 03 46 21 LMP-EVA We can pick up a lot of rocks in 20 - Hey, I'd like to go to the other side, John, of Plum because those rocks over there aren't dust covered, if you can see them.

05 03 46 32 CDR-EVA That's a good idea, Charlie.

05 03 46 34 LMP-EVA See right out there towards South Ray?

05 03 46 36 CDR-EVA Yes.

05 03 46 37 LMP-EVA Those rocks don't look as dust covered as these.
Uh-oh, I missed. Wait a minute.

05 03 46 53 CC Nice juggling.

05 03 46 56 LMP-EVA Well, it wasn't dust covered. Well, we missed it.
But things really fly up here - I'm amazed.

05 03 47 07 CC You guys sure have dirty hands.

05 03 47 09 CDR-EVA My first guess is it is a breccia with white clast
in it. And I see lineations all along it, in the
breccia. It's a white clast breccia is what it is.
I see no other clast in it. Of course, once you
get the dirt off of it might all be white. At
first cut, it would be a white clast breccia.
Going into 362.

05 03 47 44 LMP-EVA Okay, Tony. This one is a - same spot - is a
breccia with a white matrix - is glass coated on
one side and then typical glass - lunar-surface
glass coating.

05 03 47 59 CC Okay, we copy that. And when you're through with
this site, you can press on around Plum if you like.

05 03 48 08 LMP-EVA Okay, we'd like to. There is a big boulder over
there, and there are some blocks that aren't -
that are sitting out and aren't filleted. We'd
like to try over there. See what ...

05 03 48 19 CC Okay, use your discretion. You've got the time.

05 03 48 20 LMP-EVA Here, John, why don't you grab that line, that
crummy thing!

05 03 48 33 CDR-EVA Okay, those are big glass, aren't they?

05 03 48 36 LMP-EVA Yes. See that glass right there, on the top?

05 03 48 39 CDR-EVA Yeah.

05 03 48 45 LMP-EVA Okay; Tony, the general terrain here is sloping off to the south - Correction - Yes, southwest at about 1 to 2 degrees, and the Plum, excuse me, Flag Crater is on this - it's about to the top of this big ridge that slopes off generally to the southwest to the west of South Ray. Over.

05 03 49 15 CC Okay; some of the boulders you see around there, do they have fillets and, if so, are they built up on any particular side?

05 03 49 26 CDR-EVA That's rock bag 352, Houston.

05 03 49 29 CC Okay, 352.

05 03 49 36 CDR-EVA I take it back; that's rock bag number 2.

05 03 49 42 CC (Laughter) Okay; number 2.

05 03 49 44 LMP-EVA Come on. Stick her in; let's go.

05 03 49 50 CDR-EVA Okay.

05 03 49 51 LMP-EVA Man, is it dark in those shadows. Want to get an after there, John? I'll get a - get it?

05 03 50 00 CDR-EVA Yep.

05 03 50 01 LMP-EVA Okay, soil sample coming up. ...

05 03 50 07 CDR-EVA Okay.

05 03 50 18 LMP-EVA There you go.

05 03 50 23 CDR-EVA (Cough) Okay, that soil sample's in bag 369, Houston.

05 03 50 27 CC Okay, 369.

05 03 50 29 LMP-EVA 369.

05 03 50 30 CC Roger.

05 03 50 33 CDR-EVA Charlie, you're gonna fall down here with all these rocks.

05 03 50 37 LMP-EVA (Laughter) No. I'll give you the shovel in just a minute when I fill up, and we'll swap.

05 03 50 42 CDR-EVA Okay.

05 03 50 44 LMP-EVA This shovel is a great tool, I'll tell you.

05 03 50 47 CDR-EVA Dadgum.

05 03 50 49 LMP-EVA Oh, boy. Man, here comes the Bobbsey Twins.

05 03 50 53 CC You guys look like you're having a ball.

05 03 50 57 CDR-EVA We are. It really is fun.

05 03 50 59 LMP-EVA Now, John! Look - look at that footprint. Look underneath that regolith. When you kicked that up a meter - centimeter or so, under it is white, absolutely white, right here.

05 03 51 10 CDR-EVA Well, take your old thing and do an exploratory there for a while. Let's suggest that.

05 03 51 21 LMP-EVA Look! Look at that. Come over here.

05 03 51 24 CDR-EVA Yes.

05 03 51 26 LMP-EVA Look at that.

05 03 51 28 CC How about doing a skim right here?

05 03 51 29 LMP-EVA Won't you look here? Okay, the top -

05 03 51 37 CDR-EVA ... perfect ...

05 03 51 39 CC Okay, I guess we'd just like a scoop here and no skim.

05 03 51 40 CDR-EVA Charlie's right everywhere -

05 03 51 45 LMP-EVA Okay, Tony, let me describe what it is. The top centimeter of the regolith is gray, and you get down under that, and it's white.

05 03 51 58 CC Roger; we copy that.

05 03 51 59 LMP-EVA ... different albedo - three shades different.

05 03 52 04 CDR-EVA You ought to be able to see that in the TV right there, Houston.

05 03 52 06 CC Right, we can.

05 03 52 09 LMP-EVA I'll dig you - dig you a little trench here. Boy, that's going to be a hard job, John. Can you see that, Houston? We'll sample right there and get you a scoopful of this underlying regolith.

05 03 52 28 CC Okay, I guess -

05 03 52 30 LMP-EVA It's a different albedo; it's amazing.

05 03 52 33 CC Charlie, we can see that here. Why don't you go ahead and get a bag of the dark and a bag of the light, and then we'll press on to that block from the northwest side.

05 03 52 42 LMP-EVA All right.

05 03 52 47 CC Boy, my kids don't get as dirty as you are.

05 03 52 52 LMP-EVA (Laughter) We're having - I bet they having - don't have as much fun either.

05 03 52 58 CC I bet you're right.

05 03 53 00 CDR-EVA It sure is neat here. Okay; let me get a shovelful of this, right off the top here. There we go.

05 03 53 13 LMP-EVA Now look at that finger. Picked that up with one finger.

05 03 53 18 CC Ah, the delicate touch.

05 03 53 22 LMP-EVA John, we're going to have to change that bag dispenser. That is terrible.

05 03 53 25 CDR-EVA Is there another one? Do we have another one?

05 03 53 27 LMP-EVA Yeah, we have another one under my seat.

05 03 53 34 LMP-EVA Okay.

05 03 53 40 CDR-EVA That is going - that top scoop is going in bag 352, Houston.

05 03 53 44 CC Okay, 352.

05 03 53 57 LMP-EVA Y'all know how good that - water stuff tastes. Ah! Try to get way down there, John, and get a - Uh-oh.

05 03 54 20 CDR-EVA Uh-oh, what?

05 03 54 21 LMP-EVA I just - had a good scoopful, and I lost it. Let me dig out a little - another little trench. There. There she be. Coming up all white. That's all that's in there, John.

05 03 55 11 CDR-EVA Okay. And it's going into bag 357.

05 03 55 13 CC Okay, 357. You fellows are really packing them away there.

05 03 55 31 LMP-EVA Okay.

05 03 55 32 CC How do you feel, Charlie?

05 03 55 34 LMP-EVA Fine, great. Tony, I can't get a locator. You know we're right on the rim of -

05 03 55 41 CC We've located it on TV, so we have it.

05 03 55 47 LMP-EVA All right. Okay; we're going over to the big boulder.

05 03 55 57 CC Good show.

05 03 56 26 LMP-EVA Man, you can't see anything down-Sun - down-phase, John. Tony, looking - -

05 03 56 31 CDR-EVA That's what I was trying to tell you, Charlie.

05 03 56 33 LMP-EVA - - looking down-Sun here, down-phase at this area downslope, you get a definite feeling of lineations that run southwest, northeast - from Stone Mountain. There's sort of little furrowed ridges, and pits, and things.

05 03 56 53 CC Okay, you don't see any sharp scarps or anything like that, though?

05 03 57 00 LMP-EVA No, sir; no, nothing like on that map.

05 03 57 03 CC All right.

05 03 57 04 CDR-EVA Although, it's worse. Boy, I'll tell you, there's holes that - especially in zero phase.

05 03 57 18 CDR-EVA Now I'm out of water, drinking water, that is. Okay.

05 03 57 26 LMP-EVA Hey, John, you want to try just a piece of that?

05 03 57 29 CDR-EVA Look at that, Charlie!

05 03 57 31 LMP-EVA What's that?

05 03 57 32 CDR-EVA That thing has - has greenish-black clast in it. Right there in that boulder, there?

05 03 57 40 LMP-EVA Looks like it to me, too, yeah. Let's see if we can get a piece of that. Okay, Tony, this is a subrounded rock - boulder that's a meter to a meter and a half across, it has a predominant fracture set of 20 centimeters on the side that run here, southeast - Correction, southwest northeast. It's the predominant fracture set.

05 03 58 05 CC Okay.

05 03 58 06 LMP-EVA And it's partially buried.

05 03 58 11 CDR-EVA ...

05 03 58 12 LMP-EVA Okay. And John, over here also as we move around, that very white material is right under the - right under John's feet. I'll take a picture of that. And he's really changed the albedo by kicking into this little crater by this big rock. Going to get all - Ah, here he comes, folks. He's got the hammer out, I knew he couldn't resist.

05 03 58 46 CDR/ (Laughter)
LMP-EVA

05 03 58 52 CDR-EVA I don't know if this will work or not, Charlie,
but it couldn't pick a better spot. Here we go.

05 03 58 58 LMP-EVA Going to do it. There's a piece. Let me hold you
down a little bit. Hot dog! He did it. It's a
very friable rock, apparently, Houston.

05 03 59 15 CC Okay; outstanding.

05 03 59 20 CDR-EVA Charlie, don't do that, let me do it.

05 03 59 22 LMP-EVA I got it. Leaning on the shovel. Okay, Houston,
it's got some green clast, some white clast, a
grayish matrix. The clasts are millimeter size
and make up 5 percent of the rock. One big crystal,
5 millimeters across, but I can't tell what it is.
But it's a beauty.

05 03 59 58 CC Okay; you think they're still breccia?

05 04 00 05 LMP-EVA I'm not sure, John, I think it might be - Yeah, I
think it's a breccia, really, very friable.

05 04 00 13 CDR-EVA Yeah, it has - it's a breccia, Houston.

05 04 00 15 LMP-EVA Yeah, uh-huh.

05 04 00 17 CDR-EVA Well, no - it's not really. It's a breccia, and
I can see at least - like Charlie said, there are
two or three different type clasts in it. It's
just a one-stage breccia, though, it looks like.
It's going into bag 353.

05 04 00 36 CC Okay, 353; and you said about - -

05 04 00 37 LMP-EVA ...

05 04 00 39 CC - - you got about 9 minutes until you have to leave.

05 04 00 45 LMP-EVA All right. We'd like to go out and get one of those sharp rocks and a soil sample here.

05 04 00 51 CC Okay, sounds good. And while you're taking pictures there, can you take some pictures of the lineations on the ground you talked about?

05 04 01 00 LMP-EVA Yeah, I'll do that when I get to the right spot.

05 04 01 02 CC Okay.

05 04 01 05 LMP-EVA Okay, I'm taking a soil sample of the fillet around this rock.

05 04 01 09 CC Okay.

05 04 01 11 LMP-EVA Boulder. John, you just whacked that beauty right off of there.

05 04 01 19 CDR-EVA Like you say, it's friable (laughter). I hit it on a fracture set, too.

05 04 01 24 LMP-EVA Yeah. Turn the shovel that way.

05 04 01 28 CDR-EVA 368 this stuff is going into, Houston.

05 04 01 31 CC Okay, 368, the soil.

05 04 01 35 LMP-EVA Okay, I'll get the after on that, John. Okay?

05 04 01 39 CDR-EVA Charlie's getting the after on that soil in 368.

05 04 01 45 CC If you have time, can we do a second pan from here?

05 04 01 50 CDR-EVA Yeah, I'm supposed to do that, ain't I?

05 04 01 53 LMP-EVA Yeah, I was just thinking about that. That'd be a good idea. We're right on the rim of - we're really right on the rim - there's rocks right on the rim of - both Plum and Flag.

05 04 02 08 CDR-EVA My guess is that the rock is the way - it's laid in here, it's probably from the bottom of Plum, somewhere, or down there somewhere.

05 04 02 17 LMP-EVA Okay, John, I'm going to go over here and get some of these lineations.

05 04 02 21 CDR-EVA Okay.

05 04 02 22 LMP-EVA Close up. Get something out there for scale. Tony, the lineations might be - might be just the - I think really what it is is the shadows cast by the Sun, because the regolith is so unconsolidated - loosely packed.

05 04 02 46 CC Roger. I think you're probably right, but it makes a good study.

05 04 02 52 LMP-EVA In fact, I'm convinced of that. And, okay - that's two stereo from 7 feet.

05 04 03 00 CC Okay.

05 04 03 01 LMP-EVA John, you are just beautiful. That is - that is - the most beautiful sight.

05 04 03 07 CDR-EVA What's that?

05 04 03 08 LMP-EVA You standing there on the rim of that crater.

05 04 03 09 CC Doggone. I've never heard John described as beautiful.

05 04 03 12 LMP-EVA No. Well, he's not - real - well, actually, he is on this thing; I'll tell you. Hi, there.

05 04 03 24 LMP-EVA Hey, John, I'm going to run on out and look at some of these angular ones out here.

05 04 03 28 CDR-EVA Okay.

05 04 03 36 LMP-EVA Tony, those lineations are definit - definitely due to the shadows on this loose regolith.

05 04 03 50 CC Okay. We're going to have to hustle you on pretty soon, so you better grab those angular rocks.

05 04 03 59 LMP-EVA Okay.

05 04 04 00 CDR-EVA That pan takes me through frame 53.

05 04 04 03 CC Okay; 53.

05 04 04 08 LMP-EVA Tony, I'll document this one while John get -
coming over with the scoop. In place is a gnomon.

05 04 04 15 CC Okay, fine. Boy, this TV sure makes it fun.

05 04 04 26 CDR-EVA And we real - really make good time around here.

05 04 04 29 LMP-EVA Yeah.

05 04 04 36 CDR-EVA Did you get that biggy, Charlie?

05 04 04 38 LMP-EVA That one right there is what I'm gonna get. Think
it will go in the bag?

05 04 04 41 CDR-EVA No.

05 04 04 44 LMP-EVA Try it. This is a great way to do it, leaning
on this shovel. It might go in the bag, John.

05 04 04 55 CDR-EVA Nah, Charlie.

05 04 04 56 LMP-EVA Huh?

05 04 04 57 CDR-EVA Let's not even try it.

05 04 04 59 LMP-EVA Don't want to try it? Okay; this angular rock is
too big for a bag, and it's got some glass on it
and I think it's a breccia also, Tony. It's
going in John's SRC.

05 04 05 11 CC Okay, and it's time to go back and pack up.

05 04 05 16 LMP-EVA Okay. Gosh! I see what you mean, babe.

05 04 05 21 CDR-EVA Hey, you can't get the top off.

05 04 05 23 LMP-EVA Get the top off? Now just pull it off with your
things there.

05 04 05 32 CDR-EVA Okay, I figured I was going to do that.

05 04 06 05 CDR-EVA Can't believe that terrain, Houston.

05 04 06 09 LMP-EVA Here you go, John. Why don't you carry it back?

05 04 06 12 CC You're right. That's pretty spectacular.

05 04 06 14 CDR-EVA Let's just lay it - let's just lay it in the seat.

05 04 06 23 LMP-EVA Here we come!

05 04 06 24 CC Okay, we see you.

05 04 06 26 LMP-EVA Ready or not.

05 04 06 27 CC We're ready.

05 04 06 29 CDR-EVA Here's my hammer ring, Charlie.

05 04 06 31 LMP-EVA Boy! How did that come out?

05 04 06 32 CDR-EVA I don't know.

05 04 06 34 LMP-EVA I'll get it, John. I can do it with a shovel easy.
I'm glad you saw that.

05 04 06 56 LMP-EVA Have you got everything?

05 04 06 57 CDR-EVA Yeah.

05 04 06 58 LMP-EVA Give me some. I can carry something. Hey, it's
in there. It's not in your pocket. There it goes.
Times flies.

05 04 07 20 LMP-EVA Man, I can't wait to get back to Buster, Tony.

05 04 07 23 CC Right.

05 04 07 28 LMP-EVA It's really some crater.

05 04 07 30 CC As you come around there, there is a rock in the
near field on this rim that has some white on the
top of it. We'd like you to pick it up as a grab
sample.

05 04 07 39 LMP-EVA This one right here?

05 04 07 41 CC That's it.

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05 04 07 44 LMP-EVA This one right here?

05 04 07 45 CC That's it. You got it, right there.

05 04 07 49 LMP-EVA Okay, that's a -

05 04 07 50 CDR-EVA That's a football-size rock.

05 04 07 52 LMP-EVA It's a "Dave Scott" size.

05 04 07 56 CDR-EVA Are you sure you want a rock that big, Houston?

05 04 08 01 CC Yeah, let's go ahead and get it.

05 04 08 03 CDR-EVA That's 20 pounds of rock right there.

05 04 08 05 LMP-EVA Okay. It has some big clasts in it, John.

05 04 08 13 CDR-EVA It sure has.

05 04 08 27 LMP-EVA If I fall into Plum Crater getting this rock Falburger [?] has had it.

05 04 08 37 CC We agree.

05 04 08 39 LMP-EVA Okay; I've got it. That's 20 pounds of - that's 20 pounds of rock!

05 04 08 48 CDR-EVA You want to put it in here, Charlie? I'd just as soon you didn't.

05 04 08 52 LMP-EVA Look at the size of that.

05 04 08 53 CDR-EVA I know it.

05 04 08 56 LMP-EVA Oh, Tony, it's got some beautiful crystals in it though. That was a good guess.

05 04 09 02 CC Good show.

05 04 09 07 LMP-EVA Okay, put it in there, John.

05 04 09 10 CDR-EVA Put it in where?

05 04 09 11 LMP-EVA In your SCB.

05 04 09 13 CDR-EVA I don't think it'll fit. Don't think it will fit.

05 04 09 23 LMP-EVA It ain't gonna fit.

05 04 09 27 CDR-EVA Put it under your seat.

05 04 09 30 LMP-EVA Yeah. Kind of dusty. Hey, do you want some more bags here?

05 04 09 38 CDR-EVA Yeah.

05 04 09 40 LMP-EVA Okay, here you - here's you a good one. Okay, Tony, I'm gonna put that little glass ball - that I haven't sacked yet - Look at that, John.

05 04 09 52 CDR-EVA Yeah, it is a big piece of glass.

05 04 09 53 LMP-EVA Solid glass.

05 04 09 55 CDR-EVA Black glass.

05 04 09 57 LMP-EVA Going into bag - 4.

05 04 10 15 CC Okay; we'll need an EMU check before you drive off.

05 04 10 25 LMP-EVA Stand by.

05 04 10 27 CDR-EVA Yeah, I'm running at 48 percent; 3.87. I'm on halfway between INTERMEDIATE and TERMINAL [?] and I didn't have any flags. We got to do something with this bag before we leave, Charlie.

05 04 10 43 LMP-EVA Put it under your seat. Under my seat.

05 04 10 47 LMP-EVA Okay, Tony, I'm clear on the flags. My frame count is 65; got -

05 04 11 14 CDR-EVA What you got, Charlie?

05 04 11 17 LMP-EVA Looks like I'm about 35 percent, and I'm between INTERMEDIATE and MIN; and I'm at 3.85.

05 04 11 29 CC Okay.

05 04 11 30 CDR-EVA Yeah, make sure you're in MIN I guess, before we get in and start driving.

05 04 11 35 LMP-EVA Yeah. Going to MIN. That's a good point. Thanks.

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05 04 11 40 CDR-EVA Okay.

05 04 11 41 LMP-EVA Beeps. Single bound.

05 04 11 46 CDR-EVA MODE switch is going to 1, Houston.

05 04 11 49 CC Okay.

05 04 11 53 CDR-EVA I'm going to position your TV horizontal and CCW, which it almost is.

05 04 12 02 LMP-EVA It is. You saved me a lot of work there.

05 04 12 21 LMP-EVA Ah-oh.

05 04 12 23 CDR-EVA What's the matter, Charlie?

05 04 12 24 LMP-EVA Oh, my seatbelt came off my ring. Can you get it for me, John?

05 04 12 26 CDR-EVA Yeah.

05 04 12 28 LMP-EVA Will you get in -

05 04 12 30 CDR-EVA I couldn't see it - Oh, there it is. Let me get it for you.

05 04 12 33 LMP-EVA Thanks.

05 04 12 38 CDR-EVA Yeah, you got it.

05 04 12 41 LMP-EVA Okay.

05 04 12 52 LMP-EVA Boy, this is a nice belt.

05 04 12 54 CDR-EVA Okay, we're in MODE switch 1 on the TV. Oh, to ... - -

05 04 13 05 CDR-EVA Can you see my pin over there, Charlie?

05 04 13 11 LMP-EVA Can I see what?

05 04 13 15 CDR-EVA Can you see whether I'm about to pull out my pin or not?

05 04 13 24 LMP-EVA Pull up your tent?

05 04 13 26 CDR-EVA Pull out my pin.

05 04 13 27 LMP-EVA Oh, I can't see. No, it doesn't look like it.

05 04 13 49 CDR-EVA Man, are we filthy!

05 04 14 05 CDR-EVA Okay.

05 04 14 07 LMP-EVA Okay.

05 04 14 08 CDR-EVA Go to ...

05 04 14 10 LMP-EVA Okay, Tony, we're just about underway.

05 04 14 18 CDR-EVA Okay; we're going to follow our footsteps back.

05 04 14 21 LMP-EVA Okay, that's a good idea.

05 04 14 26 LMP-EVA Tony, did you read?

05 04 14 29 CC Yeah, we sure did. Okay, and we're looking at - -

05 04 14 32 LMP-EVA Okay; we're underway.

05 04 14 38 CC Okay, we're looking at a few changes there at Spook. We're going to cut that station down to about 19 minutes. And if you get there in time, we'll have John go ahead as nominal and do the LPM. And then we'll end the LPM site measurement. And Charlie, you can do you 500 millimeter near the edge of Spook, and do a pan near the rim of Spook, and why don't you do a couple of samples of Buster if you have time left. And that'll be our station 2.

05 04 15 09 LMP-EVA Okay, why the cutback?

05 04 15 17 CC Okay; it's your water consumption there, Charlie.

05 04 15 23 LMP-EVA Ah, rats! Okay.

05 04 15 25 CC That's all right - it's - you're getting some really good geology there. Don't feel bad.

05 04 15 39 LMP-EVA Okay; we're making good time going back, and it's easier looking - going up-Sun. You can see the craters a lot better. The regolith - the characteristics of the regolith are the same.

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05 04 15 52 CDR-EVA Are you using the 16, Charlie?

05 04 15 55 LMP-EVA No.

05 04 16 00 CDR-EVA Well, it ain't easier for me. If I wasn't following these tracks, it would be bad - up-Sun or down-Sun - it's bad for driving.

05 04 16 06 CC Roger. We figured it probably would be.

05 04 16 09 LMP-EVA You're making great time, John. We're doing - we're doing 11 clicks.

05 04 16 13 CC Outstanding!

05 04 16 14 LMP-EVA Super!

05 04 16 15 CC The Grand Prix driver is at it again.

05 04 16 20 LMP-EVA Barney Oldfield.

05 04 16 22 CDR-EVA I can follow a road.

05 04 16 25 CC Back to the on-off switch mode. John, did you dust that TV lens?

05 04 16 35 CDR-EVA I dusted it somewhere.

05 04 16 38 CC Okay, fine.

05 04 16 40 CDR-EVA I don't remember if it was that station or not.

05 04 16 47 CC Okay, I guess we'll need it dusted again at this next stop.

05 04 16 52 CDR-EVA All righty.

05 04 16 56 LMP-EVA Okay, Tony. As I look up-Sun here - going back through the - you can see these lineations, mostly furrows, I'd call them, with random orientation. And they're definitely the Sun casting shadows on unconsolidated regolith.

05 04 17 19 CC Right.

05 04 17 21 LMP-LM You can't believe how up and down this is, Tony.

05 04 17 26 CC How about when you're driving across rays? You noticed any difference in the Rover tracks?

05 04 17 35 CDR-EVA (Laughter) I notice an increase in block population. But the tracks you can't see - they're behind you.

05 04 17 42 CC Okay; I thought maybe you could see them behind the front wheel there.

05 04 17 49 CDR-EVA (Laughter) It's a cloud of dust, Tony.

05 04 17 54 CC Okay; we copy.

05 04 18 12 CDR-EVA Isn't that - that looks - that's Spook, isn't it? That big one right there?

05 04 18 19 LMP-EVA Yeah; I think it is. That's the one we called Buster.

05 04 18 26 CDR-EVA Okay. We got to go up north if you're gonna -

05 04 18 31 LMP-EVA Okay, Tony. We're in a real blocky boulder field here. It's probably from - thrown out from Spook. What we originally called Spook was not Spook. I think this blocky one is Spook. And we're coming up from the south side of it.

05 04 18 52 CDR-EVA Yeah, I'd say, Houston, that I was farther past - I guess that I was farther past Double Spot.

04 05 19 07 LMP-EVA But we got 0.8 mile, John, and Spook is supposed to be a mile. That - that's got to be it right down there.

05 04 19 15 CDR-EVA Buster?

05 04 19 16 LMP-EVA No, that's Spook.

05 04 19 19 CC Okay, Spook should look about the same size as Flag.

05 04 19 25 CDR-EVA ... Does it look the same size?

05 04 19 29 LMP-EVA No, this is the biggest crater right over here to the right.

05 04 19 32 CDR-EVA Okay; well, this is Buster.

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05 04 19 34 LMP-EVA Okay, that's what I thought. It's a blocky crater.

05 04 19 36 CDR-EVA Let's stop the Rover halfway between them?

05 04 19 39 LMP-EVA Yeah.

05 04 19 40 CC No, near the edge of Spook.

05 04 19 41 LMP-EVA Buster is a lot bigger than - Yeah, okay, it's about 50 meters or so. We're bearing 089.8.

05 04 19 54 CC Okay.

05 04 19 55 LMP-EVA We're supposed to park 180 - about halfway, John.

05 04 19 57 CDR-EVA We're in a big hole back over here, can you try ...?

05 04 20 00 CC Little bit nearer to the end of Spook so we can see into Spook.

05 04 20 06 LMP-EVA What you really want to see into is Buster. Buster is about the same size as what we call Spook here. In fact, it's a more impressive crater.

05 04 20 17 CC Okay, whatever turns you on, there.

05 04 20 19 LMP-EVA John, that thing's - that, that's got to be - Tony, is there a big crater to the south of Spook?

05 04 20 29 CDR-EVA Cove is.

05 04 20 33 CC That'd be quite a ways. Red Rose looks about like 0.8 kilometer.

05 04 20 44 LMP-EVA No. Okay; well, let's park here, John. This is great sampling. We've got plenty of boulders and everything.

05 04 20 52 CC All right. Let's do it right here. We concur.

05 04 20 59 LMP-EVA The Buster is a lot bigger than Plum is. The one we call Plum.

05 04 21 04 CC Right, it should be.

05 04 21 06 CDR-EVA Right, it sure is.

05 04 21 10 LMP-EVA Okay, then we got the right place then, if it should be. Okay, we're stopped and we're 180, 087, 2.8, 0.8, 115, 115, 72, 72, 100, 100, off-scale low, off-scale low.

05 04 21 31 CC Okay, we copy.

05 04 21 52 LMP-EVA Okay; pan one up on Spook crater.

05 04 21 56 CDR-EVA I can't believe it, Charlie.

05 04 22 02 LMP-EVA What? You did it again?

05 04 22 03 CDR-EVA My hammer just got hung up in the instrument panel.

05 04 22 05 LMP-EVA I know it. I saw that. It was on those stanchions there. I'm sorry, I should have said something to you.

05 04 22 15 CDR-EVA Okay; well, I won't need it. Do you need it?

05 04 22 17 LMP-EVA No.

05 04 22 18 CDR-EVA Put it in the seats. I'm going to put this thing back in one more time.

05 04 22 24 CC Charlie?

05 04 22 26 LMP-EVA You're kidding!

05 04 22 27 CDR-EVA No.

05 04 22 28 LMP-EVA Okay, I'll put it in. Come on over. You start the LPM, and I'll be over in just a minute.

05 04 22 32 CDR-EVA Okay, when I get the antenna up.

05 04 22 36 LMP-EVA Okay.

05 04 22 40 CC Okay, Charlie. Are you on a ray there? Or - I know the blocks angular.

05 04 22 48 LMP-EVA The blocks are angular, but they are definitely coming out of Buster.

05 04 22 50 CC Okay, very good.

05 04 22 56 LMP-EVA They dissipate very quickly. In fact, they don't even come to Flag.

05 04 23 03 CC Okay. Hey, we've got a TV picture!

05 04 23 05 CDR-EVA Buster is a real impressive crater.

05 04 23 20 LMP-EVA John? Old Orion!

05 04 23 23 CDR-EVA Where is it, Charlie?

05 04 23 25 LMP-EVA Right - just to the left - right under the Sun, as a matter of fact.

05 04 23 29 CDR-EVA By golly, we did park it in the right place!

05 04 23 34 LMP-EVA I think we did!

05 04 23 38 CDR-EVA Somebody's working the TV, and it ain't even locked up yet!

05 04 23 42 CC Okay, John. We'll need to press on with that LPM, or we won't get it done.

05 04 23 57 CDR-EVA Got your point, commander.

05 04 24 04 LMP-EVA Okay; since you don't do just - LPM, John - and I'm gonna do the 500, I won't put your bag back on. Okay?

05 04 24 11 CDR-EVA Okay, take that time - -

05 04 24 12 LMP-EVA Okay, Tony. Under here again, right under the regolith, the first centimeter or so, we have the white albedo material.

05 04 24 23 CC Understand. Hey, that does a good job on the lens there.

05 04 24 28 CDR-EVA Your eye looks clear to me here, Houston.

05 04 24 30 CC Yeah, that helped a lot.

05 04 24 38 CDR-EVA And the Earth is - You should be locked up, I guess. And the Earth is boresighted in the boresight machine.

05 04 24 53 LMP-EVA Thirty. Okay. That's gonna be cross-Sun, so I'm going to do it at f/8.

05 04 25 07 CC That's a deep ... there, isn't it?

05 04 25 08 LMP-EVA How you read me, Houston?

05 04 25 09 CC We copy you fine.

05 04 25 17 LMP-EVA Sounds like you're reading us.

05 04 25 20 CDR-EVA ... where's your TV? Charlie, fix this thing for me.

05 04 25 35 LMP-EVA Let me take these pictures.

05 04 25 38 CDR-EVA Look, Charlie?

05 04 25 39 LMP-EVA Huh?

05 04 25 40 CDR-EVA I've got to do this LPM.

05 04 25 41 LMP-EVA Okay. You don't want to go ahead and get started with that?

05 04 25 42 CDR-EVA I want us to do it, bit I - -

05 04 25 43 LMP-EVA Okay, okay, okay.

05 04 25 49 LMP-EVA Houston, do you read? Over?

05 04 25 50 CC We're copying 5 by. How us?

05 04 25 56 CDR-EVA Did you knock your MODE switch OFF? Did I knock mine OFF?

05 04 25 58 LMP-EVA I'm - we're both in AR.

05 04 26 05 CC John and Charlie, this is Houston. You copy?

05 04 26 10 CDR-EVA Yeah, loud and clear. Where you been?

05 04 26 12 CC I - Well, you've been there all the time. I - I don't know. Got great TV - really fine.

05 04 26 21 LMP-EVA Okay, there it is.

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05 04 26 26 CDR-EVA What am I hung up on now, Charlie?

05 04 26 28 LMP-EVA Okay, you got on that what-cha-ma-call-it, that - -

05 04 26 31 CDR-EVA Hangs out there?

05 04 26 32 LMP-EVA - - that hangs out there. Yeah.

05 04 26 34 CDR-EVA Okay.

05 04 26 50 CDR-EVA Okay.

05 04 27 10 CDR-EVA No LPM.

05 04 28 40 LMP-EVA Hey, Tony. I'm going to take a few of South Ray here, with the 500. We got a good view of it here.

05 04 29 08 CDR-EVA Okay, the LPM is - got its sensor head on it, and the power switch is coming on.

05 04 29 13 CDR-EVA MARK.

05 04 29 14 CC Okay.

05 04 29 18 CDR-EVA And the temperature label says nothing.

05 04 29 20 CC All right.

05 04 29 23 LMP-EVA Okay, Tony, the 500 millimeter's up to 50.

05 04 29 26 CC Okay. We copy that.

05 04 29 30 LMP-EVA I guess I take a few too many. I had a triple, vertical, stereo pan on Stone Mountain, and about five frames on old North and South Ray. Over.

05 04 29 46 CC Okay, we copy that.

05 04 29 51 LMP-EVA Okay, I'm finished with my pan, and the 500 - I'm gonna run over to - Buster and some sampling. Over.

05 04 30 05 CDR-EVA Buster is really an impressive crater, Houston. The walls are so steep, and the blocks are all over it.

05 04 30 13 CC Okay, we copy that. And Charlie, sounds like you've got a good plan there.

05 04 30 19 LMP-EVA Okay. And if you'll notice, I'm carrying John's bag, and a shovel, and I'm not taking a gnomon.

05 04 30 42 CDR-EVA Okay.

05 04 30 45 LMP-EVA Man, that's gonna be a little steep ridge to climb.

05 04 31 07 LMP-EVA You get - Yeow whee! Man, John, I tell you, this is some sight up here - looking down into that beauty. Tony, the blocks in Buster are covered - the bottom is covered with blocks - the largest 5 meters across. The sides - the blocks seem to be a preferred orientation, northeast to southwest. They go all the way up the wall on those two sides, and on the other side, you can only barely see them outcropping in about 5 percent. Ninety percent of the bottom is covered with blocks that are 50 centimeters and larger. And I get a partial pan into there.

05 04 32 12 CC Good show. It makes it sound like a secondary.

05 04 32 14 LMP-EVA And - -

05 04 32 18 CDR-EVA I know, boy. Okay, Houston, I'm back. The sensor number 1 is on there and - -

05 04 32 26 CDR-EVA MARK.

05 04 32 27 CC Okay; we start the clock.

05 04 32 33 LMP-EVA If that is a secondary, that is a big rock that hit in there.

05 04 32 37 CC Roger.

05 04 32 38 LMP-EVA The rocks down there are very fractured, though. The rocks down there are extremely fractured - you can see a major fracture set running - dipping about north 30 degrees on one rock. The other one is subhorizontal, so it's a - just a very impressive sight as far as the boulder goes. They're all angular. Some of them - Well, I call some of them

subrounded, but the majority of them are angular, and they have a grayish texture to them and that's about all I can tell. I got a partial pan from up here on the rim. And I'm gonna start sampling.

05 04 33 21 CC Okay; it sounds good, Charlie. And why don't you press on sampling now? And, it's time, John.

05 04 33 30 LMP-EVA All right.

05 04 33 32 CDR-EVA Okay; can I give you - Okay, X, 657; Y, 363; Z, 440; X, 655; Y, 360; Z, 437; X, 654; Y, 354; Z, 440.

05 04 33 57 CC We copy.

05 04 34 00 CDR-EVA Is that okay - did you get all that stuff, Houston?

05 04 34 03 CC We sure did.

05 04 34 06 CDR-EVA Yeah, well, turn that around.

05 04 34 26 LMP-EVA Okay, there's a sort of angular to subrounded block going in bag number 5, Tony.

05 04 34 32 CC Okay, bag 5.

05 04 34 33 LMP-EVA It's dust covered so that's all - and it's dust covered, that's all I can say about it. I got another little one, same spot; and it's got a whitish cast to it, and another little one that's got a whitish cast to the underside of it. All that in bag 5.

05 04 34 54 CC Okay.

05 04 35 08 CC And John, verify your visor's down.

05 04 35 15 CDR-EVA Yeah, I never - I forgot to raise it.

05 04 35 17 CC Okay.

05 04 35 24 CDR-EVA Thank you, Tony. Okay; 2 is installed.

05 04 35 43 LMP-EVA And Tony, I really think we're sampling blocks out of this -

05 04 35 46 CDR-EVA MARK, Tony.
05 04 35 47 CC Okay.
05 04 35 54 CDR-EVA Did you get that mark?
05 04 35 56 CC Yes, sure did and started the clock. And did you get the picture of the location, there?
05 04 36 10 CDR-EVA Okay, do that right now. Is that okay?
05 04 36 15 CC Okay, that's fine.
05 04 36 20 LMP-EVA Okay, Tony. From here is a soil sample going into bag 6. This is on the rim of Buster.
05 04 36 35 CC Okay. And John, you can take a reading whenever you want.
05 04 36 43 CDR-EVA Okay, wait a second.
05 04 37 02 CDR-EVA Okay; Houston. That was frame count 56 on magazine Baker.
05 04 37 06 CC Okay.
05 04 37 08 LMP-EVA That's the rock I want, but it's too big for the bag. But it might go in the bag. How much time, Tony?
05 04 37 25 CDR-EVA Okay, Houston. We're ready for the reading.
05 04 37 27 CC Go ahead.
05 04 37 30 CDR-EVA Okay: 114 is X, 361 is Y, 356 is Z.
05 04 37 39 CC Go.
05 04 37 42 CDR-EVA 116 is X, 360 is Y, 366 is Z; 116 is X, 357 is Y, 374 is Z.
05 04 37 58 CC Okay, we copy that.
05 04 37 59 CDR-EVA Going out and turning them around. Did you get all of that?

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05 04 38 00 CC Sure did. And Charlie, we'll be leaving as soon as John finishes.

05 04 38 11 LMP-EVA Okay. Okay, there's another rock going into bag 7.

05 04 38 18 CC Okay; bag 7.

05 04 38 20 LMP-EVA Dust covered. And I'm gonna go out and get - Okay, I'm going about a quarter of a diameter away from Buster and sample some more.

05 04 38 27 CC Okay.

05 04 38 30 LMP-EVA The rim of Buster is pretty good slope climbing up there, Tony.

05 04 38 49 CDR-EVA Okay.

05 04 39 00 LMP-EVA How long have we been out, Tony?

05 04 39 01 CC I got a - -

05 04 39 04 CDR-EVA A couple of hours, Charlie.

05 04 39 06 CC - - 05:45, Charlie. And I've got a mark done.

05 04 39 09 LMP-EVA Okay.

05 04 39 11 LMP-EVA MARK, Tony.

05 04 39 15 CC Okay.

05 04 39 58 LMP-EVA The only trouble is that you can't put the bag - -

05 04 40 00 CC Okay, John.

05 04 40 13 CDR-EVA Okay: X is 104; Y, 403; Z, 423; X, 107; Y, 404; Z, 425; X, 110; Y, 405; Z, 425.

05 04 40 36 CC Okay. Outstanding and visor down.

05 04 40 38 CDR-EVA Did you get those, Houston?

05 04 40 40 CC Sure did.

05 04 40 42 CDR-EVA Visor is down.

05 04 40 44 LMP-EVA Okay, Tony, this is a - the rock I've got here - -

05 04 40 47 CDR-EVA READ switch is OFF, and the POWER switch is OFF.

05 04 40 52 LMP-EVA - - is a very friable rock, and it's the most shocked rock I've ever seen; it's just pure white. The whole matrix is pure white. And it's not a breccia. Hey, John, I hate to tell you this, but I dropped my bag.

05 04 41 09 CDR-EVA I'll get it.

05 04 41 10 LMP-EVA If you come - They can't guess what happened. The little thing I didn't - it came unlocked.

05 04 41 16 CDR-EVA You've got to tape those.

05 04 41 18 LMP-EVA No, not that. It was just the top thing.

05 04 41 26 CDR-EVA This is really some rock, really shocked. Okay, move back and let me get it on the fly, Charlie.

05 04 41 36 CC Okay, and as soon as you get buttoned up there, we'll be taking off.

05 04 41 43 CDR-EVA Okay.

05 04 41 50 LMP-EVA Tony, on this friable rock - this shocked one; it's very friable and I'm gonna try and get it in the bag but I'm not sure it's gonna go. And if I don't get it in the bag, I don't think it's going to survive. Well, there's part of it in the bag, anyway.

05 04 42 10 CC That'll do fine.

05 04 42 12 LMP-EVA It broke in two in my hand.

05 04 42 15 CC Geochemists are always telling us how little rock they need.

05 04 42 22 LMP-EVA Okay, and that's in bag number 9.

05 04 42 26 CC Okay; bag 9.

05 04 42 29 LMP-EVA They are going to get a lot of nice - they're going to get a lot of nice rock samples today.

05 04 42 34 CC Good show. It sure sounds that way.

05 04 42 35 CDR-EVA Nice little rocks.

05 04 42 39 CC Sounds like a lot of rocks.

05 04 42 41 LMP-EVA That was a real balancing act, Tony.

05 04 42 43 CDR-EVA And if somebody cleans our suits, they can get another 5 pounds.

05 04 42 49 CC That's our comprehensive sample.

05 04 42 51 CDR-EVA Now, here comes the interesting part.

05 04 43 05 LMP-EVA Very good, John.

05 04 43 14 CDR-EVA Ed was right, it does wind up on itself.

05 04 43 18 CC Yes, Ed's sitting here chuckling.

05 04 43 20 CDR-EVA Will it unwind on itself?

05 04 43 23 LMP-EVA Yeah. Look at that thing! It's like a bowl of spaghetti!

05 04 43 30 CDR-EVA What I hope is, it doesn't go into the mouth of the -

05 04 43 46 CC Well, you're doing pretty good there, John.

05 04 43 51 CDR-EVA Oh, yeah.

05 04 44 07 LMP-EVA Okay, bag number 10, Tony, is another one.

05 04 44 10 CC Okay, bag 10.

05 04 44 12 LMP-EVA It's an angular rock.

05 04 44 19 CC Charlie, we better get you loaded back up.

05 04 44 21 CDR-EVA I was worried about that fire cape.

05 04 44 24 CC Say again, John.

05 04 44 26 CDR-EVA I was worried about - on the geophone experiment, huh?

05 04 44 28 LMP-EVA They want us to load up, John. I guess they are - I'm running out of water.

05 04 44 35 CDR-EVA Okay.

05 04 44 38 CC John, go ahead with what you were saying.

05 04 44 40 CDR-EVA I said, have we got a problem of some kind? Are we needing to get Charlie back?

05 04 44 49 CC It's no problem. We're just trying to - You're a little bit late on this station and to get everything in and so to get back in in time, we might be a little late.

05 04 45 00 CDR-EVA Okay.

05 04 45 02 LMP-EVA We understand.

05 04 45 03 CC Right. We are going to shorten the EVA by about 8 minutes, is all.

05 04 45 10 LMP-EVA 8 minutes. (Laughter) We'll settle for that.

05 04 45 18 LMP-EVA We got floor samples and about - That sample is going into bag 11, Tony.

05 04 45 25 CC Okay, bag 11.

05 04 45 30 LMP-EVA And here, Tony, I don't really see - That's a sackful, John. I don't see the high albedo stuff underneath.

05 04 45 50 CDR-EVA Well, I think it is in as good as I can put it back in, Houston. But I wouldn't be surprised to see it hanging out some day.

05 04 46 02 LMP-EVA Houston, I hate to tell you this, but those rocks, these light ones here, they look like caliche to me.

05 04 46 12 CC Well, who knows?

05 04 46 18 LMP-EVA Okay, Houston. We're going frame switch to 1 and CCW. You already got it in CCW? Yeah. MODE switch is going to 1, Houston.

05 04 46 32 CC Okay. And could I get your final frame count?

05 04 46 41 LMP-EVA You just got mine. I gave you the last rate count on the - on the IPM.

05 04 46 46 CC Right.

05 04 47 00 CDR-EVA Really works great.

05 04 47 16 LMP-EVA Man, the old pallet is closed - boxed right in there. Look at that beauty.

05 04 47 24 CDR-EVA Did Charlie check MINIMUM on the cooling?

05 04 47 26 LMP-EVA Oh, yeah. ...

05 04 47 37 LMP-EVA There we go. I did it that time.

05 04 47 45 CC And John, can you check and make sure your purge valve pin is still in?

05 04 47 51 CDR-EVA Is it in, Charlie?

05 04 47 57 LMP-EVA Ain't no way I could tell ...

05 04 48 01 CC Outstanding.

05 04 48 07 LMP-EVA We are mounting upon the vehicle, as they say, Houston.

05 04 48 15 CC That skill is off ...

05 04 48 16 LMP-EVA Okay.

05 04 48 23 LMP-EVA Okay; I'm going to take some pictures. Wow, is that Sun bright! Ooh! There's home. You see it?

05 04 48 30 CC Yeah.

05 04 48 32 LMP-EVA John, you're not going right. That navigation has us right on. You turn to 086, we'd be pointed right at that beauty.

05 04 48 42 CDR-EVA Let's do that.

05 04 48 47 LMP-EVA Look at it, John. Four more degrees and you got it. Stop her. You're 087 now. You're about 084 and we can get - have it?

05 04 48 59 CDR-EVA Okay.

05 04 49 01 LMP-EVA You're gonna have that big crater. Man, this is a fun ride.

05 04 49 12 LMP-EVA Okay, Tony, we're doing 10 clicks.

05 04 49 14 CC Outstanding.

05 04 49 18 LMP-EVA Occasionally, the back end breaks - occasionally, the back end breaks loose, but there is no problem. This is really some machine.

05 04 49 30 LMP-EVA Hey, looking back up-Sun, the rays are even more pronounced. Looking up-Sun rather than down-Sun, the blocks stand out like ... It's just like driving on snow. By golly!

05 04 49 48 CC Yeah, I know all about that.

05 04 49 53 CDR-EVA I know you do, but us Florida boys don't know much about it.

05 04 49 58 LMP-EVA It takes these small craters up to a meter just like a piece of cake. You occasionally get blinded by the LCRU mirrors and the DCU [?] mirrors.

05 04 50 13 CDR-EVA And the Sun!

05 04 50 14 LMP-EVA That's what I meant. Oh, you mean - and I got my thing down.

05 04 50 19 CDR-EVA That is a good idea.

05 04 50 23 LMP-EVA Look at there, you can see your flags out, John.

05 04 50 25 CDR-EVA Yeah.

05 04 50 28 CC And Charlie, could you look at the amps during the higher speed part. We'd like a number.

05 04 50 35 CDR-EVA Okay; well, let us get a high speed first.

05 04 50 38 LMP-EVA ... the voltage is - the switch's on VOLTS right now, John, and I don't want to move it.

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05 04 50 44 CDR-EVA Yeah, if Charlie moves a switch while we're driving, I'll be turned right - left every time.

05 04 50 48 CC Okay; understand.

05 04 51 03 CDR-EVA By gosh, this is really something.

05 04 51 05 LMP-EVA Sure is.

05 04 51 27 CDR-EVA Yeah, man.

05 04 51 29 LMP-EVA Ya-a-a hoooo!

05 04 51 32 CDR-EVA (Laughter)

05 04 51 34 LMP-EVA Look at that thing dig in.

05 04 51 36 CDR-EVA Boy, we just missed a ...

05 04 51 39 CC Are you steering on all four wheels?

05 04 51 44 LMP-EVA Yep.

05 04 51 46 CC No problem?

05 04 51 50 CDR-EVA No, I was really going slow at first. I think it would be a problem when you're navigating on unknown terrain.

05 04 52 01 LMP-EVA Hey, we've been making about 10 clicks, Tony, and going just super.

05 04 52 05 CC Outstanding.

05 04 52 07 CDR-EVA Well, you see, going down-Sun or into the Sun, which we're not going to be doing much of anymore, is really - you can't - you can't plan ahead far enough to do yourself any good.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 03 29 XX BEGIN LUNAR REV 26

05 03 38 56 CC Casper, Houston.

05 03 39 02 CMP Hello there.

05 03 39 03 CC Hello. How'd it go on that rev?

05 03 39 10 CMP Well, that's right interesting. On the zodiacal light, I got it done and took the last frame just as the Sun - I took the frame and it said stop the tape and the Sun came up. So, I guess that all worked out pretty good. In the process, I missed the settings for a quarter of a second and possibly one of them for a half because when I turned the filter, it came off. And I figured there wasn't any sense in taking it with the filter in other than its 90-degree positions. But the rest of the stuff - managed to get done on time and we rolled out at 31:09 and turned the MAPPING CAMERA, ON, at 31:09. So, you missed about 6 seconds.

05 03 40 00 CC Roger. Copy.

05 03 40 03 CMP I guess the - it was - maybe that was - maybe I made it. It was right close - yeah, 31:12 was when you wanted it. That was a tight maneuver.

05 03 40 34 CC Ken, you have your 9 Charlie handy?

05 03 41 01 CMP Okay, Hank. Go ahead.

05 03 41 02 CC Okay. Our best guess for the LM is at coordinates 80 and Charlie Alfa 0.7. That's about 200 meters northwest of Double Spot.

05 03 41 23 CMP Okay. That's 80 and Charlie Alfa 0.7.

05 03 41 28 CC That's affirmative.

05 03 41 36 CMP Okay. We'll go take a look.

05 03 41 42 CC And, I do have one other Flight Plan change for you.

05 03 41 45 CMP Thank you very much.

05 03 41 53 CC That occurs at 126:44.

05 03 41 54 CMP All righty.

05 03 42 15 CMP Okay, go ahead.

05 03 42 16 CC Okay. You know we told you earlier we didn't really want to play around with that mass spec boom. So, we want to delete the "Mass spec retract to 8.4 feet."

05 03 42 29 CMP Okay, that's deleted.

05 03 42 31 CC And, at 1 - 128:29, since we didn't pull it back, we don't need to deploy it again. We can delete the "Mass spec deploy."

05 03 43 12 CMP Hank, are you still there?

05 03 43 14 CC Roger. Did you copy that last?

05 03 43 19 CMP No, you just stopped talking it sounded like.

05 03 43 22 CC Oh - okay - -

05 03 43 23 CMP You want me to delete the boom retraction.

05 03 43 27 CC Okay, at 128:29, there - delete "Mass spec deploy."

05 03 43 42 CMP Okay, that's because it is already out.

05 03 43 45 CC That's affirmative.

05 03 43 50 CC And, Ken, your biomed data looks good now and I guess that's about all I got for you at AOS. Did you see anything on this last back side that is worthy of comment?

05 03 44 03 CMP Ah - yeah. Around Mandel'shtam, I was looking at some interesting flow features. And, again, I am using the flow feature - that's the kind of appearance it has - not that's what it is. And, right at AOS - oh, maybe 3 minutes after AOS - I mean LOS -

05 03 47 31 CMP Hank, right now I am looking at - coming on across Smythii and I'm looking at some features there that - up on one of the - of the subdued filled-in craters that we see on the northern edge - I - well, it's out - out of where I can reach it now, what

I - what I was looking at was a crater that's - all subdued and typical of those features in Smythii. It had an outer ring and I think probably the crater I was looking at is the one that's about -

05 03 48 25 CC

Hit AUTO in the HIGH GAIN, Casper, when you get a chance.

05 03 48 31 CMP

Okay, you've got AUTO. I guess the one I was looking at is the one that's on the map about 85 degrees - no, make that about 84 degrees east and about 2 degrees south - There's a large one there. And on the northeast side of it, there is a little bright-rayed crater that I - first caught my eye. And, then there's an arcuate pattern that goes with it that's concentric to this large crater. And this bright crater is right at the head of it. This concentric material is a very light color - and if it were in a straight line, you would say it was ray material. It's possible - it doesn't look like a raised rim like the other rims on the concentric crater on the big basin. However, it looks like this little bright-rayed crater is right at the head of it. And it is - the bright-rayed crater appears to be domed up in just a slight rise and then this bright crater in top of it. And then what looks like this other ring, which is concentric to the big crater. We ought to have that on pan stuff, so I won't worry about it. Because it is almost directly into the groundtrack.

05 03 50 07 CC

Roger. Can you see Neper from there?

05 03 50 13 CMP

Not now. I probably could have then.

05 03 50 26 CC

How far to the - either side of the groundtrack do you think you can adequately see?

05 03 50 35 CMP

Not very far. These windows really - You're really restricted. Let me see if I can give you a gouge here.

05 03 50 44 CC

I was just curious. We are going to be coming by La Pérouse and Kapteyn here shortly and I just wondered if you could get a look at their central features.

05 03 50 52 CMP Yeah. I know you can't see - Oh, I'm almost positive you can't see that far.

05 03 51 26 CMP We're flying - what a - north - south of Blagg right now, right? So, that means my window number 3 is straight down.

05 03 51 37 CC That's affirmative.

05 03 52 15 CMP Okay, I've got - ol' La Pérouse and Ansgarius.

05 03 52 29 CMP Well, wait a minute - maybe not.

05 03 52 42 CMP Okay, I can see La Pérouse. I missed him. I got out here a little bit too late.

05 03 42 58 CMP I should be looking at the two I was always getting confused here. And, that - must be getting pretty close to a subsolar point, because the terrain features are really hard to distinguish. I do see Kapteyn and Langrenus A. And the central feature in Langrenus A is more obvious than the one in Kapteyn from the Sun angle.

05 03 53 41 CC You just passed the subsolar point, Ken, about 3 or 4 minutes ago.

05 03 53 48 CMP Yeah, it's pretty hard to see things, although I guess I'm equally impressed with how much you can see in - certainly see a lot more than these photographs have shown us.

05 03 54 05 CC You are over the Maclaurin series now.

05 03 54 16 CMP Yeah, I have trouble with them up here just like I did in school.

05 03 55 32 CMP Okay, I am looking at the central peaks in Langrenus and you can see blocks with the telescope here.

05 03 55 51 CMP There's actually some fairly large ones on the - on the western slopes of the eastern part of the horseshoe. And there appear to be an awful lot of them in the little alluvium fan that appears to be out to the south.

- 05 03 56 43 CMP And, I am trying to look at some of those dark patches that are in the southern walls. They look like flat dark blobs of material that are in - along the terraced material. And I really can't make out a great deal. Terraces in this area are - are extremely wide and fairly steep. And the walls here look relatively steep compared to the other walls around the Moon.
- 05 03 58 11 CMP This is really a nice attitude for viewing things. I can see Petavius and it stacks up - great big central peak - I think that's Petavius because Petavius B is down there.
- 05 04 00 37 CMP Okay, I am looking at Messier and Messier A and they're - around the elongate of the two, there doesn't appear to be anything you can pick up with binoculars except it looks kind of mottled. The interiors slope like all the rest. The interior didn't look particularly different - on - the rounded one, it looks like there is a resistant - several resistant layers in the sides, and I'll get a picture of those. In fact, they're standing out. And, it does look like there is a connection between the two craters. Some subtle thing that comes out in the direction of the tails and, then as you come out to the west, there's some darker material that runs out and looks smooth and stands out and comes out into the mare and it - almost looks like dark material might be - might be - might be a result of the crater although I'm sure that the white - the light streaks on the - are the things that are supposed to be coming out -
- 05 04 02 13 CMP It does appear to be, though, that when I look at the - I've got a place now where I can see the light tail and the - and the regular mare together and I got a picture of that. That's frame number 14 on magazine Victor. And that - It looks to me like there is a higher crater count of large craters in the light-rayed material than there is in the darker material.
- 05 04 02 47 CC Say that again, Ken, about the crater count.

- 05 04 02 52 CMP It looks like it's higher in the light-rayed material than it is in the darker stuff, which is, I guess, what you would anticipate.
- 05 04 03 21 CMP If you are a fan of bright-rayed craters, frame number 15 is one of those, just coming up on - oh, lost my place.
- 05 04 03 55 CMP Yeah, it's about halfway between - oh, the beginning of the highlands - Gutenberg Highlands, and - where Censorinus is.
- 05 04 04 13 CC Roger.
- 05 04 05 01 CMP And, Hank, at this higher Sun angle now when we get down here and we look at this place where the - where we're talking about the bright rays that seem to take a funny shape between MAdler and a little crater out to the east of him. It's not real obvious now that there is anything more than some bright material in between it.
- 05 04 05 25 CC Roger.
- 05 04 05 43 CMP I'll tell you, these Sun angles really can play tricks on you, and I'm looking at MAdler now, and I got a real good view of him. And we discussed the possibility of having material come in from the north and run down inside of him. And it's not that obvious when you look down on him from here. There's material that runs over - you see a little high. As you look down inside, you see light and dark material, the same kind of combination you see in other craters. With the naked eye, it looks very much like - there's an expression that says that this ridge to the north ran down inside there and formed that little tongue. But when you look at it in blown-up detail, you see some vertical - well, now I can see places where I can see a flow pattern that's run down in. And, as a matter of fact, I'll get a picture real fast. Hope that gets it.
- 05 04 06 42 CC Do you think that - just looking at a map here - do you think that what you're seeing could be an expression of the rim of Nectaris?

05 04 06 52 CMP No. No, I sure don't because this has a nice margin, and it curves down in and rolls down as though it had - it starts where there's a little terrace - a little - looks like part of a cratered terrace. And it runs down inside and it runs out and forms that central feature, and it runs down on the floor. And it certainly appears that it came and rolled down on there after the crater and all its slump features were already there. We'll have to come back to the question of its relation to Theophilus.

05 04 07 26 CC Roger.

05 04 09 20 CC Ken, for your information, John and Charlie are at Flag now.

05 04 09 29 CMP Okay, I'll wave to them. I'll tell you, NASA needs to recruit some octopuses. I could really use a couple of more hands.

05 04 09 45 CC (Laughter) Roger.

05 04 10 13 CMP Okay, I'm going to concentrate on North Ray as I distinctly believe that the - area that the traverse drawn on that goes up on the North Ray comes up on a - material that looks like it has flowed around and is part of the basic furrowed Descartes unit that's mapped back further to the east. And it looks to me like it runs down around the crater and - and straight into it.

05 04 11 04 CMP I can see evidence of stratigraphy in North Ray, and lots of it in South Ray. And as we come across at - boy, I'll tell you, the - the general topography down there looks about the same all the way across the board.

05 04 13 57 CMP And just at a cursory glance, we're coming up on Albategnius now and that material that's over to the east of it - that kind of hummocky and undulating material and it's furrowed. And it looks very much like the material around Descartes. I said it did in a very low Sun, and it has the appearance of having many of those same characteristics.

05 04 14 55 CC Have you got pretty good shadows in this area now, Ken?

05 04 15 01 CMP The shadows are right here coming across Albategnius. They're pretty well cleared out. You just get the shadows from the very big peaks. At Ptolemaeus, it's almost completely clear of shadows. Alphonsus still has some. I can pick out the crater chain now. It's just now getting out of the shadow, and, sure enough, there is a great big little ridge that lays across the front of it that's been masking it all this time. The floor of Ptolemaeus looks to be like all the rest of the Cayley material. It's got a great deal of craters as you can see from the pictures. I would say the preponderance of them are rimless. As they get a little larger, they start to form with a - very - a very subtle rim, so I guess I can't say that they're all rimless. There is one, looks like a fracture, about in the middle, and it may be a scarp that's caused by a fracture, or it may be a flow pattern.

05 04 16 51 CMP And as we come upon Davy chain, it appears that they do have - they don't each have an individual rim. There is mottled material in this area, and I'm going to try and get that magazine. I think you need to see this. Can you give me the settings for the - so we can take a picture of this real fast.

05 04 17 18 CC Stand by.

05 04 17 33 CMP Using VHBW.

05 04 17 42 CC Okay. I'll - we see if we can get them, Ken.

05 04 17 47 CMP Okay. I'm going to take one here now at - that was 5.6 and 1/125 I'll take a 250th. Second one's a 250th. And that ought to bracket it, I hope. And that's of the crater chain itself. And it just - it appears that they're essentially rimless, but the whole area down there is kind of mottled.

05 04 18 16 CC Roger. Did you use the EL for that?

05 04 18 17 CMP It's a very pretty scarp. No, I used VHBW.

05 04 18 51 CC Casper, Houston. You're coming up in about 20 seconds to a T-stop.

05 04 18 53 CMP I sure am. Okay. Thank you. Give me a call at T-stop.

05 04 19 12 CC MARK it; T-stop.

05 04 19 17 CMP Okay. We're at T-stop. Thank you.

05 04 19 32 CMP Okay, that's - We're now in frame 36 on magazine SS.

05 04 19 50 CC Okay. You can go - STANDBY on a MAPPING CAMERA and IMAGE MOTION, OFF.

05 04 20 00 CMP Okay. STANDBY and IMAGE MOTION, OFF. Barber pole - gray.

05 04 20 21 CMP It's very interesting, Hank. I've got a little stranger back here that's trailing me. Must be one of Casper's friends.

05 04 20 29 CC All righty. We'll - -

05 04 20 30 CMP Got a little light's just sitting out there. I guess he's - I have no idea how far away it is, you know, though - I have the impression it's like 10 feet, but it could be 100 feet or 1000 feet. But it's apparently some little particle that's in orbit with me, and it's - it's probably rotating, because it's winking. I first saw these last night, and I thought I'd seen something on the ground. Then I realized I'd - it was moving at the same rate I was and every now and then I look out and I see these particles that are reflecting around me.

05 04 21 07 CC If you see a blue one winking, you'd better pull over.

05 04 21 10 CMP Mass spec guys might be interested. (Laughter) Yeah, if I hear someone say, "Beep, beep," I'll wake the SPS or something.

05 04 21 28 CMP The mass spec guys might be interested in that though.

05 04 21 32 CC Okay. They're listening.

05 04 23 48 CC Casper, Houston.

05 04 23 53 CMP Go ahead.

05 04 23 54 CC Roger. To make up some of the SIM Bay data we lost here, we'd like to make a real-time change here, since we've got to maneuver over to the north oblique here in about 40 minutes or so. We'd just like to now make a maneuver to plus-X SIM Bay, and we'll take SIM Bay data until you have to roll on over to the north oblique.

05 04 24 21 CMP I understand you'd like for me to go to plus-X forward SIM Bay attitude now.

05 04 24 26 CC That's affirmative.

05 04 24 32 CMP Okay. I can do that and eat at the same time.

05 04 25 36 CMP Henry, I understand you want me to go to the north oblique photo attitude.

05 04 25 40 CC Negative. Now we just want you to go to the plus-X SIM Bay.

05 04 25 43 CMP Or just to the - Okay, fine.

05 04 29 10 CC You playing music, Ken?

05 04 29 14 CMP Yes, sir. How do you like Mahler from space?

05 04 29 19 CC Sounds all right.

05 04 29 21 CMP I know you don't like him even - you don't even like him at home. I'll tell you, this has got to be absolutely sinful - too much fun to be ...

05 04 30 09 CC Okay. I see you're at attitude.

05 04 30 18 CMP Hey, thank you. Good call. That'll keep me from having to do it again.

05 04 30 27 CC And, Ken, to fill you in, what we're after is to get as much of the SIM Bay data as we can, since we missed some of it. The alpha part especially needs a lot of it, and - if you've got you Flight Plan in front of you, at - at 125:15, we are supposed to now - then move over to the 40 degrees north oblique. FAO says that maneuver takes a

maximum of 3 minutes. So if you could delay starting that until whatever you figure is a reasonable time before the mapping camera T-start, then we can - we can get a pretty good slug of data in there.

05 04 31 08 CMP Okay. Be glad to do that. How's our little laser coming along? Is it doing any better or any worse? I guess we haven't had it on since you gave me your report, though.

05 04 31 38 CC It's still toddling, Ken. I guess when we get it back running again, we'll be getting about 80 percent with it.

05 04 31 49 CMP Okay. Is that latter network working, or has it got a different problem?

05 04 31 54 CC It's working okay, Ken.

05 04 33 03 CMP Hank, can I give you some comments that are not really pertinent to anything we're doing, but little observations that I had a chance to make, and I'm afraid I'll forget them. I got too many things stored up in my head now.

05 04 33 18 CC Okay. Go ahead.

05 04 33 19 CMP But - one of - one of the things, I was just sitting here looking at the equipment and some of the things that have caused more interest than others in what we were doing. And - one of the things that is at the heart of a lot of your time in this spacecraft is fixing something to eat. Now, I'm - Without discussing whether or not you need to eat this much, just the idea that if you try to eat part of it, it takes an awful long time to fix each of these things. And one of the big hangups is we all get clustered around the water gun. We've talked about gas coming out of the water gun, and this is not the drink port, but the food-preparation station. And the - if you - one of the ways we found we could induce gas bubbles into the water was by depressing the plunger before it had had a chance to complete its stroke. If you let it complete its stroke, it seems to give you a nice, relatively gas-free shot of water. And it looks like the

hot water gives you more for an ounce than the cold water does. But if you're very meticulous about waiting until you're sure that the plunger has made its full travel, and then count to 10 or something before you push it again, the cold water isn't quite as short as it looks like it is. And I don't really know how to explain why we have gas bubbles sometimes and why we don't. It's almost as though the gas separator may not affect the problem. We started out and the first couple of days we didn't have any gas. I guess about 2 days. Then on the third day, we started getting gas in the hot water and we were getting like 50 percent gas. We tried the cigar gas separator, and that - that - after we got it flushed out the first time, seemed to work pretty well. And then it started getting gas, so we decided to try the prototype model. Then when we put it on the feed station - why, as soon as we put it on, why, we made a squirt and nothing came out, and we decided to try it again. And by then, it was obvious that it was building up pressure inside, and the food station was putting out water, and it wasn't coming out the other end. And we never did get water to come out the - the outlet side of the new gas separator. And it looks like it has a crack in the top on the inlet side, and the gas - the water was bubbling out of that. It was coming out under pressure. When we took the thing off, why, you could tell that the check valve or something, had never been opened. So we really don't know whether that thing has any effective use or not. And it - it seems like the more water you use, the more gas you get. I don't - I'm not sure I completely understand that. You get more gas in the hot water than you do in the cold water. But the water I've been getting out today and yesterday has been almost gasfree. I can spin it up here, and I won't get - I get a zone of less than 10 percent gas. And that's 10 percent of a 7-ounce food - juice bag. The other day we were getting 50 percent. And I really can't psych out exactly all the causes for it. The cigar food - cigar dispenser there has some problems of its own. And every time you get through with it, it dribbles. And it will dribble for quite a while. But I found out if you put the little cap on it right away, then it quits dribbling. And it's only that initial

dribble, and the rest of it from there on is easy. I really don't expect anything to be done with these comments. I just want to - we're supposed to evaluate these things, Hank. And rather than write them down - it's a lot easier to put here, and I'll get it off the tape after the flight.

- 05 04 37 56 CC Okay. I took notes there on most of that.
- 05 04 38 01 CMP Okay. I'm sorry. I should have told you first. I really wasn't anticipating you having to copy all that. I'm kind of rambling and being verbose. But I can see that I'm not going to get everything I see written down and probably ought to go ahead and get it jotted down some way.
- 05 04 39 37 CC Ken, it looks like the next action in the Flight Plan for you is around 125:13 where it says "GDC align." I think we've scratched out everything ahead of that.
- 05 04 40 01 CMP Okay. I'm taking advantage of that to get a little eating done, and maybe we can have a chance to look at the backside this time.
- 05 04 40 08 CC Okay.
- 05 04 44 24 CMP Hank, there's one other thing I'd like to comment on before I forget it.
- 05 04 44 29 CC Go ahead.
- 05 04 44 33 CMP That's the cockpit temperature. I've been noticing a little gage, and it (laughter) - it doesn't ever move. I think it's got a - I think it's plugged into a dummy load somewhere. But the cockpit temperature does, in fact, change quite a bit. And on the way out, in PTC with the three of us in here, it never really got cool enough even for people as warmblooded as Charlie and I. And we were wondering, you know, gee, if it was like that in PTC, what was it going to be like when we got in orbit. And the first day in orbit there, it was - it really was kind of hot and stuffy. And I don't know when it got cool, but last night it was nice and cool. And, in fact, I woke up this morning because I was cold.

That was the reason I woke up. And in the past, I've had a hard time sleeping sometimes, because it was warm. I don't know whether that's a - that's caused by going to the 60-circular orbit, or whether that's caused by having only one body to take care of in here, instead of three. But it was very obvious. Unfortunately, we'd get a chance to - I couldn't tell you yesterday. I was wearing a suit, and so it was never really comfortable most of the day. Maybe when John and Charlie get back, we'll notice again, and see if it gets hot again.

05 04 49 29 CC

Casper, Houston. We're about 2 minutes from LOS, and everything's looking good from this end.

05 04 49 41 CMP

Okay, Hank. You're cutting out; I understand.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 04 52 07 CDR-EVA - - Sun or into the Sun, which we're not gonna be doing much of any more. It's really - you can't - you can't - you can't plan ahead far enough to do yourself any good.

05 04 52 18 CC Roger.

05 04 52 19 CDR-EVA That's why I was going so slow there at first.

05 04 52 30 LMP-EVA Okay, John. We need to stop out here for the Grand Prix.

05 04 52 33 CDR-EVA Okay.

05 04 52 34 LMP-EVA And it's a -

05 04 52 39 CDR-EVA Here's a flat place, sort of.

05 04 52 41 LMP-EVA But let - We got to get over there where the - I'd like to get over there so I won't have to get back on, see, and pick up the core stems.

05 04 52 48 CDR-EVA Okay. I got you.

05 04 52 50 LMP-EVA You've got to arm the mortar package central station at switch 5, CCW. Okay, why don't we go over to the right, where the stems are. ... boresight it on the LSM now.

05 04 53 06 CDR-EVA Yeah.

05 04 53 15 LMP-EVA Hey, here's a big one, John.

05 04 53 17 CDR-EVA Oh, man.

05 04 53 18 LMP-EVA Hook a right.

05 04 53 42 LMP-EVA Tony, again we're just driving by the - the ALSEP and apologize for that heat flow. I wouldn't trade you - The drill seems to work just great, though. I think it's real - it's in good shape right now for next flight.

05 04 54 00 CC Good show, Charlie.

05 04 54 05 CDR-EVA There's a flat place right in here, Charlie.

05 04 54 07 LMP-EVA Yeah, that's what I was thinking. See, you could go out up that way and then out over that way towards the LM. Okay?

05 04 54 12 CDR-EVA Right. Right.

05 04 54 14 LMP-EVA Okay. Let me jump off.

05 04 54 16 CDR-EVA A day ago, it didn't look like we were even gonna land, and now we've sampled our first highlands. I feel pretty good about the science without the heat flow.

05 04 54 27 LMP-EVA Well, I know Mark's disappointed, and I sure am. Frankly, that was a - just a real shame. That was - My big moment, was to get that thing going. Put this camera in here, John. Okay?

05 04 54 43 CDR-EVA Yep.

05 04 54 45 LMP-EVA Okay. Now let me see. You're suppose to drive 45 degrees to the Sun. Okay?

05 04 54 51 CDR-EVA Yep.

05 04 54 52 LMP-EVA Okay. Let me get the - 16 off.

05 04 54 55 CDR-EVA I'll do it from there up towards this way. Okay?

05 04 54 58 LMP-EVA Wait a minute. Okay, which way you gonna drive? From here this way?

05 04 55 02 CDR-EVA Going over to - -

05 04 55 03 LMP-EVA - - this stone?

05 04 55 04 CDR-EVA You see where that white thing is?

05 04 55 05 LMP-EVA Yeah.

05 04 55 06 CDR-EVA I - I'll go over there toward a rock and drive up this way. Okay?

05 04 55 09 LMP-EVA Okay. Well, wait - Why don't you just drive - drive towards the LM. Let me move out here, and you just drive towards the LM, turn around, and then drive towards Stone.

05 04 55 17 CDR-EVA Okay.

05 04 55 18 LMP-EVA Okay?

05 04 55 19 CDR-EVA Okay.

05 04 55 20 LMP-EVA Let me get the camera. Let me get it set here now. It's 24 - gonna be using the trigger, so it's 24, and f - f/8 at 250.

05 04 55 39 CDR-EVA Hey, that IM makes a nice looking house.

05 04 55 50 CC Especially since it's about the only one there.

05 04 55 56 CDR-EVA Yeah.

05 04 55 59 LMP-EVA You're right, Tony. It ain't - nothing much up here but a lot of rocks.

05 04 56 03 CDR-EVA Hope the door opens, Charlie.

05 04 56 05 LMP-EVA Huh? What?

05 04 56 07 CDR-EVA I said, I hope the door opens.

05 04 56 08 LMP-EVA It'll open. ... close it. This thing is stuck. I can't get it up. Let me move out. Okay. To start, I'm suppose to be about 50 meters or so from you.

05 04 56 28 CDR-EVA Okay, Charlie. And what I'll do is drive from A to B, standing start, max velocity readout, and - do some - I'm not going to do much steering control around here other than to avoid regular craters. We'll have to do that anyway.

05 04 56 51 LMP-EVA Yeah. Okay. I'm ready.

05 04 56 53 CDR-EVA And I'm not going to brake it to amount to anything.

05 04 56 58 LMP-EVA DAC's on -

05 04 56 59 LMP-EVA MARK. That max acceleration?

05 04 57 06 CDR-EVA No.

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05 04 57 10 LMP-EVA Man, you are really bouncing.

05 04 57 14 CC Is he on the ground at all - -

05 04 57 16 CDR-EVA - - she's hitting 10 kilometers. Huh?

05 04 57 20 LMP-EVA He's got about two wheels on the ground. There's a big rooster tail out of all four wheels. And as he turns, he skids. The back end breaks loose just like on snow. Come on back, John. Okay, the DAC is running. Man, I'll tell you Indy's never seen a driver like this. Okay, when he hits the craters and starts bouncing is when he gets his rooster tail. He makes sharp turns. Hey, that was a good stop. Those wheels just locked.

05 04 58 03 LMP-EVA MARK off.

05 04 58 05 CC Okay.

05 04 58 06 CDR-EVA Okay, you want to do it one more time?

05 04 58 07 CC - - about a minute and 5 seconds that time.

05 04 58 08 LMP-EVA Okay.

05 04 58 09 LMP-EVA MARK on. Okay. You could have gone the other way, but go ahead. There's the big craters there, though, aren't they?

05 04 58 19 CDR-EVA Yeah. I don't want to run into those holes.

05 04 58 24 LMP-EVA They want 4 minutes' worth, John. That was a minute and 5. Maybe you can do it in twice more.

05 04 58 30 CDR-EVA Charlie (laughter).

05 04 58 31 LMP-EVA Okay. Turn sharp.

05 04 58 34 CDR-EVA I have no desire to turn sharp (laughter). Okay, here's a sharpie.

05 04 58 39 LMP-EVA Hey, that's great! Man, those things - when the - when those wheels really dig in, John - John, when you turn is when you get the rooster tail.

05 04 58 51 CC Charlie.

05 04 58 52 LMP-EVA The suspension system on that thing is fantastic.

05 04 58 54 CC That sounds good. We sound like we probably got enough of the Grand Prix. We're willing to let you go on from here. Call that a Grand Prix.

05 04 59 03 LMP-EVA Okay. Man, that was all four wheels off the ground, there. Okay. Max stop.

05 04 59 12 CDR-EVA Okay. I don't want to do that.

05 04 59 13 LMP-EVA Okay. Excuse me.

05 04 59 16 CDR-EVA They say that's a no-no.

05 04 59 22 LMP-EVA Okay, DAC off -

05 04 59 24 LMP-EVA MARK. Okay, John. DAC's off.

05 04 59 27 CDR-EVA Okay. I have a lot of confidence in the stability of this contraption.

05 04 59 30 LMP-EVA Me, too.

05 04 59 32 CC Sounds great.

05 04 59 34 LMP-EVA Okay. You got to dismount, arm the mortar pack - -

05 04 59 41 CDR-EVA Okay. Where's your core tubes at, Charlie?

05 04 59 43 LMP-EVA I'll get them.

05 04 59 45 CDR-EVA Okay. Well, I'll stop it - I'll - -

05 04 59 46 LMP-EVA Go ahead. I'm going to run back in.

05 04 59 49 CDR-EVA I knew you'd rather get out and walk.

05 04 59 51 LMP-EVA That's right.

05 04 59 52 CC After he saw the way you drove.

05 04 59 57 CDR-EVA Well, it's a lot less - when Charlie's in here, it's a lot less bouncy. And that's the truth. I should say some less bouncy.

05 05 00 15 CC John, you're gonna get a feedwater tone in the near future.

05 05 00 22 CDR-EVA Okay.

05 05 00 23 LMP-EVA Man, I can't believe mine's going through that much faster. Course, I sweat like crazy. Always have. Okay, Tony, I'm jogging back in.

05 05 00 36 CC Okay.

05 05 00 41 CDR-EVA Charlie, I can't get my seatbelt off.

05 05 00 43 LMP-EVA Uh-oh.

05 05 00 47 CDR-EVA See if you can tell - tell me what the problem is.

05 05 00 50 LMP-EVA Okay. You don't have it - you don't have it unlocked. Now let her go. No, you don't have it unlocked, John. It's - got it over center. Push it - now let your hand go. See - wait a minute. Now. You got to let this thing go - you're pushing here.

05 05 01 14 CDR-EVA Oh, okay.

05 05 01 15 LMP-EVA Okay; let it -

05 05 01 16 CDR-EVA - - Okay, I can't - - I couldn't see it - -

05 05 01 17 LMP-EVA - - Now there you go.

05 05 01 18 CDR-EVA Okay; fine.

05 05 01 20 LMP-EVA There you go.

05 05 01 21 CDR-EVA Thank you.

05 05 01 22 LMP-EVA You are filthy.

05 05 01 26 CDR-EVA (Laughter) I tell you, there's the pot calling the kettle black.

05 05 01 37 LMP-EVA Man, there's a beautiful secondary, Tony.

05 05 01 41 CC Is it oblong or round?

05 05 01 43 LMP-EVA -- Meter size. It's - it's round with a very angular block in it.

05 05 01 53 CC I guess we don't have time to look at it, Charlie.

05 05 01 55 CDR-EVA And my purge valve is still on strong.

05 05 01 58 LMP-EVA No, I'm going to press on.

05 05 01 59 CC Okay.

05 05 02 01 LMP-EVA I didn't even stop.

05 05 02 05 CC Gee, we could have called that a seatbelt stop.

05 05 02 36 LMP-EVA Tony, the rocks in this ray near the lunar module are entirely different from the ones we've been sampling. They're just different. We're gonna have to make a stop here - in station 10 - and call station 10 here, right in front of the lunar module and sample here.

05 05 02 54 CC Okay. Sounds like a good plan.

05 05 02 59 LMP-EVA Wow, I'm in the dark. I'm at the LM. ...

05 05 03 20 LMP-EVA Okay. I ran to the third mark down from full - whatever that is; empty, I guess. I ran - looks like 50 percent of the mag, Tony.

05 05 03 36 CC Okay. I've got about 2 minutes and 10 seconds, so that would be about right.

05 05 03 41 LMP-EVA That's about right, then.

05 05 03 45 CDR-EVA Okay, first arming pin is out. Second pin is going to arm. ... Third pin is going to arm.

05 05 04 25 CDR-EVA *** as far as it goes. Must be armed.

05 05 04 56 CDR-EVA Now they ought to all be armed. Either that or the pins are broke off. Okay. At switch 5, we'll go CCW.

05 05 05 09 CC Okay.

05 05 05 19 LMP-EVA After you've been out in that Sun awhile, that - this shadow is really dark. ... Hey, Tony, the cores are in the bag; breaking out the solar wind.

05 05 05 41 CC Okay. Okay. And, John - -

05 05 05 46 CDR-EVA Switch 5, CCW - -

05 05 05 47 CC - - did that mortar package move at all when you pulled the pins out?

05 05 05 52 CDR-EVA Yeah, it moved, but it's level still.

05 05 05 54 CC Okay.

05 05 06 01 CDR-EVA Is there anything else you want me to do while I'm out here, Houston?

05 05 06 05 CC Negative.

05 05 06 09 CDR-EVA Huh? Say again?

05 05 06 10 CC No, let's head on in.

05 05 06 14 CDR-EVA Okay.

05 05 06 44 LMP-EVA Here it says "Sun."

05 05 06 47 CDR-EVA Charlie, figure out where that is.

05 05 06 49 LMP-EVA This is foolproof. Point this side at Sun, dummy. Okay. Solar wind is planted in the Descartes Highlands. Figure out where what is?

05 05 07 10 CDR-EVA The Sun.

05 05 07 11 LMP-EVA Oh, I was reading - reading the SWC.

05 05 07 14 CDR-EVA Oh. (Laughter)

05 05 07 18 CC Okay, Charlie. Sounds good.

05 05 07 20 CDR-EVA Okay, I got a - okay, Houston; BEARING, 022; RANGE, 0.1; and that's where it is. And that is no joke.

05 05 07 31 CC Outstanding.

05 05 07 32 CDR-EVA That's where we aligned it at - that is fantastic! You want to read these numbers off, or you just want to head out?

05 05 07 43 CC Let's have them.

05 05 08 00 CC John. We'll take those numbers.

05 05 08 06 CDR-EVA No, (laughter) I'm already going.

05 05 08 09 CC That's okay.

05 05 08 10 CDR-EVA En route, now.

05 05 08 13 CC Okay. We'll get them when you park.

05 05 08 16 CDR-EVA Okay.

05 05 08 31 CDR-EVA Ain't nothing - There's nothing plain about this place, Houston, I'll tell you. I don't know whoever thought it was plain. Cayley Plains, man.

05 05 08 40 LMP-EVA Okay, Houston. These rocks - I picked up one - -

05 05 08 43 CC Kind of like ... smooth.

05 05 08 44 LMP-EVA - - right out here that I described that blue - that - -

05 05 08 49 CDR-EVA Yeah, that - that's smooth.

05 05 08 50 LMP-EVA - - that blue one that I described from the lunar module window, and my bluish color is because it's glass coated, but underneath the glass, it's a crystalline rock that, to me, has the same texture as the Genesis rock, and it's not a breccia. At least I can't - the part I'm looking about - at is it's not a breccia - maybe just one big clast. But the part I'm looking at is a one solid - it's an igneous, plutonic rock.

05 05 09 29 CC Okay. How big was it?

05 05 09 33 LMP-EVA It's about football size, little bit smaller. Going into plus-Z footpad.

05 05 09 42 CC Okay.

05 05 09 43 CDR-EVA Okay, Houston. Your readings are - We're parked on a heading of north. And it says the BEARING is 355, the RANGE is 0, the DISTANCE is 4.2. It says the AMP-HOURS are 108, 105, 6 - and the VOLTS, 68 and 68. The AMPS, of course, are 0. On the 1 BATTERY, TEMPERATURE is 104, and 1 [sic] is 105. That number 2 is 105. The FORWARD MOTOR TEMPs are off-scale low, and the REAR MOTOR TEMPs are off-scale low. And there's my - my - my - my - my water flag, I hope.

05 05 10 37 CC Roger. You have a water flag.

05 05 10 41 CDR-EVA Turn on the OPS - Huh?

05 05 10 44 LMP-EVA Okay. Tony, can I take the - the pictures of the SWC with my black and white?

05 05 10 56 CC Stand by a second.

05 05 11 01 LMP-EVA I've already got it on; I hope you say yes.

05 05 11 03 CC Yeah, go ahead.

05 05 11 07 LMP-EVA Okay. Thank you.

05 05 11 10 CDR-EVA Okay, Houston. You're going to 3.

05 05 11 13 CC Okay.

05 05 11 24 LMP-EVA ... Every one of them.

05 05 11 25 CDR-EVA Yeah.

05 05 11 26 LMP-EVA And we didn't see any at - at the other two craters.

05 05 11 30 CDR-EVA We might have missed some, but I agree I didn't ...

05 05 11 35 LMP-EVA Tony, I'd say 15 - 15 percent of these rocks are glass coated, and at the other - stops 1 and 2, we didn't see any.

05 05 11 45 CC And, Charlie, while you got the camera taking pictures there, we'd like you to go around and look at that cosmic ray and take a picture of it, and read off the temp label.

05 05 11 56 LMP-EVA Yeah. I already took a picture of it.

05 05 11 58 CC Okay. We're going to need a temp lable reading - -

05 05 12 00 LMP-EVA - - 7-footer in color. Okay. I'll go read the temp. You want another picture?

05 05 12 09 CC No, we don't need another picture. You might comment if there's any dust on it.

05 05 12 16 LMP-EVA No, it's clean as a whistle. And, buddy, it is - must be high. All of the labels - all three on each side are black. It's a hun - over 140.

05 05 12 30 CC Okay. We'd like you to take it off and put it on the minus - Y strut, in the shade.

05 05 12 39 LMP-EVA Okay. John will have to do that.

05 05 12 42 CC Okay.

05 05 12 45 CDR-EVA Okay.

05 05 13 03 CC Okay. And, Charlie, we'd like to press on with the closeout.

05 05 13 08 LMP-EVA And that's what I'm doing.

05 05 13 10 CC Okay.

05 05 13 13 LMP-EVA I'm - I've got - gotten John's bag now, and I'm gonna empt - empty it in the SRC, keeping the core tubes out.

05 05 13 37 LMP-EVA John, I think we've raised this thing too high.

05 05 13 58 CDR-EVA Okay, Houston. You should have us now.

05 05 14 25 LMP-EVA John, can you - can you take my bag off? I'm ready to ... You've got a whole bag. I emptied yours in there, and it wasn't even - it didn't even fill in the SRC, so take my bag off and we'll - -

05 05 14 36 CDR-EVA Okay.

05 05 14 37 LMP-EVA - - and I'll get on with this.

05 05 14 39 CC Okay, guys. We'd like to switch out the SCBs in the rock box. And we'd like to put SCB-5 in there instead of SCB-1.

05 05 14 49 LMP-EVA Tony, I've already emptied SCB-1 in there.

05 05 14 56 CDR-EVA Most of SCB-5 can go in there too, Houston.

05 05 14 59 LMP-EVA Yeah.

05 05 15 00 CC Okay. Great.

05 05 15 01 LMP-EVA I think I can get them both in there. I'm emptying them in, Tony.

05 05 15 03 CC Good show.

05 05 15 04 LMP-EVA Okay, Tony. Like we planned, I'm empty - I'm just emptying them into that.

05 05 15 09 CC Okay.

05 05 15 10 LMP-EVA And it packs easier that way.

05 05 15 24 CDR-EVA Boy, old LCRU, you are dusty.

05 05 15 42 CC Thank you, John.

05 05 15 47 CDR-EVA Say again?

05 05 15 48 CC I said thank you.

05 05 15 52 CDR-EVA Okay.

05 05 15 58 CC And, Charlie, we'll need your frame count sometime.

05 05 16 03 LMP-EVA Okay.

05 05 16 04 CDR-EVA Okay, Houston. Going to RESET on the far UV.

05 05 16 26 CC And, John, we have a new target for you.

05 05 16 32 CDR-EVA Okay. Go.

05 05 16 33 CC 204, azimuth; elevation 26.

05 05 16 42 CDR-EVA Boy, Charlie, you have to watch that battery cable. It's way up in the air around this thing.

05 05 16 46 LMP-EVA I know it.

05 05 16 48 CDR-EVA Say again the azimuth, Houston.

05 05 16 49 CC 204.

05 05 16 53 CDR-EVA No. You keep clipping out your first - your first number.

05 05 16 56 CC Roger. That's azimuth 204, elevation 26.

05 05 17 04 CDR-EVA Okay.

05 05 17 24 CDR-EVA I can't believe that.

05 05 17 39 CDR-EVA Okay, Houston. This thing is getting tighter and tighter in turning in the azimuth. I bet you it ain't going to make it much longer.

05 05 17 58 CDR-EVA *** 04 and 26.

05 05 18 02 CC Roger.

05 05 18 20 CDR-EVA I can't believe it. Okay; 204 and 26.

05 05 18 25 CC Sounds good.

05 05 18 34 CDR-EVA Okay. It may see a little LM there, Houston. That's what you want; we'll leave it there.

05 05 18 41 CC Okay. And we'd like you to go to - John, we'd like you to go to INTERMEDIATE on your cooling.

05 05 18 49 CDR-EVA Yeah. Okay.

05 05 19 00 LMP-EVA John, you've got to move the cosmic ray.

05 05 19 04 CDR-EVA Oh, yeah. Okay. *** that right now.

05 05 19 14 LMP-EVA Okay, Tony. We got all the rocks that we collected, except for a couple of biggies, into the SRC. Over.

05 05 19 21 CC Outstanding, Charlie. The reason for putting those others in there, is they wanted the soils in the S - SRC.

05 05 19 30 LMP-EVA Yeah.

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05 05 19 37 CDR-EVA Okay. Your white ring; right, Tony?

05 05 19 42 CC White ring. That's right.

05 05 20 02 CDR-EVA *** Dog you. *** Out of there.

05 05 20 09 LMP-EVA And you know I said the battery covers weren't going to get dusty?

05 05 20 14 CDR-EVA Houston, I don't know how to tell you this, but cosmic ray unlocks down at the bottom, but it won't unlock up at the top. Which way do I push it or pull it?

05 05 20 27 CC It should be a lift-off. Straight up. Correction. Straight out.

05 05 20 42 CDR-EVA Okay. That's what it is. Fantastic. Okay. It's set away from the Sun on the minus-Y.

05 05 20 59 CC Okay. That sounds good.

05 05 21 06 CDR-EVA And Charlie's right; it's ... there. Charlie, be careful when you go past the minus-Y.

05 05 21 20 LMP-EVA Okay.

05 05 21 33 CC Hey, fellows, we're able to see the Earth with your big eye there.

05 05 21 39 LMP-EVA How about that. Pretty sight, isn't it?

05 05 21 43 CC Sure is. Man, that looks weird.

05 05 21 48 CDR-EVA Okay. Houston, the way I had to set it to keep the - to keep the - to make it stand up against the strut, it's about, I'd say it has an angle of 50 or 60 degrees to the Sun. And the Sun is shining on the back of it, because the strut won't shield it completely, if you know what I mean. The base of it is down in the footpad, and the top of it is out - sticking out past the strut.

05 05 22 18 CC Okay. We copy that, John.

05 05 22 23 LMP-EVA Tony, my frame count - -

05 05 22 24 CC That's no problem, John. That's good.

05 05 22 25 LMP-EVA - - on magazine Bravo.

05 05 22 29 CDR-EVA Okay.

05 05 22 31 LMP-EVA You finished with your pictures, John?

05 05 22 33 CDR-EVA No. I haven't done those yet.

05 05 22 34 LMP-EVA Okay. Tony, my frame count on magazine Bravo was 120.

05 05 22 39 CC Okay; 120.

05 05 22 49 LMP-EVA And I'm helping John load up. I'm doing ETB right now, while he's taking pictures.

05 05 22 56 CC Okay.

05 05 23 26 CDR-EVA Cross-Sun, f/5.6 at 60; 20 feet.

05 05 23 41 CC Charlie, was your magazine Bravo or Golf?

05 05 23 48 LMP-EVA Whatever the one - whatever the one the checklist said.

05 05 23 55 CC Okay.

05 05 23 56 LMP-EVA I'll tell you inside; I'm bringing it inside.

05 05 23 57 CC Okay. That's fine.

05 05 24 06 LMP-EVA Okay. I've got all the film, John. All - -

05 05 24 08 CDR-EVA Okay, Charlie.

05 05 24 09 LMP-EVA All I need is your camera, and the ETB is going over to the MESA table. And I got a great big rock, a muley.

05 05 24 19 CDR-EVA Houston, if I take a down-Sun, I'll have to stand in front of this contraption. You want me to do that? In front of the camera at 3 feet?

05 05 24 31 CC I guess if you stand a few feet away from it, it shouldn't be too bad. Move 8 or 10 feet away, though.

05 05 24 40 CDR-EVA Okay. I'll take it at 8 feet.

05 05 24 53 LMP-EVA Tony, I take that back. That rock we picked up, the big - the muley is - oh, I was going to say glass crystals, but take that back. It - Part of it seems to be shocked, and it's a crystalline rock on the inside under all the dust. Whatever it is.

05 05 25 14 CC Okay, fine. We'll take it.

05 05 25 20 LMP-EVA Hey, we - What?

05 05 25 23 CC That's fine; we'll take it.

05 05 25 28 LMP-EVA Okay. I dropped - I dropped it onto the strut; part of it fe - broke off. I'm sorry. Okay, tidy MESA blankets; I've done that. Big rocks, I've done. I'm ready to clean EMUs and stow antennas.

05 05 25 47 CDR-EVA Okay. Where does my camera go, Charlie?

05 05 25 49 LMP-EVA Right here in the old ETB.

05 05 25 52 CDR-EVA What are we going to do with this thing? Can we throw it away?

05 05 25 55 LMP-EVA Leave it under the - throw it away; it's empty. Pull it straight up; there you go. That crummy thing. Yeah. That's okay.

05 05 26 13 CC Okay. We'd like - to the items that you're transferring up, we'd like to add the pallet 1 and the LiOH can.

05 05 26 24 CDR-EVA Yes, sir.

05 05 26 25 LMP-EVA Okay, John's frame count is 65.

05 05 26 30 CC Okay; 65.

05 05 26 43 LMP-EVA Glad you remembered that, Tony.

05 05 26 47 CC I just aim to help.

05 05 26 52 CDR-EVA Hey, that - we have to put that in the pallet, right?

05 05 26 54 LMP-EVA No. Yeah, but hold it. I don't want it to drop on the dirt. *** let me go put this ETB over ... thing.

05 05 27 05 CDR-EVA Put the SRC over there, too.

05 05 27 07 LMP-EVA I can - I can do it over the SRC; it's all right, John.

05 05 27 12 CDR-EVA You can?

05 05 27 13 LMP-EVA Yeah. I think we overdid it a little bit on that MESA. (Laughter). Why does the - why does the thing hit the ground? I don't understand that. Never did in training.

05 05 27 29 CDR-EVA I don't either, Charlie. Maybe we ... the struts.

05 05 27 32 LMP-EVA I guess maybe you did; it didn't feel like it, though. Nice soft Navy landing.

05 05 27 39 CDR-EVA Thirty g's.

05 05 27 40 LMP-EVA Hot dog! Look at that beauty come out of there (laughter). Stick it right - Wait a minute - wait a minute. Okay.

05 05 28 03 CC Charlie, you can dust that LEC if you want.

05 05 28 09 LMP-EVA Okay, we will. That Velcro - Why don't you Velcro that down for me, John. John?

05 05 28 17 CDR-EVA Yeah?

05 05 28 18 LMP-EVA John, can you Velcro that down for me? Excuse me. There, that's great. Okay. I guess we got to dust and stow antennas.

05 05 28 29 CDR-EVA What are you fixing to do with all that stuff, Charlie? Don't drop any of it.

05 05 28 32 LMP-EVA All right. I'm going to take - put it right on here.

05 05 28 35 CC And, John, when you're working on Charlie there, we noticed he's got some loose straps on his tool harness. You might get those down; otherwise, he'll snag them. Okay. It's the cover over the hooks.

05 05 28 45 CDR-EVA Yeah.

05 05 29 04 LMP-EVA Okay. Okay; turn around and let me check you. You're okay on this side. Let me check the other side. You got a couple dangling, too. Can you bend over, John?

05 05 29 22 CDR-EVA Rats. Can't see that ... Velcro ...

05 05 29 27 LMP-EVA Okay. That's got it. Okay. I've placed the core stems, I ... the SRC, HEDC, commander unload SCB, close SRC-1, MESA blanket, big rocks. Ready for the clean EMUs.

05 05 29 41 CDR-EVA I think we're ready for that, Charlie. *** Go get the LCRU brush.

05 05 29 46 LMP-EVA Okay. I'll go run get it.

05 05 29 47 CDR-EVA I'll get it. Let me get it.

05 05 29 49 LMP-EVA Okay.

05 05 29 50 CDR-EVA ... working to death.

05 05 29 55 LMP-EVA Man, it doesn't feel like work; it's just fun.

05 05 29 59 CDR-EVA Yeah.

05 05 30 02 LMP-EVA You know the only thing tired on me is my hands. Fingers, really. You'll never get us clean. I think this is a waste of time.

05 05 30 12 CDR-EVA Well, we're going to try it anyway, Charlie ...

05 05 30 24 LMP-EVA *** Coming off. Yeah. It's coming off. I think a good kick on the strut would be the best thing. And I stuck my water - -

05 05 30 43 CDR-EVA ..., Charlie?

05 05 30 55 LMP-EVA Tony, be advised that we are not taking any SCBs up. I emptied the SCBs into the - into the SRC.

05 05 31 08 CC Okay. We copy that.

05 05 31 10 CDR-EVA Are we gonna get them all in there, Charlie?

05 05 31 12 LMP-EVA Yeah. All the rocks went in there.

05 05 31 15 CC You might put - what are you going to put the big rock in? That might go in the SCB.

05 05 31 22 LMP-EVA Okay, we - It will.

05 05 31 24 CDR-EVA Won't fit. Remember?

05 05 31 26 LMP-EVA No. One of them will. The one I just picked up will. The big one that go - that we picked up out at Flag won't fit.

05 05 31 36 CC Okay.

05 05 31 43 CDR-EVA Okay. I've got you, Charlie, as soon as I can get you ... hands ... Man, got some dirt right in here on - Hold your arm up. There you go. But your hose is clean.

05 05 32 10 LMP-EVA Man, you can feel that water running through your hose right there, John.

05 05 32 14 CDR-EVA Yeah.

05 05 32 16 LMP-EVA Great feeling. Oh, gosh, guess what I did!

05 05 32 19 CDR-EVA Dropped the brush, Charlie.

05 05 32 20 LMP-EVA Dropped the brush.

05 05 32 23 CDR-EVA Get it?

05 05 32 35 LMP-EVA Uh-oh. Come on. Okay, I'll start over again.

05 05 32 45 CDR-EVA Here. Let me - dust the dust brush first.

05 05 32 50 LMP-EVA Okay.

05 05 32 53 CDR-EVA Think you've got a lot of it on you, too.

05 05 32 55 LMP-EVA No. That's okay.

05 05 33 02 CC Looks like you guys have been playing in a coal bin.

05 05 33 09 CDR-EVA (Laughter) Well, I'm not so sure we want all this stuff to get up there in that machine with us.

05 05 33 14 LMP-EVA I don't know how we're going to get it off.

05 05 33 16 CDR-EVA Just do the best we can.

05 05 33 17 LMP-EVA Yeah. Let me have it, John.

05 05 33 19 CDR-EVA Okay.

05 05 33 21 LMP-EVA I promise not to *** Off your pockets pretty good, John. *** Take a little while. Okay. Let me get under here.

05 05 33 38 CDR-EVA I tell you, Houston, my general impression of this thing is I'm a lot more surprised at how - how - how - really beat up this place is. It must be - it must be the oldest stuff around, because it's just craters on top of craters on top of craters. And there's some really big old subdued craters that we don't even have mapped on our - on our photo map, I'm sure of it.

05 05 34 12 LMP-EVA Bend over, John.

05 05 34 16 CDR-EVA Because they just show up as gentle depressions.

05 05 34 19 LMP-EVA Okay, that's good as I can do.

05 05 34 20 CC Okay, we copy that.

05 05 34 21 LMP-EVA There you go. ***

05 05 34 26 CDR-EVA ... Okay.

05 05 34 27 LMP-EVA Tony, one of those big rock bags I could - I mean, those big rocks I could put into the SRC. It's an undocumented rock - grab sample. I don't mean the SRC, but the SCB. Why don't we just leave it there and get it for next time, Tony?

05 05 34 51 LMP-EVA I tell you what, I'm gonna get it. Bag 5.

05 05 34 59 CDR-EVA Now there's a data point. Just since the time I dusted LCRU and right now, it needs dusting again. Get some dirt in your eye, Houston? Yeah, hold still. There you go.

05 05 35 17 CC Charlie, we think you ought to put the one that you can get in the SCB - put it in a bag and carry it up. That one that's too big, if there's no where to stow it upstairs, why don't you just leave that one down.

05 05 35 29 LMP-EVA Oh, there's a place to stow it. We just don't have the big rock bag out.

05 05 35 33 CC No, we understand. It'll just get a lot of dust around the cabin with that open rock.

05 05 35 45 CDR-EVA Okay, Houston. Do you want your - do you want your LCRU covers at 65-percent open today?

05 05 35 54 CC That's affirmative.

05 05 35 58 CDR-EVA And you want your LCRU POWER switch to go to OFF?

05 05 36 01 CC Right. And when you get through there, we'd like to turn the TV away from the Sun and point it down.

05 05 36 11 CDR-EVA Okay.

05 05 36 30 CDR-EVA Okay. You're - Want me to turn you OFF before I move you away and point you down, or does it make any difference?

05 05 36 39 CC It doesn't make any difference. Okay, point it and then turn it OFF.

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05 05 36 48 LMP-EVA Okay, John. Come stow my antenna. I'm ready to get in.

05 05 36 51 CDR-EVA Okay, Charlie.

05 05 36 54 LMP-EVA Please.

05 05 36 58 CDR-EVA Wait a minute until I get my hands ***.

05 05 37 14 CDR-EVA Okay, the LCRU brush is stowed. Okay. POWER on TV is going to OFF, Houston.

05 05 37 21 CC Okay. And, John, verify that the DAC is turned so the battery's towards the Sun.

05 05 37 26 CDR-EVA I mean the LCRU power.

05 05 37 34 CDR-EVA Houston, how do you read? Over.

05 05 37 36 CC Okay, we're copying you, John. And verify the DAC's turned - the battery to the Sun.

05 05 37 52 LMP-EVA Can you reach it?

05 05 37 53 CDR-EVA No, I can't - I can't reach it, Charlie.

05 05 37 56 LMP-EVA Okay, wait a minute.

05 05 38 06 CDR-EVA *** ... it up ... Go ahead.

05 05 38 14 CDR-EVA Houston, how do you read? Over.

05 05 38 17 CC We're copying you both 5 by. How us?

05 05 38 19 CDR-EVA ... receiving us. Okay, now we got you.

05 05 38 23 CC Okay. Good show, and - -

05 05 38 24 LMP-EVA We seem to be losing you when ... PLSS.

05 05 38 25 CC - - John, while you're still out there, we'd like you to confirm that the DAC camera is turned with the battery towards the Sun.

05 05 38 33 CDR-EVA I fooled you on that one, Tony; I did it.

05 05 38 36 CC Okay.

05 05 38 39 CDR-EVA Okay. Wait a minute.

05 05 38 47 LMP-EVA Got it?

05 05 38 48 CDR-EVA No. Bend over. One time good. Okay, I'm just going to Velcro it down.

05 05 38 52 LMP-EVA That's fine.

05 05 38 53 CDR-EVA Okay. Go.

05 05 38 54 LMP-EVA Okay.

05 05 38 55 CDR-EVA ..., that's the best I can do.

05 05 38 56 LMP-EVA That's okay. Let me - -

05 05 39 00 CDR-EVA Can you get to mine?

05 05 39 01 LMP-EVA Yeah, ... If I can ... *** get to it, that's where I can get it in that little strap there - ...

05 05 39 13 CDR-EVA Yeah, there it goes.

05 05 39 17 LMP-EVA Okay, you're down ...

05 05 39 19 CDR-EVA Okay.

05 05 39 22 LMP-EVA Okay, I'll tell you what. Let me jump up on the ladder and then you hand me that. Okay?

05 05 39 26 CDR-EVA Okay.

05 05 39 32 LMP-EVA We got an SCB, a ETB, a core stem, and the core stem.

05 05 39 37 CDR-EVA Okay.

05 05 39 39 LMP-EVA Man, look at that.

05 05 39 40 CDR-EVA You want to throw the pallet out?

05 05 39 43 LMP-EVA Yeah, I will.

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05 05 39 45 CDR-EVA Okay.

05 05 39 46 LMP-EVA *** do it.

05 05 39 47 CDR-EVA Got it. Can you do that all right, Charlie?

05 05 39 54 LMP-EVA Yeah. Got to step.

05 05 40 01 CDR-EVA Do you need some help?

05 05 40 02 LMP-EVA No, I say you've just got to step.

05 05 40 04 CDR-EVA Okay, do you need some help on getting in there?

05 05 40 06 LMP-EVA Don't think so.

05 05 40 07 CDR-EVA Okay. Wait, you're just gonna a - -

05 05 40 11 LMP-EVA I know it. ***

05 05 40 21 CC Okay, John. How you going to carry that large LiOH can up?

05 05 40 28 CDR-EVA Large LiOH can is in the pallet - pallet, Houston.

05 05 40 32 CC Okay. Fine.

05 05 40 33 CDR-EVA Isn't that where it's supposed to be?

05 05 40 35 CC That's Roger.

05 05 40 38 CDR-EVA ***

05 05 40 41 LMP-EVA *** Okay, Tony, I'm up on the porch.

05 05 40 52 LMP-EVA Ah ha! Hatch open.

05 05 41 24 CDR-EVA Okay, Houston, the old battery covers are pretty dirty - at least one of them is. I'll get them.

05 05 41 45 LMP-EVA Guess what?

05 05 41 46 CDR-EVA What?

05 05 41 47 LMP-IM I'm in.

05 05 41 48 CC Good show. And, John, while you're down there, verify that the battery covers - the LRV battery covers are open and the circuit breakers are all pulled on the LRV.

05 05 42 05 CDR-EVA Okay. I verify that the battery covers are open. I haven't pulled the circuit breakers yet. I'm going over and dust - I'm dusting the battery covers; they're dirty.

05 05 42 13 CC Okay. Understand.

05 05 42 15 CDR-EVA They get dirty from - they get dirty from what you might expect, opening the battery covers.

05 05 42 22 CC Okay.

05 05 42 23 CDR-EVA I think they're clean before that.

05 05 42 24 CC Okay.

05 05 42 27 LMP-LM Okay. Tony, on the LiOH cans, I verify two green.

05 05 42 45 LMP-LM Copy, Tony?

05 05 42 47 CC Say again, Charlie.

05 05 42 51 LMP-LM Two green on the LiOH cans.

05 05 42 52 CC Okay. We copy that, Charlie.

05 05 42 57 LMP-LM Got two green on the LiOH cans.

05 05 43 01 LMP-LM Johnny, you ain't gonna believe this, but the food is blown up like - like a balloon.

05 05 43 07 CDR-EVA You're kidding me.

05 05 43 08 LMP-LM No. It popped out of that stowage. Busted the snaps.

05 05 43 21 LMP-LM Gonna take me a few minutes to do this emptying here.

05 05 43 25 CDR-EVA That's the best I can do your batteries, Houston, but I think they're in pretty good shape.

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05 05 43 30 CC Okay, John; sounds good.

05 05 43 44 CDR-EVA And I retracted the LCRU after opening the battery covers because that needed doing.

05 05 44 12 LMP-LM You can't believe the dirt I've tracked in here, John.

05 05 44 16 CDR-EVA I can believe it, Charlie.

05 05 44 19 LMP-LM Old Orion was nice and clean; now she's filthy.

05 05 44 24 CDR-EVA *** BUS A, B, C, and D coming open.

05 05 44 27 CC Okay.

05 05 44 33 CDR-EVA All four buses open.

05 05 44 55 CDR-EVA Okay, Charlie. Can I bring you the SRC-1?

05 05 44 58 LMP-LM Yes. Look. I don't want to hit the camera. Here comes the pallet.

05 05 45 04 CDR-EVA Wait, wait - Wait a minute, let me - I tell you what, let me go up on the porch, bring in SRC, and you give me the pallet, and I'll bring it back down.

05 05 45 12 LMP-LM All right, that's a good deal.

05 05 45 14 CDR-EVA Yeah.

05 05 45 15 LMP-LM Watch yourself. That's not as easy as it looks, John, climbing up there.

05 05 45 20 CDR-EVA I know that. Come from a long line of cowards.

05 05 45 27 LMP-LM Okay, here comes the little doomaflitchy out. It landed on the porch.

05 05 46 01 LMP-LM John, I'm thinking it might be easier - Are you on the ladder yet?

05 05 46 04 CDR-EVA Huh?

05 05 46 05 LMP-LM Are you on the ladder?

05 05 46 06 CDR-EVA Yep.

05 05 46 07 LMP-LM Good. *** there, babe.

05 05 46 30 CDR-EVA Okay, Charlie, here comes SRC-1.

05 05 46 33 LMP-LM Okay.

05 05 46 38 CDR-EVA Can you get it?

05 05 46 39 LMP-LM Yes, I think so.

05 05 46 46 CDR-EVA *** ...

05 05 46 47 LMP-LM ...?

05 05 46 58 LMP-LM Let me give you this thing here.

05 05 46 59 CDR-EVA Okay, give me that thing.

05 05 47 06 LMP-LM Got it?

05 05 47 07 CDR-EVA Yes. ... to keep this SRC up while I ...

05 05 47 11 LMP-LM Are you going back down? Okay, and we've got the core stems, an SCB -

05 05 47 17 CDR-EVA Yes.

05 05 47 18 LMP-LM And that's it - and then an ETB.

05 05 47 22 CDR-EVA Roger.

05 05 47 29 LMP-LM Hardest part of the whole EVA, Tony.

05 05 47 39 CC Say again, Charlie.

05 05 47 43 LMP-LM I say getting into this moose is the hardest job of the whole EVA.

05 05 47 49 CDR-EVA Okay, and there's the pallet. Now - What did you bring up with you?

05 05 47 57 LMP-LM I brought the - the pallet. We've got an SCB, the core stems, and ETB.

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05 05 48 06 CDR-EVA Okay. Hardly nothing in the SCB, right?

05 05 48 08 LMP-LM One big rock is all.

05 05 48 09 CDR-EVA Yes.

05 05 48 19 CDR-EVA Whew! That other big muley we'll get when the -
with a big rock bag later on.

05 05 48 32 LMP-LM Think you can do that all on - one-handed, John,
huh?

05 05 48 36 CDR-EVA If I can jump up to the third ring [sic]. *** I'm
gonna do here is jump. There we go.

05 05 48 44 LMP-LM He jumps over buildings with a single bound,
Houston. Faster than a speeding bullet.

05 05 48 54 LMP-IM Okay, Tony. We're bringing SCB number 5 in with
a big rock.

05 05 48 59 CC Okay, we copy that.

05 05 49 06 CDR-EVA The cores - Wait a minute. You gonna have to
stick those up in the -

05 05 49 10 LMP-IM Oh, don't kick them back out, John. - -

05 05 49 11 CDR-EVA I'm not.

05 05 49 12 LMP-IM Hold still.

05 05 49 13 CDR-EVA I'll get them - I'll get them to you.

05 05 49 16 LMP-IM Okay. Okay. Can you hand them up?

05 05 49 18 CDR-EVA How's that?

05 05 49 19 LMP-IM ... say great! Got them. Filthy. Here you go.
Gimme - no.

05 05 49 33 CDR-EVA Here's your SCB.

05 05 49 34 LMP-LM Okay.

05 05 49 41 CDR-EVA Okay, let me get you an ETB.

05 05 49 46 LMP-LM Tony, read out the EB - ETB stuff.

05 05 49 52 CC Okay, Charlie. You - -

05 05 49 53 LMP-LM ... to be ... of me.

05 05 49 54 CC Right, you have two HEDC mags, B and D; three HEDC mags, A, C, and H; one 500-millimeter mag L; three DAC mags, P, Q, and R; your maps; and six sample contingency bags - or containment bags.

05 05 50 21 LMP-LM Okay, John. I didn't get that.

05 05 50 25 CDR-EVA You didn't hear any of it?

05 05 50 26 LMP-LM I did not get those bags. The samp - See, I don't have that on my checklist.

05 05 50 32 CDR-EVA Okay.

05 05 50 33 LMP-LM And they're - and they're on the MESA.

05 05 50 35 CDR-EVA Okay, I'll go get them.

05 05 50 36 LMP-LM Okay; they're for the E-cover bags.

05 05 50 38 CDR-EVA Yeah, right.

05 05 50 41 CC Okay. They're in the left front of the MESA, John.

05 05 50 46 CDR-EVA Yes, I know where they're at. Okay, now it doesn't hit the deck anymore. That hit the deck some more.

05 05 51 02 LMP-LM Tony, I've got 6:58. Is that right?

05 05 51 06 CC That's right.

05 05 51 39 CDR-EVA Okay.

05 05 51 42 LMP-LM Yes, I think that was the only thing I didn't have, John.

05 05 51 45 CDR-EVA Okay.

05 05 51 56 CC Roger. You should have six DAC mags - correction, six Hasselblad mags and three DAC mags.

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05 05 52 06 LMP-LM Yes, I've got all the film.

05 05 52 10 CC Okay.

05 05 52 18 CDR-EVA These bags are on the left side of the MESA, right, Charlie?

05 05 52 21 LMP-LM Yes. Left front. Right where the SWC - I mean, the core stem bags were.

05 05 52 30 CDR-EVA Yes, I've got them up here.

05 05 52 41 CC And, John, maybe you could set the UV - -

05 05 52 42 CDR-EVA Right where the core stem bags were?

05 05 52 46 CC - - before you go up this time.

05 05 52 48 CDR-EVA Is it sample containment bags?

05 05 52 50 LMP-LM That's right.

05 05 52 51 CDR-EVA Okay. Oh, okay. And underneath that is a flag for the - the old ... I'm not sure there's any sample containment bags in there, Char - Yes, I guess maybe they are.

05 05 53 14 CDR-EVA I'll bring them up separate, Charlie. You want me to reset the UV before I go up this time?

05 05 53 18 CC Yes, it would be a good idea. Then you could just stay up.

05 05 53 20 LMP-LM Why don't you bring the -

05 05 53 25 CDR-EVA Oh, ... Okay.

05 05 53 38 LMP-LM John, when you come up, if you remember to bounce - bounce your foot - *** your feet on the struts - -

05 05 53 45 CDR-EVA Okay.

05 05 53 46 LMP-LM - - it'll clean them off. That's what I'm doing up in the - in - but mine's on the floor.

05 05 53 52 CDR-EVA Okay, ETB - now set the far UV. What's the target, Houston? I'm over at the far UV.

05 05 53 58 CC Okay. Reset. And then the target is 134 azimuth and 39 elevation.

05 05 54 11 CDR-EVA Okay.

05 05 54 24 CDR-EVA Okay, Houston; 3, 2, 1 -

05 05 54 26 CDR-EVA MARK, reset; 134 azimuth. Houston, can I hit the reset again. I didn't see the film move. No, it - it did.

05 05 54 44 CC Okay, fine.

05 05 54 48 CDR-EVA Because it's reloading. Boy.

05 05 55 03 CC Okay, that azimuth was 134.

05 05 55 10 CDR-EVA 134 is looking at the lunar module, Houston. You don't want to do that.

05 05 55 17 CC Okay. Would elevation of 39 look over it?

05 05 55 25 CDR-EVA Heck, no. It's at 26 now; it's not clearing it.

05 05 55 38 CDR-EVA Well, let me see, it might.

05 05 55 45 LMP-LM Hey, Houston, I just got a water flag.

05 05 55 48 CDR-EVA If you want to take a look at Charlie - you want to take a ju - look at Charlie, yeah, it'll clear it, but it's not any good, Houston.

05 05 56 01 CC Okay, Charlie. What do you have?

05 05 56 05 CDR-EVA He has a water flag.

05 05 56 20 CC Okay. Azimuth is 258, elevation is 64.

05 05 56 29 CDR-EVA Okay. I'm going to go to reset again; will that be all right?

05 05 56 32 CC That's fine.

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05 05 56 33 CDR-EVA If I can't make it. Okay, reset -

05 05 56 37 CDR-EVA MARK; 258, 64.

05 05 56 40 CC Roger.

05 05 57 11 LMP-LM Man, that is some contraption, John.

05 05 57 34 CDR-EVA 258 and 64, Houston.

05 05 57 37 CC Okay, fine. We'd like for you to get on in then.

05 05 57 42 CDR-EVA Okay. That's not looking at anything that I recognize.

05 05 58 14 CDR-EVA Okay, Charlie. Here I come. Keep cool, man.

05 05 58 17 LMP-LM I'm fine. Don't worry.

05 05 58 29 CDR-EVA Ugh. Boy; up to the third ring [sic], Charlie. Beautiful! Just like flying.

05 05 58 37 LMP-LM ... jumps so the Lakers will want you when you get back.

05 05 58 46 CDR-EVA Here are those bags.

05 05 58 47 LMP-LM Okay, ... I've got them. Thank you.

05 05 58 55 CDR-EVA You know, I thought I had them.

05 05 58 58 LMP-LM ... a little bit. I'm not closing you out, John. I'm just - get some bending room here.

05 05 59 28 CDR-EVA Okay, Charlie.

05 05 59 36 LMP-LM Okay.

05 05 59 46 LMP-LM ...

05 05 59 47 CDR-EVA Okay. I'd get that hook out of the way, if I were you.

05 05 59 59 LMP-LM Okay, hook is out of the way.

05 06 00 10 CDR-EVA ... to move that?

05 06 00 12 LMP-LM No, I think you can get in - Wait a minute; I can get it here. Okay, I got it.

05 06 00 20 CDR-EVA Okay.

05 06 00 24 LMP-LM Okay, enter the - the humble abode. Okay, you really got to arch your back, John. There you go; you got it. Hey, come towards me a little bit. Okay. Keep coming towards me. There you go. Okay; now bend over a little bit. Come forward a little bit. There you go; you got it. Your hook - tool harness is hooking up on the - on your - There you go.

05 06 01 04 CDR-LM Phew, man!

05 06 01 11 LMP-LM Okay. Now we're back inside.

05 06 01 15 CDR-LM I cannot turn around, Charlie.

05 06 01 17 LMP-LM Huh? Can't you go the other way? Okay, you got it.

05 06 01 24 CDR-LM Hung up on something.

05 06 01 25 LMP-LM Yeah, you get - you're sitting on the hatch.

05 06 01 28 CDR-LM Oh.

05 06 01 31 LMP-LM Don't want to close it all the way and getting all this feedwater in here. Okay, now come around. There you go. Now we got it. We're back inside.

05 06 01 41 CDR-LM Okay.

05 06 01 42 LMP-LM Okay. We got to close the primary H₂O.

05 06 01 47 CDR-LM Okay.

05 06 01 48 LMP-LM ... turning - There you go.

05 06 01 52 CDR-LM ..., close. ...

05 06 01 58 LMP-LM Okay, yours is closed?

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05 06 02 00 CDR-LM Okay, let me get yours. Get my visor up.

05 06 02 06 LMP-LM Okay ...

05 06 02 27 CDR-LM Can you swing your pack this way just a little?

05 06 02 30 LMP-LM How's that?

05 06 02 34 CDR-LM Okay, and your water valve is closed.

05 06 02 37 LMP-LM Okay. And we can close the hatch. Okay, DUMP VALVE going AUTO.

05 06 02 47 CDR-LM I haven't got the hatch closed, Charlie.

05 06 02 49 LMP-LM Okay.

05 06 02 52 CDR-LM It's closed.

05 06 02 53 LMP-LM Okay; can you lock it?

05 06 02 54 CDR-LM No.

05 06 02 56 LMP-LM Okay. Probably got to push it to lock it. There you go.

05 06 03 04 CDR-LM ...

05 06 03 14 CDR-LM Ain't locking. Why don't we - wait until we get it pressurized. It's closed good and tight.

05 06 03 19 LMP-LM Okay.

05 06 03 20 CDR-LM Got the DUMP VALVES to AUTO?

05 06 03 21 LMP-LM No, not yet. I was waiting until you get out of the way.

05 06 03 26 CDR-LM Okay.

05 06 03 27 LMP-LM Okay, DUMP VALVES in AUTO. Okay, PLSS O₂ and the press flags may come on during repress. Okay, I'm going CABIN REPRESS, AUTO; CB 16, CABIN REPRESS, closed.

05 06 03 38 CDR-LM Okay.

05 06 03 39 LMP-LM Move up just slightly. Let me get around you.

05 06 03 46 CDR-LM Okay.

05 06 03 50 LMP-LM Cabin repress, here we come.

05 06 04 00 CDR-LM ...

05 06 04 01 LMP-LM I got an 0 flag.

05 06 04 06 CDR-LM I got an 0 flag.

05 06 04 18 LMP-LM How is the pressure?

05 06 04 19 CDR-LM Two psi, Charlie.

05 06 04 20 LMP-LM Two?

05 06 04 21 CDR-LM Two.

05 06 04 22 LMP-LM Three?

05 06 04 23 CDR-LM Two.

05 06 04 24 LMP-LM Oh, okay. Okay, read the checklist. Something happens at 2-1/2.

05 06 04 29 CDR-LM Okay. Where is it?

05 06 04 32 LMP-LM ...

05 06 04 33 CDR-LM Okay. ... cabin at 2-1/2 ...

05 06 04 35 LMP-LM Maybe we can turn the PLSS O₂ off at 2-1/2.

05 06 04 39 CDR-LM Okay. Okay, PLSS O₂ off and cabin pressure ...

05 06 04 54 LMP-LM Okay. My thing's going right down.

05 06 05 04 LMP-LM Man, it's up there already?

05 06 05 05 CDR-LM Yeah.

05 06 05 06 LMP-LM That is amazing. Hey, Houston - -

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05 06 05 07 CDR-LM Will you turn off our PLSS O₂, Charlie?

05 06 05 09 LMP-LM - - ... in.

05 06 05 12 CC Okay, very good. You had a 7 hour and 11 minute EVA.

05 06 05 19 LMP-LM Super! (Whistle) MASTER ALARM. It's cabin ... probably. Okay, PLSS O₂, PRESS REG A, and MASTER/CABIN lights are on; verify cabin pressure. Go to PRESS REG A and B to CABIN.

05 06 05 36 CDR-LM PRESS REG A and B to CABIN, Charlie.

05 06 05 39 LMP-LM Okay, got them.

05 06 05 40 CDR-LM Okay, CABIN warning light off?

05 06 05 43 LMP-LM It is.

05 06 05 44 CDR-LM Verify cabin pressure stable at 4.6 to 5.

05 06 05 48 LMP-LM Yeah.

05 06 05 49 CDR-LM Okay, PURGE VALVE to depress PGA as required.

05 06 05 52 LMP-LM Okay, mine's depressed.

05 06 05 53 CDR-LM Mine seems like it's depressed, too.

05 06 05 54 LMP-LM Yeah.

05 06 05 57 CDR-LM There's - Verify EVA circuitry configurations.

05 06 06 02 LMP-LM Okay.

05 06 06 03 CDR-LM White dots out plus EVA decals - plus - plus the con - plus the - other contingencies. Fire down ones that we're using today.

05 06 06 12 LMP-LM Hey, Houston, do you have telemetry?

05 06 06 17 CC Roger. We have telemetry.

05 06 06 21 LMP-LM Say, how does the cabin ECS look to you?

05 06 06 34 CDR-LM Wow, look at all them footprints out there, Charlie.

05 06 06 37 LMP-LM Great.

05 06 06 38 CC John, verify you locked the forward hatch.

05 06 06 41 LMP-LM ... looks tracked.

05 06 06 44 CDR-LM No, I didn't lock it. I will.

05 06 06 55 LMP-LM That got it.

05 06 06 56 CDR-LM Yeah. Now it's locked, Houston.

05 06 06 57 CC Okay.

05 06 06 58 LMP-LM Help push that ... in. That's hard to do, pressurized. In fact, it's impossible. I'm so dirty, I can't believe it.

05 06 07 08 CDR-LM Okay, let's keep going here, Charlie.

05 06 07 10 LMP-LM Okay, doff gloves; stow on comm panel; doff helmets with visors, lower shades, stow in -

05 06 07 19 CC And, Charlie, your cabin ECS looked good.

05 06 07 29 LMP-LM I'm going to have to have some ... in here. ***
My hand's so tired I can't ***

05 06 07 58 LMP-LM John, can you help me?

05 06 08 00 CDR-LM I think you have some pressure in the suit there.

05 06 08 03 LMP-LM Right.

05 06 08 04 CDR-LM Let me get this other glove and I'll get it. I think my fingers are just tired.

05 06 08 34 CDR-LM What a mess, Charlie.

05 06 09 00 CDR-LM I can't.

05 06 09 11 CDR-LM There we go.

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05 06 09 13 LMP-LM (Laughter) Sorry to get you so dusty. Okay. Here, let me do that one. I can do it, I'll just get this one off to - Okay. Thank you.

05 06 09 33 CDR-LM Well, look at that, would you.

05 06 09 35 LMP-LM Boy, mine are tired, too. I'll tell you.

05 06 09 39 CDR-LM Okay?

05 06 09 45 CDR-LM Okay. Again, it says to doff helmets with visors; lower shades; stow in helmet bag.

05 06 10 37 LMP-LM Boy, it feels good to be - ...

05 06 10 40 CDR-LM Hey, that Moon dust don't taste half bad.

05 06 10 44 LMP-LM Is that what that is?

05 06 10 45 CDR-LM Yeah.

05 06 10 46 LMP-LM I think it is just the ECS.

05 06 11 03 CDR-LM Okay. Stowing the helmet bags. Verify safety on dump valve. ...

05 06 11 12 LMP-LM Get that.

05 06 11 15 CDR-LM First thing I want - -

05 06 11 17 CDR/
LMP-LM - - is a drink of water.

05 06 11 19 CDR-LM I'm going to take a break and get me a drink of water.

05 06 11 21 LMP-LM ... I finished mine long ago.

05 06 11 28 CMP-LM ...?

05 06 11 30 CDR-LM ...

05 06 11 34 CDR-LM Yes. ... I could have drank all of mine if I had a mouth behind my left ear. That's my only problem. It got lodged back there and I could never get at it.

05 06 12 14 LMP-LM I'm telling you, Tony, you should have seen the water quantity go down about 10 percent on that drink.

05 06 12 22 CC Okay. We saw it, Charlie.

05 06 12 28 CDR-LM Boy, that tasted good. Okay; verify safety. DESCENT H₂O O [sic] valve, OPEN. Remove PURGE VALVE; stow in purse. Okay; disconnect OPO - S O₂ hose.

05 06 12 47 SC ...

05 06 12 56 CDR-LM That's why you saw me dogging it out there, ...?

05 06 13 18 LMP-LM Okay, I'm turning my pump off. ***

05 06 13 25 CDR-LM Okay, now I've got to disconnect your OPS - purge valves to -

05 06 13 32 CDR-LM Still gonna purge ...

05 06 13 34 LMP-LM Yeah, when I connect ...

05 06 13 41 CDR-LM Try not to step on that bag. That one's going back to the co -

05 06 13 46 LMP-LM Okay.

05 06 13 49 CDR-LM I can't believe that I'm so dirty.

05 06 14 02 LMP-LM Now it works good, ... good to get around to it.

05 06 14 06 CDR-LM Well, shoot, Charlie, let me get that thing.

05 06 14 08 LMP-LM Okay.

05 06 14 31 LMP-LM Charlie dusty.

05 06 14 48 LMP-LM Okay, let me get you - Why don't you turn and face me, and I can get to your O₂ ... I've already got mine.

05 06 14 57 CDR-LM You got yours?

05 06 14 58 LMP-LM You know, John, it would be a lot easier if you could come this way.

05 06 15 01 CDR-LM No sweat. Oh. Oh.

05 06 15 06 LMP-LM All right, how's that?

05 06 15 08 CDR-LM That's fine, Charlie.

05 06 15 11 LMP-LM I think that one's over the ...

05 06 15 12 CDR-LM ... very much.

05 06 15 14 LMP-LM Okay. And, Houston, I'll read the checklist. . . . Disconnect OPS O₂ hose; connect LM hoses - funny that we have to do that; - SUIT ISOL, both, SUIT FLOW; PLSS PUMP, OFF, and FAN, OFF.

05 06 15 26 CDR-LM Okay.

05 06 15 30 LMP-LM Disconnect PLSS H₂O from PGA; connect LM H₂O - now, that's the last - last thing we got to do. Okay, I got a flag - a press flag.

05 06 15 45 LMP-LM Okay, ... your water.

05 06 16 02 LMP-LM Okay, give me a ... Okay, there it is.

05 06 16 09 CDR-LM Where's yours at?

05 06 16 10 LMP-LM I think it is on the wall. Here wait.

05 06 16 17 CDR-LM Come around this way with it.

05 06 16 25 LMP-LM Okay.

05 06 16 26 CDR-LM Yeah.

05 06 16 27 LMP-LM ... Okay ...

05 06 16 36 CDR-LM Okay. Connect LM H₂O; we did. PLSS mode goes to off, both.

05 06 16 42 LMP-LM Okay.

05 06 17 56 CDR-LM Close. Okay. AUDIO: commander and LMP, VHF, RECEIVE.

05 06 18 03 LMP-LM Okay. Go.

05 06 18 04 CDR-LM VHF B, OFF.

05 06 18 05 LMP-LM Wait a minute. Start over again on that.

05 06 18 08 CDR-LM VHF A to RECEIVE.

05 06 18 10 LMP-LM Okay.

05 06 18 11 CDR-LM VHF B to OFF.

05 06 18 12 LMP-LM Okay.

05 06 18 14 CDR-IM MODE, ICS/PTT.

05 06 18 16 LMP-LM Okay.

05 06 18 17 CDR-LM RELAY to OFF.

05 06 18 18 LMP-LM Okay.

05 06 18 19 CDR-LM COMM: VHF A transmitter to OFF.

05 06 18 22 LMP-LM Okay.

05 06 18 23 CDR-LM A RECEIVER to ON.

05 06 18 24 LMP-LM Go.

05 06 18 26 CDR-LM B TRANSMITTER and RECEIVER, OFF.

05 06 18 27 LMP-LM Go.

05 06 18 28 CDR-LM TELEMETRY BIOMED - No. Forget that one. VHF ANTENNA to AFT.

05 06 18 33 LMP-IM Okay.

05 06 18 34 CDR-IM UPLINK SQUELCH to OFF.

05 06 18 35 LMP-LM Wait a minute. AFT and OFF. Go ahead.

05 06 18 39 CDR-LM Okay. Verify DESCENT O₂ greater than 56 percent. LMP first; connect your O₂ for 10 minutes - 4 minutes. It takes 2 minutes and 15 - yeah, we got 80 percent.

05 06 18 52 LMP-LM Yeah. Well, I hope.

05 06 18 56 CDR-LM Okay, Charlie. I don't know if I can - I keep hanging up on something back there. What - -

05 06 19 00 LMP-LM Watch your hoses. Let me disconnect these because we don't need those dadgum things around like that. Okay; now can you spin around there?

05 06 19 15 CDR-LM Yeah. Here comes all the checklist and cards.

05 06 19 18 LMP-LM Okay.

05 06 19 20 CDR-LM Okay, need that one, that might be an APS card.

05 06 19 29 LMP-LM Okay. Okay, turn ... up.

05 06 19 33 CDR-LM Which way, Charlie?

05 06 19 35 LMP-LM Well, your hoses are coming from this side, so you got to get to that valve behind you. There you go.

05 06 19 47 CDR-LM If that's the valve I got to get to, it's behind me, Charlie. (Laughter)

05 06 19 51 LMP-LM Okay, PLSS Mode. Houston, how do you read? Over.

05 06 20 03 CDR-LM Turn sideways, Charlie, and let me get you some oxygen.

05 06 20 10 LMP-LM We are still in DOWN-VOICE BACKUP, we should be hot mike.

05 06 20 14 CDR-LM That's what I figured.

05 06 20 15 LMP-LM Houston, how do you read? Over.

05 06 20 19 CC Orion, this is Houston. You're hot mike to us.

05 06 20 22 CDR-LM Okay, you got to - -

05 06 20 26 LMP-LM Okay, reading you 5 by. How us?

05 06 20 30 CC Loud and clear.

05 06 20 34 LMP-LM Okay, we're still in ... PLSS.

05 06 20 41 CC Roger, John; we're following you through the checklist.

05 06 20 47 CDR-LM Charlie (laughter).

05 06 20 51 LMP-LM They think I'm you!

05 06 20 54 CDR-LM Okay, that's got it. Okay, now. Okay, I don't have my watch, here - wait a minute; yeah, I do, too. O - okay, go ahead; I'll start a mark. I can't make it. Wait a minute, Charlie, don't move. PLSS FILL going to fill.

05 06 21 17 CDR-LM FILL. Oh, listen to that oxygen run in there.

05 06 21 21 LMP-IM You got it open?

05 06 21 22 CDR-LM Yeah, can't you tell?

05 06 21 23 LMP-LM No.

05 06 21 24 CDR-LM You don't hear nothing?

05 06 21 25 LMP-LM Huh-uh.

05 06 21 26 CDR-LM Poor fellow. You better get your ear check.

05 06 21 28 LMP-IM You sure that's open?

05 06 21 30 CDR-LM Yeah. Just about ran out of oxygen, too, while you were at it, didn't you? Hey, Houston, can you give us a mark at the end of 4 minutes?

05 06 21 39 CC Roger. Starting now.

05 06 21 42 CDR-IM You're already - Okay.

05 06 21 46 LMP-LM That Ed Mitchell?

05 06 21 47 CDR-IM Yep.

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05 06 21 48 LMP-LM That you, Ed?

05 06 21 49 CC That's affirm. Tony has been here for 7 hours or so; he's - went to check out.

05 06 22 00 LMP-LM Oh. How's everything going?

05 06 22 03 CC Real great. Did a fine job.

05 06 22 07 CDR-LM That's good. It's a lot of fun, I'll tell you that. By gosh, if it isn't.

05 06 22 13 CC You bet your life. Just take her easy there and catch your breath, and I'll let you know when 4 minutes is up.

05 06 22 31 CDR-LM That's what we're doing.

05 06 22 45 CC Surprisingly enough, John, we have better comm now than before you went out, on the LM.

05 06 22 53 CDR-LM I don't understand that. They must have the big dish still up.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 05 27 XX BEGIN LUNAR REV 27

05 05 42 22 CMP Hello, Houston. Are you there today?

05 05 42 25 CC Hello, Casper. How did it go?

05 05 42 30 CMP Just fine. Having a ball. Got all kinds of neat little things seen on the - this last rev. Had a chance to start watching right of the terminator and just kind of watched the scenery as it came by in AOS. And I think I did wonders for the magnification of these binoculars by cleaning the lens. I had about given up on them, decided that they weren't as good as I thought they were. Until I found out that one side had somebody's big greasy thumbprint on it. Somebody probably being me.

05 05 43 07 CC Roger.

05 05 43 15 CMP And, right now, on magazine Victor, I am up to frame 37.

05 05 43 28 CC Roger. Victor, frame 37. And, Ken, I've got some pads for you.

05 05 43 35 CMP Okay. Let me get my pencil and paper.

05 05 43 40 CC First one's at 126:20, UV photo pad.

05 05 43 48 CMP Okay, hang on a second. Let me get everything Velcroed down.

05 05 44 01 CMP Okay. Say again the time, please, Hank.

05 05 44 04 CC 126:20.

05 05 44 12 CMP Okay. 126:20. All righty.

05 05 44 19 CC Okay. T-start is 126:19:26.

05 05 44 29 CMP Okay. 126:19:26.

05 05 44 33 CC And just for info. Somewhere around 126:35, we're going to get you a state vector update. The next pad time is at 127:18.

05 05 44 46 CMP Okay, 127:18; go ahead.

05 05 44 49 CC Your gamma ray deploy time to 15 inches is 14 seconds.

05 05 44 57 CMP Okay, that will be 14 seconds.

05 05 45 00 CC And your T-start for your pan - mapping camera pad right there is 127:27:58; T-stop, 130:28:19.

05 05 45 18 CMP Okay, 127:27:58, 130:28:19.

05 05 45 23 CC Okay, and the pan camera pad at 128:13.

05 05 45 31 CMP Okay, stand by a second.

05 05 46 20 CMP Okay. What's the next one now - at 128:10, you say?

05 05 46 24 CC Well - Roger. 128:13 there, the pan camera photo pad.

05 05 46 32 CMP Go ahead.

05 05 46 33 CC T-start is 128:19:09, 128:20:47.

05 05 46 48 CMP Okay, 128:19:09, 128:20:47.

05 05 46 56 CC Okay, that's about all the pads. You say you saw some interesting things on the back side, huh?

05 05 47 07 CMP Yeah, the real Moon is just like photos - the more you look, the more you see. You'll be happy to know, though, that, until you get used to it, the craters on the real Moon can turn inside out just like they do on (laughter) on the photographs.

05 05 47 24 CC Really?

05 05 47 25 CMP It's very frustrating.

05 05 47 34 CMP And it's not always clear which way to turn to - to turn them over.

05 05 47 40 CC Roger; I understand. Hey, I got a little poop on - some of the gamma ray results, if you're interested - in case you're interested in doing some sort of global observations relative to the color or character of large areas on the Moon. The early gamma ray stuff shows that the highest readings occur in the maria areas in the west, including Nubium, Cognitum, and Procellarum. The next highest are in the central highlands from - -

05 05 48 08 CMP Okay, just a second now. The highest stuff is in the mares [sic] - to best - -

05 05 48 18 CC Roger. In the west - -

05 05 48 20 CMP - - Cognitum, Nubium, and so on.

05 05 48 23 CC Right. And the next highest - is in the central highlands from Mädler to Alphonsus.

05 05 48 36 CMP Okay, the - you say the highest readings - highest of - of what? Just - just the highest counts?

05 05 48 43 CC I guess just the highest - highest counting rates in the gamma spectrometer.

05 05 48 53 CMP Okay.

05 05 48 54 CC Third highest is Mare Fecunditatis area. And the lowest readings occur in - on the far-side highlands.

05 05 49 14 CMP Well, I can't - I can tell you they sure look different. They're all black over there. That's always intriguing, when you can't see something.

05 05 51 02 CC And, Ken, these light-colored markings you reported near King Crater - the west of King? Farouk says those are near the crater Abul Wafa. And these may be similar to the swirls of Ibn Yunus, but they are not identical. And for your information, the markings of Abul Wafa are - he uses the term antipodal or opposite to Riccioli, on the western part of your track.

05 05 51 32 CMP (Laughter)

05 05 51 34 CC That means it's 180 degrees from there.

05 05 51 36 CMP Tell him that it - it's awfully - Roger; Roger. Tell him it's awful hard to find a place where there - 180 degrees away - there won't be a crater on the Moon.

05 05 51 45 CC (Laughter) Roger.

05 05 51 48 CMP He'll understand.

05 05 51 54 CC Casper, HIGH GAIN on the AUTO - AUTO on the HIGH GAIN.

05 05 52 00 CMP Sure can.

05 05 52 21 CMP I got one that's better for him this time, though. I'm not at all sure that those swirls that I saw north of - northwest of King are - are really - like the others or not. I - I tried to get a look at Ibn Yunus this time, and it's still a little too far to the north.

05 05 55 19 CMP You know, Henry, one of the things that impresses me is that when you look at the mare surface in very high Sun, like I'm doing now, a lot of the very shallow craters that have just very subtle, sweeping walls and are together maybe in a chain or in groups - when you see this at high Sun, it looks exactly like a swirl pattern. If you didn't know that's what it was, you'd - you probably would wonder about it also.

05 05 55 49 CC Roger.

05 05 57 06 CMP And, Hank, would you give me a warning about 126:18?

05 05 57 11 CC Will do.

05 05 58 27 CMP Hank, looking in the bottom floor of Messier - I think it's the original Messier, the elongate one - the bottom dark material has a little ropy white material that runs down the length of the crater. And at one end, it looks like - sort of like a high-water mark. On the northern - northern and western end of that, it looks like there had been a high-water mark and then maybe this stuff had dropped down. And you see little blocks of that stuff, kind of like the whole thing had just been floating and it had just sunk a little bit.

05 05 59 28 CMP When I look in the wall of the other one - the round one - it appears that there's a depression in the northwest side where it's kind of pushed in and things may have run down in there. I have the distinct impression that there was an original crater that is not part of the bright one that we see now that's over on the western side.

- 05 06 00 29 CMP Yes, as a matter of fact, Messier A does show a secondary crater. And I have the impression that that was an old crater that kind of smoothed and darkened and looked like the rest of these older craters, and that it - Messier A then was penetrated on top of that, or at least formed subsequent to that, and it kind of broke into that wall.
- 05 06 00 42 CC Roger. The map shows an indication maybe there might be a secondary there.
- 05 06 00 48 CMP Yeah, it - I had thought maybe that was a - a terrace - kind of like a slump feature, but apparently that's not the case.
- 05 06 01 31 CMP I wish we had some low-Sun pictures of this crater that had the bright splash rays that I took a picture of before, that's about halfway between Messier and Censorinus. I'd swear it's on the top of a - a very shallow rise. And it appears to me that there is a very slightly darker albedo to the material underneath it - That goes out about the same diameter as the bright rays. Now, it may be that the bright rays are giving it that characteristic just because they're - they may be tenuous enough that they don't show up by themselves, but they may be there.
- 05 06 02 32 CMP There's another one a little smaller that's about halfway between the one I just described and Censorinus. And if there's one that I'd agree with Stu has black things that drape down inside it - like that might, but maybe when I get closer, it'll look like shadows. It's kind of hard to tell from here. There are an awful lot of blocks around it, it appears.
- 05 06 03 22 CMP I'm looking now at this bright, depressed crater that's next to it, and I'm going to try to get a picture of that next time I get the camera available because this white stuff runs down the side of a very smooth brown crater. And there's places where you can see it's run out on the floor on the bottom, and it has a very strange appearance. It - it - The white stuff looks like it ran out and then just stopped abruptly. There's no - no toe on it or anything.

05 06 06 36 CC Casper, Houston. About a minute to go for your UV.

05 06 06 42 CMP Okay. Thank you, sir.

05 06 07 29 CC And, Ken, you don't have to acknowledge, but John and Charlie just got back into the LM, and they're just repressurized.

05 06 07 44 CMP Okay. I show that we're at the time to do this; however, it looks like we're not up to Descartes yet, and the camera's pointing - along towards Kant.

05 06 07 59 CC Okay. The Flight Plan calls for leading it about 2 minutes, Ken.

05 06 10 15 CMP Okay, Hank. I got it done, but I guess I made one mistake there. I didn't get the engines off - I didn't hear any firings during the time that I was taking the pictures, but I didn't get to FREE.

05 06 10 27 CC Roger.

05 06 10 38 CC And, Ken, the guys are back inside. I don't know whether you heard me a while ago or not, but EVA-1 was a total success. They had a 7 hour and 11 minute EVA.

05 06 10 49 CMP Outstanding. Did they have anything particularly significant to say or -

05 06 11 01 CC I didn't catch all of it, let me ask - -

05 06 11 02 CMP Did they have any surprises in the things they saw or that they didn't expect?

05 06 11 30 CC I guess the big thing, Ken, was they found all breccia. They found only one rock that possibly might be igneous.

05 06 11 40 CMP Is that right? (Laughter)

05 06 11 45 CC Yeah. I guess the guys are a little bit surprised by that.

05 06 11 46 CMP Well, that ought to - that ought to call for a session with the - (laughter) yeah, yeah (laughter). Well, it's back to the drawing boards or wherever geologists go.

05 06 12 13 CC Hey, Ken. Ron's asking what you were wearing last night when you got cold.

05 06 12 23 CMP I was just sleeping in my sleeping bag. I mean - All I had to do was get up and put on my - my jacket and trousers. Up to then, just getting in the sleeping bag was almost too hot.

05 06 12 40 CC Roger.

05 06 12 49 CMP Okay, we're at frame 60 on magazine 00.

05 06 16 50 CMP Okay. I've got a real good look at the Davy chain now, and they are definitely all rimless. There are some - they run kind of northeast-southwest, and there are a couple of very subtle constructional features that just look like little - little bubbles of material that run north and south. They cross the ch - crater chain but - in fact, when they cross it, it kind of breaks it up. But the - the craters in the chain themselves don't look like they have any rims at all.

05 06 17 48 CC And, Casper; Houston. You're coming up on about 15 seconds to T-stop for the mapping camera.

05 06 17 57 CMP Okay. Thank you.

05 06 18 11 CMP And the MAPPING CAMERA is OFF.

05 06 19 13 CC And, Ken, have you done the rest of the things there?

05 06 19 19 CMP I'm coming up to it now. Thank you. Going to STANDBY, and IMAGE MOTION, OFF, and it's barber pole - and gray. And here comes the gamma ray shield. SHIELD is OFF now.

05 06 19 55 CC And if you'll give us ACCEPT, we'll up-link a state vector.

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05 06 20 02	CMP	Okay, you've got her.
05 06 21 59	CC	Casper, the computer's yours.
05 06 22 04	CMP	Okay. Thank you.
05 06 22 48	CMP	Okay, and I'm taking magazine XX out of the 35, and I'm going after magazine ZZ.
05 06 22 58	CC	Okay.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 06 23 00 LMP-LM Hey, Ed, it's really a spectacular place. I know why you were so excited at Fra Mauro.

05 06 23 05 CC Roger, Roger, Charlie - -

05 06 23 06 LMP-LM Boy, that is a - -

05 06 23 07 CC And our comm is better because we have the 210 up now.

05 06 23 12 LMP-LM Yeah. How long we gonna have that beauty?

05 06 23 32 CC We'll only have it for a few hours here, but we're hoping to have it for a good portion of the other EVAs, but I don't have the exact numbers yet.

05 06 23 44 LMP-LM Thanks, Ed.

05 06 23 50 CDR-LM Ed, you're right; it was almost doable.

05 06 23 57 CC Pretty close to the margin there, John.

05 06 23 59 CDR-LM We only - we only had a 100 - yeah, we only had 110 percent this time.

05 06 24 05 CC You're right, and belay my last. I don't guess we'll have that large antenna.

05 06 24 17 LMP-LM That's okay.

05 06 24 20 CC John, the comm during the EVA was magnificent.

05 06 24 23 CDR-LM I guess for you guys - it was good, huh?

05 06 24 26 CC Yeah, really great.

05 06 24 30 LMP-LM Ed - Ed this - you - you guys have been loud and clear to us every time on your uplink regardless of the dish.

05 06 24 40 CDR-LM That's right.

05 06 24 41 LMP-LM Sorry we're so bad to you.

05 06 24 47 CC Okay. We've got about 50 seconds to go here - -

05 06 24 48 LMP-LM I just can't get that steerable working. It just won't - -

05 06 24 49 CC - - on the PLSS fill.

05 06 24 56 LMP-LM Okay.

05 06 25 03 CDR-LM Sock some water to me, Charlie.

05 06 25 04 LMP-LM Okay, how about a little squirt? Man, this LCG pump cooling is the best thing they ever built.

05 06 25 13 CC That's pretty great, isn't it?

05 06 25 15 CDR-LM That's enough.

05 06 25 20 LMP-LM (Laughter) Yeah - yeah. John says sock some water to me, and I just get the breaker, and he says that's enough every time. Man, it really freezes you. You can't take it any - any long length of time; you just have to turn it on to get your suit all cooled down in about 10 seconds and shut it back off again.

05 06 25 38 CC You're right. Hey -

05 06 25 40 CC MARK, 4 minutes. You can go to the next one.

05 06 25 44 CDR/
LMP-LM Okay.

05 06 25 49 CDR-LM Okay, PLSS FILL coming off.

05 06 25 53 LMP-LM You want me to reach that, John?

05 06 25 54 CDR-LM Yeah, can you get it, Charlie?

05 06 25 57 LMP-LM Yeah. Yeah. That's a hard valve, isn't it? Okay, it's CLOSED.

05 06 26 00 CDR-LM It's hard from where I'm at.

05 06 26 02 CDR-LM CLOSED is clockwise, isn't it?

05 06 26 03 CDR-LM Yeah. Okay. Let me get you off - out of this thing. Uh-oh. Can you get up like this a little? There it goes - undo that ... Okay, would you keep the - keep that hose out of the duct.

05 06 26 26 CC And we'll take your reading when you get to it there, John.

05 06 26 37 CDR-LM Okay.

05 06 26 44 CDR-LM What you got, Charlie?

05 06 26 45 LMP-LM I don't know. Does this say turn the L - turn the - -

05 06 26 49 CDR-LM I don't think it said did - yeah, AR. 95 percent.

05 06 26 57 LMP-LM 95 percent!

05 06 26 58 CDR-LM (Laughter) Yeah.

05 06 26 59 CC Okay. Copy 95.

05 06 27 01 LMP-LM Hey, Houston, I have 90 - yeah. Ain't that amazing.

05 06 27 06 CC That sounds like a good fill.

05 06 27 07 LMP-LM Four minutes. Okay.

05 06 27 17 CDR-LM Let me have that dadgum - Did you get mine?

05 06 27 23 LMP-LM Where are we in the Checklist? Let me -

05 06 27 25 CDR-LM The PLSS - O₂ PLSS fill.

05 06 27 28 LMP-LM Okay. Okay, yeah. All you need to do is put that thing to my side there and let me stand here for 4 minutes.

05 06 27 40 CDR-LM You're gonna do that, huh?

05 06 27 42 LMP-LM Yeah. Give me a little water dump - for a little water dump pill, too.

05 06 27 46 CDR-LM Okay, wait a minute.

05 06 28 04 LMP-LM Okay, you'll have to move up, John, a little bit if you can. Can you?

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05 06 28 05 CDR-LM Up where?

05 06 28 09 LMP-LM Okay, Ed, on my mark.

05 06 28 11 LMP-LM MARK. It's OPEN.

05 06 28 14 CC Roger.

05 06 28 16 LMP-LM Here you go, John.

05 06 28 21 CDR-LM Okay, thank you.

05 06 28 36 LMP-LM I can't believe it.

05 06 29 03 CDR-LM And I sucked that beauty dry.

05 06 29 07 CC Say, Orion. We figure this 8 minutes of refill is enough rest. We'll start EVA-2 immediately.

05 06 29 19 CDR-LM (Laughter) You better send a couple more guys up here. You better start them here in the next 5 minutes.

05 06 29 26 LMP-LM Yeah, I really think I could take another couple hours except for my fingers.

05 06 29 30 CDR-LM Yeah, I think so too. I could - I could do the running around; that would be a piece of cake.

05 06 29 35 CC Yeah, they start to get bloody stumps after while, don't they, Charlie?

05 06 29 40 LMP-LM That's exactly what they feel like, Ed. But it's worth a bloody stub or two, I'll tell you. That was really an experience!

05 06 30 00 CDR-LM Yeah, my suspicion was confirmed on the rocks. Some rocks had dust all over them, and some didn't have any. Still don't and still do.

05 06 30 09 CC Sounds familiar.

05 06 30 25 LMP-LM Boy, I tell you these little EMUs - PLSSs are really superfantastic.

05 06 30 35 CC They do a pretty fine job.

05 06 30 36 LMP-LM Next time you get a chance with - next time you get a chance with a camera, look and see what we landed just beyond.

05 06 30 48 CC Okay.

05 06 30 50 LMP-LM Ed, you won't believe the size of that hole back there. You just won't believe the size of that hole behind the LM.

05 06 30 57 CC Charlie, I believe anything.

05 06 30 58 LMP-LM I never saw that.

05 06 30 59 CC I'm gullible.

05 06 31 18 LMP-LM How's our time, Ed?

05 06 31 20 CC Got about 50 seconds.

05 06 31 25 LMP-LM Thank you.

05 06 31 46 CDR-LM Don't hog all the water.

05 06 32 01 CDR-LM Houston, when we do a water recharge, if we set the PLSSs on the floor or on the midstep, is this thing level enough so that we won't have a tilted PLSS as long as the PLSS is vertical? Or in the - or in my station?

05 06 32 24 CC Stand by on it, John, we think so. We'll have a good answer in a moment, and your 4 minutes is up. You can press on. Give us a readout.

05 06 32 32 CDR-LM Okay. Time that. Let me turn that lonesome beauty off.

05 06 32 45 CDR-LM I just can't reach it.

05 06 32 52 CDR-LM Okay, it's off; 94.5 percent. Houston, 94 and a half.

05 06 33 10 CC John, say again your number.

05 06 33 15 CDR-LM PLSS, 94.5.

05 06 33 17 CC Roger; 94.5. And, John, setting it on the floor will be fine, if the hose is long enough so it doesn't tilt.

05 06 33 29 CDR-LM Okay. Now, we may - we may leave - on the midstep is where we're thinking about doing it.

05 06 33 36 CC That's really the best place.

05 06 33 38 LMP-LM Okay, stow the supply hose which is - -

05 06 33 45 CDR-LM You can't move.

05 06 33 48 LMP-LM No, that's the wrong way. I want - they want us to stow this thing, but I guess we could leave that out.

05 06 33 53 CDR-LM What's that?

05 06 33 54 LMP-LM That's the supply hose.

05 06 33 56 CDR-LM Oh, I'll stow it.

05 06 33 57 LMP-LM Okay.

05 06 34 02 CDR-LM Shoot, Charlie. All you gotta ask - do is ask. I'll admit I ain't paying any attention, but you might as well ask any how.

05 06 34 08 LMP-LM (Laughter)

05 06 34 19 CDR-LM That was - that was really something else.

05 06 34 35 LMP-LM Okay, disconnect OPS actuator from RCU; disconnect RCU from PGA.

05 06 34 41 CDR-LM There you go.

05 06 34 42 LMP-LM Okay.

05 06 34 52 CDR-LM It's that thing right there.

05 06 34 54 LMP-LM Wait a minute, John. Before I do this I, got a wet rag over here. I'm gonna wipe that RCU off before I put it anywhere.

05 06 35 02 CDR-LM That's a good idea. In fact, I'd like to wipe off the front of your suit in a couple of places. The only place you haven't got dirt is on - on your neckring.

05 06 35 42 LMP-LM Sorry I gave out of water there. We'd have gone another hour. Man - -

05 06 35 49 CDR-LM You were really huffing and puffing on that drill.

05 06 35 51 LMP-LM Yeah. Well, when I was really huffing is when I went over and got that rock and fell down. That's how I got so dirty.

05 06 35 58 CDR-LM Oh.

05 06 36 03 LMP-LM Because I had the camera on, and I couldn't get close enough to spring up, so I backed into a crater.

05 06 36 11 CDR-LM Oh (laughter).

05 06 36 21 LMP-LM Hey, that's going to work neat, John. We can wipe our PGAs with - with something like that. Okay, disconnect RCU, that's this thing, and the PGA.

05 06 36 32 CDR-LM Okay, there's mine. Here. Okay.

05 06 36 37 LMP-LM Okay, wait a minute; let me read on.

05 06 36 40 CDR-LM Verify FAN, OFF; PUMP, OFF.

05 06 36 41 LMP-LM Yeah, everything off; MODE SELECT, 0; and then - -

05 06 36 42 CDR-LM MODE SELECT, 0.

05 06 36 43 LMP-LM - - disconnect from this PLSS.

05 06 36 45 CDR-LM PLSS. Okay.

05 06 36 46 LMP-LM My main function.

05 06 36 52 CDR-LM Okay, that's yours, Charlie.

05 06 36 54 LMP-LM Okay, yours goes in first. Let me get my ... connected.

05 06 37 02 CDR-LM Okay, babe.

05 06 37 14 CDR-LM Okay. That's one.

05 06 37 30 CDR-LM It occurs to me when we suit up tomorrow, we're going to have to wash our hands before we can put our gloves on, or we'll get a lot of dirt in the suit loop.

05 06 37 37 LMP-LM Yeah, I agree.

05 06 37 43 CDR-LM Well, that's got it - it ain't going anywhere.

05 06 37 48 LMP-LM Okay, disconnect PLSS O₂ hoses; doff PLSS/O - PLSS and OPS, mine first. Stow LMP PLSS on floor, and yours on the midstep.

05 06 38 01 CDR-LM Okay.

05 06 38 13 LMP-LM How'd I get so dirty?

05 06 38 24 CDR-LM Well, you're getting all this off down here, Charlie.

05 06 38 27 LMP-LM Okay.

05 06 38 31 LMP-LM Put that around here.

05 06 38 35 CDR-LM Okay.

05 06 38 49 LMP-LM Let me have this. I want to get that - this connector clean right here.

05 06 39 14 CDR-LM Dadgummit. I knew I was going to do something I'd forget again. I was going to cut my fingernails. Look at those fingers.

05 06 39 22 LMP-LM Yeah. Mine are the same way, and I cut mine. I don't think it has anything to do with that.

05 06 39 38 LMP-LM Okay, you're free, and I'm free. Let me dock mine first, and I'll put mine in.

05 06 39 45 CDR-LM Okay. Got it, Charlie.

05 06 39 55 LMP-LM Hold onto it.

05 06 39 56 CDR-LM Got it.

05 06 40 00 LMP-LM Okay, I got it.

05 06 40 02 CDR-LM You got one side of it. I got the other side.

05 06 40 03 LMP-LM Okay, let it go, I got it.

05 06 40 07 CDR-LM You're hung up on something.

05 06 40 08 LMP-LM Your hoses, I think. Either that or my hoses.
Yeah, my hoses. Ah! Okay. OPS is reading 6000.
Yeah, that's right; that's where it started.

05 06 40 45 CDR-LM Go ahead, Charlie. Don't cut yourself on that -
Okay, now that - I didn't - I couldn't put it in
here.

05 06 40 49 LMP-LM Okay.

05 06 40 53 CDR-LM Okay. Report OPS pressure.

05 06 40 58 LMP-LM Okay. Let's get your PLSS off and then I'll stow.
Let me - let me stow this stuff, okay?

05 06 41 03 CDR-LM Okay. That's a good idea.

05 06 41 39 LMP-LM Okay. Now I want to stick that beauty right up
under there for now. Okay. Now, we're ready to
get yours off. Yours goes to the mid-step.

05 06 42 20 LMP-LM Can you pick up on it?

05 06 42 21 CDR-LM Oh yeah.

05 06 42 29 LMP-LM Okay.

05 06 42 31 CDR-LM Got it?

05 06 42 32 LMP-LM Okay. Okay. To the mid-step with that one, and
look at your OPS pressure.

05 06 42 43 CDR-LM Yeah, oh - -

05 06 42 47 LMP-LM It's a bucket of worms, isn't it?

05 06 42 49 CDR-LM What the bucket of worms is, is old dumb-dumb here
is turning the wrong direction.

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05 06 42 52 LMP-LM Okay, Ed. John's OPS is 5900 and mine is 6 -
about 6050.

05 06 43 02 CC Okay. We copied that, Charlie.

05 06 43 10 LMP-LM We've got the PLSS doffed now. We're stowing the
OPS hoses.

05 06 43 16 CC Roger.

05 06 43 34 LMP-LM Okay. There we go. ... LM O₂ - install gas con-
nector plugs in purge and electrical dust cap.

05 06 44 08 CDR-LM Better do something about that, Charlie.

05 06 44 10 LMP-LM What? About what, John?

05 06 44 24 CDR-LM Where'd the electrical dust cap go?

05 06 44 27 LMP-LM I don't know. We can get a piece of tape and put
over it.

05 06 44 30 CDR-LM Yeah.

05 06 44 34 CDR-LM PLSS electrical dust caps.

05 06 44 36 LMP-LM Oh, that's these things - the RCU covers.

05 06 45 01 CDR-LM Okay.

05 06 45 07 LMP-LM Done. Done. Insure PLSS LiOH cartridges and
batteries numbered 1 and 2 replaced with 3 and 4.
Okay. Change PLSS bat, stow in buddy SLSS bag.
Put a cable to battery; stow PLSS hoses and straps.
Okay?

05 06 45 26 CDR-LM Okay. Where are the PLSS bats at?

05 06 45 29 LMP-LM Right up here.

05 06 45 39 LMP-LM You got number 1?

05 06 45 41 CDR-LM Yeah.

05 06 45 42 LMP-LM You get number 3.

05 06 45 56 LMP-LM Okay. There's number 1, and it's being replaced by number 3. Old number 1. It's hot, too, boy.

05 06 46 06 CDR-LM Put this cover on it, so we can make sure it's been used.

05 06 46 08 LMP-LM Okay.

05 06 46 12 CDR-LM Well, that really ain't too good of a clue, is it?

05 06 46 32 LMP-LM Boy, I know what I'd like right now.

05 06 46 34 CDR-LM They want the PLSS battery connected?

05 06 46 36 LMP-LM Yes.

05 06 46 51 CDR-LM Okay. That's connected.

05 06 46 52 LMP-LM Okay, now we connect your hoses. All of them.

05 06 46 58 CDR-LM Oh. Gee, let me see that diagram one more time.

05 06 47 09 CDR-LM Where is this one?

05 06 47 17 LMP-LM Thank goodness for those covers. You didn't get it, John.

05 06 47 24 CDR-LM Yeah, I did.

05 06 47 26 LMP-LM It didn't go all the way in. No, see, it pops out on you. Now.

05 06 47 29 CDR-LM Oh.

05 06 47 32 CDR-LM One, two, looks like the water - yeah, it's water.

05 06 47 56 LMP-LM Okay. That's got it. Three is electrical.

05 06 48 04 CDR-LM What's electrical?

05 06 48 05 LMP-LM That's this one.

05 06 48 14 CDR-LM ... what 3 really is.

05 06 48 29 CDR-LM Oh, man, you're right. It keeps popping out.

05 06 48 36 LMP-LM There you got it.

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05 06 48 40 CDR-LM Three and 4 is this; and that should have been 1.

05 06 48 51 LMP-LM (Laughter) Okay. Okay. Disconnect left end of PLSS tool harness. Change LiOH cartridge, temp less than 130. Read cartridge decal. Stow used LiOH cartridge inside canisters. Stow canisters in buddy SLSS bag. Install PLSS tool harness. Okay?

05 06 49 13 CDR-LM Okay.

05 06 49 27 CDR-LM Need another shot of agua, Charlie

05 06 49 29 LMP-LM Agua coming up.

05 06 49 36 CDR-LM Now, we got to take this thing down?

05 06 49 41 LMP-LM Well, let's undo the bottom and just slide it up, how's that?

05 06 49 44 CDR-LM Okay.

05 06 49 45 LMP-LM The bottom's already loose.

05 06 49 50 CDR-LM That's got it.

05 06 49 52 LMP-LM Okay, I'll get you a canister.

05 06 49 54 CDR-LM Okay.

05 06 49 55 LMP-LM If I can reach it. It would have to be number 1. I believe it was in a vacuum.

05 06 50 11 CDR-LM Okay, Charlie. That's got me.

05 06 50 13 LMP-LM Okay you got 1. Okay. That's the wrong one. Now, wait a minute.

05 06 50 16 CDR-LM Yeah, this is 1.

05 06 50 18 LMP-LM That you got out already?

05 06 50 19 CDR-LM Yeah.

05 06 50 20 LMP-LM Okay.

05 06 50 22 CDR-LM Phew, oh man!

05 06 50 25 LMP-LM Dadgum it!

05 06 50 42 LMP-LM Man, I'd thought I'd had it out there with that LCRU. I couldn't get that Astromate connector done. The thing is the cable's just too stiff. I'd push down on it - -

05 06 50 53 CDR-LM Yeah?

05 06 50 54 LMP-LM - - and the cable would push me back.

05 06 50 55 CDR-LM (Laughter) I had a heck of a time setting up the central station, for same reason. Never had any problem with that before.

05 06 51 02 LMP-LM Yeah, me either. Same thing with that - that connector never had had problems before.

05 06 51 18 CDR-LM You know, that's the kind of thing you want to push on just as hard as you need to do to get it, but you don't want to push on it hard enough to booger it.

05 06 51 23 LMP-LM I know it.

05 06 51 24 CDR-LM And the question is how hard is that? What's its ...? I don't know.

05 06 51 39 LMP-LM Well, you can put a lot of - that old jack, John, just brought that core stem right out of there. Sure wish we could have had that -

05 06 51 52 CDR-LM Okay. That's got it; it's in and locked.

05 06 51 56 LMP-LM Okay, now we got to in - reinstall the hool - the tool harness.

05 06 51 58 CDR-LM Okay.

05 06 52 10 CDR-LM Well, I don't know. Man, I never even saw that thing until all of a sudden I turned around, and there it was following me.

05 06 52 18 LMP-LM Okay, let's do this. Pull this down, John.

05 06 52 24 CDR-LM Okay.

05 06 52 25 LMP-LM Now wait a minute; slide it under here.

05 06 52 34 CDR-LM Tell you what, let me undo it a little bit.

05 06 52 37 LMP-LM Okay.

05 06 52 39 CDR-LM Mine's already slid under.

05 06 52 41 LMP-LM Mine wasn't on this side. Okay, now, I'll tighten it up for you.

05 06 52 47 CDR-LM Okay. Whoa, whoa, Charlie. I'll never stow it, now. You got to let it up - -

05 06 52 52 LMP-LM Okay.

05 06 52 55 CDR-LM It's down over this beam.

05 06 52 57 LMP-LM No need to get it too tight; we've got to get in here anyway for - -

05 06 53 00 CDR-LM Yes, sir. That's right. We've got to - -

05 06 53 01 LMP-LM - - for the refill - -

05 06 53 02 CDR-LM That's right - -

05 06 53 03 LMP-LM - - for the refill.

05 06 53 04 CDR-LM - - for the refill.

05 06 53 05 LMP-LM Okay.

05 06 53 06 CDR-LM One more - -

05 06 53 07 LMP-LM Boy, is that the lunar dust that smells so funny. You think?

05 06 53 08 CDR-LM No. No, I don't - I don't know what it is.

05 06 53 15 LMP-LM Okay. Disconnect OPS antennas to remove OPS and stow antenna lead.

05 06 53 21 CDR-LM Okay.

05 06 53 22 LMP-LM Stow commander's OPS on engine cover. Stow commander's PLSS in recharge station. Whew!

05 06 53 47 CDR-LM We're gonna have to hook that back up, because we're going to do a checkout again tomorrow and hook it into here.

05 06 53 53 LMP-LM Yeah. That's right.

05 06 54 02 CDR-LM Well, I hate to tell you this, but it won't - it's just not long enough.

05 06 54 06 LMP-LM Well, I'll have to give you lots of hose.

05 06 54 08 CDR-LM Okay, wait a minute. Okay, that ought to do it.

05 06 54 22 LMP-LM Reach?

05 06 54 23 CDR-LM Yes.

05 06 54 25 LMP-LM Is it locked?

05 06 54 27 CDR-LM It's locked.

05 06 54 33 LMP-LM Rope fig [?] to PLSS. Okay, now comes our major chore. Getting that beauty into that -

05 06 54 41 CDR-LM Let me show you something. How easy it is in 1/6 gravity. Now, lend me your flashlight.

05 06 54 50 LMP-LM It's in the - it's in the purse.

05 06 54 53 CDR-LM In the purse, huh?

05 06 54 58 LMP-LM Man, you looked beautiful standing out there by Flag Couple [sic] Crater, but you are ugly now.

05 06 55 57 LMP-LM It's a panoramic scene of beauty. We might have too much junk sticking out there, John.

05 06 56 10 CDR-LM Oh, that ain't the problem.

05 06 56 20 CDR-LM Okay.

05 06 56 22 LMP-LM Do you want me to slide around on this side and help?

05 06 56 31 CDR-LM I need that flashlight again, Charlie. What did you do with it? Put it back in here?

Tape 83/16

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05 06 56 44 CDR-LM Okay.

05 06 56 46 LMP-LM Let me help.

05 06 56 48 CDR-LM Okay.

05 06 57 02 LMP-LM Now. One reason you didn't, this - this thing wasn't hanging over here.

05 06 57 10 CDR-LM Okay. Okay?

05 06 57 12 LMP-LM Okay. Now.

05 06 57 17 CC Orion, Houston. When you get a moment, give us normal voice.

05 06 57 25 CDR-LM Okay. Look, Charlie, it's not making it.

05 06 57 31 LMP-LM I know it's not making it. You got too much - the hoses are sticking out too far. I g - this side - I could get this side right now.

05 06 57 42 CDR-LM Yeah.

05 06 57 43 LMP-LM Yeah.

05 06 57 44 CDR-LM I've almost got it over here. Great. Can you raise up on it a hair?

05 06 57 51 LMP-LM Yes, this way?

05 06 57 52 CDR-LM No, the other way.

05 06 57 53 LMP-LM There you go.

05 06 57 54 CDR-LM Okay. Now, push toward the wall.

05 06 57 55 LMP-LM Okay.

05 06 57 56 CDR-LM There you go. Push toward the wall.

05 06 57 58 LMP-LM Okay.

05 06 57 59 CDR-LM Okay, now - now, screw it in.

05 06 58 03 LMP-LM Okay. (Laughter) Wait a minute. Give me the flashlight, now.

05 06 58 18 LMP-LM Okay. Down a little bit.

05 06 58 20 CDR-LM Okay.

05 06 58 33 LMP-LM There we go.

05 06 58 34 CDR-LM You got it.

05 06 58 35 LMP-LM Yes.

05 06 58 36 CDR-LM Ahh.

05 06 58 41 LMP-LM Houston, that was accomplished in only -

05 06 58 44 CDR-LM It only took us 10 minutes to stow the PLSS.

05 06 58 47 CC Well, that's about 2 minutes better than usual.

05 06 58 59 LMP-LM Oh. Okay. Okay. Commander's PLSS, LMPlee's -
LM's PLSS - could have missed that.

05 06 59 10 CC And, Charlie, we'd like that normal voice when
you get a second.

05 06 59 13 CDR-LM Stow the hose.

05 07 00 03 LMP-LM Houston, how do you read us on normal voice? Over.

05 07 00 06 CC Okay, reading you loud and clear on normal voice.
And also check panel 16, COMM DISPLAY circuit
breaker closed. Verify that for us, please.

05 07 00 19 LMP-LM No, sir. It was open.

05 07 00 21 CC Okay. It's open. Please close it.

05 07 00 26 LMP-LM It's closed now, Ed.

05 07 00 28 CC Okay, Charlie. Thank you. Okay, and give us HI
BIT RATE now, Charlie.

05 07 00 40 LMP-LM Okay, you got HI BIT RATE.

05 07 00 43 CC Okay, Charlie. Since you are off of hot mike,
now, when you get to the battery management
portion, coming up next on your checklist, skip
it and we'll pick it up at 128 hours.

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05 07 01 13 LMP-LM What time is the GET now, Ed?

05 07 01 16 CC Okay. Your GET now is 127:13.

05 07 01 23 LMP-LM Okay.

05 07 01 24 CC And we'll be changing the procedure slightly, Charlie, so let us know - Well, we'll call you when it's time to - to do that battery management.

05 07 01 34 LMP-LM That's fine. We don't have any tick-tock, so if you'll just call us, we'll appreciate it.

05 07 01 38 CC Okay. And let me advise you of something that's coming up. Before you get your PGAs doffed and over the engine cover, we want to stow that extra LiOH canister back in the bracket there.

05 07 01 51 LMP-LM Okay, yeah, we'll get that.

05 07 02 05 CC And Orion; Houston. We're showing your SUITS DISCONNECT valves in DISCONNECT.

05 07 02 17 LMP-LM That's affirmative. We don't have the hoses hooked up. I'll hook up the ho - turn on the air.

05 07 02 32 CC Good enough. Thank you, Charlie.

05 07 02 41 LMP-LM Hey, Ed. We're in - Here's our configuration, CABIN GAS RETURN is OPEN; SUIT CIRCUIT RELIEF to AUTO; SUIT GAS DIVERTER, PUSH-CABIN; the SUIT ISOL valves in SUIT FLOW; and the hoses are hooked up to the wall.

05 07 02 58 CC Okay, Charlie. Fine.

05 07 10 31 LMP-LM Okay, Ed we're on the Lunar Surface Checklist, page 3-4. Over.

05 07 10 36 CC Okay, Charlie. We copy that.

05 07 14 06 LMP-LM Okay, Houston. Bag number 5 is in sample -
SCB number 5 is in sample containment bag num-
ber 5, and it weighs 14 pounds.

05 07 14 17 CC Okay. We copy that. SCB-5 in bag 5, and it
weighs 14 pounds.

05 07 14 28 CDR-LM Bet you at least 10 pounds must be the SCB.

05 07 14 32 CC (Laughter) You collected a lot of rocks out there.

05 07 14 44 LMP-LM That was only one rock, and that was a grab sam-
ple that I got about 30 meters in front of the
LM. Over.

05 07 14 51 CC Right. That's right.

05 07 14 55 LMP-LM Okay. SRC number 1 weighs 42 pounds.

05 07 15 01 CC Okay. We copy.

05 07 15 07 LMP-LM And that's all the rocks we got.

05 07 15 11 CC Okay.

05 07 15 42 CC Okay. I don't know how factual it is, but I
remember getting a note the last week before launch
that you had your rock control weight up to
215 pounds.

05 07 16 01 LMP-LM Okay, Tony. We'll get 215 pounds of rock.

05 07 16 04 CC I bet you will.

05 07 16 05 LMP-LM How much have we got now?

05 07 16 10 CC Oh, you have 56 pounds you called back, including
the weight of the SRC, which is about 12 pounds.
So that would make it about 44 pounds.

05 07 16 34 CC I bet the muley special down there will double
your weight.

05 07 16 40 CDR-LM I'm sure it will. It gave Charlie a hernia.

05 07 17 09 CC Okay, and that SCB-5, we'd just like you to stow behind the engine cover, if you can still get to it behind the suits there. We can't give you a permanent location, because we don't have the c.g. yet, with - without the rest of the rocks.

05 07 17 24 CDR-LM Understand. It doesn't make much difference right now.

05 07 17 27 CC Okay.

05 07 18 19 CC Hey, I thought you might be interested up there, all the orbital science is working fine. The only problem Ken's had is with the laser altimeter. It only keys about 80 percent of the time, so he's losing about 20 percent of the data, but that's - it's still working fine, and everything else is outstanding.

05 07 18 39 CDR-LM Yeah, well - well what's - what's his data show is - what's he say Descartes is made of?

05 07 18 45 CC Okay, that's a - -

05 07 18 46 LMP-LM Is he getting it in real time like he did last time?

05 07 18 48 CC I'll get back there and find out. I'll get back up to you with that.

05 07 18 55 LMP-LM I was just curious as to what the sensors were saying about our area right here.

05 07 19 00 CC Yeah, I'd like to know that, too.

05 07 20 32 LMP-LM Houston, 16.

05 07 20 33 CC Go ahead, Charlie.

05 07 20 38 LMP-LM Okay. We just picked up a pretty high-pitched hum in the - in the ECS loop. Would you have them take a look.

05 07 20 46 CC Okay. We'll do that.

05 07 21 32 CC Okay, Orion, we have HI BIT RATE, and we don't see anything out of the ordinary right now.

05 07 21 47 LMP-LM Okay. Thank you.

05 07 21 51 CC Incidentally, whenever you happen to get your data book there, I have some new block data for you.

05 07 22 01 CDR-LM That'll be a while, Tony.

05 07 22 03 CC Okay. No hurry.

05 07 25 40 LMP-LM Okay, Tony. John's taking his PGA off.

05 07 25 44 CC Okay.

05 07 26 06 LMP-LM In fact, Tony, I think this high pitched hum is how the loop should sound, if I remember our chamber test. This is exactly what it sounds like, and it hadn't been doing that.

05 07 26 17 CC Okay. Very good. You're trying to tell us we don't - you don't know what normal sounds like.

(NO COMM FOR 19 MINUTES)

05 07 45 46 CDR-LM Hello, Houston. I'm up on comm. How do you read? Over.

05 07 45 49 CC Okay. You're 5 by there, John.

05 07 45 56 LMP-LM Okay. Coming out of my suit, now, Tony.

05 07 45 59 CC Okay.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 06 30 18 CMP Hank, you know I mentioned to you yesterday that old GDC was really hanging in there, and I think it's drifted less today than it has before.

05 06 30 32 CC Hey, that's just fantastic. I never saw one in the simulator like that.

05 06 30 40 CMP Oh, we - we asked them to put in big drifts so we wouldn't get in the habit of trusting it, you know, without keeping in mind you got to keep dressing it up. And, so help me, this thing - I'm gonna run you a drift check here, when I get through with this maneuver. But I'll bet you that it's, you know, 1 degree an hour in roll is about it.

05 06 31 57 CC Casper, Houston. Can you terminate the BAT B charge?

05 06 32 03 CMP Sure can. And it's off.

05 06 32 08 CC Okay, and we want to get GAMMA RAY shield, on.

05 06 32 16 CMP Okay, the GAMMA RAY shield is coming on, now.

05 06 39 32 CC Casper, omni Delta.

05 06 39 38 CMP Oh, you're already on omni Delta.

05 06 39 40 CC Boy, it sure sounds bad.

05 06 39 45 CMP Yeah, it does. Anything else go with that, Hank?

05 06 39 54 CC Say again.

05 06 39 58 CMP Does anything else go with that?

05 06 40 47 CMP Hank, do you read me at all?

05 06 40 48 CC Roger, Ken; I'm reading you.

05 06 40 54 CMP Oh, okay. I just wondered. I got a lot of noise, but I hear you loud and clear whenever you talk.

05 06 40 58 CC Roger. Same here.

05 06 41 14 CMP Any word on how the LM consumables are looking, or is it too soon to tell?

05 06 41 21 CC I haven't heard anything yet, Ken.

05 06 41 29 CMP Have they said anything about which - if they only run one more EVA, which one they'll run?

05 06 41 38 CC Stand by.

05 06 42 14 CC Ken, they're still looking at whether we've got enough consumables or not. However, tomorrow they're going to proceed with EVA-2.

05 06 42 25 CMP Okay.

05 06 44 20 CC Casper, Houston. We've got just a few minutes here to LOS, and everything looks good from this end. We'll probably do a shift change in here while - during LOS. Stu will come on, and I'll see you in the morning. A last reminder to configure your DSE at 127:01.

05 06 44 43 CMP Okay. At 127:01, I get a HIGH BIT RATE and command RESET. Okay, thanks a lot, Hank, you've been a big help today. See you in the morning.

05 06 44 52 CC Okay.

(NO COMM FOR 51 MINUTES)

05 07 25 XX BEGIN LUNAR REV 28

05 07 36 45 CC Casper, Houston; standing by.

05 07 36 54 CMP Roger, Stu. Be with you in just a minute, soon as I find out where I am here. I just took a picture; now I don't know how to tell you where I am. It's really bad when you switch from window to window, trying to figure out where some of these things go to.

05 07 37 54 CMP Okay. Stu, I'm - I don't - I don't think we've got any - any open items.

05 07 38 06 CC No, we're - we're pretty clean here. I've got a correction for you as you look at the landing site again, but that can wait until after you finish with Kapteyn here and so forth.

05 07 38 20 CMP Okay. That's probably a good idea. I've got a pretty low saturation level. I've - I got a good look at the - both the Sard [?] and at your bright ray on Chaplygin on this last pass. And I really don't know what to make of all that. That - you're right about the location of that bright ray on Chaplygin. So I guess you win on that one. The thing that I thought was rather intriguing about that was that there are all kinds of big blocks all around the outside of it, and all around on the inside too. And yet it looks like a great big mud pie. I really don't - don't know how to put it all together. It certainly doesn't have the characteristics of - any kind of a violently explosive thing. And I get to looking around at some of these other craters, and I was speculating on whether or not they're - the fact that everything is soft back here on the back side and how that compares to the front side. You know I guess one of the things that strikes me is that everything back here really isn't that soft. It - It's soft in that the colors are - are very uniform and the - -

05 07 39 44 CC Could I interrupt you, Ken?

05 07 39 47 CMP - - and the - you don't have deep crevices. Go ahead.

05 07 39 50 CC Okay. You're probably just about in the area here for - to look at Kapteyn, you're V6.

05 07 39 59 CMP Oh, thank you.

05 07 40 25 CMP Looks to me like I ought to be quite a ways from Kapteyn.

05 07 40 28 CC Okay. You are, it's just - -

05 07 40 30 CMP I'm just now coming up - -

05 07 40 31 CC - - this is.

05 07 40 32 CMP - - on Smythii.

05 07 40 33 CC Roger. I - I agree with that. This - this is the time you've got listed as to start your preparation and, yeah, you've - -

05 07 40 40 CMP Okay.

05 07 40 41 CC You've probably got - -

05 07 40 42 CMP Thank you.

05 07 40 43 CC - - about 5 or 6 minutes.

05 07 40 47 CMP Yeah, I tell you. All those hours we spent looking over these things so you can recognize them without the map have sure been a big help. You can just look out there and generally know about where you are. Except there's places here on the back side where I still have to get my map out in order to sort out what I'm looking at. It does look an awful lot alike in places, yet you look down in it and I think the only reason that everything here looks alike is it's just like everything back here has been dusted with something.

05 07 41 20 CC Yeah, I - -

05 07 41 21 CMP Because there's still these; there are sharp features. You know there's rims of craters that are sharp and there are steep sides. And there's all kinds of things that don't go along with the concept of being weathered down and old. And with the binoculars - they really bring in an awful lot of things, and you see that there are - there's an absence of little tiny craters. And all - there's overabundance it seems like of the great big guys. On the small scale, you don't see nearly as much. It's just like everything back here had been dusted over not so long ago on a geologic scale. You do see flow fronts and all kinds of things back in there just like you do in the maria surfaces and you see little - haven't seen any ridges to speak of. But I've seen an awful lot of fro - flow fronts that run up and down things. And I don't see an awful lot of the elongate kind of terrain that we've characterized with Descartes. Except way back near the 180 point, and the rest of it is almost unique to the backside, I think.

- 05 07 42 40 CC Okay. That sounds real great, Ken. Hey, that bright ray on Chaplygin, what did you make of that dark stuff. Does that really drape over the side?
- 05 07 42 52 CMP Well, I haven't been to the place where I could see that and look down on it. But during our first rev - after DO - no - yeah. The first rev after DOI, we passed right abeam of that guy and I got you a nice oblique shot of it from what looked like it was right next door. And it's got very sharp rims on it. It's - it's got dark material around it, on the inside and the outside, and I guess it's draped. But it looked to me like it was a, you know, a very sharp feature. It had all the appearances of a - what you would think of as a fresh strata volcano would look like as a little bitty guy. And the white stuff looks like snow on it.
- 05 07 43 38 CC Very good, and thanks for taking my picture.
- 05 07 43 45 CMP That was pretty spectacular, because we were about, only about 30 miles high at the time, and that makes - really did make it look like it was right next door.
- 05 07 44 14 CMP I did find one place up in, I think it's in Guyot where I'd swear there's a hole in the side of the crater wall and stuff is running out of it - dark material. And maybe I'm all out to lunch on that, I - but it sure looks that way. And I got some pictures of that. But that whole area to the north and west of King has really got a lot of stuff in it that I'd never seen before, and I suspect that's because King's been so interesting, we hadn't looked at the pictures around it. And I - I've remarked several times about the swirls and things that I see back there and that they had some topographic relief yesterday. Today, I really can't tell whether they do or not, and I think that's due to the changing Sun angles. And Farouk made some comment about that being near Abul Wafa, and I'm really talking about an area that's north of Abul Wafa by about 5 degrees. It's about - about if you draw a line between Firsov and King, Abul Wafa's about as far south of that line as the area I'm talking about is north of it.

05 07 45 30 CC Okay.

05 07 45 49 CMP And we're coming up now on old Kastner.

05 07 46 11 CC Casper over Kastner; that almost sounds poetic, Ken.

05 07 46 17 CMP (Laughter) Right. I'd sing to you, too; but, well, that might be better than my music, you never know.

05 07 46 27 CC No, if you can't play me "Riding Old Paint," why, I don't want you singing either.

05 07 46 36 CMP Okay. Well, have it your own way. You don't know what you're missing.

05 07 47 04 CMP Boy, we sure picked a lousy attitude for this observation. (Laughter)

05 07 47 10 CC ... Ken.

05 07 47 11 CMP I don't care what they say, hanging upside down - I don't - I don't do so well. And we're sitting here at an awfully high Sun angle, which makes the features very difficult to identify. But I have Ansgarius located, and there's La Perouse. And old La Perouse looks like a - looks like an old Langrenus with a big star in the center of it.

05 07 50 04 CMP Boy, I'll tell you, you can hardly make out much of anything about Kapteyn, due to this high Sun.

05 07 51 29 CMP No, I'm afraid I won't be able to say anything about Kapteyn. We're past it now and at this high Sun, you can't make out much of anything. He's a little too far from the groundtrack in this attitude to comfortably do when you're scrunched up in the corner of the window. And I guess I'm looking almost straight south now. Boy, there's one set of peaks that stick up down there that are really huge. Stick up over the horizon, make it look like the Andes.

05 07 52 08 CC Okay. We copy that, Ken.

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05 07 52 54 CC Go, flight [?]
05 07 52 58 CMP Say again, please.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 08 12 31 CDR-LM Okay, Houston. We're ready for the EVA debriefing with Houston, and lift-off time - I guess we can take that, too, if we can find the Data Book.

05 08 12 41 CC Okay, fine. Why don't we just give you all the housekeeping right now? Charlie, when you're ready - -

05 08 12 49 LMP-LM Okay.

05 08 12 50 CC - - we can give you the battery management.

05 08 12 59 LMP-LM Okay, go ahead with that. Charlie's all ears.

05 08 13 02 CC Okay. If you'll read us the ED voltages.

05 08 13 13 LMP-LM It's amazing, but they're still 37 volts.

05 08 13 16 CC Well, that's encouraging. Okay, we'd like the LUNAR BATTERY to the CDR's BUS. BATTERY 3 and 4, OFF. BATTERIES 1 and 2, ON.

05 08 13 28 LMP-LM Okay. I won't do it in that sequence, but I'll do - I know what you want.

05 08 13 34 CC Okay, fine. Okay, the battery management on 3-3 will get you there.

05 08 13 58 LMP-LM Okay, you got it. BATs 1 and 2 are ON. BATs 3 and 4 are OFF. And the lunny BAT is COMMANDER.

05 08 14 06 CC Good show. And looks good here. And do you want this block data?

05 08 14 20 CDR-LM Ready to copy.

05 08 14 22 CC Okay. This is LM lift-off, LM Timeline Book. T-28, 128 plus 21 plus 08. T-29, 130 plus 19 plus 49. T-30, 132 plus 18 plus 22. 131 [sic], 134 plus 16 plus 54.1 - T-32, 136 plus 15 plus 27. T-33, 138 plus 15 plus 20. And that's it.

05 08 15 21 CDR-LM Okay. Give me 31 again, Tony.

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05 08 15 24 CC Okay, T-31, 134 plus 16 plus 54.

05 08 15 35 CDR-LM Okay. Starting with T-29, 130 plus 19 plus 49; 132 plus 18 plus 22; 134 plus 16 plus 54; 136 plus 15 plus 27; 138 plus 15 plus 20, through 33.

05 08 15 58 CC Okay, readback's good. And, we have some changes to your Surface Checklist - 3-5.

05 08 16 14 CDR-LM Roger. What page did you say, again?

05 08 16 17 CC 3-5.

05 08 16 21 CDR-LM Roger.

05 08 16 25 CC Okay - -

05 08 16 26 LMP-LM You speak.

05 08 16 27 CC - - all right. We're going back to a nominal post-EVA-1, pre-EVA-2. So, on the EVA debriefing with Houston, that's at 128:20. And cancel the crossouts that we've put in there. Eat period's at 128 plus 35, and go ahead and do the - the part at the bottom of the page that you've redlined out there, the 112 plus 10. Do that part.

05 08 17 08 LMP-LM Okay.

05 08 17 09 CC Okay. At the top of the second column there, the PLSS O_2 and H_2O recharge is 129 plus 20; go ahead and do that. And the rest of the page, go ahead and do.

05 08 17 25 LMP-LM Okay.

05 08 17 27 CC Okay. On the next page, 3 - 3-6, the presleep is at 129 plus 50.

05 08 17 41 LMP-LM Okay.

05 08 17 42 CC And the rest period begins at 130 plus 15. That's the bottom line, second column.

05 08 17 53 LMP-LM Okay; 130:15. Do you want us to do the - bring up the computer? Over.

05 08 18 00 CC Negative.

05 08 18 03 LMP-LM Okay, we'll still skip that.

05 08 18 05 CC Roger. And it'll be an 8-hour sleep period, and I don't have the morning's checklist yet. I'd like - I'm trying to get that for you tonight so we won't have any updates in the morning. Get your cue - We'll get your cue card, too, tonight.

05 08 18 21 CDR-LM That'll be kind of you, Tony.

05 08 18 24 CC Okay, now I just have some questions - -

05 08 18 27 LMP-LM That ought to be pretty nominal, Tony.

05 08 18 28 CC Yeah, we're looking right now at a completely nominal - -

05 08 18 30 LMP-LM Hey, let me ask you - -

05 08 18 33 CC - - completely nominal EVA-2, and the day will probably be 2 hours longer, so you have - it's kind of a relaxed day. We'll have some time to sit around and talk in the evening. And we're still looking beyond there, but things look pretty good. And your biomed looks great down here. Just keep up the orange juice. Try - Push on it a little bit there and everything will be fine.

05 08 18 58 CDR-LM Push on the orange juice and everything will be fine?

05 08 19 02 CC Yes, push on the orange juice. Roger.

05 08 19 04 CDR-LM I'm - I'm going to turn into a citrus product is what I'm gonna do.

05 08 19 09 CC Oh, well; it's good for you, John.

05 08 19 15 CDR-LM Ever hear of acid stomach, Tony?

05 08 19 17 CC Well, I don't know about that. Also, since tomorrow's pretty relaxed, we encourage you to get a lot of sleep tonight. You've got - you've got plenty of time; no need to feel like you've got to press in the morning.

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05 08 19 30 CDR-LM Okay, and I think I've got a pH factor going for about 3 right now.

05 08 19 36 CC Okay (laughter).

05 08 19 38 LMP-LM Okay - -

05 08 19 39 CC We'll give you a buffer when you get down.

05 08 19 41 LMP-LM Okay, Tony - -

05 08 19 42 CDR-LM Because of the orange juice.

05 08 19 44 LMP-LM Yeah. I'd like to ask a couple of questions about consumable status, how we look for EVA-3, and what kind of day EVA-3 would be - preliminary plans. Over.

05 08 20 06 CC Okay. We've got a whole general plan here. And I'd like to send that up to you later, if that's okay.

05 08 20 16 CDR-LM That's fine. And I'd like to get some information on what we did today, in terms of how the PLSS worked, and - and how our metabolic rates were, and how - that - that sort of thing.

05 08 20 31 CC Okay, understand. We'll get them to work on that. And whenever you're ready, I can start sending up these questions from - -

05 08 20 42 LMP-LM Then let's have your debriefing.

05 08 20 44 CC - - Yeah, right from the back room.

05 08 20 51 CDR-LM We're ready as we'll ever be.

05 08 20 53 CC Okay. There was one here, just - use of words that we had a question on. When you armed the mortar package, you described all three pins are pulled. I read that to mean that you'd pulled the horse collar there and armed the two switches. Is that right?

05 08 21 11 CDR-LM That is affirmative.

05 08 21 14 CC Okay, now on to the geology.

05 08 21 16 CDR-LM She's all ready to go.

05 08 21 18 CC Good show. Okay, when Charlie was working around the LM there, he described a black vesicular basalt underneath the engine. Was that the only basalt you saw on all of EVA-1?

05 08 21 40 LMP-LM That's all I saw. There - there are - there are some more blocks than that scattered, I think, around the landing area, Tony.

05 08 21 51 CDR-LM Yeah, and, Tony, Charlie's idea to make this area LM 10 - I mean, to make this stop 10 is a pretty good one. There's plenty to get around here.

05 08 21 59 CC Okay, we understand. You said that this area - the rocks in this area look different from what you saw. About how far west did that difference go?

05 08 22 11 CDR-LM There you go. I was just at zero phase. I just hang on to the Rover and try to see where the next hole is.

05 08 22 21 CC That's called passing the buck.

05 08 22 22 LMP-LM Well, let me say, Tony, that the - -

05 08 22 25 CDR-LM That's not passing the buck, Tony. You can't - you couldn't - there's no way you can look down there when you're driving and see any - you can't even see the craters, much less the - -

05 08 22 34 CC We understand about the point you make.

05 08 22 36 CDR-LM - - what kind of rock's there are.

05 08 22 38 CC Okay.

05 08 22 41 LMP-LM Well, let me give it a try, Tony. I always have an opinion. The rocks around the - beyond the ALSEP, on our drive out past Spook and Buster, all had this breccia appearance to them, with the primarily grayish matrix with a dark clast. At Buster, though, there were some - some rocks that

were very shocked, I think. In fact, they just crumbled in my hand - the one I picked up. So, at least at Buster and Flag - Spook, the rocks appeared to be different in the main than they are right here. Over.

- 05 08 23 32 CC Okay, we copy that. Of the rocks you saw, do you feel like you - you sampled all the representative types?
- 05 08 23 45 LMP-IM Well, out - out there at Flag, they were all so dust covered, I don't know. I was really surprised when John broke that big boulder open and saw that whitish matrix with the clast. I frankly don't think that was a breccia, but it was pretty friable rock, anyway.
- 05 08 24 07 CC Okay, we copy that. You first described the muley rock as a crystalline and then switched to a - Correction. You first described it as a breccia, then switched to a crystalline. I wonder if you could have some third or fourth thoughts on that?
- 05 08 24 34 LMP-IM Well, it was - I'd say when I picked it up, it was pretty dust covered, and only had a couple of spots to - that I could look. One area looked like a crystalline rock. There was a - If it was - if it were a breccia, then that clast is pretty large, a centimeter or so. If it's a - if it's a crystalline rock, then it - it's a sort of a feldspar-looking type crystal. The other, when I turned it over, it had another one of those white specks that most of the breccias have around here, and that's when I switched. So it could be a combination, Tony.
- 05 08 25 21 CC Okay. We copy that.
- 05 08 25 37 CC Okay. Can you give us a numerical estimate on the proportion of the rock types in the LM area. We wonder if there's any correlation between rock type, size, shape, or angularity.
- 05 08 25 53 CDR-IM Well, there probably really isn't a correlation like that. I was just looking out the window here. I see some very angular - very angular rocks that are white rocks. And some - some more grayish rocks - in other words, less white in them that are sort of subrounded - -

- 05 08 26 38 CC Okay. Do they correlate with sizes?
- 05 08 26 39 CDR-LM - - and some rocks that are - No, these are all about the same size. No, the big whities are - It's just - it's just not - it's not going to be that correlatable. I see some that's sitting out there in the middle of the - the LM area that look like - I swear they got some pinks in them, but if they were just a - pink with black glass in them laying across - on the way to ALSEP site. And, seemingly, from - You can almost say they came from South Ray if you're a betting man. And that big one - these big ones - these - those - these - those need to be predominantly the size of - of say, 20-centimeter rocks, and they're very angular. This don't - The white rocks are also - they're smaller. They are on the order of 10 to 15 centimeters. I'm just guessing because we're sitting right here in the middle of this thing, and it's sort of like we can't see the forest for the trees. They seem to be a smaller rock, maybe 6 - no - 6 to 12 centimeters, very angular. And they're probably less than 5 percent of the rock type. The other - the other rock - the predominant rock in the area is just an old gray, subrounded, angular - an angular rock. And I would guess that's a breccia of some type. And although the surface is very boulder-strewn, as you probably noticed on the television, it looks exactly at the ALSEP site, in here, at the same amount of boulders. I guess we put the thing in the same ray almost, because it's almost on a line from here to South Ray. I guess what I'm saying is I can see what I believe to be at least three different rock types out here. The white, the pinkish, and this is from the LM so I'm really not qualified to go into that - the pinkish with the black clast in it, and the sub - subrounded gray rock.
- 05 08 29 18 CC Okay. Have we sampled all three of those?
- 05 08 29 24 CDR-LM No, we haven't done any sampling around the LM or stations around the ALSEP site.
- 05 08 29 31 CC Okay. We copy that. I understood that. I just wondered if you had picked up anything that you thought was the pink with the black specks anywhere?

- 05 08 29 41 CDR-LM I think most of the rocks that I was - with Charlie, when he was picking up, except for that one that we beat off over there, they're all dust covered predominantly, and I never got a chance to look at them.
- 05 08 29 51 CC Okay, I understand. So generally - -
- 05 08 29 57 LMP-LM Hey, Tony, I'd like to give you a what I - -
- 05 08 30 01 CC Go ahead, Charlie.
- 05 08 30 02 LMP-LM Let me say something, Tony, here. I'd like to give you what I think - the - the three major areas that we saw today. One, here at the LM, is a - I'm convinced is a ray from South Ray. The rock types being predominantly frabare [?]. Over by Flag, we were out of that ray. We were in the Cayley, and I sampled on the rim of Buster. And whatever made Buster, I don't think it was a secondary, because I think the rocks that we picked up there were true shock rocks. And I just can't see a secondary doing that. So the rocks around there - We were definitely out of the ray at Buster and Flag. And also, it's - Excuse me. It's Buster and Spook. At Flag and Plum, we're again into Cayley with hardly any blocks visible. So you have a Cayley without the blocks farthest out. You have the Cayley with the blocks that, I think, are some of the stuff that was made from Buster on the rim, and then in here towards the LM, we have the South Ray.
- 05 08 31 27 CC Okay. That sounds good, Charlie.
- 05 08 31 30 CDR-LM Yeah, I believe Charlie - I think Charlie's right about that.
- 05 08 31 35 CC Okay. In your summary there, you answered a whole mess of my questions here. I got to slide down the list and find one you haven't answered. Okay. How about that albedo change in the subsurface soil that you talked about? It seemed like, course you saw it first time at Flag and more - probably more excited about it there. Was there any difference in that - in - in its nature between there and Buster and ALSEP and LM?

05 08 32 10 LMP-LM No. It - Only around the LM, it was just in ALSEP, it was just in spots. At Buster, it - Correction - at Plum, it seemed to be everywhere, and everywhere we dug a little scoop, my predominant impression was that the white albedo was coarser grained than the fine dust-covered on top.

05 08 32 41 CC Okay. The white is coarser.

05 08 32 46 LMP-LM That's affirmative. It looks - it sort of - I'm not going to say ash flow, but it sure looked like it was coarse, white - Let me get a better word. Let me think about that one for a description.

05 08 33 04 CC Okay. Okay, just a question there for you, John. When you got to Halfway or what you decided was Halfway, we understand you looped around the south, is that right?

05 08 33 19 CDR-LM That's affirmative.

05 08 33 23 CC In any of the craters that you looked into - -

05 08 33 26 CDR-LM Yeah, we came up on ...

05 08 33 28 CC Okay. In any of the craters that you looked into, was there any evidence of outcrops in the walls? Anything other - You mentioned the one boulder that was sticking out the side of Flag, I think it was, that - Was there any other evidence of any - any bedrock? Any ledges?

05 08 33 47 CDR-LM Did you see any in Buster? Charlie didn't see any, and I didn't see any.

05 08 33 51 CC Okay. No benches in any of these craters at all - -

05 08 33 53 CDR-LM No, these were very subdued - No, these were rather subdued craters. They do have rocks sticking out of them, particularly at Buster and there was a few at Flag. But the rest of them really didn't. The deceptive part of the whole business - you know, is you can't really tell by looking at a crater how big it is. I was almost willing to buy Halfway for being - for being Flag.

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05 08 34 26 CC Okay, we understand - -

05 08 34 27 CDR-LM It's a long way from being Flag Crater size.

05 08 34 31 LMP-LM Tony, let me try again. The larger craters, the old subdued ones, were boulder free. The only hint that - that I had was this northeast-southwest rocks - just boulder distribution and Buster. And that went sort of up the wall southeast to north - southwest to northeast. Over.

05 08 35 10 CC Right; understand. I guess that's why - went ahead and called it a secondary. It probably isn't. It was just a - since it was oriented with the structure of the area.

05 08 35 23 LMP-LM Man, that was a big rock that came in there, if that was a secondary. I'll tell you, that is a big crater. The walls on it are - Well, the east wall was still in shadow to some degree with whatever our Sun angle is now; and we couldn't see in the bottom of Flag or Spook. The walls - You just couldn't get up close enough to the rim to see into the bottom.

05 08 35 50 CC Okay, from the TV there, I was - a couple of times when you were walking around those rims, I was wishing we had that - that rescue lanyard.

05 08 36 02 CDR-LM Too late now there, Tony.

05 08 36 05 CC Roger.

05 08 36 08 CDR-LM We'd have to count on Charlie being able to crawl out of any hole he gets in.

05 08 36 15 CC Okay, we're looking - -

05 08 36 16 LMP-LM When I fell down over there by the ALSEP, I - I crawled into one to stand up.

05 08 36 26 CC How was the footing, trying to climb out of those - the little ones?

05 08 36 33 LMP-LM It's a piece of cake on those little 10-meter size.

05 08 36 37 CC Okay. On this station 10, we're perhaps considering beefing it up, and letting you do some sampling in that area. And from what you've been saying now, it sounds like you think that the LM-ALSEP area would be a good place to spend some time. You think from your experience with the drill there, you could drive the double core all right? And how does a rake sample in that area look?

05 08 37 08 CDR-LM Yeah, we can get a lot of rocks in a rake sample. Charlie says the double core will go.

05 08 37 18 CC We're thinking about maybe moving 10 a little bit away to get out of the LM descent and the peeling paint on the LM and all this kind of stuff. So from what you've been saying, if that's a ray, it should be okay to move to the - the south-southwest.

05 08 37 37 CDR-LM What peeling paint on the LM?

05 08 37 41 CC Oh, your ablative paint on the top.

05 08 37 43 CDR-LM Man, that LM looks good from the outside. She looks good from the outside. All that paint's gone away.

05 08 37 49 CC (Laughter) Okay; understand.

05 08 37 52 CDR-LM There's still a little bit out there.

05 08 37 56 CC Okay, a question here on the cosmic ray. When that - the red ring came off, did it bring the whole cable with it?

05 08 38 10 CDR-LM No, it brought about 3 inches with it.

05 08 38 16 CC Okay. Did you happen to notice if there was a 1-1/2-inch hole visible in the upper left-hand corner of the upper panel?

05 08 38 31 CDR-LM A 1-1/2-inch hole visible in the upper left-hand corner of the upper panel?

05 08 38 37 CC I know. I wouldn't have noticed but the question's here. I thought - I thought you just might have seen it.

- 05 08 38 44 CDR-LM Well, there was a bunch of squares - squares in different samples in the upper panel, but I guess everybody knows that - but, you say, we would have made a 1-1/2-inch hole in the whole business?
- 05 08 39 00 CC No, you wouldn't have made the hole, but it would have shown it - -
- 05 08 39 01 CDR-LM I can look at it tomorrow. We can find out when passing by the Y strut tomorrow.
- 05 08 39 09 CC Okay. Was there any cable - After you pulled the red ring off, was there any cable hanging out the bottom of the cosmic ray experiment? I mean, was there any of that string left? What we're - what I'm wondering is, did the string break?
- 05 08 39 23 CDR-LM Yes, it did. I looked at the top of the - of the panel. It did look like it - the thing had jammed up in there. Some of the Mylar in the top section was crinkled in a funny way, like it had been pulled down on it. And that was the only abnormal thing I noticed about it.
- 05 08 39 48 CC Could you estimate how far it moved before the thing broke?
- 05 08 39 58 CDR-LM Yeah. At least 3 inches. How far does it have to move?
- 05 08 40 07 CC As long as you get any movement at all, it should be all right.
- 05 08 40 13 CDR-LM That's what I figured. I think it moved some. I mean - -
- 05 08 40 19 CC Okay. That - that should give them enough information to think about back there. I'm just curious - we're curious about the position of the UV camera. We saw it on TV, but it was pretty hard to get an exact location. Could you estimate how many feet down-Sun from the plus-Z footpad, and I understand it's right next to the edge of the shadow?

05 08 40 58 CDR-LM Okay. It is right now, the camera is about - I would say, from the center of the Z-footpad - I mean the plus-X footpad to the center of the bottom of the camera is about 4-1/2 or 5 feet.

05 08 41 31 CC Okay. Now that is directly to the camera, or is that in the down-Sun direction?

05 08 41 38 CDR-LM That is in the down-Sun direction.

05 08 41 41 CC Okay. Understand.

05 08 41 43 CDR-LM To the Y - in the Y distance, the distance to the camera is about - oh, maybe 5 feet from the - up from the Z strut out to the camera, it may be 6 feet. And it looks like to me that the Sun has got to move - I'm not so sure we're not going to have to move the camera to keep it in the shade, if the Sun is going to move another 20 or 30 degrees over here.

05 08 42 28 CC Okay. Understand. The Sun looks like it's coming down the top of it?

05 08 42 36 CDR-LM No, the Sun is not coming down on top of it.

05 08 42 40 CC No, I didn't mean - -

05 08 42 42 CDR-LM The camera has got to move - the shadow has got to move in - oh, about 12 feet before it gets into the LM or - That's hard for me to tell from right here.

05 08 42 57 CC Okay. Understand, John.

05 08 42 59 CDR-LM But I set it up just exact - I set it up like that picture in the book.

05 08 43 04 CC Roger. Okay. One more geology question here. Was there any difference between the rocks in the bottom of Buster and those on the rim of Buster?

05 08 43 28 LMP-LM You want me to guess, Tony? I don't think so.

05 08 43 32 CC Okay, you're right. That's all - that's all you can do.

05 08 43 38 LMP-LM Okay. And the reason I don't think so is that the rocks in the bottom were all shattered and crumbly looking and sort of mounds of rocks with many fractures in them and - which was just like the one I sampled that crumbled up in my hand. So, texturally, from 50 meters, they look the same.

05 08 44 04 CC Okay, fine. That's the end. Do you have any comments on the geology?

05 08 44 16 CDR-LM We didn't do enough of it.

05 08 44 18 CC (Laughter) I think you did an outstanding job. The back room was elated. I went back there after the EVA and talked to them, and - and they were really excited, really pleased with it.

05 08 44 32 CDR-LM Who's in the back room, now? Is Dale and Lee and Bill Muehlberger [?] back there?

05 08 44 38 CC Yeah, I saw Dale and Lee. I didn't see - Correction - I saw Dale and Bill; I didn't see Lee. I think he's on the planning team.

05 08 44 47 CDR-LM Okay.

05 08 44 49 CC Okay, I have your EMU summary. There were PGA problems. Both PLSSs performed nominally, with no major anomalies. The CDR's average metabolic rate was 850 Btu's an hour. The LMP's average metabolic rate was 1050 Btu's an hour. And - there's something here, under several procedures in work, to work around that purge valve pin problem. I wasn't sure you had a problem.

05 08 45 35 CDR-LM I don't think we've got a problem, either, if I can figure a way to keep it out of - of holding it every time I get in and out of the LM - Rover. If I can't do that, why, we'll just keep putting it back in.

05 08 45 49 CC Okay. We'll investigate it tonight and we'll make a recommendation, if necessary, during the EVA prep tomorrow.

05 08 45 59 CDR-LM Okay.

05 08 46 00 CC Maybe we'll put a lanyard on the pin or something.

05 08 46 04 CDR-LM (Laughter) Oh, Tony, now.

05 08 46 06 CC I'm just reading it. Okay. The LMP had depleted both the primary and secondary water tanks, and the CDR had approximately 2 hours remaining. And the LMP's O₂ use rate was higher than expected due to high metabolic rate. CDR's O₂ rate was nominal.

05 08 46 35 CDR-LM No, mine was lower than expected.

05 08 46 42 CC Okay. The medics agree.

05 08 46 44 LMP-LM I tell you, I expended about a - I expended about a thousand of those when I fell down.

05 08 46 52 CC Roger. You were really puffing away, there.

05 08 46 58 LMP-LM Well, you've got to get up.

05 08 46 59 CC You're right. Good idea.

05 08 47 04 CC Okay. That's about all I've got except for the plans for the next couple of days, and I guess I don't have them quite yet. We'll get those to you later. Why don't you go ahead and eat.

05 08 47 17 CC If you haven't done so already - -

05 08 47 18 CDR-LM That's a sport.

05 08 47 20 CC Oh - one question on the food, there. You mentioned, Charlie, that one of the bags had kind of blown up. I wonder if you could describe which one it was and what it looked like.

05 08 47 32 LMP-LM Yeah. It's the one we're heating right now, and it's day 5, meal C, and it was back there in the food compartment. And it was in there in its little bag, and the thing just sort of came loose and everything floated out. So the - Each little sample is not - is not - the vacuum is not gone on it. It's okay, but - I mean, each part of it - but - it must have been the overbag or something.

05 08 48 03 CC Okay. Copy that. Great. Oh, I'm looking forward to tomorrow. I - I - The day went so fast today. The first thing I knew, I didn't have a chance to eat or get a cup of coffee or anything. It was really - really hot along here. Doggone exciting.

05 08 48 26 CDR-IM Well, it was pretty interesting. I think we'd do a little better on the driving cross-Sun tomorrow.

05 08 48 31 CC Roger. You made good time coming back.

05 08 48 37 CDR-IM Yeah, follow in your tracks. That's the only way to fly.

05 08 48 43 LMP-IM Hey, Tony. If we were on time, and we got our 7-hour EVA in, what - how come we cut down - where did we lose - we must have lost it somewhere because we only had half the time at Flag - or Spook, rather.

05 08 49 03 CDR-IM Yeah, I was curious about that, too.

05 08 49 06 CC Okay. We got out of Flag about 10 minutes late, really, by the time you're really all loaded up and moving. And I can't remember right now where we lost the rest of the time.

05 08 49 24 LMP-IM Okay. Thank you. Let me say that - that all our geology training, I think, has really paid off. Our sampling is really - at least, procedurally - has been real teamwork, and we appreciate everybody's hard work on our sampling training.

05 08 49 48 CC Okay. And I sure think it's paying off. You guys do an outstanding job.

05 08 50 00 CDR-IM Yeah. You noticed how good I carried the bags, huh?

05 08 50 19 CDR-IM They - they'll be that way.

05 08 50 37 CDR-IM I got gas, again. I got it again, Charlie. I don't know what gives it to me. Certainly not - I think it's acid in the stomach. I really do.

05 08 50 44 LMP-IM It probably is.

05 08 50 45 CDR-LM I mean, I haven't eaten this much citrus fruit in 20 years. And I'll tell you one thing, in another 12 days, I ain't never eating any more. And if they offer to sup me potassium with my breakfast, I'm going to throw up. I like an occasional orange - really do. But I'll be darned if I'm going to be buried in oranges.

05 08 51 13 LMP-LM ... you really played it easy today. I wish I'd ... stayed out another hour.

05 08 51 25 CDR-LM I knew all that stuff you were doing would make you work hard.

05 08 51 28 LMP-LM It seemed like - -

05 08 51 30 CDR-LM Well, I don't know what I was doing. You did most of my work. You unloaded the ETB and loaded the ETB and all that stuff.

05 08 51 40 LMP-LM ... loading and unloading. You know why? I got back here. You were - I'll tell you what it was. We never practiced that part before of the - of warming the water packet.

05 08 51 53 CDR-LM Yeah.

05 08 51 54 LMP-LM While I get back. You see, I ... playing around and drink. And so, I got back here to the LM, golly, I had SWC out, went out there to pick up that rock, and that's the only reason - because I'd keep running back in. ...

05 08 52 42 LMP-LM About 20 minutes before I went to the Rover, had A ... and ... dropped the up-link ... got a whiff of that turkey and gravy ...

05 08 53 16 CDR-LM What'd I do with them?

05 08 53 20 LMP-LM What did you do with them?

05 08 53 21 CDR-LM They're right there over the - Oh, they're gone. I put them up over the - right up in here. They ain't there? Must be on the floor, then. Is all that ripped open or something, Charlie?

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05 08 53 47 CC Orion, Houston.

05 08 53 53 CDR-IM Yes, sir.

05 08 53 58 CC Okay, John. You're where you have a hot mike.

05 08 54 07 CDR-IM How long - how long have we had that?

05 08 54 10 CC Okay. It's been on through the debriefing.

05 08 54 28 CDR-IM How could we be on hot mike with NORMAL voice?

05 08 54 48 CC John, how do you have your intercom set up?

05 08 55 04 CDR-IM I'm in S-BAND to T/R, ICS to T/R, RELAY is OFF, MODE is ICS/PTT, AUDIO CONTROL is NORMAL, VHF A is RECEIVE, VHF B is OFF.

05 08 55 31 CC John, would you exercise your PUSH-TO-TALK button there? It may be stuck.

05 08 55 48 CDR-IM Yeah, I hit it then.

05 08 55 59 CC John, it doesn't seem to be a hot mike now. Evidently, you got it off.

05 08 56 15 CDR-IM Okay. Fine.

05 08 57 21 MCC Hello, John. How do you read?

05 08 57 34 CDR-IM Loud and clear. How do you read? Over.

05 08 57 37 MCC Okay, John. While you're eating, just let me pass a message on to you. That, number 1, you guys did a beautiful job there today. We're real happy with it down here. Tony told you the plan tomorrow is to run a full 7-hour, and our plan beyond that is to give you a little longer day than usual tomorrow. And the following day, run a third EVA for about 5 hours, then go ahead and launch the rendezvous and try to hold you to about an 18-hour day total, which means hang on to the LM and go into a sleep cycle. So that's kind of the master plan at this point.

05 08 58 22 CDR-LM Okay. Fine.

05 08 58 25 MCC And we hope you're going to get lots of rest here tonight. You've got plenty of time to do it, and, of course, with only two meals a day, why, you ought to be hungry enough to push the heck out of that. But as long as you're feeling good, why, everybody will be real happy down here, and you go as far as you feel like going.

05 08 58 44 CDR-LM That's what we're doing.

05 08 58 46 MCC Roger.

05 08 59 10 CC Yeah.

05 08 59 26 CC Well, fellows, I'll see you all in the morning. Have a good sleep.

05 08 59 32 CDR-LM Thank you.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 07 57 13 CC Okay, Ken, this is just sort of a general question about the terraces in Stone Mountain and if you get a chance, why, look down around the south end of that EVA-2 traverse, down around station 5, and just might look in the area and see if you can give any hints on how definite those terraces are. They're going to try to establish at station 5 on the first terrace. And if you think it looks definite enough, why, that's a no-sweat operation or how easy it looks to determine between first, second terrace, and so forth.

05 07 57 58 CMP Okay. I kind of looked for that and - I - let me take another look specifically at that. It appeared to me that - probably on the ground you wouldn't know you're on the first terrace. But let me take another look at that - I'll check it out this time. And again - we're only guessing what - you know, trying to guess what it would look like if you - indeed were that far down.

05 07 58 28 CC Roger. And this is sort of a no-sweat type question, Ken, so don't - don't worry too much about it, we just like to have you lamp that area again.

05 07 58 41 CMP Okay.

05 07 58 50 CMP Did they get a chance to drive the Rover around very much?

05 07 58 58 CC Ah - yeah. The Rover went real well. I think they had - got pretty much everything in on the first EVA that they'd planned on.

05 07 59 12 CMP I'll bet those are two tired guys by now, then.

05 07 59 21 CC Yes. I expect they are, Ken. They got in 56 pounds of rocks today.

05 07 59 28 CMP (Laughter) Oh - very good. We've got a place for them.

05 08 00 21 CMP Did Hank tell you we got a couple of little Casperellos flying along with us?

05 08 00 28 CC No. No, I guess I don't get that one, Ken.

05 08 00 34 CMP (Laughter) Well, the first time I noticed it was - I guess it was yesterday evening. I think maybe you were on when I saw the little particles flying along with me - right after - after the ground goes into darkness and you're still in daylight, then you can see all these things against the ground. And they all flicker and speckle and they come tumbling along. And this morning we came out, and I guess we were going minus-X, and I looked out the center hatch and here was this little thing just flying formation on me and I - in the dark, I couldn't teel how far back it was, but it was just sitting there and apparently it was tumbling because it was giving off little flashes in and out. And it didn't look like it was opening or closing or anything else, it was just sort of sitting there.

05 08 01 27 CC Well, that sounds like a real live Casper to me, Ken.

05 08 01 35 CMP Well, it's so small it's probably a Casperello.

05 08 01 38 CC (Laughter) All right.

05 08 04 43 CMP I'm looking at the - down at the central peak at Theophilus. And it has all of that same cross-hatched appearance on the shadowed side that we saw on Silver Spur and Hadley.

05 08 05 01 CC Okay.

05 08 05 48 CMP Okay. I put POWER on the PAN camera and the barber pole's back to gray.

05 08 05 57 CC Okay. I copy that. STAND BY, STEREO, and POWER, and you're a minute and 20 seconds from T-start.

05 08 06 07 CMP Okay. Passing over Kant.

05 08 06 14 CMP I'll tell you, the old landing site stands out now. You couldn't miss that for anything. And it wasn't that obvious at the lower Sun. Unfortunately, I'm a little too far south to be able to give you a good answer on those terraces, but I'll give a hack at it.

05 08 06 34 CC Okay. Copy that. And you're 45 seconds from T-start.

05 08 06 41 CMP Okay. And I'm just over here standing by.

05 08 07 12 CC You're 10 seconds from T-start.

05 08 07 23 CC And she ought to be -

05 08 07 24 CMP OPERATE.

05 08 07 25 CC Okay.

05 08 07 26 CMP I have a barber pole with gray.

05 08 07 32 CC Okay. And you've got an IMAGE MOTION. You want barber pole.

05 08 07 40 CMP Beg your pardon?

05 08 07 42 CC Okay. You want to take your IMAGE MOTION to barber pole.

05 08 07 44 CMP Do you want me to go back to the observation?

05 08 07 46 CC Okay.

05 08 07 48 CMP Does that take priority over the observation?

05 08 07 50 CC No.

05 08 07 51 CMP Yes or no.

05 08 07 53 CC No.

05 08 08 04 CMP Yes. I think that they will be able to recognize that they're on the first terrace.

05 08 08 15 CMP Oh, I don't know, over by Cinco they're not that obvious. They are further around to the west, but I'm not sure that recognize the first terrace. They might recognize Cinco.

05 08 08 30 CC Okay.

05 08 08 46 CMP Okay. I'll get the IMAGE MOTION now.

05 08 08 50 CC Okay. You're 10 seconds to a - T-stop.

05 08 08 53 CMP Stand by.

05 08 08 57 CMP Roger. Standing by for T-stop.

05 08 09 03 CMP Okay. Stand by. And we're barber pole on the IMAGE MOTION.

05 08 09 15 CC Okay.

05 08 09 21 CMP Thank you, sir.

05 08 09 23 CC Roger.

05 08 09 31 CC Okay. And the lens is stowed; you can go PC off, Ken.

05 08 09 39 CMP Okay. PAN CAMERA power is off.

05 08 09 44 CC Got you.

05 08 09 48 CMP Boy, these - these -

05 08 09 49 CC And we'd like HIGH GAIN, AUTO, Ken.

05 08 09 51 CMP You'd swear that - Sure thing. You'd swear that you ought to be able to see the IM with these binoculars. I think if you knew where to look exactly, you might be able to see it. But you couldn't hold anything in your hand any more sensitive. I'll tell you, the Cinco craters stand out very nicely and the Crest crater is very obvious from up here. But it looks like the path you've drawn that goes from station 5 to 6 and 4 - that path looks to me like it runs down sort of a tongue of material. That you can drive up it - and that those white lines we've got drawn on chart 9 Charlie - really aren't obvious at all. When you get over around more in the South Ray side you start to see these things, but it's just not at all obvious that they're going to see anything - down that path.

05 08 10 49 CC Okay.

05 08 10 50 CMP They got a good system; they should be able to find Cinco.

05 08 11 10 CC Okay. Now I heard earlier that you could see Double Spot with binocs. Does that sound right, Ken?

05 08 11 18 CMP That's affirmative.

05 08 11 20 CC Okay.

05 08 11 21 CMP I'll tell you, it's - they're really neat.

05 08 11 27 CC Okay. And I'm sure that they passed on to you that the LM should be 200 meters northwest of Double Spot.

05 08 11 35 CMP Yeah. I just - Every time I've gone over, I've been looking for something that I thought was probably more worthwhile than just the gee whiz of my saying I saw the LM.

05 08 11 44 CC Yeah. I agree with that priority.

05 08 11 52 CMP I wish they - I really wish we'd gotten into North Ray - maybe they'll still get a chance, because it looks to me like a - that's a pretty interesting path up there. Interesting from the fact that it looks like it's constructional - the ridge that runs up to North Ray crater.

05 08 12 45 CMP You know that central peak that we've all been looking at in Albategnius and thinking it was so big? It can't be so terribly big because - at least, it can't be terribly tall because it is just now sticking its nose up in the daylight. And the terminator passed here a long time ago.

05 08 13 08 CC Okay. Good observation, Ken.

05 08 13 23 CMP Boy, that straight wall really shows up from here. Just so they know that's a pretty interesting thing. It's interesting enough to rate number 36.

05 08 13 45 CC Okay. And I guess you're rocking on, ready for your terminator photos here of Guericke.

05 08 13 52 CMP Yes. I'm sitting waiting to get a little closer to them. I got Lassell, Albategnius B all lined up and boresighted.

05 08 14 02 CC Golly.

05 08 14 08 CMP There's a lot more of these sharp depressions. I don't know whether to call them grabens or what, but these - these little sharp lines that run across - there's a lot more of them than I'd guessed you'd find.

05 08 14 30 CC I suspect that they are showing - -

05 08 14 32 CMP And there's Lassell C.

05 08 14 33 CC - - up now in the low Sun angle?

05 08 14 37 CMP Yes. They really stand out in low Sun. One of the things - I'm looking at one right here that's next to Lassell C. I'm going to start my strip and talk a little while I'm doing it. And that's at a - one that's just to the north of Lassell C in that highlands clump that's next to it there. And - it looks like in the low Sun, on the outside of it, you see all kinds of craters. You know, the typical low Sun angle pictures of crater patterns. Oh, down in the floor of this thing it's just as smooth as a whistle. Like someone had drug a - something heavy through there and just made a deep impression.

05 08 15 31 CC Okay. Got you.

05 08 17 01 CMP You know it's not real obvious whether I see the end point of that strip. The thing we've drawn I think I see - but it looks like an awful lot of other craters in this low Sun. We'll have to wait until a higher Sun to see if it really is different.

05 08 17 18 CC Okay.

05 08 17 29 CMP Okay. Magazine SS is now reading 47.

05 08 17 37 CC Forty-seven on SS.

05 08 18 33 CMP Okay. It's time for a little GAMMA RAY DEPLOY.

05 08 18 38 CC Roger.

05 08 18 42 CMP MARK. It's coming out.

05 08 18 45 CC Okay. We got your MARK.

05 08 18 54 CMP Okay. I'm - I'll turn it off. Well - it looked to me like in 12 seconds and I still had a barber pole. Let's say I retract it and try again.

05 08 19 10 CMP Oh, wait a minute. That thing was already 15 inches out. That's what it is. Okay.

05 08 19 18 CC All right.

05 08 19 19 CMP Am I correct?

05 08 19 20 CC That's correct, Ken.

05 08 19 23 CMP Okay. I just - my tape in this dim light, I had the lights turned down, I didn't see the tape until it was already out.

05 08 19 39 CMP That sort of makes it sim by 5 - Casper 0.

05 08 20 07 CC And, Ken. Before you put your Flight Plan away there to exercise, I'd like to remind you of something here.

05 08 20 17 CMP All righty. Go ahead.

05 08 20 18 CC Okay. If you want to turn over to 129:25, thereabouts.

05 08 20 30 CMP Got it.

05 08 20 31 CC Okay. You'll see the - the write-in change there that may look funny to you, but we really want those steps done. And what we're doing is turning the IMAGE MOTION OFF for that pass and that's why it's a little out of the ordinary.

05 08 20 51 CMP Roger. I understand. This is - the purpose of this was so that they can get a calibration on just how much motion comes with that. They can tell where the zero point and smear comes on the film. Is that correct? That's just a gee-whiz thing.

05 08 21 07 CC Okay, Ken.

05 08 21 11 CMP The information is gee whiz to me; I guess it's important to the people who have to make maps out of the stuff.

05 08 21 18 CC Roger.

05 08 21 28 CMP Okay. And anything else before I do myself in?

05 08 21 33 CC No. About the only other thing I've got, Ken, is your - your temperature for the sleep period. I guess there are a couple of things we could do, like we could leave some power on to increase the load, or we could try to move the TEMP IN valve or we could - I guess you don't have any -

05 08 21 57 CMP I'm sorry. I wasn't meaning to be complaining. I was merely wanting to record a remark that there was a significant change in the cabin. Sometime starting yesterday, sometime, and I don't know when - compared to what we had had. And that was not something that I was asking for relief on. It's very comfortable.

05 08 22 23 CC Okay. Very good.

05 08 22 24 CMP Sorry if somebody put any time on it.

05 08 22 27 CC No. It's no problem and - -

05 08 22 28 CMP No, I just - -

05 08 22 29 CC - - was just glad you're happy.

05 08 22 30 CMP I thought it was kind of interesting. Yeah, I thought it was kind of interesting and I don't know whether it's because I'm in a 60-mile orbit or whether it's because there is only one guy in here adding heat to the atmosphere. I guess we'll decide that when John and Charlie climb in.

05 08 22 53 CC One explanation is that you lost two roommates; but, also, my cabin ran what I thought a little chilly, and do you notice it getting a - gets a little clammy going through dark pass?

05 08 23 10 CMP Well, it's not doing so bad today. Yesterday, in the dark passes, all the windows were fogging up and every time I'd breath I had to go wipe the window off. Looked like I was standing in front of a pet store. And I haven't had that trouble today at all. And it looks like it's slowly drying

itself out. We had an awful lot of condensation in here - showed up during - after LOI. All down in the suit bay was a great big puddle of water, and we had not been aware of any collection of water anywhere before that. But it had obviously been there. It didn't come out of the tunnel, but it just sort of finally all condensed. And any time you go in to clean out the suit circuit return screen, why, down in the bottom of that compartment you can see that there's a - there's condensation on some of the lines and there's a little moisture in the bottom of the compartment.

05 08 24 14 CC Okay. We got those. And I'll not talk to you for a while here. You can have at it.

05 08 24 24 CMP Okay. As a courtesy, I'll turn VOX off too.

05 08 24 28 CC Okay.

05 08 27 28 CMP Hey, Stu.

05 08 27 30 CC Go ahead.

05 08 27 35 CMP Do you folks have any - if you don't have anything more to pass up on this pass, I'll set my alarm clock here to remind me just before LOS, but I'd kind of like to take my comm carrier off during the exercise period if that wouldn't bother anybody.

05 08 27 55 CC No. That's - that's fine with us.

05 08 28 03 CMP Okay. I've got my tone booster hooked up. And if you want me, send a crew alert and I'll come talk to you.

05 08 28 10 CC Okay. We can handle that. And looks like we have nothing else. And if you come up before LOS, fine; if not, we'll see you around.

05 08 28 22 CMP Okay. See you in a little bit.

05 08 28 23 CC Okay. And if I miss you at LOS, I do want to remind you about - you've got to configure the DSE on this pass.

05 08 28 36 CMP Roger. I've got my kitchen clock set for that.
05 08 28 38 CC Okay.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 09 00 46 CC Orion, Houston.

05 09 00 52 CDR-LM Go ahead.

05 09 00 53 CC Roger. Just wanted to confirm that you guys are recharging the PLSSs. We're showing a little high water usage and assumed that was the case.

05 09 01 03 CDR-LM No, we're not. We were just drinking a lot. We're filling drink bags, juice bags, and food, Houston.

05 09 01 21 CC Okay, fine. We're just a little ginchy down here based on previous experience with the leak.

05 09 01 32 CDR-LM Well, we - we looked back - just looked back in the back-on - to try to find a lost item, and we looked all through the back end. And there's - there's some condensation on the ECS side, but there's no leaks back there.

05 09 01 52 CC Okay, everybody's happy.

05 09 02 15 CC Orion, if we're not disturbing your dinner there, would you comment on whether you found anything that accounted for that hot mike situation a while back?

05 09 02 35 CDR-LM Well, unless it was a stuck mike button. That's the only thing we can think of because our comm configuration was normal.

05 09 02 45 CC Okay.

05 09 02 52 LMP-LM Sorry about that, but it - it's terrible being on a hot mike here sometimes.

05 09 02 56 CC Well, you guys have done commendably well, considering the fact that you didn't know you were on it. I'm very happy with your - -

05 09 03 09 LMP-LM Thank you. (Laughter)

05 09 03 15 CC I wish we could say the same for some of the people down here.

05 09 03 25 LMP-LM Yeah.

05 09 11 08 LMP-LM Houston, we getting ready to start the PLSS O₂ and H₂ recharge. Has an hour passed since our initial O₂ recharge? Over.

05 09 11 24 CC Roger. Go ahead.

05 09 11 32 LMP-LM You're clipping a little bit. Say again.

05 09 11 34 CC Roger. Go ahead. You're clear.

05 09 11 36 LMP-LM Thank you.

05 09 18 10 LMP-LM Okay; Houston. We're gonna start the water recharge right now.

05 09 18 14 CC Okay.

05 09 19 36 LMP-LM Okay; we've started the water fill. Give us a hack at 5 minutes, please, Houston.

05 09 19 40 CC Roger. Will do.

05 09 23 51 LMP-LM Houston, Orion.

05 09 23 53 CC Go ahead, Orion. Houston here.

05 09 23 55 LMP-LM Roger. If all goes according to schedule on this plan you sent up, what would be our total lunar surface stay time?

05 09 24 07 CC About 19 hours. Oh, you're talking about surface stay time. I'm sorry; I'm giving you EVA time. Well, hang on a second. We'll have to figure that one out.

05 09 24 28 LMP-LM Appreciate it, Boss.

05 09 24 31 CC Okay, thank you.

05 09 24 51 CC Okay, Charlie. You've got 5 minutes, and your total lunar surface time would be about 71 hours, in round numbers.

05 09 25 07 LMP-LM Thank - thank you, boss.

05 09 25 09 CC Roger.

(NO COMM FOR 36 MINUTES)

05 10 01 18 CDR-LM Okay, Charlie's charging his PLSS with water, and he just started 5 minutes about - 5 seconds ago.

05 10 01 34 CC Roger.

05 10 01 37 CDR-LM Can you keep time on that for us, Houston?

05 10 01 41 CC Roger. Got her running.

05 10 01 45 CDR-LM Okay. What is this water problem that - that Charlie's telling me you think we've got? Should we start looking for leaks?

05 10 01 59 CC No. Relax on that, John. They just noticed a higher than normal usage and, you know, we had that leak - I guess it was on 15 - that we discovered there when people were resting. Just wanted to make sure that you weren't doing something that was using high usage.

05 10 02 19 CDR-LM Okay. We were drinking plenty of it, I'll tell you that.

05 10 02 26 CC Well, it's good for you. How's the temperature on it? Does it taste pretty good?

05 10 02 34 CDR-LM Yeah, it's pretty good. Yeah, it's good water. It really is.

05 10 02 44 CC Great.

05 10 02 47 LMP-LM I never thought - never thought water had a flavor to it, but this has really got a good flavor.

05 10 02 51 CC That's that good high-calorie iodine in it that does that for you.

05 10 02 58 CDR-LM That's probably what we really need.

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- 05 10 03 08 CC Yeah, you guys earned a good shot, there, today. Wish we had something a little stronger to give you.
- 05 10 03 20 LMP-LM You just keep it on the cooler, boss. We'll be back and get out - take you up on that.
- 05 10 03 24 CC Okay.
- 05 10 03 27 CDR-LM I'll - I'll tell you that's really - that's really a nice place to work, once you get out in the open like that. That is really something.
- 05 10 03 39 CC Yeah, that was pretty impressive. Looked real great on the TV, and you guys did a real beautiful job there.
- 05 10 03 57 CC Looks like you were lucky to find a place big enough to land in.
- 05 10 04 02 CDR-LM Yeah, I - I've got second thoughts, right now, as to whether or not that was luck or skill. I thought it was being pretty skillful because I could see all the way to the - I could see all the way to the ground and then we got out - and I noticed that we were kind of close to a crater, so I went forward a little. Then we got out and, shoot, we hadn't landed more than about 10 feet beyond this big thing.
- 05 10 04 32 CC That's pure skill and cunning, John.
- 05 10 04 34 CDR-LM And it - That's right. I didn't realize we'd come in so close to it. I think I was backing up just a hair before we - before we landed, although the - although the probe seemed to have broke straight up and down.
- 05 10 04 52 CC Roger. Sounds like you had essentially no velocity, except vertical.
- 05 10 05 06 LMP-LM That - and, Deke, the landing didn't seem that hard, but we must have stroked the gear. The - the bell is about 10 inches off - less than that - about 4 or 5 inches off the ground. But the MESA was sitting right on the ground. We had to pick it way up, and the ALSEP was less than eye level, really.

05 10 05 24 CC Well, it could be our simulation isn't all that good, either.

05 10 05 33 LMP-LM That's true.

05 10 06 32 CC Okay, we got the 5 minutes on your PLSS there.

05 10 06 42 LMP-LM Roger. Thank you.

05 10 06 44 CDR-LM I just did that so the guys on the ground would know when we were using this water this much.

05 10 06 51 CC Roger. Good idea.

05 10 06 53 CDR-LM We completed the - and we've completed the both - the charges of - both PLSSs now.

05 10 06 57 CC Roger.

05 10 07 08 CDR-LM We're scheduling another EVA in 2 or 3 hours here.

05 10 07 11 CC Well, if you're ready to run, we could probably work that out in about an hour or so.

05 10 07 22 CDR-LM It's amazing how much better you feel once you sit around for a couple of hours afterwards. Boy, when we got in we were pretty - pretty well convinced that we couldn't do a heck of a lot more, but I think - it's just like any other training exercise. Once you sit around for a couple of hours, you're ready to go again. I think we are.

05 10 07 43 CC Roger. Well, we got a nice casual schedule from here, so you might as well power down and get a good 8 hours of snoozing. You'll really feel like it in the morning.

05 10 07 54 CDR-LM That's what we're going to do.

05 10 08 00 CC How are the fingers feeling at this point? A little better?

05 10 08 09 CDR-LM Yeah, that - that's - my fingers - it wasn't my fingers so much as my knuckles. I - I don't really understand it, but - it's going to be very interesting to see what - what I can do with them.

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05 10 08 23 CC Roger.

05 10 18 47 LMP-LM Houston, Orion. Whose biomed do you want to watch tonight?

05 10 18 58 CC Stand by 1.

05 10 19 17 CC Okay, biomed on the right-hand side, Charlie.

05 10 19 25 LMP-LM Okay, you going to watch me again tonight?

05 10 19 29 CC Yeah, you apparently painted a pretty picture for them. They like you.

05 10 19 36 LMP-LM Okay.

05 10 21 47 CDR-LM Okay, Houston; this is John. I'm going to be on comm tonight. I'm going to get Charlie some good sleep. Okay?

05 10 21 50 CC Okay, fine. Yeah, that wasn't anything magic about our input there.

05 10 22 05 CDR-LM Yeah, he - he got good sleep last night, as a matter of fact, and so did I.

05 10 22 10 CC Roger. That's correct. We agree.

05 10 22 20 LMP-LM Couldn't ever believe we'd go to sleep, Deke, but, man, this guy John sleeps like a baby up here. I've never seen it.

05 10 22 31 CC It sounds like the best place in the world to sleep. I wish I was with you.

05 10 22 43 CDR-LM We do too, boss.

05 10 24 43 CC Orion, Houston.

05 10 24 48 LMP-LM Go ahead.

05 10 24 49 CC Roger. We've got a short Flight Plan update for tomorrow. Here's some miscellaneous items if you want to go ahead and take them now.

05 10 25 01 LMP-LM Stand by about 20 seconds.

05 10 25 03 CC Okay.

05 10 25 34 CDR-LM Go ahead.

05 10 25 35 CC Okay. This is in your checklist, 3-7, right-hand side of the page, following "Empty ETB," where it shows "1 - HCEX Mag B," delete that line.

05 10 26 04 LMP-LM Okay.

05 10 26 06 CC Okay, and then add that line down further on the page where it says "Stow in ETB" add "1 - HCEX Mag B."

05 10 26 29 LMP-LM Okay. Copy.

05 10 26 30 CC Okay. On the left-side page about halfway down, where you have "Book for revs 25 through 31," that is now "34 to 39." And the two lines below that, I believe, have already been deleted, but double-check that.

05 10 26 51 LMP-LM Okay, 34 to 39, and you're right, Deke. We already deleted that.

05 10 26 58 CC Okay, now page 3-8, right-hand side, halfway down. Delete two lines: "Change LM ECS, lithium hydroxide cartridge"; and then the one below it, "Stow used cartridge with BSLSS Bag."

05 10 27 18 LMP-LM Okay.

05 10 27 20 CC Okay, on 3-9, delete the whole page.

05 10 27 30 LMP-LM We got it. Go ahead.

05 10 27 32 CC Okay. 4-3. Get your EVA cue prep card on this one, and we'll enter those all on that page.

05 10 27 48 LMP-LM Stand by.

05 10 27 49 CC Okay.

05 10 28 19 LMP-LM Okay, go ahead.

05 10 28 20 CC Okay. On the right side of the card, in the middle, after comm. These are all add-ons. There's about six line items of add-on under there, which

we have fit on our card. You'll have to start up above that column to do it. First is "S-BAND MOD PM."

05 10 28 47 LMP-LM Okay, keep reading them.

05 10 28 48 CC Okay.

05 10 28 49 LMP-LM I got that, "S-BAND PM."

05 10 28 50 CC Okay. Next, "TRANSMITTER/RECEIVER, SECONDARY; POWER AMP, SECONDARY; VOICE, DOWN VOICE BACKUP; PCM, PCM, RANGE, OFF." Okay, then down about five lines there, TLM BIOMED, where it says "OFF," should be "LEFT," and three lines below there, where it says "RECORDER, ON," should be "OFF."

05 10 29 45 LMP-LM Okay, copy. S-BAND to PM; POWER AMP to SECONDARY; TRANSMITTER/RECEIVER, SECONDARY; DOWN VOICE BACKUP; PCM to PCM; ranging OFF, TELEMETRY, LEFT; and RECORDER, scratch.

05 10 30 02 CC Affirmative. Okay, next change is 5-3. And on 5-3, right-hand column, battery management. Delete that whole column.

05 10 30 22 LMP-LM Okay, deleted.

05 10 30 23 CC Roger. Okay, page 5-4. Left column, bottom of the page, the last two lines. Delete "TLM PCM - LO," and "S-BAND VOICE DOWN to VOICE BACKUP."

05 10 30 39 LMP-LM Copy.

05 10 30 40 CC Okay. Then on the bottom of the right-hand side, three lines up from the bottom: CABIN GAS RETURN, where it is "AUTO," change to "OPEN."

05 10 30 55 LMP-LM Copy.

05 10 30 56 CC Okay, page 5-5, middle left-hand column. Delete "Stow LM ECS lithium hydroxide in bracket aft of engine cover." And bottom of the page - -

05 10 31 10 LMP-LM Go.

05 10 31 11 CC Roger. Bottom of the page, where it's "Rev 32-36," should now be "Revs 40 to 45." Okay, next change is - -

05 10 31 25 LMP-LM Go ahead.

05 10 31 26 CC Okay, next change is 5-6, bottom of the page. Below "MCC-H CONFERENCE," add "153:45; change LM ECS lithium hydroxide cartridge and stow cartridge in bracket and jett bag."

05 10 32 08 LMP-LM Okay, at 153:45, we change the LiOH, and we stow the cartridge and the bracket in the jett bag.

05 10 32 15 CC That's affirmative. And then same page, top of the right-hand, eliminate "PRO, 30-VERB 37 ENTER," that line and also "STANDBY light-on." And that's all the changes we have here.

05 10 32 33 LMP-LM Okay, fine. Next line down, that "ECS for sleep" - we'll go CABIN GAS RETURN to OPEN again, Deke.

05 10 32 43 CC Okay, and stand by 1, here. I believe we've got a comm configuration they wanted to change on you. Just a second.

05 10 33 52 CC Okay. Orion, Houston.

05 10 34 00 LMP-LM Go ahead.

05 10 34 02 CC Okay, we're going to try a configuration change here on your comm to save a little power trying to hold LO BIT RATE with an 85-foot dish and - which means select LO BIT RATE; VOICE, OFF; open the POWER AMP circuit breaker; and wait about 4 minutes. And then return to the opposite configuration. Do not touch the POWER AMP switch, and you'll have no comm during this period of 4 minutes. Want me to go back through that slow?

05 10 34 39 LMP-LM Yeah, could you run through it again slow?

05 10 34 43 CC Okay, you can go LOW BIT RATE. And you can do that right now.

05 10 34 50 CDR-LM That's done.

05 10 34 52 CC Okay, stand by 1. Okay, now you can go VOICE, OFF. At the conclusion of that, of course, we'll be out of contact with you. Open the POWER AMP circuit breaker and then stand by for 4 minutes. Then return to the original configuration.

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05 10 35 27 CDR-LM Okay, we got it.

05 10 35 28 CC Okay.

05 10 38 57 CC Orion, Houston. You can now turn VOICE, ON again; close the POWER AMP. Apparently their little test didn't work.

05 10 40 46 LMP-LM Okay, Houston; Orion. We're back up in comm configuration. How do you read? Over.

05 10 40 53 CC Roger. Read you 5 by 5, and we've just got one final thing to do and that should sew it down for the evening. Just wanted to double check that you've got your suit hose connectors red to red, blue to blue.

05 10 41 08 LMP-LM Deke, we're just going to get them. We've been drying out the suits. We're going to configure the ECS for sleep momentarily.

05 10 41 20 CC Okay. As soon as you're through with that, give us a call and turn your voice off and go to sleep. Sleep tight.

05 10 41 31 LMP-LM Roger.

05 10 41 35 CC And we've got a full 8 hours programed for whenever you power down and it gives you plenty of time tomorrow to do everything you've got to do, so don't sweat it.

05 10 41 45 CDR-LM Okay. I was right pleased that we could get through that today. I thought it was going to be kind of tight and - and I was pleased that we got as much done as we did.

05 10 42 00 CC So was everybody else. I was - -

05 10 42 02 CDR-LM I guess I'm sorry that - I'm sorry that we had that accident with that cable but I - we - we probably should improve our training along those lines, but I don't know what else to do.

05 10 42 17 CC Roger. Can't win them all, John. That was a beautiful job; you guys were right on the line all the way. For your information, we do have some

people playing around with a potential fix for that heat flow thing, but my personal opinion is that it ain't going to work. I don't think it's worth the bother, but we'll talk to you about that later, if it looks like it's at all possible.

05 10 42 51 CDR-IM Roger.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 09 25 XX BEGIN LUNAR REV 29

05 09 33 05 CC Casper, Houston. Standing by.

05 09 35 49 CC Okay, Casper; Houston. Standing by.

05 09 35 57 CMP Hello there.

05 09 36 00 CC Greetings. You're loud and clear.

05 09 36 05 CMP Yeah, so are you. Looks like we had a little extra trouble locking up that time.

05 09 36 21 CC That was - we reacquired with a ground station here. It was a - a switch here, Ken. And there's nothing wrong with the good ship Casper.

05 09 36 34 CMP Oh, yeah. I was going to chastise you guys for that. I just happened to notice. I was looking out and I noticed that the Earth was quite a ways above the horizon, and I looked down and there wasn't any signal strength. I was - I got to wondering about it. I don't think you guys are sanforized; you're getting smaller.

05 09 36 59 CC Hey, if you've got a couple of minutes, at your convenience, I'll give you a - a tentative master plan.

05 09 37 09 CMP Okay. Let me put some of my toys in a nice resting place, and I'll be with you.

05 09 37 14 CC Okay. This is not a Flight Plan update, Ken. This is just going to be a general summary of what we're looking at.

05 09 37 25 CMP Roger.

05 09 37 40 CMP Let me get this thing set up for the photo pass, and then I'll - I'll be ahead, and then we'll go into that.

05 09 37 46 CC Roger. It's at your convenience.

05 09 37 48 CMP Got to switch mags here.

05 09 39 21 CMP Hey, Stu, I notice that this thing keys an awful lot at any sharp sound in the cockpit. If this is getting annoying, I'll turn the VOX level down.

05 09 39 30 CC Haven't been hearing a thing right then, Ken.

05 09 39 35 CMP Okay. Fine.

05 09 41 50 CMP Okay. All set.

05 09 41 56 CC Okay. I'll have a few - about three Flight Plan updates for you, and when we get through, when you get a chance. But here's the way it - the Plan is looking. We'll have no PC-2 or shaping burn. We'll do PC-1 about three revs prior to LM lift-off, which according to - which will be about 4 hours later than the Flight Plan shows. We're showing lift-off of the LM for about 175:44. And in the place of the nominal PC-1 time, we'll be doing the bistatic radar. The - they will have the third EVA. It'll be - they're shooting for about 5 hours on it. And, of course, the prime objective is - is North Ray. EVA-3 and the rendezvous will be done on the same day, and to hold down the crew time, it'll - that'll make it about an 18-hour day. We'll hold onto the LM through the rest period and jettison the LM the next day. From your standpoint, everything will be fairly nominal, up until about lift-off minus 6 hours. It'll be pretty close to about what we're showing in the Flight Plan now. Of course, we'll have some updates as they - they work the - the scientific standpoint of it. Oh, and TEI will be approximately a day early.

05 09 43 46 CMP A day early?

05 09 43 50 CC That's affirmative.

05 09 43 54 CMP All right. Any particular reason? I mean - I would - I would have guessed some of the other things, but not that.

05 09 44 05 CC Ken, well, I guess it's - it goes down into the bit with we've skipped the PC-2. Why, considering the SIM Bay and the objectives left, everything - everybody's going to be happy and decide to ship you out a - around a day early.

05 09 44 33 CMP Okay. Where's - we're going to launch the satellite from the orbit we're in? Is that the idea?

05 09 44 45 CC Yeah, it'll - it'll be the orbit after PC-1, and there's no sweat on the lifetime, Ken. They - they're guaranteeing a lifetime of at least a year and looking to have a fairly reasonable perigee after - even after a year, from - from the orbit after PC-1.

05 09 45 10 CMP Okay.

05 09 45 30 CC And that's - that's about it. Of course, all the specifics will be coming up to you, and I have three Flight Plan updates just any time you're ready. No sweat.

05 09 45 46 CMP Okay. I'll go ahead and copy.

05 09 45 51 CC Okay. The first one will be at 130 hours 31 minutes.

05 09 45 59 CMP Go ahead.

05 09 46 03 CC Okay. We want to delete the "MAPPING CAMERA, RETRACT." And at 130:34 delete the "MAPPING CAMERA/LASER ALTIMETER COVER, CLOSE."

05 09 46 19 CMP Okay. Delete the "MAPPING CAMERA RETRACT," and the "COVER CLOSE."

05 09 46 24 CC Okay. And at 131:19.

05 09 46 31 CMP All right.

05 09 46 33 CC Okay. Your speed on your camera is changed to 1/250.

05 09 46 47 CMP Okay. That's 1/250.

05 09 46 50 CC Okay. And just to ease your mind on that other note - Flight Plan note - we're gonna - The mapping camera will be left out during your dump and the sleep period.

05 09 47 07 CMP Okay.

05 09 47 12 CC Okay. And 132 hours.

05 09 47 58 CC And, Ken, I've got one more at 132.

05 09 48 02 CMP Okay. You - you dropped out there. I didn't get anything in. You just went silent. I didn't hear anything after - Oh, let's see, where's the last thing I got from you? I got the configuration change in the camera and the understanding that the mapping camera was going to be left out all night. And that's all I heard.

05 09 48 24 CC Oh, okay. It'll also be out during your dump. I just wanted to - -

05 09 48 30 CMP Yeah.

05 09 48 31 CC - - Verify with you that that was true. Okay and - -

05 09 48 32 CMP Yeah, I got that.

05 09 48 33 CC All righty. And you - -

05 09 48 34 CMP Roger.

05 09 48 35 CC - - got the shutter speed change at 131:19. And my next change is at 132:00 when you're - -

05 09 48 40 CMP Yes sir.

05 09 48 41 CC - - when you're ready to copy.

05 09 48 44 CMP Okay. I'm ready.

05 09 48 46 CC Okay. We want to add H₂ tanks 1 and 2 HEATERS, AUTO. H₂ FANS 1, 2, 3, OFF.

05 09 49 05 CMP Okay. H₂ tank 1 and 2, AUTO, and all three FANS OFF at 132 hours.

05 09 49 11 CC Okay. That's the end of the update.

05 09 49 42 CC And, Ken, I've got a few questions about the flow of Mandel'shtam when you've a chance you want to talk about it.

05 09 49 59 CMP Okay. Let's see. I got a few minutes. Why don't we talk right now?

05 09 50 05 CC Okay. I'll just run through - There are four questions. Why don't I just give them all to you, and then I can go back over them, but we'd like to know in what part of the floor is the flow. We'd like to know how large it is. We'd like to know the direction of flow. An on-the-spot observation of whether or not you think it's a landslide or a lava flow.

05 09 50 37 CMP Okay. I covered some of that again on this last pass, I guess. Let me - Say those questions again.

05 09 50 45 CC Okay. In what part - -

05 09 50 46 CMP You ... want me to write a few key words down.

05 09 50 48 CC Okay. In what of the floor is the flow?

05 09 51 02 CMP Okay.

05 09 51 04 CC Want to know how large it is.

05 09 51 21 CMP Okay. Go ahead.

05 09 51 22 CC Okay. And what is the direction of flow?

05 09 51 38 CMP Okay. And your last question was origin?

05 09 51 41 CC Roger.

05 09 51 46 CMP Okay. Let me see if I can get - get a map here that I can give you some reference on. The kind of flow that I'm talking about back there is - is sort of like the kind of flow from - that your - that you see in the mare materials. It's - it's not a big thing ... that you can trace back like you can

some of these other things we've seen. It's just sort of appears as a flow front. It's not sure where it comes from, and you can see it run down in the craters and around them. And, from that - I made a little more objective analysis of this stuff that you see on this back - this last pass when we came across on what we call the - the Far Side Highlands. And it's my general impression that these - these flows - maybe that - maybe I'm using the wrong term - they look like flows. They have all the characteristics of a flow front, and yet there's places where they go along, and you'll see it with the scarp going down to the east, and then all of a sudden it'll get a little confused and then the scarp will be showing up going to the west. And then you'll see places where - there's one place in Mandel'shtam - I think we have a picture of it - where this - this scarp, that looks like a flow front, curves in an arc to the right, and it's got material that comes from behind it. Then all of a sudden it sort of turns back in underneath itself and then just disappears. And there's - there's no flow front where it disappears underneath. It's - it's just a - it's a very strange thing. We've seen that in several other places. Some were appearances in the photograph that Farouk and I were looking at of Baldenburger [sic]. Now, that's on a much larger scale of course. But it's the same kind of problem, where you see a unit which is obviously overlaying another. And yet it's overlaying itself by one that the original unit happens to overlay. It's like a - a chain where each - each ring overlaps the other one in a closed circle. And it's very confusing from that point. And let me look at my map here and see if I can give you some - some better handles. I think I took some pictures back there to mark it.

05 09 55 53 CMP

Okay, Stu. Looks like the map is no help, and the - the only picture we have onboard that I can talk about - is on - in the visual photo book. It's VIA. And if you look at the ren - you don't - remember Mandel'shtam has the - the big central crater and then two little craters, or it kind of looks like concentric craters with a bull's-eye, and the flows that I was looking at were almost

on the - I guess you can say they're on the northern side of the big crater. And they run down into several of the smaller craters up there. And the general direction was with the flow scarp as I'm calling it. Facing the - facing to the west, it runs into the crater on the northern side. That's - after looking at more and more of this highlands back here, I'm beginning to believe that these are not actually flow fronts at all; they just happen to look like that if you look at them in short sections, but I think there must be some other process that's affecting all this.

05 09 57 14 CC

Okay.

05 09 57 15 CMP

I'm afraid that - that on the specific kind of questions you asked, in this case, I'm - I'm really kind of out to lunch. I - I can't make specific things when you say how large. There - the length of these things that I can trace are the same size as - as the crater that I was looking at. And I guess that must not be that central one, but one of the adjacent ones - one of the ones on the north. But they're - they're quite long, and they're all over the area. They're in craters; they're outside of them; they're on the floors. You see these things just about everywhere you look back there. They're large, and they're just - it sort of defies my imagination. I see nothing that looks like sources anywhere.

05 09 58 07 CC

Okay. We got that.

05 09 58 10 CMP

I guess that's a - I guess that's a brief summary to say that I really am not as smart as I wish I was.

05 09 58 18 CC

That sounded pretty good to me, Ken. And we'd like HIGH GAIN to AUTO.

05 09 58 32 CMP

Okay. There's AUTO. Now. GAMMA RAY, SHIELD OFF. Ah ha. And it's OFF.

05 09 58 52 CC

Okay.

05 09 58 59 CMP

And I'm gonna start in on my strip here.

05 09 59 34 CMP

And just for planning purposes, in the future, I - I know we got those templates out, and when we looked at all those templates on the charts, we said, gosh, you know, you must be able to see a lot more from the window. But, photo targets like this one are in the extreme of what you can reach from our windows. I guess they really didn't - they didn't exaggerate those things too much at all. You can see more if you put your face right against it, but by the time you get a camera in there, your field of view that you can control the camera in is greatly reduced.

05 10 00 15 CC

Okay. Is it true of the - of the hatch window also, Ken? You know that's the one we talked about that looks like - you're bound to be able to see more than - -

05 10 00 23 CMP

Yeah. It's not as true there, because you have - yeah, you can - you can certainly see more, and you can - you can get around there with a camera a lot better than you can at these sides. You - you run into - You bang your head against R-12, then you push it into the comm panel, and - there's always something where you want to put your head.

05 10 00 42 CC

Hey. I agree to that. I've been in that same corner with the 500.

05 10 00 48 CMP

(Laughter) Yeah, well one of those folded guys would be very nice. But even that, I - I - in looking at it, I'm just holding my 250 against the window here, and with the increased diameter, you'd buy a little bit with that folding one, but not a terrible amount because the darn diameter's gonna bite you. When you look at anything other than perpendicular to this side hatch window, the two window panes are so thick that you can't look very skewed.

05 10 01 24 CC

Okay.

05 10 02 39 CMP

Okay. We've started our photo strip.

05 10 02 46 CC

Okay.

05 10 07 14 CMP

Okay. That's a good place to quit. And that's frame 61 of magazine Bopa Bopa.

05 10 07 26 CC Okay. Frame 61.

05 10 07 31 CMP Yes, sir.

05 10 08 26 CMP And the IMAGE MOTION is stepped up the barber pole and back to OFF.

05 10 08 31 CC Okay.

05 10 10 23 CMP And the GAMMA RAY SHIELD is back on.

05 10 10 26 CC Okay.

05 10 11 30 CMP I tell you, Stu, that Straight Wall really is a hummer out there.

05 10 11 37 CC Sounds awful beautiful, Ken.

05 10 11 46 CMP Yeah, with all the things that are on the front side, I'll have to admit that in many respects it's - it's more interesting. I'm not sure there's any more to be seen or learned here, but it's - there's enough extra variety that it's easy to - to recognize something that's different. You don't have to look so hard to see what's the same. When I look down at the - at the individual sections of material, I look at this Cayley down here, - oh, what am I looking at - Ptolemaeus and Alphonsus, the floors that - that Cayley fill. It looks just on the detail scale as the stuff on the back side does. And the - the rims around the craters like Alphonsus - that material looks just like the stuff on the back side. When you get down to the detail level, it all has the same features. The only thing that I see that's - that's quite a bit different is I don't see any of these rille systems on the back side anywhere.

05 10 12 58 CC Okay. Maybe we can talk to FIDO and work in something where you can just orbit the front side.

05 10 13 12 CMP (Laughter) Yeah, I'll get in one of those synchronous kinds.

05 10 13 44 CMP I'm looking out here now at the area just to west of the south of Lassell E on a little highlands there. And if you go straight south from Lassell, there's a little tip of highlands material that runs out to the west. Then it stops, and if you take from there and draw a line, I would guess it's almost due west. It looks like there's two entirely different materials there. Like you built it out of two fabrics and then put it down. The one to the north is darker than the one to the south. It's - it's split by a very straight line, and there's a - a very distinct difference in the - in the albedo or the shade of gray that the mare has.

05 10 14 32 CC Okay.

05 10 15 40 CC And, Ken, you're under 1 minute to MAPPING CAMERA, OFF. You got about 45 seconds.

05 10 15 49 CMP All right, sir. Thank you.

05 10 16 21 CC And you're 10 seconds T-stop.

05 10 16 27 CMP Thank you. And it's stopped.

05 10 16 37 CC Roger.

05 10 18 13 CMP M in STANDBY.

05 10 18 18 CC Okay.

05 10 18 21 CMP And the laser's off ...

05 10 18 23 CMP MARK.

05 10 18 25 CC Okay.

05 10 21 36 CMP Okay. The ALPHA/X-RAY COVER is coming CLOSED.

05 10 21 39 CMP MARK.

05 10 21 40 CMP Barber pole and gray.

05 10 21 43 CC Okay.

05 10 30 36 CC Okay. We've got - -

05 10 30 37 CMP Okay, I guess I'll - I'll torque these, although it seems like a shame.

05 10 30 41 CC Yeah. We - we see them, and - go ahead and torque them. Boy, that beauty's nice.

05 10 30 48 CMP Yeah, it really is.

05 10 31 19 CMP Hey, Stu. No one ever said anything about the - the P23s. Anyone in the back room know how they came out? What kind of an altitude we ended up with?

05 10 31 32 CC Yeah, Ken, I've - we've got that. I'd looked at it there a couple of days ago. A little blurb there I'd written in. It said the mark data was real consistent, and I think it was something like 33 kilometers, but I'm - let - let me check that out for you.

05 10 31 54 CMP Okay, I was just curious. I - I didn't feel like I had as much trouble with that horizon as I anticipated. As far as knowing where I ought to be, my problem was getting the spacecraft there.

05 10 34 15 MCC Ken, I remember your comment here yesterday about the sextant and the telescope really looking swinging. Have you had any change in that at all, and in particular, the - how about the reticle on your - on your sextant? How does that look to you, and how did the lunar surface look through the sextant? These are just all my own personal questions, so don't - don't take much time on them.

05 10 34 39 CMP All right, Jay. Yes, I - no, as a matter of fact, at one time I looked in there and saw the sextant was really blurred and I thought, "Oh, here we go. Just what you'd said." And I got to looking around, and I found that these eyepieces vibrate on there quite badly. And I guess I shouldn't use the word vibrate, then, but they unscrew, and I've got a lot of tape wrapped around them now to keep them on. And they change focus. And I had to refocus the thing. And once I got it focused, it's - if I turn the reticle lights up to full intensity, why, I get a little bit of a smear. But not much at all, and when I look at

the images on the ground like in the tracking - I took a look during the practice tracking period - and, boy, I tell you, that was just as nice. The only problem was, when you're down low and looking through that 28th power, your field of view is so small you wouldn't recognize your own house if you flew over it.

05 10 35 56 CC

Roger. Copy.

05 10 35 58 CMP

I still - I'm still not having as much success with the telescope as I - as I ought to, and I'm - I'm trying to psych it out. I was going to take a look here a couple of times. I'm not aware of any light in the telescope right now, but you just can't see any stars in there. And I'm wondering if the Earth is enough still that it - it might blank them out. Because they are obviously there when I look out the window. But they become a great deal more obvious once I get on the back side, or in that double umbra. And I thought I'd try to make a note to check that in the telescope on this pass. I know when the LM was on the nose, that really made a big difference, because all I could see was LM.

05 10 36 49 CC

Okay. I - -

05 10 36 50 CMP

... reflection off the LM.

05 10 36 51 CC

Okay, I graded that. You get a very good picture of the LM quad.

05 10 36 57 CMP

Yeah, I can see the quad in the radar. I can tell you all about them.

05 10 37 03 CC

Roger.

05 10 37 05 CMP

But even in earthshine it was - it was - you could - you could pick out all the features in earthshine. It was really amazing. And was just - just - just beautiful. And last night or whenever it was when we were playing around there, why, if I had had a little more confidence in the depth perception, we could have done our stationkeeping without any lights and earthshine. You get - once you leave earthshine, though, you really need that

old docking light. And the docking light, much to my surprise, isn't - isn't good for much outside of 500 feet. And, at 500 feet, if you ever lost sight of the target, you probably wouldn't pick it up again. When you get into 300 feet, then - then it holds the target - with sufficient illumination to see things and tell relative motion. I didn't turn all the cockpit lights down too dim, because the LM strobe is such a beauty. And finally we turned the strobe off just to save power and time on it. And we had no problem at all, but the - I had to help the LM guys how bright that thing was in their face, but I had the impression it wasn't so terribly bright.

05 10 38 31 CC

Okay. Thank you.

05 10 38 36 CMP

Got another little piece of amazement here that you'll - you might appreciate. It took me by surprise. I did a - I started out and I checked the GDC drifts when - right after we got on our way. And they were running pretty high; and they were about 7 degrees an hour if I remember right. I've got them written down somewhere. I won't look for them now. Maybe it was like 6 degrees, but they were pretty healthy drifts. And this was some time after I got - I checked one set of BMAGS before TLI and one after. And I did a GDC align at 127 hours. I just did another one; this is 100 and - 130:45. So that's 3 hours and 45 minutes, and the two are off by 2 degrees in roll, 1 degree in pitch, 3 degrees in yaw. And that's the way this thing's been operating for the last couple of days. And I - I don't know what finally got it to square itself away. At the time the platform went belly-up there, why, they were about 12 degrees apart, and they had been aligned probably no more than a couple of hours before that. And I noticed the following day - I started watching the GDC, and I noticed I didn't have to align it very often. And it just seems like the more it runs, the better it gets.

05 10 40 05 CC

Hey, that sounds jolly good, Ken. I - I had suspected that you've been keeping a rather close eye on the GDC.

05 10 40 15 CMP (Laughter) Well, I tell you, every time I zero in on the optics, I make about 50 checks of all the switches in here.

05 10 40 24 CC Roger.

05 10 40 25 CMP That'll keep your attention.

05 10 40 26 CC Roger. I suspect that the GDC stays pretty well aligned, too.

05 10 40 33 CMP Maybe it knows something that I don't.

05 10 40 37 CC Roger.

05 10 40 45 CMP Something else that surprised me, Stu. Maybe you remember. I can see a - a definite horizon for the Moon within a minute or so of AO - LOS. And I - I guess that's the zodiacal light and the solar corona showing up there, but I really didn't anticipate seeing that nice dark disk. And there's a - it's just like seeing the Earth horizon on a dark night. It's really there.

05 10 41 29 CC Okay. Thanks, Ken. We got that.

05 10 41 34 CMP Do you remember seeing that much horizon?

05 10 41 41 CC No, sure didn't, Ken. But I had - I had very few passes where the orientation was where I could - could see that.

05 10 41 59 CMP Yeah, I understand.

05 10 43 54 CC And, Ken, we're in about a minute and a half to LOS.

05 10 44 00 CMP Okay.

05 10 44 02 CC And I want to - to remind you to configure the DSE here on - on this.

05 10 44 12 CMP Okay. Thank you very much.

05 10 44 16 CC Jolly good. We'll see you in a little bit.

05 10 44 21 CMP All righty. Have an extra cup of coffee. And, if you don't drink the stuff, I need some.

05 10 44 29 CC Okay. I'm not sure I can even drink coffee for you, Ken. How about a cup of chocolate?

05 10 44 35 CMP (Laughter) Well, we probably both want the same thing right about now.

05 10 44 43 CC Roger.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 11 10 39 CDR-LM Okay, Houston. We are all rigged up for sleep, and we'll be seeing you in the morning.

05 11 10 57 CC Okay, John. I guess we're all ready for you to go to sleep. One thing we want to - Stand by. We want your SUIT ISOL valves to connect. I hope that's the right terminology for you LMies.

05 11 11 31 CDR-LM We got SUIT FLOW and SUIT DISCONNECT. What do you want?

05 11 11 42 CC Okay. We want the CDR's hose to connect and SUIT FLOW.

05 11 12 24 CDR-LM I - I - You're snowing me there. I - What do you want? You want flow through the hose or not?

05 11 12 35 CC Okay. We want the CDR's SUIT ISOL to FLOW. We wanted the same configuration as - old Percy over there.

05 11 12 54 CDR-LM The CDR's SUIT ISOL valve to FLOW.

05 11 13 01 CC That's affirmative.

05 11 13 07 CDR-LM Okay, you want it to FLOW.

05 11 13 10 CC Okay, it looks good.

05 11 13 15 CDR-LM Okay.

05 11 13 19 CC And, good night.

05 11 13 27 CDR-LM Good night to you guys. Thank you much for a good day. Enjoyed it.

05 11 13 31 CC Okay. We'll look forward to a bigger and better one tomorrow.

05 11 21 52 CDR-LM Houston, 16. Over.

05 11 22 00 CC Go ahead, Orion.

05 11 22 04 CDR-LM Okay, this is Orion. Could we put our AOT detent to either 4 or 6, because the Sun is shining right in it right now, and it's lighting up the whole cockpit even though we're all - got the lights turned down. It's just like we got a big spot in here. Or is - or is that not possible?

05 11 22 24 CC Okay. Stand by.

05 11 23 06 CC Okay. John. The word is, you can put it in any position you want, if that'll solve your problem. We don't care.

05 11 23 19 CDR-LM O - Okay. Thank you.

05 11 23 50 CDR-LM That solved our problem, in detent 6. Thank you much, Houston.

05 11 23 57 CC Roger, Orion. And, good night, again.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 11 22 XX BEGIN LUNAR REV 30

05 11 32 58 CMP Hello there, Stuart.

05 11 33 00 CC Oh, greetings, Casper.

05 11 33 16 CMP I just took a - another look at our old friend, King, looking at him this time from the north looking south and west. And, there's no question in my mind now that there's - there definitely some dark material that's on the top of the central peaks, that's on that western side. Before, I couldn't really tell if there was or not. It looked like there was some blocks that might be casting shadows. But, looking back at it, there's something on there that at least changes the albedo and nothing else. And it's not shadow. And I got a picture here on frame Victor that ought to - hopefully will substantiate that.

05 11 34 02 CC Hey, that sounds - -

05 11 34 03 CMP That white valley - -

05 11 34 04 CC - - jolly good.

05 11 34 06 CMP - - ... Mandel'shtam, I took another - took another look at the craters we'd talked about. And, there are two places on there where I think I see these flow scarps that I was talking about. And, one of them is at - let's call it 163 degrees east and about 2-1/2 degrees south. And, you see a little blob that the artist has drawn in there, and that looks like that is part of - of what I'm looking at - that appears to me to be a - kind of like a flow field.

05 11 34 46 CC Okay. Got that.

05 11 35 35 CC And, Ken, I notice here this is supposed to be in the middle of your eat period. Are you eating?

05 11 35 47 CMP Well, as a matter of fact, I just looked and noticed that it was an eat period. I guess I will go and do same. I got all carried away with this being the first time I've had a chance to look to the south.

05 11 36 07 CC Okay. When we come up down here, in about 7 or 8 minutes, why, we're showing this - the PAN CAMERA to have the POWER on so we can take a look at it. We want to play a couple of little games with the V over H override switch at that time, to see if we can find one of the positions of that switch that might have a little less effect on our sensor - You know that was - that was a change and we're noticing the sensor has been detecting lower light levels than it should. So, we're going to put the switch to HIGH ALTITUDE for a couple of minutes and then LOW ALTITUDE for a couple of minutes, and we'll give you a call on all those.

05 11 37 03 CMP Okay. Just tell me what you want, and I'll go down here and put my nose in the feed bucket.

05 11 37 06 CC Okay.

05 11 37 20 CMP Seems like I ate just a couple of minutes ago.

05 11 42 17 CC Casper, Houston.

05 11 42 19 CMP Go ahead.

05 11 42 21 CC Okay, if you got time there in mixing up your food, we'd like to have the PAN CAMERA to STANDBY and the POWER on.

05 11 42 31 CMP Okay. PAN CAMERA to STANDBY and POWER on. Omm - Om - a - Okay. And POWER is on, the talkback is barber pole, and again it's gray.

05 11 42 50 CC Okay, and let's go on the V over H override to HIGH ALTITUDE, now, Ken.

05 11 42 58 CMP Okay. V over H, HIGH ALTITUDE -

05 11 43 01 CMP MARK.

05 11 43 04 CC Okay.

05 11 45 33 CC Okay, Ken, if you'll give us LOW ALTITUDE on the V over H override.

05 11 45 38 CMP Okay, going LOW ALTITUDE -

05 11 45 40 CMP MARK.

05 11 45 41 CC Okay.

05 11 47 59 CC Okay, Ken. You can go to center, off position on the V over H override, and you can go AUTO on the HIGH GAIN.

05 11 48 10 CMP Okay, V over H override is center off and HIGH GAIN is in - AUTO.

05 11 48 16 CC Okay.

05 11 48 28 CC And, Ken. Just for your info, the field geology team are in the final phase of making their plans for EVA-2 tomorrow. So, if you've got any additional comments, why, better make them this - this pass because they'll have to have it all firmed up.

05 11 48 52 CMP Oh, I think they're smarter than I am.

05 11 48 59 CC Well, now. Don't get too carried away up there.

05 11 49 04 CMP (Laughter) No, I would really - I'd really hope they make it to North Ray, though. I think that's going to be different than we expected it to be.

05 11 49 17 CC Roger.

05 11 50 08 CC Okay, Ken, we are ready for PAN CAMERA POWER to OFF at this time.

05 11 50 16 CMP Okay, PAN CAMERA POWER is coming OFF -

05 11 50 19 CMP MARK.

05 11 50 20 CC Okay, we got it.

05 11 51 54 CC Hey, Ken. How did we make out in our discussion on North Ray low altitude there as far as being able to see the - the white albedo or not? Or, were you too far to the south?

05 11 52 10 CMP Oh, I got ahead. It depends which rev you want to talk about. On - well, I looked at her on the first day, right after DOI, there wasn't any - there was two craters, but no rays. When I went back and looked at him on landing morning, there's a slight ray. But North Ray still doesn't stand out as being the bright guy that South Ray does.

05 11 52 35 CC Well, it's obvious I was talking about the - the landing day.

05 11 52 43 CMP (Laughter) I gathered that it would be the case.

05 11 52 47 CC Yeah, by all means.

05 11 52 58 CMP Right now I would agree with you on anything, Stu.

05 11 53 01 CC Yeah, I'll - I'll be quiet - -

05 11 53 02 CMP I'm ... here with my - -

05 11 53 04 CC I'll be quiet - -

05 11 53 05 CMP - - potato soup and my - Ah! Ah!

05 11 53 12 CC Yeah, I ought to - I'll be quiet here and let you concentrate on your eating.

05 11 53 20 CMP Oh, man. This is gourmet style. I got - I got the Modern Jazz Quartet playing "Porgy and Bess," and I got orange/grapefruit, some of it in the bag, some of it on the bulkheads, potato soup. Man, it's real gourmet style. Even got a Beta candle.

05 11 53 51 CC Hey, Ken. With all of that, now while ago you talked about some Casperellos - with all that Beta candle and all that food, you don't have any such thing as a Casperette, do you?

05 11 54 08 CMP (Laughter) No, I'm afraid I left that at home.

05 11 54 10 CC (Laughter) All right.

05 11 54 14 CMP That's about all this place is lacking, though.
(Music in background)

05 12 07 14 CC And, Ken, just another comment to close the loop on you on that P23s - the - like I said before, the marking data was very good, and you came up with an horizon of 33 and loaded is a value of 28. And after massaging all the data decided to not change it since we've shown on the other missions that coming back - the - has a tendency to have a lower horizon. So, looks like we're just swinging with what we got there.

05 12 07 58 CMP Okay, that's just fine.

05 12 11 01 CMP Hey, Stu.

05 12 11 04 CC Yeah, go ahead.

05 12 11 06 CMP Couldn't pass up a chance to watch the landing site one more time, and so I took a quick break from chow and went and watched it. And had a couple of questions in mind and only got two of them answered. One of them is that counting the - the layers in North and South Ray and South Ray looks

different than North in that South Ray shows three distinct light and dark sequences. I suspect they're slumps, but there's at least three bands. North Ray doesn't have any of that sort of thing. It's obvious from this altitude. I took another look for their terraces and the whole area - the thing that we thought looked so distinctly different in the photographs - looked like Stone Mountain and Smoky Mountain were two different things and something came in the middle of it and - it doesn't look that way to me at all today. It looks to me like it's really all - almost all part of the same material. And I've drawn another little mark on my - on my map. It's just about where you folks said you thought the LM was, except a little farther over to the north. It turns out that there's one little bright speckle there that doesn't look like craters. I don't see anything except the speckle.

05 12 12 41 CC

Okay, I'm - I'm looking there. Now, go straight north of the - of the LM and a little to the west, there's three small craters there that are covered with what looks like by ray, now. Where are you talking from that?

05 12 13 41 CC

Okay, Ken. Did you fade out, or did you stop talking? How do you read?

05 12 13 48 CMP

Oh, hey. I - I had you off of VOX and I forgot to push the key down, I had gotten so use to it. No, I - I gave you an 80 and about - oh, you were lookin in the right area. And, let me see what I can give you for coordinates on that.

05 12 14 21 CMP

How about CB 5 and 80?

05 12 14 28 CC

Okay. We've got CB 5 and 80.

05 12 14 34 CMP

Okay, and you know I'm - I'm not overhead long enough to be sure that that's what I'm looking at, but it looked to me like it had a - a different kind of glint to it.

05 12 14 48 CC

Okay. I'm sure they've got that.

05 12 14 52 CMP

Oh - hey. I've got one.

05 12 16 06 CMP Well, I missed it. By the time I got the camera, it was gone. But that little - little buildup that we talked that was just to the west of Lassell, I had it spotted, and I was grabbing for the camera, and I couldn't find it again after I got back.

05 12 16 27 CC Okay. And, Ken, if you want to go ACCEPT we'll uplink the jet monitor load; and, it's your choice whether you want us to initiate it or you want to initiate it.

05 12 16 46 CMP All right, you guys can do that.

05 12 16 49 CC Okay, we've got - Copy that.

05 12 22 19 CC Okay, Ken. The computer is yours. Go to BLOCK, and the EMP is running.

05 12 22 32 CMP Okay. Thank you very much. You guys are really helpful.

05 12 28 41 CC And, Casper; Houston.

05 12 28 49 CMP Be with you in a second.

05 12 29 07 CMP Okay, go ahead, Stu.

05 12 29 09 CC Okay. We're showing the lower 14 minutes to LOS; but, we're going to lose data before that. And, we'd like to get that E-memory dump just any time you're ready. We're all configured.

05 12 29 31 CMP You got it.

05 12 29 34 CC Okay.

05 12 31 51 CC And, Ken, on the HIGH GAIN, we'd like a REACQ. We'd like PITCH, zero; YAW, 170.

05 12 32 05 CMP Okay, you have REACQ; PITCH, zero; YAW, 170.

05 12 32 10 CC Okay.

05 12 35 01 CC Okay. Ken, we're going to lose comm with you here shortly. And, we'd like to get your onboard read-outs and if you would get your book to copy, we've got a TEI-41 pad.

05 12 35 35 CMP Okay. Let's see. Okay, I'll give you some read-outs first. Battery C is 36.7; battery B, 36.3; battery A, 36.8. I guess all you really needed out of that was battery C though. Now, you'd like the pyro's. Okay. They're - A is 36.7 and B is 36.7.

05 12 36 24 CC Okay. We've got all of those. Give us your RCS.

05 12 36 26 CMP And, you'd like to have - you want the quantities?

05 12 36 34 CC That's affirmative.

05 12 36 40 CMP Okay. On A - 63 percent. Bravo shows 62 percent.

05 12 37 08 CC And, Ken; let's go AUTO now with the HIGH GAIN. We're going to lose you in REACQ.

05 12 37 16 CMP Okay. You've got AUTO. Charlie is 66 and Delta is 67.

05 12 37 24 CC Okay. We've got all of those and I'd like to give you a TEI-41 pad.

05 12 37 33 CMP Standing by to copy.

05 12 37 35 CC Okay, it's TEI-41: SPS/G&N, 38709; plus 0.72, plus 1.33; 155:06:58.45; plus 3355.2, plus 1151.0, minus 0235.0; 181, 095, 020; rest of the pad NA. The GDC align - same as circ. Ullage, two jets, 17 seconds. Longitude at T_{ig} plus 173.29, assumes no LOPC-1.

05 12 38 45 CMP Okay. TEI-41: SPS/G&N 38709; plus 0.72, plus 1.33. 155:06:58.45; plus 3355.2, plus 1151.0, minus 0235.0; 181, 095, 020. Sirius and Rigel with the same numbers for circ; two jets, 17 seconds. Lambda plus 1732.9 and no LOPC-1.

05 12 39 17 CC Okay. That's a good readback and we'd like to bid you good night and remind you that your logic power for the SIM bay is still on.

05 12 39 32 CMP Okay. Thank you very much. I'll see you in the morning.

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05 12 39 35	CC	Okay. And we'd like to have REACQ at LOS. And that will be PITCH, zero; YAW, 170 - -
05 12 39 45	CMP	Okay, I'll get it.
05 12 39 48	CC	Okay.
05 12 39 49	CMP	I have PITCH, zero; and 170 set in.
05 12 39 51	CC	Okay. Get a good night's sleep.
05 12 39 56	CMP	Okay. Good night, Stu. Yes, sir. Thank you very much. You've been a big help.
05 12 40 03	CC	We'll see you tomorrow.
05 12 40 08	CMP	Okay.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 13 21 XX

BEGIN LUNAR REV 31

05 15 20 XX

BEGIN LUNAR REV 32

05 17 18 XX

BEGIN LUNAR REV 33

REST PERIOD - NO COMMUNICATIONS

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 19 09 01 CDR-LM Houston, Orion. Over.

05 19 09 03 CC Orion, Houston. How do you read?

05 19 09 09 CDR-LM Roger. What time are we supposed to get up? Over.

05 19 09 13 CC John, I can't understand you. We'd like, if you're reading, to go DOWN VOICE BACKUP.

05 19 09 23 CDR-LM Okay. What time is wake-up time?

05 19 09 33 CC You're about 3-1/2 minutes from normal wake-up now.

05 19 09 39 CDR-LM Okay, we timed it pretty good.

05 19 09 42 CC Looks like you timed it just about right on your own.

05 19 10 22 CC Orion, Houston. Voice check.

05 19 10 36 CDR-LM We're reading you loud and clear on DOWN VOICE BACKUP. Over.

05 09 10 40 CC Okay. We're reading you a little better, too.

05 19 10 59 CDR-LM How did the system look last night?

05 19 11 03 CC Everything looked real good, John.

05 19 22 49 LMP-LM Hello, Houston; 15. Over.

05 19 22 52 CC Good morning, Charlie. How are you?

05 19 22 59 LMP-LM I guess it is 16, Houston. Fine. I guess we're 16. How did the biomed look on me all night long, Tony?

05 19 23 07 CC Okay, Charlie. I guess the biomed looked good. How do you feel this morning?

05 19 23 15 LMP-LM I feel great. Why don't you have the docs tell me how much they think I've slept?

05 19 23 27 CC Charlie, they say they think you've slept 6 hours.

- 05 19 23 36 LMP-LM Okay, fine. I was going to say 7. Of course, I don't know exactly when we got started, but once we got started, it was just like a baby, except for one time I woke up to - when I got cold, and I had to put on my sleeping bag.
- 05 19 23 53 CC Outstanding.
- 05 19 23 59 LMP-LM Okay; here we go with the crew status report. First, I'd like to say that we stuffed and gorged ourselves; really, and still couldn't eat everything. I tell you, one of those meals would fill the whole Roman army on maneuvers for 2 days. But John, he ate the - yesterday's meal, day 5 meal C, and day 6 meal A. And on day 5 meal C, John ate everything, plus the EVA beverage. And the day 6 meal A, which was breakfast yesterday, John ate everything except the ham steak - scratch the ham steak. He got 7 hours and 15 minutes sleep last night, and he took no medication. Over.
- 05 19 25 12 CC Okay; we got that, Charlie.
- 05 19 25 33 LMP-LM Okay; turning to my page. On day 5 meal C, you can scratch the chocolate pudding, and I ate everything else plus the EVA beverage. John, also, had an EVA beverage. On day 6 meal A, I ate everything but the ham steak. Over.
- 05 19 26 03 CC Okay; we copy.
- 05 19 26 10 LMP-LM And I said I got 7 hours, but whatever you all say - but I slept real good - feel great.
- 05 19 26 28 CC Okay; before you all get too covered up, we'd like you to check your biomed sensors. And did you take any medication?
- 05 19 26 37 LMP-LM Yeah, I took another Seconal again, to start off. And I guess my biomed is good; John's looks firm as it can be.
- 05 19 26 57 CC Okay.
- 05 19 27 05 LMP-LM Now we're going to start the chow. And, well, I guess I'll copy the lift-off times first, if you have them.

05 19 27 13 CC Say again, Charlie.

05 19 27 19 LMP-LM Roger. Do you have those lift-off times for us?

05 19 27 24 CC Okay; stand by 1.

05 19 28 01 CC Okay, Apollo 16. We don't have that block time yet. We'll get it to you in a minute. We have a couple of questions about the heat flow again, if you want to think about those.

05 19 28 16 LMP-LM Go ahead.

05 19 28 17 CC Okay. That heat flow cable that fits into the Central Station is connected to a printed circuit board inside the connector there. And we're curious about the end of the cable. Does it have any of that printed circuit board on it or is it just a free end of the ribbon cable?

05 19 28 41 LMP-LM Tony, I was thinking about that last night, and it looks like to me that it might have some of that printed circuit. All I can see is that the end of the cable is very smooth and it's - and it's silver and I think the printed circuit is partly silver, but I'm not really positive; that's something you can think about. And it is - and it is very smooth, and around the connector it is very smooth there, also. And if John kicked that thing out of there, it came right out of there without - without moving the Central Station at all. Over.

05 19 29 26 CC Okay. How about that - the PSE - the passive seismic cable. Is it tight? What we have to decide here is - if you move the Central Station, will it disturb the PSE? That thing is uncaged now and you can't recage it. So we can't afford to move it.

05 19 29 58 LMP-LM Well, he said it's - he thinks it's pretty tight, John does, but I can't remember. How far do you want to move it?

05 19 30 10 CC Well, what we're thinking about is if we did ask you to take off that astroconnector on the heat flow experiment, you may have to lift the station up to get underneath to the little lever.

05 19 30 24 LMP-LM Yes. But, Tony, everybody's told me it's grated [?] and once you got that little beauty on there, you can't get it off.

05 19 30 34 CC We're working on that now.

05 19 30 40 LMP-LM Yes, I think there's a little pin or something in there you have to push in. And I don't know whether we got the tools for that. Well, I think we could do that. It's not that tight. I think we could do that - pick it up.

05 19 30 59 CC Okay; understand. Fredo's been over running through this, John, this heat flow experiment, to see if the procedure is effective. We don't - we don't have a decision yet. We don't want to get you all excited about it, but we'll have something - a yes or no in about 45 minutes.

05 19 31 19 LMP-LM Well, I guess we'll still be here.

05 19 31 25 CC Okay.

05 19 32 12 LMP-LM Tony, if you thought yesterday - if I thought yesterday's meal was big, you ought to see this one. Man, there's a lot of chow here.

05 19 32 38 CC Charlie, which meal did you say you were eating?

05 19 32 52 LMP-LM It's breakfast, day 7 meal A.

05 19 32 55 CC Okay. We're trying to put a little weight on you.

05 19 32 56 LMP-LM - - Day 6, meal B tonight. Man, I tell you, I feel "oink" right now.

05 19 33 25 CC I can just sit here and talk a few words about the traverse today, if you like. I haven't really organized the - my notes on it, so it may ramble a little bit, but I've gotten a briefing by the planning team. It looks like an interesting plan here. The traverse is almost - well, it's exactly like normal EVA-2. From Ken's words, he can see definite benches in Stone Mountain and thinks that you'll have a pretty good chance of identifying them. He can see layers in South Ray, which makes the rays at station 8 a whole lot more interesting than we had even anticipated. So right now, we'd

like you to do a normal 4, 5, and 6. The main thing identifying 6 is being on the - on the slope part of the down - the bottom of the slope of the lowest bench, station 5 being on top of the first bench, and station 4 being on top of the second bench - in fact, it may be a little above. Right now, we're thinking that we won't have you aim for Crown, because Crown is probably a little bit more subdued than we'd like, and probably not worth the effort to get to. Cinco D and E is, as we talked about before. Probably be station 4, probably be a good place. At the end of station 5, we may have you do an LTM [?]. I'll update this all in real time for you, I'm just talking about what we'll probably do here. And station 7 we're going to eliminate and save time back - take the whole time and put it at station 10 so you'll be able to do that primary sampling we asked for. We think that sounds great. As you drive from 6 to 8, we're more interested now that you do get some pictures of Stubby as you go along, of that area, because we don't have station 7; so we'll ask you to turn your DAC over that way as you're driving. A DAC pointed down-Sun probably wouldn't see much, anyway, in that zero phase.

05 19 35 32 LMP-LM

Okay, Tony, I think you'll be able to come up on Stone there. It looks like to me you're gonna be able to see right into - into South Ray and right into Stubby and all those craters. The general topography here is a downslope. From North Ray, it leads from the ridge to our immediate right all the way down to South Ray, and - with the lowest point really being maybe south of Survey Ridge. Over.

05 19 36 06 CC

Okay, right. And we could see - I think I could see the bright area of South Ray on the TV pan. It really stands out down there. But our really exciting station looks like it might be station 8, and we're really going to encourage you to scout around and see if you can get the samples of the dark layers that we see in South Ray.

05 19 36 31 LMP-LM

It looks like the base of Stone Mountain is really topographically lower than we are right now.

05 19 36 42 CC Okay. And, also, on station 9, it may turn out to be difficult to find a pristine area. We'll let you scout around a little bit, and pick your own station 9 of whatever looks like isn't ray material. And on the location of station 10, we'd like you to put it just about where you said it might go as you were driving back yesterday. It sounds like the contact between the ray and the non-ray material is just west of you there, and we'd like to run the penetrometer array along the contact but in the ray material; that is, the penetrometer array would now go in a northeast/southwest direction, and a double core would be something like 50 meters to the southwest of the deep core. Let me correct that a second here. Hold on. I'll correct that. The double core will be about 50 meters towards the LM but along the contact, so it'll be about 50 meters closer to the LM than the deep drill. And at station 10, since you'll have a longer sampling time, we'd like you to sample on both sides of the - of the - of the ray; in other words, in the ray, along the line between the deep drill core and the LM, and off the ray to the west.

05 19 38 41 CDR-LM Okay, Houston. I'm going to have to hold the UV camera back. I think ...

05 19 38 52 CC Say again, John. Okay, we've got a plan here at the end of the EVA to move it back. Do you think it will stay out of the Sun until then?

05 19 39 12 CDR-LM Houston, 16. Over.

05 19 39 17 CC Go ahead.

05 19 39 38 LMP-LM Houston, did you copy John there? Over.

05 19 39 41 CC We sure did there, Charlie. You copy us?

05 19 40 04 CT Orion, this is Honeysuckle. We have a comm outage with Houston at this time. Stand by 1, please.

05 19 40 13 CDR-LM Okay, Honeysuckle. Nice to talk to you. How are y'all doing down there?

05 19 40 17 CT We're doing great; nice to talk to you.

05 19 40 26 CDR-LM Right, sounds good.

05 19 40 28 CT Roger that; we'll be with you shortly ...

05 19 40 33 CDR-LM They're having comm trouble.

05 19 40 46 CT Say again, Orion. You're pretty poor quality on this backup.

05 19 40 54 CDR-LM I said ...

05 19 41 00 CT I still can't copy you, Orion. I'm sorry about this. The quality is very poor here.

05 19 41 10 CDR-LM Okay, you're loud and clear.

05 19 41 12 CT Roger that. I read you a bit better now.

05 19 41 51 CC Apollo 16, Houston.

05 19 42 05 CC Apollo 16, Houston.

05 19 42 40 CT Houston, Comm Tech Honeysuckle net 1. And how do you read?

05 19 42 42 CC Honeysuckle, Houston. Comm test. Loud and clear. How do you read?

05 19 42 46 CT Houston, Comm Tech Honeysuckle net 1. How do you read?

05 19 43 08 CT Orion, this is Honeysuckle. We're still having a little trouble with the incoming from Houston. We should get it restored very shortly for you. Sorry about the delay.

05 19 43 20 CDR-LM Roger. Thank you.

05 19 43 22 CT Okay, we're reading you this time for a change.

05 19 43 31 LMP-LM Okay; you guys are nice to talk to; we don't care about Houston.

05 19 43 35 CT Well, thanks very much. Certainly appreciate it. It has been a pleasure working on this mission.

05 19 43 46 CDR-LM Roger. We'd sure like to come down there and see you folks. ... too.

05 19 43 51 CT Well, you've got a permanent invite, any time you like.

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05 19 44 00 CDR-LM That sounds nice.

05 19 44 03 CT We'll keep the beer cool for you.

05 19 44 06 CT Honeysuckle Comm Tech, Houston Comm Tech, net 1.

05 19 44 11 CDR-LM You just got a couple of fellows going to show up on your lawn here.

05 19 44 15 LMP-LM That's the best idea I've heard all day.

05 19 44 20 CT Thanks. It's a pretty good one down here, too.

05 19 44 30 LMP-LM You see, in my terminology ... 40 eight-packs for right now, the way I feel. I'd really love one.

05 19 44 40 CT Roger that. We're still having difficulty with the comm, Orion. Hopefully, very shortly, we'll get the net up for you.

05 19 44 57 LMP-LM Okay. Take your time; don't worry about it; we're eating.

05 19 45 05 CT Oh, don't worry, Orion; we'll worry.

05 19 45 19 CT ... Houston Comm Tech on 16 - 7 ...

05 19 45 22 CT Roger. ...

05 19 45 24 CT Roger.

05 19 45 25 CC Roger. How do you read?

05 19 45 26 CT Read you loud and clear now.

05 19 45 27 CT I read you same.

05 19 45 28 CDR-LM Roger. We're checking on ...

05 19 45 29 CC Roger.

05 19 46 29 CT Honeysuckle Comm Tech, Houston. Contact net 1 for a comm check.

05 19 46 31 CT Loud and clear. Comm check on me.

05 19 46 33 CC You are loud and clear, also.

05 19 46 52 CC Orion, Houston.

05 19 46 59 LMP-LM Go ahead.

05 19 47 02 CC Hey, upstanding. You're back.

05 19 47 05 LMP-LM Yes, we're ... on the comm for a little while, and then we had a nice chat with Honeysuckle. They're mighty friendly folks down there.

05 19 47 17 CC Very good. Hey, during some of that, I was chatting away about EVA-2. I wonder if you got - how much of it you got? Did you get on through to station 10?

05 19 47 30 LMP-LM No, we stopped at about station 8, Tony. Well, actually, you were talking about taking pictures of Stubby as we go by station 7, and that was all.

05 19 47 42 CC Okay, fine. If you'd like, I'll continue on with that.

05 19 47 49 CDR-LM Okay, Tony. ... real time ... to do this. You guys are going to have to tell us when we get to a place, what you want done when we get there. There's no way we can remember it and write it down, and - -

05 19 48 02 CC Oh, I understand that. And we'll do all of it real time, but I just thought that you might like an over-all plan before you get out.

05 19 48 14 CDR-LM Damn good idea.

05 19 48 15 CC Okay. As you drive from station 6 to 8, we'd like for you to swing that back over and take pictures into Stubby, and all points to the south. And then we're going to really stress station 8, because it may be a chance to sample many of those materials that Ken was able to see in South Ray, so station 8 is a key station. Station 9, we're not at all sure that you'll be able to recog - that we'll - The nominal station 9 is a pristine area, so we'll just let you scout around and see if you can - find the best you can. And station 10 will be longer.

05 19 49 03 LMP-LM I was going to say, Tony. I guarantee you we'll find a place. It is out of sight of the LM that's 3 or 4 kilometers away.

05 19 49 11 CC Okay, good show. And station 10 will be 12 to 15 minutes longer now, and we'd still like it on a line between the deep core and the LM, so it will be on a northeast line. And we'd like it in the ray that you described, but near enough to the edge so that you can sample off the west edge of the ray. Also, we'd like you to pick up that particular basalt that you described underneath the engine bell.

05 19 49 48 CDR-LM Okay. Hey, listen. This is a pretty good size - I don't know how big this ray is, but the sample on the west edge of it (laughter). I don't understand how we're going to do that.

05 19 50 04 CC Where do you think that west edge was? Was it all the way back towards Spook?

05 19 50 15 CDR-LM It's not that far, but I think, like if we go due west of the LM, we can go 300 meters. And we'll probably run into some really big boulders, which are probably in the center of the ray, and then they thin out a little off to the other side from the Ray. I think we're in about ..., and it probably runs over that way for a good long ways.

05 19 50 53 CC John, the comm was bad enough, I didn't get all that. Maybe they got it in the back room back there, and we'll act on it real time.

05 19 51 03 CDR-LM Okay. All I'm saying is the ray must be 350 meters wide, and we're on probably the east half of it.

05 19 51 40 CC When you get a chance up there, could you look out the window and see if the LRV battery covers are still open?

05 19 52 02 LMP-LM Yes, they are both still open, Tony.

05 19 52 04 CC Okay, they are both still open.

05 19 52 09 LMP-LM Well, in fact, all three of them are open. Oh, that's right. John just reminded me two of them are hooked together, but they're all open anyway.

05 19 52 26 CC Okay.

05 19 52 29 CDR-LM I think one problem we're finding out that we may not have figured, is that we are probably parked at about a four or five ... right roll. So it put it more into the Sun than it would have been otherwise.

05 19 52 47 CC Right.

05 19 54 30 CC I have this block data here, if you want to take it sometime.

05 19 54 41 CDR-LM Okay. Tony, in my opinion, we probably should sample the edge of ray and we should go east maybe about 100 meters.

05 19 54 52 CC I'm sorry, John. The comm is real bad. Say it again, please.

05 19 54 59 CDR-LM I said, it would probably be best to go east a hundred meters and sample the edge of the ray. We'd be closer to the edge.

05 19 55 22 LMP-LM Okay, Tony. Give me 2 seconds and you start going with the update.

05 19 55 39 CC Okay, the block data update. T-35, 142 plus 10 plus 51; T-36, 144 plus 09 plus 22; T-37, 146 plus 07 plus 53; T-38, 148 plus 06 plus 25; T-39, 150 plus 04 plus 57. And that's it.

05 19 56 56 LMP-LM Okay, Tony. For some reason 30 - reel 34 is blank. We did that last night, and we didn't get it this morning. But starting with 35: plus 42 plus 10 plus 51; 144, plus 09 plus 22, 146 plus 07 plus 53; 1 plus 48 plus 06 plus 25; 150 plus 04 plus 57. Over.

05 19 57 28 CC Okay; the only one I have question on was T-38 148 plus 06 plus 25.

05 19 57 37 LMP-LM That's Charlie, that's what I got.

05 19 57 40 CC Okay; good show.

05 19 57 46 LMP-LM Hey, is it Friday or Saturday down there?

05 19 57 51 CC You know, I had to think about that last night. In fact, I had to ask Kathy. It's Saturday.

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05 19 57 56 LMP-LM Okay; thank you. Saturday morning?

05 19 58 01 CC Roger. It was a nice, humid, but sunny morning when I came in.

05 19 58 09 LMP-LM Good show. What is your GET now?

05 19 58 13 CC Say again, Charlie?

05 19 58 19 LMP-LM What is the present GET? Over.

05 19 58 24 CC Okay, it's about 10 minutes away from the morning.

05 19 58 34 CDR-LM GET; ground elapsed time.

05 19 58 36 CC Oh, EGT - GET. It's 140 plus 10.

05 19 58 48 CC You'll have to excuse me down here. I'm having to interpolate. The comm is really bad.

05 19 59 01 LMP-LM Well, Honeysuckle was reading us pretty good.

05 19 59 42 CC Orion, Houston. Are you going to carry your pliers out with you?

05 19 59 52 LMP-LM Yeah, John's got them in his - had them in his pocket last time.

05 19 59 56 CC Okay, good show. We may need that to work on the cosmic ray.

05 20 00 28 CDR-LM Hey, Tony?

05 20 00 29 CC Go ahead, John.

05 20 00 34 CDR-LM Did you hear what we said about the UV camera? Over.

05 20 00 39 CC I got about the UV camera, and we got a procedure already that - we'd probably ask you to move it out of the - or back to the north at the end of EVA-2. Do you think - you don't think it will be in the Sun before that, do you?

05 20 00 55 LMP-LM It's in the Sun right now. The lens ... in the Sun.

05 20 01 01 CC Okay, we'll probably have you do it right away
when you get out, then.

05 20 01 08 CDR-LM Are you sure this is going to be a nominal EVA-2?

05 20 01 11 CC Yes, it's a nominal EVA-2 except the - with the
exceptions I talked about.

05 20 01 31 CDR-LM Okay, we're just pulling your leg.

05 20 01 34 CC (Laughter)

05 20 01 36 CDR-LM We're just pulling it real fine, Tony..

05 20 01 37 CC We're just going to have you rebuild ALSEP and the
cosmic ray experiments; otherwise, it is a nominal
EVA.

05 20 01 46 CDR-LM I thought we had changed ...

05 20 02 12 LMP-LM If we eat all this meal, Tony, we are not going
to be able to get our suits on.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 09 16 XX

BEGIN LUNAR REV 34

REST PERIOD - NO COMMUNICATIONS

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 20 17 43 LMP-LM Houston, 16.

05 20 17 46 CC Go ahead, Charlie.

05 20 17 50 LMP-LM Okay, Tony, we're going to pick up the ETB and try to get a handle on going through this procedure. We're on 3-7 and the eat period. We're going to - take up on 3-7. Do you want us to stop off there on two?

05 20 18 21 CC Stand by 1.

05 20 18 30 LMP-LM And how - how do we look right now on your time line ...?

05 20 18 42 CC Okay, go ahead on 3-7 there and top off the PLSS O₂, and say that last comment again.

05 20 18 53 LMP-LM Okay, how do we feel about - how - how are we on the time line? We're just about through eating.

05 20 19 02 CC Okay, stand by 1.

05 20 19 03 CDR-LM ... want the top off, is it not?

05 20 19 30 CC Okay, Charlie, you're in good shape. You look like you're about on it.

05 20 21 06 CDR-LM Charlie will be off comm for awhile.

05 20 21 09 CC Okay, fine. And, John, if you have a minute there, you might consider attaching a lanyard to your apple [sic] on the third key and attaching the lanyard to one of the fittings on the front of the suit so that if that pin - or that key comes out, you won't have to go looking for it.

05 20 21 31 CC But that's a crew preference; whatever you think is necessary.

05 20 21 34 CDR-LM Okay. ... attach a lanyard to the third key so the key doesn't get away from us.

05 20 21 45 LMP-LM Huh?

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05 20 21 46 CDR-LM Attach a lanyard to the third key so it doesn't
get away from us.

05 20 21 50 SC Very strange.

05 20 21 54 CC We just aim to please, John.

05 20 21 59 CDR-LM Say again.

05 20 22 01 CC We just aim to please, John.

05 20 23 23 CDR-LM No, we're not supposed to bring it back. ...

05 20 23 32 LMP-LM Huh?

05 20 23 39 CDR-LM No. This ...

05 20 26 22 CDR-LM I don't know, Charlie.

05 20 26 26 LMP-LM I can't remember where that comes in the Flight
Plan. I think it's right at 130 hours.

05 20 26 41 LMP-LM We're in shape.

05 20 26 50 CDR-LM Yeah.

05 20 26 56 LMP-LM No, what? ... what?

05 20 27 19 CDR-LM If anybody ever said ... spacecraft ... with a
134-pound backpack on your ... and I said aw, get
serious.

05 20 27 47 CDR-LM ... Charlie.

05 20 28 20 CDR-LM Yeah.

05 20 28 46 LMP-LM Health buildup.

05 20 29 16 LMP-LM I'll leave that to Jake and ...

05 20 29 20 CDR-LM ... wild out here ...

05 20 29 33 LMP-LM That yours right here?

05 20 30 24 LMP-LM ... one more time ... to make sure.

05 20 31 38 CDR-LM Say, Charlie did you tell them about your urine?

05 20 31 40 LMP-LM No.

05 20 31 43 CDR-LM Say again, Charlie.

05 20 31 50 LMP-LM If I have my ... Over.

05 20 40 23 CDR-LM Okay there, Houston. I'm checking the LTC now.

05 20 40 30 CC Roger, Ed.

05 20 42 32 CDR-LM Houston, Orion.

05 20 42 34 CC Go ahead, Orion.

05 20 42 40 LMP-LM Right. Do we have the updates of the EVA-2 checklist?

05 20 42 49 CC Orion, you're very garbled there. We don't have the updates yet, I guess.

05 20 43 01 LMP-LM Okay; we advise that we're starting to put on our suits right now. Over.

05 20 43 07 CC Roger.

05 20 43 56 CC Okay, Orion; Houston. You should have all your updates. I - we've gone around the room again and there's nothing coming up.

(NO COMM FOR 37 MINUTES)

05 21 21 12 LMP-LM Okay, Houston; Orion. Over.

05 21 21 16 CC Go ahead, Charlie.

05 21 21 21 LMP-LM Okay, I've got my suit on and John's going off comm and getting his suit on.

05 21 21 26 CC Okay. Very good.

05 21 21 31 LMP-LM Okay, how we doing timewise?

05 21 21 39 CC Stand by 1.

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05 21 22 07 CC Okay, Charlie, in about 7 minutes you would normally be through suiting.

05 21 22 18 LMP-LM Through suiting in 7 minutes! We're going to be a little behind, then.

05 21 22 22 CC That's okay. You've got a good long day today.

05 21 22 30 LMP-LM Where does this 2 hours come in, Tony? Is that supposed to be at the end?

05 21 22 34 CC Roger. That'll be after the EVA.

05 21 22 42 LMP-LM Okay - okay, so we could eat into that and not affect our sleep period. Is that right?

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 21 15 XX BEGIN LUNAR REV 35

05 21 26 11 CC Good morning, Casper.

05 21 31 42 CC Good morning, Casper. You stirring around yet?

05 21 32 41 CC Casper, Houston.

05 21 32 48 CMP Hello, there.

05 21 32 49 CC Good morning. Did you have a good night?

05 21 32 57 CMP Yes, sir.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 21 36 28 CDR-LM Okay, Houston, I'm suited.

05 21 36 36 CC Okay, John.

05 21 36 39 CDR-LM We're starting into our equipment prep for EVA-2.

05 21 37 12 CDR-LM Okay, Houston. Charlie's PRD is 21118.

05 21 37 18 CC Okay, 21118.

05 21 37 25 CDR-LM Mine is 22054 - 56.

05 21 37 48 CDR-LM Hou - Houston, do you want to go to NORMAL VOICE like we've got in the checklist?

05 21 37 52 CC Stand by 1.

05 21 37 57 CDR-LM Do you want us to go NORMAL VOICE? Okay.

05 21 38 03 CC No, we'd like to stay DOWN VOICE BACKUP.

05 21 38 08 CDR-LM Roger; DOWN VOICE BACKUP. BIOMED is LEFT.

05 21 39 52 CC And John, Houston.

05 21 40 04 CDR-LM Go ahead. Over.

05 21 40 06 CC Okay, I got this result on the quick look on the X-ray. I just thought I'd pass it up to you. The Descartes area is higher than - in aluminum silicon than mare, but it's not as high as the highlands east of Smythii.

05 21 40 26 CDR-LM Well, we can't land there.

05 21 40 29 CC You're right.

05 21 40 30 CDR-LM Okay, thank you. What you're saying is the back side is where the action is? Hang in there, Tony. You'll see a little action today.

05 21 40 44 CC Okay.

05 21 46 19 CDR-LM Okay, Houston. We're down to PLSS donning.

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05 21 46 26 CC Okay, and you're right back on the time line.

05 21 46 29 CDR-LM You get the - Yeah, there was a little - a little slack in there, but we took care of it.

05 21 46 35 CC Roger.

05 21 46 43 CDR-LM Okay.

05 22 00 54 CDR-LM Tony, how do you read?

05 22 01 08 CDR-LM Houston, Orion. Over.

05 22 01 12 CC Go ahead, Orion.

05 22 01 16 CDR-LM Okay, we're back on comm now and we're going - ready for the PLSS comm checks. Over.

05 22 01 24 CC Roger.

05 22 01 39 CC Orion, this is Houston. Could you stand by 1 minute, please.

05 22 01 48 CC Go ahead, Orion. This is Houston.

05 22 01 59 CC Orion, Houston's go.

05 22 02 03 CDR-LM Yeah, we want to know if we can do the PLSS comm checks. We just got a call to stand by. It sounded like Mike.

05 22 02 16 CC Stand by 1.

05 22 02 20 CDR-LM Okay.

05 22 02 39 CC Go ahead, Orion.

05 22 02 43 CDR-LM Go ahead. Over.

05 22 02 55 CDR-LM Go ahead. Over.

05 22 02 59 CC Orion, this is Houston. You called?

05 22 03 04 CDR-LM Yes, we thought you were calling us. We got a call from somebody that sounded like Mike to stand by on the comm check. Over.

05 22 03 13 CC Okay, fine.

05 22 03 19 CDR-LM What do you mean, fine, Tony? Are we go for the comm check? Over.

05 22 03 22 CC Yes, we're go for the comm check.

05 22 03 27 CDR-LM Okay. Okay, AUDIO LMP: S-BAND to T/R, ICS is T/R, RELAY to ON, MODE to VOX, VOX SENSITIVITY to max, VHF A to T/R and B to RECEIVE.

05 22 03 52 LM-LM A to T/R, B to RECEIVE - -

05 22 03 53 CDR-LM Okay, ...

05 22 03 54 LMP-LM I got more.

05 02 03 55 CDR-LM Okay. It says here's this second thing that goes in there. Remember you copied last night.

05 02 03 58 LMP-LM Okay.

05 22 04 02 CDR-LM S-BAND PM to PM.

05 22 04 03 LMP-LM Go.

05 22 04 04 CDR-LM SECONDARY-TRANSPONDER to SECONDARY.

05 22 04 07 LMP-LM I got all that.

05 22 04 08 CDR-LM PWA to SECONDARY?

05 22 04 09 LMP-LM Yeah.

05 22 04 10 CDR-LM DOWN VOICE BACKUP?

05 22 04 11 LMP-LM Yep.

05 22 04 12 CDR-LM PCM to PCM.

05 22 04 13 LMP-LM Yeah.

05 22 04 14 CDR-LM RANGING to OFF.

05 22 04 15 LMP-LM Yep.

05 22 04 16 CDR-LM Okay. VHF A TRANSMITTER to VOICE.

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05 22 04 19 LMP-LM Go.

05 22 04 20 CDR-LM A RECEIVER to ON.

05 22 04 21 LMP-LM Go.

05 22 04 22 CDR-LM B RECEIVER to OFF.

05 22 04 23 LMP-LM Go.

05 22 04 24 CDR-LM B - RECEIVER to ON.

05 22 04 25 LMP-LM Go.

05 22 04 26 CDR-LM Wait a minute. B Re - TRANSMITTER to OFF and
B RECEIVER, ON.

05 22 04 28 LMP-LM I got that.

05 22 04 30 CDR-LM Okay. TELEMETRY BIOMED to LEFT.

05 22 05 05 CDR-LM Okay, SENSITIVITY is max. Can you hear me,
Charlie? VHF A to T/R, B to RECEIVE. Okay.

05 22 05 24 CDR-LM I'll get you, Charlie.

05 22 06 05 LMP-LM Got it?

05 22 06 07 CDR-LM And locked. Okay, AUDIO closed. PLSS, MAIN,
right; verify. PLSS, MAIN, right, verified.
PLSS mode LMP, A, CCW. Tone, on; vent flag, P.
Press flag, 0; O₂, momentary. PLSS pressure gage
to be greater than 85, Charlie.

05 22 06 39 LMP-LM It is.

05 22 06 40 CDR-LM What is it?

05 22 06 41 LMP-LM It's about 94.

05 22 06 44 CDR-LM Okay. Comm check with me and Houston.

05 22 06 46 LMP-LM Okay, how do you read, Houston?

05 22 06 49 CC Okay, we copy you, Charlie. You've got a lot of
hash in the background, but we can make do. It's
about like yesterday.

05 22 06 58 LMP-LM Okay, John's reading me 5 by and you're super. We're going to get John - John up now. CB COMM COMMANDER AUDIO, open.

05 22 07 05 CDR-LM It's open.

05 22 09 02 LMP-LM VHF A, OFF.

05 22 09 03 CDR-LM It's OFF.

05 22 09 08 LMP-LM Go to - PTT, MAIN right, verify. Then it should go to B and you get a tone.

05 22 09 17 CDR-LM Okay. Can you give me the LCG pump?

05 22 09 20 LMP-LM Yeah.

05 22 09 21 CDR-LM Okay, I got a tone on.

05 22 09 25 LMP-LM Should have a vent flag.

05 22 09 26 CDR-LM Vent flag, P, 0.

05 22 09 30 LMP-LM Momentary - should be greater than 85.

05 22 09 32 CDR-LM Okay. I'm reading 92 percent on the oxygen.

05 22 09 40 LMP-LM Okay. Now comm check - crewman in B cannot hear Houston. Houston, this is the LMP. How do you read? Over.

05 22 09 53 CC Okay, we hear you with a lot of noise in the background.

05 22 09 58 LMP-LM Okay. John's coming up.

05 22 10 04 CDR-LM Read you loud and clear, Charlie.

05 22 10 06 LMP-LM Okay, let's go. PLSS mode to B - to B and A.

05 22 10 15 CDR-LM Okay, Houston, how do you read me on A?

05 22 10 18 CC Okay, we're copying, with a lot of noise.

05 22 10 24 CDR-LM Say again, Houston.

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05 22 10 27 CC We copy you fine, but you have a lot of noise.

05 22 10 29 CDR-LM Charlie cut you out.

05 22 10 32 LMP-LM Roger.

05 22 10 33 CDR-LM Okay.

05 22 10 34 LMP-LM Go to AR.

05 22 10 35 CDR-LM Go to AR.

05 22 10 39 LMP-LM Okay, VOX VOLUME's going to max.

05 22 10 44 CDR-LM Max.

05 22 10 47 LMP-LM Okay, Houston, how do you read?

05 22 10 49 CC Okay, we are loud, and so is the hash.

05 22 10 56 LMP-LM Okay, John's got 92 percent and I got 94 percent. And I'm turning VHF-B SQUELCH to full decrease.

05 22 11 05 CC Okay.

05 22 11 08 CDR-LM Okay, final systems prep.

05 22 11 10 LMP-LM Are you cold enough, John, or do you want to get some more cold?

05 22 11 13 CDR-LM I think we should get some more.

05 22 11 15 LMP-LM Okay, we'll get some more cold. Instant cold coming up.

05 22 11 19 CDR-LM Circuit breaker 16 ECS: CABIN REPRESS, close, verify.

05 22 11 22 LMP-LM Verify.

05 22 11 24 CDR-LM SUIT FAN DELTA-P, open.

05 22 11 25 LMP-LM Okay, open.

05 22 11 27 CDR-LM SUIT FAN number 2 to open.

05 22 11 28 LMP-LM Open.

05 22 11 29 CDR-LM Verify ECS caution and warning SEP light's -
component light's on about a minute.

05 22 11 34 LMP-LM Okay.

05 22 11 35 CDR-LM Okay. SUIT GAS DIVERTER - PULL to EGRESS, verify.
Okay, that's not - yeah, that is - no - that's
PUSH-CABIN.

05 22 11 46 LMP-LM PULL-EGRESS.

05 22 11 47 CDR-LM PULL-EGRESS.

05 22 11 48 LMP-LM Okay.

05 22 11 49 CDR-LM CABIN GAS RETURN to EGRESS.

05 22 11 50 LMP-LM Go.

05 22 11 51 CDR-LM SUIT CIRCUIT RELIEF to AUTO.

05 22 11 52 LMP-LM Go.

05 22 11 53 CDR-LM Verify.

05 22 11 54 LMP-LM Yeah. Is that cold enough, John?

05 22 11 56 CDR-LM Yeah.

05 22 11 57 LMP-LM Okay. Phew. Okay.

05 22 12 03 CDR-LM OPS connect. Okay, we got the hose - -

05 22 12 06 LMP-LM Hmm.

05 22 12 10 CDR-LM Okay - that's - you're first.

05 22 12 12 LMP-LM Okay.

05 22 12 15 CDR-LM Stow act - We got to go - ... - ISOLATE.

05 22 12 24 LMP-LM Okay.

05 22 12 25 CDR-LM Okay. You got both of them?

05 22 12 27 LMP-LM Okay, there's the MA [?] caution light.

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05 22 12 38 CDR-LM Okay, your OPS is on and co - nected.

05 22 12 40 LMP-LM Okay, I need the purge valve.

05 22 12 47 CDR-LM Here's the purge valve. I had that a long time ago.

05 22 12 50 LMP-LM John, maybe if I clocked yours outboard - what do you say?

05 22 12 55 CDR-LM That may be a good idea.

05 22 12 58 LMP-LM Good. Verify, lockpin closed - lockpin in and LO flow.

05 22 13 08 CDR-LM You got LO flow. LO flow mode, I should say.

05 22 13 15 LMP-LM Okay, my PGA diverter valve is vertical.

05 22 13 20 CDR-LM Okay, you're - -

05 22 13 21 LMP-LM You got it?

05 22 13 22 CDR-LM Okay. How come you can't - -

05 22 13 25 LMP-LM Huh?

05 22 13 28 CDR-LM Get your purge valve out and then I'll ... O₂.

05 22 13 32 LMP-LM All righty.

05 22 13 35 CDR-LM Why don't you hold that and let me get your O₂ - O₂ hose. ... Got it? ... You look pretty clean, Charlie. Compared to how dirty you were yesterday.

05 22 13 55 LMP-LM That's in, locked, locked; cover's coming up.

05 22 14 00 CDR-LM Make sure yours is - locked. Yeah, it's locked. Locked. You have LO flow. Locked.

05 22 14 12 LMP-LM Pin's in.

05 22 14 14 CDR-LM A little bit anyway.

05 22 14 16 LMP-LM Okay.

05 22 14 17 CDR-LM Stand up, I'm going to clock this outboard vent,
Charlie.

05 22 14 20 LMP-LM Okay, fine.

05 22 14 24 CDR-LM I won't ... outboard much.

05 22 14 26 LMP-LM It'll have to come way up.

05 22 14 28 CDR-LM That's all right. Do that.

05 22 14 30 LMP-LM That all right?

05 22 14 31 CDR-LM Yeah.

05 22 14 32 LMP-LM Okay.

05 22 14 36 CDR-LM Stand by. Okay, that's in and locked, locked.

05 22 14 43 LMP-LM Okay, the ... right up here.

05 22 14 47 CDR-LM Okay.

05 22 14 48 LMP-LM Okay, now I'll have to ...

05 22 14 50 CDR-LM Yeah.

05 22 14 51 LMP-LM Yeah. Okay, we've done that. Let's take a drink
of aqua.

05 22 14 57 CDR-LM You bet. Slurp-slurp.

05 22 15 02 LMP-LM ...

05 22 15 08 CDR-LM Gonna have another shot of water, too. I'll
bet - the metabolic rate, I've committed a million
Btu's turning around to get - -

05 22 15 21 LMP-LM To get the water - -

05 22 15 22 CDR-LM - - to get the water gun going. There we go.
Man, my hands are black already. Golly.

05 22 15 57 LMP-LM You want to put some more in those drink bags?

05 22 16 00 CDR-LM No, I don't think - do you want to?

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05 22 16 02 LMP-LM No, I got plenty.

05 22 16 04 CDR-LM Okay. Okay, pump's going open. DESCENT H₂O's coming off.

05 22 16 08 LMP-LM Let me lock this gun in place.

05 22 16 10 CDR-LM Okay.

05 22 16 16 LMP-LM Now it's turning.

05 22 16 33 LMP-LM There we go. Locked.

05 22 16 37 CDR-LM Okay, we're back to here - to position on mikes.

05 22 16 39 LMP-LM Yep. Position mikes, both. We already done that.

95 22 16 41 CDR-LM Okay. PLSS FAN is ON; vent flag, cleared.

05 22 16 48 LMP-LM PLSS FAN is ON.

05 22 16 49 CDR-LM Don helmets with LEVAs, check drink bag positions.

05 22 16 52 LMP-LM Okay, let me get yours first.

05 22 17 37 CDR-LM ..., too.

05 22 17 38 LMP-LM Okay.

05 22 17 47 LMP-LM Drink bag's in - side. Alignment mark's good. Can you see if it's locked?

05 22 17 59 CDR-LM ... - -

05 22 18 00 LMP-LM It did. Super.

05 22 18 02 CDR-LM Oh, beautiful.

05 22 18 03 LMP-LM How about that? The first - -

05 22 18 08 CDR-LM Okay. Go.

05 22 18 14 LMP-LM Now, let me get your back here. Turn around. There. Okay, done?

05 22 18 26 CDR-LM Okay, Charlie, let me get this zip - this Velcro isn't up on your - -

05 22 18 29 LMP-LM Thing again, huh?

05 22 18 30 CDR-LM Yeah. It's jacking around.

05 22 18 32 LMP-LM All right.

05 22 18 34 CDR-LM Got it. That'll keep it from getting in there.

05 22 18 41 LMP-LM I can't understand when I got that white paint on the outside of my LEVA.

05 22 18 44 CDR-LM (Laughter) I don't either (laughter).

05 22 18 46 LMP-LM Huh?

05 22 18 47 CDR-LM Could have been somebody on the fence [?], no doubt. Okay. Wait a minute. There you go. Wait a minute. You're getting them all - you got to keep your head up while we're - -

05 22 19 05 LMP-LM Okay, get an alignment there while - there you go.

05 22 19 16 CDR-LM Okay, you locked?

05 22 19 18 LMP-LM ... here ain't on.

05 22 19 24 CDR-LM Didn't have - Wait a minute, wait a minute.

05 22 19 28 LMP-LM Sounds like it's got back of the LEVA in it, John. Take it off; it's not locking at all.

05 22 19 48 LMP-LM Yeah, it's right back here.

05 22 19 51 CDR-LM Yeah, I couldn't get it down back there.

05 22 19 53 LMP-LM Yeah.

05 22 19 55 CC And you're doing fine up there. You're about 15 minutes ahead.

05 22 20 03 CDR-LM Roger; thank you.

05 22 20 10 LMP-LM Now, that ought to do it.

05 22 20 28 CDR-LM I got it, Charlie. Whoa! It's locked.

05 22 20 33 LMP-LM Great!

05 22 20 34 CDR-LM There you go - a millstone - a milestone. Okay. Charlie, I want to get this - the Velcro down - the back. ... for you. Okay, it's down good, Charlie.

05 22 21 02 LMP-LM Okay. Okay, don helmets we've done; checked drink bag; lower protective visors.

05 22 21 14 CDR-LM Okay, secure tool harness self-doff straps.

05 22 21 16 LMP-LM Okay.

05 22 21 27 CDR-LM Tool harness is on the floor.

05 22 21 29 LMP-LM My tool harness is on the floor! You're kidding!

05 22 21 36 CDR-LM Huh?

05 22 22 05 CDR-LM Okay, can you turn around?

05 22 22 07 LMP-LM Yeah.

05 22 22 08 CDR-LM The other way, Charlie.

05 22 22 10 LMP-LM Okay, if you'll give me one side to hold for you - -

05 22 22 13 CDR-LM Okay, the other side is over there for you to hold.

05 22 22 15 LMP-LM Okay.

05 22 22 21 CDR-LM Hold that thing.

05 22 22 22 LMP-LM I missed it.

05 22 22 23 CDR-LM Okay, just hold your doff - donning strap there.

05 22 22 25 LMP-LM I can't see it. Okay.

05 22 22 26 CDR-LM Just hold it. Now, just don't pull up on it.

05 22 22 28 LMP-LM Okay, yeah.

05 22 22 34 CDR-LM I can't - -

05 22 22 35 LMP-LM If I squat down, would it help?

05 22 22 36 CDR-LM No.

05 22 22 47 CDR-LM Yeah, maybe it would.

05 22 23 08 CDR-LM Okay, Charlie.

05 22 23 21 CDR-LM Okay, I got it. You can stand up.

05 22 23 23 LMP-LM Okay.

05 22 23 24 CDR-LM How about a shot of liquid water while you're -
it'll take your liquid metabolic rate to get
you there. There you go. Get it.

05 22 23 39 CC John, Houston.

05 22 23 43 CDR-LM Go ahead. Over.

05 22 23 45 CC Okay. We understand you put your purge valve in
so that the apple's outbound. Are you pretty
confident you can operate it out there?

05 22 23 58 CDR-LM Yep.

05 22 24 02 CC Okay, fine.

05 22 24 14 CDR-LM Well, Charlie. Your ... turned sideways. No,
that won't slide down. It is.

05 22 24 21 LMP-LM Probably those snaps up there.

05 22 24 25 CDR-LM Probably what it is. (Laughter) Did you just
pull it loose?

05 22 24 31 LMP-LM No.

05 22 24 37 CDR-LM Okay, the - turn around again.

05 22 24 42 LMP-LM I can't go much farther; I'm wrapped up in my
water hose.

05 22 24 45 CDR-LM Understand. But with the - have to be routed
underneath your - -

05 22 25 00 LMP-LM Look, why don't you just undo the bottom and
leave it like it is? And - undo the bottom and
cinch it up real loosely at the bottom? It
won't stay like it is?

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05 22 25 11 CDR-LM I got it, Charlie.

05 22 25 13 LMP-LM Okay.

05 22 25 25 CDR-LM Okay, Charlie. Just stand up now - you'll - -

05 22 25 29 LMP-LM I'm against the roof.

05 22 25 37 LMP-LM Okay, OPS set?

05 22 25 39 CDR-LM Got it.

05 22 25 40 LMP-LM Okay, I'm going to spin around to the left. Do you need another shot of water?

05 22 25 48 CDR-LM No, let me get it. No, we're not ...

05 22 25 55 LMP-LM Okay?

05 22 25 57 CDR-LM Okay, now we're ready - just as soon as we get this water, we'll go on cooling.

05 22 26 02 LMP-LM Right now, we got to hook up these LEVA straps.

05 22 26 17 CDR-LM Okay.

05 22 26 42 CDR-LM Okay.

05 22 26 43 LMP-LM Good?

05 22 26 55 CDR-LM Okay.

05 22 26 57 LMP-LM We'll turn the - okay, we're down to - turning off the pump.

05 22 27 01 CDR-LM Okay.

05 22 27 02 LMP-LM Disconnect the water. And while I'm around here, I'm going to check my circuit breaker configuration.

05 22 27 09 CDR-LM You too, Charlie?

05 22 27 10 LMP-LM Okay, it's fine.

05 22 27 13 CDR-LM Breaker - circuit breaker configuration looks good, too.

05 22 27 17 LMP-LM Okay.

05 22 27 30 CDR-LM Okay, verify the following.

05 22 27 32 LMP-LM No, not that far yet. We got to hook up the water. You - you - if - if you bring it around this way, you'll be better, John.

05 22 27 45 CDR-LM Okay.

05 22 27 48 CDR-LM Take - your feet.

05 22 27 52 CDR-LM Am I out of your way now?

05 22 27 53 LMP-LM No, something's got me back there.

05 22 28 06 CDR-LM You're - you're hooked on a comm hose back there, Charlie.

05 22 28 09 LMP-LM Yeah, I know it.

05 22 28 14 CDR-LM Wait a minute.

05 22 28 17 LMP-LM Got it?

05 22 28 19 CDR-LM Yeah.

05 22 28 20 LMP-LM Okay, thanks.

05 22 28 22 CDR-LM Hoses.

05 22 28 40 CDR-LM Okay, I'm going to move your hose back to back. Okay, Charlie, I'd like to get your - str - I'd like to get this strap a little better on you.

05 22 28 50 LMP-LM Which one, the comm thing?

05 22 28 52 CDR-LM I got it, I got it. That works good.

05 22 29 16 CDR-LM I'm gonna secure your hoses up here.

05 22 29 19 LMP-LM Okay.

05 22 29 25 CDR-LM There we go. That's great.

05 22 29 38 LMP-LM Okay - the circuit breakers are verified. Now - okay, now, we got to hook up some water.

05 22 29 44 CDR-LM Can't get much coolant without them. That's yours. Okay, yours is in and locked. In and locked, Charlie.

05 22 30 03 LMP-LM Okay, thanks, John. Okay, verify the following locked. Helmets and vistors [sic] aligned and adjusted.

05 22 30 12 CDR-LM Go.

05 22 30 13 LMP-LM That feels good. O₂ connectors, three, locked.

05 22 30 17 CDR-LM Go.

05 22 30 18 LMP-LM Checked that. Purge valve, one, locked; H₂O connector's locked.

05 22 30 21 CDR-LM Go.

05 22 30 22 LMP-LM Comm connector's locked. Okay, we verified the CBs.

05 22 30 25 CDR-LM Right.

05 22 30 26 LMP-LM Turn the page - and turn the page says "Don EV gloves; wrist locks, four - -

05 22 30 34 CDR-LM Glove straps adjusted - the trick of the week.

05 22 30 42 LMP-LM Say, "If PLSS biting, O₂ ON/OFF."

05 22 30 47 CDR-LM Okay; it's not biting - any more than usual.

05 22 30 54 LMP-LM No more than usual.

05 22 31 32 LMP-LM Okay. Oh, man.

05 22 31 55 LMP-LM Okay.

05 22 31 56 CDR-LM Got her on and locked? Boy, you're amazing. I can't even get the first one on. Get it, Charlie.

05 22 32 09 LMP-LM Looking good. Watch it. That's got to go on the bottom, John.

05 22 32 38 LMP-LM There we go.

05 22 32 39 CDR-LM Got it locked?

05 22 32 40 LMP-LM Yeah.

05 22 32 41 CDR-LM Okay.

05 22 32 42 LMP-LM Locked. Let me get it - I can get this other one.

05 22 32 49 CDR-LM Okay, I'm going to turn my PLSS O₂ on a little.
Okay?

05 22 32 51 LMP-LM Okay.

05 22 33 25 CDR-LM Okay, can you get that one for me?

05 22 33 26 LMP-LM Okay.

05 22 33 35 CDR-LM Got it, Charlie.

05 22 33 37 LMP-LM OPS sounded pretty good, didn't it?

05 22 33 38 CDR-LM Yeah. Right on, right on.

05 22 33 43 LMP-LM Get that down good over - -

05 22 33 46 CDR-LM Yeah. ... good. Okay, the old gloves are on and
locked.

05 22 33 57 LMP-LM Okay, pressure integrity treck [sic].

05 22 33 59 CDR-LM PLSS - -

05 22 34 00 LMP-LM PLSS DIVERTER, MIN.

05 22 34 01 CDR-LM MIN. Okay, mine won't - mine is MIN.

05 22 34 10 LMP-LM Okay, PUMP's going ON.

05 22 34 12 CDR-LM PUMP's ON.

05 22 34 14 LMP-LM PRESS REG A and B to EGRESS.

05 22 34 15 CDR-LM Okay.

05 22 34 17 LMP-LM Read the integrity checks for me. Okay?

05 22 34 19 CDR-LM Okay.

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05 22 34 20 LMP-LM Okay, mine is in EGRESS - both of them in EGRESS.

05 22 34 22 CDR-LM Both of them in EGRESS. Okay. PLSS O₂, ON, Charlie.

05 22 34 25 LMP-LM Okay.

05 22 34 36 CDR-LM Press flag clear at 3.1 to 3.4.

05 22 34 40 LMP-LM Okay.

05 22 34 42 CDR-LM Cuff gage 3.7 to 4.0 at - O₂ flag clear.

05 22 34 49 LMP-LM Okay, I'm coming up.

05 22 35 01 LMP-LM That feels good.

05 22 35 06 CDR-LM I can get that - I can get that valve myself right here. See there?

05 22 35 10 LMP-LM What valve?

05 22 35 13 CDR-LM That purge - that purge valve.

05 22 35 15 LMP-LM Oh, good.

05 22 35 16 CDR-LM See?

05 22 35 18 LMP-LM Yeah, I see.

05 22 35 51 CDR-LM Okay - are you - are you holding at 3.85?

05 22 35 54 LMP-LM I'm 3.85.

05 22 35 56 CDR-LM Okay. PLSS O₂ to OFF and monitor cuff gage for 1 minute. Mine's OFF. Okay.

05 22 36 10 LMP-LM Get mine, John.

05 22 36 11 CDR-LM Okay.

05 22 36 12 LMP-LM I can't quite reach it.

05 22 36 14 CDR-LM Okay, Houston. I'm gonna - -

05 22 36 15 CDR-LM MARK on a 1-minute pressure-decay check on me.

05 22 36 18 CC Okay, fine. We're timing.

05 22 36 20 CDR-LM Charlie's is OFF and -

05 22 36 24 CDR-LM MARK.

05 22 36 52 LMP-LM Well, for once, I got my drink bag in the right position. It's not leaking.

05 22 37 06 LMP-LM Tony, we'd like to change our calls up to Pigpen 1 and Pigpen 2.

05 22 37 14 CC We thought about that last night and - 1 minute's up.

05 22 37 22 CDR-LM ... are you ready? Let me get yours off.

05 22 37 26 LMP-LM Wait, we can't do it both - at least, I can't reach yours if you're going to mine.

05 22 37 31 CDR-LM Okay, mine decayed about 0.2 - actually, it was a little less than 0.2 because I ran it for about - it for about a minute 20.

05 22 37 41 LMP-LM Okay, mine less than 0.2 - about 1-1/2. Okay, would you turn my oxygen ON, please, John? Yours is ON.

05 22 37 51 CC Okay, we copy.

05 22 37 54 CDR-LM Okay, yours is back ON, Charlie.

05 22 37 55 LMP-LM Okay.

05 22 37 56 CDR-LM Get your tone?

05 22 37 59 LMP-LM Yeah.

05 22 38 01 CDR-LM Confirm GO for depress from Houston. Okay, Houston, we're back up and we're requesting a GO for depress.

05 22 38 06 CC Okay, you're GO.

05 22 38 11 CDR-LM Okay, circuit breaker 16.

05 22 38 13 LMP-LM Go ahead.

Tape 93/20

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05 22 38 14 CDR-LM CABIN REPRESS to open.

05 22 38 16 LMP-LM It is - let me get in the right position here.

05 22 38 19 CDR-LM Okay.

05 22 38 28 CDR-LM Let me get out of the way.

05 22 38 29 LMP-LM That would be great. Good. Okay. Go ahead.
What's next - it's open.

05 22 38 33 CDR-LM CABIN REPRESS valve to CLOSE.

05 22 38 36 LMP-LM Okay, it's going CLOSED.

05 22 38 37 CDR-LM Overhead or forward dump valve, OPEN, then AUTO -
at 3-1/2 - verify cuff gage does not drop below 4.6.
You gonna get the overhead -

05 22 38 48 LMP-LM Yeah. Okay, there it comes. Man, that's a big
haul up there.

05 22 38 53 CDR-LM Okay, let me - we're at 4, 3.8, 3.7, 3-1/2. CLOSE.

05 22 38 59 LMP-LM Okay, it's CLOSED.

05 22 39 01 CDR-LM Okay, verify cuff gage does not drop below 4.6.

05 22 39 06 LMP-LM Mine is 5.

05 22 39 09 CDR-LM Verify - Okay, cabin at 3-1/2, suit circuit is
locked up at 4.3.

05 22 39 16 LMP-LM That's true.

05 22 39 21 CDR-LM Okay, start the watch. Go ahead, Charlie.

05 22 39 25 LMP-LM Okay, let me get my watch started. Okay. Okay,
here we go. Open.

05 22 40 00 CDR-LM Man, that's wild on your ears.

05 22 40 01 LMP-LM Yeah.

05 22 40 03 CDR-LM Old pressure relief valve's working.

05 22 40 24 CDR-LM Man, that South Ray is really something.

05 22 40 41 CDR-LM Coming up on 0.3.

05 22 40 51 CDR-LM Okay, about - coming up on 2 minutes - supposed to be able to crack the hatch at 2 minutes.

05 22 40 55 LMP-LM Yeah, there's the water hag - the water flag.

05 22 40 58 CDR-LM Okay. Must be getting up there somewhere.

05 22 41 03 LMP-LM Yeah.

05 22 41 07 CDR-LM ... water flag A. Okay, see if you can torque the - open forward hatch, I guess.

05 22 41 13 LMP-LM Okay.

05 22 41 15 CDR-LM It's down to -

05 22 41 16 LMP-LM That ought to work right.

05 22 41 18 CDR-LM It's coming up 2 minutes, right now.

05 22 41 24 LMP-LM Okay.

05 22 41 25 CDR-LM MARK.

05 22 41 40 LMP-LM There it is - Man! Now, go out, dust and everything.

05 22 41 46 CDR-LM I'll tell you why you can't open it is on account of this air behind it.

05 22 41 49 LMP-LM You can tell that - look at the particles flying out of here.

05 22 41 54 CC Maybe it'll clean some of that dirt out.

05 22 41 56 CDR-LM Okay, you got it?

05 22 42 01 LMP-LM It does a pretty good job at that. Hey, John, we gonna have to - you're gonna have to turn around and get over next to your circuit breaker panel for me to get any water or - on - or anything.

Tape 93/22

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05 22 42 12 CDR-LM Okay. Which way?

05 22 42 16 LMP-LM Turn to the - your right.

05 22 42 25 CDR-LM Can you get it?

05 22 42 26 LMP-LM Well, I can; my darn - both hands are all -

05 22 42 33 CDR-LM Okay, let's get yours.

05 22 42 36 LMP-LM Can you reach it? Watch it that that hatch don't fall shut.

05 22 42 41 CDR-LM Can you turn around?

05 22 42 43 LMP-LM That's where I'm gonna head; wait a minute.

05 22 42 49 CDR-LM Okay, there we go. Can you raise up?

05 22 42 56 LMP-LM Not much more; I'm hitting the ceiling.

05 22 43 18 CDR-LM There you are.

05 22 43 19 LMP-LM Okay. Water's on.

05 22 43 21 CDR-LM Water is on.

05 22 43 22 LMP-LM Okay.

05 22 43 23 CDR-LM Drop back around, I think, I hope.

05 22 43 28 LMP-LM Okay, let me have the hatch.

05 22 43 30 CDR-LM Okay. Do you want to hand me the - the jettison thing and - -

05 22 43 34 LMP-LM Yeah, when you get out on the - when you get out on the porch, I'll hand you everything. Okay?

05 22 43 37 CDR-LM All right.

05 22 43 41 CDR-LM Okay, ... checklists.

05 22 44 00 CDR-LM Okay, I don't have any flag. That thing must be working like a champ. They're still ... water flag. I can - I can see it - yours is sublimating. You can really see it. Or you can see some ice building up back there anyway.

05 22 44 26 LMP-LM I'm getting good cooling. I can feel it.

05 22 44 29 CDR-LM Yeah, so do I.

05 22 44 31 LMP-LM Okay, let's go.

05 22 44 32 CDR-LM Okay.

05 22 44 33 LMP-LM Okay, Houston. We're gonna get out.

05 22 44 35 CC Okay, we understand your water flags are cleared.

05 22 44 40 CDR-LM That's correct.

05 22 44 41 LMP-LM John's is; mine's not quite, but I feel good cooling.

05 22 44 48 CDR-LM Back up a hair?

05 22 44 50 LMP-LM No.

05 22 44 54 CC Okay, John, you're GO for egress. Charlie, we'd like - -

05 22 44 56 LMP-LM Okay, mine just flipped.

05 22 44 58 CC Okay, fine. You're both GO for egress.

05 22 45 05 CDR-LM ... hose is stuck.

05 22 45 14 LMP-LM Okay, John. You're doing great. You got to come towards me a little bit. There you go. Yeah, you're - you've got to swing your rear end towards me - there you go - now, it's - your PLSS is out the door - bend over a little bit, so you don't catch your harness - there you go. Okay.

05 22 45 38 CDR-EVA Okay.

05 22 45 53 CDR-EVA Okay, Charlie. Hand me the jett bag.

05 22 45 55 LMP-LM Okay. Stand by.

05 22 46 15 CDR-EVA Hit the strut, didn't it?

05 22 46 17 LMP-LM Yeah.

Tape 93/24
Page 1002

05 22 46 18 CDR-EVA Didn't hurt the strut.

05 22 46 19 LMP-LM No. Okay, here's the ETB.

05 22 46 22 CDR-EVA Okay, give me -

05 22 46 24 LMP-LM I don't want to throw it too hard, because the camera's in there.

05 22 46 27 CDR-EVA Okay.

05 22 46 29 LMP-LM There we go.

05 22 46 30 CDR-EVA It won't hurt it - wrap it around this finger.

05 22 46 35 LMP-LM Okay. RECORDER's ON, VOX is in max; guess you want these unplugged. Okay, get the plugs off. LMP's off and these look okay. Coming over to this side, I think. There we go.

05 22 47 05 CDR-EVA Okay, Houston. What do you want to do with the camera?

05 22 47 09 CC Okay. We'd like you to go over and describe to us where the Sun is with respect to the UV.

05 22 47 18 CDR-EVA I could have done that standing in the vehicle.

05 22 47 23 CC Well, we're going to have to move it back, but we just wanted the data before you move it.

05 22 47 35 CDR-EVA Charlie, watch out for the - the big rock in the footpad.

05 22 47 38 LMP-LM Yeah, I know it. I put it there. That's old beauty.

05 22 47 47 CDR-EVA Charlie, is my visor down? I can't - -

05 22 47 51 LMP-LM ...

05 22 47 52 CDR-EVA Never mind, never mind.

05 22 47 54 LMP-LM Your protective one; I don't know about your -

05 22 47 56 CDR-EVA Okay, I got them both down. The other one.

05 22 48 00 LMP-LM Okay, mine is down.

05 22 48 03 LMP-EVA Okay, Houston; I'm out on the porch.

05 22 48 07 CC Okay, Charlie.

05 22 48 11 LMP-EVA Okay, got to go back and close the hatch.

05 22 48 15 CDR-EVA Okay, the Sun is just - at this setting, the Sun is - is slicing off about - slicing off 2-1/2 to 3 inches of the - it's slicing off half of the end with the spectroscope box. You know what I mean?

05 22 48 40 CC Okay.

05 22 48 41 CDR-EVA It slices right across there.

05 22 48 43 CC Okay, the Sun is on the film cassette, is that right?

05 22 48 48 CDR-EVA It is on the spectroscope. The spectroscope box that - that hooks out. It's the optical part.

05 22 49 01 CC Okay, we'd like you to move the UV camera - in the east direction, directly east, so that it's 1 foot behind the plus-Z pad. Reset before you move it.

05 22 49 20 CDR-EVA Okay. Okay.

05 22 49 29 LMP-EVA Okay, Tony, I'm on the old lunar terrain again.

05 22 49 33 CC Very good.

05 22 49 35 CDR-EVA Do a reset?

05 22 49 36 CC Okay, you do a reset and move the camera in the east direction until it's 1 foot behind the line that goes north-south through the plus-Z footpad.

05 22 49 52 CDR-EVA Okay.

05 22 50 06 LMP-EVA Oh, quarter to 11.

05 22 50 26 LMP-EVA Hey, that thing really pops open.

05 22 50 30 CDR-EVA Okay, Houston, she's moved.

05 22 50 32 CC Okay, read - level it there, and then we're going to give you a target to aim at the Earth - setting for aiming at the Earth.

05 22 50 59 CDR-EVA Houston, this really isn't too very good for me to do this because I can't get my backpack between it and the struts to operate it. Would you like to try this in the real world?

05 22 51 22 CC Negative, John. If you have to move it south a little bit, it's safe to move it to the edge of that shadow.

05 22 51 36 CDR-EVA Okay, let me do that.

05 22 51 49 CDR-EVA Okay, it's reloading now. We're going to lose whatever we're doing here.

05 22 51 53 CC Okay, that's fine. We understand.

05 22 52 33 LMP-EVA Hey, John, that's better. I move the MESA back down and it's - Man, it's supernice. Don't have to fight the suit. The SRC-1 is open. Hey, what I'm going to do, Tony; I'm going to bring up the TV for you.

05 22 52 53 CC Okay, when you push in the circuit breakers, would you read us the battery temperatures?

05 22 53 01 LMP-EVA Okay, the AUX - Okay, all the breakers are going in. And the battery temps are one, 65, and the other is 82. Correction - one, 70, and the other is 82.

05 22 53 22 CC Okay, 70 and 82.

05 22 53 27 LMP-EVA Okay, what's next, for the TV?

05 22 53 32 CC Say again, Charlie.

05 22 53 36 LMP-EVA What is the next switch setting for the TV? It's not on my checklist.

05 22 53 46 CC Okay, on the LCRU switch, MODE 1.

05 22 53 53 LMP-EVA Okay, go ahead.

05 22 53 57 CC Okay, position TV horizontal and counterclockwise to stop.

05 22 54 06 LMP-EVA Okay, go ahead.

05 22 54 13 CDR-EVA Okay, Houston, that camera is releveled. Camera is releveled, Jim.

05 22 54 21 CC Okay, John, we'd like you to - -

05 22 54 22 CDR-EVA Now, what else did he say about this?

05 22 54 23 CC John, we'd like you to aim it at the Earth. The azimuth is 058, elevation is 75.

05 22 54 34 CDR-EVA Roger.

05 22 54 42 LMP-EVA Okay, Tony, what else on the TV, please?

05 22 54 44 CC Okay, just go to MODE 3 on that and we'll leave it there. And we'll control it from here.

05 22 54 50 LMP-EVA Okay, will you have a picture? Okay.

05 22 55 01 CC Okay, John, with those - that azimuth and elevation look through the Earth sight and center it on the Earth, then give us the azimuth you are reading and from that we'll calculate a new target.

05 22 55 20 CDR-EVA Okay, y'all are just about dead center, Tony, in the - the high gain.

05 22 55 26 CC Okay, fine.

05 22 55 32 LMP-EVA You ought to be getting a picture.

05 22 55 34 CC Okay, and, Charlie, go EXTERNAL on the LCRU switch.

05 22 55 40 CDR-EVA What was the elevation setting, Tony?

05 22 55 44 CC Okay, the elevation is 75.

05 22 55 55 LMP-EVA Okay. I copy that EXTERNAL.

05 22 55 56 CC Okay.

05 22 55 57 LMP-EVA It is EXTERNAL.

05 22 56 00 CDR-EVA Okay, Houston; I'm - I'll tell you what -

05 22 56 09 LMP-EVA There. Now it's EXTERNAL. It was OFF.

05 22 56 17 LMP-EVA Okay, your power is up to 4, Tony; I mean your S-band AGC is to 4 and you're EXTERNAL. I - it was OFF, I'm sorry.

05 22 56 23 CC Okay.

05 22 56 40 CC Oh, and we got a picture.

05 22 56 45 CDR-EVA ... Okay, Houston; the Earth is in the center and the camera's leveled.

05 22 56 56 CC Okay, would you read off the azimuth now?

05 22 57 08 CDR-EVA Well, I - I left the azimuth on there and leveled the camera and put the Earth in the center. How's that? Is that - -

05 22 57 15 CC Okay, that sounds fine and the azimuth is 058.

05 22 57 21 CDR-EVA 058 and 76.

05 22 57 25 CC Okay, then the first target will be 112 and 40.

05 22 57 33 CDR-EVA 112 and 40. You want to do a reset after we get to that target, right?

05 22 57 43 CC That would be fine. And when you do a reset, verify the film advances and read the Tempa-label for us.

05 22 57 54 CDR-EVA Okay - -

05 22 57 55 CC That's the Tempa-label on the film cassette.

05 22 58 00 CDR-EVA Roger.

05 22 58 30 CDR-EVA That's going to be pointing right at the lunar module, Houston.

05 22 58 34 CC Okay, then move it to the left until it is clear of it.

05 22 58 37 CDR-EVA ... important. Oh!

05 22 58 43 CC Move it in azimuth.

05 22 58 52 CDR-EVA You want me to move it to the left until it's clear, but I've got to take it out the other side of the vehicle.

05 22 58 57 CC Move it in azimuth.

05 22 58 58 CDR-EVA I got to take it to the north of the vehicle.

05 22 58 59 CC Not the camera.

05 22 59 04 CDR-EVA Okay. Thank goodness, you said that - I was about to pick this thing up.

05 22 59 12 CC Sorry about that, John.

05 23 00 24 CDR-EVA There's no way to get that out without -

05 23 01 03 CDR-EVA Okay, Houston, I think we're clear now.

05 23 01 05 CC Okay, good show; hit reset, watch the film.

05 23 01 10 CDR-EVA It's reading 09 - but it's reading 080, Houston. Is that okay?

05 23 01 25 CC Stand by a second, John. Why don't you read that Tempa-label to us?

05 23 01 34 CDR-EVA On the battery?

05 23 01 35 CC No; that's on the film cassette.

05 23 01 41 CDR-EVA Okay. The Tempa-label on the film cassette is black at a 100 degrees F.

05 23 01 48 CC Good show. That's good news. I hate to do this to you, John, but we're going to have to change targets. We'd like to go the azimuth 317.

05 23 01 59 CDR-EVA Okay, 317.

05 23 02 15 CC And elevation, 51.

05 23 02 46 CDR-EVA Okay, 317 at 51.

05 23 02 49 CC Okay, hit reset and watch the film; if it advances, we're through with it for now.

05 23 03 00 CDR-EVA Oh, boy - it advanced - over 120 - it - like more - almost 180 -

05 23 03 06 CC Good show. That's the way it should go. Now we'd like you to turn around and look at the cosmic ray for a second.

05 23 03 10 CDR-EVA Okay, I turned around and looked at the cosmic ray.

05 23 03 16 LMP-EVA Turn around and lookit the cosmic ray.

05 23 03 19 CDR-EVA That's a nice cosmic ray - and -

05 23 03 21 CC Okay (laugh). In the top panel - -

05 23 03 24 CDR-EVA Where's this -

05 23 03 25 CC - - in the top panel when you pulled that - -

05 23 03 27 CDR-EVA Yes?

05 23 03 28 CC - - ring, a piece of tinfoil should have slid up so there's only a 2-by-2 flap in the upper left-hand corner. Can you see that tinfoil?

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 21 35 38 CC Casper, Houston. We show you in CMC, FREE.

05 21 35 48 CMP Thank you.

05 21 37 15 CMP Okay, the GAMMA RAY SHIELD is OFF.

05 21 37 19 CC Roger.

05 21 37 26 CMP And the PAN CAMERA POWER is coming on -

05 21 37 27 CMP MARK.

05 21 37 29 CC Roger.

05 21 37 45 CMP Are you ready for a status report?

05 21 37 52 CC Go ahead.

05 21 37 58 CMP Okay, Bravo 1, 15051; Bravo 3, 6-1/2; Bravo 4, negative. On the chow. On meal A, had scrambled eggs, orange juice with potassium. On meal B, had coffee, orange drink with potassium, and a beef steak. Meal C, delete the frankfurters. Add turkey and gravy and coffee.

05 21 38 49 CC Okay, we got it. And, Ken, your consumables - we're just about back on the nominal for the cryo, and the RCS is 150 pounds above the redline.

05 21 39 13 CMP Okay. That's sort of holding its own, then, isn't it?

05 21 39 17 CC Roger. And if you'll give us ACCEPT, we'll get your state vector up.

05 21 39 24 CMP You've got it.

05 21 41 56 CC And Casper, we're clear for a POWER, OFF, on the PAN CAMERA.

05 21 42 05 CMP Okay. POWER is coming OFF -

05 21 42 09 CMP MARK.

05 21 42 54 CC Ken, I've got some words on the SIM bay status, if you want to listen.

05 21 43 01 CMP Okay. Fire away.

05 21 43 04 CC Okay, mapping camera is working real well, except for that extension problem. We have a margin of 203 frames. The laser altimeter is still degrading. We're down to where we're getting about 70 percent of the good altitudes. Thirty percent of the time, it's fouling up. The pan camera is overexposing the film, but we can process a great deal of that out. However, we will lose some resolution. We're 58 frames ahead on that. The mass spec is perking along real good, and no immediate evidence of purges or water drops in the data. And we got that retraction problem that you're aware of, where we will leave it out except for burns. And the gamma ray spectrometer is doing excellent work. We've got good peaks for thorium, silicon, and potassium. And the X-ray and alpha particle are nominal.

05 21 44 13 CMP Okay.

05 21 44 15 CC And the computer is yours.

05 21 44 27 CMP Thanks.

05 21 44 43 CC And Casper, Houston. I've got some Flight Plan changes for you.

05 21 45 05 CMP Okay, go ahead.

05 21 45 06 CC Okay, the first one is at 142 hours.

05 21 45 13 CMP All right; go ahead.

05 21 45 14 CC Delete the "Charge battery A."

05 21 45 20 CMP Okay, that's deleted.

05 21 45 21 CC Okay, at 143:15.

05 21 45 30 CMP Go.

05 21 45 32 CC Delete the VERB 48 load.

05 21 45 41 CMP Okay, VERB 48 is deleted at 143:15.

05 21 45 45 CC Okay. At the same time, 143:15, we want to add, "P20, option 5; minus-X forward trim attitude; maneuver completion time of 143:32. Your NOUN 79 is 3 degrees. Set high gain."

05 21 46 22 CMP Okay, at 143:15, it'll be option 5, minus-X SIM bay; NOUN 79, 3 degrees; 143:32 is the maneuver completion time; and I would guess the high gain ought to be about 01, 170.

05 21 46 38 CC That's affirmative. And immediately following that, we want to go to the CSM Experiment/EVA Checklist, Gum Nebula photo sequence B, page X/2-8.

05 21 47 03 CMP Okay. And then we do - get ready for the Gum Nebula sequence B on page X/2-8.

05 21 47 10 CC That's affirmative. This will give you some warning here because, after you eat there, there's probably not enough time to get that before you have to start it. Okay, at 143:35 - -

05 21 47 21 CMP Okay, yep.

05 21 47 26 CC - - acquire MSFN with the - the MANUAL, WIDE, 0 and 170. Just change it to the angles you've got. NORMAL acquisition, S-BAND, greater than 1/2 scale, you know, then REACQ now.

05 21 47 44 CMP Roger.

05 21 47 45 CC Okay, at 144:15 - -

05 21 47 56 CMP Okay.

05 21 47 58 CC Go to P00. Then VERB 49 maneuver to DSM, that's deep-space measurement slash Gum Nebula point 2 attitude. And the attitude is 305, 136, 298. And the maneuver completion time is 144:25.

05 21 48 35 CMP Okay, at 144:10, I want to go to P00, VERB 49 to DSM slash Gum Nebula point 2. The attitude, 305, 136, and 298. Maneuver completion time, 144:25.

05 21 48 49 CC Roger. And that was to be accomplished at 144:15, and at 144:30 - -

05 21 48 55 CMP Yes, sir.

05 21 48 56 CC - - it calls for a P52. They want to move that back to 144:26.

05 21 49 18 CMP Okay. You want to do the P52 as soon as the maneuver is completed, about 144:26.

05 21 49 25 CC That's affirmative. Right in - as soon as you get in the dark. And could you give us the GAMMA RAY, SHIELD on now.

05 21 49 40 CMP Okay, the SHIELD is on.

05 21 49 41 CC And HIGH GAIN to AUTO.

05 21 49 48 CMP You have it.

05 21 49 50 CC Okay. At 144:30, it's time to start the deep-space measurements, the Gum Nebula, and at 144:31, Gum Nebula photo sequence B, page X/2-8.

05 21 50 30 CMP Okay. And how long does that thing take, Hank? It's about a - -

05 21 50 35 CC Okay. The Gum Nebula - I mean - -

05 21 50 37 CMP Deep-space measurements.

05 21 50 38 CC The deep-space measurements start at 144:30. The Gum Nebula photo sequence - you - If you want to build you a little tape there, they should run from about 144:36 to 144:50.

05 21 51 01 CMP Okay. That's 144:36 to 144:50.

05 21 51 07 CC Roger. That's when the photos are going - -

05 21 51 08 CMP Okay, and that's in the deep-space-measurement business, I don't have to do anything - -

05 21 51 09 CC - - you're getting deep-space measurements all the time that's going.

05 21 51 15 CC That is affirmative, Ken.

05 21 51 16 CMP Roger. I don't have to do anything during that time, though. Is that correct? Okay.

05 21 51 21 CC And at 144:35, of course, delete that VERB 49 maneuver.

05 21 51 30 CMP Roger.

05 21 51 36 CC And Ken, that gets us through the next rev. I've got a few more changes, but if you like, we can wait until the following rev to read them off.

05 21 51 51 CC You're coming up - -

05 21 51 52 CMP Okay. I'll do the - the stuff that comes up right at - -

05 21 51 53 CC - - on gegenschein here now.

05 21 51 54 CMP Okay, the stuff I have to do between the time I have LOS and the time I pick you up again is still good. So why don't we just put it off, and let me get going on this gegenschein?

05 21 52 10 CC Okay.

05 21 53 20 CC Ken, we understand that mag ZZ is in the Nikon,
and FAO says that ought to have plenty of film to
do the Gum Nebula.

05 21 53 30 CMP Okay. Fine. Thank you, sir.

(NO COMM FOR 41 MINUTES)

05 22 34 21 CC Casper, Houston. No need to acknowledge. We're
back 2 minutes from LOS. All your systems are
looking good. Just a reminder to configure your
DSE to HIGH BIT RATE, RECORD, FORWARD, COMMAND
RESET at LOS.

05 22 35 42 CMP Okay, Hank. I copied you, and I'll catch that.
Thank you.

05 22 35 45 CC Roger.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

05 23 03 45 CDR-EVA There's only a 2 by 2 flap in the upper left-hand corner. Yeah, but it's more than 2 by 2; it's about - there's a hole that's covered up - there's a hole up there, and it's covered up in the upper left-hand corner, or almost covered up.

05 23 04 06 CC Okay. Understand that. That should be right.

05 23 04 11 CDR-EVA It's almost covered up.

05 23 04 13 CC Could you describe how it's almost covered up? Which part isn't covered?

05 23 04 19 CDR-EVA The bottom part of the hole is - is almost uncovered. The bottom one - I'd say the bottom - one - one-fourth of the hole is un - is - is not covered.

05 23 04 34 CC Okay. That's good news, John. That means you - it deployed fine. We'll get a picture of it later from Charlie, and if you could go about your nominal work now.

05 23 04 54 CDR-EVA The old water bag is working super. This is going to be a good day, Charlie.

05 23 04 58 LMP-EVA Good. Oh, the old commander's camera. Right down in the old dust. That's on - that's on the floorboard; that's not onto the ground.

05 23 05 15 CDR-EVA Okay (laughter). I wonder what my nominal workload is at this point.

05 23 05 22 LMP-EVA I don't know.

05 23 05 24 CDR-EVA We're supposed to be at station 4, Charlie.

05 23 05 27 LMP-EVA Just like in training, John. Right?

05 23 05 29 CDR-EVA Yeah (laughter).

05 23 05 31 LMP-EVA I'm linking the water to orange juice. Open my visor.

Tape 94/2
Page 1016

05 23 05 38 CC And, Charlie, when you're taking that pan, let me know. I have another picture for you.

05 23 05 45 LMP-EVA All righty.

05 23 05 47 CDR-EVA Okay, Charlie, hold still a second and let me get your - old PLSS strap tied down on here a little bit.

05 23 05 53 LMP-EVA Old PLSS strap tiedown.

05 23 05 59 CDR-EVA Man, that's really bad there.

05 23 06 17 CDR-EVA *** tell you how a grown boy could get his straps so messed up in one little EVA.

05 23 06 26 LMP-EVA Oh, the old dark slide. Come out. Expose one picture. Okay.

05 23 06 44 CDR-EVA You got - you got the ETB. Right?

05 23 06 46 LMP-EVA Yeah. Just about finished with it.

05 23 06 49 CDR-EVA You got the LRV circuit breakers, BUS A, B, C, and D, and NAV closed?

05 23 06 53 LMP-EVA Yes. No, I didn't close - yeah, NAV POWER's closed.

05 23 06 56 CDR-EVA Okay. The dustbrush is on the LCRU.

05 23 06 58 LMP-EVA It is? Amazing.

05 23 07 01 CDR-EVA Close LRV covers and press tight. Okay, Houston, the covers are still open, and they don't have any more dust on them than they did yesterday.

05 23 07 11 CC Outstanding.

05 23 07 13 LMP-EVA Therefore, you have to dust. What we need is a dustbrush for the dustbrush.

05 23 07 26 CC Don't say it, Charlie.

05 23 07 31 LMP-EVA Say again?

05 23 07 33 CC I said, don't suggest it.

05 23 07 38 LMP-EVA Yeah. Somebody will probably like that. I was just kidding, you guys. What we need is less Velcro. Man! Tony, yesterday when that piece of Velcro - Hey! Can you see - guys see that dust on there, with the TV?

05 23 07 56 CC We're not looking down far enough right now.

05 23 08 00 LMP-EVA Oh. John, make sure that I did the - all the things on - The ETB is emptied, and magazine Lima is on the camera 500, and every - all the other film is stowed.

05 23 08 11 CDR-EVA Whew. Okay. Down and press tight.

05 23 08 17 CC Okay.

05 23 08 19 LMP-EVA Man, that - that LPM is a bucket of spaghetti.

05 23 08 28 CDR-EVA Not messing with it, are you?

05 23 08 30 LMP-EVA No. I just - was just - -

05 23 08 32 CDR-EVA And as near as I can figure, Tony, what we've got to do now is load up the PLSSs and go get them. Want me to reset the far UV again, or you just want to be happy with this? We - all we got to do now is a PLSS loadup.

05 23 08 49 CC Okay; yes. We have one more target on it. I'm not sure they have enough time - Hold on.

05 23 08 56 LMP-EVA Wait a minute; I got to get a pan, John. So it'll be a few minutes. Why don't you run around and pick up a rock.

05 23 09 02 CDR-EVA Hey! Outstanding suggestion. Give me a rock bag, Charlie.

05 23 09 08 LMP-EVA The little ones or the big ones?

05 23 09 10 CDR-EVA Huh?

05 23 09 11 LMP-EVA Why don't you take your camera?

05 23 09 12 CDR-EVA I will.

05 23 09 15 LMP-EVA Okay. That - -

05 23 09 16 CDR-EVA That's yours, huh?

05 23 09 17 LMP-EVA Yeah. Well, I got some right here. You use those, and I'll put the old maps - Which way are we going today?

05 23 09 28 CC How about south?

05 23 09 33 LMP-EVA The Hadley Rille.

05 23 09 42 CC Okay - -

05 23 09 43 LMP-EVA - - started training building.

05 23 09 48 CC (Laughter) Okay. Verify that your PLSS antennas are up, and could we have an EMU check first chance? And John, if you're out picking up a rock, you might - -

05 23 09 58 LMP-EVA Our antennas aren't up. How's the comm?

05 23 10 01 CC Comm sounds good.

05 23 10 05 LMP-EVA Maybe we ought to leave them down. That way we won't break them off.

05 23 10 13 CC And John, if you're picking up a rock, could you get that - -

05 23 10 15 LMP-EVA Always thought it would work - -

05 23 10 17 CC - - the vesicular basalt underneath the engine bell?

05 23 10 24 CDR-EVA Yep. Sure could do that.

05 23 10 27 LMP-EVA Tony, that's - that is a double muley - that rock.

05 23 10 30 CC Uh-oh.

05 23 10 32 LMP-EVA Come here, John. Let me get your antenna. No, I can't reach it. You - Why don't you get down-slope and lean on the Rover. There we go. Camera's on. This is a - Guess what. The antenna's up, and the comm is still the same. There we go - -

05 23 10 59 CC And just forget that big rock for now. That's too big to handle.

05 23 11 07 CDR-EVA Well, I do - It's inaccessible; it's underneath the engine cover.

05 23 11 11 CC Okay; fine.

05 23 11 12 CDR-EVA You want me to crawl under the LM?

05 23 11 13 CC No. That's all right.

05 23 11 15 CDR-EVA Okay. But there's probably another nice rock - I'm sure there's another good rock around here that I've been eying out my window I wanted to get anyway.

05 23 11 25 LMP-EVA Hey, John.

05 23 11 26 CDR-EVA Yes, Charlie.

05 23 11 27 LMP-EVA I hate to tell you, but I need your camera for the - Here, take mine with the black-and-white and let me have yours for the pan.

05 23 11 35 CDR-EVA Charlie.

05 23 11 36 LMP-EVA I'm sorry. Little out of sequence, there. Here -
*** collision. (Laughter)

05 23 11 49 CDR-EVA *** running together in the Sahara Desert.

05 23 11 57 LMP-EVA Let me - Okay; I got it. I got it - -

05 23 12 04 CDR-EVA You got it?

05 23 12 05 LMP-EVA Yeah.

05 23 12 06 CDR-EVA Okay.

05 23 12 12 LMP-EVA Okay. Hm. Happy birthday, it says. *** EDC, left seat; pan quad III. Well, guess what? I'm on the wrong - wrong side. ... Works better for me, Tony, if I skip out here rather than - If you want some of this blackish rock, John, a small one that's - that's bagable, there's a bunch right out here that look just

like what I call that basalt. In fact, there's hundreds of them.

- 05 23 13 08 CDR-EVA Yeah. They're out from that - that little impact crater we just landed beyond. And I want to get this nice white one right here.
- 05 23 13 18 LMP-EVA Okay. The old pan - -
- 05 23 13 21 CC And - -
- 05 23 13 22 LMP-EVA - - starts at f/11 at 250. Okay. Exactly 60 feet to the left, Tony.
- 05 23 13 36 CC Okay.
- 05 23 13 46 LMP-EVA *** the best pan. Boy, it sure looks different looking up-Sun. And that - you can still see those lineations in Stone Mountain, Tony. In fact, they're maybe a little bit more pronounced.
- 05 23 14 14 CC Okay. Do you feel like they're the same angle?
- 05 23 14 18 LMP-EVA Yeah. Exactly the same angle. Down at the bottom, there aren't any. They start in one place, that is, and it's a little ridge that's to the east of - Cinco, down at the base; the - what we call the base here. There's two pretty predominant craters over there. Right there, there aren't any.
- 05 23 14 41 CC Okay. Why don't we catch that as you drive out - -
- 05 23 14 43 LMP-EVA All over the mountain. Okay. I don't think we're going that far east, but - -
- 05 23 14 49 CC Okay. Those extra pictures - -
- 05 23 14 51 LMP-EVA Hey, Tony. What is the other pic -
- 05 23 14 53 CC Right, of the Cosmic Ray experiment. So if you'll go over to that side, we'd like a cross-Sun, at f/11, 250 at 15 feet.
- 05 23 15 05 LMP-EVA Okay. Cross-Sun, f/11, 250 at 15.

05 23 15 08 CDR-EVA Okay, Houston. I just picked up this rock. It's a white rock, a very white rock, but it has a black glass layer on the back of it, or what appears to be black glass - a thick black glass; and it's about a hand-size specimen. I can't get it in the bag, but I'll get it anyway. And it has a lot of zap craters in it, and some - lining the zap craters are some white - whitish substance.

05 23 15 38 CC Okay, John. Sounds good. And Charlie, we'd like a - like an up-Sun of that cosmic ray, also. And the settings on that will be f/5.6.

05 23 15 46 LMP-EVA Okay. Looking up-Sun. Okay. Do you know that thing's not even looking at the Sun, is that right? Is that what you want it to do?

05 23 15 55 CC That's right. We want it to look away from the Sun.

05 23 15 59 LMP-EVA Okay; that's what - what it is. I don't think you're going to see much in this picture, but I'll take it. It's a - I guess it's just - it's just really gonna show you how it's sitting. Okay. That's done.

05 23 16 16 CC Okay; good show. And we'll have the UV after the PLSS loadup.

05 23 16 21 LMP-EVA What else?

05 23 16 22 CC That's it, John - Charlie.

05 23 16 27 LMP-EVA I'm tangled up in this spaghetti here.

05 23 16 30 CDR-EVA Charlie, do - don't get too close to that, and watch out for the battery cable.

05 23 16 33 LMP-EVA I - I see that; it's just this Rover deploy cable I was in. There. There, I'm okay. Okay, we're ready for the loadup, and I'll swap cameras with you. *** put yours on your seat, John. Where'd those bags go that you had? You got them?

05 23 17 00 CDR-EVA I put them over here on my back *** There you go, Charlie.

05 23 17 04 LMP-EVA Just leave it there.

05 23 17 05 CDR-EVA Where?

05 23 17 06 LMP-EVA There. Okay. Why don't you put those on my camera, and I'll put these on yours.

05 23 17 10 CDR-EVA Okay.

05 23 17 15 LMP-EVA I got two core tubes sitting up there, too. Don't let me forget those.

05 23 17 19 CDR-EVA Where? Up on the thing?

05 23 17 20 LMP-EVA Yeah. Up on the - handtool carrier -

05 23 17 22 CDR-EVA You want them in this SCB here - -

05 23 17 24 LMP-EVA No. They go - they go back in here.

05 23 17 27 CDR-EVA What are we gonna do with this SCB right here?

05 23 17 28 LMP-EVA That one goes under my - that one is going on my back. That's the one I emptied yesterday.

05 23 17 33 CDR-EVA Okay. Fine. And I'll get that.

05 23 17 36 LMP-EVA The other one - You're going to be chock full of core tubes today, babe. I'll tell you. This is core-tube-taking day. And a super SE - whatever. Okay. I'm ready for loadup, I guess.

05 23 17 51 CDR-EVA Okay. Hold still.

05 23 17 52 LMP-EVA Excuse me.

05 23 17 53 CDR-EVA I'm loading you.

05 23 17 54 LMP-EVA Excuse me.

05 23 17 58 CDR-EVA I think that's what I'm doing.

05 23 18 03 LMP-EVA Ah, the old lunar surface. We really kicked this stuff up, Tony, around - right around the lunar module where we walked, it - where you don't have the footprints and the tracks, it's - it's very smooth, very white albedo - -

05 23 18 18 CDR-EVA Charlie, could you bend over?

05 23 18 20 LMP-EVA Yeah. Very white albedo. Where we've kicked it up, it's about two shades grayer. It's a dark - a lot darker albedo. And you know why I think that is, Tony? You look down-Sun, and it's not that way. You look up-Sun, and it is. I think it's the shadows that the Sun casts on the particles that have been disturbed that causes it to give a darker albedo.

05 23 18 55 CC Good observation.

05 23 19 01 CDR-EVA Okay, Charlie. I got you.

05 23 19 03 LMP-EVA Okay. Your turn. Man, you won't be able to carry this thing for the core tubes in it. Guess what?

05 23 19 12 CDR-EVA Open it.

05 23 19 13 LMP-EVA I couldn't - I did. I couldn't get it off a minute ago - I mean I couldn't get it on a minute ago. There we go.

05 23 19 19 CDR-EVA Let's just lay those things on the seat***

05 23 19 40 CDR-EVA Houston, it's easier on the Moon to - There's a lot of trouble with the UV camera with the azimuth scale. It's easier to pick the camera up and - and relevel it by pushing it into the dirt than it is to - than it is to change the azimuth settings. Every time you change an azimuth setting, you have to relevel it.

05 23 20 03 CC We copy that.

05 23 20 05 LMP-EVA Hold still, John. This thing keeps coming off.

05 23 20 08 CDR-EVA In fact, the azimuth setting seems to be getting tighter and tighter. I don't understand that, but that - you know - that's what it seems to be doing.

05 23 20 24 LMP-EVA Dadgum thing! You know, if there was just a patch of Velcro on these bags and one on your PLSS, you wouldn't have to worry with that strap.

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05 23 20 49 CDR-EVA Let me give you an EMU status check while I'm standing here: 385, MIN cooling, no flags, and I'm reading 84 percent.

05 23 21 05 CC Okay, we copy.

05 23 21 06 CDR-EVA That sound about right to you, Houston? Should I be that low this quick?

05 23 21 15 CC We're working that.

05 23 21 16 CDR-EVA I mean, I'm reading about 80 percent.

05 23 21 26 LMP-EVA So am I, John.

05 23 21 28 CDR-EVA Oh, okay.

05 23 21 29 LMP-EVA Okay. My flags are clear, Houston, and I've got 80 - oh, let's see, seventy-fi - I got about 83 percent. And I'm MIN cooling, and pressure is at 385, and I'm very comfortable.

05 23 21 46 CC Okay. Good show.

05 23 21 47 LMP-EVA Happy day. Okay; LRV prep. HDEC to RCU - left seat to RCU. Pan, I got. HEDC RCU to left seat.

05 23 21 59 CC And Charlie, verify the Q mags on the DAC and that the DAC's running - or it runs.

05 23 22 07 LMP-EVA It's not running, but the Q mag is there. I -

05 23 22 11 CC Roger. We just wanted you to verify that the DAC was working.

05 23 22 16 LMP-EVA Okay. Just a minute. Yep.

05 23 22 23 CC Good - -

05 23 22 24 LMP-EVA Believe it or not.

05 23 22 25 CC Good show.

05 23 22 33 CDR-EVA Okay. Going to reset the far UV again, one more time.

05 23 22 37 CC Okay. And your azimuth will be 276.

05 23 22 48 CDR-EVA Okay; 276.

05 23 22 50 CC And the elevation, 14.

05 23 23 03 CDR-EVA Okay, Houston; going to reset. It worked.

05 23 23 36 CDR-EVA This must be the volcanic gases, because it's looking right at Stone Mountain. Is that what you want?

05 23 23 47 CC I'll find out, John; that 276 and 14, that is target.

05 23 24 04 CDR-EVA Okay; fine. That's set, and she's working.

05 23 24 14 LMP-EVA There's the big eye looking right at me. Boy, you can't get away with a thing around here.

05 23 24 18 CC Yeah, you're darned right.

05 23 24 30 LMP-EVA Okay, John. I'm ready to go.

05 23 24 39 CDR-EVA Okay. How do you want - (laughter) I get it, now. Okay, res - Okay, we're going to MODE switch to 1 on the LCRU, Houston.

05 23 24 52 CC Okay.

05 23 24 57 CDR-EVA And the TV's going CCW. Happy birthday [?]. Okay, Tony. Do you have any updates to station 4 as far as numbers go?

05 23 25 20 CC Yeah. We'd like to head out in a heading of 162 degrees.

05 23 25 29 LMP-EVA Okay; vice 172, okay?

05 23 25 34 CDR-EVA Okay. We're going to initialize the NAV right here by just going to RESET.

05 23 25 42 LMP-EVA Make that SYSTEM RESET. Okay, I'm gonna climb in this beauty, I hope.

05 23 25 53 CDR-EVA That's how you want to do that, isn't it, Tony?

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05 23 25 58 CC Say again, John?

05 23 26 03 CDR-EVA Okay. Do you need - you don't need Sun alignment - you don't need a Sun alignment or any of that stuff, do you?

05 23 26 11 CC Yes, we do, John. We need a Sun alignment, and go to RESET.

05 23 26 18 CDR-EVA Okay.

05 23 26 31 CC And John, do you remember what the exact heading was where you were parked?

05 23 26 32 LMP-EVA Oh, I'm in the machine!

05 23 26 37 CDR-EVA I'm parked there now. It was 358 or whatever it's reading on there.

05 23 26 43 CC Okay; fine.

05 23 26 44 CDR-EVA Don't you guys remember? I read it out to you.

05 23 26 46 CC All right. You just read north.

05 23 26 48 CDR-EVA You want to start from here, or do you want to turn - Okay.

05 23 26 56 LMP-EVA We've got to get headed west for a NAV update, John.

05 23 26 59 CDR-EVA Okay; and that's what we're gonna do.

05 23 27 09 LMP-EVA It works.

05 23 27 10 CC Good show.

05 23 27 17 LMP-EVA We're under way.

05 23 27 21 CDR-EVA Okay, do you want a NAV update from here now, or don't you?

05 23 27 24 CC Yes, we do, sir.

05 23 27 26 LMP-EVA We've got to get it.

05 23 27 28 CDR-EVA Okay. Whoa, horse.

05 23 27 34 CC And while you're there, we'll need a complete LRV read-out.

05 23 27 40 CDR-EVA Okay, Houston. It's reading 1 degree to the left, the Sun is; and we're - heading of 268; bearing is 000; distance, 00; range 00, of course. And we are pitched 4 degrees down. And we are rolled 1 degree right. Because Charlie's heavy today.

05 23 28 10 LMP-EVA You rat! *** why I didn't see that secondary from out here on the ground. You can't see the - the rocks are buried from -

05 23 28 21 CDR-EVA Look at that - look at those - look at the rocks around there, Charlie.

05 23 28 24 LMP-EVA I know it.

05 23 28 26 CDR-EVA There's your basalts and things. Those are black. They're probably glass covered, don't you think?

05 23 28 31 LMP-EVA They are. I picked up one out there. See where my footprints go?

05 23 28 35 CC Okay. Torque to 264, and could we have the rest of the numbers on the LRV?

05 23 28 42 LMP-EVA Okay. Stand by.

05 23 28 48 CDR-EVA Okay. 264.

05 23 28 50 LMP-EVA Okay, we got 114 and 114 - make that 108 and 108. Off-scale low, off-scale low on the AMPS. VOLTS are 68, 68. Rear motor - rear motor - BATTERIES are 82 and 100 and - now they're up to 80 and 60 - Oh, wait a minute - 80 and 95. MOTORS are off-scale low and - all of them.

05 23 29 21 CDR-EVA Hey, Hous - Houston. The LCRU covers are supposed to be 100 percent open at this point, ain't they?

05 23 29 28 CC That's correct.

05 23 29 29 CDR-EVA I'd better get off and open that rascal.

05 23 29 32 LMP-EVA Okay.

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05 23 30 01 LMP-EVA Want me to do it, John?

05 23 30 04 CDR-EVA Yeah. I guess you'd better, Charlie, I can't seem to unfasten this rascal again.

05 23 30 10 LMP-EVA I got it.

05 23 30 11 CDR-EVA I got it.

05 23 30 12 LMP-EVA I got it already. I'm out ...

05 23 30 22 LMP-EVA Ow!

05 23 30 35 CDR-EVA Watch it, Charlie.

05 23 30 37 LMP-EVA Am I hitting the antenna?

05 23 30 38 CDR-EVA Yeah.

05 23 30 39 LMP-EVA I was afraid of that.

05 23 30 40 CDR-EVA *** taking your PLSS ... through it. (Laughter)

05 23 30 51 LMP-EVA Oh, here we go. Watch this. Oh, my pencil fell off, but that's okay ...

05 23 30 59 CDR-EVA Suppose you need that pencil.

05 23 31 01 LMP-EVA Yeah. I can't even see the map, much less the pencil.

05 23 31 06 CDR-EVA *** like you're in pretty good shape.

05 23 31 08 LMP-EVA We need a map holder like a windshield wiper. You can power up, I'm - Wait a minute. Okay. Hooked. Let's go.

05 23 31 16 CDR-EVA Okay.

05 23 31 21 LMP-EVA Okay. DAC's coming on -

05 23 31 25 LMP-EVA MARK.

05 23 31 29 CDR-EVA Okay, give me that first heading again, Charlie.

05 23 31 31 LMP-EVA 164.

05 23 31 40 LMP-EVA Okay, Houston. We're underway.

05 23 31 44 CC Okay, good show. And even with all of that extra there, you're only leaving 2 minutes late. Outstanding.

05 23 31 55 CDR-EVA *** kidding. We must have forgot something, Charlie. That's all I got to say - -

05 23 32 02 LMP-EVA Well, everything's running. Okay. Tony, as we cross out at - to the west here - or south, we see a lot of these black rocks with the white phenocrysts.

05 23 32 17 CDR-EVA Also, we see big white rocks with black phenocrysts. How about that, Houston? Black glass, I mean. Excuse me.

05 23 32 32 LMP-EVA Okay. We've got a great view of all the way into Stone. We're right up on a ridge here, Tony. We're at 10 degrees bearing, 1.1 range. There's a 3-meter - 1-meter boulder to the right that's very angular, that's just as we've already described: the black with the whitish inclusion. We can see all the way to the base of Stone Mountain and Survey Ridge. There are some secondaries around. The terrain is covered with - about 3 percent of the surface with cobbles up to 15 centimeters, a couple of indurated little secondaries - -

05 23 33 17 CC And Charlie, verify the DAC is on.

05 23 33 19 LMP-EVA - - that are a meter or so - Yeah, I called DAC on.

05 23 33 25 CC Okay.

05 23 33 27 CDR-EVA Uh-oh, Charlie. Charlie.

05 23 33 28 LMP-EVA I feel it running.

05 23 33 30 CC Good show.

05 23 33 32 LMP-EVA Okay. Now, Tony, we're going down a - an incline downslope at 356 at 0.3, that is about - what would you say, about a 5-degree slope, John? And the boulder population and the cobble population has picked up over here to about 10 percent, I'd say.

05 23 34 00 CC Okay. There were those mounds mapped over at Phantom area. Can you see those - -

05 23 34 02 LMP-EVA I think we're just now coming up on - The mounds mapped where?

05 23 34 10 CC In the area of Phantom Crater. That will be to your left at about - it will be about 10 o'clock now.

05 23 34 18 LMP-EVA No. It's over - Phantom Crater's over a ridge. I think we're coming by WC, is what we're really coming by. I'll try 1 o'clock - make it 3 o'clock now, 350 at 0.3.

05 23 34 29 CC Okay.

05 23 34 32 CDR-EVA I think you're right, Charlie.

05 23 34 35 LMP-EVA Okay. The largest blocks we see are a meter. The regolith seems to be loosely compacted, much like the regolith over at the - which is characteristic of all of the Cayley here. Most of the rocks are angular to subrounded.

05 23 34 59 CC Okay. Do you feel you're still in that ray?

05 23 35 02 LMP-EVA Still in this ray.

05 23 35 05 CDR/
LMP-EVA Yep.

05 23 35 07 CDR-EVA Just covered with blocks and holes, Houston.

05 23 35 10 CC Okay. We copy.

05 23 35 12 LMP-EVA Lots of - lots of - lots of secondaries, Tony.

05 23 35 15 CDR-EVA Charlie, what are we shooting for?

05 23 35 18 LMP-EVA Well, we're supposed to be 17 - Let's see - -

05 23 35 24 CC Okay. The heading on the first leg is 162.

05 23 35 25 CDR-EVA Houston, can you give us ... first heading -

05 23 35 30 LMP-EVA 1.3. Okay, we've got 0.6 now. When we get there, we should be 353 at 1.3. We're traveling a little bit east. I think if you - now you - you look like you're headed just about for our spot. See Survey Ridge down there?

05 23 35 51 CDR-EVA Yeah.

05 23 35 53 LMP-EVA Hey, this is a great place to keep this map. Right - wedge it in that camera. Yow hoo! Man, that was a great - big skid. We're doing 10 clicks, Tony.

05 23 36 06 CC Outstanding.

05 23 36 07 LMP-EVA Still down about a 2-degree - 2- to 3-degree slope now. Old Barney's really driving this beauty.

05 23 36 17 CC Do you have an AMPS at max speed?

05 23 36 25 LMP-EVA I'm sitting in - I can't tell you, I'm sitting in VOLTS right now.

05 23 36 29 CC Okay. Fine.

05 23 36 30 LMP-EVA Tony, an obs - an observation here. The du - the dust-covered rocks are - are mostly rounded. The angular rocks seem to be free of dust.

05 23 36 44 CDR-EVA And there sure are a lot of rocks here.

05 23 36 50 LMP-EVA *** still as we described, cobbly, cobble size is still the same. Maybe 10 percent of the surface, now. Tony, we're starting out with - we forgot to say it, but we're starting out with the correct magazines, as per checklist.

05 23 37 10 CC Okay. Good show.

05 23 37 15 LMP-EVA Lot easier driving down here, isn't it, John? Not any real big craters. Lot of subdued - -

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- 05 23 37 22 CDR-EVA It's not as - any easier; it's just that you can see what you're doing.
- 05 23 37 25 LMP-EVA Yeah. But it didn't seem to be as rough, is what I thought. Okay. We're at 348 at 0.8 now, Tony. Still in indurated secondaries.
- 05 23 37 46 CC Okay. You should be about halfway to Survey.
- 05 23 37 52 LMP-EVA Okay. Yeah, we see Survey right up there. That was properly mapped. Most of the secondaries - the craters here, Tony, are in the meter size. Some of the larger ones may be 5 meters. Okay. It's getting a lot rougher now. A lot more hummocky at 346 at 0.9. Slowing down to about 6 clicks. That's gonna be a steep slope up there, John.
- 05 23 38 34 CDR-EVA I believe it is, Charlie.
- 05 23 38 35 LMP-EVA Up Stone. Okay. We're looking for 35 - about - at 1.3 clicks, we should be on Survey at around 35 or so. Looks like that's Survey dead ahead, to me.
- 05 23 38 54 CDR-EVA Looks like to me.
- 05 23 39 02 LMP-EVA Tony, it - Apparently, this ray is pretty extensive. We haven't got out of this cobble field yet, and we're now 1.0 at 348, and the percentages are just exactly the same. Characteristics of the regolith have - are identical, and it still appears loosely compacted. Almost like a - a freshly plowed field with - that's been rained on.
- 05 23 39 38 CC Okay. We understand that.
- 05 23 39 43 LMP-EVA Right now we're in an area, at 1.1 at 345 - 346, with four blocks that are meter to a meter-and-a-half size - make that six blocks now. And we're in a - Off to our right, there's a slight depression that's maybe 20 meters below us, that extends over to a ridge that blocks out Stubby. Okay, we're coming up to the biggest rock now we've passed on our traverse. Click. Got a picture of it. And it's got - it looks like a breccia also, Tony. It was rounded.

- 05 23 40 34 CDR-EVA Aw, shoot, man.
- 05 23 40 36 LMP-EVA Golly. Covered me with dust on that one.
- 05 23 40 39 CDR-EVA Sorry, Charlie.
- 05 23 40 40 LMP-EVA That's okay. That looks like a pretty good path off about 2 o'clock - 1 o'clock, John.
- 05 23 40 46 CDR-EVA Yeah.
- 05 23 40 49 LMP-EVA Okay. Now the percentage of cobbles is picking up, Tony, at 1.2 at 344, and we're about - maybe now 20 percent of the surface is covered with cobbles up to 15 - make it 30 centimeters, with the largest blocks in the meter size. Looks like these larger ones are caused by - there's some craters here 5 meters or so that appear to me to be a series of secondaries right in this area.
- 05 23 41 36 CC Okay. We copy that. You may bear back to the right about 10 degrees.
- 05 23 41 43 LMP-EVA Okay, I think that's a good plan. Okay. We'll do that. You can still see the rim of North - South Ray, spectacularly white. It just stands out above the surrounding terrain by an order of magnitude.
- 05 23 42 12 CDR-EVA Okay, what's the heading down Survey Ridge, where I think we are right now, Charlie?
- 05 23 42 15 LMP-EVA Okay. We should be 1 - Okay. Come down Survey at about 227, 0.4. Yeah, this is Survey. Top of Survey, Tony, has got a lot of secondaries. Thirty percent of the surface with cobble, predominantly in the 10-centimeter range, but some greater than that, up to 50 centimeters.
- 05 23 42 43 CC Okay. Take plenty of Hasselblad pictures there.
- 05 23 42 46 LMP-EVA Very blocky.
- 05 23 42 50 CC Get plenty of film.
- 05 23 42 51 LMP-EVA I'm clicking them off as fast as my finger'll pull the trigger.

- 05 23 42 53 CC Good show.
- 05 23 43 03 CDR-EVA Uh-oh; watch it, Charlie.
- 05 23 43 04 LMP-EVA I got it. Okay. Okay; I'd say now 70 percent - in this area, 70 percent is covered; 347 at 1.5.
- 05 23 43 16 CC Okay; 1.5. That's where we mapped you on top of Survey - -
- 05 23 43 18 LMP-EVA Tony, if we'd have gone - Okay. If we'd have gone to 353 on Survey originally, we'd have been down in a big depression.
- 05 23 43 34 CDR-EVA I'm still pretty depressed at this point.
- 05 23 43 36 LMP-EVA Oh, man, John. This is really a ray; it just goes right in to South Ray.
- 05 23 43 40 CDR-EVA Boy, you just can't believe the blocks, Houston. The block population on Survey - what is it, 50 percent?
- 05 23 43 47 LMP-EVA Oh, I would say - estimating 60 to 70. And you can track it right in, up across, over - over the ridge - it blocks out Wreck and Stubby - into South Ray. We're going downslope now, off of Survey; still heading southeast.
- 05 23 44 25 CDR-EVA *** got to get out of these, Charlie.
- 05 23 44 27 LMP-EVA No. I think - Yeah, the Rover's hacking it with no sweat over these little ones.
- 05 23 44 31 CDR-EVA Yeah, but I mean ... spend the rest of the day in the rille - ray.
- 05 23 44 39 LMP-EVA Yeah. I think you can hook a right here a little bit, John. Looks pretty good. There's really a lot of craters here, Tony, at 1.6 at 348. The top of Survey is just pockmarked. They're pretty subdued, though. We can drive through them up to 3-meter ones with no problem. You're still making 6 clicks, John. The characteristics of the rocks, Tony, are the same as around the lunar module.

05 23 45 13 CC Okay. If you get a chance to look at the south-east side of Survey - -

05 23 45 23 LMP-EVA That's one of the white ones - -

05 23 45 24 CC - - you might see if you see any beds in there.

05 23 45 31 LMP-EVA No, not a chance.

05 23 45 33 CC Okay.

05 23 45 36 LMP-EVA It's - it's pretty well-rounded, Tony, and it just - The only predominant feature here is this ray pattern with all the secondaries.

05 23 45 44 CC Okay.

05 23 45 46 CDR-EVA Best set of rocks you ever saw, I'll tell you that.

05 23 45 55 LMP-EVA Boy, it'll be no trouble sampling the South Ray at station 8; it looks like that this ray goes right across it.

05 23 46 03 CC Very good.

05 23 46 07 LMP-EVA At - we're 1.7 now at 352, and sort of back down in - almost - We've dropped maybe 20 meters. Just passing a secondary that's 10 meters across.

05 23 46 23 CC Okay. You should see Merriam over to your right.

05 23 46 30 LMP-EVA Merriam would be down over the ridge.

05 23 46 33 CC Okay.

05 23 46 35 LMP-EVA Man, there's a great split boulder right there. (Laughter)

05 23 46 40 CDR-EVA Charlie (laughter).

05 23 46 42 LMP-EVA It is. It was an east-west split there, Tony. Very undulating terrain, hummocky; the dummockl - the - the hummocks are - Oh -

- 05 23 47 01 CDR-EVA What sh - what should our heading be down here now, Charlie?
- 05 23 47 04 LMP-EVA Okay. We've still got to go 3 - this is the one that's 2 - from here up over is - -
- 05 23 47 11 CC 168.
- 05 23 47 12 LMP-EVA - - 57 for 0.4. We should be 005 at 1 - 005 at 1.6 to cross - then we turn south again. We're at 1.8, but that's because we're a little - I think we could go straight for them, John. There's Cincos, right up there on the hill.
- 05 23 47 37 CC All right. We think you could just about head south now - -
- 05 23 47 39 CDR-EVA I think we should go straight for them; I want to get out of this ray.
- 05 23 47 44 LMP-EVA Okay. We are. We're going 180. This is terrible, this ray, isn't it?
- 05 23 47 50 CDR-EVA Yep. That's why I want to get out of it.
- 05 23 47 52 LMP-EVA Yeah. Okay. We must be coming to the edge of it. My estimate of the cobbles is back down to about 20 percent now. We have secondaries within secondaries; predominant crater size is still meter or so. Only a very few of the secondaries are indurated. Coming up on one now at 2.0 at 355. Boy, isn't it something?
- 05 23 48 36 CDR-EVA This is really something!
- 05 23 48 38 LMP-EVA You're still going 8 clicks, though, John. We're right on. Okay. Tony, apparently, we're still on Survey. It's a wide ridge that's furrowed parallel to the long axis. Now there's a big crater off to the right, John, and here's five right up here at about 12:30. Are - the Cincos are right south of Crown, though; so it's the ones to the right where we want to go. See that big crater up there below Crown?

05 23 49 23 CDR-EVA Yeah.

05 23 49 24 LMP-EVA Okay. Now you're headed right for it. And the Cincos are right to the right of that. Apparently. In fact, that big one is probably Cinco E.

05 23 49 37 CC From where you are, Cinco should be right in line with you, John - -

05 23 49 39 LMP-EVA Okay. So - It is, Tony. Right now. We got it spotted.

05 23 49 45 CC Okay.

05 23 49 48 LMP-EVA Got a little crater on the - in the inner flank. Okay. Doing 10 clicks, and it's still in the cratered, saturated downslope of Survey Ridge at 354 at 2.2. Block population is still the same. Looks like we don't get out of the ray, really, until we hit and start climbing upslope at station 6.

05 23 50 21 CDR-EVA Houston, the best idea I can give you of what this looks like, is it looks like about halfway up to - to that crater that we went to out at the Nevada test site. Man, I tell you, I've never seen so many blocks in my life.

05 23 50 37 CC Okay. Sounds like that was a good exercise then.

05 23 50 44 LMP-EVA Good exercise in driving.

05 23 50 47 CDR-EVA Oh, that was a baddy.

05 23 50 49 LMP-EVA That hit on the floorboard. That's okay. *** even getting dust on my helmet. Boy, this is neat, really neat. Okay, now between us and the Survey, Tony, we really drop off again down to the base of Stone. We're going down about a 4- or 5-degree slope that's still, apparently, ejecta - South Ray ejecta. We're down to perhaps 10 percent now on block frequency. The character of the regolith is still the same, loosely consolidated with a rain-drop pattern. It probably looks that way because of the Sun. I'm convinced of that. The rocks are mostly grayish with white clasts in them.

- 05 23 52 03 CC Okay, what's the bearing and range for that getting off the contact?
- 05 23 52 09 LMP-EVA Okay, we'll give it to you. We're right now at 354 at 2.5. We're still in a block field. It'll be about another 2 clicks before we're out of it.
- 05 23 52 23 CC Okay.
- 05 23 52 24 CDR-EVA Okay, I just don't think you can identify these things as contacts per se.
- 05 23 52 29 CC No, we understand.
- 05 23 52 30 CDR-EVA They just fade out and then they go away. Okay.
- 05 23 52 37 CC Okay, you're about 200 or 300 meters from the contact, as it's mapped, with the Descartes or the feathering out there. We'd like you to keep an eye out for any changes in regolith.
- 05 23 52 52 LMP-EVA Okay, you got it, babe. And I think that's a pretty good guess as far - At least that's where the slope of Stone starts. That Stone Mountain looked like it was right on top of us, and we've come 2.6 kilometers and we - it still looks just as far away.
- 05 23 53 09 CDR-EVA It's really something.
- 05 23 53 15 LMP-EVA Okay, Tony, characteristics are still the same as up on Survey. Ten-percent cobbles about the same size; maybe a smattering more of - of the larger ones, 50 centimeters and up. Some of the rocks seem in good shape - are hardly fractured, others appear to be badly fractured, but still con - homogeneous.

05 23 53 50 CC From your description, it sounds like we won't have any trouble finding split boulders at 8.

05 23 53 58 LMP-EVA Well, I don't know.

05 23 54 02 CDR-EVA I don't see any - I haven't seen but one split boulder so far. Not that I've been looking, but I would if there were some.

05 23 54 12 LMP-EVA Hey, that was super. That wheel just left the ground.

05 23 54 23 CDR-EVA This is the wildest ride I was ever on.

05 23 54 25 LMP-EVA I love it. This is great. Eight clicks, Tony. We got up to 12 there, once. We're at 355 at 2.8. Still have Crown and Cinco E in - in sight.

05 23 54 45 CC Sounds like you're really making money there.

05 23 54 47 LMP-EVA We got to - Okay, we got to go over another depression - down through another depression before we hit the upslope. That's about 100 meters in front of us. Boy, it's a spectacular view looking out to the west, Tony. In fact, it looks like a whole mountain itself back to the west.

05 23 55 13 CDR-EVA I think -

05 23 55 18 LMP-EVA And that - that poop about being able to see the LM all the way on traverse 2, I think, was gonna be bum dope. We've come down some big swales.

05 23 55 30 CC Okay.

05 23 55 31 CDR-EVA They may call them swales in your - in your part of the world, Charlie. They call them mountains in mine.

05 23 55 36 LMP-EVA Yep. Okay, and in my 9 o'clock position, out about a kilometer - and we're 355 at 3.0 - is a tremendous boulder that must be so far away, but it's very predominant on the skyline. Must be 5 meters or so. I can't give you any new words, Tony. The regolith is still the same. We're still in a - in a block - block field. We're just about to start up - upslope here. Have we been climbing, John?

05 23 56 25 CDR-EVA Nope.

05 23 56 26 LMP-EVA Look at that pitch meter.

05 23 56 30 CDR-EVA Maybe we have been climbing. I doubt it.

05 23 56 33 LMP-EVA Pegged out high.

05 23 56 36 CC Okay. Charlie, we'd like that DAC on 12 frames per second.

05 23 56 42 LMP-EVA Okay; 12 frames a second coming up. You got it.

05 23 56 49 CC Okay.

05 23 56 52 LMP-EVA Okay, you're - you're looking right at Cinco and - Tony, we've really been - we're really cl - it doesn't feel like we're climbing, but we've been climbing for quite a while here. I just looked at the pitch meter, and it was pegged out a minute ago.

05 23 57 07 CC Wow.

05 23 57 08 LMP-EVA We got a - We're climbing up about a 10-degree slope now.

05 23 57 12 CC Okay.

05 23 57 14 LMP-EVA And I - And let's see, 6 was at 000 at - -

05 23 57 21 CDR-EVA Charlie, what should we be heading for?

05 23 57 23 LMP-EVA Those craters up there.

05 23 57 24 CDR-EVA Oh, don't tell me that. Where?

05 23 57 26 LMP-EVA Okay, see that one that's sort of a funny shape. Looks like it's got a breach in the southeast side at 12 o'clock?

05 23 57 32 CDR-EVA Yeah.

05 23 57 33 LMP-EVA That's it.

05 23 57 35 CDR-EVA That one at 12 o'clock, huh?

05 23 57 36 LMP-EVA Yeah.

05 23 57 37 CDR-EVA Okay. Well, Houston, now that we get up to Stone - I mean up to Stone Mountain, my assessment is it's not any worse than what we've been driving down.

05 23 57 50 LMP-EVA I think this is one of our benches here, John.

05 23 57 53 CDR-EVA Think it is, huh?

05 23 57 54 LMP-EVA Yeah, we're at 33, and 5 should be at 33 and - Okay, Tony; we're on a flat area now at 355 at 3.3, and - and I think it's - it apparently is a bench. It - about - We're passing station 5, a little to the east.

05 23 58 15 CC Okay, glad you can recognize it there.

05 23 58 16 LMP-EVA Yowie.

05 23 58 17 CC That's great.

05 23 58 21 LMP-EVA And it's - I tell you, it's just as blocky here - the block population is up again to about 40 to 50 percent.

05 23 58 30 CC Okay, you might look for a fresh crater that would punch through that ray material in the Cayl - in the Descartes for station 5 when you come back.

05 23 58 40 LMP-EVA Well, we got lots of cr - Okay, most of the craters here are - There's another split one, but it - -

05 23 58 48 CDR-EVA Look at old South Ray, Charlie.

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05 23 58 50 LMP-EVA That's beautiful. Just spectacular. I can't believe it. And there's - there's Baby Ray, John.

05 23 58 58 CDR-EVA Yeah.

05 23 58 59 LMP-EVA Yeah, you can see it. And it's got black sides to it. Okay, here's a crater, Tony - remind us at 354 at 3.4 - that's about 15 meters across and about 5 meters deep, and I'll bet you it punched through.

05 23 59 19 CDR-EVA Oh, man, this -

05 23 59 22 CC Okay, we'll keep that in mind.

05 23 59 25 LMP-EVA And that - and that should be a good enough - and that should be a good station 5.

05 23 59 29 CC Okay.

05 23 59 30 LMP-EVA Man, we are really going up a hill, I'll tell you.

05 23 59 34 CC How about the traction? Are you slipping at all?

05 23 59 37 CDR-EVA That's the only one I see ...

05 23 59 39 LMP-EVA Okay. See, there seems - over here by this oblong one - which I think is Cinco E, John. We go up a steep slope, but then it seems to level out right up on top.

05 23 59 48 CDR-EVA Yeah.

05 23 59 49 LMP-EVA Okay?

05 23 59 50 CDR-EVA Yeah. Look at that bench in Crown.

05 23 59 52 LMP-EVA I know it. No, we can't see Crown now.

05 23 59 55 CDR-EVA What is - what is that thing with a V in it?

05 23 59 56 LMP-EVA That's Cinco E.

05 23 59 59 CDR-EVA The one with the V in it?

06 00 00 00 LMP-EVA Yeah.

06 00 00 02 CDR-EVA Let's go sample that.

06 00 00 04 LMP-EVA Okay, that's what I was thinking. See, it seems to be at the steep slope going up to it, but it looks like a bench or a little ridge on top. Okay, we're at 354 at 3.6, and you ought to see that Baby Ray, Tony. It's - it's got a real good raised rim. You can see some good - It's got lots of blocks around it that are hard to estimate the size. And we are going up a steep, steep slope, John. I'll tell you.

06 00 00 38 CC We believe you, Charlie.

06 00 00 40 CDR-EVA ...

06 00 00 43 LMP-EVA And it's got black streaks coming out of it. Okay, our amps are now up to 6 - 60 - Well, wait a minute. That's volts.

06 00 00 55 CDR-EVA Yeah, Charlie.

06 00 00 58 LMP-EVA This is going to be spectacular! I can see Wreck, and Trap, and orange juice. Golly. There's a little bench on up there, a little bit more, John.

06 00 01 17 CDR-EVA Yeah, we're getting up on a bench right now.

06 00 01 19 LMP-EVA And - and, boy, this is going to be such a spectacular view, you can't believe it. Okay, we're at Cinco, Tony. We feel it's 3.7 at 355.

06 00 01 35 CDR-EVA See it anywhere, Charlie?

06 00 01 37 LMP-EVA What? Cinco? Yeah, this is it. Here's the one, there's one, and the big one is just to the left over there with the V in it.

06 00 01 43 CC Charlie, you probably are at one of the lower Cincos, not D or E. You should have something like 4.0.

06 00 01 52 LMP-EVA Okay. We'll go - Okay. We'll go on up.

06 00 01 59 CDR-EVA A little easier driving uphill than down ... - -

06 00 02 02 CC And you're well ahead on the time line. You've been making good time.

06 00 02 03 LMP-EVA Yeah.

06 00 02 04 CDR-EVA ... going - -

06 00 02 07 LMP-EVA Tony, I can see into - -

06 00 02 10 CDR-EVA Charlie, let's go up here to this big blocky crater. Man, that's really good.

06 00 02 13 LMP-EVA Where's that?

06 00 02 14 CDR-EVA Right up there.

06 00 02 15 LMP-EVA That's Crown.

06 00 02 16 CDR-EVA You don't want to go up to there?

06 00 02 17 LMP-EVA Yeah, that's fine with me. Look's like a pretty steep slope.

06 00 02 21 CDR-EVA No, it's not. It might be.

06 00 02 30 LMP-EVA I don't think I'm going to be able to see Stubby from -

06 00 02 35 CDR-EVA Can you see it from here?

06 00 02 36 LMP-EVA Yeah, I can see it now. Boy, it's a bad place to stop here.

06 00 02 49 LMP-EVA We're in a pretty good right roll, Tony. About 5 to 10 degrees right roll, and climbing up a steep - steep slope. And, John, here's a great ditch right up here. It don't - it might be a crater. Just right in front of us about 20 meters. Why don't we stop there?

06 00 03 09 CDR-EVA Right up there, you mean?

06 00 03 10 LMP-EVA I'm - I'm talking about right - just really right here. See this big block at about 1 o'clock - at 12:30?

06 00 03 18 CDR-EVA Right here?

06 00 03 20 LMP-EVA Yeah, right here.

06 00 03 21 CDR-EVA ... - -

06 00 03 24 CC Okay. We concur with whatever blocky crater you want to stop at up there.

06 00 03 25 CDR-EVA - - blocks there.

06 00 03 27 LMP-EVA Okay, go ahead, go ahead.

06 00 03 31 CDR-EVA Okay, because it's on a flat bench, too.

06 00 03 32 LMP-EVA Yeah. Okay, we're at 4.0 at 355 - -

06 00 03 33 CC And go ahead and mark for nav update down-Sun, if you can find a level place.

06 00 03 40 LMP-EVA Okay, super. And, Tony, I - I think we're up at - just about to Crown Crater.

06 00 03 46 CC Okay. The main thing is to make sure that we have a crater that's big enough - -

06 00 03 52 LMP-EVA Maybe - maybe not.

06 00 03 53 CC - - to punch us through any ray material from South Ray.

06 00 03 57 LMP-EVA This one does. Don't worry. This is a 10-meter crater that's got blocks on the inside of it that are partially covered with fillet material.

06 00 04 08 CC Okay.

06 00 04 09 LMP-EVA And that's at 354 at 4 - 4.0. Hey, John. How about hooking left - we - Hey, this is - this is going to be pretty good. Now I think we're going to be surprise - Look at those blocks, John!

06 00 04 25 CC We think you're at one of the sharp Cincos - -

06 00 04 26 LMP-EVA Wow, that was a good choice. I do, too. Hey, can't we get up there closer - in that - right in that block, John? We won't have so far to walk. Upslope. Seems to be a flat place about right up here.

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06 00 04 47 CDR-EVA Yeah. This almost flat?

06 00 04 50 LMP-EVA Well, according to the pitch meter, it's not. It's pegged out.

06 00 04 57 CC Hey, fellows, Ken was just flying over, and he saw a flash on the side of the Descartes. He probably got a glint off you.

06 00 05 06 LMP-EVA Yeah. That's us. Man, those mirrors are - are dusty.

06 00 05 14 CDR-EVA I'm going up here, and set it in a crater so it doesn't go anywhere.

06 00 05 26 LMP-EVA This looks pretty good. I don't think it's going to go downslope. Tony, you can't believe it, this view looking back to the east. We see Ravine, we see the rim of North Ray that's got some really good blocks on it. Look at this slope. Look at what we have been coming up. Man - And - but we cannot see in the North Ray; it's above our position.

06 00 05 54 CC Okay.

06 00 05 55 LMP-EVA We can see the old lunar module! Look at that, John. Okay, 270 on the heading.

06 00 06 04 CDR-EVA Okay, Charlie. I want to go back down there and park in that flat - in that crater right there.

06 00 06 08 LMP-EVA Okay. Okay.

06 00 06 11 CDR-EVA *** I'm saying?

06 00 06 13 LMP-EVA Yeah, okay. Looks like to me, from my side, if you just turn real sharp left, you'd have it. But that's fine where it is.

06 00 06 19 CDR-EVA It's not flat, Charlie. It's pointing too downhill.

06 00 06 22 LMP-EVA Not sideways, it wouldn't be.

06 00 06 23 CDR-EVA Huh?

06 00 06 24 LMP-EVA Sideways. We got to park 270. But that'd be fine. Any - Why don't you go down there, John? You probably would -

06 00 06 43 LMP-EVA *** that big rock. Just cleared it. Which one are you going to park in?

06 00 06 52 CDR-EVA That one right down there, where that block is.

06 00 06 54 LMP-EVA The right?

06 00 06 55 CDR-EVA Yeah.

06 00 06 56 LMP-EVA Okay.

06 00 07 07 LMP-EVA That's a good overturnable one right there, John. Hey, we could roll that thing downhill.

06 00 07 26 LMP-EVA Look at that beauty climb over those 1-meter blocks. Okay. Just about got it. Just about - Great, great, super! Okay. We're parked, Tony, at heading 270, 354, 5.2, 4.1, 100, 100, 70, 68, 68, 85, 100, off-scale about 200, 200, and 200, 200. And I'll give you the readings.

06 00 08 09 CDR-EVA Okay, Houston. We're in real bad shape because our vehicle attitude indicator in roll - That's why you thought it was so pitched. The thing is broken, Charlie.

06 00 08 19 LMP-EVA It is. Yeah.

06 00 08 20 CDR-EVA It's broken. See, it's flipped off up there.

06 00 08 23 LMP-EVA But as soon as we get the TV up, anybody would be able to tell where we're at.

06 00 08 26 CC Okay. On the SSD, can you estimate a roll well enough for an update?

06 00 08 37 LMP-EVA I think we're rolled about 4 degrees left, and we're pitched down about, oh, 5 or 6.

06 00 08 45 CC Okay. And the SSD?

06 00 08 50 LMP-EVA Okay. Sun shadow is - 9 - -

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06 00 08 56 CDR-EVA Nine degrees.

06 00 08 57 LMP-EVA Left.

06 00 08 58 CDR-EVA Left.

06 00 09 00 CC Okay. We copied 9 degrees. And, Charlie, you want to check the DAC?

06 00 09 02 CDR-EVA - - ... all the indications, we're probably in a -

06 00 09 07 LMP-EVA Okay. Checking it off. Stand by.

06 00 09 11 CDR-EVA Charlie, whatever you do, don't hit that brake.

06 00 09 14 LMP-EVA Okay. John, it's pretty level, it seems like, right here.

06 00 09 24 CDR-EVA Well, that's what I hope.

06 00 09 26 LMP-EVA DAC's off, Tony.

06 00 09 28 CC Okay, Charlie. And can we have your frame count?

06 00 09 33 LMP-EVA Okay, the mag's empty on the DAC. My frame count is 82.

06 00 09 41 CC Okay, we copy. Sounds good.

06 00 09 46 LMP-EVA Okay, got the display? Okay, I'm around to get the 500. Tony, I - You just can't believe this - you just can't believe this - There's a ray - this view. You can see the lunar module, you can see North Ray with boulders on the southwest side, and where station 12 is, there's one huge boulder that's going to be just great. It looks like we can get up there, and there's a great ray pattern going up the side of Smoky Mountain from - from North - from North Ray.

06 00 10 24 CC Sounds fantastic. That 500 millimeter should do a job for us.

06 00 10 29 LMP-EVA Oh, I hope so. I can see super into - -

06 00 10 37 CDR-EVA Charlie, quit pushing this thing around.

06 00 10 51 CDR-EVA Charlie, could you align the high gain? I can't reach it.

06 00 10 56 LMP-EVA Okay, John. I got this roll thing working again.

06 00 10 59 CDR-EVA You did, huh?

06 00 11 00 LMP-EVA Yes. Hold still, and let me - Okay, Tony. The roll - Hit the thing - the roll is 4 degrees left. That was a great estimate on John's part. And the pitch scale is falling off, but the needle is in the center.

06 00 11 32 CDR-EVA I'd say it's about - from my ... gradients looking at the LCRU, I'd say it's about 3 degrees pitched down, 4 degrees pitched down.

06 00 11 42 CC Okay, we copy that.

06 00 11 43 LMP-EVA Oh, wait a minute. Do you want me to get the ...

06 00 11 46 CDR-EVA Yeah.

06 00 11 51 CC And while you're playing around the LRV there, how about the VOLT AMP switched to AMP.

06 00 12 01 LMP-EVA O - Okay, I did that. It's all - they're low.

06 00 12 04 CC Okay, fine.

06 00 12 07 CDR-EVA *** yours.

06 00 12 12 CDR-EVA Okay. We aren't pointed at it, Charlie. It's too hard to do this way. We have to use the - we can go at it from right here, Charlie.

06 00 12 37 LMP-EVA There's that beauty.

06 00 12 39 CC Hey, we've got a picture.

06 00 12 40 LMP-EVA Hey, Tony. That thing's a piece - okay, that thing's a piece of cake for aligning it at 270.

06 00 12 48 CC Okay, that's good news.

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- 06 00 12 56 LMP-EVA Okay, starting with the 500. I'm going to INTERMEDIATE - I mean, the MIN position on the cooling.
- 06 00 13 02 CDR-EVA Hey, ...
- 06 00 13 06 LMP-EVA Tony, you can see the rays of South Ray come out across the landscape, albedowise. And it's really predominant. They cross right across, go right up Survey, and it's definitely a ray pattern that we were crossing. Okay, 500 of Stubby, 15 and - That's not worth 15 pictures, Tony.
- 06 00 13 39 CC And, John, before you start sampling - -
- 06 00 13 42 LMP-EVA Can't see much.
- 06 00 13 44 CC - - could you give us a general impression of the rock types?
- 06 00 13 49 CDR-EVA Man, it looks to me like this rock pile that we're seeing in there is about the same type of rock. I - As you can see, they're angular. Let me go over there and look at this big one. I think they're right friable. They're very - they have a very shocked appearance. There's - there's a boulder we could turn over, Charlie.
- 06 00 14 20 LMP-EVA That's what I was saying.
- 06 00 14 22 CDR-EVA It's a big one. Right behind us. The trouble is, I don't want to push it into the Rover.
- 06 00 14 29 LMP-EVA Okay, Tony. I'm taking some 500 of South Ray. I can see into the rim on the inner wall on the south side. And the characteristics of the thing; it's got black streaks and white streaks coming out of the wall right over the rim, which - which says to me, there's two types of rocks down there.
- 06 00 14 52 CDR-EVA That's right, Charlie. That's what it says. And that's why the dark - that's why your dark streaks show up on your photograph. It's not - it's not that that thing wasn't throwing out blocks in every which direction. That dark streak right down through the middle of your photo - your photograph is probably - it looks as dark as in the area, and it's probably dark material from South Ray.

06 00 15 17 LMP-EVA The - Tony, Stubby is a very subdued old crater. It's not worth 15 pictures really. It's not much to it.

06 00 15 35 CC Okay, copy that - -

06 00 15 36 LMP-EVA No outcrop at all. I see some secondaries in - in the inner flank.

06 00 15 43 CDR-EVA It doesn't look much different than the subdued craters that we've just come across.

06 00 15 49 LMP-EVA I've just got to get a picture with the 500 of the old Orion sitting out there.

06 00 15 54 CDR-EVA Just spectacular.

06 00 15 56 LMP-EVA Okay, I'm going to take a couple of North Ray, Tony.

06 00 16 05 CDR-EVA Most of these rocks have a whitish cast to them, Houston, but -

06 00 16 13 LMP-EVA Okay, Tony, I'm up to frame count 90 on magazine Lima.

06 00 16 21 CC Okay.

06 00 16 27 LMP-EVA Wow! What a place. What a view, isn't it, John?

06 00 16 30 CDR-EVA It's absolutely unreal.

06 00 16 34 LMP-EVA You should really come up, Tony. It's just spectacular. I - Gosh, I have never seen - all I can say is spectacular, and I know y'all are sick of that word, but my vocabulary is so limited.

06 00 16 50 CC We're darn near speechless down here - -

06 00 16 51 LMP-EVA Okay, we got the description; it's - Can you guys see how really spectacular the view is?

06 00 16 59 CC We sure can.

06 00 17 02 LMP-EVA Hey, yeah. Where's the big eye? There it comes.

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06 00 17 05 CC We're looking at you.

06 00 17 08 LMP-EVA Look upslope, Tony. Okay, look on upslope, and you see all this rock field that we're in here. Okay. Any way I put the rake, the rake's coming next, John.

06 00 17 19 CDR-EVA Okay. I was just going to get this one sample.

06 00 17 21 LMP-EVA Okay, go ahead. Then we need a pan. That's after penetrations, and then I've got to get the - Guess what's coming up? I can almost pick this thing off the ground. That thing doesn't look like it's too stable.

06 00 17 37 CDR-EVA What's that?

06 00 17 38 LMP-EVA This back wheel's off the ground. The Rover. The right rear wheel is off the ground. I think we need to dust the TV lens. It's pretty dusty.

06 00 17 56 CC Yeah, Charlie. If you get a chance, we would like it dusted.

06 00 17 58 LMP-EVA I can get the lens brush. Yeah, it looks really dusty, Tony. Just a minute.

06 00 18 08 CC Okay. These blocks we see lying around the surface, are most of them from South Ray?

06 00 18 16 CDR-EVA *** don't know.

06 00 18 23 LMP-EVA Boy, I'll tell you, Tony. Up these - I just came up about a 20-degree slope, and it is really loosely compacted here. Stand by. I'm going to swing the big eye around. I can't dust unless I do that.

06 00 18 38 CDR-EVA Okay, Houston. I've got a hard rock. I think it's glass coated, but it's so dust covered I can't tell, and it's going in bag 394.

06 00 18 50 CC Okay, 394.

06 00 18 58 LMP-EVA The block population here - Okay, you're all dusted - -

06 00 19 01 CC Thank you much, Charlie.

06 00 19 02 LMP-EVA - - Houston. The block population here in this immediate area is 60 to 70 percent, with the biggest one being right in our little crater here that's a meter or so. They're all very angular and - but the majority - prime size - the majority of them are less than, oh, less than 30 centimeters or so, though there's a good proportion of 50 - -

06 00 19 35 CDR-EVA Let me put this in your bag, Charlie.

06 00 19 37 LMP-EVA Okay, coming around. Got to get the rake. Most of them are dust covered, Tony. Well, not most of them; in fact, most of them are not dust covered. The one that I'm just kicking - the ones around I kicked up.

06 00 19 56 CDR-EVA Got the rake?

06 00 19 58 LMP-EVA Yeah, I got it.

06 00 20 00 CDR-EVA Shovel.

06 00 20 01 LMP-EVA Okay.

06 00 20 03 CDR-EVA No, we don't need the shovel. You want to use that thing, or do you want me to use the rake?

06 00 20 05 LMP-EVA I'll - Let me rake this time and then I'll get on with the penetrometer, okay?

06 00 20 09 CDR-EVA Okay, fine.

06 00 20 10 LMP-EVA Okay, you want to - Where do you want to go? There's a place right up here, John, that looks like it's a good - -

06 00 20 16 CDR-EVA Okay, let's not go too far.

06 00 20 18 LMP-EVA I'm not. It's pretty steep. If you jackrabbit up it, it's pretty easy to do. There's a place right here that's got a lot of good ones.

06 00 20 36 CDR-EVA You look great, babe.

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06 00 20 38 LMP-EVA Let me get up-Sun. An 11-footer.

06 00 20 55 CDR-EVA Man.

06 00 21 00 LMP-EVA Okay, got it. And let me get a locator from up here, too. That's going to be in focus. I'll just -
Okay, I'm gonna change this, just to - Okay, Tony. Underneath this regolith up here, we've still got the same deal. Top centimeter or so is - -

06 00 21 24 CDR-EVA Now we rake.

06 00 21 25 LMP-EVA I'm sorry.

06 00 21 37 CDR-EVA Okay. Most of these rocks were white clasts.

06 00 21 43 LMP-EVA Glass coated, too - a little - -

06 00 21 45 CDR-EVA Glass coated.

06 00 21 46 LMP-EVA - - on some of them.

06 00 21 50 CDR-EVA There's 12 or 13 in that first scoop, and there's - they're mostly white clast rocks.

06 00 22 00 LMP-EVA Here comes one that's got a lot of glass on it, John.

06 00 22 08 CDR-EVA Yeah, that ought to be enough.

06 00 22 10 CC Okay, we copy that. You think you're getting breccias there, then?

06 00 22 17 CDR-EVA Okay. No, we're not sure because they're dust coated too, and there's glass - there's glass on them. They could be just shocked rock.

06 00 22 25 CC Yeah, okay.

06 00 22 27 CDR-EVA Okay, that's going into bag 395.

06 00 22 30 LMP-EVA I don't get the impression - -

06 00 22 31 CC Okay, 335 [sic].

06 00 22 33 LMP-EVA - - they're breccias, myself.

06 00 22 34 COR-EVA I don't either. But it's just an impression.

06 00 22 48 LMP-EVA Man. Boy, oh, boy. I can't believe this. Okay, you want to get an AFTER of that, John? I'll get a shovelful.

06 00 22 54 COR-EVA Okay. Okay.

06 00 23 03 CC And, John, we'd like to consider your going to INTERMEDIATE cooling.

06 00 23 08 COR-EVA Oh, okay. We'll do it.

06 00 23 12 LMP-EVA We don't need INTERMEDIATE - INTERMEDIATE. You need - at least, I - I'm comfortable just out of MIN. Let's see, we need a - some more of that, don't we?

06 00 23 21 COR-EVA Yeah.

06 00 23 22 LMP-EVA Want to get that kilo. Okay.

06 00 23 28 COR-EVA Wow - -

06 00 23 29 LMP-EVA ... some of that white stuff in the bottom.

06 00 23 31 COR-EVA Yeah. Look at that - -

06 00 23 32 LMP-EVA That's what I was going to say. Tony, underneath this top gray layer, it's white again up here, just like on the Cayley.

06 00 23 40 CC Okay.

06 00 23 42 LMP-EVA That a - that's a kilo, isn't it?

06 00 23 44 COR-EVA Yeah.

06 00 23 45 CC Yeah, that's okay - -

06 00 23 46 LMP-EVA ... okay, rake. Okay. Your old rake - your old rake is finished. Wowee.

06 00 23 56 COR-EVA And it's in bag 396.

06 00 23 58 CC Okay, 396.

06 00 24 04 LMP-EVA Oh, I'm sorry, John. I ran off and left you.

06 00 24 06 COR-EVA Now, you want me to throw - throw it in my bag.

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06 00 24 09 LMP-EVA Okay.

06 00 24 10 CDR-EVA Weren't we supposed to leave core tubes in there?

06 00 24 11 LMP-EVA No, you've got - no, you've got core tubes. Let me carry the rocks. I'll have an easier time getting the core tubes out if your bag is empty.

06 00 24 18 CDR-EVA Okay.

06 00 24 19 LMP-EVA Look at that view over there. Look at that.

06 00 24 21 CDR-EVA You've got two core tubes too, Charlie. Did you mean to have two of them?

06 00 24 24 CC Hey, Charlie. We're having a hard time getting - -

06 00 24 26 LMP-EVA No, ... own bag ... Okay.

06 00 24 27 CC - - a perspective on that crater. Could you give us the dimensions, please?

06 00 24 31 LMP-EVA Where we're standing?

06 00 24 32 CC Right.

06 00 24 36 LMP-EVA What do you think, 10 meters, John?

06 00 24 38 CDR-EVA Yeah. It's an old 10-meter crater; it's really an old one. This - these other rocks around here might have been caused by this - Matter of fact, this might of - No, I don't think so. I think these rocks were laid in here when South Ray came in.

06 00 24 57 CDR-EVA Sampling.

06 00 24 59 LMP-EVA Okay, Tony. On the penetrometer, it's benched. We'll call this crater the bench if you want to, and I'll get one uphill, one downhill, and two in the bottom of the crater. How does that sound?

06 00 25 13 CC Okay, that sounds good to us.

06 00 25 19 LMP-EVA Okay, and I'll start with a 0.5.

06 00 25 20 CC Okay.

06 00 25 29 LMP-EVA John, I'm glad we got those two core tubes. I think the other two fell off back at the LM.

06 00 25 35 CDR-EVA Okay.

06 00 25 37 LMP-EVA I don't think I ever put those back in your bag. Did I? Well, let's see; we got plenty.

06 00 25 57 CDR-EVA I'm looking at a rock here, Houston, that is a very angular rock, and it has white clasts with a - with a breccia, or it has a brecciated appearance. I'll take a picture of it and sample it for you.

06 00 26 24 LMP-EVA Okay, I'm going to take my camera off to do this. Boy, this is so neat. Man, am I having a good time.

06 00 26 41 CC Charlie, we are, too. And while you are bouncing around there, you might keep an eye out for a nearby crater that looks like it may have pulled up some local material.

06 00 27 04 LMP-EVA Now, we can't walk very far, Tony.

06 00 27 07 CC Understand.

06 00 27 12 LMP-EVA Oh, rats.

06 00 27 13 CDR-EVA What's the matter, Charlie?

06 00 27 19 LMP-EVA I had the 0.5 cone in here, and when I pulled it, I pulled it out, and it came out like it was supposed to. And then I started moving the thing down and it fell off.

06 00 27 38 LMP-EVA *** what to do about that.

06 00 28 08 LMP-EVA John, don't - don't walk right over here. That cone is over there, and I want to get - get it out.

06 00 28 14 CDR-EVA Hand me a set of tongs, too, will you?

06 00 28 16 LMP-EVA Okay, here you go.

06 00 28 22 CDR-EVA Okay. Once you get it out, can you put it back on?

06 00 28 24 LMP-EVA Well, if we go - I'll bring it over to you, and if you'll hold it for me, I think I can.

06 00 28 43 LMP-EVA How about whacking it on here, and see if you can get some of the dirt out of the bottom of it? This dumb thing is not supposed to come out of

there without being locked. My penetrometer is around here; wait a minute.

- 06 00 28 59 CDR-EVA Okay.
- 06 00 29 05 LMP-EVA Okay.
- 06 00 29 08 CDR-EVA Don't step right there, Charlie. Here's a splatter - glass splatter.
- 06 00 29 12 LMP-EVA Oh, yeah. I see it. A whole big bubble of it, isn't it?
- 06 00 29 16 CDR-EVA Yeah.
- 06 00 29 18 LMP-EVA Is that on?
- 06 00 29 22 CDR-EVA Yeah, that got it. Thank you. Beautiful. Okay. I'm going to grab sample this scrap - this glass splatter behind the Rover, Houston.
- 06 00 29 33 LMP-EVA Good. Hey, Tony. John, if you see it, there's one under that rock. Is that the one you're talking about?
- 06 00 29 40 CDR-EVA Yeah.
- 06 00 29 41 LMP-EVA Okay. Tony, can I start on number 5 on the penetrometer?
- 06 00 29 44 CC Okay, that's fine.
- 06 00 29 49 LMP-EVA Okay. I'm going up out of this crater - up on the top part of it.
- 06 00 29 57 CDR-EVA And that's going into bag 397, Houston.
- 06 00 30 00 CC Okay, 397.
- 06 00 30 05 LMP-EVA Tony, you just can't believe that South Ray Crater. It is - it is perfectly - cylindrical - circular. And it's amazing. It's just really apparent that we got two types of rocks there. Okay, I'm about up on the - up on the side now, starting with 5. And we're pushing it in.
- 06 00 30 56 LMP-EVA Okay. That's as far as it's gonna go, Tony. And it went to half - about three-quarters of the way up to the red mark.

06 00 31 08 CC Okay.

06 00 31 15 CC Okay. We'd like you to - -

06 00 31 16 LMP-EVA ... going back down in the flat part.

06 00 31 18 CC - - change to 220.

06 00 31 22 LMP-EVA Okay. And, Tony, when you push on the thing, you can't push with a very smooth force, and it's gonna - you're gonna see some spikes on the recording, I'm sure.

06 00 31 40 CC Okay. We understand that. That's fine, Charlie.

06 00 31 45 LMP-EVA And - and if you want my opinion on the thing, I don't think we're hitting hard ground. I think what I did is probably hit a rock, and I should have probably moved this thing over a little bit.

06 00 31 59 CC Okay. We'll just go with the 0.2 and see how that does.

06 00 32 04 LMP-EVA Okay.

06 00 32 15 CDR-EVA Okay, Houston. I'm sampling independently, and I've got four samples in bag 398. They're so dust covered that I can't tell anything about them - -

06 00 32 24 CC Okay; understand.

06 00 32 25 CDR-EVA - - but I suspect they're lying by this big rock, and they may be the same kind of - same kind of rock. Charlie, I'm going to get that bag out from underneath your seat and put the samples in there.

06 00 32 39 LMP-EVA Okay. You know, John, with all this - these rocks here, I'm not sure we're getting Descartes.

06 00 32 47 CDR-EVA That's right. I'm not either.

06 00 32 48 LMP-EVA We ought to go down that crater without any rocks.

06 00 32 59 CC And, Charlie, you're on the big eye. We're watching.

06 00 33 01 LMP-EVA Okay. The 0.2. You see that? The 0.2 went all the way in.

06 00 33 07 CC We understand. Can you tell how far it stroked up on the pressure? Do you think it reached the hilt?

06 00 33 16 LMP-EVA No, it very light - it was very light pressure, frankly. Hey, it just depends on whether you hit a rock down there or not. This is really loose - loosely consolidated - this regolith - loosely packed.

06 00 33 36 CC Okay. Was that index on 6?

06 00 33 41 LMP-EVA That's affirmative. Going to 7.

06 00 33 48 CDR-EVA You don't mind if I put those bags in your seat, do you, Charlie?

06 00 33 51 LMP-EVA Not a bit.

06 00 33 55 LMP-EVA Hey, turn the big eye up to the right, Tony, if you want to watch this other one.

06 00 34 02 CC Okay, we're coming around.

06 00 34 12 LMP-EVA It seems a little more firmly packed here.

06 00 34 15 CC Okay.

06 00 34 23 LMP-EVA Okay, that one bottmed out now.

06 00 34 26 CC Good show.

06 00 34 28 LMP-EVA It - oh, it's up above the red mark. And it got progressively harder. So I think that was a good - a good reading. I don't think that was necessarily a rock down there.

06 00 34 42 CC Good show. We finally guessed right.

06 00 34 49 LMP-EVA Okay. Going to 8 and I'm going downslope.

06 00 35 02 LMP-EVA John, this - this crater over here looks like it might be - just downslope here looks like it might be one of the Cincos, and it could be Descartes material, because it's just some little blocks around it. And there's - there's some little blocks in - inside the rim, too.

06 00 35 26 LMP-EVA Okay. Here we go.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

05 23 13 XX BEGIN LUNAR REV 36

05 23 25 31 CC Casper, Houston.

05 23 25 37 CMP Hello there.

05 23 25 39 CC Hello. How'd everything go on the back?

05 23 25 48 CMP Oh, we got a lot of very dim photographs.

05 23 25 54 CC Roger.

05 23 26 02 CMP Actually, we got them all in. Times worked out just perfectly.

05 23 26 17 CC Okay. I'll get your film report whenever you're ready, and when you're - -

05 23 26 21 CMP The only - Okay. Let me give you that. I just was turning the page. I did have one comment; the first - the first frame on that antisolar sequence, I think is probably not part of the gegenschein experiment itself. I think that's more of this zodiacal light business. But it's a 5-minute exposure, and we took it with the spacecraft - Let's say my head's down and nearly in the local horizontal. The camera was pointing 30 degrees down, and it looks to me like it would have had the Moon in - in earthshine - in the field of view; so I suspect that that's not much of a - not a very good frame. The rest of the sequences went - went fine, and the pointing attitudes pointed us right at the places on the chart. And I have attitude errors on the antisolar sequence. I'll just give you the attitudes at the end, and restart it from the proper attitudes. It was 165, 257, and 354. The second part of step 4 was 167, 258, 357. The attitudes in step 7: 169, 264, and 0. Attitudes in step 10: 164, 275, and 359. Magazine Zulu Zulu has 15 exposures taken.

05 23 28 09 CC Roger. Copy, Ken.

05 23 29 08 CC And, Ken, whenever you get a break there in your eating period, I got the rest of your Flight Plan changes.

05 23 29 19 CMP Okay. Let me get a couple of bags ahead here.

05 23 29 36 CMP Hey, Hank, a little curiosity here that I guess it's just "gee-whiz." I've been noticing some things like I got tool E tied to the G&N handrail, and I got a pair of scissors strapped down here in the LEB, on a tether, and I got a trash bag up in the tunnel; and most things in the cockpit give you troubles with floating around. They really - you really got to pay attention if you want them to be stable. But the trash bag never leaves the tunnel. And tool E, every time I've looked at it has been pointing - it's been hanging up instead of hanging down as you would think of it in the CMS. And my scissors are generally up. And I - I had decided that gee, that, you know, that's my imagination. That can't really be. There's no preferred direction. Then I got to thinking about the thruster configuration we have giving us the - all minus-X thrusting whenever they do fire for attitude control, and so I thought I'd take a look here while we're in ATTITUDE HOLD; and sure enough, in ATTITUDE HOLD, the tool E didn't go up and the scissors do stay down. And I guess that's when we were FREE most of that time rather than ATTITUDE HOLD. Apparently, you can see the effects over a long period in the cockpit of the minus-X firings for attitude. I thought that was kind of unusual.

05 23 32 14 CC That's pretty interesting.

05 23 32 22 CMP And let me get - get a bag open here and I'll be ready to copy while I'm drinking.

05 23 32 29 CC Okay.

05 23 32 52 CMP Okay. Go ahead.

05 23 32 56 CC Okay. Ken, the first change we want to look at is at 145:14.

05 23 33 40 CMP Hank, if we're going to do this during the - in an actual eat period, the best thing for us to do is probably for you to read them very slowly, and I'll copy all I can and then when we get to the end, I'll read them back to you.

05 23 33 53 CC Okay. At 145:14, this is a minor change in that mapping camera photo pad. The longitude there, where it says "159.9 degrees to 20.7 degrees west," that should be "23.7 degrees west," and it's just for your own information; and that's two and a half revs.

05 23 34 25 CC Okay. The next change is at 146:18, on the next page. 146:17, really, where it starts there with "GAMMA RAY SHIELD - OFF." Delete from there through "IMAGE MOTION - OFF." That's delete "GAMMA RAY SHIELD - OFF; MAPPING CAMERA - OFF (T-stop), Wait 30 seconds; MAPPING CAMERA - STANDBY; and IMAGE MOTION - OFF." At 146:24 there where - in the block for MSFN updates, we won't be giving you a mapping camera photo pad; instead it'll be a pan camera photo pad; this is just for your information, and it'll be copied at 148:10.

05 23 35 25 CC And, Ken, we need HIGH GAIN, AUTO, and we'd like to verify the position of the DSE recorder switch.

05 23 35 54 CMP Okay. You've got AUTO, and the DSE is in RECORD and FORWARD; HIGH BIT RATE.

05 23 36 00 CC Roger. Copy.

05 23 36 21 CC And, Ken, the next change is at 146:27; we want to delete all the little business there with the "GAMMA RAY GAINSTEP - ON (up) 4 steps (step 7)/SHIELD-on (center)." Delete that whole line. Okay. The next change is at 146:30. At the top of the page. This is a minor change. The SIM experiment status should now be "Plus 1111 and 02222." And if you'll flip the page over at 147 hours, the SIM status should be the same as before: "Plus 1111, 02222." At 147:12, delete "IMAGE MOTION - ON," delete "MAPPING CAMERA - ON (T-start)," and also delete that block for the photo pad - mapping camera photo pad. Okay, on the next page, at 148 hours, right at the top of the page, we want to add "GAMMA RAY, RETRACT,

- to 7-1/2 feet." The time for the retraction is 2 minutes 26 seconds. At 148:05, add "PAN CAMERA, STANDBY; STEREO; POWER - verify; PAN CAMERA, OPERATE at T-start." And, Ken, somewhere out beside that, you can build you a little block, if you like, to copy the pan camera photo pad.
- 05 23 40 27 CC At 148:17, add "PAN CAMERA, STANDBY at T-stop; PAN CAMERA, OFF, MSFN cue; and GAMMA RAY, DEPLOY."
- 05 23 41 22 CC At 148:29, where it talks about "GAMMA RAY: GAIN-STEP" et cetera, delete the middle part of that so that it reads "GAMMA RAY: GAINSTEP - ON (center)." That should be "SHIELD - ON." To repeat, that should read "GAMMA RAY: GAINSTEP - SHIELD - ON (center)." And right under that, at 148:30 there, delete "MASS SPEC, RETRACT to 8.4 feet."
- 05 23 42 44 CC At 148:30, at the top of the next column, the SIM status should be "Plus 1111, 02222." At the top of the next page, 149 hours, SIM status code should be the same as before, "Plus 1111, 02222."
- 05 23 43 52 CC And at 149:18, the block there that refers to "PAN CAMERA: STANDBY, STEREO, POWER, OPERATE (T-start)," that little group, - this is a note to yourself - should be moved up such that the T-start occurs at 149:16.
- 05 23 44 37 CC At 149:30, the SIM status code should be "Plus 1211, 22222." And, Ken, that's all of them for now.
- 05 23 45 10 CMP Okay, Hank, let me read them back to you, and I'll just start - start back here at the last one you gave me. At 149:30, we got the status code as 1211 and 22222. We moved the pan camera block that's now at 149:18 up to a point where the OPERATE comes at 149:16. SIM code on that page is - is four sticks, and zero, four deuces. Same status code on the top at 148:30. 148:29, it's "GAMMA RAY: GAINSTEP, ON - or SHIELD, ON." 148:20, it's "GAMMA RAY, DEPLOY." And, at about 148:17, it's "PAN CAMERA, STANDBY at T-stop, and then OFF at MSFN command." 148:15, it's "PAN CAMERA: STANDBY, STEREO, POWER, and then OPERATE at T-start," and I got a block ready for T-start and stop. At

148 even, it's "GAMMA RAY, retract to 7-1/2 feet," that's 2 minutes and 26 seconds from full retract - from full extension, and - I've deleted the mapping camera pad at 147:15. I've deleted the block mapping camera at 147:12 - Oops, except for the "IMAGE MOTION, INCREASE," which still goes in there. I got a status change at the top of 147; the bottom line is now 02222. 146:27, we delete the "GAMMA RAY" line. Big change in position of the pan camera photo pad to 148:10. Deleted the little block of items starting with "GAMMA RAY: SHIELD, OFF," and ending with "IMAGE MOTION, OFF" at 146:16. And the mapping camera photo pad down 145:12 is two and a half revs and ends at 23.7 west.

05 23 48 08 CC Okay, Ken. That all looked pretty good, except at 148:30 - want to make sure you deleted the mass spec retraction.

05 23 48 25 CMP Yeah, sure did. I'm sorry, I just read you the gainstep line. Yes, I'll leave the mass spec out.

05 23 48 33 CC Okay. That's a good readback.

05 23 48 39 CMP Okay, Henry. If you don't have anything else for a couple of minutes, I'll go back to feeding my face.

05 23 48 53 CC Go right ahead. I won't bother you.

05 23 52 47 CC FAO, CAP COMM. Is the TCA time in the Flight Plan pretty good?

05 23 53 00 CMP Say again, Hank?

05 23 53 07 CC I was on the wrong loop, Ken. I was just checking the time for TCA to Descartes. It's - it's pretty good, what's in the Flight Plan. John and Charlie are - are on their way up to Stone Mountain now to Cinco. They're about halfway there.

05 23 53 28 CMP Outstanding. Did they - halfway up Stone Mountain or halfway to Stone Mountain?

05 23 53 35 CC They just passed Survey Ridge.

05 23 53 41 CMP Okay. Did - Was that real obvious to them?

05 23 53 47 CC Yes, it was, and the surprising thing is that they have no trouble recognizing when they're on a ray. It's very obvious to them, on the surface.

05 23 54 00 CMP Is that right? What - what looks different when they're on it?

05 23 54 03 CC Just an enormous amount of blocks, and - they're - just the way the terrain's all churned up; and they can tell this stuff's been thrown on top.

05 23 54 17 CMP Beautiful.

05 23 58 26 CC Ken, the guys are on the first of one of those terraces there, just passing station 5 now, and they - they were able to recognize the - the ray just by the block count.

05 23 58 43 CMP Okay ...

06 00 02 12 CMP Hey, Henry, how do you read Casper now?

06 00 02 16 CC Reading you 5 by 5, Ken. How me?

06 00 02 22 CMP Oh, loud and clear. I - I guess you probably didn't get my comment about the glint over on Stone Mountain?

06 00 02 31 CC Negative. I hadn't heard anything for a while. I gave you a call while ago to tell you where they were.

06 00 02 38 CMP (Chuckle) Yeh, okay, and I answered you and I guess I wasn't on VOX, I just realized. Just as you said that I - I had just gotten in a position as I passed overhead the - the area, and I was taking a look - I had two things in mind. One of them was to - to ... by the landing area, and I got there too late to tell whether or not I had seen any of that. And then the - the next thing I did was to look over towards the terraces and see how they look today, and - when I looked over towards the terraces, it was kind of strange because I was looking out - And I'd say maybe you can see - at this Sun angle looks like there might be a terrace

out there. And you can see Crest [?] Crater very plainly. And the - the Cincos, you have to be - I have to be on top of the landing site to see it, and by the time I got around to that, I was downstream a ways; but I got a flash of light right at the base of Stone Mountain; just a glint, like a piece of metal flashed in the sunlight. And I'll bet you anything I got a reflection off the Rover if - if at about that time they were right at the base of Stone.

06 00 04 12 CC That's about where they were, Ken. I'ts about time to start your V49 maneuver.

06 00 04 19 CMP Okay. Thank you.

06 00 04 23 CC And, John and Charlie are up there, now. They're at Cinco.

06 00 04 30 CMP Already?

06 00 04 33 CC Yeah, they're making good time.

06 00 04 38 CMP Doesn't seem possible they could go that fast.

06 00 05 39 CC Ken, you might keep an eye on your middle gimbal angle on this - -

06 00 05 41 CMP Henry, the other thing that - Oh, okay.

06 00 06 03 CC And I need to get you your mapping camera photos pad up here before we get - you get too involved in this Gum Nebula thing.

06 00 06 30 CMP Okay. Go ahead.

06 00 06 34 CC Okay. This is to be copied at about 145:12. T-start is 145 - -

06 00 06 41 CMP Got it.

06 00 06 42 CC - - 18:40. T-stop, 150:16:05. And the image motion changes called in the Flight Plan are good.

06 00 07 00 CMP Okay. T-start, 145:18:40; stop, 150:16:05.

06 00 07 07 CC Good readback, Ken. And I won't bother you anymore while you're setting up.

06 00 07 15 CMP Okay. One other thing I wanted to tell you about the - in the Descartes area. You remember the little cone-shaped thing that we looked at on the plotter?

06 00 07 29 CC Roger.

06 00 07 30 CMP Just to the north and mostly to the west of Canoe [?].

06 00 07 36 CC That's affirmative.

06 00 07 40 CMP Okay. Well, I - I've looked for it on four revs now, and I - I've identified the feature that it looked like it was, and it doesn't look like that at all. It's just a little - just a little soft mound with a crater in it, and it doesn't look any different than all the other craters when you look at it from here.

06 00 08 00 CC Well, that's interesting, but disappointing.

06 00 08 07 CMP Yeah, I was, too. And, actually, that's about the same score for the one that's out here by Lassell.

06 00 08 14 CC Oh, is that right?

06 00 08 34 CC Well, in the photograph for that one there north-west of North Ray, it sure does look like it had a lot darker material around it.

06 00 08 45 CMP Yeah, I know it does, and I haven't had a chance to look at it straight down, but it - from an oblique, it sure - sure looks the same as all the rest of the things around there.

06 00 10 13 CC And, Casper; Houston. When you get down to do that P52 and go to SCS, G&C suggests that perhaps you ought to - since you're that close to gimbal lock - that middle gimbal angle, you might go MINIMUM DEAD BAND and uncage the BMAGs. And LOW RATE on that, too.

06 00 10 44 CMP Okay. That's not a bad plan.

06 00 13 24 CMP Okay. And I got a 405 here, Hank. Light go away if I wait another minute?

06 00 13 30 CC That's affirmative.

06 00 13 36 CMP You say affirmative on that - -

06 00 13 39 CC That's affirmative, Ken. You - you wait a little bit, it'll help, but stars 12 and 13 should be available.

06 00 13 47 CMP Okay; 7 and 13, thank you.

06 00 13 51 CC That's 12 and 13.

06 00 13 56 CMP Okay; 12 and 13.

06 00 15 54 CMP Well, there's - That's interesting. There's nothing in the sextant at all. And the telescope, I still haven't been able to pick up star patterns in.

06 00 16 08 CC FAO is checking into it, Ken.

06 00 17 04 CMP And I have nothing on star 13, either. I'm going to press on with the Gum Nebula and see if I can catch this later.

06 00 17 14 CC Okay, Ken.

06 00 17 33 CMP I suspect we've got something like the Moon in front of those stars.

06 00 18 37 CC Ken, maybe you can get that P52 after you finish the Gum Nebula.

06 00 18 44 CMP Roger. That's what I'm gonna try.

06 00 19 50 CMP Yeah, I've - I looked outside here, Hank, and I got the optics pointing at the Moon.

06 00 19 57 CC Roger.

06 00 20 19 CMP As a matter of fact, I'm gonna have to wait awhile here just to clear the Moon to take this Gum Nebula sequence.

06 00 20 29 CC Roger. You should be clear, according to the Flight Plan, at about 36 after.

06 00 20 41 CMP Are you sure - Has somebody verified that these - these long exposure times we're taking are going to be satisfactory when we've got a brightly lit Moon in the field of view? You know we looked at all this kind of stuff on the original, but when we started coming back trying to piece things in here in real time, I wonder if some of those things need to be verified.

06 00 21 14 CC Roger. FAO's checking. This was the PI's request.

06 00 21 23 CMP Okay. I - We'll go ahead and take them, but he ought to be aware that I got a beautiful earthlit Moon out here. I just passed - I believe that's Rima Sirsalis and - you know, you can see features, not as good as the first night, but, boy, they - they're still real big obvious features out here.

06 00 22 35 CMP At least the star patterns all check out. I've got Canopus and Regor and Avoir [?] and all those stars in sight.

06 00 22 47 CC Well, that's good.

06 00 24 31 CC Casper, Houston. FAO advises they'd like for you to wait until LOS to do the photos.

06 00 24 46 CMP Okay. Understand you want to wait until LOS. Okay. That ought to get us a little darker scene.

06 00 25 01 CC We might be pressed to get that P52 in there after that, but we'll just have to do the best we can.

06 00 25 11 CMP Well, I'm not sure you're going to get a P52 in there either, Hank. Seems to me like I'm supposed to go to a north oblique photo attitude - -

06 00 25 23 CC That's affirmative, and so why don't we just go ahead and scrub that 52?

06 00 25 24 CMP - - and we're gonna be pressed just to make that thing. That's what I was gonna suggest. Good plan. And I'll catch 52 the next time we get in the dark. The platform is - obviously knows where it is. So, we'll go ahead and get this north oblique in here, and I'm gonna have a - It looks like that may be a tight one, too - just to get to it. But I'll - we'll get there, if we have to use the higher rate.

06 00 25 52 CC Roger.

06 00 26 08 CMP Hank, you asked me earlier about the configuration of the DSE switches. Was there some problem in the last time I reconfigured?

06 00 26 17 CC INCO had some data that showed that it wasn't in RECORD, and he was puzzled about it.

06 00 26 30 CMP Well, I see I'm supposed to configure it again here in just a minute. Do you want me to cycle things, or anything like that?

06 00 26 43 CC Ken, INCO's going to take care of it this time. Would like for you to verify, though, that you are in that proper configuration. He's - at the time that we thought you'd be busy taking all these pictures here, I told him to go ahead and configure it at this end so you wouldn't have to mess with it.

06 00 27 02 CMP Okay. I'll just verify it, then.

06 00 27 08 CC And on another check there, INCO verified there was no problem with your configuration.

06 00 27 16 CMP Okay. I may be mistaken, Hank, but I believe that I can see the outer two rings of Orientale, now. I'm just coming up on the earthshine terminator, and I can see a big circular basin, that's really a - really a big guy - fills the whole window. And I can see reflections off the far rim and off the near rim, and I've got two concentric rings with some flat areas and little - little buildups in it, and it really looks hilly in there. That's a - that's a spectacular thing; I wish we could see it in daylight.

06 00 27 58 CC Roger.

06 00 30 49 CC Okay, Ken, we're about 4 minutes from LOS. Everything's looking good on this end, and just to pass on something about the guys on the surface, they've got a real good view of South Ray from where they are, and they say that - that - that the crater - the ejecta from South Ray is two different kinds of material. There's some dark material and then the light material that we call ray material, so he said there's other ejecta right along with it in all directions, where there's dark and light.

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06 00 31 27 CMP

Yeah? How about that. I think I told you yesterday that - that it appers to me that the interior of North and South Ray are significantly different.

06 00 31 46 CC

Roger.

06 00 31 47 CMP

South Ray shows a great deal of dark and light splotches and North Ray just doesn't show that real dramatic difference.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 00 35 31 CDR-EVA Okay, Houston. I'm digging an exploratory trench right here to see - material is black.

06 00 35 41 CC Okay. We copy that, John.

06 00 35 43 CDR-EVA Now - it's sure not. I mean the material is not white. It's just the same as it -

06 00 35 51 LMP-EVA Oh, rats! How'd you like that?

06 00 35 57 CC Beautiful maneuver there, Charlie. What do you do for an encore?

06 00 36 02 LMP-EVA Okay. This thing is - Okay. I went (laughter) I went down - it - That one bottomed out.

06 00 36 10 CC Okay. We saw that.

06 00 36 12 LMP-EVA But it went all the way in. I don't mean - I mean the force.

06 00 36 19 CDR-EVA Okay, Houston. I've gone down about -

06 00 36 35 CDR-EVA Shovel width, and it's all the same material. And I don't see any layering in it or anything.

06 00 36 44 CC Okay. We understand that, John.

06 00 36 50 LMP-EVA Okay. I've gone to number - sequence to number 9, and I'm stowing this beauty.

06 00 36 56 CC Okay.

06 00 37 01 LMP-EVA And that one test downhill was on the steepest part.

06 00 37 06 CC Okay.

06 00 37 09 LMP-EVA Tony, when I push that beauty in there, it almost turns the Rover over.

06 00 37 23 LMP-EVA Tony, do you want this double core - in the ditch here or downslope where I think is probably closer to Descartes?

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06 00 37 43 CDR-EVA Okay, Houston. I've got a sample out of the deepest part of this trench that I'm digging, and it's going into bag -

06 00 38 00 CDR-EVA Bag 399.

06 00 38 01 CC Okay; bag 399.

06 00 38 13 LMP-EVA Did you copy that, Tony? My question?

06 00 38 16 CC Right, Charlie. Why don't we just go ahead and take it downslope there about your last penetrometer place?

06 00 38 24 LMP-EVA Okay, will do. Hey, John, I need - I'm going to come over there - -

06 00 38 34 CDR-EVA What do you need, Charlie?

06 00 38 35 LMP-EVA - - and get a couple of cores from you.

06 00 38 39 CDR-EVA Okay. I'm going to leave those two cores in that bag. It makes it stand up.

06 00 38 44 LMP-EVA Yeah. That's great. That's the lower - upper -

06 00 38 53 CDR-EVA I wish I could say these rocks look different, Houston, but they don't. They look - -

06 00 38 58 CC Okay. We understand. And do you see a blocky rim crater within walking distance?

06 00 39 18 LMP-EVA Blocky rimmed?

06 00 39 20 CDR-EVA Blocky rim.

06 00 39 21 LMP-EVA But what is this one?

06 00 39 22 CDR-EVA How about right up there, Charlie?

06 00 39 23 LMP-EVA Yeah. That was one right up there. Uh-huh. Yeah. That's 30 meters away - up there. Getting out of this little crater is pretty, pretty hard; but after that it's - I think you'll be able to hack it.

06 00 39 38 CDR-EVA Yeah. I've got an upper and a lower.

06 00 39 50 LMP-EVA You guys looking at the scenery?

06 00 39 52 CC We sure are. It's really outstanding.

06 00 39 57 LMP-EVA Pretty view from up - Have you seen the lunar module? You shoot 12 o'clock right now on the TV.

06 00 40 03 CDR-EVA How much - how much time we got here?

06 00 40 06 CC Okay. You've got about 22 minutes left.

06 00 40 09 LMP-EVA We've got 58 total, John.

06 00 40 12 CDR-EVA Okay.

06 00 40 16 CC No. We don't have the resolution to see the LM.

06 00 40 23 CDR-EVA Charlie, get a picture of the LM.

06 00 40 25 LMP-EVA I did - with the 500.

06 00 40 26 CDR-EVA Okay.

06 00 40 57 LMP-EVA Don't poop yourself, John.

06 00 40 59 CDR-EVA Not doing any work, Charlie. Good show.

06 00 41 05 LMP-EVA Okay. The old double core is assembled. Tony, you can't - in the regolith, you see little bright speckles looking at you, and I think it's uh - uh glass particles. John has already sampled - some of them.

06 00 41 56 CDR-EVA Okay, Houston. Here's some blocky rim secondary. Here's a nice little one.

06 00 42 04 CC Okay, John. That might be a good place to get a rock. We're really looking for one where the rock around the secondary - rock around the crater - should come from the crater; not from the secondary.

06 00 42 19 CDR-EVA Yeah. I would suppose that all of them - Do you think all the blocks on the upslope side were the - were the - were the secondary that made it? Don't you reckon - if it's from South Ray? Let me go down and sample off the rim - off the south rim.

06 00 42 34 CC Okay. Sounds good.

06 00 42 35 CDR-EVA How about that?

06 00 42 36 CC Sounds good.

06 00 42 39 CDR-EVA I think you really need a primary impact crater to - to avoid the problem.

06 00 42 47 CC Yeah. You're right, John.

06 00 42 49 LMP-EVA Tony, mark me down for - for one more. Mark me down for one more blow. I'm trying to get the dust off. Man, I don't want to get down there too far. This thing is deep. Okay, Tony. I'm to the 2 o'clock - to the 2:30 position of the Rover, and I'm going to start with this double core - got it assembled. Okay. I pushed it in. Almost up - Well, I did. I got in up to the - almost to the top of the first stem by pushing it in.

06 00 43 31 CC Okay. I understand.

06 00 43 32 LMP-EVA There comes your 7-footer cross-Sun, and I'll get you a locator. I'm just going to get you a locator now that I'm downslope. It won't be in the ground. Procedurally, that's a little wrong, but I'll do it anyway.

06 00 43 45 CC That's okay.

06 00 43 47 LMP-EVA It'll save me some work.

06 00 44 00 LMP-EVA (Singing) I've been hammering [sic] on the railroad, all - Okay, Tony, about halfway up the second one - it's getting a little harder, but it's going on in.

06 00 44 18 CC Okay. Maybe we're getting down to Descartes there.

06 00 44 27 LMP-EVA Huh? That might be. Boy, those rays from South Ray - You can just track right across through Stubby right on up to Survey. You know, Tony, South Ray was mapped as the biggest crater at North Ray, and it's not nearly as big. It's just the ray pattern - the whiteness that makes it look this big.

06 00 44 56 CDR-EVA No, Charlie. It wasn't.

06 00 44 57 LMP-EVA It was not? Oh, I thought it was. Excuse me.

06 00 45 02 CDR-EVA It was when we started, but when they got - when we got -

06 00 45 09 CDR-EVA Okay, Houston. I'm standing on the rim of this crater over here. The only - the only rock I see on the south rim of this sec - obvious secondary is - is not too big. I can get down into the crater and look down in it, and see if I can scratch away to a bench, if you'd like to do that.

06 00 45 43 CC Okay. I don't think we need to do that, John. Charlie will bring up a rake there; and, maybe from that, we'll be able to get Descartes.

06 00 45 53 LMP-EVA (Laughter) I'll bring up a rake. Thanks.

06 00 45 59 CDR-EVA Are you getting a rake, Charlie?

06 00 46 01 LMP-EVA I'm getting the - I'm finishing up the double core right now. I've got it back here, and I'm taking it apart.

06 00 46 03 CDR-EVA Okay.

06 00 46 11 LMP-EVA Capped, bottom section.

06 00 46 22 CC And, Charlie, did you call off the section numbers?

06 00 46 25 CDR-EVA Carrying that rock again is going to be -

06 00 46 28 LMP-EVA No, not yet. I'll get them.

06 00 46 35 LMP-EVA Okay. That's full. Bottom section was 38, Tony.

06 00 46 38 CC Okay.

06 00 46 49 LMP-EVA Man, this is working neat. Those things are just going right back on.

06 00 46 58 LMP-EVA Okay. It's all rammed home.

06 00 47 05 CDR-EVA What I'll do, Houston, is get a soil sample off this rim. I - that's the only thing I can be assured of that's Descartes right at this point.

06 00 47 16 CC Okay.

06 00 47 20 CDR-EVA That's going in bag 400.

06 00 47 23 CC Okay; bag 400.

06 00 47 31 LMP-EVA Okay. Top section, Tony, is number 43. Pass on.

06 00 47 42 CDR-EVA Charlie.

06 00 47 46 CC Okay, Charlie. Is that 23?

06 00 47 49 LMP-EVA 43, 4-3.

06 00 47 51 CC Okay; copy.

06 00 47 52 CDR-EVA Okay. From this vantage - from this vantage point, Houston, I'd like to shoot a pan.

06 00 47 59 CC Have at it, John.

06 00 48 00 CDR-EVA It might be able to make some stereo - might be able to make some stereo with it.

06 00 48 29 CDR-EVA I tell you, this is a graphic illustration of a secondary from - from South Ray, though, and it'll show up good if I can bend over good enough to get it.

06 00 48 47 LMP-EVA Okay, Tony, the two - the double core is under my seat -

06 00 48 50 CC Okay.

06 00 48 51 LMP-EVA All finished. Hey, do you really want me to grab the rake, Tony? I got to go up and help John.

06 00 49 03 CC How you're getting that, Charlie.

06 00 49 06 LMP-EVA Say again.

06 00 49 07 CC Okay. Yeah, we'd like you to take the rake on up there.

06 00 49 12 LMP-EVA Okay. I'm putting it together now.

06 00 49 24 LMP-EVA Fred Haise gets a 6-months' supply for thinking of that - rake thing. That is really neat.

06 00 49 35 CDR-EVA I'll tell you one thing - we're sure up in the air.

06 00 49 39 LMP-EVA Yep.

06 00 49 40 CDR-EVA I told those guys at the VAB we were going to be 200 feet higher than they are. We're a lot higher than the VAB.

06 00 49 53 CC That makes a pretty good TV picture standing up there. The big eye is on you.

06 00 50 01 CDR-EVA Roger. I'm just trying to figure out - Dadgummit! Do you know where we landed? Charlie-Alfa 81!

06 00 50 11 LMP-EVA What?

06 00 50 12 CDR-EVA Charlie-Alfa 81. We're about 200 meters north of Double Spot.

06 00 50 21 LMP-EVA Yeah. There's Double Spot.

06 00 50 22 CDR-EVA Darn right.

06 00 50 23 LMP-EVA Exactly north of Double Spot, John.

06 00 50 25 CDR-EVA Well, I'll be doggoned.

06 00 50 28 LMP-EVA That's where the LMA says we're going to land.

06 00 50 31 CDR-EVA I knew we made some kind of a mistake (laughter).

06 00 50 36 LMP-EVA Man, this is tough going here.

06 00 50 39 CDR-EVA That is absolutely remarkable.

06 00 50 43 LMP-EVA Hey, John, did you make those little footprints here around in this stuff? Yes, I guess I did.

06 00 50 48 CDR-EVA No, sir. I didn't. I came across that ridge there, and I don't advise you to get down in there either.

06 00 50 56 LMP-EVA Yeah. This is steep. Okay. Where do you want this -

06 00 51 00 CDR-EVA On the rim, I think, Charlie.

06 00 51 01 LMP-EVA Why don't we get outside the rim? That would be definitely Descartes - right down here. Okay - -

06 00 51 05 CDR-EVA The object is to get the stuff that's been knocked out of the ground and landed on the rim.

06 00 51 10 LMP-EVA Yeah, I know it, but I thought that would definitely - we could say that would be definitely - okay, I'll sample right up here. That's a definite secondary right there, isn't it?

06 00 51 19 CDR-EVA Boy, I mean to tell you if that's not ..., I never saw one.

06 00 51 26 LMP-EVA Okay. This is -

06 00 51 27 CDR-EVA Hank Moore would love to see that.

06 00 51 30 LMP-EVA Yeah. Hey, let me take it easy now. I'm pooped.

06 00 51 37 CDR-EVA Yeah. Just slow down. Let me get the rake sample, Charlie. Get it.

06 00 51 43 LMP-EVA Okay. There's a lots of goodies right there on the inner rim.

06 00 51 48 CDR-EVA Yeah. Yeah. That's where I'll rake - right there. Okay?

06 00 51 53 LMP-EVA Okay. Don't fall into that ... Excuse me.

06 00 51 59 CDR-EVA Pretty good size, isn't it?

06 00 52 01 LMP-EVA Yeah. Here, let me have the shovel. Okay. I got it.

06 00 52 13 LMP-EVA That's a clod. That's what - that's an indurated clod. Here's some rocks. Good deal, boy. That's great. Hey, Let's fill this one up, and then - Hey, John, watch it. Is that okay for you?

06 00 52 32 CDR-EVA Wait a minute.

06 00 52 36 LMP-EVA Super. Got them every one in there.

06 00 52 40 CDR-EVA Okay.

06 00 52 41 LMP-EVA Okay. Real dust-covered, mostly centimeter size, Tony - about 15 frags - some smaller than that.

06 00 52 52 CDR-EVA I've already got my shovel full here, Charlie.

06 00 52 54 LMP-EVA Okay. Of the dirt?

06 00 53 03 LMP-EVA I hate to tell you this, but I think it's indurated regolith.

06 00 53 06 CDR-EVA Fine.

06 00 53 07 LMP-EVA Because I'm just breaking it up.

06 00 53 10 CDR-EVA Very friable, Houston. Like dust - dirt clods.

06 00 53 14 LMP-EVA Which is probably what it is.

06 00 53 17 CDR-EVA Want to get another one?

06 00 53 19 LMP-EVA Yeah. Can you try another one? You copy that, Tony?

06 00 53 25 CC Say again, Charlie.

06 00 53 28 LMP-EVA I don't think this - these are rocks. I think it's a - If they are, they are very friable. I think it's just indurated regolith.

06 00 53 38 CC Okay. We copy.

06 00 53 40 CDR-EVA Well, there may - there may be a rock or two in there.

06 00 53 44 LMP-EVA Wait a minute. You got to get them all to one corner, John. There you go. Okay. That's got it.

06 00 53 55 CDR-EVA Maybe some of them are rocks. Okay, Houston. That was three scoops, and we're not documenting this to the best of our ability, because I think we're standing too close to the rim here to -

06 00 54 09 LMP-EVA Down-Sun, I'd be - down-Sun, I'd be in big hole.

06 00 54 12 CDR-EVA If Charlie goes down-Sun to take the picture, we're in trouble.

06 00 54 15 CC All right. We can see that.

06 00 54 17 CDR-EVA It ought to be in the pan.

06 00 54 18 CC Right. We see it.

06 00 54 19 CDR-EVA The loc - the locator shot will be in the pan, and I'm going to shoot this - This is an up-Sun, after, of the rake sample, stereo.

06 00 54 31 LMP-EVA That was in bag 401, Tony.

06 00 54 34 CC Okay, 401.

06 00 54 37 LMP-EVA Yeah. Okay, Tony. You want us to get the - the - We can get the dense rocks here for the padded bags. There's plenty of them around, but they'll probably be out of South Ray. All these blocks that we see here came out of this secondary.

06 00 54 54 CDR-EVA Yeah.

06 00 54 55 LMP-EVA Every one.

06 00 54 56 CC Okay. We copy that. We'll collect the padded bags back near the Rover. There's no point in going back up there.

06 00 55 08 LMP-EVA Okay. Well, that's what we're going to do. I just wondered if those - if secondary was okay for you.

06 00 55 14 CC Okay. We're getting them to work it. We will need a second pan in the area of the penetrations there.

06 00 55 24 LMP-EVA I'll do that. Boy, isn't it loose? On the - on your - on your footing here, John, it feels like - feels like I'm really sinking in.

06 00 55 35 CDR-EVA Charlie, you really are. Boy, is this ever neat!
(Laughter) If I could just figure out some way
to keep my hands closed.

06 00 55 53 LMP-EVA Yeah. That's the hard part about it, isn't it?
You know, John, that black stuff is glass - on
those rocks.

06 00 55 57 CDR-EVA Sure it is. That's what I said.

06 00 55 59 LMP-EVA Yeah.

06 00 56 04 CC Okay, fellows, we'd like to get you packed up
there. We'll save the padded bags for later.

06 00 56 11 CDR-EVA Okay.

06 00 56 15 CC And your gyro is good. We won't need to torque it.

06 00 56 17 LMP-EVA I think we have enough rocks from the South Ray.

06 00 56 23 CDR-EVA Okay.

06 00 56 25 LMP-EVA I got to get one more view from up here. John,
I got to - I'll take the pan from right here.

06 00 56 36 CDR-EVA Okay. I'll go ahead and pack up, Charlie.

06 00 56 38 LMP-EVA Okay.

06 00 56 49 LMP-EVA Okay, let's see; how do I do this? f/11 at 74,
hmmmm - Click - click - click - click. Okay,
Tony. Do you want me to change the mags on the -
16? It's about empty.

06 00 57 15 CC That's affirmative.

06 00 57 16 LMP-EVA That kind of frames per second runs it through
there.

06 00 57 18 CC Right; go ahead.

06 00 57 20 LMP-EVA Okay, will do.

06 00 57 21 CC Should be mag R.

06 00 57 25 LMP-EVA Okay. Man, if I get this - top of this one in that picture - it's going to be a miracle.

06 00 57 44 LMP-EVA Okay, Tony. Doing this pan, I've moved about 2 feet downslope, so I don't know if things are going to match up too well or not.

06 00 57 51 CC Ah, we'll make it work.

06 00 57 55 LMP-EVA Okay. And, after that pan, I'll be leaving - I'll be leaving here with frame count 110.

06 00 58 02 CC Okay, Charlie; 110.

06 00 58 12 LMP-EVA You, dog, you!

06 00 58 14 CDR-EVA What are you talking about? Did you drop it, Charlie?

06 00 58 15 LMP-EVA Yeah, but I got it. Get downslope here, and it's a piece of cake.

06 00 58 20 CDR-EVA Yeah, it is.

06 00 58 22 CC And we'd like EMU check before you take off.

06 00 58 23 LMP-EVA ... I don't think it's going to -

06 00 58 29 CDR-EVA Okay. I'm reading 3.85. I have no flags. I'm down to 68 percent on the O₂. Make that 63 percent. No, 68 was right. And I'm on inbay between INTER-MEDIATE and MINIMUM cooling.

06 00 59 05 LMP-EVA Okay. I'm at 70 percent, clear flags, 3.85, and I got a - just out of inter - just out of MEDIUM - correction just out of MIN. I got it, John.

06 00 59 23 CDR-EVA Okay. I think the flact [sic] that we didn't run across any white soil may be significant around here.

06 00 59 38 LMP-EVA Tony what - how'd the metabolic rate look there?

06 00 59 45 CC Okay. Y'all look very good.

06 00 59 53 LMP-EVA Okay. Thank you. Okay. And as we leave Binko Crater, we bid a fond farewell.

06 01 00 06 CC Okay; and, John, we'll need a frame count from you.

06 01 00 08 LMP-EVA Okay, Tony.

06 01 00 13 CDR-EVA Okay. My frame count is 76, magazine Charlie.

06 01 00 19 LMP-EVA John, could you give me magazine Romeo?

06 01 00 22 CDR-EVA Yep.

06 01 00 24 LMP-EVA Hey, Tony. I think on this next one we ought to stop away from any boulders down at 5, and - and so we can get some Descartes.

06 01 00 40 CC Right, we're - -

06 01 00 41 CDR-EVA Is that where you got Romeo from, Charlie?

06 01 00 42 LMP-EVA Yeah. That's fine.

06 01 00 43 CC We agree that station 5's the key station now. We have a - a pad vector to get you to the - the crater that you called out on the way up, but it's up to you on what you think is the best place to be sure of getting Descartes.

06 01 01 00 CDR-EVA We've got you.

06 01 01 03 LMP-EVA Okay. We could move 40 feet - 50 meters downslope, and I think we'd have Descartes, but we'll - we'll - we'll look. Okay. Ready, John?

06 01 01 17 CDR-EVA Yeah. I've got the frame count. DAC's mag's R - and the bags we're skipping. Okay; DAC, f/8, 250.

06 01 01 27 LMP-EVA I've got to change that.

06 01 01 29 CDR-EVA Okay, going MODE switch to 1, Houston; and a TV-CCW.

06 01 01 35 CC Okay. That 50 meters downslope you described - Is that a blocky rim crater, or why do you think that is Descartes?

06 01 01 44 LMP-EVA Because there's no blocks around it at all.

06 01 01 48 CDR-EVA It's just an old subdued crater.

06 01 01 51 LMP-EVA It's got a few blocks around it. Tony, I can see that one downslope that you wanted us to stop at that's at station 5. It's - it won't be any trouble getting there, but if you give us a vector, that'll be certain.

06 01 02 09 CC Okay. The vector will be 352 heading and 17.

06 01 02 11 LMP-EVA John, look in the ... there. Do you see -

06 01 02 20 CDR-EVA Okay.

06 01 02 22 CC Does that look like the best bet to you? What we're looking for is a primary impact - -

06 01 02 28 LMP-EVA That seems to be about it.

06 01 02 30 CDR-EVA Charlie.

06 01 02 41 LMP-EVA Say again.

06 01 02 42 CDR-EVA What they're looking for is a primary impact crater at Descartes.

06 01 02 43 CC What we're looking for is a primary impact at blocky rim crater.

06 01 02 49 CDR-EVA Understand.

06 01 02 52 LMP-EVA Suppose we give you a primary impact with no block?

06 01 03 01 LMP-EVA Wait a minute, John. I can't find this seatbelt. There we go.

06 01 03 10 CC And we don't want one without blocks. It'll almost have to be blocky.

06 01 03 19 CDR-EVA Are you all ready to go, Charlie?

06 01 03 20 LMP-EVA Yes, sir. Strapped in. Let me turn the camera on.

06 01 03 23 CDR-EVA Okay; now watch my arm now. Okay. Don't hit my arm.

06 01 03 30 LMP-EVA Okay, wait a minute. I don't feel it - running.

06 01 03 50 CDR-EVA We'll have to get it next time.

06 01 03 55 LMP-EVA Must not have the mag in there right because it's not running.

06 01 04 01 CDR-EVA Can't fix it without getting out. Don't, don't. Let's - let's worry about that when we get to the station.

06 01 04 11 LMP-EVA Okay, Tony, the camera's not running this time. I'll fix it when we get down to 5. You won't miss much.

06 01 04 17 CC Okay; fine.

06 01 04 31 LMP-EVA And this is going to be sporty. See that string of - excuse me, John - see that string of secondaries in - in Stubby?

06 01 04 42 CDR-EVA Yeah.

06 01 04 43 LMP-EVA On the south flank of Stubby?

06 01 04 45 CDR-EVA Yeah.

06 01 04 48 LMP-EVA I think at 0.7; we are starting at 4052. Hey, what should our bearing back to the LM - bearing and range be back to the LM, Tony, when we hit that crater?

06 01 05 03 CC Okay, it'll be 3 - -

06 01 05 05 LMP-EVA The one we can't - we can't -

06 01 05 07 CC Right; it'll be 354 at 3.4.

06 01 05 16 LMP-EVA Okay. We're headed 354 and going - That thing is taking us straight for the LM, John. Downslope is easy.

06 01 05 25 CDR-EVA As long as the brakes hold out - -

06 01 05 26 LMP-EVA Yeah.

06 01 05 27 CDR-EVA It should be easy, Charlie.

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06 01 05 28 LMP-EVA Have you got the brakes on?

06 01 05 29 CDR-EVA Partially.

06 01 05 31 LMP-EVA Isn't that something?

06 01 05 32 CDR-EVA Have to.

06 01 05 33 LMP-EVA Yeah.

06 01 05 52 CDR-EVA Okay. What was the heading and distance for that -
to that?

06 01 05 54 LMP-EVA 354 for 3.4.

06 01 06 07 LMP-EVA You know, it didn't really - It was really not
apparent we were climbing this steep a slope.

06 01 06 14 CDR-EVA 354 for 0.4?

06 01 06 17 LMP-EVA 3.4.

06 01 06 19 CC Okay, that's the bearing and range that - -

06 01 06 20 LMP-EVA Okay, Tony, was that bearing and ran - was that
at stop 5?

06 01 06 24 CC Okay, the heading and distance - -

06 01 06 25 LMP-EVA Okay, stop 5. Roger.

06 01 06 28 CC - - is 352 at 0.7.

06 01 06 33 LMP-EVA Okay, we - we've got a 354 bearing back to the LM
right now, so we'll just keep on that.

06 01 06 38 CC Okay. Sounds good.

06 01 06 58 LMP-EVA Man, John. You're doing a great job. Okay, Tony,
coming back downslope 354 at 3.8 is about the same
stuff.

06 01 07 13 CC Okay.

06 01 07 17 LMP-EVA Okay. We're about to cross our tracks.

06 01 07 32 LMP-EVA We're going back down our tracks, Tony.

06 01 07 36 CDR-EVA Only way to fly, Tony.

06 01 07 37 CC I understand.

06 01 07 39 CDR-EVA Charlie, you said you were going to see some other tracks on the Moon.

06 01 07 43 LMP-EVA Yeah. That - that big crater I was thinking about is right back there - it looks like.

06 01 07 52 CDR-EVA No wonder we broke the pitch meter. Just as well we did.

06 01 07 55 LMP-EVA Yeah.

06 01 07 56 CDR-EVA Ya-ho-ho-ho-ho. Look at this baby. I'm really - I'm really getting confidence in it now. It's really humming like a kitten.

06 01 08 07 LMP-EVA Oh, this machine is super.

06 01 08 08 LMP-EVA Yeah.

06 01 08 13 CC Probably a good idea you couldn't see how steep it was going up.

06 01 08 18 CDR-EVA Darn right it was.

06 01 08 29 CDR-EVA Okay. I've got the power off, and we're making 10 kilometers an hour. Just falling down our own tracks.

06 01 08 41 LMP-EVA Hey, Tony. I'm keeping my eye out for a blocky rim one.

06 01 08 50 CDR-EVA Uh-oh.

06 01 08 59 LMP-EVA Almost spun out.

06 01 09 03 CDR-EVA How about this one right here, Charlie?

06 01 09 04 LMP-EVA Yep, that - that's it, John. That's a good one.

06 01 09 13 LMP-EVA Okay. It's stop 5. We're supposed to park at -

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06 01 09 16 CC 180.

06 01 09 18 LMP-EVA 180. Say again, Tony.

06 01 09 23 CC Roger. I was just saying 180.

06 01 09 25 LMP-EVA Say again.

06 01 09 30 LMP-EVA Roger.

06 01 09 35 LMP-EVA That doesn't look like a secondary, John.

06 01 09 38 CDR-EVA It doesn't look like one to me either. Well?

06 01 09 41 LMP-EVA It might be a primary impact, but I - I - I think those blocks are or - the rocks there are from South Ray. We'll - I think we ought to get a rake sample here.

06 01 09 50 CC How big is that crater?

06 01 09 55 LMP-EVA About 15 meters across.

06 01 09 58 CC Okay. Understand 15 meters.

06 01 10 03 LMP-EVA That's affirmative.

06 01 10 05 CDR-EVA Okay. We're parked right on the rim of it. We'll let you see.

06 01 10 08 CC Okay.

06 01 10 11 LMP-EVA The biggest - the biggest blocks we see, Tony, are about 50 centimeters, or bigger; and they're in the bottom and all over the crater - no cert - preferred orientation. Okay. We're parked at 174, 353, 5.9, 3.5, 100, 100 -

06 01 10 38 CDR-EVA Okay.

06 01 10 40 LMP-EVA Excuse me, John. 65, 65, 100 - 90, 105, off-scale low, and off-scale low - Wow!

06 01 10 58 CDR-EVA In the - in a hole?

06 01 11 01 LMP-EVA No, it's downslope for me over here.

06 01 11 03 CDR-EVA It is?

06 01 11 04 LMP-EVA Yeah.

06 01 11 16 CDR-EVA Me too, Charlie. Fact is, let's bring the Rover back up here.

06 01 11 23 LMP-EVA Well, I'm out - I'm not getting out again, and getting back in.

06 01 11 26 CDR-EVA No, I don't mean that. I mean let's bring the Rover back up here.

06 01 11 29 LMP-EVA Oh, you want to pick it up, huh?

06 01 11 30 CDR-EVA Yeah.

06 01 11 31 LMP-EVA Okay.

06 01 11 36 CDR-EVA Okay, now. We've got to swing it around.

06 01 11 48 CDR-EVA There we go.

06 01 11 50 LMP-EVA Okay.

06 01 11 51 CDR-EVA That's more like it.

06 01 12 12 LMP-EVA Didn't run.

06 01 12 13 CDR-EVA What did you say?

06 01 12 15 LMP-EVA Didn't run - the camera didn't run. X is still there. The film looks good.

06 01 12 29 CDR-EVA Okay. MODE switch to 2.

06 01 12 55 LMP-EVA Okay, now it's working.

06 01 13 16 CC Okay. We've got a picture.

06 01 13 23 CDR-EVA Got the Earth in the tube. Okay.

06 01 13 27 CC Okay. And while you're brushing off the LCRU there, make sure you do a good job. We notice it seems to be heating up.

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06 01 13 38 CDR-EVA I've been doing a good job.

06 01 13 40 CC Okay. We understand.

06 01 13 44 LMP-EVA I'll vouch for that, Tony; honest.

06 01 13 47 CC We believe you. Our best bet here at this crater is to look for - -

06 01 13 54 LMP-EVA Okay -

06 01 13 55 CC - - a rounded, as well as angular - the angular boulders are probably from South Ray. And maybe the rounded ones are - are working their way out of the regolith here. So that may be a cue to our - to our getting Descartes.

06 01 14 10 LMP-EVA Good point.

06 01 14 12 CDR-EVA Roger. Well, I'll tell you what. If we do a rake sample in the wall, would probably be our best bet.

06 01 14 20 LMP-EVA That's what I would like to do.

06 01 14 27 CC Okay. Let's try that.

06 01 14 33 LMP-EVA You know, John, looking back, I can't even see our tracks.

06 01 14 37 CDR-EVA They're back there - I guarantee.

06 01 14 39 LMP-EVA I know it. Man, we come a long way. I thought this thing was just right next door to us.

06 01 15 08 LMP-EVA That rake is sure a great way to get a lot of rocks - in a hurry.

06 01 15 14 CDR-EVA Yep, it sure is. Boy, I tell you, even South Ray looks like it's accessible. I'd - I'd hesitate to say, though. There may be blocks down there that won't quit.

06 01 15 27 LMP-EVA There's some big black ones. See those big black blocks there, John?

06 01 15 30 CDR-EVA Yeah.

06 01 15 31 LMP-EVA On - on the side of it. And there's some - there's some big white ones there, too. The black ones are the biggest.

06 01 15 37 CDR-EVA It almost looks like we could just go right down there and right up on South Ray, doesn't it? No, we couldn't (laughter).

06 01 15 42 LMP-EVA I don't believe they're going to let us, but it looks it. I agree with you.

06 01 15 46 CDR-EVA I don't think we could.

06 01 15 49 CC Judging by the blocks here, I sure don't know.

06 01 15 54 LMP-EVA Aw, Tony, this is - they aren't bad here. This Rover takes them like - I don't think we're going to need 40 minutes here, I'll tell you. We ought to spend some more time somewhere else.

06 01 16 13 CDR-EVA Let me get the rake sample here.

06 01 16 16 LMP-EVA Okay.

06 01 16 18 CDR-EVA f/11 and 11.

06 01 16 21 LMP-EVA We could go out to - Okay, go ahead, pick a place. I'll get the gnomon. You going to get it? Okay.

06 01 16 39 LMP-EVA Okay. Our little note here in the checklist, Tony, doesn't mean too much. We seem to be on a bench here that's about 50 meters wide, and then it's - and the slope here on the bench is only about 2 degrees - maybe 3 or 4 degrees - maybe 10 - no, about 5 degrees, I'd say. And -

06 01 17 02 CDR-EVA Houston, here's about a foot and a half across secondary - pri - looks like a primary that cut into the rim - the upper rim of this 10- or 20-meter sec - this - yeah, this 20-meter secondary. How about sampling out of the wall of that one?

06 01 17 27 LMP-EVA John, I don't think this is - this big crater is a secondary.

06 01 17 31 CDR-EVA That's what I mean. But this - -

06 01 17 33 LMP-EVA That little one is.

06 01 17 34 CDR-EVA This little bitty one is probably a primary, too because look how the - look at the glass on the bottom. Man, you've got to have velocity to do that.

06 01 17 42 LMP-EVA Yeah, I agree.

06 01 17 43 CC Okay, does it look like it knocked out any rocks?

06 01 17 44 CDR-EVA Charlie. Okay.

06 01 17 49 LMP-EVA Yeah, there is - -

06 01 17 50 CDR-EVA Yeah. I don't think the rocks that are there were there because of -

06 01 17 55 LMP-EVA Yeah, it does, John. There's some rocks right in that corner there, right by your footprint.

06 01 18 00 CDR-EVA Oh, yeah, right by my footprint.

06 01 18 03 LMP-EVA See that one right there - by the rake?

06 01 18 04 CDR-EVA Yeah.

06 01 18 05 LMP-EVA And here's one right in the very bottom. Why don't you get that scoop going? And I'll go over here and get a - get a locator.

06 01 18 16 CC Okay. Sounds like a good plan. And we'd like a documented sample of a glass-covered rock, if you can find one.

06 01 18 30 CDR-EVA Okay. Well, we've got several - We've already picked up a couple of beads for you, but we didn't document them.

06 01 18 55 LMP-EVA Now, that's a good bagfull.

06 01 18 56 CDR-EVA Yeah.

06 01 18 57 LMP-EVA One - one scoop.

06 01 19 00 CDR-EVA Want me to do it again?

06 01 19 02 LMP-EVA Well, we got a bagful.

06 01 19 03 CDR-EVA Notice the color of the material, Charlie, in the bottom of it - it's white. We get a kilo of soil.

06 01 19 11 LMP-EVA That's what this is. This isn't rocks.

06 01 19 14 CDR-EVA Friable soil?

06 01 19 15 LMP-EVA Yeah.

06 01 19 16 CDR-EVA That could be Descartes, Charlie.

06 01 19 19 LMP-EVA Hey, Tony, that rake soil - sample was in 332, and I just, by - with an experiment, pinched one of the rocks, and it all - it broke.

06 01 19 33 CC Okay. We copy that.

06 01 19 34 LMP-EVA It's probably going to be a bagful of soil when we get it back.

06 01 19 38 CC Well, that may still be Descartes.

06 01 19 44 CDR-EVA It may be.

06 01 19 46 LMP-EVA I think it is.

06 01 19 47 CDR-EVA The lower - the lower material in the - in the cra - in the crater is -

06 01 20 08 LMP-EVA Want - want another one?

06 01 20 10 CDR-EVA Yeah. Lighter albedo - much lighter albedo. And if I had my druthers, it's somewhere between the gray and the white out on the plains.

06 01 20 22 CC Okay.

06 01 20 24 LMP-EVA That's good, John. It's about a kilo.

06 01 20 25 CDR-EVA It's somewhere between the gray of the surface and the white material that we picked up out on the plains. About - and we got a bagful of most of that - under - from scooping underneath the rock samples.

06 01 20 40 CC Okay. And, after this, we'd like you to move to the rim of the main crater, and spend some time just describing the rocks you see, and then sample the rim.

06 01 20 52 LMP-EVA Okay. I think - okay. I think -

06 01 20 58 CDR-EVA There's one of those glass jobs, Charlie, right there.

06 01 21 01 LMP-EVA Where?

06 01 21 02 CDR-EVA Right there.

06 01 21 10 LMP-EVA I don't see it.

06 01 21 11 CC Okay. We'd like a documented glass sample, if you have a chance.

06 01 21 17 CDR-EVA That wasn't big enough to document.

06 01 21 19 CC Okay.

06 01 21 20 LMP-EVA But we'll look for a rock that's glass-coated, Tony.

06 01 21 22 CC Okay, fine.

06 01 21 27 CDR-EVA If we were to sample on the upslope side of this crater where it shield - I mean shielded toward South Ray and the wall - if - if - if it wasn't caused by South Ray, then - then we ought to be looking at the - the - the real Descartes.

06 01 21 51 CC Okay. That sounds like a good idea.

06 01 21 52 LMP-EVA That's a good plan.

06 01 22 03 LMP-EVA Hey, Tony - the - the - Here's a glass-covered one, John, right here.

06 01 22 08 CDR-EVA Okay.

06 01 22 09 LMP-EVA Remember that right by this - right by that footprint. Right where I stopped walking. Man, you're going to get me down in that crater.

06 01 22 19 CDR-EVA No, I'm not.

06 01 22 20 LMP-EVA I'm not going to get a down-Sun of that.

06 01 22 23 CDR-EVA I don't think you ought to.

06 01 22 24 CC No, let's forget the down-Sun.

06 01 22 25 LMP-EVA I'll get the cross-Sun, okay?

06 01 22 27 CDR-EVA Yeah. Now, the only rocks we see are really angular, and they're on this rim. And I - I guess the problem is - it was a cratering event was probably so long ago. There's just no - not even a hint of any ledges or bedrock in this rascal.

06 01 22 56 LMP-EVA John, why don't you take the rake right here in front of the - the - gnomon - I've already documented that area - and see what you get?

06 01 23 04 CDR-EVA Take the rake what, Charlie?

06 01 23 06 LMP-EVA And just right here in front the gnomon and see what you get. One scoop and - it might be -

06 01 23 12 CDR-EVA Okay.

06 01 23 13 LMP-EVA I got - I got the pictures.

06 01 23 16 CDR-EVA You do, huh?

06 01 23 17 LMP-EVA Yeah.

06 01 23 18 CDR-EVA Okay.

06 01 23 27 CDR-EVA I don't think you're going to get anything but soil. One or two.

06 01 23 31 LMP-EVA No, there's some rocks. Two.

06 01 23 35 CDR-EVA Yeah.

06 01 23 51 LMP-EVA Hey, there we go. Why don't you hold the bag and let me pour it in? Okay.

06 01 23 58 CDR-EVA Okay.

06 01 23 59 LMP-EVA I bet we'd be in a better position.

06 01 24 00 CDR-EVA Go.

06 01 24 12 LMP-EVA Well, we've got a few of those. Let me try one more scoopful.

06 01 24 17 CC Okay, do those look like clods, too?

06 01 24 23 CDR-EVA No, they don't. There is at least one of them that's glass-coated.

06 01 24 34 LMP-EVA Hey, there's some.

06 01 24 36 CDR-EVA These are whitish -type rocks, very small - They may have come from South Ray.

06 01 24 49 LMP-EVA Let's try one more scoop, John.

06 01 24 51 CDR-EVA Okay. There's one right under there. It looks like a good - a good samp - a good bet.

06 01 25 02 LMP-EVA Man, you can get a bunch of stuff with this rake. See, if this was - if this was from South Ray - -

06 01 25 10 CDR-EVA Hey, look at that -

06 01 25 13 LMP-EVA And all of those are rounded.

06 01 25 14 CDR-EVA I know it. That - Charlie points - the - the different characteristics of these rocks that we're just getting right now, and maybe that's the key is that all - they're more rounded than the South Ray crater rocks are.

06 01 25 30 LMP-EVA ...

06 01 25 31 CDR-EVA There are a few angular in there, but they - these are mostly rounded; and I see some little black glass on one, but they're mostly rounded, whitish rocks covered with dust, of course.

06 01 25 42 LMP-EVA These are a couple of good ones.

06 01 25 48 CC Okay. That sounds real good.

06 01 25 49 LMP-EVA Bag 334.

06 01 25 50 CDR-EVA Okay.

06 01 25 54 LMP-EVA That's bag 334, Tony.

06 01 25 57 CC Okay; 334.

06 01 26 01 LMP-EVA Houston, do you want us to go sample the rim of this thing again - some more?

06 01 26 06 CDR-EVA They want us to get a glass-coated one, and there's a good one right up on the -

06 01 26 08 LMP-EVA Okay.

06 01 26 09 CC Okay, did you get - -

06 01 26 10 CDR-EVA Let's go up there and get it.

06 01 26 11 LMP-EVA Okay.

06 01 26 12 CC Did you get your soil there?

06 01 26 15 LMP-EVA Do what? Huh? Say again.

06 01 26 18 CC Okay. You got your soil there?

06 01 26 22 CDR-EVA No. We didn't. I'll get a scoopful.

06 01 26 25 CC Okay. And you're doing so well inside the rim there, we'd kind of like you to stay inside the rim and just kind of work around and see what you can find.

06 01 26 35 LMP-EVA Okay. Let me get a sa - some soil here.

06 01 26 51 CDR-EVA Wait a minute, Charlie.

06 01 26 53 LMP-EVA This ain't - you really feel like you're on the
verge of instability, don't you?

06 01 26 59 CDR-EVA Yeah.

06 01 27 02 CC That's probably only because you are.

06 01 27 04 CDR-EVA I've got the gloves so dirty. There's a -
100 kilos. Okay. That's 100 kilos that's going
into bag 402.

06 01 27 15 CC Okay; bag 402.

06 01 27 16 CDR-EVA Hope you're able to document it with the T - TV,
because we've stepped all over it.

06 01 27 22 LMP-EVA Tony, these after pictures are going to be - on
this kind of terrain, you're - you - you're
bouncing so much trying to keep your balance, that
you just sort of obliterate whatever you've picked
up - the place you picked it up.

06 01 27 26 CC Okay. When you dig down there, you're not getting - -

06 01 27 39 CDR-EVA Okay. We'll go down about a f - wait a minute.

06 01 27 41 CC - - any of that white soil. Is that right?

06 01 27 43 CDR-EVA That's correct; we're not. I kicked some of it
away to see just how -

06 01 27 49 LMP-EVA Hey, John?

06 01 27 50 CDR-EVA Yeah?

06 01 27 51 LMP-EVA Here's an old, old rounded rock that's - that's
fractured, badly beat up. Let's - let's get that
one. Give me - Can you give me the - get your -
get your -

06 01 28 01 CC That's what we're looking for, Charlie.

06 01 28 03 CDR-EVA What, Charlie?

06 01 28 04 LMP-EVA I was going to say take a - take a picture of that.
This gnomon is worthless. It's against the stops.

06 01 28 17 CDR-EVA That one right there?

06 01 28 18 LMP-EVA Yeah. That one right there.

06 01 28 19 CDR-EVA Okay, I'll get it. I'll get a - cross-Sun.

06 01 28 23 LMP-EVA That's all we're going to be able to get.

06 01 28 26 CDR-EVA Well, it's - it's sort of an up-Sun.

06 01 28 29 LMP-EVA Man, I'm feel like I'm -

06 01 28 33 CDR-EVA I'll shoot these at 5.6, Houston. Stereopair up-Sun. You can doc - I can get the location all right.

06 01 28 40 LMP-EVA Oh, don't work at that, John.

06 01 28 42 CC Okay. We can get the location off the TV.

06 01 28 47 CDR-EVA Okay. Was an old rock, wasn't it? ... it crumbled to pieces.

06 01 29 01 CDR-EVA That was fruitless there.

06 01 29 05 LMP-EVA Get it - get that - that right there.

06 01 29 07 CDR-EVA I am. I'm trying to get upslope on it.

06 01 29 10 LMP-EVA Here let me - hand me I can get it.

06 01 29 14 CDR-EVA Careful, Charlie. There we go.

06 01 29 28 LMP-EVA Uh-oh. Okay. I got it.

06 01 29 32 CC Okay, and the white rock that you picked up and the ones you just have here, can you see any crystals in it?

06 01 29 40 LMP-EVA Yes, sir. I sure can. It's a bluish crystal, a couple of millimeters size.

06 01 29 49 CDR-EVA Bluish?

06 01 29 51 LMP-EVA Well, that's what it looked - Grayish maybe - and it's got - one corner of it's got a glass rind [?] on it about a cent - about half a centimeter thick.

06 01 30 03 CC Okay. We copy that.

06 01 30 08 LMP-EVA It looks like - it doesn't look like a breccia, Tony. It looks like a crystalline rock.

06 01 30 12 CC Outstanding. ...

06 01 30 13 CDR-EVA Yeah, it's got a lot of - it's fine grained - it seems to be a fine-grained crystalline rock anyway, the part that we can see. The particles in it are millimeter size, though. I see some millimeter-size sparklies flashing at me. That's going in bag 403.

06 01 30 33 CC Okay, 403.

06 01 30 34 LMP-EVA Hey, John, let's - why don't just - let's keep that ... - I'm having about strike out on this rake here. I can't - get a couple of little ones each time, but - -

06 01 30 43 CDR-EVA Okay.

06 01 30 44 LMP-EVA - - about it.

06 01 30 47 LMP-EVA Want to move on around there about 10 feet or so?

06 01 30 50 CDR-EVA Okay.

06 01 30 51 LMP-EVA Pick a spot. I'll follow in your tracks. You're sliding downhill about 2 inches every time you - I can't get going, here (laughter). There's a - Look at that glass-covered one right there, John.

06 01 31 12 CDR-EVA Okay. Let's get it, Charlie.

06 01 31 14 LMP-EVA Okay. I'll back off and get the - cross-Sun here.

06 01 31 26 CDR-EVA Yeah, I'll have to get an up-Sun here, or else do a lot of work.

06 01 31 34 LMP-EVA Gonna be just one rock and one bag here.

06 01 31 52 LMP-EVA Hey, Tony. We just picked you up a glass rin - lin - rind rock - at least a quarter of it's got glass on it, and it's so ra - it's so dust covered that it - -

06 01 32 09 CDR-EVA - - defies description.

06 01 32 10 LMP-EVA Defies description. (Laughter) Yeah.

06 01 32 12 CDR-EVA 404 is the bag number - -

06 01 32 17 CC Okay, bag 404.

06 01 32 19 LMP-EVA Y'all got us on the big eye?

06 01 32 21 CC We sure do.

06 01 32 24 LMP-EVA Yeah. They do.

06 01 32 25 CDR-EVA Close the top, Charlie.

06 01 32 30 LMP-EVA Okay. Let me try a rake here - let me get an after here.

06 01 32 32 CDR-EVA Get an after, Charlie.

06 01 32 33 LMP-EVA Okay. Got it. Here, let me rake up here. Here's some - these are either clods or - -

06 01 32 49 CDR-EVA Be careful, Charlie.

06 01 32 56 LMP-EVA Uh-oh. That was a whitish rock. That one probably came from South Ray. Wait a minute. Here - here's some good ones - dusty ones.

06 01 33 24 CC Man. It sure looks like a good thing we had that rake along.

06 01 33 26 CDR-EVA Yeah, most of those are either little rocks - -

06 01 33 30 CC Go ahead, John.

06 01 33 33 CDR-EVA Well, I don't - I don't - there's a round one, Charlie.

06 01 33 34 LMP-EVA Hey, there's a great one, John. There's a good rock right there.

06 01 33 37 CDR-EVA I don't think this is going to be a simple problem, even after you - -

06 01 33 45 CC We concur, John.

06 01 33 46 CDR-EVA - - you - -

06 01 33 47 CC We sure do.

06 01 33 48 CDR-EVA - - get the rocks back because they're so dark -
so darn - dark - it's 405.

06 01 33 53 CC Okay.

06 01 33 54 CDR-EVA Go in bag 405. That's a big round - round rock
that's dust covered. I see white streaks through
it, and I can't tell from the clasts showing
through that I can see whether it - it seems - no,
I don't know whether I can see any glass on it or
not. But it's a friable white rock, and it's
rounded.

06 01 34 16 CC Okay. We copy that.

06 01 34 17 CDR-EVA Going into bag 405 with Charlie's ric - with
Charlie's rake sample.

06 01 34 22 CC Okay.

06 01 34 24 CDR-EVA You see because there is so - so doggone many
craters around here, I mean - -

06 01 34 29 CC Right. Understand. We'd like you to find the
steepest slope that you can work on there, and
dig as deep as you can with that rake.

06 01 34 38 CDR-EVA Let me do that, Charlie.

06 01 34 40 LMP-EVA We were dig - we're on it right now, babe. I'll tell
you.

06 01 34 42 CC Okay, can you dig into the face of the slope a
bit?

06 01 34 45 CDR-EVA Let me dig. Let me - Charlie, let me do that.

06 01 34 49 LMP-EVA Okay. I'll swap with you.

06 01 34 53 CDR-EVA Hold the gnomon.

06 01 34 54 LMP-EVA Okay.

06 01 34 58 CDR-EVA Watch it now.

06 01 35 00 LMP-EVA Hey, how about right up here, John. Here's a deep - sleep - steep part, or right over there where we walked from. Where you going?

06 01 35 07 CDR-EVA On a steep slope.

06 01 35 08 LMP-EVA Okay, right to your left is a good one. Right where we been.

06 01 35 15 CDR-EVA Steepest is closest to the rim.

06 01 35 18 LMP-EVA That's right. Right up there.

06 01 35 21 CDR-EVA Man, you don't make much headway.

06 01 35 45 LMP-EVA Great job.

06 01 35 53 LMP-EVA Okay, Tony. We've gone vertically into the wall, about a foot, and it all looks the same. Occasionally, you see a white splotch.

06 01 36 07 CC Okay. Can you - will the rake pull out any rocks - in there? Take a rake sample down in the - the hole there.

06 01 36 19 LMP-EVA Just a minute. Hey, John, I tell you what. Let me get upslope.

06 01 36 28 CDR-EVA Move out of the shadow, Charlie. I can't see it.

06 01 36 31 LMP-EVA Okay, that - there you go.

06 01 36 33 CDR-EVA Whoop. One thing about being on a 20-degree slope. You can get down on your knees.

06 01 37 05 CDR-EVA Well, I - I think that's gonna be the name of the game until we get a -

06 01 37 17 LMP-EVA Looks like just indurated regolith, doesn't it.

06 01 37 20 CDR-EVA Uh-huh.

06 01 37 21 LMP-EVA Don't see any rocks. Here let me - let me do this.

06 01 37 35 CDR-EVA There's one.

06 01 37 36 LMP-EVA Yeah.

06 01 37 42 CDR-EVA There's some.

06 01 37 44 LMP-EVA Okay.

06 01 37 50 LMP-EVA Yeah, they're rocks all right. Going in bag 335,
three little ones, Tony.

06 01 37 54 CC Okay. We copy that.

06 01 37 56 LMP-EVA No, they aren't; they're clods. And they're clods,
not - not rocks.

06 01 38 03 CC Okay.

06 01 38 05 LMP-EVA But, anyway, 33 - 335, did I say 331, 335?

06 01 38 10 CC You said 335.

06 01 38 11 LMP-EVA Here, let me have the rake a minute. Let me try
something.

06 01 38 15 CDR-EVA Here you go.

06 01 38 16 CC Well, you think the rock concentration near the
surface is a lag surface, then?

06 01 38 27 LMP-EVA Apparently so because, in this - in this wall
here, we're not getting a thing.

06 01 38 32 CC Okay, why don't you take a soil right there - -

06 01 38 34 LMP-EVA And there looks like - -

06 01 38 35 CC - - fill up a soil bag.

06 01 38 37 LMP-EVA Okay. And there's less soil here - I mean less
rocks here than on the other side of the crater.
The side towards the Rover is - -

06 01 38 56 CDR-EVA - - is - this could be a south - south - South
Ray, course, that's downslope too.

06 01 39 04 LMP-EVA Now there is a pure - there are two rocks, right
there.

06 01 39 08 CDR-EVA Hey, Charlie, I got to put this one in your bag before I can get it.

06 01 39 11 LMP-EVA Okay.

06 01 39 15 CC And, we're going to have to press on after this sample.

06 01 39 20 CDR-EVA Yeah. Okay; 20 minutes to get back to the Rover.

06 01 39 27 LMP-EVA Oh, you need this, don't you?

06 01 39 30 CDR-EVA Yes.

06 01 39 32 LMP-EVA Get you a soil - they want a soil bag full. Hate to waste a bag on that one, but - -

06 01 39 39 CDR-EVA Okay. What? Let's put the - let's put the soil in there with the ...

06 01 39 41 LMP-EVA Okay.

06 01 39 42 CDR-EVA Bag 406 will have one rock in it and a soil sample from this low area.

06 01 39 50 CC Okay, sounds good.

06 01 39 55 LMP-EVA Let's fill up the bag.

06 01 39 56 CDR-EVA Okay.

06 01 39 59 LMP-EVA And, Tony, a lot of this soil is coming out from about 6 - 6 inches down - -

06 01 40 12 CC Okay.

06 01 40 13 LMP-EVA - - out of this crater. You know, John, I think if we got a running start straight at the Rover, we'd make it up the other side.

06 01 40 19 CDR-EVA ...

06 01 40 20 CC Go the other way.

06 01 40 22 CDR-EVA Let's go around the rim.

06 01 40 23 LMP-EVA Okay.

06 01 40 25 CC Okay, the plan back at the Rover is now we'd like John to take an LPM measurement and, Charlie, if you could sample around the rim there near the Rover and take both angular and round whatever you find.

06 01 40 38 LMP-EVA Okay.

06 01 40 39 CDR-EVA Sure will.

06 01 40 41 LMP-EVA Do they want - Okay.

06 01 40 46 CC Yep, we'd like an LPM. Incidentally, your magnetic field there is about 130 gammas back at the LSM.

06 01 40 56 CDR-EVA How is it at - how is it at the site measurement. Does it agree with that?

06 01 40 58 CC Okay. I believe it was about 20 gammas less, something like that 110 gammas.

06 01 41 02 LMP-EVA (Laughter)

06 01 41 03 CC Plunging pretty steeply.

06 01 41 07 LMP-EVA Hey, John. It's easier to go straight across. That was fun.

06 01 41 11 CDR-EVA I haven't had any trouble.

06 01 41 12 LMP-EVA Okay.

06 01 41 13 LMP-EVA I had a tough time walking up there, on the side - -

06 01 41 17 CDR-EVA I got big feet today, Charlie.

06 01 41 18 LMP-EVA - - like that. Uh-uh.

06 01 41 27 CDR-EVA Going 45 feet on an LPM re - (laughter) gonna put me over the edge here. I'm gonna go out at right angles to the Rover, around this crater rim, for this measurement, Houston. It may not be exactly 45 feet, but it'll be close.

06 01 41 39 CC Okay. That sounds good, John. And, Charlie, we'd like some fist-size samples here.

06 01 41 46 LMP-EVA Okay, we've got a ton of them. We'll get them for you.

06 01 41 51 CC Good show.

06 01 41 56 CDR-EVA Okay. Lots of luck with that LPM.

06 01 42 11 CC And, John, why don't you take a pan when you document the location of that LPM tripod. That'll take care of our pan.

06 01 42 20 CDR-EVA That's a good idea. All right, fine, good - good head.

06 01 42 23 LMP-EVA I already took one pan.

06 01 42 24 CDR-EVA Well, they want another one.

06 01 42 26 LMP-EVA Okay.

06 01 42 28 CDR-EVA Okay. The READ switch is going on. Not the READ switch, the - the ON switch, the power switch.

06 01 42 36 CDR-EVA MARK.

06 01 42 37 CC Okay. We got it. Charlie, where did you take your pan from?

06 01 42 50 LMP-EVA Hmmm, on the south rim of that crater.

06 01 42 55 CC Okay.

06 01 42 56 LMP-EVA About 10 feet be - to the 4 o'clock position of the Rover.

06 01 43 01 CC Okay, John. I guess we won't need a pan, if you can just get the LPM.

06 01 43 09 CDR-EVA All right.

06 01 43 31 CC Okay, John. A minute.

06 01 43 35 CDR-EVA Wait a minute; I'm deploying it.

06 01 43 38 CC Oh, I thought you gave a mark. All right. I understand.

06 01 43 39 CDR-EVA - - turning ...

06 01 43 40 CC I understand.

06 01 43 43 CDR-EVA Yeah, I did - for turning on.

06 01 44 05 CDR-EVA Hey, I got it out to the white line now.

06 01 44 10 CC Okay.

06 01 44 35 LMP-EVA Okay, Tony. I'm sampling right in front of the Rover. - about 10 feet. I got a fist-size rock out here.

06 01 44 41 CC Okay.

06 01 44 48 LMP-EVA It's captured in the old tongs. Was captured in the old tongs.

06 01 44 57 CDR-EVA Okay, that's aligned perfectly. Here we go.

06 01 45 10 CDR-EVA Okay. Now start your minute, Tony.

06 01 45 12 CC Okay. Will do.

06 01 45 42 LMP-EVA Okay. That rock's going in 336. It's a - a rounded rock and it's dusty, and all I can see is - is some streaks on it, Tony - white streaks.

06 01 45 53 CC Okay.

06 01 45 57 LMP-EVA Hey, John. Could you throw - throw me the bag that's under your seat. I'll get it. I'll get it. I'll get it.

06 01 46 03 CDR-EVA I'm about to - I'm gonna knock ... - -

06 01 46 05 LMP-EVA Well, I'll get it.

06 01 46 06 CDR-EVA It's under my seat?

06 01 46 07 LMP-EVA I thought so. The one that we were - -

06 01 46 09 CC Okay, John -

06 01 46 10 CC MARK.

06 01 46 12 LMP-EVA No, it's not there; it's under my seat. Excuse me.

06 01 46 15 CDR-EVA Okay.

06 01 46 26 CDR-EVA Okay. The READ switch is going on. 563, 415, 3 -
wait a minute. 563, 415, 356, 570, 424, 357, 571,
425, 357, off. Okay. The RE - the off - the
POWER switch is coming OFF.

06 01 46 58 CC Okay. Fine.

06 01 47 01 LMP-EVA Did you get those, Tony?

06 01 47 02 CC We sure did.

06 01 47 04 CDR-EVA Did you get those? I forgot to ask you. Okay.

06 01 47 07 CC And visors down.

06 01 47 08 CDR-EVA ... visors down. Hey, Charlie, where I tripped
over here is a lot of white rock.

06 01 47 21 LMP-EVA I got some over here, too. Boy, I'm going to grab
that one. That's a fresh, sharp, white rock,
Houston, that I have never seen the like of. Very
angular.

06 01 47 51 CDR-EVA Ouch. Boy, Charlie, look at this rock. That has
got to be plage.

06 01 48 04 LMP-EVA Whereabouts did you find it, John?

06 01 48 05 CDR-EVA Right down there in that - that hole - -

06 01 48 07 LMP-EVA Oh, yeah.

06 01 48 08 CDR-EVA - - with all that white rock - -

06 01 48 09 LMP-EVA Uh-huh.

06 01 48 10 CDR-EVA Look at these little crystals in it. No, that
couldn't be. A big, white, angular rock and it's -
but all the crystals in it are very small. That -
that is a crystal rock. We're gonna get that one.
That's the first one I've seen here that I really
believe is a crystal rock, Houston.

06 01 48 39 LMP-EVA Want to put it in a padded bag?

06 01 48 41 CC Outstanding - -

06 01 48 42 CDR-EVA I believe we'd have to break it in two, so - -

06 01 48 43 CC No, we don't need that in a padded bag.

06 01 48 54 CDR-EVA It's about 6 centimeters - 12 centimeters long, and it's got a head on it like - it looks like the head of a - maybe a viper or diamondback, if you lay it down flat. You won't have any trouble recognizing it. And it's white, and when I hold it up to the Sun, it has a greenish cast to it. A greenish-bluish cast.

06 01 49 24 CC Okay.

06 01 49 26 CDR-EVA Oh shoot! I see some - I see some striations in it, too. They may be my imagination.

06 01 49 32 LMP-EVA Okay, Tony. I've got two more documented samples in bag 33 - two more rocks documented in 337.

06 01 49 41 CC Okay, 337. And we're gonna have to press on here.

06 01 49 47 CDR-EVA Okay, I'm putting this rock under your seat.

06 01 49 51 LMP-EVA I'm in. Okay, John.

06 01 50 08 CDR-EVA ... I wouldn't do that.

06 01 50 31 LMP-EVA I don't blame that pitch meter for falling down. Man, I've fallen down twice. (Laughter) I'm deadly. The Rover wheels are covered with dust, John.

06 01 50 46 CC And, John, do you have a bag number for your white rock, or have you collected it yet?

06 01 50 52 CDR-EVA I made a grab sample out of it, Houston.

06 01 50 54 CC Okay.

06 01 50 58 LMP-EVA Too big for a bag, wasn't it, John?

06 01 51 00 CDR-EVA Yeah, it was too big for a bag.

06 01 51 01 CC Okay.

06 01 51 03 LMP-EVA It's - amazing how you can trip over - how you can be going along and trip over a rock, and I'm one of these guys that always looks down and it's - and still seem to be able to trip them going forward.

06 01 52 20 LMP-EVA Okay, Tony. The samples are complete here. I'm leaving with frame count number - looks like about 170, Tony. I'd better change mags before I start out on - we start out here. Over.

06 01 52 43 CC Okay. Sounds good.

06 01 52 48 CC Okay. And, while you're up there, you might adjust the DAC. Maybe you can get it running.

06 01 52 55 LMP-EVA I already did, and it's running. It'll be running.

06 01 52 57 CC Okay. Good show.

06 01 53 04 LMP-EVA John.

06 01 53 05 CDR-EVA Yes, sir.

06 01 53 06 LMP-EVA That is the best sample we've got.

06 01 53 07 CDR-EVA I know it.

06 01 53 10 LMP-EVA I'll tell you. That is a crystalline rock if I've ever seen a crystalline rock.

06 01 53 14 CDR-EVA First one today.

06 01 53 16 LMP-EVA Yeah.

06 01 53 17 CDR-EVA I ... (laughter) at least the first one you could say was one, maybe. ... - -

06 01 53 19 LMP-EVA That is a great rock. Okay, John, could you - when you get around there, could you give me a film mag, black and white?

06 01 53 30 CDR-EVA Okay. I guess we could - -

06 01 53 31 LMP-EVA Which one do you want me to use, Tony?

06 01 53 32 CC Call that one the "Great Young."

06 01 53 37 CDR-EVA Oh. Come on.

06 01 53 40 LMP-EVA It's not very big, but it's just a nice rock.

06 01 53 44 CC Okay.

06 01 53 46 LMP-EVA Yeah, it was made about - it looks like it's about 3 days old. No, it must be on the order of 4 billion.

06 01 53 57 CDR-EVA Which one do you want, Charlie?

06 01 53 59 LMP-EVA The black and - any black and white. It doesn't matter. Wrong pocket.

06 01 54 06 CDR-EVA Any black and white?

06 01 54 07 LMP-EVA Yeah, ain't but one - -

06 01 54 08 CDR-EVA Okay.

06 01 54 09 LMP-EVA - - magazine I.

06 01 54 10 CC Okay. I - -

06 01 54 11 CDR-EVA You already shot up a roll of black and white?

06 01 54 12 LMP-EVA Yeah. 170.

06 01 54 17 CDR-EVA Okay.

06 01 54 18 LMP-EVA Uh-oh. I got it. There you go.

06 01 54 27 CDR-EVA Okay. Start sliding it in the camera box. ... I got dust on it. *** put him *** we *** got the *** Baker 2.

06 01 54 51 CC Okay, we can - -

06 01 54 52 CDR-EVA Yeah, ...

06 01 54 53 CC - - see it works.

06 01 54 55 LMP-EVA Okay, Tony. Maga - yeah, magazine India.

06 01 54 59 CC Okay.

06 01 55 01 LMP-EVA And starting with frame count number - about number 3. I guess I fired off a couple.

06 01 55 07 CC Okay.

06 01 55 24 CDR-EVA Okay, we're ready to press here.

06 01 55 27 CC Okay, and just to make sure you didn't get any dust on that LCRU while you're working around there, we would like you to brush it off again. We're really heating up on that.

06 01 55 36 LMP-EVA It's clean.

06 01 55 38 CC Okay.

06 01 55 40 CDR-EVA It is clean.

06 01 55 43 LMP-EVA It's clean. Honest.

06 01 55 46 CC Okay. That's okay.

06 01 55 49 LMP-EVA Want to shut it down for a while?

06 01 55 55 CC No. That's all right. And, Charlie, on your LRV read-outs, we won't be needing VOLTS, so why don't we just leave that switch in AMPS?

06 01 56 05 LMP-EVA Okay. Got it in AMPS.

06 01 56 14 CC Okay.

06 01 56 16 LMP-EVA Okay. It - it's dusted. Going downhill, it doesn't get near as much dust as it did coming up - for some reason.

06 01 56 27 CDR-EVA Maybe that's because (laughter) it was 4 kilometers one way and half of one the other. That's probably the reason.

06 01 56 37 LMP-EVA I hope I can get back in this beauty here now.

06 01 56 42 CDR-EVA You're in.

06 01 56 48 LMP-EVA Okay. Dadgummit.

06 01 56 53 CC Okay, we've got the - the - -

06 01 56 55 CDR-EVA Don't - don't do anything with the -

06 01 56 57 CC - - magnetometer reading. Station 5 there is 125 gamma down; the ALSEP site was 230 gamma - correction - up; the ALSEP site was 230 gamma down; and Spook was 180 down. Hey, John. Do you have switch position 1?

06 01 57 16 CDR-EVA No, it's - no, I'm going to 1 right now.

06 01 57 20 CC Okay. Good show.

06 01 57 21 CDR-EVA ... the TV?

06 01 57 24 CC We thought maybe you were getting on - -

06 01 57 27 CDR-EVA TV's on CCW.

06 01 57 28 CC Okay.

06 01 57 42 CDR-EVA TV is CCW. Heading for 6.

06 01 57 49 CC That was a very interesting magnetometer reading.

06 01 57 50 CDR-EVA Yeah. I didn't think I'd ever - Well, give you a good alignment and read the numbers right, but (laughter) other than that I -

06 01 58 07 CC And, John - -

06 01 58 08 CDR-EVA Okay. Station 6 - -

06 01 58 09 CC - - We'll need your ...

06 01 58 10 CDR-EVA - - should be about - You'll have to wait. Oh, no, I can see it. It's - 96, Tony, 96.

06 01 58 19 CC Okay. Very good.

06 01 58 36 CC And, Charlie, DAC on as you start back - -

06 01 58 40 CDR-EVA Okay. We're in and we're on our way.

06 01 58 43 LMP-EVA It's already on.

06 01 58 45 CC Okay. That station 6 will be completely nominal.

06 01 58 46 LMP-EVA Okay. Ahh. Okay. This is 3.60 at 2.9. Why don't we just make it 3.5 at - at 2.9.

06 01 59 01 CDR-EVA Okay, Charlie. I want to follow my tracks down this thing.

06 01 59 03 LMP-EVA That's fine.

06 01 59 08 CDR-EVA Okay, we're riding at idle, and she's picking up speed.

06 01 59 12 CC Okay. And we would like station 6 at the lowest terrace on Stone Mountain and a blocky crater, if possible.

06 01 59 27 CDR-EVA Understand. The lowest terrace and a blocky crater.

06 01 59 29 CC Roger.

06 01 59 32 CDR-EVA Charlie, where do you think Stone Mountain takes off in the - -

06 01 59 37 LMP-EVA ... I can see a place down here. See that - off to the left, John, by our - where your tracks came up there - -

06 01 59 43 CDR-EVA Yeah.

06 01 59 44 LMP-EVA There's a pretty big crater, with some blocks around it. I think that might do.

06 01 59 55 LMP-EVA Hey, Tony, where do you estimate a - one would be?

06 02 00 03 CC Okay. You'll be at - -

06 02 00 04 LMP-EVA Look, there's one right down there, John; 12 o'clock, there's one, about 200 meters.

06 02 00 11 CDR-EVA Twelve o'clock, 200 meters?

06 02 00 12 LMP-EVA Yeah.

06 02 00 14 CC Okay. You'll be in the neighborhood and range of 3.0 or a little bit greater.

06 02 00 26 CDR-EVA Okay. I'm just glad that we don't have that - watch the Rover go TV. Or (laughter) I don't think we'd be going.

06 02 00 41 LMP-EVA Hey, Tony, look in that -

06 02 00 45 CDR-EVA Where is it, Charlie?

06 02 00 46 LMP-EVA Just to the left there, John. See those blocks over there in that crater.

06 02 00 50 CDR-EVA Say, where.

06 02 00 51 LMP-EVA Okay, you're 10 o'clock position.

06 02 00 54 CDR-EVA That big block there?

06 02 00 55 LMP-EVA No, well, on over farther than that.

06 02 00 56 CDR-EVA You want to take off and go that way now? I can't see nothing. I got my blinder down.

06 02 01 05 LMP-EVA Oh, I'm sorry. Okay, now hook a left. No, not through this crater. (Laughter).

06 02 01 10 CDR-EVA Yeah.

06 02 01 13 LMP-EVA Right on the other side of this crater.

06 02 01 14 CDR-EVA Kind of expect trouble from backseat drivers.

06 02 01 16 CC Yeah, I've noticed that.

06 02 01 18 LMP-EVA Well, that's only 3 - that's only 3.3, John. Why don't we go down a little bit further.

06 02 01 24 CDR-EVA This one right here?

06 02 01 26 LMP-EVA Yeah, that one's only 3.3 down. They think about 3.0. Turns out it's not a crater at all anyway. It's just a swale.

06 02 01 39 LMP-EVA Yeah. Really some interesting angular blocks here. Okay, Tony. It's still apparently - well, it's - we veered - we're steering about 3.40 now, and - we're getting some angular blocks and cobbles just as we described before - 20 percent of the surface, perhaps.

06 02 02 13 CC Okay. The nominal station 4 would be on a bearing of 3.56. But you're going to have to use - -

06 02 02 21 LMP-EVA Okay. That's pretty good.

06 02 02 22 CC - - your own judgment.

06 02 02 30 LMP-EVA We'll veer over that - -

06 02 02 31 LMP-EVA Okay.

06 02 02 32 CDR-EVA 3.56 at what, Charlie?

06 02 02 33 LMP-EVA At ... says.

06 02 02 34 CC At 3.0.

06 02 02 39 LMP-EVA 3.0. Okay?

06 02 02 54 CDR-EVA Like driving a camel.

06 02 02 55 LMP-EVA Yeah. And, Tony, over on - Smoky, it doesn't appear - I can see the lineations over there, but the - they are more widely spaced than - than on Stone here and mostly parallel to the Cayley. Bear - bear left a little bit, John, if you can. There's a - okay, we're at 3. We can start looking for a place now.

06 02 03 32 CDR-EVA Here's the bench right down here, I think.

06 02 03 33 LMP-EVA Yeah, I see it.

06 02 03 34 CDR-EVA Did you?

06 02 03 35 LMP-EVA Yeah. Now if we drive along the bench, maybe we'll find a blocky crater.

06 02 03 51 CDR-EVA Want to go right or left?

06 02 03 53 LMP-EVA Left. Because then station 8's on over to the left.

06 02 04 05 CDR-EVA Look at that block there, Charlie.

06 02 04 06 LMP-EVA Where?

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06 02 04 07 CDR-EVA That big block right over there.

06 02 04 09 LMP-EVA I know it. That's the one I described. It's a giant size.

06 02 04 21 LMP-EVA Okay, Tony. We're at 3.0 at 3.55. Driving west, along a bench, trying to find a blocky crater.

06 02 04 32 CC Okay. Sounds good.

06 02 04 43 LMP-EVA Passing these big glass-splattered rocks that apparently came out of South Ray. Think every one of them did, frankly.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 01 12 XX BEGIN LUNAR REV 37

06 01 29 25 CC Casper, Houston.

06 01 29 31 CMP Hello there.

06 01 29 33 CC Hello. Did you have a busy rev?

06 01 29 38 CMP (Laughter) Yeah. That was a little tight. I went to a - to a - half degree per second, and we made it. Seems like I had some things I needed to bring you up to speed on. Let me see if I can find out where I wrote them down.

06 01 30 14 CMP I feel like one of the most - one of the most interesting things I've seen on the back side here is in the crater Guyot. Up on the side, there's a big hole, and it sure looks like there is some big, black blob running out of it.

06 01 30 28 CC What's the name of that crater again, Ken?

06 01 30 33 CMP Guyot. Just to the north and west of King.

06 01 30 40 CC Roger. Copy.

06 01 31 39 CC Ken, do you have any film reports for us?

06 01 31 47 CMP Oh. Let's see. Magazine Papa Papa, I've got 77 showing, and - I'll get you that 35-millimeter mag here somewhere.

06 01 33 00 CMP Okay. On 35, magazine Zulu Zulu, I'm reading 22 frames. I had to retake one of the frames; I knocked my flashlight, and it came on while I was in the middle of one of the sequences.

06 01 33 16 CC Roger. Understand. And if you'll give us AUTO on the HIGH GAIN and ACCEPT, we'll send you up a state vector.

06 01 33 27 CMP You have AUTO and ACCEPT.

06 01 35 00 CMP And the PAN CAMERA POWER is on.

06 01 35 06 CC Roger.

06 01 35 38 CC Casper, the computer is yours.

06 01 35 44 CMP Okay. Thank you.

06 01 36 38 CC Casper, we're ready for POWER OFF on the PAN CAMERA.

06 01 36 46 CMP Okay. I'll get that in just a second.

06 01 37 21 CMP Okay. The POWER is OFF.

06 01 45 06 CC Casper, you're awful quiet.

06 01 45 13 CMP Yeah. I'm doing a little housecleaning.

06 01 45 19 CC Roger. And I hear your radio running while you're doing it.

06 01 45 27 CMP Oh, yeah. And this one is kind of appropriate. Are you familiar with Mr. Holst's suite "The Planets?"

06 01 45 37 CC No, I'm not.

06 01 45 42 CMP Well, seemed that was an appropriate thing to bring along.

06 01 45 46 CC Roger.

06 01 50 31 CMP You know, Hank, you wouldn't think you could lose something in only 12 feet. Right now, I've probably got more things lost than I've got found.

06 01 50 43 CC (Laughter) Roger.

06 01 50 56 CMP Somewhere, I lost the ring sight that goes on the TV camera and the Hasselblad. And it's probably wherever I put it. (Laughter) But, unfortunately, I just don't happen to know where that is. I guess that's really the only piece of operating equipment that I've misplaced. Well, that's pretty good, considering the shambles that this place generally stays in.

06 01 51 53 CMP It's really puzzling. I've been sitting here - one of the reasons I'm not saying an awful lot is I'm trying to get some kind of an idea in my head as to how you describe the differences between the front and the back materials. And that's really hard. Because every time you look for a - an objective thing, you really kind of find that there's a lot of similarities, when you get down to the details. It's not clear that the back side is - would be that much different from the front if we put a few mares in there and a couple of - of the big rilles.

06 01 52 47 CMP One of the things that I noticed about - most of the craters on the back side, the larger ones - even the ones with the steep interiors - do not have any kind of a - a block ejecta around the outsides. You know. I shouldn't say none, but it's very seldom - You have to stop and look for each block. But there are a few craters like - Chaplygin, and - a couple like that that - in fact, have large blocks around the outside. King is another one that has - The outer flanks of King look very much like the central feature in the interior.

06 01 53 51 CMP And I got North and South Ray again and -

06 01 53 57 CC John and Charlie are at station 5 now, Ken.

06 01 54 03 CMP Okay. I guess I really can't say I see them.

06 01 54 12 CC They're packing up to move on down to station 6 now.

06 01 54 20 CMP Okay. I can see one, two, three distinct layers and it looks like several streams of material that go from the interior of South Ray over to - One of them points out, goes in South Ray and over the lip and down the outside. And it points over towards Baby Ray. And I'm trying to look at the material - All those things we said we could see, all those lineaments and things that we looked at back in the furrow of Descartes just don't show, Hank.

06 01 54 56 CC Roger.

06 01 54 58 CMP And I'm looking down into the floor of Dollond T, and it looks like Dollond T has two different units: one that kind of floods in from the west - looks like it sort of fills the floor there. All that stuff that we talked about and all those things we looked at on the plotter are apparently below the resolution of what I can see with these binoculars. And, in general, as the Sun comes up, my first impression at the lower Sun was that the material to the - of Stone and Smoky were the same and that the Descartes furrowed material was also part of the same thing. As the Sun angle comes up, it starts to change its character a little bit, and it's looking more like the plotter photos.

06 01 56 38 CC Roger. It sure seems that the Sun angle really affects what - what you're able to see. And - I guess you're about ready to look at Alphonsus. Is that correct?

06 01 56 53 CMP That's correct.

06 01 57 26 CMP Okay. We're just coming up on Albategnius and Klein now. Boy, I wish we could get a couple more of those - forward oblique photo passes. That was the one time when the windows were really pointing in the direction you'd like to have them. Other than that, you have a permanent crick in your neck.

06 01 58 14 CMP I've looked at Alphonsus on quite a few of our revs; and, at the lower Suns, there was absolutely no - nothing I could say about dark halos around those

little craters. Now, this time, I look at them, and there's a very obvious dark halo. It looks exactly like the dark halos you see around the two craters to the south of Theophilus. I've looked for some topographic or - or surface feature that might be different between the northern and southern halves of Alphonsus, and I've had absolutely no luck at all with that. I see now one, two, three distinct, dark halo areas and probably a fourth one. The rim of Alphonsus and the rim of Ptolemaeus are inseparable - where I am right now. I haven't quite gotten to it yet. The long, north-south trending lineament that runs through Alphonsus looks just like the photographs. It does indeed run up there, and it runs through the wall, and looks like it's an extension of the little crater chain that runs through Ptolemaeus. Halley fill in the floor of Ptolemaeus looks just like it does in Alphonsus. I don't see any - any really significant difference. The only thing I can say about the dark halo areas in Alphonsus - is that - Well, I can't get the binoculars on them because I can't get close enough to the window.

06 02 00 18 CMP

If you remember that one we looked at the blowups of, I'm looking at that now, and - Yeah, there's a slight albedo difference or a darkening of the material around the - It doesn't look any different than any other crater down there. It's filled in on the western flank. It has a slightly raised rim around the eastern side. It's very subtle. It looks very subdued. It looks just like all the rest of the craters that you see all over the rest of the Moon. Nothing significant about it - except in its setting. I really don't see any relationship between Davy and Davy's chain with any other feature that shows in either Ptolemaeus or the surroundings. The main token - I can't even get over far enough to take a good look at - at Alpetragius. ... is just about out of the field of view. And one thing I am gonna try to take a look at, and I don't know if we have enough Sun yet, and I'm gonna use these light level - red and blue filters, and take a look at Lassell C. And see whether or not there's any enhancement that's comparable to what we've seen with the photographs with the red and blue filters.

06 02 02 20 CMP And just looking at these things directly through the filters, you don't - you don't see anything there at all. I didn't really think you would, but I thought it was an interesting thing to try.

06 02 02 37 CC Roger. Copy.

06 02 02 38 CMP And I can see a lot of the - that little crater that's out to the west of Lassell C, the one that looks like it has a little cone ***, is very obvious now that the Sun's come up higher; and it's - it does look a little different, but there's so many of these little craters and little mountain things that stick up through the floor of the mare that it's not real obvious that that's anything out of the ordinary.

06 02 03 13 CC Can you see the little bright ray there?

06 02 03 19 CMP Say again.

06 02 03 21 CC There should be a little bright ray, I think. Isn't it? Near the suspected dark cone?

06 02 03 31 CMP I didn't see any bright ray around it. No sir.

06 02 03 43 CMP And you can see all the Fra Mauro area now. And Rima Parry system stands out, and you can see Parry and Bonpland. And most of the highlands material that's over to the east of - of Fra Mauro itself all has the same appearance as though it's - belongs to the same pattern.

06 02 04 35 CC You ought to be approaching the terminator now. Is that right?

06 02 04 41 CMP Yes sir.

06 02 04 54 CMP And I have been rather impressed with the fact that, in most of these little ... or rilles, in the low Sun, it appears to me that the - -

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 02 05 06 LMP-EVA Hey, here's a crater here, John, that's about
10 meters, that - fairly blocky rim, angular.
Want to stop here? It's a secondary on this side.

06 02 05 19 CDR-EVA Yeah. What do you think?

06 02 05 21 LMP-EVA Tony, it's a secondary. We're at 357 at 3.1, and
we got a secondary that's fairly blocky rim.
There's one up just to the up - a little upslope
from us that might be better. But there's not as
many blocks on the rim. Same size crater.

06 02 05 44 CC Okay; we'd like some more blocky ones.

06 02 05 51 LMP-EVA Okay, I think it's a secondary.

06 02 05 53 CC Right, but it might - -

06 02 05 54 LMP-EVA Okay, you can park a 180 here, John.

06 02 05 55 CC - - have punched through.

06 02 05 59 CDR-EVA Okay, but - I can't park 180. If I park 180, we'll
be downslope from it.

06 02 06 07 LMP-EVA No, the crater's over to the left.

06 02 06 08 CDR-EVA I know where the crater is.

06 02 06 10 LMP-EVA Oh.

06 02 06 17 LMP-EVA Why, don't you just park north? I can point that
antenna north.

06 02 06 23 CDR-EVA Okay.

06 02 06 24 LMP-EVA You ought to get over here to the right a little
bit so the TV won't be looking into the Sun.
Okay, this is good; yeah.

06 02 06 37 CDR-EVA Now I'll just swing around and point it north.
How will that be? There.

06 02 06 45 LMP-EVA That's great.

06 02 07 00 LMP-EVA Good show.

06 02 07 01 CDR-EVA Okay.

06 02 07 21 LMP-EVA Okay, Tony; 180, 357, 6.7, 3.1, 100, 95; amps 0, 0 - maybe - well, maybe 2 amps each. Bats are 95 and 110; off-scale low, off-scale low, and off-scale low, off-scale low. Over.

06 02 07 31 CC Okay; we copy that, and verify DAC off.

06 02 07 38 LMP-EVA Soon as I get out.

06 02 07 39 CC Okay, and we'll also need EMU checks here.

06 02 07 47 LMP-EVA Okay, I don't have any flags; I can't see my quantity.

06 02 07 56 CDR-EVA You got about 65 percent.

06 02 07 59 LMP-EVA Sixty-five percent and - my pressure's good, and I'm just - I haven't changed my cooling.

06 02 08 12 CC Okay.

06 02 08 13 LMP-EVA Mmmm.

06 02 08 16 CDR-EVA Okay. Now this is harder ...

06 02 08 18 LMP-EVA It is.

06 02 08 19 CDR-EVA Boy, Charlie.

06 02 08 20 LMP-EVA It is.

06 02 08 21 CDR-EVA This is ... hard ... - -

06 02 08 22 LMP-EVA It's a lot harder.

06 02 08 23 CDR-EVA Yeah, I didn't - we didn't sink near - Of course, we're not standing on the rim of a crater. But this is harder, because we're just sort of bouncing here.

06 02 08 31 LMP-EVA Yeah, it's a lot more - Tony, the regolith character - as John said, it's really changed.

06 02 08 41 CDR-EVA Okay, let me get the -

06 02 08 44 LMP-EVA When we walk, we don't bounce as much - I mean, we don't sink in as much.

06 02 08 50 CDR-EVA *** at 2.

06 02 08 59 CDR-EVA ... - Charlie -

06 02 09 05 CC Okay; we've got a picture.

06 02 09 13 CDR-EVA Roger. And you hardly got any dust on you, but I'm going to do you a favor and dust you off.

06 02 09 20 CC All right.

06 02 09 31 CDR-EVA What you doing there, Charlie?

06 02 09 33 LMP-EVA *** what this rock's made out of. I'm trying to get a fresh surface.

06 02 09 38 CDR-EVA I wouldn't do that. It's not worth doing.

06 02 09 54 CDR-EVA *** help you there. That okay?

06 02 10 00 CC Ah, thank you much there, John.

06 02 10 01 CDR-EVA Man, that is some rock.

06 02 10 05 LMP-EVA That matrix there's pure white, John, with black pheno - phenocryst in it. It might be clast. It might be a breccia. And it's got some lathlike crystals in it.

06 02 10 29 CDR-EVA Look at that!

06 02 10 31 LMP-EVA That's the one I'm talking about. See, I just broke that open.

06 02 10 34 CDR-EVA Yeah, that's a two-rock breccia. Let me get a bigger piece of it, Charlie.

06 02 10 37 LMP-EVA I think - Okay, I don't know whe - You can't whack it off.

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06 02 10 40 CDR-EVA Too hard to whack?

06 02 10 41 LMP-EVA Yeah, I've whacked about five times, as hard as I could.

06 02 10 44 CDR-EVA Okay, Houston, it has a white matrix with square clasts and elongate clasts in it.

06 02 10 50 CC Okay, sounds good.

06 02 10 51 CDR-EVA That - that might be - and it's round - and it's rounded, too.

06 02 10 57 CC Very good, and we understand it's a two-rock breccia.

06 02 10 59 LMP-EVA Looks like some more of them right down here, John, that are - that are sample - -

06 02 11 03 CDR-EVA That is correct.

06 02 11 05 LMP-EVA - - that are sample size.

06 02 11 08 CDR-EVA Okay, let's get some of those.

06 02 11 10 LMP-EVA We only got 20 minutes here. I'll start the pan.

06 02 11 15 CDR-EVA Okay.

06 02 11 20 CC And, John, we'll need an EMU check.

06 02 11 26 CDR-EVA Okay. I'm reading 385, and - no flags.

06 02 11 43 CDR-EVA Every time I read my oxygen gage I, get a - (laughter) get an earful of orange juice.

06 02 11 48 LMP-EVA Yeah, mine, too.

06 02 11 53 CDR-EVA Fifty-eight percent, and I'm on - between INTER-MEDIATE and MINIMUM cooling.

06 02 12 03 CC Okay; we copy.

06 02 12 07 LMP-EVA Okay, pan's complete, Tony.

06 02 12 09 CC Very good.

06 02 12 11 LMP-EVA *** break - grab the gnomon, John, and we - How about a set of tongs and a shovel? That ought to be good.

06 02 12 18 CDR-EVA Think that ought to work?

06 02 12 19 LMP-EVA Yeah.

06 02 12 21 CDR-EVA Okay, that'll probably save us some energy.

06 02 12 25 LMP-EVA Yep; think we might need it. Guess what?

06 02 12 29 CDR-EVA What?

06 02 12 30 LMP-EVA Look at that. *** the wheels.

06 02 12 34 CDR-EVA It is?

06 02 12 35 LMP-EVA Yeah. That's the gnomon stick. See the legs?

06 02 12 38 CDR-EVA Yeah.

06 02 12 39 LMP-EVA They're still in the bag.

06 02 12 41 CDR-EVA Houston, you got any recommendations there?

06 02 12 44 CC Yeah, I think you ought to just use - your scoop or something for a gnomon.

06 02 12 53 CDR-EVA See what happened?

06 02 12 55 CC No. We can't see it now - -

06 02 12 56 LMP-EVA Pulled it right out of there.

06 02 12 57 CC - - but I understand exactly what you mean.

06 02 12 58 CDR-EVA You blew it.

06 02 13 01 LMP-EVA Okay, I got the wand, and the legs stayed in the bag. Okay, give me a shovel, John. We can use the scoop.

06 02 13 10 CDR-EVA Okay; well, we can use the shovel if - Where - where do you want to go?

06 02 13 15 LMP-EVA I don't care. Anywhere is fine. This looks like a - Here's a nice little cracked one right there.

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06 02 13 20 CDR-EVA Yup.

06 02 13 21 LMP-EVA These are angular - there's some angular and rounded rocks right there.

06 02 13 23 CC Just pick anything in the picture for scale. - -

06 02 13 24 CDR-EVA - - ...

06 02 13 25 LMP-EVA Okay.

06 02 13 26 CC All we'll lose is the vertical.

06 02 13 31 CDR-EVA Okay?

06 02 13 32 LMP-EVA Okay. You can stick the tongs in there, John.

06 02 13 35 CDR-EVA Good.

06 02 13 36 LMP-EVA It'll go in the ground. I tried that a minute ago. It worked great. I don't see why I'm doing a down-Sun - but I'll do it.

06 02 13 53 LMP-EVA Hey, Tony, can you get a locator from the TV on this sample?

06 02 13 56 CC I sure can. We've got it now.

06 02 13 59 LMP-EVA Just pan by it. Okay; thank you.

06 02 14 27 LMP-EVA Okay.

06 02 14 29 CDR-EVA Excuse me.

06 02 14 36 LMP-EVA Okay.

06 02 14 37 CDR-EVA Okay, that's going in bag 407. It was some soil and some dirt, a rounded rock - But wait a minute, Charlie, let me get a - of that.

06 02 14 45 LMP-EVA Okay. Okay.

06 02 14 53 CDR-EVA Let's grab this angular one next.

06 02 14 55 LMP-EVA All right.

06 02 14 57 CDR-EVA Okay?

06 02 14 58 LMP-EVA Yep.

06 02 15 00 CDR-EVA No, now - Wait. Charlie!

06 02 15 02 LMP-EVA What?

06 02 15 03 CDR-EVA Let me get it with the tongs.

06 02 15 06 LMP-EVA Leaning on that shovel is easy.

06 02 15 16 LMP-EVA Might be the same kind, John, that you picked up on the way there.

06 02 15 21 CDR-EVA Yeah.

06 02 15 23 LMP-EVA *** won't - get the sack there.

06 02 15 29 CDR-EVA Maybe you can.

06 02 15 30 LMP-EVA This is - partially sacked. There we go. You got it.

06 02 15 33 CDR-EVA Okay, that - Get the after. Got it. 408, Houston, is the bag number.

06 02 15 52 LMP-EVA Now, I'll swap you.

06 02 15 55 CDR-EVA Why don't you get a soil sample? ... - -

06 02 15 57 LMP-EVA Okay; that's a good idea.

06 02 15 59 CC Okay, and you've got about 10 minutes left before we'll have to leave.

06 02 16 06 CDR-EVA Okay.

06 02 16 07 LMP-EVA Okay, maybe we could go to one more area. And so we won't salt it with it, this is just one broken-up block here.

06 02 16 17 CC Good plan. Hey, you fellows are always thinking.

06 02 16 28 LMP-EVA Well, we try to please. 338 is the soil sample.

06 02 16 35 CC Okay.

- 06 02 16 36 LMP-EVA That spinning up that bag really works great.
See anything down under there, John?
- 06 02 16 45 CDR-EVA No. This is the second - this is rim of it. It's
very soft. I didn't have any trouble digging down
with the shovel.
- 06 02 16 56 LMP-EVA Solid gray all the way - -
- 06 02 16 57 CDR-EVA Solid gray all the way down. I see no layering.
- 06 02 17 00 CC Okay.
- 06 02 17 01 LMP-EVA Let me put this in your bag.
- 06 02 17 11 LMP-EVA John, how about on the upper rim there? This - -
- 06 02 17 14 CDR-EVA Look at - -
- 06 02 17 15 LMP-EVA This might have been a secondary.
- 06 02 17 17 CDR-EVA Look at that right over there, Charlie.
- 06 02 17 18 LMP-EVA It's a - It's a really a unique white-looking
something-or-other.
- 06 02 17 23 CDR-EVA Yeah. Let's see what that is.
- 06 02 17 32 LMP-EVA I think it's soil.
- 06 02 17 40 CDR-EVA Well, you want to get some of it? It's unusual
soil, if it is.
- 06 02 17 45 LMP-EVA It might have been just a little - yeah, it looks
like a little teeny impact, doesn't it?
- 06 02 17 56 LMP-EVA Hey, let's get a quick one and then go on up here
and get some of these blocks on the upper rim.
- 06 02 18 02 CDR-EVA Okay. Okay, there's f/ll at - okay. It's a down-
Sun. Turn around and get a locator.
- 06 02 18 19 CDR-EVA Boy, this - this 1/6 gravity is so neat!
- 06 02 18 28 LMP-EVA Got you a bag coming, John. Hey, Tony, what we're
picking up is a - a white - It looks like a little
patch of indurated regolith, and it's whitish in
color.

06 02 18 47 CC Okay; we copy.

06 02 18 51 LMP-EVA Okay, let me - okay, let's get a little bit more of the white, John. That - that got most of it; it was just on the end of the scoop.

06 02 18 57 CDR-EVA Okay. There's a gu - Oh, that's great.

06 02 19 14 CDR-EVA *** this orange juice ...

06 02 19 23 CDR-EVA That got it?

06 02 19 24 LMP-EVA Yeah, that's got it. I'll get your after.

06 02 19 27 CDR-EVA I'll get it, Charlie.

06 02 19 28 LMP-EVA Okay. Okay, that's in bag - that soil sample's in 339, Tony.

06 02 19 33 CC Okay; 339.

06 02 19 37 CDR-EVA And number - I'm through frame count 106, now.

06 02 19 41 CC Okay; 106.

06 02 19 46 CDR-EVA Maybe we can get a chance to get up another sample
*** ...

06 02 19 53 CC Okay, you've got about time for just one more.

06 02 19 56 CDR-EVA Okay.

06 02 20 00 LMP-EVA Okay.

06 02 20 02 CDR-EVA I been hankering for a piece off that rock.

06 02 20 05 LMP-EVA Here's an old - rounded one right here, John. With the white spots - in it. I don't think - Here's a real angular one right over here. It's probably out of a -

06 02 20 20 CDR-EVA Let's get this rounded one, Charlie - -

06 02 20 21 LMP-EVA Okay.

06 02 20 22 CDR-EVA - - just on a hunch.

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06 02 20 24 LMP-EVA Okay, I agree. Down-Sun, here.

06 02 20 38 LMP-EVA Got it.

06 02 20 39 CDR-EVA Wait a minute. Get a locator.

06 02 20 56 CDR-EVA Okay?

06 02 21 08 LMP-EVA We's ... Oh, good show.

06 02 21 12 CDR-EVA In bag 409, Houston. And it's so dust-covered that I'm unable to describe it, although it's a white subrounded rock. And I can't dis - distinguish any crystalline structure in it. It's going in bag 409.

06 02 21 29 CC Okay; and you've got 5 minutes here.

06 02 21 34 CDR-EVA Charlie, put that one in mine. Yours is full.

06 02 21 36 LMP-EVA Okay. Yours is getting full, too. We got to change out bags. Whoops! My bag is full?

06 02 21 47 CDR-EVA Almost.

06 02 21 48 LMP-EVA Okay. There you go.

06 02 21 49 CC Hey, you fellows have been really scooping them up there.

06 02 21 54 LMP-EVA Hey, John.

06 02 21 55 CDR-EVA Yes.

06 02 21 56 LMP-EVA Bring me the scoop a minute. Let me - let me whack this thing right here. It's so good that I can't pass it up. All right, there's a good place to whack. Something to lean on. Thank you.

06 02 22 15 CDR-EVA Oh, that's har - You got it!

06 02 22 16 LMP-EVA Hot dog!

06 02 22 17 CDR-EVA Charlie, beautiful.

06 02 22 18 CDR-EVA Demolished it.

06 02 22 19 LMP-EVA Hey, that's a great rock! Look at that! I'm sorry we didn't get it documented before, Tony, but that is a good sample. It's a - I think it's a crystal rock. Just a minute - -

06 02 22 32 CC Okay, let's go ahead and document it now - -

06 02 22 33 LMP-EVA - - let me just go ahead and -

06 02 22 34 CC - - so we get the location of the one that's still in place. It didn't look like it moved.

06 02 22 40 CDR-EVA No, he didn't move anything there. I'm gonna do an up-Sun on this documentation.

06 02 22 44 LMP-EVA Okay, I'll get a cross-Sun here. It's a - it's a - it's a grayish bluish - rock, Tony, in the matrix with some white clast in it.

06 02 23 06 LMP-EVA Let me get it with this - It isn't any trouble, John.

06 02 23 22 LMP-EVA Man, I - the matrix is so fine-grained, I can't tell, Tony, but it's definitely got a blue cast to it and there - there are inclusions of a whitish - it looked like plage to me.

06 02 23 34 CC Okay; we copy that. Sounds great.

06 02 23 36 CDR-EVA ... we're gonna have to move out.

06 02 23 37 LMP-EVA ... plage, wouldn't you say? Okay.

06 02 23 45 CDR-EVA And then, needlelike black crystals in it, too.

06 02 23 48 LMP-EVA Yeah.

06 02 23 49 CDR-EVA I see one in there that's a millimeter wide by 3 millimeters long, and a - and some other needle-like crystals in it.

06 02 23 58 LMP-EVA Here's another piece - came off the same rock.

06 02 24 02 CDR-EVA It has this white clast in it. I don't - I - it's got to be a breccia, Charlie.

06 02 24 07 LMP-EVA Think so?

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06 02 24 08 CDR/ LMP-EVA Yeah.

06 02 24 09 LMP-EVA They don't really look like -

06 02 24 13 CDR-EVA That's going in bag 41 - 410.

06 02 24 17 CC Okay; 410.

06 02 24 21 LMP-EVA Okay. Tony, when you say 5 minutes, does that mean that we be on the Rover moving?

06 02 24 27 CC Okay, that's the rolling time. It's time to load up right now.

06 02 24 29 LMP-EVA Well, good. Okay. Yours - yours is hooked, too, John.

06 02 24 37 CDR-EVA How do you get it unhooked?

06 02 24 38 LMP-EVA Well, I don't know. Did you get it?

06 02 24 44 CDR-EVA Your training bags never did hook.

06 02 24 47 LMP-EVA I know it (laughter). No, they -

06 02 24 49 CDR-EVA That ... there was unhooked.

06 02 24 50 LMP-EVA Okay; I - I'll put this up.

06 02 24 52 CDR-EVA Okay.

06 02 24 53 LMP-EVA You go get the - the TV.

06 02 24 58 CDR-EVA Boy, is this a neat way to travel!

06 02 25 00 LMP-EVA Isn't it great? I like to - I like to skip along.

06 02 25 04 CDR-EVA Not me, boy.

06 02 25 08 CC Oh, Charlie, you're pure crazy.

06 02 25 09 CDR-EVA Okay - Skip.

06 02 25 19 LMP-EVA Well, whatever you call it.

06 02 25 20 CDR-EVA (Laughter) Okay.

06 02 25 24 LMP-EVA I can't get my left leg in front of me. Oh, the docs never knew.

06 02 25 33 CC You fooled them again.

06 02 25 34 CDR-EVA Okay; we're going mode switch to 1.

06 02 25 36 CC Okay.

06 02 25 38 LMP-EVA I knew it was gonna come in handy some day.

06 02 25 42 CDR-EVA And the TV is going up to CCW.

06 02 25 46 LMP-EVA Okay; and we've got the - Hey, is the DAC supposed to be on? Yes, the DAC on. Okay. Turning the DAC on.

06 02 25 57 CC Okay.

06 02 25 58 LMP-EVA The DAC is on, and now watch this big leap. Oh, oh - can't leap. I'm hooked onto something.

06 02 26 15 CDR-EVA Oh, you rat.

06 02 26 24 LMP-EVA Sorry, John. But my seatbelt fell off.

06 02 26 27 CDR-EVA Fell off?

06 02 26 28 LMP-EVA Well, it was on the floor.

06 02 26 40 CDR-EVA But - Charlie?

06 02 26 46 LMP-EVA Fell down again, John.

06 02 26 48 CDR-EVA Yes, I saw that. Can you make it? You want me to get out and help you?

06 02 26 55 LMP-EVA No, I'm getting it now. And I'm next to the Rover. My backpack hit the seat and just vaulted me off. How does my camera lens look?

06 02 27 08 CDR-EVA Dusty; we'll dust it at the next place.

06 02 27 10 LMP-EVA Okay.

06 02 27 12 CC And, Charlie, we'll need a frame count.

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06 02 27 14 LMP-EVA I'm sorry it's taking this - Oh, yeah.

06 02 27 19 CDR-EVA ... mines lll.

06 02 27 24 CC Okay, lll.

06 02 27 29 LMP-EVA Fifty for me.

06 02 27 31 CDR-EVA Charlie.

06 02 27 32 LMP-EVA What?

06 02 27 33 CC Okay; 50.

06 02 27 34 CDR-EVA Your back - your - we're gonna have to - you
knocked off your whatchacallit, your -

06 02 27 38 LMP-EVA Is that my bag?

06 02 27 39 CDR-EVA Yeah, it - Wait a minute. It's not off, but it
will be in a second. It's loose. Turn around
and let me see. No, it's Velcroed on.

06 02 27 49 LMP-EVA Okay; good.

06 02 27 52 CDR-EVA That would be a - That would be bad.

06 02 27 57 LMP-EVA Yeah, wait a - I hate to say it, John, but I'm
going to have to take a minute and fix this buddy
SLSS bag.

06 02 28 02 CDR-EVA Okay.

06 02 28 03 LMP-EVA About to come loose. ...

06 02 28 16 LMP-EVA Hey, Tony, we're delaying slightly. The buddy
SLSS bag was working loose.

06 02 28 21 CC Okay.

06 02 28 25 LMP-EVA Okay, there it is.

06 02 28 40 CDR-EVA Are you doing okay, Charlie?

06 02 28 42 LMP-EVA Yes, I'm doing fine.

06 02 28 43 CDR-EVA Okay.

06 02 28 44 LMP-EVA I just can't get my PLSS back in. There we go.

06 02 28 50 CDR-EVA All set?

06 02 28 51 LMP-EVA Just a minute. Dadgum seatbelt.

06 02 29 08 LMP-EVA Well. Okay; there. I'm in, finally. ... - -

06 02 29 14 CC Okay, and we understand the DAC is on?

06 02 29 16 CDR-EVA ...

06 02 29 18 LMP-EVA Bye - Yes, sir.

06 02 29 21 CC Great.

06 02 29 22 LMP-EVA And we bypass station 7 and we go to 8. And that's - -

06 02 29 25 CC All right we figure ... 274 and 0.8.

06 02 29 26 LMP-EVA - - ... 17.9 and ... Okay, so that's distance, right?

06 02 29 35 CC That's right.

06 02 29 36 LMP-EVA 274. Okay, John, I make it 6 point - 7.5 on distance. Look at that blue rock - that we just whacked on!

06 02 29 53 CC And when you get there, you'll read 3.0 and 10 degrees.

06 02 30 02 LMP-EVA Okay. Okay, we're going downslope - cross-slope, Tony. And I feel like I'm about to fall out. We're still in a blocky - in the blocky field. In fact, it's just South Ray material, I think, just all over the place.

06 02 30 38 LMP-EVA Hey, John, ...

06 02 30 41 CDR-EVA Glad you got our seatbelts on, Charlie.

06 02 30 44 LMP-EVA Me, too. Okay, I can still see old Orion. We sure parked on a - you landed on a - the highest point around, John. Even down in that crater you can see - you can still see it.

06 02 30 59 CC Hey, not bad for a Navy pilot.

06 02 31 03 LMP-EVA Oh, he did a great job. Okay, we're back into a thicker part of the ray, Tony. The regolith is here covered with cobbles about 40 to 50 percent. You're gonna have to bear way left, John. Okay, now, if we hold that range, like the - the tack in - Look at that piece of glass we just rolled over. This'll be great - 015, we've got to go.

06 02 31 39 CC Gee, we sure hope you don't get a flat tire there.

06 02 31 41 CDR-EVA What do you want, 015?

06 02 31 44 LMP-EVA Yeah.

06 02 31 46 CDR-EVA Man, if you could see these rocks, you'd hope it.

06 02 32 00 LMP-EVA Oh, boy. We ran over that beauty.

06 02 32 02 CDR-EVA Yeah, and ... not so sure - -

06 02 32 03 CC I just noticed. There should be a lot of boulders in here, and we'd like you to get a lot of the Hasselblad photos. And then when you go past the north side of Stubby there, swing your DAC around.

06 02 32 15 LMP-EVA Okay, we're not going to be able to see Stubby, Tony. It's on the other side of a big ridge.

06 02 32 19 CC Okay.

06 02 32 24 LMP-EVA The map was wrong. It's been mapped wrong. We're down in a little swale now, and there's about a 30-meter ridge off to our left about 300 meters; it blocks out Stubby. You want us to go up and travel along that ridge?

06 02 32 40 CC Well, depending on your trafficability.

06 02 32 46 LMP-EVA Well, we could do it. I'd like to - I'd like to see back into Stubby.

06 02 32 57 CC Well, why don't you press on up there?

06 02 33 06 LMP-EVA Want to, John?

- 06 02 33 07 CDR-EVA Yeah, might as well. We've got to go by that big rock. Is that where we're going, to that big rock?
- 06 02 33 13 LMP-EVA That'd be a great place to sample the ray. That's probably on the ray. But we to - they want to go left, about 10 o'clock, up onto that - top of that ridge.
- 06 02 33 21 CDR-EVA Okay; will you be able to take pictures?
- 06 02 33 22 LMP-EVA Yeah.
- 06 02 33 37 LMP-EVA Okay, Tony. This is really a - really a ray. You can - in fact, you can see coming out over the ridge - you can distinctly see the rays from South Ray - the whiter albedo in the - and the contact between the white ray and the Cayley here. Quite apparent.
- 06 02 34 01 CC Okay; very good.
- 06 02 34 04 LMP-EVA We're now at 00 - 005 at 3.0. And the contact I'm talking about is at 12 o'clock, probably a couple of hundred meters.
- 06 02 34 15 CDR-EVA You know, I don't want to be discouraged about this sort of thing, but I feel like this may be a problem we're going to have to attack logistically out here. Because, boy, it is really difficult to tell - just looking at a rock, except for the roundedness and the - except for the roundness, it's difficult to tell what kind of a rock it is. Now there's a vesicular-looking rock right there.
- 06 02 34 41 LMP-EVA Yeah.
- 06 02 34 42 CDR-EVA That's the first rock I've seen with vesicles in it.
- 06 02 35 02 LMP-EVA Okay, Tony, we're traveling now - southwest. We're at 006 at 3.0 -
- 06 02 35 10 CC Okay; copy.
- 06 02 35 11 LMP-EVA And we've still got a couple hundred meters to go up to the ridge. John, why don't you swing directly

south and go - let's just go straight up that beauty, see what we see up there. Probabably nothing but another ridge.

06 02 35 27 CDR-EVA It's pretty steep, Charlie.

06 02 35 29 LMP-EVA We're making 0.6 - or 6 kilometers an hour.

06 02 35 40 CDR-EVA That's really a steep ridge.

06 02 35 42 LMP-EVA This is here?

06 02 35 43 CDR-EVA Yes.

06 02 35 44 LMP-EVA Have you got full throttle on?

06 02 35 45 CDR-EVA I got full throttle.

06 02 35 47 LMP-EVA Boy, we're hardly moving.

06 02 35 50 CC Okay, you want to read some amps?

06 02 35 56 LMP-EVA Yeah. We've got 55 - 50.

06 02 36 00 CDR-EVA Okay, what it is, is we've lost the rear-wheel drive.

06 02 36 05 CC Okay, understand.

06 02 36 06 CDR-EVA Not reading any amps on the rear wheel.

06 02 36 11 CC Okay; we copy that.

06 02 36 21 CDR-EVA And with that in mind, I'd just as soon not go to this ridge, Charlie.

06 02 36 24 LMP-EVA Me, too. I agree.

06 02 36 27 CC Okay; we suggest you head on towards B and stay on fairly flat ground, and we'll work up a procedure.

06 02 36 40 LMP-EVA John, why don't we check it? Can you - can you turn the - board off and see if we move?

06 02 36 56 LMP-EVA It just might be a steep slope. But the front wheels were really digging in.

06 02 37 03 CDR-EVA No, Charlie. The ammeter was reading zero.

06 02 37 05 LMP-EVA I know. Could be a broken meter.

06 02 37 14 LMP-EVA Okay, Tony, at 007, 3.1 - passing another secondary that's elongate in the direction of South Ray and it - Those are the big blocks they were talking about, John. Right over there, there are four or five of them.

06 02 37 41 CC And how fast are you making now, John?

06 02 37 43 LMP-EVA The regolith is still -

06 02 37 47 CDR-EVA Say again?

06 02 37 48 CC How fast are you doing?

06 02 37 50 CDR-EVA What'd you say, Tony?

06 02 37 52 LMP-EVA He wants to - how fast we're going.

06 02 37 54 CDR-EVA We're going at 7 clicks.

06 02 37 56 CC Okay.

06 02 38 10 LMP-EVA How about stopping up there in the middle of all of those big boulders, John?

06 02 38 15 CDR-EVA Call that station 8?

06 02 38 16 LMP-EVA Call that station 8. That's gonna be about it. We're about -

06 02 38 50 LMP-EVA There's one that's overturnable, I'll bet you. Right there. Look at that elongate one - that shred there - whatever that is.

06 02 39 12 LMP-EVA Okay, Tony, we're at 00 - 010 at 3.0, and we've got about three or four - 2- or 3-meter-size blocks, one black and some white ones. How does this stop sound?

06 02 39 27 CC Okay; this sounds pretty good.

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06 02 39 32 LMP-EVA Okay, 180, John, on the heading. No, 270; they
want a nav update. ... - -

06 02 39 41 CDR-EVA That's right.

06 02 39 43 CC Okay, and we're looking primarily for blocks from
South Ray. So if you feel like this is the ray,
this sounds great. And we don't need a nav update,
so 180 is great.

06 02 39 56 LMP-EVA What do you think, John?

06 02 39 58 CDR-EVA Oh, yeah.

06 02 40 08 IMP-EVA I definitely think - about - This is fine here.
Get on up a little bit on the - That full throttle?

06 02 40 16 CDR-EVA Yep, Charlie.

06 02 40 19 LMP-EVA Amazing. Okay, Tony. 176, 011, 7.9, 2.9, 195,
95, 00, 100, 115 - 110 make it. And I can't see
the motor - off-scale low, forward and rear motors -
or forward motors.

06 02 41 04 LMP-EVA Off-scale low, rear ones.

06 02 41 05 CC Okay, we copy that.

06 02 41 07 CDR-EVA Okay, Houston. What happened, we may have mou -
my -

06 02 41 12 LMP-EVA Excuse me, John. I'm sorry.

06 02 41 14 CDR-EVA My -

06 02 41 15 LMP-EVA Okay.

06 02 41 16 CDR-EVA My best guess of what happened - of what may have
happened, Houston, is that - is that - is that we
may have - cut a wire or something on the back.

06 02 41 36 CC Cut a wire? ... - -

06 02 41 38 LMP-EVA Okay, I've got -

06 02 41 41 CDR-EVA Yeah, a wire going back there to that aft thing. We hit - on the way down here, the regolith and everything being what it is, when we were bouncing up in the air we may have come - we came down on at least two rocks that I know about.

06 02 41 57 CC Okay; we understand.

06 02 42 03 CDR-EVA Well, it's a sort of dynamic (laughter) situation that I don't think anybody was thinking about much.

06 02 42 22 MCC Can he see those wires? I - I can't.

06 02 42 25 LMP-EVA Okay, Tony. Starting our pan from about the 1 o'clock position of the Rover, sort of bracketing these blocks - blocks here.

06 02 42 34 CC Okay.

06 02 42 36 CDR Okay; Station 7.

06 02 42 38 LMP-EVA John, before I do this, how about checking my lens?

06 02 42 40 CDR-EVA Well, okay.

06 02 42 41 CC And verify the DAC's off.

06 02 42 46 LMP-EVA I missed that. Stand by.

06 02 42 50 CDR-EVA How's mine, Charlie?

06 02 42 53 LMP-EVA Yours is great. It did good.

06 02 43 01 CDR-EVA Okay; go. Okay, mode switch to 1.

06 02 43 08 LMP-EVA Thanks for the reminder, Tony.

06 02 43 10 CC Okay.

06 02 43 11 LMP-EVA Man, those battery covers are filthy.

06 02 43 17 CC We aim to please, too.

- 06 02 43 23 LMP-EVA And the regolith here, is firmer than up on - Stone. We're in a blocky field here. Predominant size is 10 to 15 centimeters, but the biggest one is a couple of meters. And you'll see that 12 o'clock from the Rover.
- 06 02 43 50 CC Wow! That's a real boulder.
- 06 02 43 51 LMP-EVA It has a bluish cast to it - black maybe. Okay, you already see it, huh? And beyond that, there's a white one that's - It looks like a big - that big one that John sampled. Think we ought to get one of those. Okay; pan's complete. Double core here is first thing. And I'll sample - I think we're in the ray, so I'll just sample - right out - do it right over here.
- 06 02 44 42 CDR-EVA Okay, Houston, you should have us now.
- 06 02 44 43 CC Okay; we sure do.
- 06 02 44 45 CDR-EVA What're you doing, Charlie? Charlie?
- 06 02 44 49 LMP-EVA What?
- 06 02 44 50 CDR-EVA What're you doing?
- 06 02 44 51 LMP-EVA Stand by.
- 06 02 45 02 LMP-EVA Tell you later.
- 06 02 45 08 CDR-EVA Okay.
- 06 02 45 09 LMP-EVA Yeah, I need to get a double core or two.
- 06 02 45 12 CDR-EVA Okay.
- 06 02 45 14 CC Thank you, John.
- 06 02 45 17 LMP-EVA Agh.
- 06 02 45 24 CDR-EVA Want to get it, Charlie?

06 02 45 26 LMP-EVA Yeah, if I could ever get the top open on those things. Okay, there we go. There's an upper and lower. Closed again.

06 02 45 41 CDR-EVA Okay.

06 02 45 43 LMP-EVA What did he say? Didn't he call you for something, John?

06 02 45 46 CDR-EVA What did you say, Tony?

06 02 45 48 LMP-EVA Oh - oh, he said, "Thank you."

06 02 46 09 LMP-EVA How do you read, Houston?

06 02 46 11 CC Oh, you sound good, Charlie.

06 02 46 16 LMP-EVA Okay; thank you.

06 02 46 29 CDR-EVA There's a boulder over here we can split.

06 02 46 32 LMP-EVA Yeah.

06 02 46 34 CDR-EVA You see it?

06 02 46 36 LMP-EVA That - that's one - that one off to your right down there - I think we could turn that one over.

06 02 46 45 CDR-EVA Yeah. I think you're right. I think we could turn that one over, Charlie.

06 02 46 48 LMP-EVA How about samples of those two? That white one and that big one on the other side over there?

06 02 46 57 CDR-EVA ... get a chance. Can I help you with the double core?

06 02 47 01 LMP-EVA No. Go ahead and - what you got to do.

06 02 47 05 CDR-EVA Okay, well I can get a rake soil here while you're doing that. Okay?

06 02 47 09 LMP-EVA Okay, I'll have to - Okay, fine. I'll just have to take the scoop off. Can you do that rake soil by yourself, you think?

06 02 47 17 CDR-EVA Yeah.

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06 02 47 19 LMP-EVA Okay.

06 02 47 24 CDR-EVA Think so. Okay. Rake soil away from the boulders.

06 02 47 47 CC I'm just a little curious. How near are you to the edge of this ray?

06 02 47 56 LMP-EVA Goes in both directions as far as we can see.

06 02 47 58 CDR-EVA That's right.

06 02 47 59 CC Okay. We can forget that one sample off the ... - -

06 02 48 01 LMP-EVA Tony, the whole area - Tony, the whole area is just covered with these rocks.

06 02 48 13 CC Yeah. It sure looks that way.

06 02 48 14 LMP-EVA - - ... you seen - have you seen the rocks that - on the - Okay, that's what they all are.

06 02 48 21 CC Okay; I guess we're just looking for a variety then in the boulder protocol.

06 02 48 28 LMP-EVA Okay, we can give you that, I'll tell you. There's a - two big boulders at 12 o'clock that are going to be great sampling. One of them is a rounded and - but the biggest - and the other one is a white - and it's black. The other is white and it's very sharp, very angular.

06 02 48 54 CC Okay.

06 02 48 58 LMP-EVA Okay, I pushed the - the core in - double core in, Tony, about - almost up to the second - about halfway up the first.

06 02 49 12 CDR-EVA Charlie, I get a locator on you and a down-Sun, too. Sun, too.

06 02 49 15 LMP-EVA Okay, great. Seven feet. Eight.

06 02 49 41 LMP-EVA ***

06 02 49 58 CDR-EVA What's the matter, Charlie?

06 02 50 01 LMP-EVA Not going in too well.

06 02 50 05 CDR-EVA Pretty hard around here.

06 02 50 11 LMP-EVA Oh, rats.

06 02 50 15 CC That's all right. I do that all the time. Usually, I have my thumb in the way.

06 02 50 32 LMP-EVA Nope, I can't do it. I can't get down that far.

06 02 50 51 LMP-EVA Now I'm going to have to go get the tongs.

06 02 50 53 CC Yeah, it looks like a good plan.

06 02 50 55 LMP-EVA And the hammer. Tony, I don't think the doub -
Yeah, Tony, I don't think the double core is going
to go in. Do you want me pull it out and shake
it out and try another place? I think I hit a
rock - -

06 02 51 06 CC Okay, yeah, we'd sure like you to do that.

06 02 51 08 LMP-EVA ... - - all at once. Okay. It just sto - that
one just stopped all at once, so I think I did hit
a rock.

06 02 51 17 CC Okay.

06 02 51 21 CDR-EVA Okay, Houston -

06 02 51 26 CC And, John, on the LRV, do you - do you know if you
lost the rear steering as well as the drive?

06 02 51 36 CDR-EVA No, because I'm unable to see behind me.

06 02 51 40 CC Okay.

06 02 51 41 LMP-EVA We could give it a little test drive, John, if -

06 02 51 45 CDR-EVA Yeah. I wasn't getting any - I wasn't getting
hardly any amps out of the - out of the rear.
I was getting some, so maybe that's an indication
that I had rear steering.

06 02 51 58 CC Okay. Except a while ago - -

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06 02 52 00 CDR-EVA Okay, Houston, out of five -
06 02 52 01 CC - - we had a couple of amp ... zero.
06 02 52 05 CDR-EVA Oh. Out of - out of five scoops, I've got about -
oh, 10 rock frags, a couple of which are - one of
which has some interesting black glass along the
sides of it, the other of which is covered with
black glass and - but in the most there's not much
of that material around here. That's going into
bag 411.
06 02 52 38 CC Okay. Bag 411.
06 02 52 39 CDR-EVA There's hard - Where you're away from boulders
there's hardly any - anything but soil - very few
rocks, in other words.
06 02 52 49 CC Understand.
06 02 53 26 LMP-EVA Oh, you dog. Whew. Take a break.
06 02 53 38 CC Good idea.
06 02 53 40 CDR-EVA Yeah, Charlie. Slow down.
06 02 53 50 LMP-EVA Hey, there are little glass beads all over the
place here, John.
06 02 53 53 CDR-EVA And little - places where little white rocks seem
to have hit, too. I'll get a soil sample here.
06 02 54 46 LMP-EVA Boy, it is hard under here, Tony.
06 02 54 49 CC Right, it sure looks it, but I can see you're
getting it down.
06 02 54 50 LMP-EVA - - ... It's in.
06 02 54 57 CC Good show.
06 02 54 58 LMP-EVA It's a little off vertical, but you're just going
to have to take it.
06 02 55 01 CC Oh, I think we'll take it, Charlie.

06 02 55 03 LMP-EVA Okay. Boy, I hope that thing is full of gold, because that was a hard one. Whew!

06 02 55 23 LMP-EVA I can't believe it. It comes out so easy.

06 02 55 34 LMP-EVA Okay, the bottom one is 36, Tony.

06 02 55 37 CC Okay.

06 02 55 38 LMP-EVA I've got my hand over the top number. I'll give it to you in a minute.

06 02 55 40 CC Okay.

06 02 55 41 CDR-EVA Okay, the soil sample here, Houston, is going in bag 412.

06 02 55 46 CC Okay; 412.

06 02 56 13 CDR-EVA I don't know what this is staring here at me here, Houston, but I'm going to pick it up because -

06 02 56 23 CC Anything that stares at you, you'd better pick up.

06 02 56 24 CDR-EVA It has - it's a - it's a - it's a glass, but in this sunlight, it's reflecting red, green - like the - like a rainbow.

06 02 56 39 CC Very good.

06 02 56 46 LMP-EVA Found the first prism on the Moon, John.

06 02 56 48 CDR-EVA It's something like that.

06 02 56 54 LMP-EVA Whew, boy.

06 02 57 32 CDR-EVA Charlie, guess who's out of bags.

06 02 57 34 LMP-EVA Oh, the commander. Here, wait a minute. I'll come and get you one.

06 02 58 01 CDR-EVA I don't know if that thing will last or not. No, I guess it was just black glass but it was the way the Sun was reflecting off of it. Isn't that too bad? Anyway, that's a sample - and it's going in bag 4 - 413.

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06 02 58 24 CC Okay, 413.

06 02 58 25 LMP-EVA Okay, Tony, the bottom - the bottom core, as I said, was 36 and the top part is 20 - 9, I think; wait a minute - 29.

06 02 58 39 CC Okay, we copy 29.

06 02 58 46 CDR-EVA I didn't know you guys were watching. I wouldn't have done that (laughter).

06 02 59 04 LMP-EVA You know, I've found a use for every geology tool on this - got back here.

06 02 59 37 CDR-EVA I'm gonna drive over there, Charlie, so I - let me check out this -

06 02 59 43 LMP-EVA Hey, that's a good idea, John.

06 02 59 45 CDR-EVA Steering.

06 02 59 47 LMP-EVA Houston, turn - turn off the front drive power to it. I think you're right because those front wheels were really digging in.

06 02 59 59 CC Okay.

06 03 00 05 CDR-EVA How about if we just leave the TV on - just drive over to where we're going to sample these boulders and test this thing out a little. Will that mess you up too bad? Or do you lose sync or something and never get it back.

06 03 00 32 LMP-EVA I know there are some core tube caps in here somewhere, but ...

06 03 00 38 CDR-EVA ... We're just going to drive slow because we want to check this baby out.

06 03 00 46 LMP-EVA You need some more bags, John.

06 03 00 48 CDR-EVA Yep.

06 03 00 51 LMP-EVA Okay, here's a setup on your seat. There's the core tube cap.

06 03 01 07 LMP-EVA Just not answering.

06 03 01 09 CDR-EVA Houston, how do you read? Over.

06 03 01 10 CC Oh, we're copying you 5 by. Are you go - you -
We understand that you're going to drive over to
the other area.

06 03 01 20 CDR-EVA We'd like to, and we'd like to run through a Rover
steering test while we're doing it. What we're
talking about doing - you see which - those boulders
you're looking at. We're just talking about driving
around this crater - about halfway around it to do
the steering test.

06 03 01 37 CC Okay, sounds good and we'd - would like - after
you've done that, we would like to go through a
procedure of our own while you're on there.

06 03 01 48 CDR-EVA All righty. You want to st - you want to stay off
and watch, Charlie.

06 03 01 52 LMP-EVA Yeah, I'm going to watch. Okay, Tony, the - did
you get the - that the doub - that the double core -
the bot - the top one was 29?

06 03 02 01 CC Yes, we copied that.

06 03 02 05 LMP-EVA Okay.

06 03 02 07 CDR-EVA Oh, boy.

06 03 02 09 LMP-EVA I'll get it, John. Go ahead and get in. I'm ...
strap.

06 03 02 12 CDR-EVA No, we've got it (laughter).

06 03 02 15 LMP-EVA How about that one?

06 03 02 17 CDR-EVA I wouldn't believe it if I - we may not get it out
of there.

06 03 02 25 LMP-EVA (Laughter) I wouldn't believe it if I saw it again.
Here you go. Okay.

06 03 02 43 LMP-EVA That little box finally came out of there.

06 03 02 56 LMP-EVA Okay, you're all locked.

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06 03 02 58 CDR-EVA Okay.

06 03 03 02 LMP-EVA Man, there's a lots of glass around here.

06 03 03 09 CDR-EVA Okay, now what I'm going to do - is -

06 03 03 14 LMP-EVA Why don't you try it - excuse me.

06 03 03 16 CDR-EVA I'm going to turn - I'm going to try the steering first, Charlie.

06 03 03 20 LMP-EVA Okay. Why don't you just go to P, PRIMARY, and let me check a look at her.

06 03 03 25 CDR-EVA Okay, PRIMARY.

06 03 03 27 LMP-EVA It's working.

06 03 03 29 CDR-EVA Steering's working?

06 03 03 30 LMP-EVA Yeah.

06 03 03 32 CC Okay, how are your amps?

06 03 03 33 LMP-EVA Why don't you just try rear drive only.

06 03 03 38 CDR-EVA Just sitting there doing nothing.

06 03 03 40 CC Okay.

06 03 03 41 CDR-EVA Now a - D max, Charlie.

06 03 03 47 LMP-EVA It ain't going. You lost it.

06 03 03 49 CDR-EVA Yeah. Now let's take the - put them on BUS C.

06 03 03 53 LMP-EVA Yeah.

06 03 03 54 CDR-EVA How about that?

06 03 03 55 LMP-EVA Okay.

06 03 03 56 CC Okay, how about the - rear drive on the - -

06 03 03 59 CDR-EVA Okay?

06 03 04 00 CC - - BUS A and B.

06 03 04 01 LMP-EVA That's okay; you got it.

06 03 04 02 CDR-EVA We got it, right? Okay, Houston, we got rear steering on bus - wait a minute, wait a minute, wait a minute. That's for - with that FORWARD DRIVE POWER - that ju - no, that's just with the FORWARD DRIVE POWER. Okay, now I'll put the LEFT REAR on BUS B. Now let's see what we've got.

06 03 04 25 LMP-EVA Nope. No, John, nothing.

06 03 04 28 CDR-EVA Okay, we've tried the forward and rear steering on BUS B. We have rear steering. We have forward steering. We have forward drive power, but we don't have any rear drive power on either bus. Let me try it - let me try it in SECONDARY.

06 03 04 47 CC Okay, John, we'd like you to try the PWM 1 on the LEFT REAR and RIGHT REAR.

06 03 04 54 CDR-EVA You want me to go - okay, you want - on - I - I'm in PWM 1 on LEFT REAR and RIGHT REAR?

06 03 05 03 CC Right on ... - -

06 03 05 04 CDR-EVA How about if - You want me to go to PWM 2 on the FRONT [sic] REAR? Say again.

06 03 05 07 CC Negative. We would like all the DRIVE ENABLES to PWM 1.

06 03 05 14 CDR-EVA Okay, they're all on PWM 1, and do I have to be in PWM 1 SELECT 1, or BOTH.

06 03 05 21 CC Negative.

06 03 05 22 CDR-EVA Oh, that's the problem.

06 03 05 25 LMP-EVA That's the problem, you weren't in BOTH, huh?

06 03 05 27 CDR-EVA That is the problem. Some how this guarded switch got moved to - oh, isn't that amazing.

06 03 05 37 LMP-EVA Amazing.

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06 03 05 38 CDR-EVA Yeah.

06 03 05 39 LMP-EVA Unbelievable.

06 03 05 40 CC Okay, great -

06 03 05 41 LMP-EVA ... You're still in 1 - okay, let me -

06 03 05 43 CDR-EVA I'm going to turn off the front drive power.

06 03 05 45 LMP-EVA Okay, you're in 1. There you go. That's it.

06 03 05 55 CDR-EVA Okay, now, let's see if we got it.

06 03 05 59 LMP-EVA Nope.

06 03 06 07 CC Okay, we'd like to go back to nominal configuration.

06 03 06 08 LMP-EVA I'll bet your ... off, John.

06 03 06 12 CDR-EVA That's what we're doing.

06 03 06 14 LMP-EVA Okay, now try your rear steer - rear motor. Okay, you've got it now.

06 03 06 20 CDR-EVA The - the problem was, Houston, the PWM 1 was - PWM SELECT was in 1. That was the problem. Sorry about all that inconvenience.

06 03 06 44 LMP-EVA ... over this big boulder - Try that. I've haven't done that since we been up here.

06 03 06 48 CDR-EVA Watch out, Charlie. I'm liable to run over you.

06 03 06 50 LMP-EVA Yowee! Hey, man, don't do that. ... gently.

06 03 07 01 CC John, after you went back to normal configuration, did you drive it?

06 03 07 08 CDR-EVA Yes; that mess you up?

06 03 07 24 LMP-EVA Houston.

06 03 07 28 CDR-EVA ... where they are.

06 03 07 47 CDR-EVA You still got a picture, huh?

06 03 07 50 CC Sure do. But I think we need the antenna touched up.

06 03 07 54 CDR-EVA Well, that's what I ... I could do if I drove slow. All right, be glad to.

06 03 08 01 LMP-EVA Tony, this is really some rock. It's a two-rock breccia, with the matrix being blue to me, in this light anyway, and the white clasts are a crystalline - fragments of crystalline rocks - that appear to be fairly coarse-grained - take that back - fine, let's say, fine-grained -

06 03 08 42 CDR-EVA That's the one you want to turn over, Charlie.

06 03 08 45 LMP-EVA This thing! Gosh! I can't even budge it.

06 03 08 48 CDR-EVA (Laughter) It's a biggie.

06 03 08 49 LMP-EVA Hey! I did budge it.

06 03 08 51 CDR-EVA Charlie wants to turn that one over, Houston.

06 03 08 53 LMP-EVA I want to get a chip out of it. That - Look at that rock over there, John. If that's not a - a crystalline rock, I'll - -

06 03 08 59 CDR-EVA Eat the whole thing, right?

06 03 09 00 LMP-EVA - - depressurize right here. Yeah, the whole thing.

06 03 09 05 CC I wouldn't bet on that, Charlie.

06 03 09 07 CDR-EVA Stereo on it?

06 03 09 08 LMP-EVA Yeah, but I didn't get - I didn't get a closeup. I don't think we can turn that one over, John (laughter). I can move it. I can rock it.

06 03 09 17 CDR-EVA Wait a minute. Wait a minute. Let's go over here and look. Let's not put no effort into it. I believe we can. I believe we can push it - I believe we can push it this - this way.

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- 06 03 09 27 LMP-EVA Well, let's get a chunk off of it before we - -
- 06 03 09 29 CDR-EVA Okay.
- 06 03 09 30 LMP-EVA - - push it.
- 06 03 09 32 CDR-EVA No, I don't think so either.
- 06 03 09 34 LMP-EVA There's a better one to turn over right down there.
It's about half this size.
- 06 03 09 37 CDR-EVA Yeah. Yeah, it'll w - it'll work - it'll work good.
- 06 03 09 38 LMP-EVA Yeah.
- 06 03 10 03 CDR-EVA Got a few footprints around it for scale now,
Houston. You got your hammer, Charlie?
- 06 03 10 11 LMP-EVA Yeah, I got the hammer, and I'm bringing the tongs
and the - and the scoop for a little fillet sample
around it.
- 06 03 10 19 CDR-EVA That's a good head.
- 06 03 10 23 LMP-EVA Okay, Tony, we might think of a padded bag sample
here, those - There's one rock here that I'm con-
vinced - Well, this whole rock here, its - it -
it - Well, this big one's a breccia, but the other
one looks like a crystalline rock.
- 06 03 10 39 CDR-EVA Let me carry one of these -
- 06 03 10 45 LMP-EVA Let's see, let me get a little closeup of this
thing.
- 06 03 10 54 CC Okay, why don't you try to chip out some of those
clasts there, and we won't worry about overturning
this one, but maybe you can get - maybe you can get
a fillet here. If you haven't messed up the fillet
by getting in there too close.
- 06 03 11 11 LMP-EVA Okay.
- 06 03 11 14 CDR-EVA Charlie, you got your hammer locked in your pocket.
- 06 03 11 20 LMP-EVA So nobody can steal it from me.

06 03 11 23 CDR-EVA Let's see you give it to me, then.

06 03 11 26 LMP-EVA How's that?

06 03 11 27 CDR-EVA Tricky, ain't you. (Laughter)

06 03 11 30 LMP-EVA Okay. John, let's find a good place to whack.

06 03 11 33 CDR-EVA Let's get the fillet first, though -

06 03 11 34 LMP-EVA Okay.

06 03 11 35 CDR-EVA - - we'll get dirt all over it.

06 03 11 41 CDR-EVA Actually, I don't see any fillet, per se. I think it just hit and made a - stick it in the dirt. *** End it up in the dirt, Charlie. *** Tell which way is up. How about right there?

06 03 12 00 LMP-EVA Okay. Fine.

06 03 12 13 CDR-EVA *** cross-Sun stereo, where are you gonna *** ...

06 03 12 17 LMP-EVA Okay. Just take a picture of it and I'll hold the scoop end. I'm gonna ***

06 03 12 21 CDR-EVA *** standing in the shadow, Charlie. Get the after, Charlie.

06 03 12 27 LMP-EVA Huh?

06 03 12 29 CDR-EVA Get it in the after.

06 03 12 32 LMP-EVA Oh. Okay.

06 03 12 36 CDR-EVA Can't you get that cotton-picking shovel out of the way?

06 03 12 39 LMP-EVA Yeah. (Laughter)

06 03 12 45 CDR-EVA Okay, now take a big hunk out of there.

06 03 12 48 LMP-EVA Okay, here we go. Man, you can't see anything with *** down in the shadow like that. There we go. Hey, John, here's a little piece just sitting up here on top of the rock that's - that's got the -

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06 03 13 26 CDR-EVA Okay, Houston, that sample's in bag 374.

06 03 13 30 CC Okay; 374.

06 03 13 33 CDR-EVA Bag.

06 03 13 35 LMP-EVA Open it. Let's see. We got to find a place to chip that.

06 03 13 44 CDR-EVA Here's a place that's hanging out, Charlie. Charlie.

06 03 13 52 LMP-EVA Okay, let's get a - let me get a - a before. Why don't you put a - put your - your hammer down there.

06 03 14 03 CDR-EVA They've got enough documentation on the scale.

06 03 14 06 LMP-EVA Okay. That looks great. Got to hit it, it looks like.

06 03 14 13 CDR-EVA Yeah, but it's right at a fracture, so it'll come off in good shape.

06 03 14 15 LMP-EVA Yeah.

06 03 14 20 LMP-EVA Man, the whole rock's coming apart. Super job, John.

06 03 14 23 CC Good show.

06 03 14 30 CDR-EVA Wow! Boy! It was a - one of those fractures that's all included with glass.

06 03 14 36 CC Understand.

06 03 14 37 CDR-EVA Charlie?

06 03 14 38 LMP-EVA Yeah.

06 03 14 39 CDR-EVA See those glass fractures that - -

06 03 14 40 LMP-EVA Uh-huh.

06 03 14 41 CDR-EVA I think the after on this one will be pretty interesting.

06 03 14 44 LMP-EVA Okay, Tony, that - -

06 03 14 46 CDR-EVA Don't stick that in the bag.

06 03 14 47 LMP-EVA Yeah - Is going in 340.

06 03 14 49 CC Okay, bag 340.

06 03 14 53 LMP-EVA No, that was - that was a - yeah, bag 340 for the
the rock.

06 03 14 59 CDR-EVA *** Charlie.

06 03 15 14 LMP-EVA There we go. *** cameras keep running in this
dirt, I'll never know.

06 03 15 26 CDR-EVA Ah, plop.

06 03 15 30 LMP-EVA Okay?

06 03 15 32 CDR-EVA Got it. Now, how about that rock over yonder.

06 03 15 37 LMP-EVA That's the one I'm going for. Did you get the
after?

06 03 15 40 CDR-EVA No, I sure didn't, but I*** won't have any trouble
putting this back in place, Houston.

06 03 15 57 LMP-EVA Look at that beauty, John! That is a crystalline
rock, no breccia.

06 03 16 01 CC Absolutely great.

06 03 16 03 CDR-EVA A no - no-breccia, crystalline rock, huh?

06 03 16 07 LMP-EVA And it is whitish to gray, with a lot of zap pits
in it.

06 03 16 14 CDR-EVA *** it is, I believe. A baby could run across one.
It even has some - it even has what look to be -
No, those - those are zap pits, aren't they?

06 03 16 24 LMP-EVA Yeah. In fact, Tony, the whole area - There's a lot of this rock - There's a lot of this rock here, scattered all over - scattered around.

06 03 16 33 CC Okay, understand. Good. We'll need a picture, and then we'll see if you can turn it over.

06 03 16 42 CDR-EVA No, we can't turn that one over.

06 03 16 44 CC Okay.

06 03 16 46 CDR-EVA Think we can turn that over, Charlie?

06 03 16 47 LMP-EVA Yeah, we might, if we grab hold of this corner. I'd like you to get a big sample first, though. Get a down-Sun.

06 03 16 55 CDR-EVA Where do you want a sample from?

06 03 16 57 LMP-EVA See that sharp corner? Right up at the top there?

06 03 17 00 CDR-EVA Off the top?

06 03 17 02 LMP-EVA Yeah.

06 03 17 06 CDR-EVA Okay. *** think I can get that. It's fractured right there.

06 03 17 08 LMP-EVA Okay, I was thinking - Okay, that's good.

06 03 17 14 CDR-EVA Ah, shoot. Look at that.

06 03 17 27 CDR-EVA Well, if that ain't pure plage, I never seen it.

06 03 17 31 LMP-EVA Don't it look like pure plage to you?

06 03 17 32 CDR-EVA I don't know what it is, though.

06 03 17 35 LMP-EVA It's pure feldspar, looks like - -

06 03 17 38 CDR-EVA Pure feldspar. Don't it look like it's been -
It's so sandy looking, it could have been reworked
or something.

06 03 17 48 LMP-EVA Maybe partially shocked.

06 03 17 49 CDR-EVA Shocked, yeah.

06 03 17 51 LMP-EVA But it's pure plage - it's plage, Tony.

06 03 17 55 CC Okay, we copy that.

06 03 17 56 LMP-EVA And it's in 341. Whack off - Whack off another
piece right here, John.

06 03 18 01 CC Okay, understand it's pretty friable.

06 03 18 03 LMP-EVA And this rock is pretty predominant.

06 03 18 06 CDR-EVA Where, Charlie?

06 03 18 07 LMP-EVA No, he didn't - -

06 03 18 08 CDR-EVA No, it isn't friable; it just fractured.

06 03 18 10 CC Okay.

06 03 18 12 CDR-EVA Where do you want to hit it off, Charlie?

06 03 18 14 LMP-EVA Right - right at that sharp - where - see where
the no - the - right there; yeah. See how that
comes off. Pretty friable isn't it?

06 03 18 22 CDR-EVA Yeah. Bet it's shocked.

06 03 18 25 LMP-EVA Yeah.

06 03 18 32 CDR-EVA Put that in the same bag?

06 03 18 33 LMP-EVA Yeah, let's put them all - and there's another
piece down there, if you - I'll get the tongs.

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06 03 18 37 CDR-EVA We got to get the after.

06 03 18 38 LMP-EVA Okay, I'll get the after of that right here.

06 03 18 43 CDR-EVA Okay, the first two pieces - the first piece was off the top of the rock, the second piece is under the shadow of the (laughter) gnomon shovel, and they're both going in bag number whatever Charlie says.

06 03 18 56 LMP-EVA 341.

06 03 18 57 CC Okay, we - -

06 03 18 58 LMP-EVA We're gonna have another piece that came out of the same - the second whack.

06 03 19 02 CC Okay.

06 03 19 08 LMP-EVA John, let's put this other piece in a - another bag, because this one has got no dust in it at all. Hold - Just hold that gnomon, let me ... this one up.

06 03 19 18 CC And we'd like you to still have a try at turning it over.

06 03 19 20 LMP-EVA Let's do it without getting any -

06 03 19 25 CDR-EVA Okay. *** get that rascal over?

06 03 19 30 LMP-EVA Well, we can try.

06 03 19 31 CDR-EVA We ought to try rolling it down in that hole.

06 03 19 36 LMP-EVA Okay.

06 03 19 39 CDR-EVA *** greenish hue to it, too, I don't - I'm making that up, maybe.

06 03 19 43 LMP-EVA Okay. The other piece of that rock's going in 342, Tony, and that rock's pretty - I see at least 10 other rocks around here that have that same appearance, so it's not a - a completely anomalous rock.

06 03 19 59 CC Okay.

06 03 20 04 LMP-EVA The bag's getting full, John.

06 03 20 08 CDR-EVA Yeah.

06 03 20 13 LMP-EVA I don't think we can turn that one over, but I think we can turn that one over down over there.

06 03 20 20 CDR-EVA Which way do you want to turn it?

06 03 20 22 LMP-EVA I was going to push it that way - -

06 03 20 23 CDR-EVA Think you're right.

06 03 20 24 LMP-EVA - - because we - we can get down below it.

06 03 20 25 CDR-EVA Wait, let's move the toolage.

06 03 20 27 LMP-EVA Okay.

06 03 20 29 CDR-EVA Here's a rock with glass splattered all over its body.

06 03 20 32 LMP-EVA Yeah, I see.

06 03 20 36 CDR-EVA Let me do that, Charlie.

06 03 20 37 LMP-EVA No, we can both lift it.

06 03 20 46 CDR-EVA No way.

06 03 20 47 CC Okay, let's forget that one.

06 03 20 49 LMP-EVA - - budged once, but I don't think we're gonna do it. Tony, there's one off at - at the 3 o'clock position of the Rover that I think we can turn over.

06 03 20 59 CC Okay, have at it. And remember we're looking for shaded samples and east-west cracks and all that kind of thing.

Tape 96/42

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06 03 21 09 LMP-EVA Yeah, well, there's nothing like that here.

06 03 21 11 CC Okay.

06 03 21 13 LMP-EVA Unfortunately.

06 03 21 27 CC If you see one with a better developed fillet - -

06 03 21 29 LMP-EVA - - you'll never budge that rock.

06 03 21 30 CC I'm not so sure we got a good fillet on this last one, so we might be willing to sample another.

06 03 21 39 LMP-EVA Okay. Sorry that y'all gonna be looking up-Sun, Tony, but - Oh, man, John, that's a biggie. Looks bigger than I thought.

06 03 22 05 CDR-EVA Big?

06 03 22 06 LMP-EVA Yeah.

06 03 22 08 CDR-EVA Now, we - we take the documentation first, right? Get the -

06 03 22 14 LMP-EVA Yeah, let me take a cross-Sun - -

06 03 22 17 CDR-EVA I'll get the cross-Sun.

06 03 22 18 LMP-EVA Okay, then we'll see if we can move it. I don't think, we can. It's got a pretty big base to it. Okay, 7 foot at F/8. I got it. Hey, 1 - Got a good fillet around it.

06 03 22 43 CDR-EVA It does.

06 03 22 45 LMP-EVA Okay, let me turn over and see what that says. It doesn't have any dust on the top of it. I thought we could get the fillet sample here, but it doesn't have any dust on the top.

06 03 22 58 CC We don't need dust from the top. If this is a better fillet than the other, you might take a soil sample there, and then a reference soil away, and then a chip off the rock, and we'll have a good fillet sample.

06 03 23 09 LMP-EVA Okay, this is a better - this is a better fillet than the other one.

06 03 23 13 CDR-EVA Okay, but I thought you - you didn't want - you wanted - you didn't want breccias - breccia.

06 03 23 21 LMP-EVA Just crystalline or rough breccia for fillet sample.

06 03 23 25 CDR-EVA I don't know whether it's tough or not. You mean hard.

06 03 23 29 LMP-EVA Yeah.

06 03 23 30 CDR-EVA Not tough.

06 03 23 32 LMP-EVA Yeah, hard. ... let's try it, John, okay?

06 03 23 35 CDR-EVA All righty.

06 03 23 36 LMP-EVA We'll fill that square. Okay, fillet coming in from this side. There's a good one right over here. Already got the cross-Sun.

06 03 23 57 CDR-EVA My personal guess is that it - fillet didn't come off that rock.

06 03 24 01 LMP-EVA Mine, too; 375.

06 03 24 08 CC Okay, 375.

06 03 24 16 CDR-EVA *** Charlie, wait a minute. Wait a minute; here - Let me put this in your bag and give you a hand *** turn that. Got to get a rock off the top before we turn it, right?

06 03 24 28 LMP-EVA No, they don't have to do that. They want a chip off of it, though.

06 03 24 32 CDR-EVA That's what I mean.

06 03 24 33 LMP-EVA Yeah.

06 03 24 35 CDR-EVA Okay, let's get the chip.

06 03 24 37 LMP-EVA Okay. Okay, Tony, I got a footprint in, but I'll put the - the spade - the shovel - the scoop, rather, will be right - right west of where the fillet was taken.

Tape 96/44

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06 03 24 53 CC Okay, good show. And we'll need a reference soil.

06 03 25 02 LMP-EVA Yeah, we'll get it.

06 03 25 04 CDR-EVA Lift up, Charlie.

06 03 25 05 LMP-EVA That's a hard breccia, ain't it?

06 03 25 06 CDR-EVA A hard, hard rock.

06 03 25 10 LMP-EVA Hit it right here on this corner right here in the
sh - in your shadow now. Down a little bit. There
you go. That's a - Super.

06 03 25 21 CDR-EVA Careful.

06 03 25 24 CC Hey, Charlie, you just dropped a sample.

06 03 25 26 CDR-EVA That just opened up a - Charlie, you're bouncing
around too much - -

06 03 25 32 LMP-EVA Thank you.

06 03 25 33 CDR-EVA - - your top came loose. Thank you, Houston.

06 03 25 40 LMP-EVA Pretty good resolution, Tony.

06 03 25 42 CC Right.

06 03 25 49 LMP-EVA Could you stick that back in my bag, John?
What do you what? John?

06 03 26 09 CDR-EVA No, I just feel like my suit is pressurizing more.
What are you guys looking at down there on the
ground?

06 03 26 15 CC Oh, we're seeing you bending over a big boulder.

06 03 26 18 LMP-EVA What's your ... gage read?

06 03 26 22 CDR-EVA No, no, on my suit pressure.

06 03 26 25 CC 3.9.

06 03 26 28 CDR-EVA Let me get it, Charlie. Okay.

06 03 26 31 LMP-EVA I felt the same way a minute ago, John. Dadgum
thing's gonna be too big to go in there, anyway.

06 03 26 42 CDR-EVA Yep ***

06 03 26 44 LMP-EVA Go ahead.

06 03 26 50 CDR-EVA I got you.

06 03 26 52 LMP-EVA Get it?

06 03 26 53 CDR-EVA Yeah.

06 03 26 58 LMP-EVA Want to crack it in two or bring the whole - it's
not gonna be any good unless we can get it in the
sack.

06 03 27 02 CDR-EVA It isn't gonna be any good unless we put it in the
sack?

06 03 27 05 LMP-EVA I don't think they'll ever recognize it again.

06 03 27 07 CDR-EVA Oh, yeah; throw it in my bag.

06 03 27 11 LMP-EVA Let's - Okay. Okay, Tony, that fillet - that chip
off that block - -

06 03 27 22 CDR-EVA Okay, and it opened up a clear fillet, and there's
a lot of - this is a vesicular type of breccia ...

06 03 27 36 LMP-EVA Another piece that fell off here.

06 03 27 38 CDR-EVA Don't worry about it, Charlie.

06 03 27 39 LMP-EVA Well, I was gonna put it in a sack so they'll make
sure - all that hammering, I don't want them to
lose it. Yeah.

06 03 27 50 CDR-EVA Hey, let's push it over.

06 03 27 52 LMP-EVA Don't think we can. Okay, that came off the rock
right there. Okay, Tony, a loose piece off the
side of the rock is going in bag 343.

06 03 28 09 CC Okay; 343.

Tape 96/46

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06 03 28 15 CDR-EVA *** to push that rock.

06 03 28 19 CC Okay, and you've got - -

06 03 28 20 LMP-EVA - - the other way, downslope with it, John.

06 03 28 23 CC - - 15 minutes left.

06 03 28 30 CDR-EVA Okay, lean on it.

06 03 28 38 LMP-EVA That's too much work, John.

06 03 28 40 CC Yeah, don't strain yourselves there.

06 03 28 42 LMP-EVA We can rock it out of there.

06 03 28 45 CDR-EVA Well, you don't want to - -

06 03 28 47 LMP-EVA Don't worry. Gonna need - Getting a full sack, too, babe.

06 03 28 59 CDR-EVA *** hold this here for a second, Charlie?

06 03 29 01 LMP-EVA Yeah, wait a minute. Let me get this top closed. Turn around just a minute to your right; thank you. Okay. Go ahead. *** think you can do it, John. *** what I was trying.

06 03 29 24 CDR-EVA You were trying to pick it up?

06 03 29 25 LMP-EVA That's what I tried - Yeah, I tried from that edge, too. *** not even budging it.

06 03 29 32 CDR-EVA Well, you just can't get a grip on it.

06 03 29 34 LMP-EVA No, you can't, not with these gloves. Here's your hammer back. We got to go off 5 meters and get a reference soil.

06 03 29 44 CC Okay, why don't we get that reference soil and look around for a little bit smaller boulder to turn over.

06 03 29 52 MS Okay.

06 03 30 04 CDR-EVA I think the reference soil is back there at the soil sample.

06 03 30 08 LMP-EVA Okay, here's 5 - 5 - Here's a pretty pristine area right over here, John, we haven't been walking - We can just go over here and get it. Take the shovel down there and I'll - Is that 5 meters?

06 03 30 24 CDR-EVA Yeah, that's about 5 meters. Fifteen feet, baby.

06 03 30 26 LMP-EVA Yeah. Okay, I get the down-Sun.

06 03 30 32 CDR-EVA Okay, the shovel will be in the rocks. *** near these rocks, and we had the shovel to pick it up with, so -

06 03 30 49 LMP-EVA And that serves as a locator, too, Tony.

06 03 30 51 CC Okay, that sounds fine.

06 03 31 01 LMP-EVA What is it, babe?

06 03 31 03 CDR-EVA I was looking for a boulder to turn over, and I don't see any.

06 03 31 06 LMP-EVA There's a little one right up there; it's about a foot and a half.

06 03 31 09 CDR-EVA That one right there?

06 03 31 10 LMP-EVA Yeah, uh-huh. Okay, Tony; is one scoopful enough?

06 03 31 18 CC Roger. One scoopful.

06 03 31 32 LMP-EVA Got a little glass bead in it, John.

06 03 31 33 CDR-EVA It does.

06 03 31 36 LMP-EVA That's good. Went right in. Okay, that one shovelful, Tony, baby, is in 344.

06 03 31 51 CC Okay; 344.

06 03 31 56 LMP-EVA Put it in my bag, John. Yours is full.

06 03 31 59 CC And we'd like you to use the rest of the time here just in documented sampling, if you don't see a more appropriate boulder than that foot-and-a-half one.

Tape 96/48

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06 03 32 10 CDR-EVA Okay.

06 03 32 11 CC And, we encourage you to just look for some variety.

06 03 32 12 LMP-EVA There's one down here, but that's quite a ways down - down to your left. There's one down there, but it's pretty far downslope.

06 03 32 22 CDR-EVA How about - this one right here - We can turn it over, Charlie. It just isn't very big, that's all.

06 03 32 26 LMP-EVA That's right, that's what they just said; they don't want that one.

06 03 32 29 CDR-EVA Oh.

06 03 32 34 LMP-EVA Whoops, here we go again. Give me a help.

06 03 32 42 CDR-EVA Here you go.

06 03 32 45 LMP-EVA Okay, just push - start pushing on ahead.

06 03 32 49 CDR-EVA Give me a hand.

06 03 32 50 LMP-EVA Okay. Here we go. There goes a bag. There goes another bag - -

06 03 32 56 CDR-EVA - - sample bag.

06 03 32 57 LMP-EVA - - two bags. Dadgummit.

06 03 33 05 CDR-EVA I think we ought to trade those bags - samp - samples.

06 03 33 09 LMP-EVA Yeah, I'm gonna empty them in the seat.

06 03 33 11 CDR-EVA Huh?

06 03 33 12 CC Right, those babies look about full.

06 03 33 13 CDR-EVA Yeah, I think we should do that.

06 03 33 16 LMP-EVA They are.

06 03 33 18 CDR-EVA They ain't look - they - they're not looking it, they really are full. We ought to go trade them out right now.

06 03 33 25 LMP-EVA Okay.

06 03 33 26 CDR-EVA Both sets. *** our hard work here. Let's go trade them, Charlie.

06 03 33 32 LMP-EVA Yeah, that's a good idea. How are the consumables looking, Tony?

06 03 33 44 CC We'll get a number for you.

06 03 33 59 CC Okay, your consumables look pretty good. In fact, you may even be able to get a little extension.

06 03 34 08 CDR-EVA Hotdiggity.

06 03 34 09 LMP-EVA Super.

06 03 34 29 LMP-EVA Okay, let's see. Stand that up, we're gonna be using that beauty.

06 03 34 37 CC And, Charlie, as long as you're back here at the Rover - -

06 03 34 38 LMP-EVA Okay, John, there's an empty bag - -

06 03 34 42 CC - - we'd like you to take some 500-millimeters, when you get a chance, of Stone Mountain.

06 03 34 48 LMP-EVA All righty; I'll do it.

06 03 34 51 CDR-EVA Man, we were just up there (laughter). You weren't paying attention, huh?

06 03 34 58 LMP-EVA And, Tony, when I shade my eyes I can still see those lineations climbing right up to the southwest, and starting at the Cayley and going right on up across the mountain. Let's change these bags.

06 03 35 16 CDR-EVA - - change bags. Bend over, Charlie.

06 03 35 22 LMP-EVA Okay.

06 03 35 23 CDR-EVA That Velcro held. I'm really surprised. Okay. I've got it.

06 03 35 34 LMP-EVA Okay, excuse me.

06 03 35 36 CDR-EVA All right.

06 03 35 40 LMP-EVA Now I'll get yours. We got a couple of core tubes -
I tell you what I'll do, John. Let me get yours
off of here.

06 03 35 48 CDR-EVA Okay.

06 03 35 49 LMP-EVA And -

06 03 35 52 CDR-EVA Why don't you get the core tubes out?

06 03 35 55 LMP-EVA Okay, I will. There's another bag under my seat
that I could put them in.

06 03 36 01 CDR-EVA Will they hold any more when we do that?

06 03 36 07 LMP-EVA No, you're right. Make sure these tops are down
good here.

06 03 36 20 CDR-EVA ***lieve it.

06 03 36 35 LMP-EVA That one wasn't on.

06 03 36 36 CDR-EVA Huh?

06 03 36 37 LMP-EVA Mine wasn't on.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 02 04 00 CMP The highlands material that's over to the east of
Fra Mauro itself all has the same appearance -
as though it's - belongs to the same pattern.

06 02 04 35 CC You ought to be approaching the terminator now.
Is that right?

06 02 04 42 CMP Yes sir.

06 02 04 54 CMP And - I have been rather impressed with the fact
that, in most of these little - grabens or rilles,
in the low Sun, it appears to me that the floors

of these things have a lower crater density in general than the outsides of the crater - the crater density on the outside of the - of the rille itself. You can see this at low Sun angle quite dramatically.

06 02 05 35 CMP And just to the west of the Fra Mauro area, we've got another rille coming up, and - in places, it looks like it has a little - little ridge around it. When you get the real low Suns on this very mottled surface - it looks more like you're looking at some of those sponges and things you see in the ocean floor than it does any part of the Moon - the way it will look when the Sun comes up.

06 02 08 52 CMP Okay, Hank. Do you have a - couple of photo pads for me?

06 02 08 59 CC I sure do.

06 02 09 03 CMP Okay. Why don't you fire away?

06 02 09 05 CC Okay. The first one is at 4 - 148:10, and it's a pan camera pad.

06 02 09 18 CMP Okay.

06 02 09 19 CC T-start: 148:07:14; T-stop: 148:17:14.

06 02 09 35 CMP Okay. T-start for the pan camera: 148:07:14; stop: 148:17:14.

06 02 09 42 CC Okay. At 149:05 on the next page, your solar corona pad.

06 02 09 53 CMP Okay.

06 02 09 54 CC 149:02:56.

06 02 10 02 CMP 149:02:56.

06 02 10 03 CC And the same page, down at 149:25; pan camera pad - T-start is 149:16:24; T-stop: 149:38:04.

06 02 10 26 CMP 149:16:24, and 149:38:04 for the pan camera.

06 02 10 32 CC Roger. Good readback.

06 02 10 45 CC And if you've got your scratchpad handy, I've got a couple of comments I'd like to - questions I'd like to get up on Guyot, you mentioned a while ago.

06 02 10 58 CMP Okay. Stand by. I'll get it. Okay. Go ahead.

06 02 11 10 CC Okay. You described this big hole with a black blob, and the question is: Is the big hole a crater, or does it look more like a volcanic vent?

06 02 11 26 CMP Well, it looks to me like a - like a crater, like all the rest of the craters around here, except it occurs in the side of a - a crater wall. But - I've been looking for similar features, and there's quite a few of these big - real large craters that have similar size craters in their walls too. So I wouldn't say that's anomalous.

06 02 11 54 CC Roger. And does the blob look at all like lava?

06 02 12 05 CMP (Laughter) Well, I can't get close enough right now to see. There's - -

06 02 12 08 CC Okay. We just want you to have these questions - -

06 02 12 10 CMP - - two things that look like flows. One of them is a - Yeah. Well, I - obviously, that's one of the things that - and I don't think we're gonna be able to answer that question; at least, I can't. But I - it looks like - it looks just like the - material that you see coming down the side of the mountains to the north of Flagstaff. I know that's lava, but whether this is the same sort of thing or not I don't know, because there's so many places on the back side where you see what appears to be flow lines and if you follow them far enough, you find some pla - place where they get lost. Now this one is a - has a real dark set of material - and when I say real dark, I mean dark compared to the rest of the Moon. And it's - it seems to be - consisting of two different flows, or two different

units: one - much lighter and closer to the regular lunar surface; both of them are darker though, and the dark ones look like the same kind of dark material - I'd say it looks the same as what you see in subtle expressions in the little domes in King and along the central peak.

- 06 02 13 41 CC Casper, could you get the LASER ALTIMETER ON, please?
- 06 02 13 47 CMP Oh. Yes sir. It's on. Thank you.
- 06 02 13 58 CC Okay. And could you give us an estimate of how large this feature is?
- 06 02 14 11 CMP Uh-oh. I was afraid you'd ask that. Let me get a scale on Guyot.
- 06 02 14 23 CMP The crater is in the - almost due - west of the wall - pointing towards Lobachevsky; and I would say that the crater is about - between a quarter and a third the diameter - The diameter of the crater is between a quarter and a third the total depth from the floor of the Crater Guyot up to the rim.
- 06 02 15 04 CC Roger. Copy. And - Ken, we - we - you got another opportunity to look at this thing on the next rev, I think. Our figures here show that your time of closest approach is 147:31:04. And you should be able to see it through window 4 and then window 3 as you go by. And, this is just for your own information, if you do want to take another look and take a stab at these questions and any other things you see about it.
- 06 02 15 41 CMP Okay. I've been - I commented on this thing, I thought, sometime yesterday - first time I saw it - and I've been looking at it periodically. Unfortunately, it occurs at the same time King does, and you - you get all wrapped around the axle trying to figure out which one you need to work on.

06 02 15 59 CC Okay. Just threw this out to you in case you want to take a look at it.

06 02 16 06 CMP Yeah. Thank you very much. I've got you a couple of pictures of it.

06 02 16 31 CMP Let's see. I'll try to whip off a P52 here for you before I start to exercise.

06 02 16 43 CC Hey, that's real good, Ken. We were hoping you'd donate a couple of minutes of your exercise period for that.

06 02 16 52 CMP I'm so far behind on exercise now that I may never exercise again. It's really gonna hurt when I get back and have to go to work.

06 02 18 03 CC Ken, you have been getting some exercise - You haven't been omitting these exercise periods, have you?

06 02 18 11 CMP No. No. But that just isn't - you know, that just isn't much. I can hardly get a heart rate enough to even tell it's there. It doesn't seem like I can change it with the equipment I have.

06 02 18 26 CC Okay. Well, we want you to - -

06 02 18 28 CMP No. I get the exercise. In just doesn't amount to anything.

06 02 18 29 CC - - take full advantage of all these.

06 02 18 33 CMP (Laughter) Yeah. Well, you'll feel better when you get through, having done something like that. Even though I don't think it's enough exercise to amount to anything, it just makes you feel better. I advocate doing them.

06 02 21 55 CC Casper, we have the angles. You're clear to start.

06 02 22 06 CMP Okay. I'll catch it at 00:50.

06 02 22 27 CC And you'd better get your camera set up, Ken, for the terminator photos.

06 02 22 34 CMP Okay. Thank you.

06 02 22 44 CC And when you get that, just might as well do your exercise - don't want to interfere with that. And I'll just give you a brief call prior to LOS.

06 02 22 54 CMP Okay.

06 02 30 13 CC Casper, Houston. Do you read? You are looking good at LOS, and we'd like you to verify the DSE after LOS.

06 02 32 15 CC Casper, if you still read, the Surgeon says you got your heart rate up to 90 now.

06 02 33 02 CMP Hank, according to that theory, it sounds like the hardest work I've done in this flight was lift-off.

06 02 33 08 CC (Laughter) Roger. Hey, INCO says he's going to take care of the tape recorder, but you might ought to verify.

(NO COMM FOR 50 MINUTES)

06 03 10 XX BEGIN LUNAR REV 38

06 03 23 02 CC Casper, Houston.

06 03 23 10 CMP Hello, there.

06 03 23 12 CC Hello, Ken. How'd it go on the last pass?

06 03 23 19 CMP Oh, it went all the way around, came back out the front side, and I got exercise, and got some terminator pictures, and got a good look at Guyot again. I guess I'm gonna have to - gonna have to

make a few corrections to my size estimate on that thing at Guyot. It looks like the crater that it's coming out of is really like half the size of the Guyot feature, instead of what I had said before: about a third. And - not only that, but the - I disc - I saw something else this time that was - also went unnoticed before. The crater is located right at the top of the rim and works its way down to about halfway, then this dark material comes out; and there's two - as I said before - there's two shades of this dark material. Then - a striation that shows up that's like all the rest of these lineaments we've been seeing all over the Moon. And I think I remember saying something as I passed Theophilus on one of our early revs right after we got here that it looked like these - these patterns that we see that are all over the surface - on the sides of every hill and every out - every vertical surface - they all seem to follow the contours of any local topography. If there's a - like in Theophilus, I first noticed it here on the crater rim - There were some other little craters up along the side, and those little craters that were up along the side left impressions down inside the - on these - these striations that run around the - the rest of the - of the Moon, or the rest of the crater interior. And that happened everywhere you looked.

06 03 25 50 CC

Could they be fractures or something like that?

06 03 25 57 CMP

Well. That was what I was wondering: if these are shock reflections or something like that. And I guess that still is a reasonable hypothesis, except these things are all over the surface, everywhere you look - in places where you really wouldn't expect to see shocks; but, you know, maybe they're there after all.

06 03 26 26 CC

Did you happen to observe, going by King this time, anything up to the north, any expression at all of the Soviet Mountains?

06 03 26 39 CMP Yeah. I've been looking for those for - quite a few revs now, and I cannot follow the rays of King out to the north and make any conclusion at all about them. I can see some of the ray material that comes down from King, but - or it comes out from King, I should say - but I'm really having no luck at all tracing that stuff to the north. Then I started looking for this - Soviet Mountains; and, when you look north and south - way out on the horizon here - you get the impression that there's north and south trending, very subtle constructional builds. But I'm not sure that isn't just the way we're looking at it, because every time you look cross-Sun, you're gonna see that sort of pattern. Anything that's there is gonna show up, and if you put enough of these craters together, they are bound to make a line. So, I can't really say that I see one; it appears to me that if there is, there's a very, very shallow rise which, instead of calling it a mountain range, I would call it more like a plateau front similar to the Kant Plateau rise as it comes up from behind Theophilus.

06 03 28 03 CC Could you give us high gain, AUTO position?

06 03 28 14 CMP You have AUTO.

06 03 28 17 CC Okay. I guess the - the laser altimeter is down to about 50 percent now, and - the groundtrack is not gonna go over that part, so we're not gonna get any laser information to give us any data on the topography in that area. And that's why we're particularly interested in your observations of whether there's actual rise in the topography there or not.

06 03 28 42 CMP It's real hard to say. I'd say if there is, it's like a plateau though, Hank - very subtle.

06 03 28 59 CC Ken, could you give us WIDE BEAM width and then back to NARROW?

06 03 29 18 CMP Yeah. That doesn't seem to help. Let me go back and try her.

06 03 30 34 CMP Okay. I've got you back in REACQ and NARROW.

06 03 30 40 CC Okay.

06 03 30 46 CMP You want me to try AUTO again?

06 03 30 49 CC Okay, Ken. Go back to AUTO.

06 03 30 56 CMP Okay. Looks like you got it that time.

06 03 31 04 CC Anything else to report on your back side observations, Ken?

06 03 31 15 CMP Say again, Hank?

06 03 31 16 CC Do you have any other comments about the back side observations?

06 03 31 28 CMP No. I guess there's some stuff around King there again that's just - the more I study that one feature, the more I see with it, which is sort of what you'd expect. And it's kind of nice because it's right on the groundtrack so often. Looks like there's a lot of material that I would call an ejecta blanket that comes out from it. It seems to climb up the sides of craters around it, surrounding it. And it looks definitely like there's some kind of a - of a flow - again, I would characterize it more as a mud flow than anything else. It looks like it comes out of that southeastern corner - the stuff that goes out to the northeast and to the northwest is all - looks like it comes out a lot faster.

06 03 32 23 CC Roger. Can you see any expression of that central feature out to the north?

06 03 32 32 CMP Say again, please.

06 03 32 34 CC The central feature there - the "Y" in King crater - can you see any expression of that out to the north - through the north wall of the crater, up toward the north?

06 03 32 48 CMP No. No better than you can looking at the photographs. There's a lot of light material up there that has what looks like dark material sticking through it. It looks that way very obviously - looks like there's rocks and - it's still hard to determine if those are rocks or if those are shadows, but I've seen it a couple of times looking back from the - from west to east, and it still looks like - hard - shadow, so it must be our - it must be dark material or a block at least, rather than shadows.

06 03 33 26 CC Roger. We're gonna have the rest of your Flight Plan updates for you later in this rev, Ken. I notice it's supposed to be your eat period, and I don't want to eat up too much of that, if you'll pardon the expression. So I'll hush up for a while.

06 03 33 54 CMP After a pun like that, you'd better.

06 03 33 58 CC (Laughter) Roger.

06 03 34 13 CMP That was so bad, Hank, it belongs on our "Thought for the day" board.

06 03 34 17 CC (Laughter) Roger.

06 03 35 08 CMP Hank, did the surface guys say anything about - have they seen any different kind of material? I guess - I understood all they saw yesterday was breccia. Have they seen anything else this morning?

06 03 35 23 CC Stand by.

06 03 35 46 CC Ken, most of the things they've seen today are breccia again. They did find one rock they thought was crystalline, but there's some doubt about it.

06 03 36 00 CMP Well, based on our past experience, when you see a crystalline rock, it's best to be quiet about it, I guess.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 03 36 00 LMP-EVA - - my feet that I could put them in.

06 03 36 02 CDR-EVA Will they hold any more when we do that?

06 03 36 04 LMP-EVA No. You're right. Make sure these tops are down good, here.

06 03 36 31 CDR-EVA Leave it.

06 03 36 32 CDR-EVA Hate - that thing.

06 03 36 33 LMP-EVA See, that one wasn't on.

06 03 36 34 LMP-EVA Huh?

06 03 36 35 LMP-EVA Mine wasn't on.

06 03 36 55 CDR-EVA ... thing. Charlie.

06 03 37 00 LMP-EVA What?

06 03 37 01 CDR-EVA I think we ought to put them under our seats. Well, let's open the gage here. We ain't got any room under our seat.

06 03 37 08 LMP-EVA Right.

06 03 37 12 CDR-EVA Okay. Now, you tell me why that thing - Oh, I can see from here.

06 03 37 29 CDR-EVA Push down on that door. That's good. (Laughter) ... on the thing it goes on ...

06 03 38 00 LMP-EVA Do you want me to open the door?

06 03 38 01 CDR-EVA No, I've got it now. There we go.

06 03 38 05 LMP-EVA Without that camera, it's a piece of cake.

06 03 38 07 CDR-EVA Yeah, it's -

06 03 38 08 LMP-EVA Okay; now, that top is closed good and tight. That one there is. Okay. Now. Hey, Tony, we're breaking out bag 4.

06 03 38 26 CC Okay; bag 4.

06 03 38 30 LMP-EVA John, I think we can just leave you - those -
doomaflickies - the core tubes in the - in there,
and then when I get to the next place, I can - -

06 03 38 42 CDR-EVA Use it like we normally do.

06 03 38 44 LMP-EVA Yeah, I'll just use them ...

06 03 38 47 CDR-EVA All you have to do is just pull it in the ...,
Charlie. It'll open right up.

06 03 38 53 LMP-EVA Do what?

06 03 38 56 CDR-EVA Pull it in the ...

06 03 38 58 LMP-EVA That's what I tried to do, but it didn't work.

06 03 39 13 CDR-EVA Okay; it's on the top, get this Velcro strap
through it. Five minutes to change bags. Pretty
expensive.

06 03 39 40 CDR-EVA Charlie, since I don't have to carry the gnomon
any more, I could carry a sample bag in one hand.
We could use that technique.

06 03 39 54 LMP-EVA That's yours now; it's on.

06 03 39 56 CDR-EVA Okay.

06 03 40 02 LMP-EVA Okay. Now, there's one under my feet that's
partially full of rocks. Let me get that. Just
use that.

06 03 40 06 CDR-EVA That thing is full, that's why, and there is
another rock under there that has to go in -

06 03 40 09 LMP-EVA Oh. Okay; we'll get a - okay, we'll just break
out a new one then.

06 03 40 14 CDR-EVA I think you'd better.

06 03 40 23 LMP-EVA Okay; I'm breaking out bag number 6.

06 03 40 27 CC Okay: SCB-6.

06 03 40 29 CDR-EVA Go, Charlie.

06 03 40 32 LMP-EVA Hey, how much time we got left, Tony? This is taking a long time.

06 03 40 48 CDR-EVA Okay, Charlie. Can you turn to the right a little and bend over?

06 03 40 50 LMP-EVA Yeah.

06 03 40 53 CC Okay. I guess we'd like - -

06 03 40 54 LMP-EVA Tony, this might be a good place - -

06 03 40 55 CC Go ahead, Charlie.

06 03 41 00 LMP-EVA Go ahead.

06 03 41 01 CC We're prepared to let you move on out as soon as you're reconfigured there.

06 03 41 08 LMP-EVA Okay; I was just gonna say - There's some good crystalline, that white crystalline rock that we picked up there. There's some good fist-size ores that would make good padded bag samples.

06 03 41 25 CC Okay. While you're configuring, we'll work that.

06 03 42 06 LMP-EVA Oh, dear.

06 03 42 10 CDR-EVA ... kittens with mittens could do better than this.

06 03 42 14 LMP-EVA Isn't that terrible? Isn't that terrible?

06 03 42 26 CC Okay; Charlie. What SCB did you have on before - -

06 03 42 34 LMP-EVA I think it was number 2. Stand by.

06 03 42 36 CC Okay.

06 03 42 39 CDR-EVA There goes the fender. Uh-oh. Okay; it was number 2.

06 03 42 46 CC Okay. We copy that.

06 03 42 47 CDR-EVA No; sorry. That was mine. Charlie had number 1.
Charlie had number 1.

06 03 42 53 CC All right. We copy that.

06 03 42 59 CDR-EVA And I had number 2.

06 03 43 02 LMP-EVA Okay; Tony. We're gonna start sampling again.

06 03 43 07 CC Negative. It's time to go.

06 03 43 11 CDR-EVA It's time to go?

06 03 43 14 CC Yes sir. It sure is.

06 03 43 15 LMP-EVA That was terrible, taking that much time.

06 03 43 21 CC Well, we'll get the padded bags later.

06 03 43 24 LMP-EVA Have we been out there an hour? Been out here an
hour? Tony, we've been here an hour?

06 03 43 32 CC Yes, you have.

06 03 43 38 LMP-EVA It doesn't seem like it.

06 03 43 40 CDR-EVA Time flies, huh?

06 03 43 41 LMP-EVA It sure does.

06 03 43 46 LMP-EVA The old stop 9. Close, says me. Ha! It did.
We lost a fender, Tony. The pusher-downer fender
on the right rear wheel is gone.

06 03 44 03 CC Roger. Just like the trainer.

06 03 44 07 LMP-EVA Just exactly. Okay. Station 8, 10. Got the
sampling. Rake soil was done. Okay; only one
boulder sample. Sorry we couldn't turn one over,
Tony. Okay; that was frame count 120, Tony.

06 03 44 35 CC Okay. We copy that, Charlie. And we may get a
boulder yet, you never know.

06 03 44 45 LMP-EVA Okay; we've still got a half a mag of -
three quarters of a mag on the magazine R. Do
you want me to turn it on?

06 03 44 57 CC Yeah. Let's go ahead and turn it on.

06 03 45 02 LMP-EVA Okay. We'll let her run, one frame a second - -

06 03 45 05 CC Okay.

06 03 45 06 LMP-EVA - - f/8.

06 03 45 07 CDR-EVA Okay; Houston. We're going MODE - MODE switch
to 1.

06 03 45 12 CC Okay; see you later.

06 03 45 15 CDR-EVA Roger. My frame count is 142.

06 03 45 17 CC Okay; 142.

06 03 45 45 CDR-EVA Looks like you're in pretty good, Charlie.

06 03 45 50 LMP-EVA Thank you.

06 03 46 02 LMP-EVA Oh, dadgummit, John. I dropped my seatbelt.

06 03 46 05 CDR-EVA Here you go. Let me get it for you.

06 03 46 13 LMP-EVA Okay. I got it. Thank you.

06 03 46 14 CDR-EVA Got it?

06 03 46 27 LMP-EVA You know, it's a shame we never did ... get to
see into Stubby; but that's a - -

06 03 46 33 CDR-EVA I thought you were looking in it from Stone there.

06 03 46 34 LMP-EVA Oh, I did from there, but I didn't see that - I
couldn't tell whether - you can't see this west
side - east side of it to see whether the thing
is really filled in from a flow or not or whether
it's just subsident. That's what I really wanted
to find out.

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06 03 46 50 CC Okay. And we have a configuration change for the LRV.

06 03 47 05 CDR-EVA Okay. Go ahead with your config change.

06 03 47 07 CC Okay. On the PWM SELECT, we'd like to go to 1. And, on the DRIVE ENABLES, we'd like - -

06 03 47 17 CDR-EVA Okay; we're in 1.

06 03 47 18 CC Right. And the DRIVE ENABLES, we'd like LEFT REAR and RIGHT REAR to PWM 1.

06 03 47 23 CDR-EVA LEFT REAR and RIGHT REAR to PWM 1. Go.

06 03 47 26 CC And on BAT 2, BUS C circuit breaker, we'd like to pull that one; that'll load up battery 1 a little bit more. Bat 2 I guess is a little hot.

06 03 47 40 CDR-EVA You want to pull BAT 2 BUS C circuit breaker?

06 03 47 43 CC That's affirmative.

06 03 47 45 CDR-EVA Yeah. Okay, BAT 2 BUS C breaker coming open.

06 03 47 54 CDR-EVA We're on - is that - is that it? Did that complete it, Tony?

06 03 47 58 CC That's it.

06 03 48 00 LMP-EVA Wait a minute. Your drive power left rear and right rear is in BAT BUS C - ... You don't have any drive power.

06 03 48 09 CC Drive power should be nominal.

06 03 48 10 CDR-EVA ... I don't understand. Yeah, that'll be all right.

06 03 48 12 LMP-EVA Okay, fine; I don't know that much about it.

06 03 48 15 CDR-EVA Okay, Houston; we're proceeding to station 9.

06 03 48 22 CC Okay.

06 03 48 24 LMP-EVA Okay, John.

06 03 48 30 CDR-EVA Station 9, vacant lot.

06 03 48 35 LMP-EVA Ah, we get to sneak up on one.

06 03 48 36 CC Right. The idea is we're looking for an area as flat as possible with as little evidence of South Ray material. Probably the word from the back room, you're looking for a shallow saucer.

06 03 48 50 CDR-EVA (Laughter) They got the (laughter) they got the message all right. Yeah, that's going to be a real good find, Houston.

06 03 49 02 LMP-EVA I don't think we can do it. Okay; ten clicks, Tony.

06 03 49 09 CC Okay.

06 03 49 10 LMP-EVA Still in a cobbly area, with boulders up to a meter. Just like - looks just like our last stop. This is a shallow saucer area, but there's no boulder to sneak up on.

06 03 49 26 CC And could we have an amp reading with that ten clicks?

06 03 49 31 CDR-EVA Right, we're doing - What does it look like - six or seven, Charlie?

06 03 49 36 LMP-EVA Ten. In that first one, 20, you had 10 - it is a little - -

06 03 49 38 CDR-EVA Well, if you'd pick a pair like that - should be reading 10, Houston, but nobody can do that.

06 03 49 45 CC Okay.

06 03 49 50 LMP-EVA I can still see the ascent stage of Orion, Houston. And we're in a boulder field now that has a population of cobble size up through 15 centimeters covering 30 percent of the surface.

06 03 50 16 CDR-EVA Isn't there a better place to go than where we are? To get there, I don't know where it would be.

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06 03 50 21 LMP-EVA This 015 for 2.7 - according to them, we're almost there.

06 03 50 29 CDR-EVA I think, well, I think we're just too close to the - to the ray patterns off South Ray.

06 03 50 34 CC Okay; we understand. All we can do is pick the best you see.

06 03 50 36 CDR-EVA Don't you?

06 03 50 37 LMP-EVA Okay; well, let's go on a little further closer to the LM and maybe we'll come across one that isn't so - it's more - -

06 03 50 48 CC Okay. A worse problem - -

06 03 50 49 LMP-EVA - - pristine. Will that be all right - because the - because - there's no - Say again?

06 03 50 56 CC Right. That would be fine, except a worse problem is to get contamination from the LM. We'd rather have contaminations from South Ray than from the LM.

06 03 51 07 LMP-EVA Okay.

06 03 51 08 CDR-EVA All righty, we have just found your place.

06 03 51 09 LMP-EVA There it is, right over there. See that big rock, John?

06 03 51 12 CDR-EVA Yep.

06 03 51 14 LMP-EVA Down in that big hollow.

06 03 51 16 CDR-EVA That ain't a hollow; that's a crater! (Laughter)

06 03 51 19 LMP-EVA Well, it's a old - Down where I come from, it's a hollow.

06 03 51 23 CDR-EVA Which one? That - -

06 03 51 24 LMP-EVA That one that - it's over there about 50 meters, 2 o'clock.

06 03 51 28 CDR-EVA Okay; we're gettin - That's up a slope, up on the slide of it - side of it - -

06 03 51 32 LMP-EVA Well, I know, but it's on the side of one - side facing the LM, so that would even be better.

06 03 51 38 CC You say it's on the side facing the LM? We wouldn't want to face the LM. We want to not see descent.

06 03 51 46 LMP-EVA I blew it. It's on the - it's on the side of the crater away from the rim - the LM.

06 03 51 51 CC Good show.

06 03 51 55 LMP-EVA Tony, you're co - Yeah, no way to see the LM from over here.

06 03 51 57 CDR-EVA Yeah, but Charlie, we can't - we can't get off the samples around - -

06 03 52 02 LMP-EVA Why not?

06 03 52 04 CDR-EVA Oh, okay; let's drive up here. Uh-oh. Hey, you're okay. Did you get a little dust there, Charlie?

06 03 52 19 LMP-EVA No, just a scosh [sic] - The only trouble is, John, this rock's so big you can't even reach over it.

06 03 52 27 CDR-EVA That's what I'm saying.

06 03 52 29 LMP-EVA Yeah, but you can sneak around on the side. This is a steep slope right here, babe.

06 03 52 36 CDR-EVA That's what I was telling you. How about that rock right there?

06 03 52 43 LMP-EVA That one right here is fine.

06 03 52 44 CDR-EVA Okay.

06 03 52 51 LMP-LM Yeah, this - yeah, this is - 180 parking, I guess. Yeah. Let's don't get too close - we've got to sneak up on it. John, I can't get out.

06 03 53 11 CDR-EVA Why?

06 03 53 12 LMP-EVA You parked right in a crater, for me. That's good, now.

06 03 53 18 CDR-EVA Yeah, but that ain't 180.

06 03 53 21 LMP-EVA Okay; excuse me. (Laughter) Everywhere - I think you park in a crater - everywhere you go, there's a crater. I might as well just take my chances. I'll take this. Thank you. See that little hole you parked on there?

06 03 53 47 CDR-EVA Yeah.

06 03 53 48 LMP-EVA Okay. Okay; Tony, we're at 176, 0.7 - 007, 8.7, 2.6, 90, 90, zero - well, maybe 2 on the amps. So left for 1 battery is 100; 120 on 2. I'm still reading off-scale on both - all batteries - -

06 03 54 28 CC Okay. We copy that and DAC off.

06 03 54 29 LMP-EVA - - I mean, all motor temps.

06 03 54 30 CC We copy that and DAC off.

06 03 54 31 CDR-EVA (Laughter) Th - th - Thank goodness.

06 03 54 46 LMP-EVA Okay. Stand by.

06 03 54 47 CDR-EVA Okay, on ye old number 2 on the MODE switch.

06 03 54 48 LMP-EVA (Laughter) I can't get out.

06 03 54 49 CDR-EVA Oh, there you go again, Charlie.

06 03 54 50 LMP-EVA There I go again. Dadgummit.

06 03 54 51 CDR-EVA There you go.

06 03 54 53 CC And we'll need EMU checks.

06 03 54 58 LMP-EVA Let me get up off the ground.

06 03 55 01 CC Okay; Charlie.

06 03 55 04 LMP-EVA Okay. I got it.

06 03 55 07 CDR-EVA Is my lens dirty?

06 03 55 09 LMP-EVA Wait a minute. No, it's good, John.

06 03 55 10 CDR-EVA Okay.

06 03 55 12 LMP-EVA How about mine?

06 03 55 15 CDR-EVA Can you turn towards the Sun? I think it's okay.

06 03 55 21 LMP-EVA Okay; fine. Yeah, I'll get a pan out here.

06 03 55 25 CDR-EVA And I'll get the old high gain up.

06 03 55 39 LMP-EVA Let's see, number 8.

06 03 55 53 CC Good picture.

06 03 55 57 CDR-EVA Go.

06 03 55 59 LMP-EVA Getting pretty good - getting the old ... in there.

06 03 56 14 LMP-EVA Tony, I bet you that Rover would have climbed to the top of - ... right on up - -

06 03 56 23 CDR-EVA Sure it would.

06 03 56 26 LMP-EVA That is - this is some machine, I'll tell you. Gcing to turn your eyeball around and dust it out, Tony.

06 03 56 35 CC Say again, Charlie.

06 03 56 45 LMP-EVA Okay, pan is complete. Okay, we need the surface samplers - samples. And that go - starts with the Beta and then the velvet and then a skim and a scoop.

06 03 57 04 CDR-EVA Hey, we snipped that rock over there, the one I'm gonna sneak up on, Charlie.

06 03 57 07 LMP-EVA Yeah, after 2, place gnomon - and we don't have that - plus Sun stereo after, down-Sun, locator. Dc skim 3. Okay, so we don't get any pictures until we get the first two.

06 03 57 20 CDR-EVA Well - you got a - you got the pan.

06 03 57 24 CC Okay. And before you leave the Rover, we'd like you to pull the BAT 2 BUS D circuit breaker. We'll let you put it back in before you drive off.

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06 03 57 31 CDR-EVA BAT 2, BUS B circuit breaker. Roger. That's out.

06 03 57 41 CC Okay.

06 03 57 46 LMP-EVA And, Tony, your comment on this pallet - the locking - on the tool harness - the locking ring on the pallet doesn't stay up every time. It's slightly inconvenient, but no big deal.

06 03 58 00 CDR-EVA The big dip, Charlie.

06 03 58 01 CC Okay, understand.

06 03 58 02 CDR-EVA The dip.

06 03 58 03 LMP-EVA I'm going to get a shovel for the scoop. And I thought we'd maybe - and I'll tell you what I got to do is fix up a - start on a double core for the CSVG.

06 03 58 24 CDR-EVA Okay; well, let me get these samples out of the way. Oh, I'm sorry, I'm sorry.

06 03 58 29 LMP-EVA Got to get - this out of the way.

06 03 58 31 CC And, Charlie, was that DAC off?

06 03 58 42 LMP-EVA Yeah, I got the DAC off.

06 03 58 43 CC Okay.

06 03 58 47 LMP-EVA I think. Let me go check again.

06 03 58 52 CDR-EVA Okay.

06 03 58 53 LMP-EVA Hey, pan left, Tony. Thanks for reminding me, Tony. I had forgotten it.

06 03 59 00 CC Okay.

06 03 59 03 LMP-EVA If you'll pan left, we'll show you the rock we're going to sneak up on.

06 03 59 12 CC Don't scare it.

06 03 59 19 LMP-EVA It's the wrong way. Don't open it - don't open that.

06 03 59 26 CDR-EVA It's between us and the LM. It's between the LM and us.

06 03 59 30 LMP-EVA On, I know that, but they don't want you to open this thing until you get right up next to the rock.

06 03 59 35 CDR-EVA Is that what he said?

06 03 59 38 LMP-EVA Well, that's - not just now, no.

06 03 59 39 CDR-EVA Oh, yeah. Okay.

06 03 59 40 LMP-EVA I'm going to get the other one.

06 03 59 42 CDR-EVA Okay. Oh, yeah.

06 03 59 46 CC We agree with Charlie, there. We'd like you to get up a little closer to it and face away from yourself before you open it.

06 03 59 55 CDR-EVA Facing away from myself, huh? Okay.

06 04 00 02 CC Right, you're filthy, as - Fredo says.

06 04 00 10 LMP-EVA John, are you sneaking? .

06 04 00 12 CDR-EVA Yeah. Ah-h-h!

06 04 00 18 CC Gee! We're missing the great rock hunt here.

06 04 00 26 LMP-EVA You're - you're just not watching him sneak, Tony.

06 04 00 29 CC I'd sure like to.

06 04 00 30 CDR-EVA I gotcha!

06 04 00 37 LMP-EVA What are you all doing looking at the seats?

06 04 00 40 CC Which way do we go?

06 04 00 48 LMP-EVA We're sneaking up on it, Tony.

06 04 00 56 LMP-EVA Ah! Got him. Let's - let me see, John.

06 04 01 01 CDR-EVA You can't see, Charlie - -

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06 04 01 04 LMP-EVA From way out here, just point it at me.

06 04 01 06 CDR-EVA Oh.

06 04 01 07 LMP-EVA You don't have any ... Okay; here - here's the other one. Give me that one, huh?

06 04 01 28 CC Gee! The first lunar great rock hunt and we missed it.

06 04 01 36 CDR-EVA Tell you something else. I leaned on the rock and we turned this one over. (Laughter)

06 04 01 40 LMP-EVA Again.

06 04 01 51 CC Okay. Did that disturb the surface on the other side there?

06 04 02 00 CDR-EVA Yeah. The picture will show how I disturbed it.

06 04 02 02 CC Okay. It's important that you put this second one down in an area that wasn't - -

06 04 02 06 CDR-EVA ... No, we didn't disturb it at all.

06 04 02 07 CC Okay, good.

06 04 02 10 CDR-EVA Yeah, we know that.

06 04 02 11 CC Okay.

06 04 02 17 CDR-EVA There you go. Get it?

06 04 02 22 LMP-EVA Yeah. In an area that that wasn't - that that didn't go in, right?

06 04 02 24 CC Right.

06 04 02 25 LMP-EVA Tony, John - John was sneaking just like this. He really got up to it before the - it even knew he was coming.

06 04 02 34 CC Outstanding, Charlie. Thanks for the rerun.

06 04 02 35 CDR-EVA Ah, man, that thing flops open.

06 04 02 43 LMP-EVA Okay, John, I'll give you a hint. Man, that's a great sneak. Okay; that's good. Right there.

06 04 02 52 CC Okay. Just a little pressure.

06 04 03 03 LMP-EVA Beautiful. You picked some up on that one. Only on one corner. He got some on one corner, Houston.

06 04 03 11 CC Okay, we'll have to take it that way.

06 04 03 13 CDR-EVA That's too bad. That's the way the ground is.

06 04 03 16 LMP-EVA Okay.

06 04 03 17 CC Right. Man, you fellas have outstanding ...

06 04 03 19 LMP-EVA I'd say about 20 percent of it's covered.

06 04 03 22 CC Twenty percent is pretty good. That's fine.

06 04 03 24 LMP-EVA I say 20 percent. Okay, 20 percent - 20 percent of one corner is covered. I mean, 20 percent of the whole thing is covered. These go in your rock bags, don't they? I mean in the SCBs?

06 04 03 39 CDR-EVA Yeah. I don't know. Let me take them back and put them under the seat. I don't know where they go.

06 04 03 43 LMP-EVA I think they go in the SCBs. Tony, do these go in the SCBs?

06 04 03 48 CC They'll go in the SCB that doesn't go in the SRC.

06 04 03 53 LMP-EVA Yeah, okay. We've already got that one collected. Okay, John, that was beautiful.

06 04 04 05 CDR-EVA Guess what.

06 04 04 06 LMP-EVA What?

06 04 04 09 CDR-EVA Top ...

06 04 04 18 LMP-EVA Okay, now we got to go get - after two place the gnomon. I'll put the shovel. We got a cross-Sun after, and a down-Sun on locator.

06 04 04 28 CDR-EVA Okay. Well, that's going to be hard to get. Don't put the dirt all over there!

06 04 04 31 LMP-EVA I didn't. I missed it.

06 04 04 34 CDR-EVA Okay. It's going to be hard to get because - I need to -

06 04 04 44 LMP-EVA You can get - you can get a down - a cross-Sun from over on the this side.

06 04 04 48 CDR-EVA Okay.

06 04 04 49 LMP-EVA We don't have to sneak anymore.

06 04 04 52 CDR-EVA We don't need a UHT anymore, do we, Houston? Are we going to need it for the ALSEP?

06 04 04 58 CC Negative.

06 04 04 59 LMP-EVA We got one back there.

06 04 05 00 CDR-EVA You got one back there?

06 04 05 02 LMP-EVA Yeah, it's sitting in the heat fl - it's sitting in the heat flow. See how far you can throw that beauty. Look at that. Clean across the crater! Beautiful. Okay, I'll go get the down-Sun. There we go.

06 04 05 19 CC Well, at least in the vacuum, it doesn't boomerang.

06 04 05 20 CDR-EVA Turn and get a locator.

06 04 05 42 CDR-EVA Ah ha. Yeah, Houston, I'm looking back at the LM. Charlie, you can get a picture of the - I can get a picture if I put it on f/whatchacallit, and it'll show that - that rock is between us and the LM.

06 04 05 56 LMP-EVA Sure is.

06 04 05 57 CC Hey, good show!

06 04 05 58 CDR-EVA You can barely see the LM over there. That - that fills that square.

06 04 06 05 LMP-EVA Yeah, now - well, wait a minute, we got to get a skim. Okay.

06 04 06 17 CDR-EVA Okay. Can we skim where the - can we skim where the pristine sample was?

06 04 06 19 CC Okay, we'd like to skim next to it.

06 04 06 20 LMP-EVA No, they want it right beside it, right there ...

06 04 06 23 CDR-EVA You can't see any of that stuff.

06 04 06 24 LMP-EVA Yeah, I can - I can see. Okay, here we go. Get me a bag ready.

06 04 06 30 CDR-EVA Okay.

06 04 06 48 LMP-EVA Tony, I probably got 5 millimeters on that skim.

06 04 06 53 CC Okay, that's pretty good.

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06 04 06 55 CDR-EVA That's a pretty good little skim there.

06 04 06 59 CDR-EVA What - what setting should I open this up to - to show you these prints we got in the vacuum here? I mean in the shadow?

06 04 07 09 CC Okay, I'll get you a number on that. Why don't you go ahead and get the deep sample.

06 04 07 16 LMP-EVA Okay. I can - I can hardly see in there again. Okay, I'm going to widen - -

06 04 07 23 CDR-EVA That's going into bag 376? Did you give them this?

06 04 07 25 LMP-EVA Yeah. No, I didn't.

06 04 07 26 CDR-EVA Okay.

06 04 07 27 LMP-EVA What - okay, I got to widen this area.

06 04 07 28 CC Okay, 376.

06 04 07 30 CDR-EVA Okay.

06 04 07 43 CC And, John, 5.6 at a 250th.

06 04 07 52 CDR-LMP Okay. I'll get you a little flight line of that. Okay, and Charlie's scoop is being taken right under the -

06 04 08 10 LMP-EVA You got it.

06 04 08 28 LMP-EVA Okay, there you go. That's going in bag 377, Houston.

06 04 08 33 CC Okay, 377. And you've got about 10 minutes now, and we'd like to get that CSVG.

06 04 08 43 LMP-EVA Okay, Tony. We can turn this rock over. If you want us to get that sample in, we need an extension.

06 04 08 54 CC Okay, we understand. We'll work on that.

06 04 08 59 LMP-EVA Yeah, I'll go get the CSVC then.

06 04 09 00 CC All right. We'll go ahead and do the CSVC.

06 04 09 03 LMP-EVA Joan, you want to start sampling while I do that?
Okay, I'm going.

06 04 09 10 CDR-EVA Okay. Well, I can get - I can get -

06 04 09 25 CC John, can you turn that over by yourself?

06 04 09 30 CDR-EVA Well, I'm going to give it a go.

06 04 09 32 CC Okay. Sounds like - sounds like worth trying.

06 04 10 01 CDR-EVA Ah! Come back here, you rascal.

06 04 10 12 LMP-EVA Getting a sample off of it, John?

06 04 10 14 CDR-EVA Yeah.

06 04 10 15 LMP-EVA Good.

06 04 10 29 CC John, you lost the bag?

06 04 10 32 CDR-EVA Yeah, lost my - lost my whole set of bags. Oh,
shoot.

06 04 10 56 LMP-EVA May I borrow your hammer, John? This core, I
think I might be able to push it in, but -

06 04 11 03 CDR-EVA Okay.

06 04 11 07 LMP-EVA Collision [?]. Okay, we'll just do it right here.
Tony, I'm 15 m - 15 meters out to the left of
the - -

06 04 11 18 CC Roger. We're watching you, Charlie.

06 04 11 25 CDR-EVA Tape came loose.

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06 04 11 31 LMP-EVA Okay, there we go. Pushed it in halfway, Tony.

06 04 11 36 CC Okay. And remember not to hammer this one all the way in.

06 04 11 44 CDR-EVA ... top of that.

06 04 11 45 LMP-EVA Yeah, yeah. Got you.

06 04 11 46 CDR-EVA The top of that rock is a hard breccia, and I'm just going to throw it under your seat, Charlie.

06 04 11 58 LMP-EVA Okay. Is it in a bag?

06 04 11 59 CC Okay; did you have a bag number?

06 04 12 00 CDR-EVA Huh?

06 04 12 01 LMP-EVA Is it in a bag?

06 04 12 03 CDR-EVA 373.

06 04 12 04 CC Okay, 373.

06 04 12 16 LMP-EVA Okay, Tony, that's about 7 centimeters out.

06 04 12 19 CC Looks good to us.

06 04 12 25 LMP-EVA Feels good to me, too, to get that over.

06 04 12 29 CC Roger. It looks good.

06 04 12 30 CDR-EVA Yeah, that's got it all - on three sides.

06 04 12 58 CDR-EVA Okay, now. Here's the picture to show where the top rock came out. Charlie, I got it!

06 04 13 11 LMP-EVA He got it!

06 04 13 12 CC Outstanding, John.

06 04 13 14 LMP-EVA He did it, Houston! He did it.

06 04 13 23 CC So you can not only sneak up on them, you can flip them over, huh?

06 04 13 31 CDR-EVA Yeah. That's a biggie. Man, it looks like it's been sitting there for quite a while. Look at that soil underneath it.

06 04 13 41 CC Okay.

06 04 13 43 CDR-EVA Before I stomp all over it, Charlie, sneak over
here and let's get some of this soil.

06 04 13 46 LMP-EVA Okay.

06 04 13 47 CC Right. A chip off the bottom and the soil will
probably do it.

06 04 13 54 CDR-EVA A chip off the bottom. (Laughter)

06 04 14 00 LMP-EVA I see a place where we can get a chip off the
bottom, Houston.

06 04 14 04 CC Evidently you found the right boulder.

06 04 14 09 LMP-EVA Right. That was a real good boulder.

06 04 14 12 CDR-EVA Scn of a gun's been laying out here all this time.

06 04 14 17 CC Just waiting for you.

06 04 14 18 LMP-EVA Hey, John, let me cap this - let me cap this little
beauty here before we lose it - before I forget
about it. Yeah, I'm coming with the scoop. What
else do you need?

06 04 14 35 CDR-EVA I need the hammer.

06 04 14 36 LMP-EVA I got it.

06 04 14 44 CDR-EVA Hey, why don't you just sort of sneak up so you
don't sprinkle any dirt down in the bottom of this
place where we turned it over.

06 04 14 50 LMP-EVA Yeah, okay.

06 04 14 51 CDR-EVA ... Gee, Charlie.

06 04 14 52 LMP-EVA Look at that soil! It's all cake looking, isn't
it?

06 04 14 54 CDR-EVA Yeah, it is.

06 04 15 01 LMP-EVA Okay. Let me get the soil before you start
whacking. Okay?

06 04 15 04 CDR-EVA Oh, yeah.

06 04 15 05 LMP-EVA It's all glass-covered. The bottom is glass covered, Houston.

06 04 15 14 CDR-EVA Yeah, white glass.

06 04 15 18 LMP-EVA No, that - the black stuff is the glass. That other is crystal. That's a crystalline rock.

06 04 15 21 CDR-EVA Yeah, yeah. Well, that part of it is.

06 04 15 24 CC Very good.

06 04 15 32 LMP-EVA And it looks just like an alkali flat in the cake that's under it, Tony. And that's right from the deepest part. That sample is right in the middle, which happens to be the deep - the - the deepest penetration that boulder made.

06 04 15 53 CC Very good.

06 04 16 02 LMP-EVA Okay. There's a sackful. 379.

06 04 16 06 CC Okay, bag 379.

06 04 16 29 LMP-EVA Where are you going to whack it, John?

06 04 16 30 CDR-EVA ...

06 04 16 31 CC And, Charlie, your SCB is open, so a rock might come out.

06 04 16 37 LMP-EVA Okay. Real friable, isn't it?

06 04 16 49 CC Now you found a real rock.

06 04 16 50 LMP-EVA Aha!! Look at that piece! Here, let me get it, John. Back up. I'll go get it. There it is right there.

06 04 17 10 CDR-EVA Can't you just pick it up with your shovel?

06 04 17 12 LMP-EVA I don't want to get it too dirty.

06 04 17 17 CDR-EVA Dirty.

06 04 17 21 LMP-EVA Ah! Ooops. There we go. Okay, we got you about a 4-centimeter chip.

06 04 17 30 CC Okay, that sounds good. Just get some photos of it and I - I think we've done it.

06 04 17 38 LMP-EVA And that's not glass, John. Those are crystals. Those are big crystals. At least 5 millimeters, with a bluish cast to them.

06 04 17 59 CDR-EVA That's going in bag 380, Houston.

06 04 18 03 CC Okay, 380.

06 04 18 07 CDR-EVA It - it looks to me like it's a - a - a shocked rock with a lot of - and this is a guess - a lot of black glass in the fracture patterns.

06 04 18 20 CC Okay.

06 04 18 23 LMP-EVA Okay. Okay, I'll hold it.

06 04 18 25 CDR-EVA Hey, man ... Okay, that was a -

06 04 18 45 LMP-EVA Okay, that was about a 5-footer, Tony. A little down-Sun, and the shovel is right where the - -

06 04 18 52 CDR-EVA Bag was.

06 04 18 53 LMP-EVA - - bag was. Close my top on that thing, John.

06 04 18 55 CC And, John, while your working on it back there, why don't you close that thermal cover to Charlie's OPS. It's on the rear left.

06 04 19 03 CDR-EVA Thermal cover to - okay. Charlie, your whole rear left OPS is open.

06 04 19 10 LMP-EVA Oh, heavens. I can feel the heat leak.

06 04 19 19 CC Right. We caught you with your fly open.

06 04 19 23 LMP-EVA (Laughter)

06 04 19 29 CDR-EVA Can you suggest any way to close it? I can't get it. I can't get it.

06 04 19 37 LMP-EVA Well, let's forget about it.

06 04 19 38 CDR-EVA Let's go back to the ... to the Rover - -

06 04 19 43 LMP-EVA Yeah, I've got to close this CSVC up; take me a couple of minutes. You could go get a sample. Okay?

06 04 19 51 CDR-EVA Fair enough.

06 04 19 56 CC Okay, we'd like you to pack up, John, if you could help Charlie. I think we'll have to get on.

06 04 20 05 LMP-EVA He can't help me with it.

06 04 20 06 CDR-EVA Okay.

06 04 20 07 LMP-EVA Unless you could get - well, you could get the top of that CSVC.

06 04 20 23 CDR-EVA Where is it?

06 04 20 32 LMP-EVA It's in the SCB number 2.

06 04 20 34 CDR-EVA Where? I'll get it. Just stay there.

06 04 20 43 LMP-EVA I am. I just wanted to get - I got a plunge - Okay, the plunger went right down, Tony. It's about 4 centimeters from the top.

06 04 21 06 CC Okay. And before you stick it in there, could we have the core tube number?

06 04 21 12 LMP-EVA Oh, yeah. I keep forgetting that. Thirty-four.

06 04 21 18 CC We copy.

06 04 21 23 CDR-EVA Wait a minute, Charlie.

06 04 21 26 LMP-EVA Slid right in. I never would have believed it.

06 04 21 28 CDR-EVA I wouldn't have thought it, either.

06 04 21 29 LMP-EVA I never would have believed that. Hope it's down in far enough to lock it, though.

06 04 21 35 CDR-EVA You'll have to pull the bottom - -

06 04 21 37 LMP-EVA Huh?

06 04 21 38 CDR-EVA Push the bottom shield off, then pull it out.

06 04 21 55 LMP-EVA Put the spade up.

06 04 22 10 LMP-EVA What did you do with the shovel, John?

06 04 22 14 CDR-EVA I laid it over there on the bench.

06 04 22 17 LMP-EVA Okay.

06 04 22 18 CDR-EVA Yeah.

06 04 22 38 LMP-EVA Tony, that CSVC goes in the -

06 04 22 54 CC All right, Charlie, that CSVC goes in the SRC.

06 04 22 55 CDR-EVA That goes in ... Charlie

06 04 23 00 LMP-EVA Roger. Okay.

06 04 23 09 CDR-EVA Okay. Back to station 10, Charlie.

06 04 23 11 LMP-EVA Okay.

06 04 23 15 CC And, Charlie, before you get on there, we'd like the DAC on at 12 frames per second.

06 04 23 22 LMP-EVA All righty-rooty.

06 04 23 36 CDR-EVA If anybody told me this thing would go up the side of that mountain, I'd have said, man, I don't -

06 04 23 42 LMP-EVA I wouldn't have believed it. This is a real beauty.

06 04 23 51 CC Okay. And we need frame counts.

06 04 23 55 LMP-EVA Okay. Okay, Tony, I'm leaving with 100 and - about 161.

06 04 24 02 CDR-EVA I got 100 - 165. I probably ought to change this mag.

06 04 24 09 LMP-EVA Do you want me to change the mags, Tony?

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06 04 24 16 CC Yeah, let's both change.

06 04 24 21 LMP-EVA Did he say both change?

06 04 24 23 CDR-EVA Yeah.

06 04 24 25 LMP-EVA Okay. Tony, I don't have a black and white left. I'm going to run off a couple, John.

06 04 24 34 CDR-EVA Okay. I'm out. Three frames to go and I'm out.

06 04 24 44 CC Okay.

06 04 24 45 CDR-EVA How about that?

06 04 24 47 LMP-EVA Okay, magazine Bravo has got something in it - **a few frames. You used about 50 on it yesterday.** And we can use magazine Delta. Both put color on. Is that okay, Tony?

06 04 24 59 CC Okay. That sounds fine. Let's put Bravo on John's since doesn't shoot while he's driving.

06 04 25 05 LMP-EVA Okay.

06 04 25 13 CDR-EVA Got to hold it back and then pop it - There you go. Hold that; then pop her locse. There you go.

06 04 25 21 CDR-EVA Which one, Charlie?

06 04 25 25 LMP-EVA Delta for me and Bravo for you. Thank you.

06 04 25 35 CDR-EVA Bravo.

06 04 25 38 LMP-EVA Right in the corner, there.

06 04 26 01 LMP-EVA Okay. Magazine Delta is working, and I'm starting with frame count number - oh, about 1.

06 04 26 09 CC Okay, Delta 1.

06 04 26 18 LMP-EVA Dropped your bags again, John.

06 04 26 20 CDR-EVA Yeah. The tape came off, Charlie.

06 04 26 22 LMP-EVA Aw, that thing did come off, didn't it?

06 04 26 25 CDR-EVA Yeah.

06 04 26 28 LMP-EVA Okay. Let me come around and help you put
it on. Okay?

06 04 26 41 CDR-EVA Yeah.

06 04 26 42 LMP-EVA The tape's still there. This thing just peeled
off under the tape.

06 04 26 56 CDR-EVA Boy, almost.

06 04 26 59 CDR-EVA It happens in training.

06 04 27 00 LMP-EVA You got it.

06 04 27 02 CDR-EVA How's my lens?

06 04 27 04 LMP-EVA Turn into the Sun. Okay.

06 04 27 09 CDR-EVA ... your ...

06 04 27 10 LMP-EVA It's okay. Won't even see that. Okay. The DAC
is set at f/8 at 12 frames a second. And I'm
not going to turn it on until we start moving,
Tony.

06 04 27 22 CC Okay; that sounds good.

06 04 27 28 CC And we're going to have to move out.

06 04 27 29 CDR-EVA Okay, and I'm - -

06 04 27 30 LMP-EVA Well, we're mounting up right now.

06 04 27 34 CDR-EVA Frame Bravo of number 66.

06 04 27 39 CC Okay. We copy 66.

06 04 27 40 LMP-EVA ..., John.

06 04 27 47 CDR-EVA Okay. MODE switch to 1. Oh, somebody already
did it.

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06 04 28 01 LMP-EVA They were looking at us with the big eye.

06 04 28 05 CDR-EVA There's tne blasted heat flow.

06 04 28 11 CC And, John, we have a small configuration change. We'd like both the STEERING and the REAR DRIVE POWERS to BUS Baker.

06 04 28 20 CDR-EVA Okay.

06 04 28 26 LMP-EVA All the steering?

06 04 28 31 CC That's affirmative, - the rear steering.

06 04 28 32 CDR-EVA ... clean now.

06 04 28 34 LMP-EVA I know it. See, when you - Okay.

06 04 28 40 LMP-EVA Man, I'm glad that you - you're driving this thing. I can't reach those buttons down there at the bottom. You ought to get that before you get in.

06 04 28 51 CDR-EVA What is that?

06 04 28 55 LMP-EVA DRIVE, REAR STEERING to BUS breaker.

06 04 28 57 CC Roger.

06 04 28 59 LMP-EVA Okay, you got all back, 2 - 2 CBs out, Tony.

06 04 29 03 CC Right. We understand. We're loading up battery 1; battery 2 is a little warm.

06 04 29 10 CDR-EVA Okay. Say again what he wants. Did you get it, Charlie?

06 04 29 17 LMP-EVA No, I can't reach it, STEERING, REAR, BUS breaker.

06 04 29 20 CC Roger.

06 04 29 21 CDR-EVA STEERING REAR to BUS Baker.

06 04 29 22 LMP-EVA And what else, Tony?

06 04 29 23 CC The DRIVE POWER to BUS Baker - REAR DRIVE POWER.

06 04 29 30 CDR-EVA REAR DRIVE POWER to Baker. Okay, you got it.

06 04 29 33 CC Okay.

06 04 29 45 LMP-EVA It's back to the LM. Right, Tony?

06 04 29 48 CC Roger. We going back to the ALSEP area.

06 04 29 51 LMP-EVA Station 10? Yeah. That's with a stop 10, right?

06 04 30 06 CC Okay, we'd like you to drive gingerly up to the ALSEP area there, and we're going to ask you to hold the end of that broken cable up in front of the TV and that will be the station 10 parking area. And then you can do the station 10 tasks down to the south - correction - up to the northeast.

06 04 30 29 LMP-EVA Okay. You mean out by the mortar package?

06 04 30 36 CC No, it'll be behind the mortar package. The task will be up to the northeast.

06 04 30 43 LMP-EVA Oh, yeah, to the northeast. Okay. That's my other northeast.

06 04 30 52 CC Right.

06 04 30 54 LMP-EVA Tony, I can't get over how hilly this place is. It's one hill right after the other - or ridge.

06 04 31 04 CC It sounds like an outstanding place. Sure wish I were there.

06 04 31 12 LMP-EVA Well, we wish you were too, Tony.

06 04 31 20 CDR-EVA Okay, pictures are going.

06 04 31 24 LMP-EVA Tony, you're not going to see much out the right side of my in-motion Hasselblad because of - this DAC camera magazine effectively blocks out that part of the field.

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06 04 31 41 CC Okay. We understand.

06 04 31 44 LMP-EVA Boy, but I itch. Man.

06 04 31 52 CC As long as you have the DAC on, that sounds fine. Why don't you swing the DAC back and forth a little bit occasionally during the drive and get a side view.

06 04 32 06 CDR-EVA Anybody - anybody that ever called this place plains, Cayley Plains, really didn't know what he was talking about. There isn't a plain around here.

06 04 32 13 CC Right. Understand. Just like FS smooth.

06 04 32 16 CDR-EVA Right. It's exactly right. FS smooth. I can't believe it.

06 04 32 25 LMP-EVA John picked the only flat place within a kilometer to land.

06 04 32 31 CDR-EVA Sure glad we didn't land any - on any of these slopes, I'll tell you that.

06 04 32 36 LMP-EVA ... it hadn't been - I don't know what this big crater is over here. This one - Tony, really the ridges here and we're looking off - We're now at 007. You just saw it in the - well, you'll see it in the Hassel - and in the 16, but off to the 2 o'clock from 007 at 2.6, at north - north headings; there's an old subdued crater that's probably 30 meters deep.

06 04 33 06 CDR-EVA And how many meters around?

06 04 33 09 LMP-EVA Oh, I'd say - -

06 04 33 10 CDR-EVA 900 meters long.

06 04 33 12 LMP-EVA No, not that much. Better than 300, anyway.

06 04 33 16 CDR-EVA Yeah, it's 300 meters across.

06 04 33 20 LMP-EVA And it didn't even show on the map.

06 04 33 23 CDR-EVA I tell you what it did show in.

06 04 33 25 LMP-EVA What?

06 04 33 27 CDR-EVA Those low angle looks that we got at the landing site.

06 04 33 28 LMP-EVA Yeah, I'll say. Our rear - that fender was well needed, John. I'm being showered with - -

06 04 33 38 CDR-EVA Yeah.

06 04 33 39 LMP-EVA - - dust.

06 04 33 40 CDR-EVA Didn't mean to do that. So am I.

06 04 33 43 LMP-EVA Okay, Tony, the - we - we're coming in an area that is not as - that's not quite as blocky. I'd say maybe - 10 percent of surface is covered with cobbles. Still same size. There's one big boulder that I just got a picture of.

06 04 34 05 CDR-EVA Buried.

06 04 34 06 LMP-EVA It's just buried 3 meter - and it's buried from - it's on - well, it's buried all over. I was going to say it's mostly from - wasting from downslope - upslope, but that is not true.

06 04 34 33 LMP-EVA And, off to our right is the big crater - the big, deep sub - very subdued that just shows - I see no large rocks, no outcrops at all anywhere around there. All I do is see big boulders that are part - apparently part of this ray, the biggest one being 2 meters.

06 04 35 09 CDR-EVA I'm making 11 clicks now on this relatively smooth region.

06 04 35 28 LMP-EVA Tony, it's a very old surface, apparently. The - every crater here is very subdued, from the half-meter size up to the 4- or 5-meter size.

06 04 35 41 CC Okay. Copy that.

06 04 35 42 LMP-EVA Completely saturated. Here come a couple of angular blocks that you just got a picture of. They remind me of the one we sampled up there at station 8. We're getting into an area now at 0.7 - 007, at 2.6 - where the - it's more pebbly than cobbley, being 4 centimeters or so.

06 04 36 16 CDR-EVA My -

06 04 36 17 LMP-EVA Huh?

06 04 36 18 CDR-EVA My whatchacallit just fell off.

06 04 36 20 LMP-EVA The SCB?

06 04 36 21 CDR-EVA No. See - look and see if it's between my legs. Can you see over there? I can't see. I think it fell between my legs.

06 04 36 28 LMP-EVA What thing?

06 04 36 32 CDR-EVA My - bag.

06 04 36 35 LMP-EVA Well, I didn't see it, John. We've got plenty of those.

06 04 36 37 CDR-EVA Got plenty?

06 04 36 38 LMP-EVA Yeah.

06 04 36 39 CDR-EVA Okay. Wondered whether to go back or not.

06 04 36 42 LMP-EVA I don't think it's worth it.

06 04 36 46 CC Okay. And could we have a range and bearing, please?

06 04 36 49 LMP-EVA Okay. We're at 007 at 2.6, and we can - -

06 04 36 53 CC Okay.

06 04 36 58 LMP-EVA - - see just the top of Orion.

06 04 36 59 CC Very good.

06 04 37 00 LMP-EVA And that map system, Tony, has got us pointed right at it.

06 04 37 05 CC Outstanding.

06 04 37 13 LMP-EVA These little -

06 04 37 15 CDR-EVA Here's a really - a glass-covered one right there. Little round - looks like a bowling ball.

06 04 37 19 CDR-EVA We're doing V-max now, 8 clicks - 9 clicks, because we're going up a real steep slope.

06 04 37 34 CC Okay. Do you have a amp?

06 04 37 45 LMP-EVA We're not - we're all on the battery 1?

06 04 37 47 CC That's right.

06 04 37 48 CDR-EVA 40, yeah. Okay, 40 amps! Yeah.

06 04 37 52 LMP-EVA Yeah. Okay, we just topped out on a rise, Tony, and we're going down into another swell. I can see Flag crater off at 11 o'clock, and we're heading 007. It's a - boulder strewn on the south side. Pointed straight ahead of us, it's between us and the lunar module. It's a - uh-oh.

06 04 38 22 CDR-EVA What's the matter, Charlie?

06 04 38 24 LMP-EVA The range keeps still saying 26. I think it's working. Well, anyway, you better delay that range, Tony. It's been 26 for quite a while.

06 04 38 41 CC Okay. That's fine. We - we agree.

06 04 38 46 LMP-EVA We can see the LM, though.

06 04 38 48 CC Okay. Fine.

06 04 38 49 LMP-EVA Now we're going down in a - another - another 2 to 300 meter - maybe 500-meter subdued crater. That's really going to be a steep slope, if we go straight into it, but John is adroitly maneuvering around it.

06 04 39 05 CDR-EVA I'm not going down that critter. (Laughter)

06 04 39 07 LMP-EVA That is really steep. Look at that.

06 04 39 09 CDR-EVA Look at that hole in the bottom of it.

06 04 39 10 LMP-EVA I know it. Tony, it's a - a - a subdued crater without any rim at all. It is sort of oblong - -

06 04 39 19 CDR-EVA But look at that - look at that - look at the - that hole in the bottom has a - has a ledge in it.

06 04 39 26 LMP-EVA I know it. Tony, it looks - it rem - this reminds me of Big Sag. You know Big Sag on the map, north of - west of North Ray. Then this whole area to our right - -

06 04 39 40 CDR-EVA Up. Up. Up.

06 04 39 42 LMP-EVA Turn the camera around there. I wish I could give you -

06 04 39 55 CDR-EVA Turn it around.

06 04 39 57 LMP-EVA Best I can do.

06 04 40 11 CC Okay. Just going - -

06 04 40 12 LMP-EVA Tony, you remember those - out in Hawaii - -

06 04 40 14 CC - - by time and speed, you're about 1.2 kilometers.

06 04 40 20 LMP-EVA Okay. Then our distance and range is stopped.

06 04 40 23 CC Roger.

06 04 40 25 CDR-EVA Our distance is - Our bearing appears to be okay.

06 04 40 34 LMP-EVA Yeah. Hey, Tony, you remember out in - in Hawaii those at Kapoho where we saw those very small little sink-hole craters?

06 04 40 44 CC Roger.

06 04 40 46 LMP-EVA This looks like a big one of those.

06 04 40 47 CDR-EVA The one down in the middle of that hole?

06 04 40 48 LMP-EVA Yeah.

06 04 40 49 CDR-EVA I agree with you. That's what I was thinking.

06 04 40 52 LMP-EVA In fact, the whole area does, looks like just a big slump. Something fell out the bottom. Because there's no rim to this thing at all, John.

06 04 41 01 CC Okay. It'd sure be good if you could swing the DAC over that way, if it's still running.

06 04 41 06 LMP-EVA I - I can't get it over that way.

06 04 41 09 CC Okay.

06 04 41 11 LMP-EVA It just won't - it's running, but I - I don't have strength in my hands. Let John turn over that way and we'll give you a couple of - as he swings around, I'll give you a couple of pictures of it. Can you make a 360, John?

06 04 41 27 CC You should be out of film in the DAC.

06 04 41 29 CDR-EVA Okay, where do you want? Right here?

06 04 41 32 LMP-EVA Yeah. But - okay, that's fine.

06 04 41 34 CDR-EVA Did you get it?

06 04 41 36 LMP-EVA Yeah. Could you keep on going around?

06 04 41 38 CDR-EVA Sure.

06 04 41 39 CDR-EVA Let's just make a 360 this way.

06 04 41 41 CC Okay, and get it on your Hasselblad, please.

06 04 41 44 CDR-EVA Hey, that's a neat way to -

06 04 41 48 LMP-EVA Okay, that's what we're doing.

06 04 41 49 CC Good show.

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06 04 41 50 CDR-EVA That would be a neat way to take a tr - a pan, Charlie.

06 04 41 52 LMP-EVA That's just what I'm doing, taking a pan of that thing. We got it.

06 04 41 57 CDR-EVA Okay.

06 04 42 00 LMP-EVA Great. Okay, we got a pan from the Rover, Tony, with a 360.

06 04 42 03 CC Okay. And if you can turn the DAC off, please turn it off.

06 04 42 11 LMP-EVA Okay, wait a minute. Well - Apparently it wasn't running, Tony, because I've still got half a mag left. I'll turn it back on.

06 04 42 30 CC Okay.

06 04 42 36 LMP-EVA My arms are just too short - -

06 04 42 39 CC Understand.

06 04 42 40 LMP-EVA - - to get that thing on and off from the Rover seat. I should have turned it on on the side, but at 12 frames a second I thought we'd just run too much out. Okay, it's running now.

06 04 42 53 CC Okay.

06 04 42 57 CDR-EVA I could - I could tell you how it's doing, Charlie. I could see that - I could - I glance at it ever so often.

06 04 43 13 CDR-EVA Sure is comforting be able to hear those old wheels turning. You can hear them; they make a rumble.

06 04 43 20 CC We can't hear them, but we can imagine it's comforting.

06 04 43 22 CDR-EVA A walking traverse in this place would be terrible.

06 04 43 30 LMP-EVA Okay, still in a - still in a cobbly area, Tony. There are two - apparently - to me, two distinct sizes. Those are the 6-centimeter size and below - well, around 6 centimeter - and those around 15 centimeters. Cover 30 percent of the surface.

06 04 43 55 CDR-EVA Okay, I'm V-max right now, Houston, and - and up slopes we're going about 8 and down slopes, about 11.

06 04 44 06 CC Good.

06 04 44 08 LMP-EVA The nav system is gone completely, John. But I don't - that bearing's not even working, I don't think.

06 04 44 17 CDR-EVA Huh?

06 04 44 18 LMP-EVA I don't think that bearing's working either. Could our bus configuration cause -

06 04 44 27 CDR-EVA Don't see how.

06 04 44 30 LMP-EVA What does the nav system work off of, Tony? Is it bat 2?

06 04 44 39 CC Stand by a second, Charlie.

06 04 44 41 CDR-EVA It is. That's the LM up there, isn't it?

06 04 44 46 LMP-EVA ...

06 04 44 47 CC Okay. Your nav system works off Baker and Delta, so it should be on Baker, all right.

06 04 44 57 LMP-EVA Okay. Well, it's not counting either range, bearing, or distance.

06 04 45 05 CC Okay. Is your heading working at all?

06 04 45 08 CDR-EVA The bearing's working, isn't it?

06 04 45 10 LMP-EVA I don't think so. Yeah, the heading's working.

06 04 45 25 CDR-EVA I'll tell you how we'll get back, Charlie.

06 04 45 30 LMP-EVA Yeah, we got to go on top of that ridge over there, and then we'll be there. John, see those blocks up on the top of Smoky?

06 04 45 37 CDR-EVA Yes.

06 04 45 38 LMP-EVA If you head for those, the LM was right in line with those from our last stop. And I'm - I'm convinced that bearing was good from our last stop because we haven't changed much. Okay, Tony, coming up into the area now to our 3 o'clock position - correction 9 o'clock - we're heading 020 - it looks like another one of those old subdued sag areas.

06 04 46 09 CC Okay. And we're going to cut back on our station 10 just a little bit here, and we'll skip that photography of the heat flow cable. We'd like you to park halfway between ALSEP and the LM, and do a nominal station 10, except we'll drop the trench.

06 04 46 27 LMP-EVA John - -

06 04 46 28 CDR-EVA Don't want to do the trench. Okay.

06 04 46 29 LMP-EVA John, you lucked out.

06 04 46 30 CC Yeah, I bet that breaks you up.

06 04 46 35 CDR-EVA Surprises me.

06 04 46 44 LMP-EVA How do the consumables look, Tony?

06 04 46 46 CC Your consumables are fine.

06 04 46 51 LMP-EVA Roger. We feel fine.

06 04 46 53 CC Okay. Good.

06 04 46 56 LMP-EVA Okay. We're coming up on that area now as we top a rise - a ridge that is bouldery, about 10 to 12 percent of area is covered with boulders greater than 50 centimeters. And it's cobble covering about 60 percent. Looks like we - apparently a secondary around here somewhere caused all this. But we don't see the crater.

06 04 47 23 CC Okay, we copy that, and you have enough consumables to go on a long time. We just feel you've put in a good day.

06 04 47 33 CDR-EVA Well, why don't we stay out here and set a new world's outdoor record?

06 04 47 37 CC Ah, we don't need that; we got to leave something for 17. We're going to set a new sleep record on this one.

06 04 47 44 LMP-EVA Well, this has been fun.

06 04 47 45 CDR-EVA There's that second.

06 04 47 46 LMP-EVA Okay, there's the secondary, Tony. We're coming up on our 2 o'clock - 10 o'clock position. There's about a - what, 50 meters, John, you think?

06 04 47 56 CDR-EVA Yep.

06 04 47 57 LMP-EVA Fifty-meter crater that's a secondary or at least - it might be a primary, with these blocks just being out of it. And it's quite deep.

06 04 48 12 CDR-EVA That's probably a prim - I don't know whether that's a secondary or primary, though.

06 04 48 18 LMP-EVA We could tell. The block distribution seems to be - radially equivalent. I think that was probably a primary punched into the old Cayley.

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06 04 48 40 CC Okay, and, Charlie, we think the DAC's out of film now, if you want to turn it off.

06 04 48 45 CDR-EVA It is empty. Reading empty.

06 04 40 48 LMP-EVA Okay. Okay, it's off.

06 04 48 52 CC Okay.

06 04 48 53 CDR-EVA What's that thing up there on the hill, Charlie?

06 04 48 58 LMP-EVA Where? Straight ahead?

06 04 49 00 CDR-EVA Yeah.

06 04 49 02 LMP-EVA That's a rock.

06 04 49 03 CDR-EVA I was afraid you were going to say that.

06 04 49 04 LMP-EVA We got to get over this ridge, John, and we'll see the old LM. Man, you have cov - I am covered from head to foot - with dust. Boy, those fenders really are useful, Tony. This one we lost in the back has resulted in us being - -

06 04 49 35 CDR-EVA Pretty dirty.

06 04 49 36 LMP-EVA - - a double pig pen.

06 04 49 38 CDR-EVA We're going to have to really brush.

06 04 49 40 CC Charlie, you mean you guys are getting dirty?

06 04 49 42 CDR-EVA Maybe that's how we'll get our extension.

06 04 49 47 LMP-EVA No, been dirty. I think we're going to probably come out a little east of - where we need, John.

06 04 50 03 CDR-EVA I wouldn't be surprised, Charlie.

06 04 50 08 LMP-EVA But if we do, we ought to cross the tracks if we get too far east.

06 04 50 09 CDR-EVA That's exactly why I'm going this way, old buddy.

06 04 50 11 LMP-EVA Okay.

06 04 50 12 CDR-EVA Hang in there.

06 04 50 14 LMP-EVA You are sharp!

06 04 50 15 CDR-EVA Yes.

06 04 50 17 LMP-EVA You full blower?

06 04 50 19 CDR-EVA V-max.

06 04 50 21 LMP-EVA Must be a pretty steep slope here. Man, look at those angular blocks there, would you. Around there. Tony, here are 30 or 40 very angular blocks - 50 centimeters or so - and they have the same character as the ones we sample bagged, so - apparently, a ray material.

06 04 50 46 CC Okay.

06 04 50 48 LMP-EVA A little comment about - a little comment about the regolith. The regolith is texturally the same throughout. The only difference is a white - the difference in albedo that you can see on some of the fresh craters and also in the rays as we were going towards South Ray.

06 04 51 15 CC Okay. And, Charlie, you can expect the feedwater tone.

06 04 51 18 CDR-EVA Really an amazing vehicle.

06 04 51 19 LMP-EVA Isn't it?

06 04 51 22 CDR-EVA Okay, I just got a flag of some sort. Or is that me?

06 04 51 26 LMP-EVA Huh?

06 04 51 32 CDR-EVA Is that you or me? You expecting a flag, Houston?

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06 04 51 35 CC Right. Can you reach ... water on the Rover?

06 04 51 40 LMP-EVA Houston. Houston.

06 04 51 46 CC Go ahead, Charlie.

06 04 51 51 LMP-EVA Okay, I'm going to AUX WATER ON. There's the LM, John.

06 04 51 57 CDR-EVA How about that, sports fans.

06 04 51 59 LMP-EVA Right on, babe. Right on.

06 04 52 05 CDR-EVA Okay, Houston, we just topped the ridge and the LM is about (laughter) 200 meters from us. I think they've had - we've had a comm drop.

06 04 52 23 CC John, Houston.

06 04 52 27 CDR-EVA Go ahead.

06 04 52 30 CC Okay, we had our comm drop out here, and I understand Charlie got his water switched over.

06 04 52 37 CDR-EVA That's affirmative.

06 04 52 38 CC Okay.

06 04 52 39 CDR-EVA Yeah, Charlie's on AUX water.

06 04 52 42 LMP-EVA Was you expecting that?

06 04 52 43 CC Yeah, we tried to give you a call, but we had our comm drop out just about that time.

06 04 52 55 LMP-EVA ... is. How about swinging right and let me get a picture of that, John. With the Rover and - a little bit more. We want a nominal station 10, so it's between the core - -

06 04 53 09 CC Charlie, your feedwater pressure is still building.

06 04 53 10 LMP-EVA ... over here to the right by that - -

06 04 53 15 CC Okay, we've got it now, Charlie. Your feedwater pressure's going up.

06 04 53 23 LMP-EVA Okay, I was on min.

06 04 53 25 CC You're in good shape.

06 04 53 28 CDR-EVA ... between the mortar package and the - mortar package and the Rover?

06 04 53 33 LMP-EVA No. Yeah, that's a good place to park. I've got to go over here and get the - the penetrometer in line. Yeah, that'd be good. Mortar package and the Rover.

06 04 53 45 CC Sounds good to us.

06 04 53 59 LMP-EVA We won't have any trouble nagivating without that navigation system, but it's just keeping them posted to where we are.

06 04 54 05 CC Right. When you get parked there, we'd like you to reset your nav.

06 04 54 11 LMP-EVA Okay.

06 04 54 13 CDR-EVA Okay. Which way we want to park on this one, Charlie?

06 04 54 15 CC 180.

06 04 54 16 LMP-EVA Pointing south again. 180. Hook a right. I can't believe how hilly this place is. There's not a flat place around.

06 04 54 27 CDR-EVA Right, except where that LM is.

06 04 54 29 LMP-EVA Except right there where that LM is.

06 04 54 32 CDR-EVA I'ts really good. That saved us a lot of time.

06 04 54 43 LMP-EVA Okay, it's resetting, Tony.

06 04 54 45 CC Okay.

06 04 54 51 LMP-EVA Okay, and you got - well, the heading says we're at 176, 65. What's the num - I can't read the number 2 AMP HOUR.

06 04 55 07 CDR-EVA Number 2 AMP HOUR says - it's reading as 110.

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06 04 55 13 LMP-EVA Yeah. 65 and 110; 105 - 110 and 120; off-scale low, off-scale low; and off-scale low, off-scale low.

06 04 55 30 CC Okay, we copy that.

06 04 55 32 LMP-EVA Wait a minute. The forward - the forward motors are not off-scale low; they're just coming up - they're about - make that the rear motors - they're about 210.

06 04 55 43 CC Okay, 210. And we'll need an ...

06 04 55 47 LMP-EVA The forward motors are off-scale low.

06 04 55 48 CC Okay.

06 04 55 49 LMP-EVA Okay, let me get out of this thing.

06 04 55 51 CDR-EVA Okay, mine is holding pressure at 395; I'm between MINIMUM AND INTERMEDIATE. I don't have any flags and - My O₂ is so covered with dust, I can't tell what it is. But it looks like - Tony, I think I got - Dadgummit. I can't tell.

06 04 56 35 CC That's okay, John. We - we read 35 percent down here.

06 04 56 38 LMP-EVA Well, I got - -

06 04 56 42 CDR-EVA Okay, Yeah. It looks up above 25, anyway; 25, 35, there you go.

06 04 56 47 LMP-EVA That's what mine is, too, Tony, about 33. And I got 3.8 min cooling, and I've got just a water flag. I got the ... and the aux water's on.

06 04 56 59 CC Okay, sounds good.

06 04 57 04 LMP-EVA Look at this place. It is filthy.

06 04 57 15 CDR-EVA Okay, Houston. Going to 3.

06 04 57 18 CC Okay.

06 04 57 33 CDR-EVA Okay, lets see. There's the core. I need the fork.
Okay, we got them.

06 04 57 47 LMP-EVA And we're gonna - I'm starting on the double core,
Tony.

06 04 57 50 CC Okay, that sounds good. And, John, since we're
running behind here, I wonder if could operate
the penetrometer.

06 04 58 07 CDR-EVA A piece of cake.

06 04 58 17 CDR-EVA Why don't you just give us an extension?

06 04 58 23 LMP-EVA Hey, how about an extension, you guys? We're
feeling good.

06 04 58 26 CC Well, we understand and we can understand why you
wouldn't want to get back in, but we'd like you to
get back in on time. And you've got a lot of finds
there, so don't worry about it.

06 04 58 47 CDR-EVA You said all we was gonna do tonight is sit around
and talk.

06 04 58 52 CC Well, we like to hear you talk.

06 04 58 57 LMP-EVA Tony, we could really -

06 04 58 59 CDR-EVA Yes, especially on a hot mike. (Laughter)

06 04 59 01 CC That just makes it more interesting.

06 04 59 05 LMP-EVA Ten minutes and we could get all this done, Tony.
How about 10 minutes, Tony? Please. John, you got
the shovel - the s - sh, yeah.

06 04 59 16 CDR-EVA Lock at that, Charlie.

06 04 59 17 LMP-EVA What? I don't see. What? What? What?

06 04 59 23 CDR-EVA Somebody up there likes us. That's bag number 4.
See where it is?

06 04 59 29 LMP-EVA Came off, huh?

06 04 59 30 CDR-EVA Came off, and it's hanging between the fender and
the frame.

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06 04 59 36 LMP-EVA That is amazing.

06 04 59 37 CDR-EVA Yeah.

06 04 59 41 LMP-EVA Okay, can I have your hammer?

06 04 59 44 CDR-EVA Double core. Okay, can be anywhere out in front of the Rover. I'll go out ... Rover ... and do ... antenna.

06 05 00 00 LMP-EVA Come on, Tony. Pretty please?

06 05 00 01 CC We're working it. Okay, we'll go ahead and give you 10 minutes.

06 05 00 06 CDR-EVA Tony, is - -

06 05 00 07 CC How's that? Just shows that we love you.

06 05 00 10 LMP-EVA Atta boy. Let's hear it for old - let's hear it for old flight, "atta boy" for flight.

06 05 00 18 CC Yea!

06 05 00 26 LMP-EVA Okay.

06 05 00 29 CDR-EVA Want me to help you with the penetrometer?

06 05 00 32 LMP-EVA Well, I've got the double core right now.

06 05 00 36 CC Okay, we'll still drop the trench and do everything else as nominal.

06 05 00 46 LMP-EVA I bet you I don't get this in here, but I'll try it.

06 05 00 49 CDR-EVA I think you will.

06 05 00 55 LMP-EVA I don't know. Okay, that's pushed in.

06 05 00 59 CDR-EVA Let me do that, and you do the penetrometer because I know how to do that one.

06 05 01 02 LMP-EVA Okay. That's a good swap.

06 05 01 10 CDR-EVA Dadgummit.

06 05 01 14 LMP-EVA John, see if I got the red dot on my camera. It stopped running.

06 05 01 22 CDR-EVA Sure do.

06 05 01 23 LMP-EVA Okay, how about spinning it once for me.

06 05 01 37 CDR-EVA ... I went to ... got it.

06 05 01 43 LMP-EVA Super. I'll get it. Cross-Sun as far you can pull - push it in. Okay. You want to hammer on this?

06 05 01 55 CDR-EVA Yeah.

06 05 01 58 LMP-EVA Okay; now the stuff to - -

06 05 02 01 CDR-EVA Take it apart with -

06 05 02 02 LMP-EVA Take it apart with its back in the back.

06 05 02 03 CDR-EVA Okay.

06 05 02 04 LMP-EVA They want you to take both of them off together and then ram it home before you separate the two.

06 05 02 12 CDR-EVA Understand.

06 05 02 13 LMP-EVA And the top of the bottom one is back here next to the LSM.

06 05 02 17 CDR-EVA Okay.

06 05 02 20 LMP-EVA Okay, Tony, which - You want me to start with the 0.5?

06 05 02 27 CC Right, it will be the 0.5 - Well, actually you have the 0.2 on there. Why don't you do the string of 0.2 and then we'll come back and get the 0.5 near the double core.

06 05 02 38 LMP-EVA Well - no, I took - I took the 0.2 off.

06 05 02 41 CC Okay, fine.

06 05 02 42 LMP-EVA I don't have anything on here now.

06 05 02 44 CC Fine, let's press for the 0.5.

06 05 02 49 LMP-EVA Okay. It gets hard down there, doesn't it, John?

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06 05 02 54 CDR-EVA Yeah, I don't think it's going to go. How many hits you want me to give it, Houston, before I quit?

06 05 03 05 CC Okay, it's not going down at all?

06 05 03 15 LMP-EVA Now, you're getting it a little bit, John. It's going in, John, about a quarter inch a stroke.

06 05 03 23 CDR-EVA It figures.

06 05 03 28 LMP-EVA No, a little bit more than that.

06 05 03 38 CDR-EVA Ahhh!

06 05 03 40 LMP-EVA I did the same - -

06 05 03 41 CDR-EVA Ohhh!

06 05 03 42 LMP-EVA I did the same thing.

06 05 03 59 CC John, it's too late to change your mind; you got to hammer that one; no trenches.

06 05 04 07 CDR-EVA Crazy. (Laughter) Should have kept my mouth shut.

06 05 04 12 LMP-EVA Dadgummit! That thing came off again.

06 05 04 16 CC It may have a bad latch in it.

06 05 04 23 CDR-EVA ... one, Houston.

06 05 04 26 CC Okay, John, you've probably hammered on that long enough. Why don't we just call it enough.

06 05 04 32 LMP-EVA It's in. John, it's in. That's far -

06 05 04 36 CDR-EVA How far do you want to drive it, Charlie?

06 05 04 38 LMP-EVA That's far - that's far enough.

06 05 04 39 CDR-EVA Drive it all the way in?

06 05 04 41 LMP-EVA Yeah, they don't want any more than that.

06 05 04 42 CC Okay, that looks good.

06 05 04 52 CDR-EVA Gee, it came right back out, too.

06 05 04 53 LMP-EVA Yeah, that's the amazing part.

06 05 05 00 CDR-EVA That is amazing.

06 05 05 09 CC Okay, John, you want to turn that over? That stuff may come out of that.

06 05 05 28 CDR-EVA Okay.

06 05 05 36 LMP-EVA Okay, I finally got that 0.5 back on. And I got number 6, Tony. Is that okay? I don't think I've used 6.

06 05 06 02 CDR-EVA Where are the core caps at, Charlie?

06 05 06 04 LMP-EVA In the - in the HTC. How about an answer, Tony?

06 05 06 09 CC Say again, Charlie.

06 05 06 11 LMP-EVA I'll bypass - no, I'm on 9 -

06 05 06 13 CC Yeah, 9's good, Charlie.

06 05 06 14 LMP-EVA I'm going to bypass 9 and go to 10.

06 05 06 17 CC Okay, that's fine, too.

06 05 06 18 LMP-EVA I just passed it on. I'm going to go to 10. Okay. Let's see - -

06 05 06 27 CDR-EVA Okay, it's full in the bottom of it, anyway.

06 05 06 31 CC Okay. And that one should be fairly near the double core, Charlie.

06 05 06 38 LMP-EVA It is, within 3 meters - 2 meters.

06 05 06 42 CC That's fine.

06 05 06 43 LMP-EVA Is that okay? Okay.

06 05 06 48 CDR-EVA Look at that, the core tube caps go on and everything.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 03 48 43 CMP Okay, and the GAMMA RAY is coming to RETRACT -
06 03 48 46 CMP MARK.
06 03 48 47 CC Roger.
06 03 48 48 CMP Barber pole. And my watch has started.
06 03 49 41 CMP And, Hank, how about if I put the PAN CAMERA to -
to POWER at the same time I take the IMAGE MOTION
up, so I can have a couple extra seconds to look
at the landing area.
06 03 49 57 CC That's fine, Ken.
06 03 50 44 CMP Okay, the IMAGE MOTION is barber pole. PAN CAMERA
is STANDBY. STEREO, POWER, barber pole and gray.
06 03 50 59 CC Copy.
06 03 51 08 CMP And the GAMMA RAY BOOM is coming OFF -
06 03 51 12 CMP MARK.
06 03 51 14 CC Roger.
06 03 52 21 CMP Boy, as the Sun angle comes up now, the features in
the landing area are really fading out.
06 03 52 55 CMP There's more evidence of terracing and banding in
Smoky Mountain than there is in Cone, it looks like.
06 03 53 11 CC How close are they going to get to that on this - -
06 03 53 13 CMP On this Sun angle, I can see one, two - Say again.
06 03 53 18 CC I was just curious to how close they were going to
get those bands on their trip to North Ray.
06 03 53 27 CMP Yeah. Well, the other thing is that they were going
to go down to Ravine, and it looks to me like the
material at Ravine is about the same material that's
around North Ray. If they get there and come up
the way they're scheduled to, it looks like they're
going to be on the same unit that they would have
gotten down at Ravine.

06 03 53 54 CMP You really have to look at this stuff in all Sun angles because you see different things from hour to hour. It's really amazing. How we doing on the pan camera?

06 03 54 06 CC Still got a little over a minute to go. I'll give you a call.

06 03 54 12 CMP All right, sir. It sure looks like that stuff that comes into the - looks like North Ray was blasted into a piece of Smoky Mountain - what it really looks like. And that the Smoky Mountain and the stuff out to the - to the east of there is really probably all from the same stuff.

06 03 55 10 CC Casper, about 15 seconds to T-start.

06 03 55 29 CMP Okay, we're OPERATE. Barber pole and a gray.

06 03 55 35 CC Roger.

06 03 58 49 CMP You know, it's very interesting that down there at Alpetragius, there's a lot of the linear features that line up with the Imbrium sculpture. They come right down, come through Alpetraguis, go through the central peak, come right through the southern wall, and go on out, and one of them goes on down and hits the rim of Arzachel.

06 03 59 16 CC That sounds pretty interesting there, Ken.

06 03 59 22 CMP I'm looking at Lassell C and the little highlands clump that's by it. And - remember, we had a red and a blue color difference, and right now the Southern Pease with a crater in it is sort of a - a tan color, and the Northern Pease is a gray. When I look at the mare, I see a big swatch of - of the tan-colored mare down to the south that goes over towards Guericke. And I see a - a tongue of darker gray material. The area around Lassell C has the tan tone to it. Then it goes out about as far as our little cone and the little bright crater next to it. That's about the outer limit - maybe just a little beyond. Then there's a patch of the - of this tan stuff that's down to the south that about lines up with the big Archean rille that's over to the southeast. Then there's a patch on

the gray-colored mare down inside of that. It's just a little circular piece. In looking at the Lassell C feature - a look at it in detail - it appears to me that this tan stuff on the south end of it has fewer craters than the stuff on the north, although not an awful lot, but there's little pitted craters all over the northern part. They're not on the southern part, and there are a couple of light, streaked bands that appear in the southern clump that you don't see in the north.

06 04 01 31 CC Can you still see Lassell?

06 04 01 37 CMP Say again, Hank.

06 04 01 38 CC Can you still see Lassell?

06 04 01 47 CMP Just barely, yeah.

06 04 01 49 CC Okay. I'm just curious why we don't see that little dark feature that's been reported there near the bright one - up to the west of Lassell C.

06 04 02 01 CMP Oh, you do, Hank. I didn't mean to say you didn't see it. I said it doesn't look like what we saw before - what we thought we saw. It's a smooth-sided thing. Let me get the binocs on it.

06 04 02 34 CMP Smooth-sided, but through the binoculars, it doesn't look at all like a cone. It looks like a little dome with one side of it broken out. And there are several other little domes out here now that I hadn't seen before.

06 04 03 00 CC When you say side broken out, do you mean like a - a - a - fractured-out piece, or did it look more like a crater?

06 04 03 13 CMP Well, through the - to the visual - just to your eyeball, it looks like a - I'll have to catch that again later, but it looked, to the eyeball, like it had a little crater in it. When I got the binoculars on it, it looked like there was just a section of it that was broken out.

06 04 03 35 CC Any evidence of where it went?

06 04 03 43 CMP No, sir. That's a loaded question.

06 04 03 50 CC Roger (laughter).

06 04 03 52 CMP Next thing you're going to want to know how it came to be there.

06 04 04 00 CC Do the other - Are the other domes similar in appearance to that one?

06 04 04 06 CMP Yeah. They're not as large, and I hadn't seen those before just now. They're right in the corner of the window, as usual. It's going to take a little work to find them.

06 04 04 21 CC Are they all complete, or do they have pieces missing also?

06 04 04 37 CMP Hank, I just saw them at the time I mentioned them. And best I could tell, they are complete.

06 04 04 45 CC Okay.

06 04 04 49 CMP But I'll have to take another look. You know, I could have been - I could have got caught with a crater that inverted on me too. I am going to have to look carefully to make sure I didn't do that.

06 04 05 08 CC And, Ken, we're about 15 seconds from T-stop.

06 04 05 28 CMP Okay. STANDBY.

06 04 06 03 CMP How about if I go ahead and put the gamma ray out?

06 04 06 09 CC Roger. Go ahead, and the lens is stowed.

06 04 06 15 CMP Okay. And the POWER is coming OFF the PAN CAMERA -

06 04 06 19 CMP MARK. The GAMMA RAY BOOM is on its way out with a barber pole. And I guess you'd like to have the SHIELD OFF. While I'm about it, I'll do that. And I'm ready to copy your pads, or whatever things you said you had there.

06 04 06 51 CC And, Ken, could you get the mass spec on for us all?

06 04 07 03 CMP It's on.

06 04 07 04 CC Roger.

06 04 07 26 CC Okay, the first change is at 1 - -

06 04 07 28 CMP Did we lose an element?

06 04 07 30 CC Negative. That was a Flight Plan change we were just getting to. We want to look at it for a rev off, and then we're going to bring it back on.

06 04 07 43 CMP Okay, (laughter) that was the one that we had agreed was a - was a "Don't waste time call." I thought maybe you just watched an element burn out.

06 04 07 52 CC Negative. I guess I should have warned you before I hollered that. The first change after that comes at 149:39.

06 04 08 05 CMP Go ahead.

06 04 08 07 CC Okay. After "PAN CAMERA - standby (T-stop)," add "GAMMA RAY, DEPLOY; PAN CAMERA, off (MSFN cue)." And I don't know whether you can squeeze it in there or not, but, we also want to add, "MASS SPEC DISCRIMINATOR, HIGH." Up.

06 04 08 45 CMP Okay. I got "GAMMA RAY, DEPLOY" after "PAN CAMERA to standby " at 149:38. And I'll get the "PAN CAMERA, off" until you tell me or when you tell me. I'll take the "MASS SPEC DISCRIMINATOR to HIGH."

06 04 09 01 CC That's affirmative. And in the little MSFN update block there, cancel - delete the photo pad - PC photo pad, the UV photo pad, and the maneuver pad. And change the "TEI-53" to TEI-54."

06 04 09 23 CMP Okay.

06 04 09 25 CC All righty. At 149:45, "MASS SPEC DISCRIMINATOR to LOW." Down.

06 04 09 42 CMP Okay. "MASS SPEC DISCRIMINATOR, LOW" at 149:45.

06 04 09 53 CC On the next page, at 150 hours, change the "Sim exp status" code to "(plus 1211) (02222)."

06 04 10 09 CMP Hey. Hey, Hank? What do you want? You're - you're getting into areas where we get AOS next time. How about letting me go ahead and work on this sunrise solar corona setup? That's a time-critical guy that if I don't get it just right, I'll miss it.

06 04 10 27 CC Okay.

06 04 10 28 CMP Can I get the rest of those updates then?

06 04 10 30 CC That's affirmative.

06 04 10 37 CMP Okay. Thank you.

06 04 11 58 CMP Minus 3 minutes before ...

06 04 17 33 CMP Okay. The SHIELD is on.

06 04 17 37 CC Copy.

06 04 27 40 CC Casper, Houston. We're about 4 minutes or so from LOS. We may lose the high gain here shortly. Everything is looking good at this point. And INCO says it might help on acquisition to tweak your dial a little bit. PITCH, 10; YAW, 0 for the next acquisition. And like to remind you to configure your DSE.

06 04 28 07 CMP Okay, Hank. Thank you.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 05 07 04 LMP-EVA Okay, that bottomed it out, Tony.

06 05 07 06 CC Okay, we can see that.

06 05 07 07 LMP-EVA ... 0.5.

06 05 07 08 CC That looks good. Why don't we go to a 0.2 and do it just in the same place.

06 05 07 13 LMP-EVA I've got almost - Okay. And then work towards the -

06 05 07 19 CC Work towards the deep core.

06 05 07 22 LMP-EVA Is this the last time we use this - is this the last time we use this thing?

06 05 07 26 CC It should be.

06 05 07 28 LMP-EVA I can't remember. We don't have it on - on EVA-3, we don't use it, huh?

06 05 07 33 CC Not right now.

06 05 07 37 LMP-EVA Well, I'll put it back, anyway. John, could you move over a skosh - let me -

06 05 07 45 CDR-EVA Yeah, that rammer-jammer only went in an inch.

06 05 07 49 LMP-EVA That's okay.

06 05 07 50 CC That's okay, as long as it gets out of the cap.

06 05 07 51 CDR-EVA ... it's supposed to go in?

06 05 07 52 LMP-EVA Yeah. Well, you got it so full - you've probably got it so full -

06 05 08 03 CDR-EVA That mess them up?

06 05 08 04 LMP-EVA Nah. You're going to leave that cap on it, anyway.

06 05 08 07 CDR-EVA That's what I thought. That cap stays on.

06 05 08 09 LMP-EVA Yeah.

06 05 08 11 CDR-EVA Until it gets back to Houston. There's the 0.2.

06 05 08 16 LMP-EVA Going to 11, Tony.

06 05 08 17 CC Okay.

06 05 08 23 CDR-EVA Hey, where's the - the top thing that goes on, Charlie?

06 05 08 26 LMP-EVA Okay. The - the one for the bottom is right there by the LSM, on top of the pallet. And there's a core tap - core goes on the - the cap goes on the top part. You see it?

06 05 08 47 CDR-EVA Boy, I sure don't.

06 05 08 48 LMP-EVA Okay. Right by the LSM, by the LMP, there's a screw on just like on the top part.

06 05 08 56 CDR-EVA Yeah.

06 05 08 57 LMP-EVA Okay. That screws back in the bottom part.

06 05 09 00 CDR-EVA Yeah, but what -

06 05 09 21 LMP-EVA There you go. You got it. There. That's good. Now ram that one and - and then put a cap on the other one and give them the numbers.

06 05 09 40 LMP-EVA Okay, Tony. Here come the 0.2.

06 05 09 46 CC Okay. Sounds good, Charlie.

06 05 09 57 CDR-EVA What are these with, Charlie? The STB?

06 05 09 59 LMP-EVA Put them under my seat.

06 05 10 01 CDR-EVA Okay. The numbers of these things -

06 05 10 06 LMP-EVA Okay, the 0.2 almost went in all the way.

06 05 10 10 CC Okay, Charlie. We see that.

06 05 10 11 CDR-EVA Okay, the upper one was 40 - the upper one was 45, the bottom one was 4.

06 05 10 18 CC Okay, John. Sounds good.

06 05 10 23 LMP-EVA Okay, Tony. Be advised I'm sorry that I'm spiking this thing out occasionally, but this is the only way we can do it.

06 05 10 30 CC That's fine, Charlie. We see the problem.

06 05 10 34 LMP-EVA Okay, I'm moving - I've got two more to do, cycling to 12. And this is about a fourth of the way - right here. Okay. Okay, number 12.

06 05 10 59 CC And, John, we should wait on your pan until Charlie's through there.

06 05 11 05 CDR-EVA Understand.

06 05 11 08 LMP-EVA Okay. That's about the same distance, Tony.

06 05 11 10 CC Okay.

06 05 11 14 LMP-EVA Cycling to 13.

06 05 11 36 CC Hey, John. While you're sampling - -

06 05 11 37 LMP-EVA Okay, I'm - -

06 05 11 38 CC - - there, you might look around and see if you see any of that vesicular basalt.

06 05 11 46 CDR-EVA That's what I'm a looking for.

06 05 11 49 CC Good show. I told them you were.

06 05 11 53 LMP-EVA Oop? Okay.

06 05 11 59 CC We see that one went all the way in.

06 05 12 03 LMP-EVA Not quite.

06 05 12 16 LMP-EVA It's in. It is - all but about 5 inches.

06 05 12 22 CC Okay.

06 05 12 23 LMP-EVA There was - that one was -

06 05 12 24 CC Okay. And, John, stand by for a feedwater tone.

06 05 12 30 CDR-EVA Just got it.

06 05 12 32 CC How's that?

06 05 12 35 CDR-EVA (Laughter)

06 05 12 43 CC And go on AUX water.

06 05 12 45 LMP-EVA Okay. Cycling to - -

06 05 12 48 CDR-EVA Okay.

06 05 12 49 LMP-EVA - - cycling to 14.

06 05 12 52 CC Okay, Charlie.

06 05 13 06 LMP-EVA And I'm right by the double core. I - I mean the deep core.

06 05 13 12 CC Okay. That sounds good.

06 05 13 13 LMP-EVA The ground's pretty beat up with - Okay, but it's pretty beat up with footprints. Should I go to a pristine area or stay here?

06 05 13 23 CC Just move it over out of the footprints.

06 05 13 27 LMP-EVA Okay. I've got a good spot. About 2 meters toward the central station.

06 05 13 32 CC Okay.

06 05 13 48 LMP-EVA That one's going all the way in, too. If I didn't lose my balance.

06 05 13 54 CC Good show.

06 05 13 55 LMP-EVA Bet I can't get up. There we go. Recovery. Bang!

06 05 14 14 CDR-EVA Flow, heat flow.

06 05 14 17 CC Okay, Charlie. One flat plate by the double core, and that'll about do it.

06 05 14 24 LMP-EVA Okay. Okay, Tony, the neck connector, the printed circuit on the heat flow, is still in.

06 05 14 40 CC Okay. We understand.

06 05 14 41 LMP-EVA The - It looked like the silver part broke off right where it's mated into the - into the - the printed circuit.

06 05 14 55 CC Okay. We copy that.

06 05 15 07 LMP-EVA Prints on the Moon. I can't believe it.

06 05 16 04 CDR-EVA But, Charlie. I just don't see any vesicular basalt.

06 05 16 07 LMP-EVA I don't either.

06 05 16 08 CDR-EVA It's sort of like - they're always there when you need them.

06 05 16 22 CDR-EVA Crummy thing.

06 05 16 37 CC And, John, as Charlie takes - -

06 05 16 38 LMP-EVA Okay. That's fine. Give Tony a number.

06 05 16 39 CC - - that penetration, we can go ahead and take your pans.

06 05 16 47 CDR-EVA Okay, Houston.

06 05 16 48 LMP-EVA Tackling the 15.

06 05 16 50 CC Okay. Good show.

06 05 16 54 LMP-EVA And it's somewhere between this mass of footprints - Aha, there it is. Okay, Tony, right beside double core.

06 05 17 13 CC Okay, Charlie.

06 05 17 22 LMP-EVA Okay, that was a pretty good one. I think it's going to turn out and it was - it went in about - 6 centimeters.

06 05 17 37 CC Outstanding.

06 05 17 42 LMP-EVA Yeah. Let me try one out here in a pristine area to see if that's - a couple of meters away, here. I wonder whether they did with all that foot walking over there. Might have just fouled that up. Nope. It was pretty good, Tony. That one went in about the same.

06 05 18 01 CC Roger. We had that one on TV.

06 05 18 05 LMP-EVA Okay.

06 05 18 14 CDR-EVA Charlie?

06 05 18 15 LMP-EVA Yeah.

06 05 18 16 CDR-EVA Can you see if my lens is dirty?

06 05 18 19 LMP-EVA Yeah, in just a minute. Turn around this way, John. I've got to look in the Sun.

06 05 18 29 CDR-EVA Which way do you want me to turn?

06 05 18 30 LMP-EVA Towards me. Towards the - Look - Slight dust but not much, it's okay.

06 05 18 39 CDR-EVA Very fine.

06 05 18 46 LMP-EVA Okay, Houston. I collected one sample, which was a - a sharp angular.

06 05 18 57 CC Okay. And we're going to have to pack up and head home.

06 05 19 03 LMP-EVA Okay. Home is about 50 meters away.

06 05 19 12 CDR-EVA Can you put this back there, Charlie?

06 05 19 13 LMP-EVA Yeah.

06 05 19 18 CDR-EVA There, I thought we had lost this brake here for a minute, but there it is. And that sample is going in bag sample 381, and I'll shoot the pan here in a second.

06 05 19 30 CC Okay, 381.

06 05 19 42 CDR-EVA And it was a black rock but I don't think it was vesicular basalt; I think it was a breccia.

06 05 19 48 CC Okay.

06 05 19 49 CDR-EVA That way, it's the same type as we've been sampling it. Going into sample bag 4 on top of the - sample 9 samples.

06 05 20 03 LMP-EVA Okay, Tony. I'm up to frame count 91 on magazine Delta.

06 05 20 08 CC Okay. We copy, Charlie.

06 05 20 14 LMP-EVA Tony, does the - I can't remember. Does the CSVG - CVSC go into the - the rock box?

06 05 20 26 CC Yes, it does.

06 05 20 30 LMP-EVA Okay.

06 05 20 40 LMP-EVA Hey, John, I'm going to take that samp - SEB number 2, my camera, and I'm heading home.

06 05 20 45 CDR-EVA Okay.

06 05 20 51 LMP-EVA Boy, is this fun.

06 05 21 08 CDR-EVA Good, that pan completes me up to frame of 89, Houston.

06 05 21 14 CC Okay, John; 89.

06 05 21 17 CDR-EVA Okay, the MO - the MODE switch is going to 1.

06 05 21 21 CC Okay. And, John, when you get inside, we have a configuration change in LRV.

06 05 21 28 CDR-EVA Okay.

06 05 21 36 CDR-EVA Charlie's already back at the LM.

06 05 21 39 CC Roger. We saw that before he went on.

06 05 21 40 CDR-EVA He walks faster than I do. Okay. Start with the configuration change.

06 05 21 50 CC Okay. Except for the PWM SELECT and the DRIVE ENABLED, we would like everything back to nominal. Circuit breakers in, and DRIVE POWER on BUS Delta, STEERING on BUS Delta.

06 05 22 06 CDR-EVA That's REAR STEERING. Circuit breakers are in, DRIVE POWER's on Delta, and STEERING's on Delta.

06 05 22 13 CC Okay. Good show. And we understand you reset before you came.

06 05 22 20 LMP-EVA Tony, looking back up - Yeah, I did that.

06 05 22 25 CC Okay.

06 05 22 26 CDR-EVA Huh?

06 05 22 28 LMP-EVA Reset the NAV.

06 05 22 30 CDR-EVA Yeah, we're reset now.

06 05 22 32 CC Okay. Fine.

06 05 22 44 LMP-EVA Okay. Tony, do we put as many core tubes as we can in the rock box also?

06 05 22 53 CC ... work that, Charlie.

06 05 22 56 CDR-EVA Boy, that's neat.

06 05 22 58 LMP-EVA How about the core tubes, do we put all the core tubes in the rock box also?

06 05 23 06 CC Okay. Charlie, we can put four core tubes plus CSVC in the rock box and then plus what documented samples you can get in there.

06 05 23 16 LMP-EVA Four core tube, CSVC documented sample, gotcha.

06 05 23 20 CC Roger.

06 05 23 21 LMP-EVA Okay. Looking back towards Stone Mountain, Tony - -

06 05 23 24 CDR-EVA Charlie, let me park the LM right here.

06 05 23 26 LMP-EVA Okay. The LM is already parked, but you sure can park the Rover.

06 05 23 30 CDR-EVA All right. Fair enough.

06 05 23 32 LMP-EVA Okay. Looking back towards - Stone Mountain, Tony, I don't see the Rover tracks.

06 05 23 42 CC Okay. That's fine. We're a little bit behind the time line there, Charlie. I think we better get closed out.

06 05 23 50 LMP-EVA Okay, we're doing that right now as fast as we can.

06 05 23 52 CC Okay. I understand.

06 05 23 55 LMP-EVA John's back at the - John's at the Rover. I'm going to put you on 3.

06 05 24 08 CDR-EVA Okay, 3. LRV powerdown ... LR ... be a good ... for the UV, Charlie.

06 05 24 21 CC And, John, as you get off the Rover, we'd like you to take a picture of the UV camera; it should be about f/5.6 at 250.

06 05 24 36 CDR-EVA Roger.

06 05 24 40 CC You don't have to stop there.

06 05 24 42 CDR-EVA ... do you want me to take that picture?

06 05 24 43 CC Yeah, just take it anywhere. As long as we can see that location, that's all we're looking for.

06 05 24 50 CDR-EVA Okay.

06 05 24 53 LMP-EVA Okay, you're aligned, Tony, with signal strength about 4.

06 05 24 55 CC Okay, we got a good picture.

06 05 24 56 LMP-EVA TV REMOTE.

06 05 24 59 CDR-EVA Okay.

06 05 25 03 LMP-EVA Actually, just the normal old thing ought to catch it, Houston, because a - it's not in Sun but there sure is a lot of Sun behind it and on it and all that. Very strange. It's in shadow.

06 05 25 20 CC Okay. I guess they wanted to see into the shadow a little bit.

06 05 25 23 CDR-EVA How's that?

06 05 25 26 LMP-EVA Okay. Well, I mean the lag - the shadows - you'll be able to see it fine. Okay. Houston, you want to RESET?

06 05 25 38 CC Roger. RESET and I have a new setting.

06 05 25 44 LMP-EVA Okay.

06 05 25 45 CDR-EVA Let me watch you, if we don't score now -

06 05 25 53 CDR-EVA Dig that, man, it did work. It's working.

06 05 25 57 CC Okay.

06 05 25 58 CDR-EVA And what are the new settings, Houston?

06 05 26 02 CC Azimuth, 326.

06 05 26 05 CDR-EVA 326.

06 05 26 06 CC And elevation, 16.

06 05 26 18 CDR-EVA Okay.

06 05 26 25 LMP-EVA Hey, Tony, I'm putting core tubes 29, 43, 45, and 54 in the rock box.

06 05 26 44 CC Okay. We copy that.

06 05 26 49 LMP-EVA CSVC is in the rock box. Packing it in there.

06 05 26 53 CC Okay.

06 05 26 56 LMP-EVA You want an unbagged rock in the rock box, Tony. I don't think you do.

06 05 27 03 CDR-EVA Okay, a 326, and what's the elevation, Houston.

06 05 27 06 CC Sixteen.

06 05 27 10 CDR-EVA Sixteen.

06 05 27 26 LMP-EVA Okay, Houston, 326 and 16. That's set and she's going.

06 05 27 37 CC Okay. Charlie, yeah, you can put unbagged rocks in the SRC.

06 05 27 43 LMP-EVA Okay.

06 05 28 06 CDR-EVA Got the hammer, Charlie? Good, I knew it, bring it here.

06 05 28 10 LMP-EVA Okay, there you are.

06 05 28 11 CDR-EVA Okay, thanks, I don't think - I think this bag here has got so little in it we can - -

06 05 28 20 LMP-EVA Let's empty it into the SRC, there's some more will go in the SRC.

06 05 28 23 CDR-EVA Well, okay. But this is only - this has got those two whatchacallens there.

06 05 28 27 LMP-EVA What you mean?

06 05 28 30 CDR-EVA All those - Yeah, okay. They can't go in the SRC. Where do they go, in the ETB?

06 05 28 36 LMP-EVA Oh, no, in a rock box - in a rock bag somewhere. Why don't you put them back here on the one - in mine, John, it's back on the Rover here.

06 05 28 44 CDR-EVA Okay.

06 05 28 46 LMP-EVA Back on the Rover.

06 05 28 59 CDR-EVA There you go.

06 05 29 26 LMP-EVA We're packing up the rock box, Tony.

06 05 29 29 CC Okay, good.

06 05 29 30 LMP-EVA Got the rocks in it. The liner's coming off. And I put the other core tubes in a - tell you in a minute.

06 05 29 49 CDR-EVA Beautiful, they just fit right in the top.

06 05 29 52 LMP-EVA Good. What's the number on that one, John?

06 05 29 56 CDR-EVA That's SCB 2. No, yeah, 1.

06 05 30 02 LMP-EVA Okay, and the - John's crystalline rock in the two bore for the two - other core tubes go in - in number 3, Tony.

06 05 30 14 CC Okay.

06 05 30 17 LMP-EVA If you got - Where'd those two core tubes go that you had?

06 05 30 20 CDR-EVA I put them in here. Four and 45 are in your seat.

06 05 30 23 LMP-EVA Oh, okay, then I got them already.

06 05 30 25 CDR-EVA Okay.

06 05 30 30 LMP-EVA Okay, my DAC goes - -

06 05 30 32 CDR-EVA Here, let me un - let me unload your backpack.

06 05 30 37 LMP-EVA Okay.

06 05 30 38 CDR-EVA My backpack's already been unloaded.

06 05 30 41 LMP-EVA Okay. We got two bags out that we - -

06 05 30 45 CDR-EVA Yeah, extra.

06 05 30 47 LMP-EVA Well, good. Okay, we're going to have three - I don't know how full mine is.

06 05 31 00 CDR-EVA Okay, I got it. ...

06 05 31 15 LMP-EVA Got it.

06 05 31 17 CDR-EVA That's got it.

06 05 31 19 LMP-EVA Okay.

06 05 31 20 CDR-EVA Okay. We hardly got any rocks in it at all.

06 05 31 22 LMP-EVA I know if we - I think I can stuff them in this other - other bag over here, John.

06 05 31 26 CDR-EVA Okay. I'll take SCB 1 and put it by the footpad, Charlie.

06 05 31 32 LMP-EVA Okay. Yeah, I can stuff them in here. Let me get these core tube caps out of here. Out of one and put them under the .. pin. Okay. I put them on the HTC, how would that be?

06 05 31 58 CDR-EVA That's fine, that midcap is empty.

06 05 32 04 CC Okay, Charlie, you called out that you put two core tubes and John's crystalline rocks in SCB 3; that should have some empty core tubes and core caps in it. Could you straighten that out?

06 05 32 18 LMP-EVA No, we - It had two core tubes emptied and we used - we used the bag, Tony, that's true -

06 05 32 27 CDR-EVA Hold it, Charlie.

06 05 32 28 LMP-EVA Excuse me, John. That was set - -

06 05 32 29 CDR-EVA But that was - -

06 05 32 30 LMP-EVA - - for EVA-1 - I mean EVA-3.

06 05 32 40 CC There's no problem as long as you took those core tubes and core caps out.

06 05 32 46 CDR-EVA We don't - -

06 05 32 47 LMP-EVA Well, we got the core caps out, but we didn't get the core tubes out and I don't know whether - we must have used them.

06 05 32 57 CDR-EVA This here has a couple of core caps in it too, Charlie; number 1.

06 05 33 00 LMP-EVA How about core tubes?

06 05 33 02 CDR-EVA That's aft, a couple of core tubes in number 1.

06 05 33 03 LMP-EVA Oh, good, okay, we'll take those out.

06 05 33 05 CDR-EVA Are they empty?

06 05 33 06 LMP-EVA Yeah. They're empty. Okay, put them under my seat.

06 05 33 09 CDR-EVA Sure they're empty?

06 05 33 10 LMP-EVA Yeah, I'm positive, unless they got a cap on, they're empty. Okay, Tony, we found them.

06 05 33 15 CC Okay, good show.

06 05 33 23 LMP-EVA Okay, SCB 3 is going to go up with us, the SRC is going to go up with us, and I'm packing the ETB now.

06 05 33 30 CC Okay.

06 05 33 31 CDR-EVA And I'm going to put these two bags under - under your seat, Charlie.

06 05 33 34 LMP-EVA Okay.

06 05 33 38 CDR-EVA Now here's a - something like that ... critter.

06 05 33 42 LMP-EVA You can just leave those bags out, John.

06 05 33 45 CDR-EVA Will bags weather all right out here ...?

06 05 33 47 LMP-EVA Oh, yeah.

06 05 33 49 CC Oh, I think they'll make it *** these bearings.

06 05 33 53 CDR-EVA Okay.

06 05 33 58 LMP-EVA Where's your camera, John? I need the camera.

06 05 34 01 CDR-EVA Right here.

06 05 34 08 LMP-EVA Okay. Got it.

06 05 34 12 CDR-EVA Hammer to left seat. LMP unload - Okay, we're both unloaded. Pack the ETB. Wait a minute. I should be doing it.

06 05 34 21 LMP-EVA I've got it in my checklist, too. That's something.

06 05 34 29 CDR-EVA Okay, now you're going to have to - going to have to change that some because we got a little more than two HTC back.

06 05 34 41 LMP-EVA John, could you get those goodies in the left seat bag there in my bag and pass them over?

06 05 34 49 CDR-EVA Okay.

06 05 34 51 CC Okay, and verify you got those rocks in the bags that you tossed under the seat.

06 05 35 01 LMP-EVA Yes, that's - Let's see, there's one - No, there's one over there I think at the corner - it's at a - No, we got them all. Yeah, there it is.

06 05 35 10 CDR/
LMP-EVA That's it.

06 05 35 13 CDR-EVA That's a glass ball that I found out there, Houston, I never said nothing about.

06 05 35 17 CC Good show. Let's bring that in.

06 05 35 23 CDR-EVA Might as well.

06 05 35 42 LMP-EVA John, here's another glass - piece of glass - hollow ball.

06 05 35 47 CDR-EVA Yeah, let's put it in this here thing.

06 05 35 49 LMP-EVA Okay.

06 05 35 54 CDR-EVA Aw, rats!

06 05 35 56 LMP-EVA Those things just bounce out of your hand - it's like -

06 05 36 11 CDR-EVA Okay, I got magazine Lima; the 500's going back under the seat. Bet it will drop in the dirt.

06 05 36 20 LMP-EVA It's as clean as that seat is.

06 05 36 25 CDR-EVA Okay, got to get to it. Camera over there.

06 05 36 46 CDR-EVA Okay, okay, Houston. Okay, SCB number 1 is sitting over there on a foot strut, Charlie.

06 05 36 52 LMP-EVA Okay. Your mike's coming off the 16, batteries into the Sun - -

06 05 37 04 CC Okay, we see that, Charlie.

06 05 37 07 LMP-EVA - - into the ETB.

06 05 37 09 CDR-EVA Okay, do you want me to turn your LCRU power off, Houston?

06 05 37 16 CC Okay - -

06 05 37 17 LMP-EVA No, we can't do that. Say again.

06 05 37 22 CC Okay, point the camera lens directly away from the Sun and down first, and then you can turn the LCRU off. Also, when you get back to the LRV, we'd like the LRV read-outs. We didn't catch those. And we'll need LCRU blankets all the way over.

06 05 37 39 CDR-EVA Okay, point the camera away from the Sun.

06 05 37 43 LMP-EVA They're all the way open now.

06 05 37 45 CDR-EVA Yeah, the camera directly down-Sun - -

06 05 37 47 CC And down at the ground.

06 05 37 48 CDR-EVA - - and down, huh?

06 05 37 50 CC That's right.

06 05 37 51 CDR-EVA My ... has stopped. Directly into the Sun?

06 05 37 56 CC Negative. Away from the Sun and down.

06 05 38 00 CDR-EVA Gotcha. There's the Sun, there's the camera, there's the down.

06 05 38 06 CC That looks good.

06 05 38 08 LMP-EVA How did that old nursery rhyme go? Oh, I know.

06 05 38 15 CDR-EVA Okay, the ... covers are coming open.

06 05 38 18 LMP-EVA You know what you sounded like then?

06 05 38 20 CDR-EVA What?

06 05 38 21 LMP-EVA That old nursery rhyme. This is the church, this is the steeple, open the door, and here are the people. Okay, two padded bags, we're just going to leave. One set maps, we got; one mag from DAC, one mag. Okay, it's all loaded. Padded bags are staying under the seat, Houston.

06 05 38 37 CC Okay.

06 05 38 42 LMP-EVA Okay, and the ETB's coming over and I'm going to hook it on the - and the - the batteries do need dusting.

06 05 38 59 CC All right, we saw it coming ...

06 05 39 00 LMP-EVA Do you want me to do that, John? I can reach better.

06 05 39 02 CDR-EVA I can get it.

06 05 39 06 LMP-EVA Those LCRUs, yeah.

06 05 39 10 CDR-EVA Man, we got a lot of rocks.

06 05 39 12 CC Good show.

06 05 39 14 CDR-EVA Only way to fly, Charlie.

06 05 39 15 CC The name of the game.

06 05 39 16 LMP-EVA And we don't have big muley yet - don't let us forget to get big muley here.

06 05 39 22 CC Oh, we wouldn't do that.

06 05 39 23 LMP-EVA That beauty's coming in if I have to sleep with it. Okay, I'm going to get pallet 2 out - with enough food for the Trojan army.

06 05 39 43 CDR-EVA (Laughter) Charlie.

06 05 39 47 LMP-EVA Oh, look at that, John. It just comes right out of there, and I had so much trouble. Okay, pallet 2, MESA, LiOH can, MESA. Hummm. Do we have that, Tony?

06 05 40 12 CC You already have the LiOH can up there.

06 05 40 17 LMP-EVA We already got it up there, don't we?

06 05 40 19 CC That's right.

06 05 40 20 LMP-EVA Yeah, that went up yesterday.

06 05 40 24 CDR-EVA Okay, then we won't worry about that. Okay, Houston, as you know, the one I have the most trouble getting is that mirror in the middle which I understand is just a NAV system anyway. But I got it as best I could and it's a lot cleaner than it was.

06 05 40 38 CC Okay, understand.

06 05 40 39 CDR-EVA Both of the Rover battery mirrors are - are as good as they were when we got here.

06 05 40 45 CC Okay.

06 05 40 46 LMP-EVA This one needs dusting, John.

06 05 40 47 CDR-EVA I know. I ain't dusted it yet.

06 05 40 48 LMP-EVA Okay. I'm going over and kick off on the strut here. Boy, that shadow is getting short.

06 05 41 02 CDR-EVA Maybe we landed later than we thought, Charlie.

06 05 41 06 CC Okay, and it's 7 hours right now.

06 05 41 13 CDR-EVA Okay.

06 05 41 19 LMP-EVA This is the best way to get the dust off, John, is kick against the strut. Look at that stuff go.

06 05 41 24 CDR-EVA Yeah, but I - Wait a minute, don't go anywhere yet.

06 05 41 27 LMP-EVA I'm not. Pat your hands, kick your feet. Okay, two SCBs, we got. Looks like we're going to have everything. Pallet 2 to ascent stage, two SCBs to ascent stage.

06 05 42 09 LMP-EVA Okay, John, I'm gonna take one of these up to the ascent stage.

06 05 42 13 CDR-EVA Okay. Careful now, you're about to kick -

06 05 42 18 LMP-EVA Oh, rats.

06 05 42 20 CDR-EVA (Laughter) He did kick it open. Wait a minute. Move, Charlie. Let me get it. Okay?

06 05 42 24 LMP-EVA Okay, I'm sorry.

06 05 42 27 CDR-EVA It's not a question of - Where's that sample that was in it?

06 05 42 38 LMP-EVA There you go. The top just wasn't too closed.

06 05 42 47 CDR-EVA Yeah. Okay, I got the bag. No, wait a minute. ... do with the sample? There it goes.

06 05 42 53 LMP-EVA Another sample.

06 05 43 13 LMP-EVA The thing's not designed to fit in there, John.

06 05 43 15 CDR-EVA It goes in there.

06 05 43 17 LMP-EVA Not flat like that, I bet you.

06 05 43 19 CDR-EVA Yes, it does. I put it in there a minute ago.

06 05 43 38 LMP-EVA Well. Got it.

06 05 43 39 CDR-EVA I figured it would really be good because we'd keep the top closed.

06 05 43 44 LMP-EVA And the way to close those things is bang on them. There you go. Okay, that's good. Okay, I'm gonna just go up and take one of them up, John, and then I was going to come back down. I'm not going inside.

06 05 43 56 CDR-EVA Okay.

06 05 43 59 LMP-EVA You want to take the brush?

06 05 44 00 CDR-EVA Yeah.

06 05 44 03 LMP-EVA Here you go.

06 05 44 06 CDR-EVA Charlie, why don't you let me get them. Let me clean you off, you go up in there, hook on, and let me just carry those things upstairs.

06 05 44 12 LMP-EVA Hook on to what?

06 05 44 14 CDR-EVA Hook on to the up - upstairs.

06 05 44 17 LMP-EVA I'm not going to hook on to anything up there. I'm going to stand there and wait on you.

06 05 44 20 CDR-EVA That's what I mean. Go on up there and let me just bring them on up.

06 05 44 25 LMP-EVA You've got four things to bring up.

06 05 44 27 CDR-EVA No problem.

06 05 44 28 LMP-EVA But you want to - whatever you want to do.

06 05 44 33 CDR-EVA Okay, let me pull my visor down. I can't believe it. Tony, do we look as dirty to y'all as we do to each other?

06 05 44 57 CC No, you just look pristine.

06 05 45 05 CDR-EVA Okay. Well, we've got two eyes, and I got the feeling we're going to stand up tonight (laughter) cleaning each other off.

06 05 45 58 LMP-EVA That's good enough, John. Clean off my RCU. That's the only other thing I wanted - Can you clean the top of it off?

06 05 46 10 LMP-EVA There we go. Let me get you.

06 05 46 31 CDR-EVA Wait until you find out that these rocks have a specific gravity of 1.0. (Laughter).

06 05 46 39 LMP-EVA Somebody's in trouble.

06 05 46 49 LMP-EVA You know, I'm not sure we're doing much good.

06 05 46 51 CDR-EVA I'll agree with you. But, really, don't forget to kick your feeties.

06 05 46 54 LMP-EVA I know it. Okay, turn around.

06 05 46 59 CDR-EVA Mainly on the back of the PLSS and the helmet, and that kind of stuff, because we -

06 05 47 03 CC And while you're working on it there, verify your antennas are down.

06 05 47 10 CDR-EVA Good thought, but they're not.

06 05 47 11 LMP-EVA Not yet. Okay, I'm knocking it off now.

06 05 47 17 CDR-EVA Now wait - Don't - No, Charlie.

06 05 47 20 LMP-EVA I wouldn't hit you hard.

06 05 47 22 CDR-EVA Listen, I don't - Nobody's ever tried that on a pressure suit. (Laughter).

06 05 47 28 LMP-EVA That was with the - dealie came loose here.

06 05 47 32 CDR-EVA He's just knocking me in the head, Houston, in case you're wondering what's going on.

06 05 47 37 LMP-EVA Got it off, though, you got to admit.

06 05 47 39 CDR-EVA Got the dirt off.

06 05 47 42 LMP-EVA John, your visor moved.

06 05 47 43 CDR-EVA Okay, let me see down here.

06 05 47 44 CC Okay, you're getting pretty far behind now. We're gonna have to ask you to go on in.

06 05 47 50 LMP-EVA Okay, we're - I'm going up right now.

06 05 47 52 CDR-EVA Charlie's going in right now.

06 05 47 54 CC Okay.

06 05 47 55 LMP-EVA We were just dusting off. We're pretty dusty.
Can you hand me the pallet when you jump up, John?

06 05 48 00 CDR-EVA Yeah. Wait - Okay, I sure will. I'll just put
this on the LCRU.

06 05 48 04 LMP-EVA Okay.

06 05 48 06 CC From the nominal time line, you're down about
30 minutes now.

06 05 48 15 LMP-EVA Yeah, well, we'll be - we'll get in right in
a hurry.

06 05 48 18 CC Okay, fine. And as you walk past that MESA,
make sure the blankets are down. We are seeing
a temperature rise.

06 05 48 28 CDR-EVA The blankets are down on the MESA.

06 05 48 31 LMP-EVA They are down.

06 05 48 32 CC Okay. Fine.

06 05 48 35 LMP-EVA How can you see - I didn't know you had any
thermometers down there. John, could you - -

06 05 48 46 CC And we would like those Rover read-outs before
you pull those circuit breakers, John.

06 05 48 52 CDR-EVA You want the pallet, right?

06 05 48 53 LMP-EVA Yeah. Tony, the MESA's partially in the Sun,
and that's probably the reason.

06 05 49 00 CC Ah so.

06 05 49 01 LMP-EVA In fact, the - -

06 05 49 04 CDR-EVA Yeah. Got it.

06 05 49 05 LMP-EVA Make it?

06 05 49 06 CDR-EVA Uh-huh.

06 05 49 17 CDR-EVA Okay. If you want, I'll take these smaller
blankets and put over the top of it, Houston.

06 05 49 27 CC We'd like you to just get on in.

06 05 49 32 CDR-EVA Okay. How are you coming, Charlie?

06 05 49 42 LMP-EVA I'm up on the porch.

06 05 49 43 CDR-EVA Okay, Houston, you want to RESET the UV camera?

06 05 49 47 CC Yep. We got a setting.

06 05 49 52 CDR-EVA Okay.

06 05 49 53 CC Okay, it's azimuth, 100; and elevation, 77.

06 05 50 01 CDR-EVA Okay. Going to RESET. That wheel's moved more than 180.

06 05 50 12 CC That may look pretty close to the LM, but we'll just take it the way it is.

06 05 50 19 CDR-EVA Okay.

06 05 50 30 LMP-EVA It's going to be pointing right at the LM, Houston.

06 05 50 32 CC Elevation is 77.

06 05 50 34 CDR-EVA All right. Maybe it'll be over the top of it. Okay. Azimuth, 100; elevation, 77.

06 05 50 55 LMP-LM Okay, Tony, I'm inside.

06 05 50 57 CC Okay.

06 05 51 00 CDR-EVA Standing up, Charlie?

06 05 51 01 LMP-LM Yeah. And I got about a ton of dirt from somewhere.

06 05 51 10 CDR-EVA Okay, elevation, 100 - azimuth, 100; elevation, 77, set and pointed. It met with the LM okay. That's straight overhead.

06 05 51 19 CC Okay. Good show. You're looking at the geocorona.

06 05 51 25 CDR-EVA Oh, the geocorona, hopefully.

06 05 51 43 CDR-EVA Charlie, are you standing up?

06 05 51 44 LMP-LM Yeah, I'm standing up.

06 05 51 46 CDR-EVA Are you ready for a rock box?

06 05 51 48 LMP-LM Yeah. I'd like to get this pallet. You can start on up.

06 05 52 02 CDR-EVA Okay.

06 05 52 09 CC And, John, have you closed the circuit breakers on the LRV?

06 05 52 15 CDR-EVA That's affirmative.

06 05 52 16 CC Okay. Fine.

06 05 52 26 CDR-EVA What happens to it if you don't pull those breakers? Run off somewhere?

06 05 53 05 CDR-EVA Okay, Charlie. Uh-uh, Charlie.

06 05 53 08 LMP-LM Why?

06 05 53 11 CDR-EVA It's too near the camera to be slinging stuff out there.

06 05 53 13 LMP-LM Oh, I'm sorry. It's just that one little old dinky thing. That's all I was going to do.

06 05 53 15 CDR-EVA Okay.

06 05 53 16 LMP-LM Okay, here comes the pallet to you.

06 05 53 25 CDR-EVA Okay.

06 05 53 26 LMP-LM Got it?

06 05 53 27 CDR-EVA Yeah.

06 05 53 28 LMP-LM Okay.

06 05 53 35 CDR-EVA I'm going to throw it by the pallet.

06 05 53 39 LMP-LM Okay, babe, you got two rocks - two SCBs and an ETB to come up. You could probably load the -

06 05 53 45 CDR-EVA There - there's the SRC right there, Charlie.

06 05 53 47 LMP-LM I know it. Well, you still got two ETBs.

06 05 53 50 CDR-EVA Two ETBs?

06 05 53 52 LMP-LM Yeah. I mean one ETB and the -

06 05 54 03 LMP-LM There are two ETBs.

06 05 54 05 CDR-EVA Right.

06 05 54 06 LMP-LM You might put one SCB on that ETB so that'll lie - it's real light.

06 05 54 17 CDR-EVA Okay, here you go, Charlie.

06 05 54 20 LMP-LM Pass her in.

06 05 54 24 CDR-EVA Okay. I should have unhooked it.

06 05 54 30 LMP-LM I got it.

06 05 54 31 CDR-EVA You want me to unhook it?

06 05 54 32 LMP-LM Well, I got it now.

06 05 54 33 CDR-EVA Okay, don't lock the hook. Just unhook it. Don't - Sorry.

06 05 54 46 CDR-EVA Okay, there it comes.

06 05 54 53 LMP-LM Okay, I got the hook. Okay, two SCBs and we got it.

06 05 54 56 CC Okay, John - Charlie. Sounds good.

06 05 55 09 LMP-LM John, you're not going to believe the dirt on this floor.

06 05 55 11 CDR-EVA Yeah, I am.

06 05 55 52 LMP-LM What are you doing?

06 05 55 54 CDR-EVA Oh, I'm trying to set something up here.

06 05 55 59 LMP-LM Okay.

06 05 56 38 CDR-EVA Did you throw something out of there?

06 05 56 40 LMP-LM No.

06 05 56 41 CDR-EVA You didn't?

06 05 56 42 LMP-LM No.

06 05 57 05 CDR-EVA Maybe we've got visitors.

06 05 57 31 CDR-EVA I got it.

06 05 57 32 LMP-LM Yeah.

06 05 57 33 CDR-EVA Okay?

06 05 57 34 LMP-LM Yeah. How do you read, Houston?

06 05 57 37 CC We're copying you, Charlie.

06 05 57 42 LMP-LM Okay. I just heard a little squeal back there
and I was curious.

06 05 57 48 CC All right. We had a handoff.

06 05 57 53 CDR-EVA Ah so.

06 05 58 01 LMP-LM These bags come open - the SCBs come open when
you don't want them to and they - you can't get
them open when you want them to.

06 05 58 11 CC Okay. We'll call that Charlie's law.

06 05 58 16 LMP-LM Yeah.

06 05 58 21 CDR-EVA Okay, Charlie, I can't get it in there ... got it.

06 05 58 27 LMP-LM You okay?

06 05 58 28 CDR-EVA Yeah. I'm fine. I just - -

06 05 58 31 LMP-LM Having a ...

06 05 58 35 CDR-EVA I got it.

06 05 58 36 LMP-LM Got it? Now let me get behind the hatch.

06 05 58 38 CDR-EVA Okay.

06 05 58 51 CC Charlie, what's John doing right now?

06 05 58 57 LMP-LM He's on the porch waiting - -

06 05 58 58 CDR-EVA Sitting on the porch waiting for Charlie to move out of the way.

06 05 59 01 CC Okay.

06 05 59 05 LMP-LM Okay. Come on, John. Here we go.

06 05 59 24 LMP-LM Okay, you've got to come right, John. Is everything okay?

06 05 59 29 CDR-LM Yeah, it's okay. Okay, I'm in the house.

06 05 59 36 LMP-LM Okay. Okay, close hatch and repress.

06 05 59 48 CDR-LM That ain't what you do now.

06 05 59 50 LMP-LM Yeah, it is. Hook it - can you - back - Wait. There we go. Okay. PLSS - Okay, wait a minute.

06 05 59 59 CDR-LM Why don't you ...

06 06 00 01 LMP-LM Yeah. Okay, we shouldn't have closed that hatch all the way. We've got our water still on.

06 06 00 05 CDR-LM That's what I said.

06 06 00 06 LMP-LM I'm sorry.

06 06 00 08 CDR-LM You just wait here and I'll get it. There we go.

06 06 00 13 LMP-LM Okay. Okay. I'll turn your water off.

06 06 00 17 CDR-LM Okay.

06 06 00 24 LMP-LM Well, I can't reach it. Oh, there you go. You were caught on the - -

06 06 00 31 CDR-LM ... bracket.

06 06 00 33 LMP-LM Yeah, on that bracket. Okay, there you go.

06 06 00 34 CDR-LM Okay.

06 06 00 35 LMP-LM Okay.

06 06 00 38 CDR-LM Turn sideways?

06 06 00 39 LMP-LM Okay. Okay, go ahead.

06 06 00 58 CDR-LM Okay, your water's off.

06 06 00 59 LMP-LM Okay. Read the next step - close hatch, I think.

06 06 01 04 CDR-LM Close hatch and lock.

06 06 01 16 CDR-LM Okay. It's closed and locked.

06 06 01 18 LMP-LM Okay.

06 06 01 24 CDR-LM It's locked.

06 06 01 25 LMP-LM Okay, I think the cabin repress is next. Okay,
and let me read the next step.

06 06 01 28 CDR-LM Okay.

06 06 01 33 LMP-LM DUMP valve goes to AUTO.

06 06 01 35 CDR-LM Okay. This valve goes open - -

06 06 01 36 LMP-LM ... going on.

06 06 01 38 CDR-LM Okay. I believe I've got a water flag.

06 06 01 41 LMP-LM Okay.

06 06 01 45 CDR-LM It's probably because we turned the water off.

06 06 01 47 LMP-LM Yeah. Okay, go ahead.

06 06 01 49 CDR-LM CABIN REPRESS to AUTO.

06 06 01 51 LMP-LM It is.

06 06 01 52 CDR-LM Circuit breaker 16: CABIN REPRESS to close.

06 06 01 55 LMP-LM Coming closed -

06 06 01 56 LMP-LM MARK.

06 06 01 57 CDR-LM MASTER ALARM and warning light on. Verify cabin pressure ...

06 06 02 02 LMP-LM Okay. I've got a water flag, too.

06 06 02 06 CDR-LM I've got a water flag and an O flag. Cabin press is up to 1.

06 06 02 11 LMP-LM Houston, we're repressing.

06 06 02 12 CC Okay, we see it.

06 06 02 15 CDR-LM Verify - PRESS REGULATORS A and B coming to CABIN, Charlie.

06 06 02 18 LMP-LM Coming to CABIN.

06 06 02 22 CDR-LM FLSS O₂ - OFF at cabin greater than 2-1/2.

06 06 02 29 LMP-LM We got 2-1/2 yet?

06 06 02 30 CDR-LM No. I'll tell you when.

06 06 02 31 LMP-LM Okay.

06 06 02 33 CDR-LM Okay -

06 06 02 34 CDR-LM MARK.

06 06 02 35 LMP-LM A flag is showing - I think. There it is.

06 06 02 42 CDR-LM ... is off. I think PLSS is off ... try it again.

06 06 02 52 LMP-LM Okay.

06 06 02 56 CDR-LM ALARM is off.

06 06 02 57 LMP-LM Good.

06 06 02 59 CDR-LM ... is off.

06 06 03 00 LMP-LM I've got a press flag.

06 06 03 03 CDR-LM Okay, CABIN warning light off. Verify cabin pressure stable at 4.6 to 5.

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06 06 03 10 LMP-LM It's there. Yeah, it is. It's there.

06 06 03 13 CDR-LM ... 4.6. What a contraption!

06 06 03 15 LMP-LM Isn't that amazing?

06 06 03 16 CDR-LM That's something else.

06 06 03 17 CC Okay. You guys had a 7-hour 23-minute EVA.

06 06 03 23 CDR-LM Beautiful.

06 06 03 26 LMP-LM That's super. That's a lot of fun. Let's go back out.

06 06 03 31 CC (Laughter) Tomorrow, Charlie, tomorrow.

06 06 03 36 LMP-LM I mean it. I feel great.

06 06 03 39 LMP-LM PLSS O₂ OFF?

06 06 03 40 CDR-LM PLSS O₂ off and - Okay, CABIN warning light on. Verify cabin pressure stable at 4.6 to 5. EV - Use purge valve to depress PGA as req'd [sic].

06 06 03 50 LMP-LM Mine's already depressed.

06 06 03 52 CDR-LM Okay, post-EVA configuration, 15 minutes.

06 06 03 58 LMP-LM Okay, verify the EVA CBs.

06 06 04 02 CDR-LM Yep.

06 06 04 03 LMP-LM I got SUIT FAN 2 and SUIT FAN DELTA-P going in.

06 06 04 08 CDR-LM Now where do you see that one? Okay, SUIT FAN 2 and SUIT FAN DELTA - -

06 06 04 11 LMP-LM That's right after ...

06 06 04 12 CDR-LM Okay, and ... circuit breakers are out, and the old flooders are out. Okay.

06 06 04 24 LMP-LM Why do those circuit breakers go in and out on you like that?

06 06 04 28 CDR-LM I don't know ... do that every time. Okay.
ECS caution and water SEP lights out, after
SUIT FAN DELTA-P, close. Doff gloves, stow on
comm panel.

06 06 04 43 LMP-LM Okay.

06 06 05 08 LMP-LM Must admit my finger's a little tired, though.
... Could you turn up your A-9 numeric lighting
when you get a chance, John? Let's look at the
caution panel. Okay. That's good. We're in
good shape.

06 06 05 49 CDR-LM Okay. My gloves are off. You need some help?
You got yours, huh?

06 06 05 56 CC And, John. That OPS latch on Charlie's OPS may
be hot to touch since that cover was up.

06 06 06 07 CDR-LM Let me see. Well -

06 06 06 33 CDR-LM Okay. It's cool as a cucumber. Thanks for your
thermal dynamic advice. (Laughter)

06 06 06 43 CC So much for a thermal analysis.

06 06 06 47 CDR-LM Yeah. It's about 72 degrees F on the ...

06 06 06 52 LMP-LM Okay. Go ahead.

06 06 06 56 CDR-LM It's hard working in an absolute zero.

06 06 07 02 LMP-LM Okay, DESCENT WATER's OPEN. Remove - You were
right here.

06 06 07 07 CDR-LM Yeah.

06 06 07 09 LMP-LM Okay, purge valves ...

06 06 07 10 CDR-LM Remove purge valves; stow in purse ...

06 06 07 15 LMP-LM I'm not either.

06 06 07 26 LMP-LM That was fun.

06 06 07 27 CDR-LM Sure was, Charlie.

06 06 07 28 IMP-LM Go.

06 06 07 30 CDR-LM Okay.

06 06 07 31 LMP-LM Okay, disconnect OPS O₂ hose. Turn around and I'll get yours.

06 06 07 36 CDR-LM Okay, I got yours. ...

06 06 07 55 LMP-LM Okay, yours is loose.

06 06 07 59 CDR-IM Okay.

06 06 08 01 LMP-LM Okay, disconnect LM O₂ hoses, red to blue and blue to red; PGA, horizontal. SUIT FLOW; PLSS PUMP, OFF; and FAN, OFF.

06 06 08 13 CDR-LM Wrong switch.

06 06 08 16 LMP-LM Okay, that - we don't - we'll bypass that.

06 06 08 19 CDR-LM Okay.

06 06 08 20 LMP-LM ISOL to SUIT FLOW.

06 06 08 27 CDR-LM We should - we're supposed to have stowed these in step 2.

06 06 08 30 LMP-LM We will - Oh, yeah, we did dock that one. We sure did. I was thinking about EVA-3. Okay.

06 06 08 45 CDR-LM Thank you.

06 06 09 18 LMP-LM Houston, the lunar dust smells like gunpowder.

06 06 09 27 CC We copy that, Charlie.

06 06 09 31 LMP-LM Really, really a strong odor to it.

06 06 09 36 CC Yeah, remember on hammering on rocks, fresh rock powder does have a strong odor.

06 06 09 47 LMP-LM I hope it's not the oxygen. But it goes away after a little while but - -

06 06 09 53 CDR-LM Well, you can bet this Moon has been hammered on. That's for sure.

06 06 09 58 LMP-LM But it is really a strong smell.

06 06 10 03 CDR-LM Boy, I'll tell you.

06 06 10 06 CC Okay, and we need a CABIN GAS RETURN valve, OPEN.

06 06 10 11 LMP-LM Okay. Stand by. Okay. Right now, we're in a SUIT GAS DIVERTER PULL-EGRESS. CABIN GAS RETURN is OPEN, and my FLOW is on and John's is in DISCONNECT. Do you want us to go to PUSH-CABIN?

06 06 10 33 CC That's affirmative. PUSH-CABIN.

06 06 10 37 LMP-LM Okay. You got it. Feels nice and cool. Sorry about that step, John.

06 06 10 48 CDR-LM Well, it's my fault.

06 06 10 51 LMP-LM Okay, we got this, we got that, we got this ... you're cutting out now ... Disconnect PLSS H₂O from PGA; connect LM - -

06 06 11 04 CDR-LM There you go.

06 06 11 05 LMP-LM That sounds like a good deal. Now that's just one step back there. The trouble is, yours is back under the rock compartment (laughter). Here you go ...

06 06 11 29 LMP-LM I've never seen anybody ...

06 06 11 35 CDR-LM (Laughter)

06 06 11 37 LMP-LM I don't think you got anything on that Beta-cloth one.

06 06 11 40 CDR-LM Yeah, I'll tell you. That's a problem you have to face with it. You know you don't set it down very hard.

06 06 11 47 LMP-LM Have you got yours hooked up yet - your water?

06 06 11 50 CDR-LM Yeah.

06 06 11 51 LMP-LM Okay, I gave us some water.

06 06 11 52 CDR-LM Okay. PLSS mode, 0, both; and AUDIO CB, open.

06 06 12 00 LMP-LM Okay, did you get your pump off - your fan and pump?

06 06 12 02 CDR-LM Yeah.

06 06 12 59 CDR-LM Okay. AUDIO, close. Okay, Charlie. Ready for the audio check?

06 06 13 39 LMP-LM Okay. Call them out to me.

06 06 13 41 CDR-LM Okay. A to RECEIVE, B to OFF; MODE, ICS/PTT -

06 06 14 31 LMP-LM Houston, how do you read? Over.

06 06 14 34 CC Five by, Charlie.

06 06 14 38 LMP-LM Okay. Thank you.

06 06 22 57 LMP-LM Houston, Orion.

06 06 23 01 CC Go ahead.

06 06 23 05 LMP-LM Okay. My initial O₂ recharge's complete and I got 95 percent.

06 06 23 17 CC Roger; 95, Charlie.

06 06 23 27 LMP-LM Ed, how are you doing today?

06 06 23 30 CC Pretty good, Charlie. And it went real great. We're real pleased down here.

06 06 23 38 LMP-LM We're happy as a clam. We just had a great time, having fun as well as the work.

06 06 24 12 CDR-LM You know, Ed, when we got up on top of that mountain and I'd been driving up it all the way, and I turned around and looked down, I thought, man, you've just nearly bit off more than you can chew here.

06 06 24 24 CC Trying to cut through. You - you've got a lot of hash and I couldn't read you very well.

06 06 24 31 CDR-LM Just as well.

06 06 24 36 LMP-LM That's his beard sticking in the mike.

06 06 24 45 CC Well, maybe you're starting late, but you'll catch up in 3 or 4 months with a beard.

06 06 24 53 LMP-LM Don't rub it in.

06 06 25 09 LMP-LM Hey, Ed, how about a little news from you. Anything going on down there that's interesting?

06 06 25 16 CC Is that news you're asking for, Charlie?

06 06 25 21 LMP-LM Yes, sir.

06 06 25 22 CC Okay. Stand by. We'll see if we can get you something.

06 06 27 53 CDR-LM Okay, Houston ... about 92 percent ... 94 ... 92 ... Houston, do you read? Over.

06 06 31 11 CC Orion, Houston.

06 06 31 17 CDR-LM Go ahead, Houston.

06 06 31 20 CC Okay. We're running down some news reports for you right now. And we're not pushing, John, but we would like to stay fairly close to time line so you can get plenty of sleep tonight. You're going to have a hard day tomorrow.

06 06 31 36 CDR-LM Wait a minute, they said we had 2 hours extra tonight where we could just sit around and talk to each other.

06 06 31 43 CC Okay, the boss just said he wasn't really sure he wanted to do all that talking tonight.

06 06 31 52 CDR-LM Neither do we. We were going to get some sleep ... Or at least take it easy on big ...

06 06 32 01 CC Gee, I'm sorry; you're in the hash again. I missed that last.

06 06 32 10 LMP-LM He said we're gonna use it for sleeping.

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06 06 32 12 CC Great. Just what we wanted.

06 06 33 28 LMP-LM Okay, Ed, my OPS ... pressure is 6100 and John's is 5900. Over.

06 06 33 38 CC Read you.

06 06 33 56 CDR-LM Houston, we've finished the initial PLSS recharge. Charlie had 95 and I had 92. Over.

06 06 34 07 CC Roger, John. Say again your presentage.

06 06 34 10 CDR-LM Houston, 92 percent.

06 06 34 16 CC We copied, John.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 05 09 XX BEGIN LUNAR REV 39

06 05 22 34 CC Casper, Houston.

06 05 22 36 CMP Hello, Houston. Are you there?

06 05 22 38 CC Roger. How's it going?

06 05 22 43 CMP Oh, just fine. That last sequence worked out just right on the money. Last frame - -

06 05 22 51 CC Glad to hear that.

06 05 22 52 CMP - - off and up came the Sun.

06 05 22 58 CC What could you see through your Polaroid filter?

06 05 23 04 CMP Oh, it doesn't do a thing. There's apparently just a little bit of polarizing done by the windows. And as I rotate the filter, why, it brightens and dims the scene just slightly. And I checked it against different types of material - the darker materials and the lighter things. And they all seemed to respond exactly the same way. I can't see any - I can't see any effects of polarizing from the surface reflection at all.

06 05 23 40 CC I believe I would have expected a difference.

06 05 23 57 CMP That time as I went by King, I took a look at a little different approach. I started out with the central peak and I tried to follow it to the north. And it appeared to me that perhaps those central peak three prongs - I was looking at the crater blocks that are on them. And then I looked at the floor, and there's a lot of crater blocks that are laying on the floor in between the two main tongues of that central fork. The - it appears to me now that maybe there were three of those pieces of central peak that run out instead of two and that perhaps they curve a little bit over to the right. Because you do see a line of the light material that continues on to the north for quite a distance that's the same thing we have seen on the photos. The first time that I've been able to see any continuous chain that goes between the central peak into the walls. And I'd like to look one more time, and see if there's any variation in the number of blocks that I see as I look circumferentially around the wall. Perhaps there is - Where the expression of the central peak goes through, I may find a higher concentration of blocks. That's what I'd like to look for next. But it looks like perhaps those - if those central features do go through the wall, that they must take a slight curve to the right. As the Sun angle comes down, these things that I reported as swirls look more and more like swirls than they did at the higher Sun, which is just backwards from what I would have anticipated, and - -

06 05 25 59 CC Ken, we are coming up on T-stop for the pan camera.

06 05 26 05 CMP Thank you, sir.

06 05 26 18 CMP And, it's off - or STANDBY, I should say.

06 05 26 38 CMP And the GAMMA RAY is going back out.

06 05 27 03 CC Casper, the lens is stuck.

06 05 27 05 CMP MASS SPEC DISCRIMINATOR is going to HIGH.

06 05 27 20 CC Casper, you are clear to go POWER OFF on the PAN CAMERA.

06 05 27 26 CMP Okay. PAN CAMERA POWER is OFF.

06 05 27 58 CC Your comment that there may be a third fork in that thing is kind of interesting. You can - If you use imagination, you might see it in a photograph, although I'm not too sure.

06 05 28 13 CMP Well, that's kind of a - that's kind of tenuous thing to be saying. I'm going to have to look some more; but I was - I - I started by tracing the blocks down the ridge in one of the peaks and then following it. And it looked - it curved, and I just followed it around. And sure enough, it looked like you hit a place along the wall where there might have been a higher concentration of blocks. And in the length of time you're overhead with this window orientation, that's about - you just can - you get this in little bitty bits and pieces. That's where that Polaroid sure would be nice. If you see something like that, and you would like to think about it, then plan your next pass - Instead of doing all your planning in real time, you could lay that picture out in front of you, and - and take a look at it, and then come back next time a little smarter.

06 05 29 03 CC Yeah, that - that - that'd be nice. Shame we don't have it.

06 05 32 23 CC Casper, could you give us AUTO on the HIGH GAIN?

06 05 32 30 CMP Okay. How about that?

06 05 32 35 CC Thank you.

06 05 33 51 CC Casper, we're ready for a DISCRIMINATOR, LOW.

06 05 33 59 CMP Okay, DISCRIMINATOR's going back to LOW -

06 05 34 02 CMP MARK it.

06 05 34 07 CC And I have the rest of these Flight Plan changes for you. Just give me a - a call when you're ready to take them.

06 05 34 17 CMP Gee, I'll finish my little chores here and be with you.

06 05 37 06 CMP Okay, Henry. Ready to copy.

06 05 37 36 CC Okay, Ken. We left off, I think, about 150 hours.

06 05 37 43 CMP Yes, sir.

06 05 37 45 CC Okay. That SIM code should be, "Plus all 1's" and then, "0, all 2's."

06 05 38 01 CMP Okay. "Plus all 1's" and "0, all 2's."

06 05 38 05 CC And at the same time, we want to delete the "PC, STANDBY" through the "PC, OPERATE (T-start)." Want to keep the comment in there about the image motion.

06 05 38 18 CMP Okay, that's deleted. Okay.

06 05 38 36 CC Okay. At 150:10, delete the pan camera photo pad.

06 05 38 45 CMP Okay, that pad's deleted.

06 05 38 50 CC Okay. And starting there at about 150:13, we want to delete everything except - Maybe I ought to read off what we ought to delete. Delete the "PAN CAMERA, MONO." Delete the "PAN CAMERA, STANDBY." We want to keep the mapping camera stuff. Delete "PAN CAMERA, OFF." Delete the - Stand by.

06 05 39 31 CC Okay. Delete the "MAPPING CAMERA, ION SOURCE, OFF." Delete "EXPERIMENT, STANDBY." Delete the caution. Delete the "MAN - MAPPING CAMERA, RETRACT." Delete "X-RAY, STANDBY." Delete "GAMMA RAY, RETRACT." Delete the MSFN block there, the whole block. Delete the "MAPPING CAMERA, RETRACT." Delete the "MAPPING CAMERA/LASER ALTIMETER COVER, CLOSE." Delete "POO, enable all jets." Delete the VERB 49 maneuver thing, both lines, and the high gain remark. And that should leave us with "MAPPING CAMERA, OFF (T-stop) Wait 30 seconds. MAPPING CAMERA, STANDBY. IMAGE MOTION, OFF. LASER ALTIMETER, OFF. ALPHA PARTICLE/X-RAY COVER, CLOSE."

06 05 40 33 CMP Okay. I concur.

06 05 40 35 CC Okay. And in addition, back up at 150:18 now, we want to add in there, "MASS SPEC, ION SOURCE, ON - up."

06 05 40 55 CMP Okay. You want to add the "MASS SPEC, ION SOURCE, ON" at 150:18.

06 05 41 02 CC That's affirmative, sir. And we - we still got the urine dump in there. And at 150:30, the experiment status should be "Plus 1110, 01222."

06 05 41 31 CMP Okay. That's "Plus all 1's, 01222."

06 05 41 38 CC Negative. In the first register there, the last digit is 0. Because we got the - -

06 05 41 46 CMP Okay. "Plus 1110."

06 05 41 47 CC - - alpha particle door closed.

06 05 41 52 CMP Roger.

06 05 41 53 CC Okay. And right after that, we want to delete both of those P52s. Both the option 3 and the option 1.

06 05 42 05 CMP Okay, they're deleted.

06 05 42 12 CC Okay. That does it for now, Ken.

06 05 42 17 CMP (Laughter) It didn't leave much, did it? I'll tell you one thing - -

06 05 42 23 CC ...

06 05 42 24 CMP - - I want to squeeze in here somewhere, and I'm not sure we're at the right place to do it. But I have yet to pick up a star pattern in the telescope. And I'm going to take one of these back-side areas here and make a concerted effort to that.

06 05 42 39 CC All righty.

06 05 42 41 CMP But I can see plenty of stars all over the place outside, and I just can't see a thing through that telescope. And I know we could when we were in Earth orbit, because the first thing I thought was that we didn't have it, and then I waited until we got around and looked at a bright part of the sky, and we got hold of Scorpion. It was there and it was all beautiful. And now, I look out there and it's just - there's just nothing there. It's just black. And that's after getting well dark adapted.

06 05 43 13 CC Where did they go?

06 05 43 17 CMP (Laughter) I don't know. Maybe it was their eat period. They're all out to lunch.

06 05 44 22 CMP Hey, Henry.

06 05 44 25 CC Go ahead.

06 05 44 30 CMP You know, we were gonna separate the - the water dump from the other dumps on one of these passes somewhere. And I don't know where that is, but I - We're not getting very much collected, and we probably ought to - I think I'll just hang onto it until it comes time to use it.

06 05 44 55 CC Okay.

06 05 46 55 CMP I'm looking at the little bright crater that has the ray-excluded zone that's just south of Mädler, and it looks like there is a little bit of - like there's a little topographic high that runs right down one ridge of that ray-excluded zone. That's the one that goes through the south. And it looked like there was a little dark material in there, and maybe on another pass, I'll get a chance to see it better.

06 05 47 37 CC Where is it you're looking, Ken?

06 05 47 43 CMP Say again, Hank?

06 05 47 46 CC Where - where are you looking, now?

06 05 47 51 CMP That's a little bright crater with a ray-excluded zone that's just about south of Mädler. And I'm looking at Mädler now, and that stuff that makes the bright ray material going out the - to the east seems to come up to the rim. You can see it - It's brighter in that area along going down the - inside of the rim. Then there's a bright streak that runs across the central area, right across and up the other side. And then it sort of stops when it gets to the other rim. But there's a faint evidence of a - of another continuation of that streak.

06 05 48 37 CC And that's in Mädler?

06 05 48 42 CMP That's in Mädler, yes.

06 05 50 56 CMP Okay. In this higher Sun, it sure appears that the - the bright things that run down into - come out of the Descartes bright spot and run north, seem to be centered around - that's Dollond - I guess that's Dollond B or A - whatever that thing is. I tried to trace the boundaries and all this material that's in what we call the furrowed Descartes that runs up and it becomes part of Smoky Mountain. That material looks just exactly like most of that stuff on the back side, except it may be a little bit darker, and I think that's the Sun angle. That whole area has that same characteristic to me.

06 05 52 00 CC Roger.

06 05 52 12 CC You remember that northwest-southeast trending we saw in the vicinity of North Ray that looked like it was some offsets in those grabens? Can you see any of that in there?

06 05 52 27 CMP Just a second. I'm not sure about that. But it does appear to me as if the - the floor that the LM has landed on is indeed a different unit that sticks in, and it's more part of this Cayley material that's farther out to the - to the west. And it does go back just about the way we had drawn the boundaries. Say again your question?

06 05 52 53 CC I just remember on a plotter, we looked at what appeared to be some graben that came across Smoky Mountain and down to the southeast of it and going back up the northwest. And they were all offset like they may have been some faulting in that area.

06 05 53 12 CMP Ckay. Well, I'm not sure what that all is, Hank. That same texture that has many patterns and linear lines and they make a kind of a hash, but that same thing appears all over the - the surface when you look at it in detail. I think I can probably take a picture of most any one of these places down here and analyze it in depth and come up with a very similar picture. And especially the things on the back side look exactly like that Descartes area. It's just that Descartes area is a very small place. And you see so much on the back side that covers that same kind of thing.

06 05 54 00 CC John and Charlie reported - I guess it's just south of - between where the LM landed and - and Stone Mountain - what appeared to be subdued crater that was some 300 meters in diameter and maybe 50 meters deep that didn't show on our map. Were you able - Can you detect something like that?

06 05 54 25 CMP You know, there's so much noise down there, Hank, I can hardly understand you. Would you say again? Sounds like you're trying to shout over a football game.

06 05 54 34 CC Roger. I'll try again, I guess. John and Charlie reported a very large crater, maybe some 300 meters in diameter, that was between the LM site and Stone Mountain. They were on their way back from station 8, and this thing wasn't on their maps, but it was very obvious to them as they were driving.

06 05 55 02 CMP I'll look and see. I really hadn't taken the time to compare features just one by one.

06 05 55 19 CC Ken, could you give us a barber pole on IMAGE MOTION?

06 05 55 25 CMP Okay, barber pole on the IMC.

06 05 55 30 CC That's one I - slipped by - -

06 05 55 31 CMP There it is.

06 05 55 32 CC - - me when I got to talking.

06 05 55 37 CMP I'm sorry. Say again?

06 05 55 39 CC I let that one slip by me when I got to talking to you about the landing site.

06 05 55 46 CMP Uh-oh. I think you'd go a long ways before you get very far behind.

06 05 57 14 CC Casper, Houston.

06 05 57 20 CMP Go ahead, Hank.

06 05 57 21 CC Roger. So far, we haven't seen anything - a smear [?] or anything requesting that urine dump by itself. So that thing is still in question. Your next urine dump would be scheduled for 20 hours from now. But it's also scheduled in conjunction with a water dump, et cetera. So I don't know where that thing stands. We're gonna check into it.

06 05 57 44 CMP Okay. It'll probably take me another 20 hours to make it worthwhile.

06 05 57 49 CC Roger (laughter).

06 05 58 28 CMP Golly.

06 05 59 19 CMP Okay, Hank. I got a better visual on that little thing we called a cone, and I guess it looks like it is a crater in the top of it. And from where I am, it looks like the southern end of it, which is away from me, probably has just about reached down level with the mare floor. The rest of it is just a smooth cone that sticks up. It does have some small craters on it. The rim looks relatively sharp, and there's a couple of fractures go through it. Its texture and albedo do not look significantly different than the mare around it. There is a little expression of perhaps a subtle depression around the eastern side of it that looks like it might be a little flow characteristic there. I'm going to shift my gaze down to these other two features,

and I guess - my guess is I really had those things reversed. They in fact were shallow craters.

06 06 00 36 CC Hey, that does sound more like a little vein or a cone to me.

06 06 00 43 CMP Well, it just looks so much like all the rest of the things around here, Hank. The texture of the surface looks like it is all the same. The flanks of it are fairly steep though. And it's got one of the sharper rims for a raised rim crater of any that I've seen.

06 06 01 42 CMP And as we come over here - we're coming up on the Fra Mauro, Bonpland, and Parry combination, and I think that's - that's Parry that has - looks like two - almost right-angle rilles running through it.

06 06 02 18 CMP I'm looking at Rima Parry. I don't remember the number. It's the western one that runs out of Fra Mauro. And it seems like it is more than just my imagination that says that the floor of that stuff is indeed smoother than the - has fewer large craters than you see in the surrounding areas, although it's pretty close to being equal in small craters.

06 06 04 01 CC Casper, you're coming up on T-stop.

06 06 04 21 CMP Okay, it's OFF for 30 seconds.

06 06 06 03 CMP Okay, MAPPING CAMERA's going to STANDBY. The IMAGE MOTION is OFF. Barber pole and gray. LASER ALTIMETER is OFF.

06 06 06 25 CC MASS SPEC ION SOURCE, ON?

06 06 06 29 CMP And the ION SOURCE is ON.

06 06 06 33 CC And did I hear you say IMAGE MOTION, OFF?

06 06 06 38 CMP That's affirmative.

06 06 06 41 CC Okay, I guess - -

06 06 06 42 CMP And ALPHA X-RAY COVER coming to CLOSED.

06 06 06 56 CC Okay, I guess that about cleans that up - -

06 06 06 58 CMP And it's CLOSED.

06 06 07 28 CC Okay, Casper. I have a - a - a block data pad for you and some Flight Plan changes.

06 06 07 38 CMP Okay. Why don't you start with the Flight Plan changes.

06 06 07 42 CC Okay. At 151 hours, and - we want to - let's see, 151 - -

06 06 07 54 CMP Hey, Hank. Hey, Hank. Have you got two loops punched up? Have you got two loops punched up? The noise is getting louder and louder. It sounds like I got - I'm trying to listen to you over a football game. And I can hardly hear you over the din of everything else. I don't know whether you need to hold the mike closer to your mouth, or whether you got another loop punched up and I'm getting crossfeed.

06 06 08 20 CC Okay. Let's try again, Ken. How do you read now?

06 06 08 26 CMP That sounds a little better.

06 06 08 28 CC Okay. I've told them to hold it down a little, too. At 151 hours, the SIM code should be "Plus 1110, 01222."

06 06 08 50 CMP Okay. That's "Plus 1110, 01222."

06 06 08 55 CC Roger. And right at 151, over to the left of that, write "Configure comm per S-band with VHF bistatic."

06 06 09 14 CC Now that's a real long bunch of switch settings there. Do you want me to read them all off? Or your - I can give you a procedure on page - -

06 06 09 27 CMP Yeah, why don't you give me the page that it was on in the old Flight Plan in volume I - -

06 06 09 31 CC Okay. Page 311, at about 202 hours and 37 minutes, if you want to turn to that.

06 06 09 47 CMP Okay. Let's do that. That'll save copying an awful lot, I think.

06 06 09 53 CC Okay. You want to look at that right now? I got one small change.

06 06 10 02 CMP Well, I almost got it. The old - Oh, wait a minute. You - What page did you give me?

06 06 10 15 CC Page 311. It's 202 hours and 40 minutes.

06 06 10 21 CMP Ah so. It's the same volume I'm in. We passed the other volume and I went back for that. Okay. All right, 311. You're ahead of me. Okay, I got it.

06 06 10 37 CC Okay, this is the only bistatic we gonna do. Start where it says, "Configure comm" and end where it says, "S-BAND ANTENNA, HIGH GAIN, MANUAL, WIDE." And the only change in there is that the VHF antenna should be "left" instead of "right." We're in a different attitude.

06 06 11 04 CMP Okay. I start where it says, "Configure comm for S-band." And I stop where - including, I assume, the high gain settings.

06 06 11 13 CC Negative. We got different high gain settings - -

06 06 11 15 CMP ... VHF antenna left instead of right. Okay. You got different high gains. All right; thank you.

06 06 11 24 CC Okay. If you'll turn back down to 151, I'll give you that high gain. It's "PITCH, 20 - plus 20; YAW, 209."

06 06 11 39 CMP Okay. That's "PITCH, plus 20; YAW, 209."

06 06 11 44 CC Roger. And verify the DSE as "LOW BIT RATE, RECORD, FORWARD, COMMAND RESET."

06 06 11 53 CMP Okay. We'll verify "LOW BIT RATE" and recording.

06 06 12 02 CC Okay. And on that same page where it says "CSM - -

06 06 12 04 CMP You want me to verify or do you want me to configure?

06 06 12 11 CC Configure.

06 06 12 16 CMP I say, do you want me to verify that DSE or do you want me to configure?

06 06 12 21 CC Configure, Ken.

06 06 12 26 CMP Okay.

06 06 12 29 CC Okay. Right under that about 151:02, delete all that - that block about the lunar horizon. In other words, starting with the little block with CSM checklist all through - right on down through "Set OMNI D."

06 06 12 46 CMP Okay. That's all deleted.

06 06 12 49 CC At 151:10, "POO." And following that, "ALPHA PARTICLE/X-RAY COVER, OPEN."

06 06 13 06 CMP Okay. At 151:10, we go to "POO" and "ALPHA/X-RAY COVER, OPEN."

06 06 13 10 CC At 151:20, "VERB 49 maneuver to bistatic attitude." And that attitude is "221, 138, 000."

06 06 13 32 CMP Okay. At 151:20, we go "VERB 49 to bistatic; attitude, 221, 138, 000."

06 06 13 42 CC All right. Delete the UV photo pad block. Delete the acquire MSFN and all that stuff there - the lunar horizon, that comment. At 151:30, next page -

06 06 14 05 CMP Okay.

06 06 14 07 CC And write small. "P20, option 2. NOUN 78, plus 270.00, minus 040.63."

06 06 14 30 CMP Boy, Hank. That comm is just terrible.

06 06 14 32 CC Okay. We're having trouble in here, Ken. Everybody is yelling and hollering. We'll get them quieted down.

06 06 14 43 CC Okay, repeat. "NOUN 78 is plus 270.00, minus 040.63. NOUN 79, minus 0.0830, plus 000.50. NOUN 34, plus 00.151, plus 0.0034, plus all zips."

06 06 15 31 CMP Okay. That says at 151:30, we go "P20, option 2. NOUN 78 is plus 270.00 and minus 040.63. NOUN 79, minus 0.0830, plus 000.50. NOUN 34 is 151, 34, 00."

06 06 16 00 CC That's correct, Ken. And as you can probably deduce from the NOUN 34, right at 151:34, you should say "Start pitch rate." And the attitude for that is "221, 114 underlined slash 138, 000."

06 06 16 32 CMP Okay. That's - that sounds reasonable. Let me ask you one question about this antenna. I've got a - a little discrepancy between the - the set knobs that I have and the feedback read-outs that I get off the instrument panel. This is on the high gain settings.

06 06 16 57 CC Roger.

06 06 16 58 CMP Can anyone tell me if it matters which I use, and which one I should use if it matters.

06 06 17 03 CC Okay, I'll get that answered while I read you the next.

06 06 17 10 CMP Okay. Read on.

06 06 17 12 CC Okay. Delete the rest of the things on that page.

06 06 17 24 CMP Okay.

06 06 17 25 CC And, from - next page, 152 to 152:30, delete all of that.

06 06 17 40 CMP Okay.

06 06 17 42 CC Next page, 152:30. Delete everything down to where it says "GDC align" at about 152:52.

06 06 18 02 CMP Okay.

06 06 18 04 CC And at - back up at 152:41, out to the side there, you can write it - add "POO, discontinue bistatic radar. VHF RANGE, OFF; VHF A and B, OFF." And then "Return your S-BAND MODE RANGING to RANGING."

06 06 18 44 CMP Okay. At 152:40, you go to "POO, discontinue the bistatic, VHF RANGE, OFF; VHF A and B, OFF; S-BAND MODE to RANGING."

06 06 18 56 CC Roger. And at 152:53, you'll pick up the nominal Flight Plan again. And at - Go to the top of the next page up there, at 153:00. That experiment status code now should be "Minus all 1's and 01222."

06 06 19 25 CMP Okay.

06 06 19 38 CC At 153:15, delete the "MASS SPEC, ION SOURCE, ON." It's already ON.

06 06 19 47 CMP All right.

06 06 19 57 CC And, Ken, back up at the top - at 153 even, right at the top of the page, "Configure DSE to HIGH BIT RATE, COMMAND RESET."

06 06 20 17 CMP Okay. "Configure DSE, HIGH BIT RATE, COMMAND RESET" at 153 even.

06 06 20 24 CC And I think that's all of it.

06 06 20 31 CMP Okay. I guess the thing that seems to me like it might be missing here is where you're gonna get - Well, you've got me setting my DSE to high bit rate over here at 153. I guess we'll get some of that, won't we? Because we - we've had it running with no dump - -

06 06 20 56 CC Roger. We've been running in low bit rate.

06 06 20 58 CMP - - ... side, and I didn't stop the bistatic until after - That's right - low bit rate - but I didn't stop the bistatic until after LOS. So you're gonna get about half of this in low bit rate and about half of it in high. Okay?

06 06 21 12 CC Roger.

06 06 21 16 CMP I - I guess I got it straight.

06 06 21 51 CC Okay, Ken. I got some more words on that question you had about - where I said verify the DSE with the bistatic. That should be - should be "verify" rather than "configure."

06 06 22 07 CMP Okay. Let me see where that is now. Okay, that's at 151. That's "verify."

06 06 22 13 CC Roger. Because you're going to configure it here at LOS. And the word is on the - the high gain angles, believe your meter.

06 06 22 24 CMP Okay. I'll use the meters.

06 06 22 28 CC And some more on this configure. We're coming up here on LOS. Apparently, it's important that the DSE be configured on a - a time. It depends on when they start to rewind. So for this rev, they want you to configure the DSE at 150:45.

06 06 22 54 CMP Okay. 150:45 as opposed to 43. All righty.

06 06 23 40 CC And, Ken, I got one more thing for you, a TEI pad, a block data.

06 06 23 51 CMP Okay. Stand by while I get my other book.

06 06 24 24 CMP Okay. I'm ready to copy.

06 06 24 25 CC Okay, Ken. And to let you know what's going on here, we were going to give you a TEI-54 pad, and they're jockeying around - and - because of the plane change. And the plane change is gonna come about 169 hours. So they're gonna give you a TEI-48 pad now, and give you a TEI-55 pad at about 164 hours. So this'll be TEI-48, SPS/G&N; 38620; plus 0.59, plus 1.25; 168 - -

06 06 25 16 CMP Hank, I - I can't hear you again. How about asking - asking the comm guy downstairs if he can patch it differently or something. It hasn't sounded like this until just the last - oh, I've been noticing it the last couple of revs, but this thing - I can't even understand you.

06 06 25 47 CC Ken, how do you read now?

06 06 25 53 CMP Well, that little burst was good, Hank.

06 06 25 55 CC Okay, let's try it again. There's been a lot of noise in the room - -

06 06 26 01 CMP No, you're getting drowned out again.

06 06 26 17 CC Okay, Ken. We'll try it again - -

06 06 26 18 CMP Hank, it sounds just like the other loops are -

06 06 26 26 CC Can you read me all right now, Ken?

06 06 26 35 CMP No, I can't, Hank. It's - it's - Unkey your mike a second. Let me tell you what it sounds like. It - it sounds like that we've got the other loop - the other air-to-ground or the Flight Director's loop or something like that that's got a VOX key that comes on, and I don't hear it when you make a short statement. But when you're on for - and hold it down for any length of time, then all this other talking comes on, and it sounds like I can probably hear Tony and I'm not sure who all else. Nothing is very clear. It is exceptionally noisy, and it just sounds like - sounds like trying to hold a conversation in a football game - is what it sounds like. And it's been - it's been annoying, but now it's getting to the place where I can't even read you.

06 06 27 25 CC Okay, it - it must be coming from somewhere else, Ken. We've got everybody in the room real quiet now.

06 06 27 34 CMP Yeah, I - I don't think it's possible (laughter) for all that noise to be coming through from your open mike. That's the reason I wanted to see if Comm Tech could chase it out or something.

06 06 27 48 CC Okay. We're about 2 minutes from LOS. I don't guess we're going to be able to get this pad to you, and we're not going to see you for another rev, about 3 hours.

06 06 28 00 CMP Okay. Well, I'm not gonna - I'm not gonna burn TEI-48 in the meantime, anyhow. But I can't - I'm not gonna copy you properly if I can't hear you.

06 06 28 12 CC Okay. We'll work on this thing and see if we can't have it better when we get comm here in a rev and a half.

06 06 28 21 CMP All right. Thank you very much, Hank.

06 06 28 23 CC Do you - do you still have the noise while we're talking now?

06 06 28 29 CMP Yes, sir. It doesn't come on immediately as soon as you start to talk. It - it builds up slowly, like you start to talk and then it takes about 1001, 1002, and then it comes on like a big rush. And it just swells up and after a couple of seconds, you're completely drowned out.

06 06 28 51 CC Okay. It must be in the lines. They're checking now.

06 06 28 57 CMP All right. Thank you very much. I appreciate it.

06 06 29 10 CMP And I promise we won't go anywhere in the meantime.

06 06 29 11 CC Okay.

06 06 29 56 CC And, Ken, if you still read, we think we got your Flight Plan squared away until you go to sleep tonight. There won't be any more major changes.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 06 42 52 CC Orion; Houston.

06 06 42 58 LMP-LM Go ahead.

06 06 42 59 CC Well, if you're in a position to where you want to listen, I've got a little sports news for you. If you'd like to hold off, let me know when.

06 06 43 10 LMP-LM Oh, go ahead. We'll listen, Ed. We're just changing out the batteries and stuff for the PLSS.

06 06 43 20 CC Okay. Right now, we've got the - got New York won 3 to 1 over the Celtics in their series. The Lakers have finished up theirs, 4 to 2 over Milwaukee. And are standing by to see the outcome of the rest of the New York and Celtics games. And the Astros have finished up 4 in a row today.

06 06 43 46 LMP-LM Won or lost?

06 06 43 50 CC Now that wasn't a kind question. Won, of course.

06 06 43 55 LMP-LM Super. Great.

06 06 43 57 CDR-LM There goes Charlie's ticket.

06 06 44 01 CC We'll run some more news down here before long. And when you get your battery management, I'll give you the new procedure, Charlie; just give me a call.

06 06 44 18 LMP-LM Okay; stand by.

06 06 58 19 CC ..., Houston. Would you give us a clue as to where you are in the checklist?

06 06 58 27 LMP-LM Okay, we just finished out - changing out my LiOH and we're stowing the PLSS O₂ and OPS is removed.

06 06 58 34 CC Okay.

06 06 59 28 LMP-LM Houston, Orion.

06 06 59 29 CC Go ahead.

06 06 59 30 LMP-LM Okay, Ed, we had one small - looking over the gear here - we had one small casualty. John's OPS antenna has about 2 inches broken off the top of it. That's the only thing we can see wrong with the gear. Over.

06 06 59 48 CC How much, Charlie?

06 06 59 52 LMP-LM About 2 inches. And I checked the comm when I noticed it. When he came in, I checked the comm and he was still sounding the same to me.

06 07 00 06 CC Okay, he sounds good to us. Do you happen to know when it occurred? Or when you first saw it?

06 07 00 15 LMP-LM Well, I think it was during the ingress. We got behind and y'all reminded us of it once, but we were still working and we didn't do it at that point. When we started dusting, Tony said get on in, and so we forgot it. I got in and then when I saw John coming up the ladder, it was gone then.

06 07 00 38 CC Okay, so we're missing a couple inches of antenna. Understand.

06 07 01 57 LMP-LM Okay, Ed, we're ready for the battery management.

06 07 01 59 CC Okay, Charlie, I'll - I'll give you the overall plan here to put the LUNAR BAT on the LMP BUS, take BATs 1 and 2, OFF, and BATs 3 and 4, ON, and I'll give you the details if you feel like you want them.

06 07 02 14 LMP-LM Oh, no. We got that. No problem.

06 07 02 16 CC Okay.

06 07 02 34 LMP-LM Okay, that's done, Ed. We got BATs 1 and 2, OFF, 3 and 4 are on, and LUNY BAT is on the LMP BUS.

06 07 02 44 CC Okay, Charlie.

06 07 03 34 LMP-LM Okay, Ed, I don't see the LUNY BAT carrying much of a load here. Is TELMU satisfied?

06 07 03 47 CC Stand by, Charlie. We're observing that. You're GO.

06 07 03 53 LMP-LM Okay.

06 07 07 57 LMP-LM Houston, Orion.

06 07 08 02 CC Go ahead, Charlie.

06 07 08 06 LMP-LM Okay, Ed. I got some weights for you. Ready to copy?

06 07 08 09 CC Stand by 1.

06 07 08 10 LMP-LM The SRC number 2 - okay.

06 07 08 18 CC Go ahead.

06 07 08 23 LMP-LM Okay, the SRC number 2 weighs 41 pounds. SCB 3, which is in sample containment bag number 3, weighs 30 pounds. SCB 1, which is in sample containment bag number 4, weighs 26 pounds. Over.

06 07 08 46 CC Okay, SRC 2 is 41 pounds. SCB number 3, which is the containment bag 3, is 30 pounds. SCB number 1, which is in containment bag 4, is 26 pounds.

06 07 09 01 CDR-LM That's Charlie's.

06 07 09 14 CC Keep going like that, you may have to throw away muley.

06 07 09 24 LMP-LM Ain't on board yet.

06 07 17 32 LMP-LM Okay, Ed. John's coming out of his suit now.

06 07 17 38 CC Okeydoke.

06 07 22 50 LMP-LM Houston, Orion.

06 07 22 59 CC Go ahead, Orion.

06 07 23 04 LMP-LM ... gather doc's worked on a metabolic ... report. Would you let us know in a little while?

06 07 23 11 CC Charlie, come at me again on that, please.

06 07 23 17 LMP-LM Roger. We're just curious of - the metabolic rates today. Could you have the doc work on that for us, and let us know in a little while.

06 07 23 24 CC Yeah. I got - I got it, Charlie. On John, the average ran about 785 average, and the LMP, on you, Charlie, ran about 870.

06 07 23 40 LMP-LM Okay. John, 785, and me, 870. Thank you.

06 07 23 46 CC Yeah, I could pre - Webb [?] predicted on both of your - of you - 890, so running to the good there.

06 07 23 54 LMP-LM That's great. Thank you.

06 07 24 36 CC And, Orion, the docs tell me you were running about an 88 average heartbeat today.

06 07 24 45 LMP-LM Okay. Okay, thank you. Is that both of us?

06 07 24 51 CC That's affirmative. Both of you.

06 07 38 33 CDR-LM Hello, Houston; Orion. How do you read?

06 07 38 40 CC Orion, Houston; did you call?

06 07 38 44 CDR-LM That's affirmative. I'm out of my suit, and Charlie's getting out of his suit now.

06 07 38 55 CC Fine. I understand that John's out of his suit and Charlie's coming out now, is that correct?

06 07 39 04 CDR-LM Yes, sir.

06 07 39 06 CC Okay.

06 07 47 01 CC Orion, Houston.

06 07 47 06 CDR-LM Go ahead, Houston.

06 07 47 08 CC Roger. Ken's passing overhead right now. Could you give him a call and verify that he's on left VHF antenna. We're not receiving the VHF down-link on the bistatic radar. And come up on TRANSMITTER A - simplex - Is that right? Okay, I believe that is TRANSMITTER A, VOICE, and B, RECEIVER.

06 07 47 54 CDR-LM Hey, Ken. How do you read - receive? Over.

06 07 48 03 CDR-LM Ken, this is Orion. How do you read? Over.

06 07 48 09 CDR-LM Hey, Casper, this is Orion. Houston, you said VHF A to TRANSMIT, B to RECEIVE, right?

06 07 48 20 CC That's correct, Orion.

06 07 48 23 CDR-LM Casper, ...

06 07 48 36 CDR-LM Houston, what do you want me to tell him, again?

06 07 48 42 CC To verify he's on the - -

06 07 48 43 CDR-LM Okay.

06 07 48 44 CC - - VHF left antenna.

06 07 48 48 CDR-LM Roger.

06 07 48 53 CDR-LM Casper, this is Orion. Over.

06 07 49 01 CDR-LM Casper, this is Orion. Over.

06 07 49 09 CDR-LM Casper, this is Orion transmitting in the blind. Houston wants to verify that you are on the left antenna. They are not receiving your check. Over.

06 07 49 40 CDR-LM Is he overhead yet, Ed?

06 07 49 45 CC That's affirmative. He's just about directly overhead. We kind of suspect he's off the headset since he is maintaining radio silence this pass for the bistatic.

06 07 49 55 CDR-LM I'm sure he has.

06 07 50 20 CC Okay, Orion; Houston. Thank you very much - That's enough - giving it a try and reconfigure your VHF back to a nominal configuration.

06 07 50 31 CDR-LM Okay, we'll do it. Sorry we couldn't raise him. But I believe he's off the headset. If he was told to maintain radio silence, he don't hear. You know Ken.

06 07 50 41 CC We're all convinced you're right, John. Thank you.

06 07 51 35 CDR-LM Okay. Charlie's almost out of his suit now.

06 07 51 40 CC Good show.

06 07 51 45 LMP-LM You know, Houston, it would sure be handy to have something like a false floor to lay down in this thing, because we sure can't stand on the ...

06 07 51 56 CC You'd like a bath mat, Charlie.

06 07 51 58 LMP-LM Do what? Say again.

(NO COMM FOR 15 MINUTES)

06 08 06 47 CDR-LM Okay, Houston. We're ready for the - we're ready for the lift-off time for revs 40 to 45. And the EVA debriefing.

06 08 07 02 CC Okay, John. We're ready to go when you're ready.

06 08 07 27 CDR-LM Okay, you can give me the revs 40 to 45 and - until Charlie gets on the comm. Over.

06 08 07 36 CC Okay. We've got T-41, 154 plus 02 plus 12; T-42, 156 plus 00 plus 41; T-43, 157 plus 59 plus 13; T-44, 159 plus 57 plus 44; T-45, 161 plus 56 plus 16, and that's it.

06 08 08 28 CDR-LM Okay, readback: 41, 154:02:12; then 156:00 plus 41; 157 plus 59 plus 13; 159 plus 57 plus 44; 161 plus 56 plus 16.

06 08 08 48 CC Okay, good readback.

06 08 08 53 CDR-LM What ground - what ground-elapsed time do you have now, Tony?

06 08 08 59 CC Say again, John.

06 08 09 03 CC Okay, your GET is 152 plus 20.

06 08 09 07 CDR-LM 152 plus 20?

06 08 09 11 CC Right, and I can give you some times in your Surface Checklist for the different periods if you want them.

06 08 09 18 CDR-LM Yeah, I would appreciate that. We're - ... we don't have any idea what time it is. Not that it makes any difference. Charlie says it's 8 o'clock here.

06 08 09 37 CC Okay, John, I didn't catch that. Do you want these times for page 5-5?

06 08 09 46 CDR-LM That's affirmative.

06 08 09 56 CC Okay. On page 5-5. The EVA debriefing should start at 151 plus 55. Eat period, 152 plus 10. PLSS O₂ and H₂O recharge, 152 plus 55. Okay, on 5-6, the midcourse conference - or MCC conference, correction, is 153 plus 25. Presleep is 154 plus 10. And rest period begins at 154 plus 35. That's on the bottom of 5-7, and that goes for 8 hours.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 07 07 XX

BEGIN LUNAR REV 40

NO COMMUNICATIONS

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 08 10 47 CDR-LM Okay, say again when the - when the rest period - where it - where it goes.

06 08 10 52 CC Okay, the rest period at the bottom of 5-7 is 154 plus 35 and it's for 8 hours. And we're gonna try to get you to bed even earlier.

06 08 11 08 CDR-LM There you go.

06 08 11 15 LMP-LM Tony, you can't believe how dirty it is in this lunar module.

06 08 11 22 CC Okay, a couple of bits of information - we'd like from you before we start the debriefing. We'd like to know if you drank all of the in-suit drink?

06 08 11 35 CDR-LM Every drop. Both of us.

06 08 11 37 CC Good show. Did you drink any water when you got back in - -

06 08 11 39 CDR-LM ...

06 08 11 40 CC - - and can you estimate how much?

06 08 11 46 CDR-LM What?

06 08 11 53 LMP-LM Yeah, we had a lot. There's no way to tell it unless you keep count of the swallows and we didn't do that each morning.

06 08 12 01 CC Okay. Understand. And we'd like to remind you that you have some ointment in your medical kit if your fingers are sore there. And just to make you feel warm, I'd like - the next handoff, we go to the 210-foot dish and we'll have HIGH BIT RATE and DATA for all your entire sleep period.

06 08 12 22 LMP-LM Yippee.

06 08 12 24 CDR-LM (Laughter)

06 08 12 27 CC Okay. When you're ready, we'd like to go on with - -

06 08 12 29 LMP-LM Start out.

06 08 12 30 CC - - a few questions here in the geology debrief.

06 08 12 38 LMP-LM Okay. On the water, we were reconsidering the dosage. It went down like a cool one after a geology trip, if you know what I mean. There's about the same amount.

06 08 12 54 CC Okay.

06 08 13 04 LMP-LM Go ahead. We're all ears.

06 08 13 07 CC Okay. Discussing station 4 here, we'd like your general impression of the rocks. Especially the bigger blocks. You described mostly breccias and white crystalline rocks. Were there any others - and could - could you just talk about them a little bit?

06 08 13 33 CDR-LM Well, we didn't see any that we recognized or we'd have told you about it. I think the big blocks were just big brothers to the little blocks. That secondary that we were working up there was a classic. It really was. And the pan showed it. Must have come from South Ray. It had a great block land in the middle. It was a breccia surrounded by all kinds of little blocks. I think that's - that's about the only rock that we saw. You know, we're not really sure. It's our first guess as to what those rocks are up there - whether they're breccias or crystalline rocks. I'm sure you all know that. But most of them were very dust covered. I only saw one clear crystalline in the whole - in the whole EVA except for the ones I get in ray and - and that was the one I picked up - I think it was station 5, or 6.

06 08 14 54 LMP-LM I think, Tony, my view is the same. We had only a predominance of South Ray ejecta all around. Mostly some of the smaller rays were given to Descartes. It just occurred to me that everywhere we were, there was a boulder field of varying sizes and intensity and you could see eruptive force - you could look back at South Ray and you could see the rays coming our way and spreading and fanning out as they flow.

- 06 08 15 34 CDR-LM You know, it just may be that that South Ray Crater is - is so ... everything or most everything around here. You know, the - like we said about the rays at South Ray, some were white and some were black rays and just a little layer of dust. I didn't see a - hardly a clear surface all day long. I felt right at home like we were back in the United States studying geology - and everybody said the rocks would be crystal clear. Well, here it's all covered up. And it is my opinion when you hit one and got a cleavage surface - that made all the difference in the world to a rock description, but a person may not be able to do that often.
- 06 08 16 30 LMP-LM Does that answer your question, Tony?
- 06 08 16 32 CC Right. And the station 4, 5, and 6 area - you mentioned that 5 and 6 got progressively - the surfaces got progressively firmer. I wonder, could you see any contact or was it a gradual thing?
- 06 08 16 51 LMP-LM No, we couldn't. Just when we got off the Rover and felt it under your feet. The softest spot was up on the top, at station 4. Progressively firmer as we went out, like you say, went down to 6. And you just noticed it when you got out.
- 06 08 17 10 CC Okay. Understand.
- 06 08 17 12 CDR-LM Of course, when we were working, it felt - we were working in a couple of craters on station 4. Right on the - you know - right on the rim of the craters, we suspected it'd be softer, too.
- 06 08 17 25 CC Okay. And station 4, 5, and 6 also, we're - we're pretty confident that your - that the ejecta or the rocks at station 4 were from South Ray. At 5 and 6 in particular, though, was there any indication that the craters either by their orientation or from the secondary blocks lying around - that the source was, in fact, South Ray?
- 06 08 17 51 CDR-LM Yeah, I would think the crater itself - it probably be South Ray crater. Although the rocks generally looked more rounded, may be from a different layer. The - the cross work of patterns you should be able to see that in the film, but the pattern of rocks were all in the - in the far wall, which was away from South Ray Crater.

06 08 18 14 CC Hey, incidently, the backroom is really impressed. They are very excited about your choice of sampling on that inner wall of that crater - I guess it was at 5 or 6 - and think that you did - you had a good chance there of getting real Descartes. In fact, they think they've got it in the box. What they're thinking right now is that the mat - the areas where you're able to kick up and see white underneath are ray materials. But you didn't see that at 5 and 6. So, we think we may - you may have got Descartes there.

06 08 18 47 CDR-LM Okay. I'll tell you one thing. If this place had air, it'd sure be beautiful. It's beautiful with - with or without air, but the scenery today up on top of that Stone - on top of Stone Mountain - you'd have to be there to see and to believe it. It's just dazzling. And I hope it showed up good on television - -

06 08 19 15 CC It sure did, John. We're really impressed.

06 08 19 17 CDR-LM - - ... with that.

06 08 19 18 CC Hey, we have a bunch of questions we'd like to ask. But we're going to knock it off and let you get some sleep and we'll try to pick your mind when you get home here. But there's one thing in the Rover there. On the drive from station 10 back to the LM, did you notice that the nav base - the nav system worked? Whether you got any distance on there in particular?

06 08 19 40 CDR-LM No, we only - we only came about 25 yards ... I didn't notice, though.

06 08 19 48 CC Okay. Did the station - did the numbers go to zero when you reset at station 10?

06 08 19 54 CDR-LM That's affirmative.

06 08 19 58 CC Okay. We copy that.

06 08 20 03 CDR-LM I tell you, that beauty is holding up like a real jewel.

06 08 20 09 CC Okay. And we've lost one piece of - -

06 08 20 11 CDR-LM ...

06 08 20 12 CC - - hardware here. We wonder where SCB-2 went?

06 08 20 23 LMP-LM Okay. I dumped that in the SRC and it's on the Rover. We're gonna use it tomorrow.

06 08 20 31 CC Okay. I understand you dumped it into the SRC and the bag's on the Rover, still.

06 08 20 38 LMP-LM Yeah, Tony. It's just like we did in training. You pack those SRCs and I could never - I mean those SCBs and I could never get the SRC closed.

06 08 20 49 CC Okay. Good show - -

06 08 20 50 LMP-LM We started dumping the stuff ... - -

06 08 20 54 CC We were wondering if - wondering what happened to the SESC that was in the pocket there, but it looks like we're in good shape.

06 08 21 01 CDR-LM The SESC is back on the Rover. I was looking at it just before we got in.

06 08 21 06 CC Okay. That's the extent - -

06 08 21 08 LMP-LM Yeah, that's ... - -

06 08 21 09 CC - - of the debriefing here. Why don't you head on with your meal and we'll have your Flight Plan updates for the conference period.

06 08 21 19 LMP-LM Okay. We'll do it.

06 08 21 27 CC And what our plan is - we've got a lot of Flight Plan changes here - about seven pages worth - and we'll put them in your conference period and if we don't get them all up tonight, we'll send you to bed on time and we'll sneak them in the morning.

06 08 21 43 CDR-LM Okay. Tell everybody in the backroom thank you and we really enjoyed it today. By golly, that view from up on Stone Mountain is something else.

06 08 21 56 CC I'm sorry, John, our comm's pretty bad. We missed that. Could you say again - -

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06 08 21 59 LMP-LM Hey, Tony - -

06 08 22 01 CDR-LM No, I won't say it again. I just wanted to say thank you to the backroom boys.

06 08 22 10 LMP-LM Tony, I'd like to say the same thing. Thanks. I think they did a great job and they kept us thinking and on our toes and came up with the right sugges - suggestions at the opportune times and thank you, too, for keeping us going. It was a good job.

06 08 22 28 CC Hey, I went back in the backroom after the EVA and they're just ecstatic back there. I know you didn't - you didn't - we didn't see exactly what we expected to see, but we think you got - you got everything that we went up there for. We're in really good shape.

06 08 22 45 CDR-LM That Rover really ... some of the - you should have seen some of the things that that Rover did today. You wouldn't believe it.

06 08 22 57 LMP-LM You just can't believe the ridges and valleys and ridge rilles, here. I tell you - the local slope might be 2 or 3 degrees, but, man, that Double Spot - whoever picked that place to land - it's the only level spot around here. Any place else, you'd really be in trouble.

06 08 23 16 CC Okay, in about 50 minutes, we're going to get the 210 here, and then we'll have pretty good comm, so why don't you go eat now and do whatever you want, and we'll give you a call when we get the 210 and see if you're ready for the update.

06 08 23 30 CDR-LM Okeydokey.

(NO COMM FOR 35 MINUTES)

06 08 58 07 LMP-LM Houston, Orion. Over.

06 08 58 11 CC Go ahead, Charlie.

06 08 58 15 LMP-LM Tony, we'd like to start on that PLSS O₂ recharge tophoff-type thing if it's been an hour. Could you all confirm that for us.

06 08 58 34 CC Charlie, I didn't understand your question. You say you'd like to do it in an hour?

06 08 58 43 LMP-LM No - no, the checklist says, "Connect LM O₂ to PLSS; HI PLSS O₂ fill, open, then close." So, we're supposed to verify that 1 hour has elapsed since initial recharge.

06 08 58 58 CC Okay. We'll start your hour.

06 08 59 07 LMP-LM No - you know, when we first got back in and we plugged up the oxygen to the PLSS, we were supposed to - from then to now, if it's - if it's been an hour, we can go ahead with this other topoff.

06 08 59 33 CC Stand by 1.

06 08 59 58 CC Okay. It's 2 hours since you started the original charge. If your question is - can you go right ahead to the topoff - with the topoff - the answer is yes.

06 09 00 26 LMP-LM Okay, Tony. We'll proceed. Thank you.

06 09 00 32 CC Okay, Charlie. Charlie, the problem here - our comm is really bad.

06 09 10 59 CC Orion, Houston. Go NORMAL VOICE and HI bit rate. We have the 210.

06 09 11 27 LMP-LM Okay, Tony, you ought to have it. Over.

06 09 11 30 CC Okay, that is outstanding. I can almost understand what you're saying, Charlie.

06 09 11 42 LMP-LM Yeah, get the grits out of my mouth. Is that our friends in Australia tonight?

06 09 11 51 CC Okay, we're on Goldstone 210.

06 09 11 57 LMP-LM Oh, our friends out on the Mojave. Good.

06 09 12 08 CC And why don't you give us a call when you're ready to take these Flight Plan updates?

06 09 12 16 CDR-LM Wilco.

06 09 25 46 CDR-LM Houston, we're going off biomed for a little bit.

06 09 25 51 CC Okay.

(NO COMM FOR 15 MINUTES)

06 09 40 04 CC Orion, Houston.

06 09 40 11 CDR-LM Go ahead. Over.

06 09 40 13 CC Okay, we'd like to try to get the bulk of this Flight Plan update up tonight because we won't have the 210-foot dish until 2 hours before lift-off. How you doing up there?

06 09 40 25 CDR-LM We're coming right along, Tony.

06 09 40 29 CC Okay.

06 09 40 33 CDR-LM We'll be with you as quick as we can - on it.

06 09 40 36 CC Understand.

06 09 40 40 CDR-LM No, I don't think you do, but it's all right.

06 09 41 55 CDR-LM Okay. Yeah, Houston. We've got the both - PLSSs recharged with water and the inlet oxygen topoff.

06 09 42 08 CC Okay.

06 09 43 02 CDR-LM Hey, Tony. What's your best guess - about where we landed?

06 09 43 12 CC About where you landed? We're just going by what you said. Originally, we had you - I think 150 meters north and 200 west and you said today that you were just north. We thought that - the first estimate of 150 north and 200 west was compatible with the LRV data that you've got, the nav data, we kind of liked that one, but I haven't seen anything from the planners yet.

06 09 43 42 CDR-LM Okay. It's pretty hard to tell. From where we were on Stone Mountain, it looks like - I could see Double Spot and we were just about - from where we were at station 4 up at Stone Mountain, I could see Double Spot and they were just a little past it, but not much.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 09 06 XX BEGIN LUNAR REV 41

06 09 15 31 CC Hello, Casper; Houston. Standing by.

06 09 15 42 CMP Hello, there. How are you doing?

06 09 15 46 CC Oh, I'm pressing along. Ken, we'd like - we saw some funnies on our - on that bistatic, and I'd like to verify the position of the VHF antenna.

06 09 15 59 CMP It was in the LEFT position.

06 09 16 01 CC Okay. That takes care of that question.

06 09 16 33 CC And, Ken, awhile ago you were reporting loud background noise. We'd like to ask you how the comm is now.

06 09 16 43 CMP Sounds great.

06 09 16 47 CC Okay.

06 09 16 48 CMP What did you do?

06 09 16 52 CC We asked you what the comm was, and that fixed it.

06 09 17 05 CC And, Ken, any time you're ready, I've got some Flight Plan updates. We lied to you while ago when I said we were through for the day. And I've got a TEI-48 pad.

06 09 17 25 CMP Okay. Why don't you give me the Flight Plan first.

06 09 17 29 CC All right. Let's go to 154:30.

06 09 17 36 CMP All righty.

06 09 17 37 CC Okay; and the reason why we're doing this is the cabin is coming up a little bit and we're going to open the waste stowage vent valve for approximately an hour. So at 154:30, we're adding "WASTE STOWAGE VENT valve, open."

06 09 18 02 CMP Okay. I guess I'm just not breathing hard enough, huh?

06 09 18 07 CC Oh, man, just great metabolism there. And over at 155:30, we can add "WASTE STOWAGE VENT valve, CLOSED."

06 09 18 27 CMP Okay. "WASTE STOWAGE VENT, CLOSED" at 155:30.

06 09 18 31 CC Okay, that will be one step off your presleep checklist there, see. And after the presleep checklist, we'd like to add "Accept VHF." And what we're gonna do here is get you configured for the VHF bistatic test during your sleep period, so disregard the VHF part of your presleep. And at 155 -

06 09 18 56 CMP You want to give me a complete - -

06 09 18 58 CC Yeah, we can do that. The time on that is 155:36 and you've got about six or seven lines; you might want to come out to the left there.

06 09 19 12 CMP Okay, all set.

06 09 19 16 CC Okay. And there at 36, we'll delete the two steps, the one with the VHF that you see, the "VHF AM T/R, RECEIVE (PANEL 9)" and delete the "VHF AM A, DUPLEX." And then add "Configure for VHF bistatic test, VHF AM T/R, three, to RECEIVE (verify). VHF AM A, OFF (verify). VHF AM B, DUPLEX (verify)." And "VHF RANGE to RANGE. And VHF ANTENNA, RIGHT." And also right, all at the same time, Ken, right here around 155:35, we'd like to - Didn't leave you much room to write - we'd like to configure for a 2-1/2 degree dead band test. So at 155:35, we'd like "CMC, FREE; P20, NOUN 79, plus 00250," and then we'll go back to "AUTO." Well, are you still with me, Ken, or did I leave you back on the waste stowage vent valve.

06 09 21 43 CMP Let's see. I guess the last thing I heard was "Are you there." (Laughter)

06 09 21 48 CC Yeah. Houston standing by.

06 09 21 54 CMP Right (laughter). And at about 155:30, we go to FREE, take P20 and narrow the dead band to 2-1/2 degrees, then go back to AUTO. We take the VHF, verify VHF panels are all three to RECEIVE. We take the VHF AM A, OFF, the VHF AM B to DUPLEX, the RANGING to RANGE, and the ANTENNA to RIGHT.

06 09 22 32 CC Okay, and you, you're not going to do anything in the presleep checklist with the VHF, because we've just given you all these others, and you deleted those two steps that were in there.

06 09 22 40 CMP Yes, sir.

06 09 22 42 CC Okay. Now let's go over to 164:10, which you'll see in the morning.

06 09 23 04 CMP Okay, 164:10.

06 09 23 06 CC Okay, we'd like to add "Terminate VHF bistatic test. VHF AM B, OFF," and "VHF RANGING, OFF."

06 09 23 33 CMP Okay. Terminate the bistatic at 164:10, VHF AM B, OFF, and RANGE, OFF.

06 09 23 41 CC Okay, and that's all the Flight Plan updates for tonight as of this moment.

06 09 23 51 CMP You've got to be kidding.

06 09 23 54 CC Jnh-unh. I've been known to lie, though.

06 09 24 00 CMP (Laughter) You sure have. Hey, you mentioned something yesterday about the general scheme of things to come.

06 09 24 08 CC That's right.

06 09 24 10 CMP Is that still sort of on tap?

06 09 24 14 CC Yeah, that's it pretty much. I thought somewhere along this pass we'd give you a little more detail, specifically, on what we'd be doing tomorrow, and maybe give you times of PCl and lift-off and so forth.

06 09 24 32 CMP Okay. I got to thinking about it some last night, and the one thing I thought about is - I understand the desire to keep the day down to some reasonable number. If we still have to put our suits on to jettison the LM the next day, that's gonna chew up quite a few hours. And if that doesn't make any difference, why that's okay, if there's nothing else for us to do during those hours. But it seems like that's - to take those suits off and then put them back on and take them off again, with three guys in here it becomes a real big operation. I guess that sort of, would seem to me, might be an option that maybe John would have an opinion on when he gets back tomorrow.

06 09 25 37 CC Okay. We copy that, Ken. Just stand by a minute.

06 09 25 43 CMP Okay. I'm not proposing you change it. I'm just suggesting you consider the big flap that goes on when three guys have to suit up in here.

06 09 25 55 CC Yeah, I guess. We're certainly aware of that, Ken, and the name of the game on this one is going to be dock with the LM and transfer across with just a minimum transfer, bring the rock boxes and your suits and the box, and that's about it. And then the next day, complete the LM transfer and so forth. The name of the game is to get to bed. And that's why the decision is made that way.

06 09 26 28 CMP Okay. All right. That's just fine then.

06 09 26 38 CC Yeah, they've pretty well set a limit here that we're aiming at, Ken, and that's an 18-hour day, considering the EVAs and your long day. So that's about the only way it would work.

06 09 26 56 CMP Okay.

06 09 27 16 CC And along that way tomorrow - we'll of course have the update for you later, but we are going to have to schedule a urine dump with the mass spec. So we'll get that.

06 09 27 31 CMP Okay.

06 09 27 50 CMP And you got POWER and STANDBY on the PAN CAMERA.

06 09 27 56 CC Okay.

06 09 27 58 CMP GAMMA RAY SHIELD is OFF.

06 09 28 01 CC Okay.

06 09 28 06 CMP And you said you wanted to give me a pad of some sort. Let me find a place to write that.

06 09 28 08 CC It'll be a little TEI-48 pad.

06 09 28 29 CMP Okay, that's what Hank was starting to give me when we bombed out last time.

06 09 28 32 CC That's affirmative.

06 09 28 37 CMP Okay. All set, go ahead.

06 09 28 41 CC Okay. That'll be TEI-48, SPS/G&N; 38620; plus 0.59, plus 1.25; 168:51:56.94; plus 3052.2, plus 0704.2, minus 0137.4; 182, 117, 014. The rest of the pad NA. Comments: the GDC align same as for circ; ullage, two jets, 17 seconds; longitude at T_{ig} , minus 172.00. Additional comments.

06 09 30 07 CMP Okay, go ahead.

06 09 30 10 CC Pad based on loading site REFSMMAT, assumed no plane change.

06 09 30 18 CMP All righty, that's TEI-48, SPS/G&N; 38620; plus 0.59, plus 1.25; 168:51:56.94; plus 3052.2, plus 0704.2, minus 0137.4; 182, 117, 014; GDC alignment goes with the circ pad, two jets, 17 seconds. Lambda ignition, minus 172.00. Pad is based on the descent REFSMMAT, and no plane change.

06 09 31 00 CC Okay, that sounds like a good readback. We got that beauty in.

06 09 31 25 CC And, Ken, we'd like PAN CAMERA POWER, OFF, now.

06 09 31 31 CMP Okay. PAN CAMERA POWER's coming OFF. And it's OFF now.

06 09 31 36 CC Okay.

06 09 31 56 CMP I got a chance to go back and look at the telescope on one of the last two revs, and found out the problem was that even after I had gone back and taped the eyepieces back on, they still had the tape on them, but the darned things had slipped out of focus with the telescope. And I guess it was far enough out of focus that it - the stars just weren't bright enough to show up. Because while I was sitting there looking in it I could focus it and then the stars would appear and disappear if I defocused it. So I refocused the eyepiece and the telescope works like you'd expect a telescope to work.

06 09 32 37 CC That little bit of troubleshooting sounds like another first for 16.

06 09 32 51 CMP Well, I never would have thought about that thing coming off if I hadn't found the eyepiece floating by me one day.

06 09 32 59 CC Oh, now why did you blow your image.

06 09 33 25 CMP What are the surface guys doing now - are they cleaning up after the EVA?

06 09 33 32 CC Roger. They're going through their cleanup, and they've had their debriefing, and I guess they're looking for them to try and be asleep in a couple of hours, or something like that.

06 09 33 47 CMP Good show. How long was the EVA today? Seven and a half?

06 09 33 55 CC It was close to that, Ken, 07:23.

06 09 34 03 CMP Oh, that's pretty good. Guess the little Rover did a good job.

06 09 34 10 CC Yeah, it, I didn't -

06 09 34 11 CMP Hank just told me they found their way up to Cinco.

06 09 34 14 CC Yeah. I didn't get a chance to watch too much of that, but I did see one, when they were up on the southern point, they put the camera out on South Ray and it was just magnificent.

06 09 34 33 CMP Oh. Save those tapes, I'd like to see that.

06 09 35 34 CMP What kind of funny did you notice on the bistatic? Was it just not getting any VHF signal?

06 09 35 44 CC Well, we didn't have it initially, and then some of the words I heard was that we were getting a signal but it was not reflecting properly. And then we picked it up somewhere passing over the landing site and got some data. So I guess I'll have to get a better recap of - of that pass, but I guess - I guess the signal was there but just - just not hitting the right reflecting point.

06 09 36 20 CMP Well, I'm just impressed that you can bounce a signal off the Moon that's as weak as this one and catch it back at Earth anyhow.

06 09 36 29 CC Yeah, and it's really not much of a switch, Ken, because we're going to run it through the night here anyway.

06 09 36 42 CMP Okay. Hey, when I turn the waste vent on for an hour here, would it - would it make any difference to the mass spec people or anyone like that if I plugged in the black bag for a few minutes?

06 09 37 07 CC Stand by.

06 09 39 40 CC Okay, Ken, we have a GO from all hands to vent the bag.

06 09 39 47 CMP Okay. We do appreciate that.

06 09 39 52 CC Roger.

06 09 40 23 CMP What's your prognosis on the pan camera? Is it getting us any good data, or is it gonna be kind of sloppy?

06 09 40 40 CC Okay, Ken, we're - as I mentioned yesterday, it looks like we're overexposing about one f-stop, and there's a lot of, you know - we'll take that out in the processing, and everybody feels like the data is real good.

06 09 40 59 CMP Outstanding.

06 09 43 51 CC And, Ken, as you whip by the site over there, if we could get you to put the GAMMA RAY SHIELD on CENTER.

06 09 44 02 CMP Okay. Do you want it now?

06 09 44 05 CC That's affirm.

06 09 44 06 CMP Or did you want me to wait? Okay, here it comes.

06 09 44 11 CC Sorry about that.

06 09 44 14 CMP It's on now.

06 09 44 15 CC Okay.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 09 44 07 CC Okay, we copy that. Much as I'd like to sit here and talk about the landing site, Deke's here looking over my shoulder, and he's telling us we've got to get on with this Flight Plan update.

06 09 44 22 CDR-LM Okay. Let me get Charlie on comm. I want him to hear it, too.

06 09 44 25 CC Roger.

06 09 44 55 CDR-LM Okay, we're ready. Go ahead.

06 09 44 59 CC Okay, in your Surface Checklist, page 5-7.

06 09 45 06 CDR-LM Go.

06 09 45 08 CC Okay, change: "Stow hammocks, roll up with sleep restraints" to - that's on the right-hand column about three or four lines down - change it to "Stow hammocks and sleep restraints in jett bag."

06 09 45 35 CDR-LM We - we could probably have figured that out. Go ahead.

06 09 45 38 CC Okay. I'm sure you could have. Okay, on that same column, at the bottom of the page, says "Lift-off time data in book for rev 37 to 43," well, change that to "46 to 51."

06 09 45 59 CDR-LM Forty-six to 51.

06 09 46 01 CC Okay, and on the - right under that on the "PRO VERB 37 06 ENTER," we'd like to delete both of those lines.

06 09 46 11 CDR-LM They're deleted.

06 09 46 13 CC Okay, on page 5-8. On the left-hand column, it says "Empty ETB as follows." We'd like to delete "1 - HCEX MAG D and LCG compartment."

06 09 46 36 CDR-LM That's deleted.

06 09 46 37 CC Okay, and after "Stow in ETB" at the top of the next column, we'd like to add "1 - HCEX MAG D."

06 09 47 01 CDR-LM Okay, "1 - HCEX magazine D."

06 09 47 04 CC Okay, that's D as in Delta. And then in the same column down - it says "2 - 16 MAGS R and S." We'd like to change that to "1 - 16 MAG S."

06 09 47 25 CDR-LM Okay, " 1 - MAG S."

06 09 47 27 CC Okay, that's S as in Sugar. Okay, on 5-9, left-hand column on - near the bottom of the page, it says "Stow ICG in ICG bag." We'd like to change that to "Stow ICG skip out (empty pockets) in jett bag."

06 09 48 12 CDR-LM Okay.

06 09 48 13 CC Okay. And then at the bottom of the page after the "Used food in containers," we'd like to add two lines. The first one is "LCG adapters," and the second line is "Urine receptacle."

06 09 48 46 CDR-LM Okay, "LCG adapters, 2; and urine receptacle, 1."

06 09 48 57 CC Okay. On 5-10, delete all the page, and add: "Battery management at 164 plus 45" in the right-hand column.

06 09 49 36 CDR-LM Okay, "Battery management at 164 hours and 45 minutes."

06 09 49 41 CC Okay, I'll send up the stuff for your cue cards later. We'll go on to page 7-1. And I'd like to know if you'd like the change in times in the Surface Checklist. That's what some of these changes are.

06 09 50 13 CDR-LM Not particularly.

06 09 50 15 CC Okay, I won't send those, then. Okay, we'll have to go on to 7-5, then.

06 09 50 33 CDR-LM Okay, we're at 7-5.

06 09 50 38 CC Fine. Okay, on 7-5, delete "Battery management."
"On Houston cue: TELEMETRY PCM, LO," "S-BAND,
VOICE," and "DOWN VOICE BACKUP." We'd like to
delete all that.

06 09 50 59 CDR-LM Okay, that's all done.

06 09 51 01 CC Okay, and after "BSLSS/rock bag against hatch,"
add "Report PRD readings to Houston."

06 09 51 25 CDR-LM Okay. "Report the ... to Houston."

06 09 51 27 CC Okay, on 7-5 and 6, delete all of the "Doff suits."

06 09 52 00 CDR-LM Okay, go ahead.

06 09 52 02 CC Okay. On 7-6, delete "EVA debriefing with Houston,"
and delete "Eat period" right after it.

06 09 52 16 CDR-LM Okay, go ahead.

06 09 52 17 CC And change "158:22 presleep and equipment stowage"
to "172 plus 32 equipment stowage," and that's
27 minutes.

06 09 52 42 CDR-LM Okay, go ahead.

06 09 52 44 CC After "Equipment stowage, 27 minutes" add "Circuit
breaker panel 11, HEATERS AOT, closed."

06 09 52 58 CDR-LM Okay - -

06 09 52 59 CC That would be right below the "Solar wind ISA - -"

06 09 53 01 CDR-LM - - before the - Okay.

06 09 53 09 CC Okay, and we'd like to - I'll hold.

06 09 53 30 CC You ready?

06 09 53 31 CDR-LM Okay. Then what?

06 09 53 32 CC Okay. On the "Stow the ETB against the hatch" in
the next line, change to "Stow ETB in IS - ISA
big pocket."

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06 09 54 05 CDR-LM Okay. "Stow E - ETB in ISA big pocket."

06 09 54 08 CC Okay. On page 7-7, delete everything except the first three lines in the left-hand column.

06 09 54 26 CDR-LM Understand delete the - everything on page 7-7 but the first three lines.

06 09 54 33 CC That's right. And page 7-8, delete the whole page.

06 09 54 51 CDR-LM That's done.

06 09 54 52 CC Okay. On page 7-9, we'd like to add at the left top ha - top side, "Rende - correction, "RENDEZVOUS RADAR OPERATE, close; RENDEZVOUS RADAR STANDBY, open; circuit breaker panel 11, LGC/DSKY, close; circuit breaker panel 11, MISSION TIMER, close."

06 09 55 59 CDR-LM Okay. Go ahead.

06 09 56 01 CC Okay. After the "GIMBAL LOCK LIGHT, off," about halfway down the page, write in "Delay VERB 16 NOUN 65 ENTER, mission timer up" - correction, "Mission timer check until after up-links."

06 09 56 34 CDR-LM Okay. Go ahead.

06 09 56 37 CC Okay, on 7-9 still. After "VERB 22 - 21 NOUN 27 ENTER, 0 ENTER," add "Wait for go-ahead from MSFN."

06 09 57 03 CC Okay. First, some information here; you might note that this is about the time we'll be getting the 210, and we'll be able to watch the powerup.

06 09 57 14 CDR-LM Okay. But we always wait for a go-ahead from MSFN on an E-memory dump.

06 09 57 24 CC Right. That's correct. But we're adding it here anyway. Okay - -

06 09 57 33 CDR-LM Okay.

06 09 57 34 CC On the "TELEMETRY, HI, verify," the telemetry will be in LO, so we'll add "TELEMETRY, HI and VOICE to VOICE."

06 09 57 57 CDR-LM Okay.

06 09 57 59 CC Okay. And we'd like to change the up-links to "Lift-off time update, time increment update, RLS, and CSM state vector."

06 09 58 36 CDR-LM Okay. Understand M3FN will up-link the lift-off time update, time increment update, the CSM state vector, and the RLS.

06 09 58 45 CC Okay. Good. After "UPDATA LINK - OFF," add - that's at the bottom of the page - "VERB 05 NOUN 01 ENTER, 1706 ENTER," and "Verify T^ephem."

06 09 59 08 CDR-LM Okay. What is it supposed to be?

06 09 59 13 CC We'll give you a call on that.

06 09 59 18 CDR-LM Okay, is it the same as it was in the Activation Checklist?

06 09 59 24 CC Negative on that. You should see it in the DSKY.

06 09 59 29 CDR-LM I wouldn't think it would be. Yeah.

06 09 59 36 CC Okay. On the top of the right-hand column, add "Circuit breaker panel 16, INVERTER 2, close," and "INVERTER 2."

06 10 00 09 CDR-LM Okay. "Circuit breaker 16 INVERTER 2, close, select INVERTER 2." Go ahead.

06 10 00 13 CC Okay. And that "POWER AMPLIFIER, PRIMARY," change that to "SECONDARY." And change, in the next line, "TELEMETRY, HI" to "LO." And delete "VOICE to VOICE."

06 10 00 31 CDR-LM Okay. "POWER AMPLIFIER to SECONDARY," "TELEMETRY to LO," and delete "VOICE to VOICE."

06 10 00 36 CC Okay. On the bottom of the page, delete the P22 acquire time. And change lift-off time to - -

06 10 00 45 CDR-LM That's deleted?

06 10 00 47 CC Right. Change lift-off time to 175 plus 44.

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06 10 01 00 CDR-LM 175:44.

06 10 01 05 CC Okay, on 7-10.

06 10 01 11 CDR-LM Okay. Go ahead.

06 10 01 13 CC On the A/T 3 star - correction, delete the box with the A tash - slash T - T 3 star. And on the next line, there, it says on the right-hand column - -

06 10 01 31 CDR-LM Okay.

06 10 01 32 CC - - it says "NOUN 25 00014, PRO (Align Complete)," change that to "NOUN 25 00014 ENTER, 00 ENTER."

06 10 01 54 CDR-LM Okay. "0014 ENTER, 00 ENTER." Go to P00.

06 10 02 00 CC Okay, fine. And delete the star marks procedures.

06 10 02 10 CDR-LM Okay.

06 10 02 11 CC And on "Parking the rendezvous radar antenna," we'd like to change that to "Trunnion O, shaft 030.00."

06 10 02 41 CDR-LM Okay. Change it to "Trunnion O, shaft 030.00."

06 10 02 47 CC That's affirmative. On page 7-11, change the time "168 plus 10" to "173 plus 29," and delete the rest of the page.

06 10 03 16 CDR-LM Okay. That's done.

06 10 03 18 CC Okay. On page 7-12, delete everything except the "VHF voice check" on the left and the "Ascent pads update" at the bottom.

06 10 03 39 CDR-LM Okay. The P22 is out.

06 10 03 42 CC Okay. On page 7-13, delete; and page 7-14, delete.

06 10 04 05 CDR-LM Okay. That's completed.

06 10 04 07 CC Okay. On 7-15, delete the left-hand column. On the right-hand column, change "170 plus 15" to "174 plus 14."

06 10 04 27 CDR-LM Okay. Go ahead.

06 10 04 28 CC And right under that line, we'd like to add, "Stow purse in ISA bottom pocket." And right under that, "Stow ISA on the aft engine cover."

06 10 04 51 CDR-LM Okay, stow purse in ISA which pocket?

06 10 04 54 CC The bottom pocket.

06 10 05 14 CDR-LM Okay, "Stow purse in ISA bottom pocket"; and "Stow ISA on the aft engine cover."

06 10 05 19 CC Okay. On page 8-1. Change the time "170 plus 30" to "174 plus 29."

06 10 05 40 CDR-LM Okay. Go ahead.

06 10 05 42 CC Okay, on 8-2, top line, third from the left, "open S-BAND ANTENNA"; 8-3 - -

06 10 05 57 CDR-LM Okay, go.

06 10 05 58 CC - - third line, seven from the left, "Open S-BAND ANTENNA." And on the fourth line, again, "Open S-BAND ANTENNA" about right under it.

06 10 06 15 CDR-LM Okay. "Open ACS-BAND ANTENNA, open the S-BAND ANTENNA in the COMM, and the S-BAND ANTENNA HEATER."

06 10 06 26 CC Okay, on 8 - correction, 8-5, on the AGS column, change "373 (plus 010502)" to "(plus 03440)."

06 10 06 56 CDR-LM Okay, "plus 03440."

06 10 07 00 CC That's correct. On 8-6, change the time "170 plus 50" to "174 plus 49." And delete the - -

06 10 07 22 CDR-LM Okay, go ahead.

06 10 07 23 CC - - steerable antenna PITCH and YAW procedures. And right under that, change the "170 plus 55" to "174 plus 54."

06 10 07 46 CDR-LM Okay.

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06 10 07 47 CC On 8-7, change "171 plus 00" to "174 plus 59."

06 10 08 02 CDR-LM Okay.

06 10 08 03 CC On 8-9, change "171 plus 10" to "175 plus 09."
And change the program 12 T_{ig} to "175 plus 44."

06 10 08 33 CDR-LM Okay.

06 10 08 37 CC On page 8-10, change the time "171 plus 15" to
"175 plus 14."

06 10 08 56 CDR-LM Okay.

06 10 08 57 CC On page 8-12, change the time "171 plus 28" to
"175 plus 27."

06 10 09 15 CDR-LM Understand "175 plus 27."

06 10 09 18 CC That's correct. On 8-13, "171 plus 30" to
"175 plus 29."

06 10 09 34 CDR-LM Okay, "175 plus 29."

06 10 09 37 CC Right. On page 8-14, row 1, "Open S-BAND ANTENNA."

06 10 09 50 CDR-LM Okay.

06 10 09 52 CC Okay, on 8-15, row 3, "Open S-BAND ANTENNA." Also
on row 4.

06 10 10 03 CDR-LM I got you.

06 10 10 04 CC On 8-16, change the time "171 plus 33" to
"175 plus 32." Change the time "171 plus 35"
to "175 plus 34." And at the bottom change
"171 plus 40" - -

06 10 10 30 CDR-LM Okay, 175:32 and 175:34.

06 10 10 33 CC - - to 175 plus 39. And I copied yours.

06 10 10 44 CDR-LM Okay, 175:39.

06 10 10 48 CC Okay, and we'd like to go to your EVA-3 cue card.
Okay, John, we're gonna hold that cue card. We'll
pick it up first thing in the morning. I've given
you a lot of stuff here.

06 10 11 08 CDR-LM We're ready to copy. It ain't so much, Tony. You're not doing anything but changing - changing it so we can lift off without throwing everything out.

06 10 11 20 CC Right. Okay, on the EVA prep.

06 10 11 25 CDR-LM Okay.

06 10 11 26 CC Add to "PLSS comm check" after "Comm" on the third column: "S-BAND MODE, PM; TRANSMITTER/RECEIVER, SECONDARY; POWER AMP, SECONDARY; VOICE, DOWN VOICE BACKUP; PCM, PCM; and RANGE, OFF."

06 10 12 14 LMP-LM Okay, we copy that, Tony. Go to PM, SECONDARY, SECONDARY, DOWN VOICE BACKUP, PCM, and OFF.

06 10 12 21 CC Very good. And the TELEMETRY BIOMED, we'll go to RIGHT on that instead of OFF. And change RECORDER, ON to RECORDER, OFF.

06 10 12 40 LMP-LM Okay. TELEMETRY BIOMED is RIGHT, and scratch RECORDER.

06 10 12 46 CC Roger. Okay, and the - on the EVA-3 post card prep for equipment jett 1, change "31 percent" to "22 percent."

06 10 13 06 LMP-LM Stand by 1.

06 10 13 09 CC Okay, it's on the backhand - back side, bottom half, left-hand column, about an inch up from the bottom.

06 10 13 18 LMP-LM Yeah, I - I see it. Okay, "22."

06 10 13 25 CC Right. And change "Remove ISS" - it's right under that - "Remove ISS, wrap and tie" to "Stow in jett bag."

06 10 13 40 LMP-LM Okay.

06 10 13 42 CC After "Yo-Yo's (2)," add "ISS and helmet bag."

06 10 13 58 LMP-LM Okay, "ISS and helmet bag."

06 10 14 02 CC Okay, and on up in the next column at the top, under "Cabin repress," delete "COMM: UPLINK SQUELCH, OFF."

06 10 14 23 LMP-LM Okay, that's third column, two lines from the bottom?

06 10 14 30 CC Right, that's correct. Third column, two lines from the bottom. Okay - -

06 10 14 37 LMP-LM Okay.

06 10 14 38 CC - - and that's it. And we have some questions on the OPS antenna.

06 10 14 48 CDR-LM I was afraid you would.

06 10 14 51 CC (Laughter) Sorry, John.

06 10 14 52 CDR-LM Okay.

06 10 14 53 CC They keep piling them in front of me. Okay, on the broken CDR's OPS antenna, we'd like you to, one: remove any of the sharp edges with the scissors and examine the entire length of the antenna for cracks. And we'll give you time to dig that out.

06 10 15 26 CDR-LM Okay. The reason that it's broke is on account of I climbed in here with it open, because we're being rushed there toward the end.

06 10 15 34 CC Roger, John. You're - you're exactly right. I'm sorry, I shouldn't have let you get - get so far behind.

06 10 15 41 CDR-LM Well, that's all right. There's no - no problem. We had plenty of consumables, and where's the fire?

06 10 15 50 CC Okay. What we'd like you to do, as reasonable - as best you can - patchwork job on that antenna. We saw about a 15 dB loss from you when - when it broke. And we - we'll probably ask you and Charlie to switch OPS tomorrow, because you're relaying. Right. We'll give you some words on that in the morning. But, if you see any cracks, we'd like you to tape around the antenna about three loops, it says, such that it covers the crack of about a half inch on either side.

06 10 16 24 CDR-LM Three loops - three loops of tape?

06 10 16 27 CC Roger.

06 10 16 32 LMP-LM Okay, Tony. The antenna is as about as long as the - about a half inch longer than the penlights that we carry, and it's in good shape except for a little crack at the top where it broke off.

06 10 17 08 CC Okay. That crack on the end there, we'd just like you to trim that back. And, examine the thing down where it goes into the - that connector there and make sure it isn't cracked down there.

06 10 17 23 CDR-LM Okay. We already did that, and it's not cracked down there.

06 10 17 25 CC Okay, good show.

06 10 17 26 CDR-LM Just right up at the end.

06 10 17 28 CC Roger.

06 10 17 29 CDR-LM And Charlie - and Charlie's got three loops of tape around it.

06 10 17 48 CC Okay. As far as we're concerned, the Government's gonna allow you to sleep. We'd like you to go into your presleep now, and we expect a - a LiOH change, and we understand you're gonna call your PRD readings before you go to bed.

06 10 18 14 CDR-LM First we've heard about it, but we'll do it, I guess.

06 10 18 42 CDR-LM Okay. Tony, could we beg off on a PRD read - -

06 10 18 46 CC Roger. It's my error. The PRD's in the morning. Sorry, John.

06 10 18 52 CDR-LM Okay. We got the suits piled one on top of the other, and it'll be a mess - The bags are up around the legs. It'll be a mess to dig them out of there.

06 10 19 00 CC Roger. Don't mess with it.

06 10 19 25 CC Roger. Deke's standing here, and he said y'all did a beautiful day's work, and he's anxious to see y'all hit the sack ASAP.

06 10 19 37 CDR-LM Okay.

06 10 19 39 CC And, I sure agree on that beautiful day's work.

06 10 19 41 CDR-LM Where's this MCC-Houston - where's this MCC-H conference at?

06 10 19 49 CC It's just over. You just had it.

06 10 19 55 CDR-LM Oh, I thought maybe you guys were going to the Wheel or something.

06 10 19 59 CC (Laughter) You mean you didn't enjoy it?

06 10 20 11 CDR-LM I would be interested in what our EVA is gonna look like for tomorrow. Maybe I was off comm when you told Charlie or something.

06 10 20 23 CC No. I don't - We haven't said anything about it. The planners will be back working on it. I can tell you what it looked like before EVA-2. It was a 5-hour EVA with about an hour up on North Ray and about 20 minutes at station 13 and essentially the rest of the time back in the LM ALSEP area, especially east of the LM, there.

06 10 20 50 CDR-LM Okay. I - It's probably subject to a change, huh?

06 10 20 55 CC Yeah, it probably is. You got a lot of good data today, and that'll make them think about it overnight, anyway. But I'm sure everybody's sort of drooling about North Ray.

06 10 21 05 CDR-LM Yeah. I - I kind of feel like if we're ever going to be able to sort this out, North Ray's probably the place. Personally, to be able to get down 200 meters is something we probably ought to do to - to see just how complicated this thing really is.

06 10 21 26 CC Right. You're sure right. But let's not think geology, let's go to bed. Incidentally, we'd like to go to LO bit rate and DOWN VOICE BACKUP. I guess with a 210 we can't assure being hooked up.

06 10 21 43 CDR-LM Okay, LO bit rate and DOWN VOICE BACKUP. You got it.

06 10 21 46 CC Okay.

06 10 21 47 LMP-LM Okay. Tony, whose the arrhythmias y'all want to look at tonight?

06 10 21 52 CC Okay. BIOMED, LEFT.

06 10 21 57 LMP-LM Yea!

06 10 22 03 CC Charlie ...

06 10 22 13 LMP-LM Okay. We just still put in a strong vote for North Ray. It looks accessible, and there's a tremendous block up there we'd like to look at.

06 10 22 23 CC Okay. We heard you talk about that. I vote for it, too. I'm gonna go back and talk to them before I go home. We'll see y'all in the morning. Good night.

06 10 22 33 CDR-LM Okay. Take it easy, Tony. Thank you, now. That was a good day's work for yourself.

06 10 22 38 LMP-LM Hey, Tony, one final comment. We've been talking about that crater that we took a pan of as we spun around and - gosh, it - I said, looked like Big Sag. John and I are leaning towards Endogenis on that, and hopefully from the films that we got you might be able to sort that out.

06 10 22 58 CC Okay. We'll sure take that in consideration. I don't know whether it'll affect tomorrow, but - but I think it's a good obser - observation. We'll see you.

06 10 23 17 CC And, Charlie, we still have a HI bit rate. We'd like to go to LO.

06 10 23 25 CDR-LM Okay, LO bit rate. And Charlie's changing the LiOH canister right now.

06 10 23 35 CC Okay.

06 10 36 13 LMP-LM Houston, 16. Over.

06 10 36 24 LMP-LM Hello, Houston - Houston, Orion. Over.

06 10 36 38 LMP-LM Houston, Orion. If you're reading B, you have a lot of static on the up-link. Over.

06 10 36 49 CC Okay, Percy Precision. Sorry about that, and we have the up-link turned down. Now I guess somebody - did you hear us comment?

06 10 37 05 LMP-LM Somebody was blasting us out of the cockpit. I turned the SQUELCH, OFF, but now it - whoever - who's that talking, is that Stu?

06 10 37 17 CC Yeah, Charlie. Boy, you're sure looking good up there.

06 10 37 21 LMP-LM Hey, babe, you doing - how you doing? Nice to talk to you.

06 10 37 26 CC Yeah.

06 10 37 27 LMP-LM Hey, you were right. Greatest thrill of my whole life. Really big - really a thrill, really great.

06 10 37 33 CC Oh, man, you're really swinging. Okay. Charlie, we'll do something about that up-link, and - we're - we're working maybe the switch configuration now.

06 10 37 57 LMP-LM Okay, this is beautiful right now, Stu.

06 10 38 04 CC There would be an old saying that would apply to that, then, wouldn't there?

06 10 38 12 LMP-LM That's right.

06 10 39 07 CC Hey, Charlie, could we have you check your UPLINK SQUELCH. Is that OFF?

06 10 39 18 LMP-LM Yeah, it's OFF right now.

06 10 39 25 CC Okay, Charlie. We're going to kill the up-link. We'll - I'll be standing by. If you hear the noise, give us a call back. And have a good night's rest, boy; we'll have a cool one for you.

06 10 39 41 LMP-LM That sounds good. Hey, we haven't gotten to the presleep checklist part. Just - if it calls for SQUELCH, ENABLE, I can turn it on, and we'll be okay.

06 10 40 10 CC Okay, Charlie. Looks like we wanted you to go to sleep a little early, and we got ahead of you. Could you call us when - just when you finish your presleep checklist, and at that time we'll have the right configuration.

06 10 40 27 LMP-LM Okay, Houston - Stu. And - hey, since we only got a watch on Houston time, could you give us a time - what time we're supposed to be up in the morning?

06 10 40 40 CC Okay. Stand by.

06 10 41 28 CC Okay, Charlie. We're going to wake you up 8 hours from now. I'm showing around 10:35, so you'll be getting a call around 06:35, in the morning.

06 10 41 43 CDR-LM Okay, but we're about a half hour away from being asleep. We're still gonna get up at 08:35, right - 06:35?

06 10 42 00 CC Okay, John. We'll give you a call at 7 o'clock.

06 10 42 14 CDR-LM Okay.

06 10 42 37 CDR-LM Hey, only with the understanding that that doesn't take a half hour off our EVA, huh?

06 10 42 49 CC O - Okay. The - Flight says that since they got all those good up-links - changes to you this evening, everything looks real clean. And he feels that you can get into the EVA on time.

06 10 43 07 CDR-LM Okay.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 09 45 34 CMP I was looking at the little dark halo craters around Mädlar, and the one that's directly to the - yeah - east of Mädlar has white streaks in it.

I guess that's fair if - If light craters can have dark streaks, I guess dark craters ought to be able to have light streaks in them. I don't know what that means to anybody.

06 09 46 01 CC

Copy. That seems fair.

06 09 49 26 CMP

Here's a little beauty that's just - just to the south of the landing site. It's off a big tall dome, and it's got all this - a great white rayed crater in the top of it.

06 09 49 47 CMP

I'm looking at North Ray now, and it seems to me that that stuff that runs up on the North Ray comes right around the corner. It comes from out in the area back behind what we used to call the -

06 09 51 18 CMP

Just as I was coming up on the landing site that time, I saw this - little, very soft dome sitting up, and it's got this bright white ray crater right in the top of it. It's just like a - the crater itself looks like South Ray, and the - except it's built up on top of this nice little dome. And I don't know if that's coincidental, or what, but it sure is an interesting thing. The crater is about a third the size of the dome itself.

06 09 52 00 CC

Roger. Copy.

06 09 52 22 CC

And, Ken, have you been mumbling any geologic terms to yourself the last couple of passes?

06 09 52 32 CMP

No, sir. I - during that bistatic, I just kept quiet inside, too.

06 09 52 40 CC

Okay. How were things around on the other side?

06 09 52 42 CMP

That was a good chance for me to - Yeah, that was a good chance for me to - to get caught up on all the housekeeping and loose ends, and kind of pick up some stuff here and there. That was a - a well-needed break.

06 09 53 02 CC

I certainly agree.

06 09 54 21 CMP

Hey, you know, looking down at this - this material that's to the north of Albatregius - Albategnius, that is - excuse me. That material, if you didn't have all these craters around it, that terrain

scene could have been placed on the back side almost anywhere. Got exactly the same characteristics as the scene - everything about it's the same as a big share of what we call Cayley and other stuff.

06 09 54 59 CC Okay.

06 09 55 03 CMP And the Cayley floor fill I see in Ptolemaeus. And all of these things look exactly like what you see in Mendeleev. I've been looking for something I could say was different. I don't see a thing.

06 09 55 20 CC Okay. That sounds like a good observation.

06 09 55 49 CMP Look at Alphonsus. I'm looking at the eastern or the dark gray craters, the one that's almost due east of the central peak, the largest ring deposit there. And to the unaided eye, it stands out quite dramatically. When I put the binoculars on it, the difference is extremely subtle. You really have to look for it, and then it just turns out to be a slightly different color, but I can't say anything at all about any difference in textures or any other thing that's different except that there's a slightly different color to it. But it's more obvious to the unaided eye than it is to the eye with magnification.

06 09 56 42 CC Okay, Ken. I guess what you're trying to say is when you get too close to the forest you can't see the trees, huh?

06 09 56 57 CMP That must be.

06 10 01 17 CMP Looks like most of these medium-size craters out here in Cognitum are - they have raised rims, but they're very smooth raised rims, and they kind of - they have a convex instead of a concave side to them. It's - very much like the little suspected cone we saw next to Lassell C. It's just that he's by himself out there, and as you get into Cognitum you see quite a few that look just like that.

06 10 01 48 CC By Jove. We got that, Ken.

06 10 02 57 CMP Okay. Maybe we could have drawn a terminator that was a little more over towards the area where we've shown our target, but there may be quite a

dropoff in elevation here. It would only take - quite a bit, to the Sun angle wouldn't have to be an awful lot, on a geologic scale I guess. But the actual terminator was running down just to the west of Le Alda [?] so I ran a strip down that.

06 10 03 32 CC Okay. We got that. You want to give us the frame number while you got it handy.

06 10 03 40 CMP Okay. Good show. How about 84?

06 10 03 45 CC Okay; 84.

06 10 08 54 CC And, Casper; Houston.

06 10 08 59 CMP Go ahead.

06 10 09 02 CC Okay, Ken, as far as tomorrow, you've got a full schedule of the SIM Bay and visuals and landmark tracking and so forth. I'm sure you don't want the details now. Would you be interested in the times of PC-1, lift-off and -

06 10 09 23 CMP Yeah. Let me get my - let me get my little scratch pad out here and let you give a kind of a summary - of major events anyhow.

06 10 09 50 CMP Okay. Go ahead.

06 10 09 52 CC Well, I don't want to - the first part of the day I really don't want to try to get into any details, Ken. It's - it's your standard P20 with a lot of mapping camera/pan cameras, and all the sensors we got - we got going. You're going to burn plane change 1 at 169 plus 40. That's - that's approximate times. And LM lift-off is approximately 175 plus 50. And I guess ... one in the middle there, too. Your - your landmark tracking will come at about 173:20, something in - in that order. And after docking - we're showing you - -

06 10 10 44 CMP Hey, that's landmark on the LM?

06 10 10 46 CC That's the landing site landmark.

06 10 10 50 CMP Okay.

06 10 10 56 CC And we'd like to have AUTO on the HIGH GAIN.

06 10 11 00 CMP Right, you've got it.

06 10 11 01 CC Okay. And then as I said before after - after docking, at - at this time, we're showing you an hour and 30 minutes for the transfer. And then you'll come inside, have an eat period, and hopefully start the rest period. And your rest period will start at about - -

06 10 11 20 CMP Okay ...

06 10 11 23 CC - - 100 - and start at about 181:30, in that area, will be the rest period.

06 10 11 32 CMP Okay. And the day starts about 164, was it?

06 10 11 35 CC That's affirmative. Around 164.

06 10 11 48 CMP Okay. That's not so bad.

06 10 12 00 CC No. The way you've been swinging along up there doing all that good work, you'll just romp through that.

06 10 12 17 CMP Well, I'll tell you, it was - it was kind of nice to just sit back and have that bistatic pass to catch up on all the things you've been putting off.

06 10 12 29 CC Yes. I know what you mean.

06 10 12 42 CMP Okay, and since you reminded me of film, let me give you the - what I got on this DAC magazine too while I take it down. That'll save asking about it later. I have a - a feeling we may be quite a ways behind on our film status. Magazine II has - that'd be 20 - that's looks to me like 42 percent.

06 10 13 10 CC Okay. I copy. II, Item Item, and 42.0 percent.

06 10 13 18 CMP ... yeah.

06 10 13 22 CC And I made it your last.

06 10 13 24 CMP That's quite a bit off from the prediction. I wonder if I - I turned it on at the right time, and I turned it off at the right time.

06 10 13 49 CC Oh, I don't know, Ken. That's - that's within 18 percent.

06 10 13 54 CMP (Laughter)

06 10 15 04 CC And, Ken, the word here is that they're not concerned about that percentage, just as long as you photograph the old mass spec.

06 10 15 17 CMP Well, we photographed something that was pointed in that direction.

06 10 15 21 CC The - the bracket didn't break off, did it?

06 10 15 23 CMP We took lots of photographs of it, whatever it was. (Laughter) No, I got worried, I knocked it once, and -

06 10 15 33 CC Well, if you dropped it, I'd of worried about the heat shield.

06 10 15 36 CMP It is unbelievable. (Laughter) Well, I started to say I was worried about the spacecraft.

06 10 15 57 CMP Probably get the pictures back and find that it has a natural frequency that's the same as the camera.

06 10 16 08 CC That's why they made it so big.

06 10 16 12 CMP (Laughter) That thing wouldn't even vibrate on a Saturn V.

06 10 16 46 CMP I think the part I liked most about this experiment was Chris Printer's [?] little window shade.

06 10 16 59 CMP It worked just fine, and it couldn't be simpler.

06 10 17 56 CC And, Ken, on your next time around, we're going to want to be talking a little bit about your rendezvous procedure, for tomorrow, and I guess we'll - as we mentioned before, we're recommending using SCS, and we've got some procedures marked up and we can give you as much detail as you want on them as for the switches, so you might want be thinking about that. And any questions about it.

06 10 18 32 CMP Okay. I think what you told me yesterday sounds like a good plan. I - I don't think that's very difficult to remember. It goes - it's straight-forward enough. It goes right along with operating without an IMU except you have the luxury of having all that nice maneuver for you.

06 10 18 55 CC Yeah, Ken, it - you know - we talked about a couple of little pitfalls there, you know, of going to CMC control with the SCS - I mean with the OPTICS switch in MANUAL and that type thing, and we would like to go through your procedures and stick in a couple of steps that would result, you know, in that wrong procedure. Now, as far as the details on where you put your SCS switches and so forth, I've got a starting plan worked out. I don't know how much detail you want on that - on that sort of thing or just turn you loose and try to do it in SCS.

06 10 19 40 CMP Oh, I'll take all the thoughts that you got, Stu.

06 10 19 43 CC Okay. We'll - we'll probably give you those on your - we will give you those on your next time around so you can cogitate on them.

06 10 19 55 CMP Okay.

06 10 20 07 CMP I'd hardly be the Government's hero if I over-torqued my Dukasons [?] on the rendezvous.

06 10 20 17 CC Well, that's - that's the one thing you've always got to watch out for. That and check 6.

06 10 20 38 CC And, Ken, a reminder on your WASTE STOWAGE VENT valve.

06 10 20 45 CMP Gee, thank you. Is it that time? It sure is.

06 10 22 03 CC Ken, have you got any bright planets in your view in that double umbra? Isn't that something - really a beautiful sight, isn't it?

06 10 26 06 CC And, Casper, we're about 2 minutes to LOS, and we'll see you on the other side.

(NO COMM FOR 48 MINUTES)

06 11 04 XX BEGIN LUNAR REV 42

06 11 14 23 CC Casper, Houston standing by.

06 11 14 29 CMP Hello there.

06 11 14 32 CC Greetings.

06 11 15 38 CC Well, how did old Kohlschuetter look, Ken?

06 11 15 45 CMP Like a big mountain.

06 11 15 50 CC Ah so.

06 11 15 52 CMP This is one of these things where that - that strip was planned for the - the groundtrack post-plane change. And, of course, we were further south at the time than was intended, so it didn't fit very well. It was really scrunched up in the corner. I don't know whether that's really going to be any help or not. But there is - Try it and maybe it'll come out okay.

06 11 16 25 CC There can't be any bad pictures of the Moon.

06 11 16 32 CMP (Laughter) That's right. When you've got nothing, a little goes a long ways.

06 11 16 41 CC Okay. We're about to wind it down, Ken. Only two things I have for you is to go over the rendezvous procedures and I'll let you get on through your presleep checklist and - and wipe it out for the day.

06 11 17 05 CMP Sounds like a good plan. Why don't we go through your - your little plan first?

06 11 17 14 CC Okay. If you're ready, go over to 171:40 and you'll have your pro - procedures there.

06 11 17 29 CMP Okay, 100 and let's - 140 - let's see, before I get over there, you want me to - Oh, you'll remind me to come back to the shift the dead band. Okay. Okay, I'm at 171:40.

06 11 17 49 CC Okay. And in that space in between that update and the LM lift-off is a nice place to write. Let's put in there first, "OPTICS MODE, CMC, verify." Underneath that, let's write a note. "SPACECRAFT CONTROL must be in SCS prior to OPTICS MODE, MANUAL." I'm just reminding you of the note that - that we passed on the other night, Ken.

06 11 18 32 CMP That's just fine.

06 11 18 33 CC Okay. And then come on down after LM lift-off, and where you have P34, delete the "CMC MODE, HOLD." And delete the next line, "Set NOUN 79," et cetera. Okay, and we'd like to add in here, and it will be four lines, so you might start out kind of small, "SPACECRAFT CONTROL, SCS; BMAG MODE, three, ATT 1/RATE 2."

06 11 19 32 CC All righty. And then, next line, "ATTITUDE DEAD BAND, MAX; RATE, low; and LIMIT CYCLE, ON." That's all on that page.

06 11 19 56 CMP Okay. Let me read that back to you, then. Between the update and lift-off, I've got "OPTICS MODE to CMC, verify." And the note that "SPACECRAFT CONTROL must be in SCS prior to OPTICS MODE going to MANUAL. Following lift-off, next to the VERB 88, "SPACECRAFT CONTROL, SCS; BMAG MODE, three, ATT 1/RATE 2; DEADBAND, MAX; LIMIT CYCLE, ON; and RATE, LOW."

06 11 20 22 CC Okay, that's affirmative.

06 11 20 40 CC Okay. Go to the next page, Ken.

06 11 20 45 CMP All set.

06 11 20 49 CC Okay. Down here at 172:10, delete "CMC MODE AUTO."

06 11 21 01 CMP Okay.

06 11 21 02 CC Okay, now, Ken. This is just a couple of words on dealer's choice. Now as you recall from running this in your attitude, right here at about 172:13, your trunnion is down through about 22 degrees. And, of course, there you were going AUTO. Now they tell me the way you had been flying the SCS

rendezvous, that you'd just stay in an ATT HOLD and let the trunnion. If you want to here, you could put the PITCH BMAG to RATE 2 and just bang it once. But I - I'm not gonna give you any - any changes of Flight Plan on that. That's just your option on how you want to keep the trunnion angle.

06 11 21 43 CMP Okay. I'll write a note here to watch for that, at that point.

06 11 21 47 CC Yeah, your trunnion will be - if you're right on nominal - will be 22 degrees right around - oh, somewhere in the order of 172:12 there.

06 11 22 08 CC Okay, and then down at the bottom there, prior to - in between the "MSFN disables" and the "P34 final comp," I want you to write in, "OPTICS MODE, CMC." And this is just a reminder.

06 11 22 36 CMP Okay, between "MSFN disables" and "final comp," we'll write in, "OPTICS MODE to CMC." I've added the note at the top - at 172:10 - to watch for trunnion increasing greater than 22 and BMAG, at least the PITCH one, can go to RATE and give it a blip.

06 11 22 58 CC Okay, that's just - that's just one way of doing it, and it - it works real good and it does not take a large rate in there, just - just about 1 or 2 at the most of what would be a minimum-impulse fire.

06 11 23 17 CMP Okay, the only reason I had been using ATT HOLD before was because we were simulating loss of - of the IMU; and, in that case, I wanted to use the attitude gyros because they had less drift. And it made the marking simpler; but, in this case, I might as well let it - give it a burp and let it track along.

06 11 23 37 CC Okay, that's the way I ran them and the - the line-of-sight rates are - are pretty low, and it's just sort of one of these no-sweat things. Just about one fast blip and then it - it just hangs right there.

06 11 23 55 CMP Very good.

06 11 23 56 CC Okay, and you've got your OPTICS MODE, CMC, down here toward the bottom. We'll turn the page.

06 11 24 05 CMP All right, I'm with you.

06 11 24 10 CC Okay, now, Ken, here's - It - This gets kind of messy through here so you might try to write small. And the only thing we're trying to do is, of course, get into P40 and take the auto maneuver, set up for the SCS burn, get back into track attitude, and then back to SCS. And the way we'll do that is we'll take the first line, "Cycle CMC MODE, FREE, AUTO," and delete it.

06 11 24 46 CMP Okay.

06 11 24 48 CC Okay. And then, after P40, write "SPACECRAFT CONTROL, CMC." And next line, "BMAG MODE, parenthesis three, RATE 2." And I want to make a note here, Ken. I mean this is not for you to write down, unless you want to, but you'll be tracking along here, and you might be a little out of the preferred track attitude. And if you go into SPACECRAFT CONTROL to CMC before you get to the burn program, the CMC will try to take you back to the preferred attitude, and you're just wasting an RCS maneuver. So wait until after you're in the burn program to go to CMC, and that's - that's true also of P41 for the midcourses.

06 11 25 43 CMP Okay, that's a good note.

06 11 25 48 CC Okay, and down here where it says "SPS checklist," we're deleting that only because your SPS cue card is - is marked up so bad. And so, the - the reason why - Let's - let's at least say you don't use the cue card as written, which you wouldn't, but we just want to make that point. And in the space in there between "Compare solution in TPI," I've got three lines for you. The first one is, "SPACECRAFT CONTROL, SCS, after auto maneuver." The next line is, and here again this is sort of superfluous, but it's "BMAG MODE, three, ATT 1/RATE 2." And then, just to sum it all up, could we add a note, "Use SCS burn procedures, if required."

06 11 27 07 CC And here again, I'll - this is not for you to write down unl - unless you want to, Ken. It's a personal reminder that we talked about before, that, if you ENTER on that 20⁴ display before going to SCS, you have activated the - the relay.

06 11 27 29 CMP Okay. I think I will just put another little note out here.

06 11 27 32 CC Okay.

06 11 27 46 CMP Okay. If I am in SCS control, though, I can - I can afford to do an ENTER on 20⁴?

06 11 27 52 CC That's affirmative. If you're in SCS control, you have no power to that relay. It comes through the SPACECRAFT CONTROL switch, and it - -

06 11 28 01 CMP Okay. That was my impression.

06 11 28 03 CC - - and it must be in CMC, so you cannot get the activation of the relay as long as you're in SCS.

06 11 28 14 CMP Okay.

06 11 28 15 CC All righty.

06 11 28 16 CMP I can still have good navigation through the CMC.

06 11 28 23 CC That's - that's affirmative. You mean - you mean - you mean the navigation programs?

06 11 28 36 CMP Onboard state vector, in the event that you did a burn?

06 11 28 40 CC Oh. What you want to do is - is go on into P⁴⁰ and stay in P⁴⁰, and then trim - trim your residuals under - out on the G&N.

06 11 28 56 CMP Roger. That's what I was - that's what I wanted to get at.

06 11 29 00 CC Yeah. And then here's -

06 11 29 01 CMP The only thing I have to do is make the actual burn itself under SCS control.

06 11 29 06 CC What we want you to do is be in SCS control when you respond to that 204 display and make the burn in SCS. And now, here again, I'm going to bring up another little pitfall. You want - down after TPI, you want to wait until the flashing 16 85 comes up before you go back to CMC. Now, you know, TPI is a short burn and you could very well burn in SCS on time and have a 99 flashing up there. Go on, get through that, and get into your flashing 16 85 before you return the - the SPACECRAFT CONTROL to CMC. At least, by that, is what I'm trying to say, Ken.

06 11 29 55 CMP Okay.

06 11 29 57 CC Okay. And that summarizes my next line, it just was "Flashing 16 85," then "SPACECRAFT CONTROL to CMC" and it was just trying to get across what I just told you in words; and, if you made the burn, why, null your residuals.

06 11 30 33 CMP Okay. And the - if it's all nominal, there really shouldn't be any maneuver there at all for - to attitude for the first midcourse.

06 11 30 44 CC That - that's affirmative. It's - it's generally not. And what - the way the procedures show it, if you want to be technically correct is, prior to P35, reminding you of your BMAGs again - BMAG MODE, three, to RATE 2. Then go ahead into P35 and - generally, I don't come up with a - with a greater-than-10-degree maneuver, but sometimes it - it dresses up the - the preferred track, there. So -

06 11 31 23 CMP Roger.

06 11 31 24 CC Okay. Then after P35, we have "BMAG MODE, three, ATT 1/RATE 2 after maneuver."

06 11 31 49 CMP Okay.

06 11 31 50 CC Okay. "ATTITUDE DEADBAND, MAX" is next line. And the next line after that is "SPACECRAFT CONTROL to SCS." And if you want to write you down a little note beside that "Before OPTICS, MANUAL."

06 11 32 33 CMP Okay.

06 11 32 35 CC And stand by 1 - That's okay, Ken. Okay, let's come on down here to P35, and delete "Cycle CMC MODE, FREE to AUTO."

06 11 32 58 CMP Okay.

06 11 32 59 CC Okay. And let's - Just before that P35 final comp, just because it's an easy place to write it, let's put it down "OPTICS MODE, CMC."

06 11 33 22 CMP Okay. Got that.

06 11 33 24 CC Okay, then after P41, we'll put "SPACECRAFT CONTROL, CMC." And now here, Ken, since it's - We never take the maneuver, but just to cover all cases on the - on the P41, after "SPACECRAFT CONTROL, CMC," we can put down "BMAG MODE, three, RATE 2," since we are running a little out of configuration.

06 11 34 08 CMP Okay.

06 11 34 16 CC Okay. Then, Ken, after - after the midcourse 1 through P76, P35, and we're just about through with these. We'll have "BMAG MODE, three, ATT 1/RATE 2 after maneuver." And the next line is "SPACECRAFT CONTROL, SCS, before OPTICS, MANUAL." And that takes care of that page.

06 11 35 03 CMP Okay.

06 11 35 06 CC All right. If you want to turn the page, we're just about home. Right before the P35 final comp, we'll put "OPTICS MODE, CMC." And after the P35 final comp, we'll delete the line, "Cycle CMC MODE, FREE, AUTO." And then after P41, "SPACE-CRAFT CONTROL, CMC." And our last entry then, "BMAG MODE, three, RATE 2." And that was a lot of talking, Ken, but that will keep the BMAGs where they're supposed to be and the relay where it's supposed to be.

06 11 36 20 CMP And it was all worth it. Okay, suppose - suppose I read that all back to you?

06 11 36 28 CC Okay.

06 11 36 36 CMP Okay, we already covered the - -

06 11 36 40 CC Ken, about - -

06 11 36 41 CMP And I'll go to ATTITUDE - Yes, go ahead.

06 11 36 43 CC Okay. Could we interrupt here before your read-back, and we've got your jet-on monitor loads but - Stand by 1. Yeah, what we'd like for you to do is go to the 2-1/2 degree dead band - there's that change that we had, and then they can be up-linking while you're reading back.

06 11 37 12 CMP Okay, I'll do that. Just a second here.

06 11 37 36 CMP Okay, we're in the 2-1/2 degree dead band and you've got ACCEPT.

06 11 37 40 CC Okay, jolly good, and I'm ready for the readback.

06 11 37 47 CMP Okay, let me mark off what I did here. Okay, before lift-off, we'll end up with - making sure that the CMC has control of the optics; we'll fly with the CMC to the initial attitude, then we'll go to SCS CONTROL; BMAGS, three, ATT 1/RATE 2; MAX, DEAD BAND; LIMIT CYCLE, ON; and RATE, LOW. Then we'll do our initial tracking there. And we'll stay with that and 172:10 when the normal auto maneuvers would be enabled, I - I'll probably take the PITCH BMAG to RATES and start a small rate in there.

06 11 38 45 CC Yeah, that'll be just one small blip.

06 11 38 51 CMP Roger.

06 11 39 05 CMP Okay, and just before the final comp on P34, we put the OPTICS MODE to CMC. Let the P34 finish and once I'm in P40, I give the SPACECRAFT CONTROL to CMC; BMAGs, three, to RATE 2; and accept the maneuver. When I'm in attitude, I can go back and do SCS control; BMAGs, three, ATT 1/RATE 2; and, should a burn be required, I'll make an SCS auto burn. I'll null the G&N residuals, still remaining in SCS control. I'll proceed past the NOUN 85

before returning control to G&N. And it'll be BMAGs, three, to RATE 2 when I get - I think the safest place is when I get in - all the way into P35. When I get it - there, I'll return SPACECRAFT CONTROL to CMC and take the maneuver. Go back to SCS control; BMAGs, ATT 1/RATE 2, all three. DEADBAND, MAX; then I'll take SPACECRAFT CONTROL, SCS; and then OPTICS to MANUAL. Prior to the final comp, we go OPTICS MODE to CMC. Again, at P41, we'll hold SPACECRAFT CONTROL to CMC, and I'll be bypassing the maneuver. And I - But if we - if we take the maneuver, it's BMAGs, three to RATE 2. Again, we'll proceed all the way through it; and, when I get into P35, I'll take the BMAGs back to ATT 1/RATE 2; and give SPACECRAFT CONTROL to SCS. Then, OPTICS to MANUAL. Same procedure for mid-course 2, except that at the completion of mid-course 2, why, I'll just stay in SCS - I mean, CMC.

06 11 41 23 CC

Okay, Ken. Couple of comments there, now. I guess how you trim the residuals is sort of dealer's choice. Once you're in that flashing 16 85 display, why, you can go to CMC freely. So you can play that any way you want.

06 11 41 48 CMP

Okay, but I might just as well stay in SCS. That's a simpler - and one less number that I'm likely to confuse.

06 11 41 55 CC

Okay, now let me - and your - your readback was - was okay. There is something now that I'll say - after the P35 where you have BMAG MODE, three, ATT 1/RATE 2; okay, if the - the CMC will start you on a good track rate; I just didn't want to get the procedures too clowned up; but, you know if you put your PITCH BMAG to RATE 2 there, before you go to SCS, you'll keep in your CMC track. Now you'll be below the rate at which you're maneuvering, but you - between TPI and midcourse 1, you'll exceed your - your attitude dead band. So, since you did say you were going to go - to go on the track method, people talked me out of when they said you always did the other one, but I think you should put a note in there, BMAG ROLL and YAW, ATT 1/RATE 2, and PITCH BMAG to - I mean ROLL and YAW, ATT 1/RATE 2 and leave your PITCH in RATE 2. Did all that talking make sense?

06 11 43 12 CMP Okay. That sounds like a good plan. Yes, sir; I understand you.

06 11 43 17 CC Okay. And that would also be true after the other P35.

06 11 43 28 CMP Roger.

06 11 43 42 CC And just so we make sure that all procedures showing the same - I'm - I'm changing mine to show that, Ken.

06 11 43 51 CMP Okay. I have mine changed, too.

06 11 44 12 CC Okay. And I think that's it. I thought before the rendezvous, we'd - we'd give you a swinging DELTA tailoff just for your weight even though you've got a chart. Just so you wouldn't have to do any figuring out. Of course, 11 is always a good number, but, just to be professional, we'll give you a good one - and since you are making an SCS burn.

06 11 44 42 CMP Thank you. I was going to ask you for that. It's really not quite the same as if you had SCS only because you got the information there what's the right thing; but it sure helped to - be a lot cheaper about your RCS.

06 11 44 57 CC Roger. We might as well be professional about this whole show, since you're doing such a good job up there.

06 11 45 12 CMP Hey, there's one other thing I was going to ask you. Yeah. About the mapping camera. Are we going to leave it out or we going to try and retract it?

06 11 45 22 CC Stand by.

06 11 45 40 CC Ken, the SIM Bay is configured for sleep. As of right now.

06 11 45 48 CMP Oh, I'm sorry, I - I'm - I'm still thinking about rendezvous.

06 11 45 56 CC Oh, I'm sorry. Okay. Stand by.

06 11 46 15 CC Okay, Ken, we're going to retract the camera for rendezvous, extend it again, and then we'll retract it for TEI.

06 11 46 27 CMP Okay. I guess since we're a little down on the RCS that might be a prudent plan. Looks like we're holding our own, if it hadn't been for that practice in formation flying.

06 11 46 55 CC Ken, as far as the Flight Plan now - the - the new revised version, we're 15 pounds ahead of the - of the Flight Plan. And we're fat on the - on the rescue redline.

06 11 47 17 CMP Okay. That sounds a little bit like changing the specs.

06 11 47 22 CC (Laughter) Well, you got to - you got to be fast on your feet. And we're 168 above the rescue redline.

06 11 47 32 CMP Okay. I will continue to be miserly.

06 11 47 36 CC By all means, and we are minus 139 on the other Flight Plan.

06 11 47 47 CMP Roger.

06 11 47 52 CC Okay. And I guess that takes care of our - of our rendezvous procedures. And sounds like you got them all copied in good order and I feel certain that'll go real easy for you. That's a - that's a smooth procedure even though it takes a lot of talking. And I guess I might remind you about your WASTE STORAGE VENT valve at this time - if you haven't already got it.

06 11 48 20 CMP I've already turned it OFF, Stuart.

06 11 48 22 CC Okay. I thought maybe if I talked to you long enough you might - you might miss that; but I didn't catch you.

06 11 48 34 CMP Okay. Well, I think I'm gonna configure myself to sleep.

06 11 48 39 CC Okay. That's - that's all we have and we'll - Well, I guess we got maybe a couple of things there on the onboard read-outs and after that it'll be - we're through.

06 11 48 59 CMP Okay. Let me give you those little guys right now. Start with the RCS: quad A, 61 percent; quad Bravo, 59; Charlie, 66; Delta, 67; battery C is 36.5, pyro battery A is 36.7, battery B is 36.7.

06 11 49 41 CC Okay. We've got all those, and the computer is yours; you can go back to BLOCK.

06 11 49 49 CMP Okay. And, let's see, did you start the - Yes, you've got my monitor running. Thank you, sir.

06 11 49 58 CC We aim to please.

06 11 50 03 CMP You guys do that.

06 11 50 08 CC Okay, I'm going to hush and leave you with the Flight Plan and let you get some rest; and tomorrow's going to be a big day. And we'll see you around.

06 11 50 19 CMP Okay, Stu. Thanks a lot. Good night.

06 11 50 22 CC Roger.

06 11 56 23 CMP Stu, would you folks like to have E-memory dump?

06 11 56 29 CC Could you stand by 1 for us, Ken?

06 11 56 35 CMP Sure thing.

06 11 56 52 CC Okay. Ken, we're ready for the E-memory dump, and Big Brother is looking over your shoulder. We notice - -

06 11 57 03 CMP You're kidding.

06 11 57 04 CC - - you're in SCS CONTROL.

06 11 57 12 CMP Thank you, Big Brother.

06 11 59 31 CC And, Casper; Houston.

06 11 59 36 CMP Go ahead.

06 11 59 38 CC Okay, somebody's moved the specular point on us, Ken, and we'd like to verify the VHF in the RIGHT ANTENNA; and, if it is, we'd like to go to the

LEFT ANTENNA for 3 minutes. And you give me a mark and I'll give you a call.

06 11 59 56 CMP Okay, it is in the RIGHT. I'm going to move it to the LEFT. Stand by.

06 12 00 02 CMP MARK. It's in the LEFT.

06 12 00 04 CC Okay, understand LEFT.

06 12 00 12 CMP I can't imagine who'd do something like move something like that.

06 12 00 16 CC You know, it's getting where you can't trust anybody these days, not even Newton.

06 12 03 07 CC Okay, Casper, if you'd give us VHF RIGHT ANTENNA and we are going to leave it in RIGHT ANTENNA.

06 12 03 24 CMP Okay.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 13 03 XX BEGIN LUNAR REV 43

06 15 01 XX BEGIN LUNAR REV 44

06 17 00 XX BEGIN LUNAR REV 45

REST PERIOD - NO COMMUNICATIONS

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 18 38 32 CC Orion, Houston.

06 18 38 40 LMP-LM Who speaks?

06 18 38 42 CC Roger. How are you doing this morning?

06 18 38 49 LMP-LM Super. Is it time to get up?

06 18 38 52 CC Yes, sir.

06 18 39 01 LMP-LM Okay, reveille, reveille.

06 18 39 38 LMP-LM We're - we're stirring; we'll be up in a minute.

06 18 39 41 CC Roger.

06 18 39 56 CQ Okay, Orion. You're STAY for EVA-3.

06 18 40 05 CDR-LM That's mighty nice of you. And we were looking for reveille for about 7 o'clock, but we'll - we'll get going right now.

06 18 40 15 CC Roger.

06 18 40 24 LMP-LM These flight directors are slave drivers.

06 18 42 29 CC And, Orion, would you give us VOICE, NORMAL, and HI bit rate, please?

06 18 46 29 CC Orion, Houston. Let's go back to LO bit rate, please.

06 18 48 00 LMP-LM Houston, Orion. We have a crew status report for you.

06 18 48 08 CC Okay, Orion. Go ahead.

06 18 48 23 LMP-LM Okay. For John, yesterday he had day 7, meal A; and day 7 - stand by - and day 7, meal B. He ate every - On day 7 meal A, he ate everything but the beef steak. On meal B, he ate everything but the romaine soup and the butterscotch pudding. He had no medication, and he'd like for the docs to guess how much sleep he had to start with, and then we'll

give you our estimate. For me, we had day - the same two meals; I ate everything on meal A except the bacon squares and on meal B everything but the romaine soup and the butterscotch pudding. I had no medication, and I slept for 7 hours. Over.

06 18 49 34 CC Roger. And we estimate John slept 6 and a half to 7 hours.

06 18 49 44 LMP-LM Okay. He was going to say 7. That's great.

06 18 49 49 CC Roger.

06 18 49 56 MCC Okay. Why don't you tell him you've got him standing by when he's ready?

06 18 50 00 CC Okay. And, Orion, I've got block data and a note from the Surgeon and a battery-management procedure at about 164 hours any time you're ready to copy.

06 18 50 24 LMP-LM Okay. You can go with the block data.

06 18 50 27 CC Okay. The block data starts at T46, 163:54:55; TPI, 166:44:00; T47, 165:53:25, 168:42:30; T48, 167:51:55, 170:41:30; T49, 169:50:26, 172:40:00; T50, 171:48:57, 174:39:00; T51, 173:47:29, 176:38:00.

06 18 51 55 LMP-LM Give me number 50 again, please.

06 18 52 00 CC T50 was 171:48:57; the TPI was 174:39:00.

06 18 52 16 LMP-LM Okay. I'll just read you back the lift-off times, starting with 46, 163 plus 54 plus 55; 165 plus 53 plus 25; 167 plus 51 plus 55; 169 plus 56 plus 26; 171 plus 48 plus 57; and 173 plus 47 plus 29. Over.

06 18 52 40 CC Let's verify T49 as 169:50:26.

06 18 52 51 LMP-LM That's so Charlie.

06 18 53 02 CC Okay. And the battery management is at 164:45.

06 18 53 16 LMP-LM Okay, Pete. What time is it now?

06 18 53 19 CC It's 163:05.

06 18 53 55 LMP-LM Okay, Pete. On that battery management, when we get to that time, just give me a call, if you will. Over.

06 18 54 00 CC Will do. Okay, and the note from the Flight Surgeon requests that you have the crew check the BIOMED harness prior to suit-up for EVA-3. And if you have the PRD read-outs handy, we'd like them; otherwise, we'll skip them.

06 18 54 28 LMP-LM Okay. I'll give you BIOMED in just a second, and John's was on all night, so I guess his is okay. And we'll give you the PRDs like we always do when we get suited up.

06 18 54 41 CC Roger. That's fine, Charlie. And John's BIOMED data looked good all night.

06 18 54 51 LMP-LM Okay.

06 18 55 02 LMP-LM Okay. You're looking at my BIOMED now, Pete.

06 18 55 08 CC Okay. Stand by a minute. Looks good, Charlie.

06 18 55 19 LMP-LM Okay. Back to John.

06 18 55 24 CC Okay.

06 18 55 49 CC Okay. Both the BIOMEDs look real good.

06 18 57 01 CDR-LM Okay, Houston. How do you read? Over.

06 18 57 03 CC Hear you loud and clear.

06 18 57 08 CDR-LM Okay. And we're going on with the PLSS tophoff right now.

06 18 57 13 CC Say again, John. Okay. Copy PLSS tophoff.

06 18 57 19 CDR-LM Topping off the PLSSs right now.

06 18 57 21 CC Roger.

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06 18 57 56 CC And, Orion, we just want to remind you again
that we want to put the commander's OPS on the
LMP PLSS.

06 18 58 07 CDR-LM Okay. E - the EVCs is not in the OPS?

06 18 58 14 CC We didn't copy the question, John.

06 18 58 19 CDR-LM I say I thought there was something about a radio
transmitter that had to be - is the radio trans-
mitter located out on the PLSS? Is that - is that
the answer to that?

06 18 58 32 CC That's affirmative, John.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 18 58 XX BEGIN LUNAR REV 46

REST PERIOD - NO COMMUNICATIONS

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 19 04 12 CDR-LM Okay, Houston. I'm going off BIOMED for about 10 minutes. Over.

06 19 04 18 CC Okay, John.

(NO COMM FOR 41 MINUTES)

06 19 45 19 CDR-LM Okay, Houston. How does that BIOMED look to you now?

06 19 45 24 CC Okay. It looks good here, John.

06 19 45 32 CDR-LM Okay. Fine.

06 19 45 37 CC How are you doing up there?

06 19 45 43 LMP-LM Oh, just fine. We finished eating, and we're ready to don suits now.

06 19 45 52 CC Okay. Fine. Do you want a quick briefing on the traverse today?

06 19 46 00 LMP-LM Okay. One comment, Tony, that - about - we were talking about last night that we didn't pass on, that the feeling we got from all the crystalline rocks was that they had a sugary texture to them.

06 19 46 18 CC Okay. We copy that. We've got - The changes for the traverse today are - are pretty simple. We've got changes to your Cuff Checklist if you want them, or I can real-time them. I think we can real-time them if that's okay with you. But I'll outline them now. At - the only change on egress -

06 19 46 44 CDR-LM Yeah, summarize it for us, please.

06 19 46 46 CC Okay. Fine. The only change right after egress, Charlie, instead of putting on mag L, I'll ask you to put mag M on the 500 millimeter. That will give you a full mag, and that would be all you need. That will save a change up at station 11, and at the LM site there, we'd like you to shoot off some pictures of - a pan of Stone Mountain,

but I'll call you on that when you get out; otherwise, the LM area is nominal. And you go up to station 11 slash 12, which will be just one station for about an hour and 5 minutes. We're going to drop the near-field polarimetry up there, and we'll concentrate on big boulder samples, a permanently shadowed sample, and the padded bag sample on the - the special samples area. We'll still like a stereopan, a far-field polarimetry of the crater interior; we'll try to get about an 80-meter base on that, and, when you get up there, Charlie, I'll brief you on what looks like the best way to do that. And we'll return along the same route you went up, and about a - one-half to 1 kilometer off the rim when you still feel you're on the continuous ejecta blanket; we'll call that station 13. We'll do a station 13 with the TV, and we'll lengthen it to 15 to 20 minutes. I've got a - a fixed time here, but I don't see it right in front of me right now, and that instead of a rock soil will be a rake soil and - plus a couple of documented samples. And then the rest of the time will be spent back in the LM area. We'll put a - we'll make a station 10 prime which is about 50 meters west of your station 10. So it makes a triangle with the deep core, which would be south of it and the station 10 which would be northeast of it and the station 10 prime which makes that northwest corner of the triangle, and we'll ask for a rake soil at station 10 prime, a - a double core at that station, a rake soil at station 10; and then whatever time is left to 35 minutes will be documented samples. Now, the end of the EVA is pretty much nominal except, John, when you go out to the permanent parking location of the AL - or of the Rover, we'd like you to make sure you take a camera along, and we'll do an LPM measurement there after you've parked it, and we'll also ask you to try to find us a dense crystalline rock if you can find it. If you can't find a crystalline one, then at least a dense breccia, and we'll do the rock on top of the LPM measurement. And that's pretty much it. I'm going to try to keep you to the time line - the time line as much as

possible because we've really got a hard time for getting back in. I know - I know the - they won't allow us to go over at all.

- 06 19 49 31 CDR-IM Okay. Well, let me tell you this, Tony. The - believe it or not, the camera is out in the Sun right now, part of it -
- 06 19 49 41 CC Is that right? Did the Sun come down -
- 06 19 49 43 CDR-IM The descent handle - the descent handle is out in the Sun.
- 06 19 49 48 CC Okay. I guess we'll probably have to slide that back into the shade again.
- 06 19 49 57 CDR-IM Yeah.
- 06 19 50 01 CC Which - Where do you think it should go? Why don't you just pick a place? I think you're better - better positioned than the backroom. You're - I'm sure you'll have better luck at it.
- 06 19 50 15 CDR-IM Okay. Well, all it - it only needs to be moved about 3 or 4 inches.
- 06 19 50 20 CC Okay. Fine. And, on the LRV, we're going to ask you to go back to the normal configuration on the PWM. If you experience any difficulty, then, we'll go back to the PWM configuration you're in now. And the attitude indicator on that pitchup problem won't - won't cause us any serious problem. Just when you do the nav update, try to park in a level area, and the backroom is hoping that the nav problem was a temporary one; that'll be okay for your EVA-3 either way, you shouldn't really have any problem because you can probably see the area you're going to, and you're going to go right back along your tracks so we're not too worried about it if you don't have the distance. And we're projecting hot battery again on EVA-3, and we may have some changes during the EVA on that. Your - your mobility rates during EVA-2 were very near those predicted, and we have a large margin of battery power so we're in good shape there. Also, they mentioned that if you have a dust problem from that missing fender - rear fender, there

is a way of putting one of the front fenders on the back, but, golly, I don't know whether you really want to do that.

06 19 51 45 CDR-LM Yes, I don't either, Tony. We'd get the dust from the front fender, then, probably.

06 19 51 50 CC Yeah, you're probably right. There was a comment from the Apollo 15 crew that the front wheel didn't seem to bother them when they lost a fender up there, but the back wheels seemed to move. I don't understand it, but that's what they said. And that's all I've got if you want to go ahead and - get dressed.

06 19 52 15 CDR-LM Okay.

06 19 52 44 CC Incidentally, it's a bright, sunny - beautiful Sunday morning here in Houston.

06 19 53 03 CDR-LM At - like 13 minutes to 8, huh?

06 19 53 12 CC Right.

06 19 55 46 CDR-LM Orion, we'd like to go DOWN VOICE, BACKUP.

(NO COMM FOR 25 MINUTES)

06 20 16 12 LMP-LM Okay, Houston. This is Orion. Over.

06 20 16 25 CC Orion, Houston. Go ahead.

06 20 16 30 LMP-LM Okay. I'm in my suit, Tony, and we're putting John's suit on.

06 20 16 35 CC Okay.

06 20 17 19 CC Hey, Charlie. How was it climbing back into that suit again?

06 20 17 30 LMP-LM They feel good once you get them on, but they sure are filthy.

06 20 17 35 CC I bet they are.

06 20 17 36 LMP-LM They're sort of dirty.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 19 49 43 CC Casper, Houston. How do you read?
06 19 49 50 CC Casper, Houston. How do you read?
06 19 50 30 CC Good morning, Casper. This is Houston.
06 19 50 37 CMP Good morning, Tom. How do you read me?
06 19 50 39 CC Read you loud and clear. How me?
06 19 50 44 CMP Loud and clear.
06 19 50 46 CC Okay.
06 19 52 34 CC Casper, let's put the HIGH GAIN to AUTO, please.
06 19 54 28 CC Go ahead.
06 19 55 00 CC And, Casper, as soon as you can, we'd like to go
ACCEPT and get a state vector up to you.
06 19 55 09 CMP You've got ACCEPT.
06 19 55 11 CC Roger. Thank you.
06 19 55 48 CC Casper, have you zeroed the NOUN 26?
06 19 55 54 CMP Yes, sir.
06 19 55 56 CC Okay. Thank you.
06 19 56 48 CC And, Casper, I've got about four pages of Flight
Plan changes for you. A few of them take effect
in the next 5 minutes or so.
06 19 57 03 CMP Okay. I'll be ready to copy in 5 seconds.
06 19 57 08 CC Okay. Sorry to rush you, but I just got handed - -
06 19 57 09 CMP That's all right.
06 19 57 10 CC - - just got handed a fist full of paper here.
06 19 57 18 CMP I hope it's green.

06 19 57 48 CMP Go ahead and read; I'm ready to copy.

06 19 57 53 CC Ken, give us HIGH GAIN, AUTO.

06 19 58 00 CMP You've got it.

06 19 58 02 CC Okay. The - I guess the first thing I'd better get to you is at 164:13. We want to manually roll clockwise 40 degrees.

06 19 58 25 CMP Okay. Forty degrees clockwise at 13.

06 19 58 30 CC All right. That's in about 3 minutes away. Actually, there was a TEI-55 pad 5 minutes ago, but I'll get that to you later.

06 19 58 35 CMP ... P20 plus-X somewhere here, I bet you.

06 19 58 45 CC At 164:16, we want to delete everything from CMC MODE, FREE, down to GDC align at 164:21.

06 19 59 14 CC And it's your computer.

06 19 59 19 CMP Okay. I got that.

06 19 59 25 CC Okay. Did you copy the deletion and also that it's your computer?

06 19 59 31 CMP Yes, sir. Are you not copying me this morning?

06 19 59 34 CC I guess - I guess I'm copying intermittently, Ken.

06 19 59 40 CMP Okay. It sounds to me like I'm keying the - I'll try to talk a little louder.

06 19 59 46 CC Okay. I'm reading you loud and clear now.

06 19 59 48 CMP I have the manual roll 40 degrees clockwise at 13, and I have the computer, BLOCK.

06 20 00 00 CC Okay. And did you copy the - the deletion of CMC MODE, FREE, down to the GDC align that's at 164:16?

06 20 00 13 CMP No, sir. I did not. Okay. I'll delete that.

06 20 00 16 CC Okay. It might be that I'm transmitting intermittently.

06 20 00 37 CC Ken, I want to leave you alone now while you make this roll, but we had a ground station failure on some of my transmission.

06 20 00 47 CMP Okay. No sweat. I got the GAMMA-RAY GAINSTEP back on.

06 20 01 27 CMP Why don't you go ahead, Don? I'm - I can listen and do this at the same time.

06 20 01 31 CC Okay. At 164:18, we want to add P20, option 5; plus-X forward SIM bay attitude; 165:32, NOUN 79, plus 000.50; and set HIGH GAIN ANTENNA, PITCH 10, YAW 0 for AOS acquisition.

06 20 02 15 CMP Okay. At 18, I want to go to P20, option 5, to the plus-X; NOUN 79 to half degree, PITCH 10 and YAW 0 for AOS on the HIGH GAIN, and I want to be there by 165:32.

06 20 02 29 CC That's affirmative. Okay, at 164:25, we want to add a mapping camera photo pad. The T-start time - -

06 20 02 45 CMP Okay.

06 20 02 46 CC The T-start time will be 164:35:00. T-stop will be 168:05:41.

06 20 03 06 CMP Okay. Mapping camera T-start, 164:35:00; T-stop, 168:05:41.

06 20 03 14 CC That's affirmative, and at 164:35 in the Flight Plan - -

06 20 03 21 CMP Okay. Just a second let me mark that up a little bit.

06 20 03 25 CC Roger.

06 20 04 01 CMP Okay. Go ahead. Mapping camera is recorded, and you said something about 164:35.

06 20 04 10 CC Roger. At 164:35, we want to add LASER ALTIMETER, ON; IMAGE MOTION, ON; MAPPING CAMERA, ON, at T-start; and you need your MOTION, INCREASE, barber pole/ON.

06 20 04 43 CMP Okay. I'll put the IMC, ON. Just before the camera starts, I'll get the LASER ALTIMETER, ON, and after we get it going, the IMC will go to barber pole and ON.

06 20 04 52 CC That's affirmative. And at the same place in the Flight Plan, you can delete the manual roll clockwise 40 degrees all the way down through the HIGH GAIN ANTENNA, PITCH 10, YAW 0.

06 20 05 06 CMP Okay. I got you there.

06 20 05 09 CC Okay. At 164:45, we want to do a P52, option 3, and GDC align.

06 20 05 21 CMP Okay.

06 20 05 23 CC And we'll use the - the same procedure we've been using on that.

06 20 05 32 CMP Roger.

06 20 05 37 CC Okay. At 164:50, we want to delete configure camera - -

06 20 05 41 CMP Okay. Stand - Stand by a second now and let me -

06 20 05 44 CC Roger.

06 20 05 48 CMP Let - let me get this maneuver going.

06 20 05 50 CC Roger. Understand, Ken. I'll stand by.

06 20 08 00 CMP Well, that should be close enough for Government work, shouldn't it?

06 20 08 04 CC Okay. Yeah, I'll go - I'll go on with the Flight Plan here, Ken, because we are coming up on LOS, and I want to at least get you to AOS. At 164:50, they want to delete, "Configure camera for terminator photos" and delete everything down through the "Record frame number" at 165:07.

06 20 08 38 CMP Okay. I got that.

06 20 08 40 CC Okay. And at 165:02, change that mapping camera pad to a pan camera photo pad, and the numbers to go in there are T-start, 165:07:13; T-stop, 165:39:13.

06 20 09 10 CMP Okay. I deleted all the stuff from 165 down to the record frame; the mapping camera; pick up the pan camera; T-start, 165:07:13, and stop, 165:39:13.

06 20 09 26 CC . That's affirmative, and 165:00 in the Flight Plan, we want to add GAMMA-RAY, RETRACT, 4 feet. The time is 2 minutes 43 seconds.

06 20 09 47 CMP Okay: At 165, you want to RETRACT the GAMMA-RAY to 2 minutes and 43 seconds worth.

06 20 09 54 CC That's affirmative. At 165:03 add PAN CAMERA at STANDBY, STERO, POWER, and OPERATE parentheses T-start.

06 20 10 17 CMP Okay, I get PAN CAMERA to STANDBY, STEREO, and POWER, and we'll start her at 07:13.

06 20 10 27 CC That's affirmative. At 165:10 - 10 - add CSM Experiments/EVA Checklist, solar corona sunrise, page X 2-11: magazine S-S, magazine H-H, and a note to perform only the camera configuration. We'll give you the times on your next front-side pass.

06 20 11 06 CMP Okay. What do you mean by you will give me the times? The start times?

06 20 11 15 CC Affirmative; and at 165:15, IMAGE MOTION, INCREASE, barber pole plus 4 steps/ON; move that to 165:27.

06 20 11 58 CMP Okay. I copy ...

06 20 12 25 CC Okay, Ken, if you read, at 165:18, you can delete, "Prepare for orb science visuals." And we'll try to pick you up AOS for the rest of this change.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 20 32 43 LMP-LM Okay, Tony. I'm ready for the battery management.

06 20 32 49 CC Okay. Stand by 1.

06 20 33 34 CC Okay, Charlie. We'd like you to read your ED VOLTS.

06 20 33 50 LMP-LM Those beauties are hanging in there at 37.

06 20 33 53 CC Oh, that's always good news. And we'd like the
BAT 1 HI-VOLT, ON; the LUNAR BATTERY, OFF; and the
BAT 2, ON.

06 20 34 11 LMP-LM Okay. That's done.

06 20 34 13 CC Okay. That's it.

06 20 34 16 LMP-LM You've got BAT - Okay, BATs 1, 2, 3, and 4 are
ON. Lunar BAT is OFF.

06 20 34 21 CC Roger.

06 20 34 24 LMP-LM Then, our PR - Okay, our passive dosimeters [sic] are
reading 22059 for John and 21123 for me.

06 20 34 35 CC Okay, we copy.

06 20 37 39 CC Okay. And you fellows are doing pretty good.
You're about 10 minutes ahead.

06 20 37 49 LMP-LM Okay. Thank you. Tony, this jett bag must weigh
100 pounds.

06 20 37 56 CC (Laughter). Well, you'll just take off faster
without it.

06 20 38 16 CC Besides, you're gonna replace all that with rocks.

06 20 38 46 CC Incidentally, you have about 123 pounds of rocks,
which means you can get about another 100 pounds.

06 20 39 00 CDR-LM We do, huh?

(NO COMM FOR 21 MINUTES)

06 21 00 24 LMP-LM Houston, how do you read? Over.

06 21 00 27 CC 5 by, Charlie.

06 21 00 31 LMP-LM Okay. We're ready for the comm check. Over.

06 21 00 36 CC Okay. Go ahead.

06 21 02 13 CDR-LM ... VHF A to T/R; B to RECEIVE. Okay. PLSS comm. Test 1, 2, 3.

06 21 02 58 CDR-LM Okay.

06 21 03 25 CDR-LM In and lock, Charlie. Charlie, let's get that off ...

06 21 03 31 LMP-LM Thank you.

06 21 03 48 CDR-LM Okay.

06 21 04 07 CDR-LM Okay. A, wheel - CCW.

06 21 04 12 LMP-LM Okay.

06 21 04 13 CDR-LM Tone, on. Vent flag, P. Press flag, C. O₂, momentary.

06 21 04 18 LMP-LM Got it.

06 21 04 19 CDR-LM Okay. PLSS O₂ press gage greater than 85.

06 21 04 23 LMP-LM It is.

06 21 04 24 CDR-LM Check comm with me and Houston.

06 21 04 25 LMP-LM Houston, how do you read? Over.

06 21 04 28 CC Okay. You're 5 by. You've got that hash in the background.

06 21 04 34 LMP-LM I thought ...

06 21 04 35 CDR-LM Okay. Panel 11, AUDIO circuit breakers to - to open.

06 21 05 41 LMP-LM VHF A, OFF and B, OFF. Okay, verify MAINTAIN. Okay, go to B. You should have a tone, a vent flag, a press flag, O₂ momentary. And an ear full of orange juice.

06 21 06 07 CDR-LM And an ear full of orange juice. Yeah.

06 21 06 12 LMP-LM It's always the case. Okay, see if - Okay, Houston. How do you read? Over.

06 21 06 20 CC Okay. 5 by, Charlie.

06 21 06 26 LMP-LM Okay, John. You go to B, and I go to A.

06 21 06 29 CDR-LM Okay.

06 21 06 33 LMP-LM I mean, I go to B and -

06 21 06 36 CDR-LM Okay. I'm in A.

06 21 06 37 LMP-LM Okay.

06 21 06 40 CDR-LM Okay, Houston. How do you read us? Over.

06 21 06 42 CC Okay. Still 5 by.

06 21 06 47 CDR-LM Okay. Fine. Okay, Charlie. AR.

06 21 06 51 LMP-LM Okay. I'm in AR.

06 21 06 56 CDR-LM Okay. Getting a tone. Wheel to Houston, blade to EVA. Houston, how's the comm and the TM look?

06 21 07 06 CC Okay. We've got good TM.

06 21 07 13 CDR-LM Okay. Looks like I got a little better than 90 percent on the O₂.

06 21 07 17 LMP-LM And I got 94 percent.

06 21 07 20 CC Okay. We copy.

06 21 07 21 LMP-LM Okay. Final systems prep. Gonna give us a shot of cold water.

06 21 07 27 CDR-LM All righty.

06 21 07 28 LMP-LM Instant cold ... SUIT FAN DELTA-P is open.

06 21 07 36 CDR-LM Okay.

06 21 07 37 LMP-LM SUIT FAN 2 is open.

06 21 07 39 CDR-LM Wait a minute. Circuit breaker (16) ECS: CABIN REPRESS to close.

06 21 07 42 LMP-LM It is.

06 21 07 43 CDR-LM SUIT FAN DELTA-P, open; SUIT FAN 2, open.

06 21 07 44 LMP-LM It is.

06 21 07 45 CDR-LM ECS caution and WATER SEP component lights are on, about a minute.

06 21 07 48 LMP-LM They will be. But we don't have the lights turned up; you won't be able to see them.

06 21 07 52 CDR-LM SUIT DIVERTER, PULL to EGRESS, verify.

06 21 07 54 LMP-LM Okay. That's got to be done right now. Go ahead.

06 21 07 59 CDR-LM CABIN GAS RETURN to EGRESS, verify.

06 21 08 01 LMP-LM Okay. Go ahead.

06 21 08 03 CDR-LM SUIT CIRCUIT RELIEF to AUTC, verify.

06 21 08 04 LMP-LM Go ahead.

06 21 08 05 CDR-LM Okay. OPS connect. SUIT ISOLATE, ACTIVATOR [sic] OVERRIDE (SUIT DISCONNECT).

06 21 08 13 LMP-LM They are.

06 21 08 15 CDR-LM Disconnect O₂ hoses; they're already gone. And connect OPS O₂ hose. Okay. The OPS O₂ hose is on and locked.

06 21 08 42 LMP-LM Okay.

06 21 08 44 CDR-LM Need a purge valve. Okay. The purge valve is in LO, and the pin is installed. And it's in and locked. Okay.

06 21 09 15 LMP-LM ... do the same to you.

06 21 09 18 CDR-LM Get the purge valve for you.

06 21 09 19 LMP-LM Okay. You better get all that string back in that purse, John, so you won't drag it out with you. There you go. Now. No. Yeah. ... Okay, you're in LO, locked, now put the pin up. Now you got it straight. Okay?

06 21 09 42 CDR-LM Okay.

06 21 10 03 LMP-LM Okay, you're in and locked. Okay, got it. Connect OPS hose.

06 21 10 13 CDR-LM I can't.

06 21 10 17 LMP-LM Stand up?

06 21 10 20 CDR-LM I'm standing up, Charlie. I'm short. Thought you were leaning toward the ... Okay, that's in and locked.

06 21 10 41 LMP-LM Okay. I'm drinking, and - water open. Okay. Want a drink of water?

06 21 10 47 CDR-LM Yeah.

06 21 10 49 LMP-LM Okay. Here you go.

06 21 10 59 CC And, Charlie, would you verify you put the polarizer on your camera?

06 21 11 06 LMP-LM I will absolutely verify that.

06 21 11 09 CC Okay. Good show.

06 21 11 16 CDR-LM Must be nervous down there.

06 21 11 17 LMP-LM Yeah (chuckle).

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06 21 11 18 CDR-LM You guys nervous?

06 21 11 29 LMP-LM Okay. Drink's complete. H-DESCENT pot wat is off.
And we install the gun in the old bracket.
Look at the dust. Okay. Position mikes.

06 21 11 45 CDR-LM That's done.

06 21 11 46 LMP-LM In position. PLSS FAN, ON.

06 21 11 49 CDR-LM ... wipe some of this dirt off my hands, here.

06 21 11 52 LMP-LM Okay.

06 21 11 57 CDR-LM Got my little gloves on, so that'll help.

06 21 12 03 LMP-LM Okay. Did you get your PLSS FAN ON, John?

06 21 12 05 CDR-LM PLSS fan is ON.

06 21 12 07 LMP-LM Okay. Don helmets with LEVAs, check drink bag
position, lower LEVA protective visor, secure the
tool harness. Okay. We'll put yours on first.
Protective visor coming down ...

06 21 12 23 CDR-LM That ...

06 21 12 25 LMP-LM Yeah, I know. Back up. Get it out of the neck
ring. Put your old ... round there. Okay. Okay,
it's lining up.

06 21 12 55 LMP-LM Oh, ... in.

06 21 13 00 CDR-LM Where is it?

06 21 13 01 LMP-LM I don't know.

06 21 13 05 LMP-LM Okay. Let's start over again, ... okay. Let's
attach the Velcro back there. Okay. (Laughter).

06 21 13 20 LMP-LM Uh-Oh. Uh-oh ...

06 21 13 40 LMP-LM Okay. There you go.

06 21 13 51 LMP-LM Get the click?

06 21 13 52 CDR-LM No. Click.

06 21 13 57 LMP-LM Looks in to me, now.

06 21 13 59 CDR-LM It's in.

06 21 14 00 LMP-LM It's on.

06 21 14 01 CDR-LM Yeah.

06 21 14 02 LMP-LM It is on?

06 21 14 03 CDR-LM Yeah.

06 21 14 04 LMP-LM It's on? It's on ... (Chuckle) ... Okay. Turn around and let me get the Velcros down in the back, John.

06 21 14 17 CDR-LM Okay. ...

06 21 14 23 LMP-LM Okay. Okay. Man, you're not gonna get ...

06 21 14 29 CDR-LM All right. Here, I've got to get your tool harness.

06 21 14 36 LMP-LM That thing okay, John?

06 21 14 38 CDR-LM What thing?

06 21 14 39 LMP-LM Tool harness.

06 21 14 40 CDR-LM Yeah, it's fine. Well, it slipped off the bottom, but we'll fix it when we get outside, okay?

06 21 14 51 LMP-LM Okay.

06 21 14 53 CDR-LM Now, let me check the Velcro. Wait a minute. Let me get ... Okay. Okay up in there.

06 21 15 05 LMP-LM I can do it better from this side, John.

06 21 15 07 CDR-LM Sure.

06 21 15 10 LMP-LM Boy.

06 21 15 20 CDR-LM Yeah. Knocked my mode switch up. ... And it's all lined up.

06 21 15 37 LMP-LM It felt like it clicked. It felt like it locked to me.

06 21 15 50 CDR-LM No, it's not locked.

06 21 16 00 LMP-LM You want me to stand up, or you stand up?

06 21 16 02 CDR-LM Well, you stand up, Charlie. I can't see under your chin.

06 21 16 04 LMP-LM Okay.

06 21 16 22 CDR-LM The top of your head is keeping it from going down, Charlie.

06 21 16 26 LMP-LM ... it's not even touching the top of my head. Check the back, and make sure the O₂ hoses are out of the way.

06 21 16 31 CDR-LM ... use the ...

06 21 16 36 LMP-LM I tell you, this thing - if you Velcroed this -

06 21 16 41 CDR-LM Yeah, if you Velcroed it up, Charlie.

06 21 16 43 LMP-LM Okay, now. There we go.

06 21 16 59 CDR-LM Got it, Charlie.

06 21 17 01 LMP-LM Got to watch it lock from here.

06 21 17 03 CDR-LM Let's try it this way. It didn't lock up though.

06 21 17 10 LMP-LM Hardest part of - prep

06 21 17 14 CDR-LM One of the hardest parts, Charlie.

06 21 17 16 LMP-LM ... for this glove donning; I can't do that even.

06 21 17 24 CDR-LM Okay, you're in.

06 21 17 27 LMP-LM ...?

06 21 17 38 CDR-LM Okay.

06 21 17 42 LMP-LM Hey, John, think I'm going to be ... in a minute. Terrible. Turn around, John.

06 21 17 55 LMP-LM ... Can you reach those tissues over there, John?

06 21 17 59 CDR-LM I don't think you're going to get it by ..., Charlie.

06 21 18 11 CDR-LM Okay. It's hooked.

06 21 18 13 LMP-LM Get my LEVA strap?

06 21 18 16 CDR-LM Okay.

06 21 18 26 CDR-LM Okay. Can you come this way?

06 21 18 28 LMP-LM Okay.

06 21 18 32 CDR-LM LEVA straps are in.

06 21 18 34 LMP-LM Okay.

06 21 18 35 CDR-LM And the bottom is secured.

06 21 18 36 LMP-LM Okay.

06 21 18 37 CDR-LM LCG ... - -

06 21 18 38 LMP-LM COLD. Yeah. ECS LCG PUMP is open. And let me disconnect the ... - -

06 21 18 41 CDR-LM ... water. We've got about 20 minutes here. ...

06 21 18 54 CDR-LM Now, my visor got ...

06 21 19 10 LMP-LM Okay. That's enough, don't you think?

06 21 19 14 CDR-LM Yeah.

06 21 19 21 CDR-LM Okay, LCG PUMP -

06 21 19 24 LMP-LM Open.

06 21 19 25 CDR-LM Disconnect the LM O₂ hose.

06 21 19 31 LMP-LM Gonna do mine?

06 21 19 33 CDR-LM Yep.

06 21 19 43 CDR-LM They are locked.

06 21 19 45 LMP-LM Okay.

06 21 19 46 CDR-LM And the ... go.

06 21 19 48 LMP-LM Okay. You already unplugged yours, huh?

06 21 20 00 LMP-LM Okay, and you are locked, and you're covered.

06 21 20 03 CDR-LM Okay, I'm going to get these off the floor before ...

06 21 20 09 LMP-LM Turn around. That's okay. ... let me get that - oh.

06 21 20 30 LMP-LM Okay?

06 21 20 35 CDR-LM Okay, verify the following: Helmet and visor aligned and adjusted; O₂ connectors, three, locked; purge valve, locked; water connectors, one, locked; comm connector, one, locked; PGA diverter valve to vertical.

06 21 20 56 LMP-LM That's - that's good.

06 21 20 57 CDR-LM My ...

06 21 20 59 LMP-LM Okay. Mine is, too. Verify EVA circuit breaker configuration.

06 21 21 05 CDR-LM Okay. All my white dots show. Decals?

06 21 21 09 LMP-LM White dots are out here plus the good old S-band.

06 21 21 19 LMP-LM Don the gloves.

06 21 22 03 CDR-LM Wait a minute, Charlie.

06 21 22 05 LMP-LM What?

06 21 22 06 CDR-LM ... your glove ...

06 21 22 21 LMP-LM Oh, man, it's gonna get stiff. Let me do one of them. Okay, I got this one out. ... set - there we go. Okay?

06 21 22 31 CDR-LM Okay. There you go. That dust gets in ...

06 21 23 13 LMP-LM Winding up the old watch.

06 21 23 42 LMP-LM Let me do it, John, and then you can get my right one, too.

06 21 23 57 CDR-LM Got it, Charlie.

06 21 24 00 LMP-LM Okay.

06 21 24 30 CDR-LM That sounds right.

06 21 24 32 LMP-LM Got it?

06 21 24 33 CDR-LM Feels right.

06 21 24 34 LMP-LM Whoops. The other way. There we go -

06 21 24 36 CDR/
LMP-LM Locked.

06 21 24 46 CDR-LM Not as much trouble as I thought we were going to have ...

06 21 24 52 LMP-LM Okay, you got - Don EV gloves, wrist locks, glove straps are tight, PLSS DIVERTER, MIN, PUMP, ON.

06 21 25 06 CDR-LM Okay.

06 21 25 07 LMP-LM And I confirm that my DIVERTER's in MIN.

06 21 25 10 CDR-LM ... off?

06 21 25 11 LMP-LM My PUMP is coming ON.

06 21 25 14 CDR-LM ...?

06 21 25 15 LMP-LM Okay.

06 21 25 16 CDR-LM Yeah, I go to egress on the PRESS REG, and would you read me the - the pressure integrity check.

06 21 25 22 LMP-LM Okay. You want EGRESS.

06 21 25 25 CDR-LM Okay. PRESS REG A and B to EGRESS.

06 21 25 27 LMP-LM PLSS O₂, ON.

06 21 25 28 CDR-LM Okay. ...

06 21 25 40 CDR-LM Turned it off.

06 21 25 42 LMP-LM Want me to get it, John?

06 21 25 43 CDR-LM I got it, Charlie. My ... is coming up.

06 21 25 45 LMP-LM Okay. I got a flag. O₂'s the first flag. And I am actually pressurizing.

06 21 25 58 CDR-LM Okay. Press flag clears at 3.1 to 3.4; cuff gage at 3.7 to 4.0; O₂ flags are clear.

06 21 26 06 LMP-LM Okay.

06 21 26 32 CDR-LM Okay. I'm off the peg.

06 21 26 47 LMP-LM Okay. ... Press flag is clear at number 3 - about 3.8.

06 21 26 59 CDR-LM Okay, my press flag is clear and she's holding at 3.85. Okay, let's turn the OPS system to O₂, OFF.

06 21 27 07 LMP-LM Okay. For 1 minute.

06 21 27 17 LMP-LM Okay, there goes -

06 21 27 18 LMP-LM MARK.

06 21 27 19 CDR-LM Mark it, Houston, we've ... integrity.

06 21 27 21 LMP-LM Can you check my antenna?

06 21 27 22 CDR-LM Okay. Yours is off, Charlie.

06 21 27 29 LMP-LM Okay.

06 21 27 37 CDR-LM Did you get that mark, Houston, on the integrity check?

06 21 27 40 CC Yes sir. Sure did.

06 21 28 31 CC Okay, that's about a minute.

06 21 28 37 CDR-LM Okay. I'm down to 3.65. From 3.85 to 3.65.

06 21 28 41 LMP-LM I went from 3.8 to 3.6, Tony. I'll get your ... over there.

06 21 28 48 CC Okay.

06 21 28 50 CDR-LM Okay. Yours is on.

06 21 28 56 LMP-LM ...? Okay, read on.

06 21 29 03 CDR-LM Okay, turn the page to -

06 21 29 06 LMP-LM Okay.

06 21 29 27 CC And, ... we're GO for depress.

06 21 29 30 LMP-LM Okay. Okay. Okay circuit breaker CB (16) ECS CABIN REPRESS to OPEN.

06 21 29 43 CDR-LM Okay.

06 21 29 47 LMP-LM MESA HEATER circuit breaker, OPEN. John, I can't get that.

06 21 29 54 CDR-LM Okay.

06 21 29 55 LMP-LM Okay, REPRESS is OPEN.

06 21 29 57 CDR-LM Okay CABIN REPRESS valve to CLOSE.

06 21 29 59 LMP-LM Going closed.

06 21 30 01 CDR-LM Overhead or forward are OPEN, then AUTO at 3-1/2 ... get, Charlie?

06 21 30 10 LMP-LM Got it.

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06 21 30 21 LMP-LM Okay, going OPEN.

06 21 30 28 CDR-LM Okay 3-1/2 -

06 21 30 29 CDR-LM MARK.

06 21 30 30 LMP-LM Okay, CLOSE.

06 21 30 45 CDR-LM Okay. It says - cabin at 3-1/2.

06 21 30 53 LMP-LM That's true.

06 21 30 54 CDR-LM Suit circuit is locked up at 4.6 - 4.3; PGA 4.6
and decaying.

06 21 31 04 LMP-LM It is; mine is.

06 21 31 05 CDR-LM Okay. We'll be starting here at 4.6 ...

06 21 31 09 LMP-LM ...

06 21 31 10 CDR-LM It says a -

06 21 31 11 LMP-LM Go ahead.

06 21 31 12 CDR-LM And it says -

06 21 31 14 LMP-LM It ought to be open up the valve.

06 21 31 16 CDR-LM Yeah. Okay. Starting the wrist watch and open
the valve.

06 21 31 20 LMP-LM Okay, coming open. Okay, we're in OPEN.

06 21 31 33 CDR-LM Holding fairly ...?

06 21 31 35 LMP-LM Yeah.

06 21 31 49 CDR-LM Okay. There's the ...

06 21 31 51 CC You fellows are doing really great. You're about
a half hour ahead.

06 21 32 06 LMP-LM Thank you. Sort of get this thing memorized
after - on the third time, Tony.

06 21 32 14 CC Yes, you're really getting it down.

06 21 32 16 CDR-LM - - ... we got it open.

06 21 32 21 LMP-LM After doing this 10 or 20 times up here, you
probably would be pretty good at it.

06 21 32 31 CDR-LM ... put you away. Okay, I got a water flag. ...

06 21 32 49 LMP-LM Okay, I'm ... mine.

06 21 32 52 CDR-LM A water flag, huh?

06 21 32 55 LMP-LM Okay. We're coming up on 2 minutes.

06 21 32 57 CDR-LM ... below the ...?

06 21 33 04 LMP-LM Negative. I'll tell you in a minute, John.

06 21 33 12 LMP-LM Okay, 2 minutes. We're down at zero on the gage.
Want me to try it, John?

06 21 33 20 CDR-LM Yeah.

06 21 33 23 LMP-LM Get my arm up out of here while I ... Hey, you
got it?

06 21 33 42 LMP-LM Okay, I know ... Okay, partially open forward
hatch.

06 21 33 51 CDR-LM It's open.

06 21 33 52 LMP-LM Okay, we can turn on the water.

06 21 33 56 CDR-LM Okay. My - are you going to get mine?

06 21 34 08 MCC ...

06 21 34 11 CDR-LM Get yours, Charlie?

06 21 34 12 LMP-LM Got it.

06 21 34 25 LMP-LM Tony, somebody's got an open mike down there.

06 21 34 28 CC Okay.

06 21 34 40 LMP-LM Okay.

06 21 34 42 CDR-LM Charlie, it's going to be hot out there today. I recommend you put your visor down.

06 21 34 46 MCC ...

06 21 34 47 CDR-LM ... I always have had mine down.

06 21 34 50 LMP-LM I agree with you. Can't believe that shadow. ... What kind of ... Sun angle we got now, Tony?

06 21 35 16 CDR-LM See if my water flag has cleared yet.

06 21 35 18 LMP-LM ...

06 21 35 34 CDR-LM Yeah, I think mine's clear.

06 21 35 40 LMP-LM Tony, how do the feedwater pressures look?

06 21 35 47 CC Stand by 1.

06 21 35 52 LMP-LM Okay. Mine's clear, John.

06 21 35 53 CDR-LM Good.

06 21 35 54 CC Okay. As soon as your flags are clear, you're GO for egress.

06 21 36 02 CDR-LM Roger.

06 21 36 03 LMP-LM Okay. Flags are both clear.

06 21 36 05 CC Okay. Outstanding.

06 21 36 07 LMP-LM I think your ...

06 21 36 28 CDR-LM That's ... as ETB, Charlie - can't turn around.

06 21 36 50 LMP-LM Okay. Your PLSS is on the instrument panel - there you go. Okay. You're lined up great today, John. Okay. Come to my - to my side a little bit. Get down a little bit, if you can. Don't hang up your PLSS tool harness.

06 21 37 14 LMP-LM There you go. Okay. John is on the porch, Tony.

06 21 37 16 CC Okay.

06 21 37 19 CDR-LM Almost.

06 21 37 25 LMP-LM Okay.

06 21 37 26 CDR-LM Charlie, hand me the jett bag.

06 21 37 31 LMP-LM That thing's so heavy.

06 21 37 39 CC Charlie, I'm surprised you admit something's heavy in 1/6g.

06 21 37 47 LMP-LM Well, I can pick John and his suit up, and that big jett bag, I can barely pick up.

06 21 37 59 CDR-EVA Golly.

06 21 38 01 LMP-LM Heavy, isn't it?

06 21 38 16 LMP-LM That was the MESA it hit when it went down.

06 21 38 18 CDR-LM That's okay.

06 21 38 19 LMP-LM Here's the ETB, you hear? I don't want to throw it. The cameras are in there.

06 21 38 24 CDR-LM Not hardly.

06 21 38 26 LMP-LM Yeah. Okay. I'll start - RECORDER is OFF; ... to do that; VOX SENSITIVITY to max; and I'm coming down the steps; CB configuration. Make sure your visor's down, John.

06 21 38 44 CDR-EVA Thank you, Charlie.

06 21 38 53 LMP-LM UTILITY LIGHTS are OFF, and I hope the floods are off. Okay, I'm on you ...

06 21 39 22 LMP-EVA Okay, Tony. I'm coming out.

06 21 39 25 CC Okay.

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06 21 39 38 CC Out again on that sunny Descartes Plains.

06 21 39 45 CDR-EVA Ain't any plains around here, Tony. I told you that yesterday.

06 21 39 50 LMP-EVA Okay. The hatch is closed - -

06 21 39 51 CC Okay. The lumpy Descartes Plains.

06 21 39 52 LMP-EVA - - but not locked.

06 21 39 54 CC The lumpy Descartes Plain.

06 21 39 55 CDR-EVA There you go. Understand. ...

06 21 40 05 MCC ...

06 21 40 11 CDR-EVA Hey, Charlie, I'm putting the ETB on the floorboard, and I'm going back and get the ...

06 21 40 15 LMP-EVA Okay.

06 21 40 19 CDR-EVA Here. I'll reset, before I do.

06 21 40 37 CDR-EVA There we go. ...

06 21 40 48 LMP-EVA Okay, let me put your antenna up, John, if you get the chance.

06 21 40 51 CDR-EVA Okay.

06 21 41 04 CDR-EVA They won't tell us apart today. We both have red stripes. Have to mush today, Charlie.

06 21 41 12 LMP-EVA How about that? Won't go down. Okay, it's down.

06 21 41 22 CDR-EVA Let me get yours.

06 21 41 23 LMP-EVA Okay.

06 21 41 27 CDR-EVA Better -

06 21 41 28 LMP-EVA Hmm?

06 21 41 29 CDR-EVA Better come over here and lean against the ladder, so old Flimbo [?] can do it.

06 21 41 50 CDR-EVA Okay?

06 21 41 51 LMP-EVA Okay. Whoops. Okay. I'm going to turn on the TV for them. Okay, Tony. Give me the LRV power up so I can get the TV going for you. All circuit breakers in?

06 21 42 10 CC Roger, all circuit breakers in.

06 21 42 13 CDR-EVA Okay, Tony, read that on the UV. Houston, the forward 2-1/2 to 3 inches of the cassette hand - all the handle is in the sunlight. But the - the battery temp on the UV is still black at a - at 100.

06 21 42 34 LMP-EVA ... Don't move it.

06 21 42 36 CC Okay. Understand. We'd like you to slide it just out of the Sun so that you think - or you feel pretty confident it'll stay in for the EVA. And I have a new setting for you. Just try to hold the alignment you have now, and we won't realign it.

06 21 42 57 LMP-EVA Okay, Tony. I got the batteries in. You've got a signal strength of 4. You're on - -

06 21 43 02 CDR-EVA Okay. Give me the new numbers.

06 21 43 03 LMP-EVA - - number 3.

06 21 43 04 CC Okay, 240 - -

06 21 43 06 LMP-EVA What? I don't have - -

06 21 43 07 CDR-EVA - - ... setting.

06 21 43 08 CC - - is azimuth and 33 is elevation.

06 21 43 12 CDR-EVA Okay.

06 21 43 23 CC And we'd like you to look at the bat temperature on the UV camera.

06 21 43 25 LMP-EVA You guys have a picture? What'd he say, John?

06 21 43 29 CDR-EVA What'd you say the elevation was?

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06 21 43 30 CC Okay. We won't get a picture for 5 minutes, but the comm is sure a lot better, Charlie.

06 21 43 38 LMP-EVA Okay, both - all the battery covers were open, Tony.

06 21 43 45 CC Okay. Understand.

06 21 43 47 CDR-EVA Okay. It's well out of the Sun now, Houston. And it's not looking at anything. It's about a foot past the ladder.

06 21 43 56 CC Okay.

06 21 44 00 CDR-EVA That's 2 -

06 21 44 02 CC 240 -

06 21 44 03 CDR-EVA - - 40 - -

06 21 44 04 CC - - and elevation 33.

06 21 44 05 CDR-EVA - - and 33.

06 21 44 14 CC And, Charlie, they've got a good picture at Honeysuckle. We don't have it here yet.

06 21 44 21 LMP-EVA Okay.

06 21 44 29 CDR-EVA Okay, she's working, Houston.

06 21 44 31 CC Okay.

06 21 44 33 CDR-EVA Here she goes.

06 21 44 38 LMP-EVA And, Tony, our cameras are loaded as per checklist.

06 21 44 43 CC Okay, the changes on that - -

06 21 44 44 LMP-EVA Tell me again what mags you want on the 500?

06 21 44 47 CC - - 500 millimeter is magazine Mike.

06 21 44 54 LMP-EVA Okay.

06 21 44 58 CC And while you have it in your hand, we'd like a pan of Stone Mountain with it.

06 21 45 05 LMP-EVA Okay. I don't have it yet.

06 21 45 08 CC Okay.

06 21 45 10 LMP-EVA That's all a - Okay.

06 21 45 16 CC And, Charlie, we'd like the LCRU on INTERNAL.

06 21 45 25 LMP-EVA Okay. John can get that, he's right there.

06 21 45 26 CC Okay.

06 21 45 27 CDR-EVA The LCRU is going to INTERNAL.

06 21 45 29 CC Good show.

06 21 45 36 CDR-EVA Wait a minute. Is that INTERNAL, Houston? Yes.

06 21 45 52 LMP-EVA Okay, Tony. It says magazine R to the right seat. I'm going to put - use magazine - I think it's S.

06 21 46 00 CC Okay. That's fine.

06 21 46 04 LMP-EVA On the DAC. We used up R yesterday.

06 21 46 09 CC Roger.

06 21 46 50 LMP-EVA Okay. Magazine Mike.

06 21 46 53 CDR-EVA Okay. The battery covers are closed tight.

06 21 46 56 CC Okay.

06 21 46 57 CDR-EVA LCRU covers are open 100 percent. We'll dust it because - the old - Closing the battery covers got dust on the LCRU, I suspect.

06 21 47 40 CDR-EVA Okay, Charlie. You're taking the ETB to the table. I'll get the big-rock bag.

06 21 47 44 LMP-EVA Okay.

06 21 47 45 CDR-EVA Where does that go?

06 21 47 46 LMP-EVA It goes - let's see. Just says unstow it - and put it - I guess you can hang it anywhere.

06 21 48 00 CDR-EVA ...

06 21 48 14 CC Okay. The big-rock bag should go in the hand tool carrier.

06 21 48 17 LMP-EVA Okay.

06 21 48 27 CDR-EVA You want it on the hand tool carrier?

06 21 48 31 CC That's right.

06 21 48 32 LMP-EVA I thought they said they didn't want the big rocks bouncing, but they might as well, huh?

06 21 48 36 CDR-EVA Okay. It's going on the hand tool carrier.

06 21 49 41 CDR-EVA And the big-rock bag's on the hand tool carrier.

06 21 49 44 CC Okay.

06 21 49 52 CC And, John, verify that you got the new battery for the LCRU.

06 21 50 01 CDR-EVA Nope, sure didn't.

06 21 50 38 LMP-EVA Okay, Tony. Your 500 is complete. I'm up to frame count 65.

06 21 50 44 CC Okay. On Mike, 65.

06 21 50 50 LMP-EVA That's affirmative. And I got a horizontal pan, east to west, three levels of it.

06 21 50 58 CC Good show.

06 21 50 59 LMP-EVA Top to bottom of the mounteen [sic].

06 21 51 02 CC That should make them all happy. How about those lineations. Do you see them still today?

06 21 51 08 LMP-EVA These lineations, you can see - yeah - they - yeah, they're still there. They seem wider apart today than they did yesterday, though.

06 21 51 23 CC Okay.

06 21 51 28 CDR-EVA Okay, unstow, tidy MESA, big rock bag to HTC. Okay.

06 21 51 39 CC And we got a picture.

06 21 51 44 CDR-EVA Super.

06 21 52 52 LMP-EVA Four at 250. That's where it is. Frame a second. Set. It's going on a boulder. But that's one that - oh - North Ray - ... here.

06 21 53 29 CDR-EVA The ICRU battery is sort of hanging up, Houston.

06 21 53 37 CC Okay. You want to -

06 21 53 38 CDR-EVA Give me the hammer, Charlie.

06 21 53 40 LMP-EVA Under the seat here. Just a minute, John. ...

06 21 53 53 LMP-EVA You going to hammer it out?

06 21 53 55 CDR-EVA No, it - it's - you wouldn't believe, but -

06 21 53 58 LMP-EVA It's not in here, it's in that - oh yeah, here it is. Wait a minute.

06 21 54 07 CC Okay. It should come straight out of the MESA. All you can do is jiggle and pull.

06 21 54 10 LMP-EVA ... can.

06 21 54 15 CDR-EVA Yes, I know that.

06 21 54 44 CDR-EVA It's been - that has always - that battery's always did that, and you rat - here let -

06 21 54 54 LMP-EVA Let me. Let me hit it.

06 21 54 55 CDR-EVA Charlie, Charlie, let me do this.

06 21 54 58 LMP-EVA Okay. Go ahead. I'll take a picture.

06 21 55 12 CDR-EVA Okay. I got it out, without doing anything.

06 21 55 16 CC Okay. Good show.

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06 21 55 21 CDR-EVA Great, John [sic]. It's going under the left seat.

06 21 55 34 LMP-EVA Here are ... little Descartes.

06 21 55 46 LMP-EVA Let's see, that's about plus C - couple of feet or so and ... down.

06 21 55 59 CC And, fellows, we're going to do a handoff in a few minutes. We may use - lose comm for a second.

06 21 56 08 CDR-EVA Okay. Okay, Charlie. You got the ETB loaded, right?

06 21 56 12 LMP-EVA Yes, sir.

06 21 56 13 CDR-EVA The big rock bag is on the - is on the hand tool carrier. And -

06 21 56 30 CDR-EVA Ah, the old U.S. flag. Looks colorful. Bus ABC in close.

06 21 56 53 CDR-EVA You already got those, huh, Charlie?

06 21 56 54 LMP-EVA Yeah, I had to turn on the TV for them - and on external, so - Okay, Tony, pan's complete.

06 21 57 02 CC Okay.

06 21 57 13 CDR-EVA Where are you, Charlie? I'll load you up.

06 21 57 16 LMP-EVA Okay.

06 21 57 19 LMP-EVA Gotta get you some bags, John

06 21 57 23 CDR-EVA Okay. Well, this one here goes on me. It's bag 4.

06 21 57 25 LMP-EVA Okay.

06 21 57 27 CDR-EVA And - we could put this one on me - it's bag - That's the one with SESC in it.

06 21 57 40 LMP-EVA Hey, let me put that one - is that the SESC? Yeah. You want me to put this one on you?

06 21 57 45 CDR-EVA Yeah.

06 21 57 46 LMP-EVA Yeah. Okay.

06 21 57 48 CDR-EVA ...

06 21 57 49 LMP-EVA Yeah. Okay. Pull the strap down.

06 21 58 02 LMP-EVA The thing slid out from under you, John. Yes.

06 21 58 09 CDR-EVA Straighten up or bend over?

06 21 58 10 LMP-EVA No, you're just fine right there.

06 21 58 56 LMP-EVA Okay, John. That's got it. Let me cinch up on your harness just a little bit there.

06 21 59 01 CDR-EVA Okay. How do you want me to get for that?

06 21 59 02 LMP-EVA That's fine. Just right there. ... you up off the ground, huh?

06 21 59 06 CDR-EVA (Laughter) Yeah.

06 21 59 07 LMP-EVA Okay, you're done. Let's see I'd better get up-Sun. I'm a little bit down-Sun from you.

06 21 59 33 LMP-EVA Oh, we left MESA heater open again. I never did get that.

06 21 59 38 CDR-EVA ... it won't hurt.

06 21 59 43 LMP-EVA Tony?

06 21 59 44 CC Go ahead, Charlie.

06 21 59 48 CDR-EVA If it's set right. It has - it hasn't been running for the past 3 days.

06 21 59 52 LMP-EVA I - I never did get that MESA heater breaker open. Remind me of that when we get back.

06 21 59 56 CC Okay.

06 21 59 57 LMP-EVA After the EVA.

06 21 59 58 CC Fine.

06 22 00 11 CDR-EVA Okay, Charlie. Let me close your top there. Okay?

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06 22 00 15 LMP-EVA Okay, babe.

06 22 00 17 CC And that's no problem, Charlie.

06 22 00 19 CDR-EVA ... to me like that about gets it.

06 22 00 22 LMP-EVA Okay. Fine, Tony. I think it was.

06 22 00 28 LMP-EVA Okay. All set?

06 22 00 29 CDR-EVA Yeah.

06 22 00 30 LMP-EVA Okay. You gonna -

06 22 00 34 CDR-EVA Gotta reset the UV.

06 22 00 35 LMP-EVA Okay. Okay, Tony. Looks like we're about
10 minutes ahead and we're ready to move out.

06 22 00 41 CC Okay. Good show. You fellows are really getting
smooth.

06 22 00 44 CDR-EVA Okay. You want the battery temp? Did I give
you that battery - Did I give that battery temper-
ature, Houston?

06 22 00 50 CC I didn't hear it. If you want to read it off, yeah.

06 22 00 51 LMP-EVA Do you want me to set the UV, or what?

06 22 01 16 LMP-EVA Okay, Tony. I'm going to put you on - position 1.

06 22 01 23 CC Okay.

06 22 01 27 CDR-EVA Okay -

06 22 01 28 LMP-EVA Now I went ...

06 22 01 35 CDR-EVA 170 F is black or it looks black. Actually,
there's so much dust on it, I really (chuckle) -
Kind of bad to have black labels on a black sur-
face. 170 F is black, as you might suspect.

06 22 01 44 CC Okay. We copy that.

06 22 01 45 CDR-EVA Want to move the battery in the shade?

06 22 01 47 CC Negative. We'd like to leave it out.

06 22 01 49 CDR-EVA What do you want to do with the battery? Oh, golly. Okay?

06 22 01 59 CC Okay. I guess we're changing our mind. We would like to put it in the shade.

06 22 02 06 CDR-EVA Yeah, that figures. Okay, back to the battery.

06 22 02 28 CDR-EVA Okay. You want to reset the camera, right?

06 22 02 30 CC Roger. Reset, and I have the new settings. Azimuth 007, elevation 15.

06 22 02 43 CDR-EVA Okay. Reset, 007 and 15. Okay.

06 22 03 05 CDR-EVA Set 007.

06 22 03 15 CDR-EVA 15.

06 22 03 32 CDR-EVA Okay.

06 22 03 33 LMP-EVA Go out here, John, and see if I can find a - a landmark to get lined up on.

06 22 03 44 CDR-EVA Okay. She's reset and level, and you heard a remote - to get to the Sun now, Charlie (laughter).

SEPARATE SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 20 57 XX BEGIN LUNAR REV 47

06 21 08 45 CC Casper, do you read, wide beam?

06 21 09 35 CMP Good morning, Henry.

06 21 09 36 CC Good morning.

06 21 09 52 CMP Don couldn't take any more of that, huh?

06 21 09 53 CC They hit you pretty quick this morning, huh?

06 21 09 58 CMP (Laughter). Yeah. That's a good way to start. Don starts off with a nice little innocuous remark like we have some Flight Plan changes for you. By the way, they start in 2 minutes (laughter).

06 21 10 14 CC Roger. Well, how quick can you move? I got another fistful.

06 21 10 21 CMP (Laughter). I figured you might. Go ahead.

06 21 10 28 CC Actually, I'm sorry to hit you with all these, Ken. I know it's a mess, but the PIs are trying to recover as much SIM bay science as they can, considering the changes in the overall Flight Plan.

06 21 10 43 CMP I understand that. Go ahead.

06 21 10 48 CC Okay. You've already beeped the IMAGE MOTION. Is that correct?

06 21 10 57 CMP Ah, no, sir. I got that down here at 165:27.

06 21 11 04 CC Okay. I didn't know whether you'd gotten that change or not. Okay. We'll go by that. We want to delete the orbital science for this rev, so you can delete that little line there at about 165:18 where it says prepare. And at 165:30 at the top of the next page, delete PAN CAMERA MODE, STANDBY, and POWER, ON. And down at 165:35, delete the PAN CAMERA POWER, OFF, MSFN cue. Okay. Let me update your times, here. At 165:31, where it says MASS SPEC, RETRACT, to 20 feet, the new retraction time is 33 seconds. And at 165:35, retract to 15 feet. The new retraction time is 30 seconds.

06 21 12 16 CMP And that 30 seconds is - is starting from where I stopped at 165:30. Okay?

06 21 12 25 CC That's affirmative. And delete the Colombo Highlands and obs - visual observations there. And in it's place, add "PAN CAMERA, STANDBY, T-stop; GAMMA RAY, DEPLOY; PAN CAMERA, OFF, MSFN cue. And, Ken, we're gonna move these next two mass spec retractions up a little bit and start your eat period earlier so we can cut it off earlier. But we'll do those real time. There's no need of scribbling up the Flight Plan. I'll just give you a call when to do it. And at - -

06 21 13 24 CMP I think that's a good plan.

06 21 13 25 CC - - 165:50 there, delete that IMAGE MOTION, INCREASE, barber pole/ON.

06 21 13 33 CMP Okay.

06 21 13 34 CC And at 165:50, we'll start your eat period. And at 166, down at the bottom of the page, delete MASS SPEC, DEPLOY.

06 21 13 50 CMP Okay.

06 21 13 51 CC And in the interest of keeping your SIM status correct, at the top up there at 165:30 the status should be plus 1211 and all two's.

06 21 14 08 CMP Okay.

06 21 14 12 CC And on the next page, at 166 hours, SIM status in the first row is plus 1121, and the same holds for 166:30.

06 21 14 54 CC And, Casper, could you give us barber pole plus 4?

06 21 15 01 CMP Okay.

06 21 15 27 CMP You have it.

06 21 15 28 CC Okay. Going back to the Flight Plan, at 166:45 -

06 21 15 43 CMP Okay.

06 21 15 46 CC You can make that end eat period. And immediately following, prepare for solar corona sunrise photos. And the T-start for those photos is 166:52:45.

06 21 16 12 CMP Okay. T-start for the solar corona is 166:52:45.

06 21 16 20 CC That's correct, Ken. And on the next page, 167:01, add "LASER ALTIMETER, OFF; then P20, option 5, for 40 degrees south oblique; NOUN 78: plus 270.00, plus 087.75, plus 180.00." And the NOUN 79 is 0.50; set HIGH GAIN, PITCH 10, YAW 350 for AOS acq."

06 21 17 25 CMP Okay. At 167, it's LASER, OFF; P20, option 5, 40 degrees south oblique; NOUN 78, plus 270, plus 87.75, and plus 180; NOUN 79's a half degree, and it's PITCH 10, YAW 350 for the HIGH GAIN.

06 21 17 42 CC Roger. And at 167:05, starting with MAN CAM - MAPPING CAMERA, OFF, delete everything through enable all jets down to about 167:14.

06 21 18 05 CMP Okay. It's including MAPPING CAMERA, OFF, down through including enable all jets. That whole block is deleted.

06 21 18 14 CC That is affirmative. And in the next line, change the YAW for the HIGH GAIN to the 350.

06 21 18 28 CMP Okay.

06 21 18 30 CC At 167:22, delete the VERB 48.

06 21 18 36 CMP Let me see. Am I supposed to be retracting that - Hey, Hank, am I supposed to be retracting that boom now?

06 21 18 46 CC Roger. You're about 30 seconds from it. Why don't you go ahead and do that, Ken?

06 21 18 54 CMP Okay. Well, let's do that thing and get it - get something done on it, because I'm gonna have to watch it.

06 21 19 05 CC That's a 33-second retract time.

06 21 19 10 CMP Okay. It's in work, and I'm watching it.

06 21 19 38 CMP Okay. It's OFF.

06 21 19 41 CC Okay. Could you give us AUTO on the HIGH GAIN?

06 21 19 55 CMP You have it.

06 21 20 03 CC Okay. And, Ken, getting back to that Flight Plan, there's only one more change that - at 167:30 -

06 21 20 10 CMP All right - go ahead.

06 21 20 11 CC We're deleting the update block.

06 21 20 23 CMP Okay.

06 21 20 24 CC And that ought to get us through another rev. Do you have your NOUN 93s from your P52?

06 21 20 35 CMP Yes, sir. Let me look back here and find them. Okay. They were minus 0.103, minus 001, plus 0.097. And I torqued those at 164:47:20.

06 21 20 57 CC Roger; copy.

06 21 21 12 CC And, Ken, I have a TEI-55 block data.

06 21 21 21 CMP Okay. Just a minute. Let me get my other book. Keep an eye on the clock there. I got another retraction and a pan camera to worry about there.

06 21 21 35 CC Roger.

06 21 22 00 CMP Okay. I'm ready to copy.

06 21 22 03 CC TEI-55, SPS/G&N; 38144; plus 0.67, plus 1.05; 182:37:26.53; plus 2864.2, plus 0396.6, minus 0096.9; 181, 095, 010; the rest is NA; Sirius and Rigel; 131, 029, 016; two jets, 17 seconds; longitude of the Moon at T_{ig} , minus 159.03; assumes LOPC-1 and lift-off REFSMMAT. And it's time for the boom retract to 15 feet.

06 21 23 38 CMP Okay. I'll get the boom, then I'll read it back to you.

06 21 23 43 CC Okay. And this is a 30-second.

06 21 23 49 CMP Okay. Thank you.

06 21 23 56 CMP Now, it's coming in.

06 21 24 25 CMP And it's OFF. Readback: TEI-55, SPS/G&N; 38144; plus 0.67, plus 1.05; 182:37:26.53; plus 286.42, plus 0396.6, minus 0096.9; 181, 095, 010; Sirius and Rigel; 131, 029, 016; two jets, 17 seconds; **lambda**, minus 159.03. This pad's based on flight change number 1 and the ascent REFSMMAT.

06 21 25 04 CC Good readback, Ken.

06 21 25 16 CC And real quickly here on the SIM status, mapping camera's perking along real good; 98-frame margin. The laser altimeter now is getting about 65 percent, good altitude. We've had 1431 firings. Pan camera is overexposing by one and a half f-stops, because of a bias in the exposure-command voltage. We're 47 frames ahead on that. The rest of the SIM bay apparatus is working real - nominal.

06 21 25 52 CMP Okay. Has the X-ray experiment detected anything that looks unusual about the Descartes area, or anything like that?

06 21 26 03 CC Okay. I'll see if I can get a reading on that.

06 21 27 08 CC Casper, you're coming up on about 15 seconds to T-stop pan camera.

06 21 27 15 CMP Okay; thank you.

06 21 27 28 CMP It's STANDBY.

06 21 27 39 CMP The gamma ray is on it's way out.

06 21 27 41 CC Roger.

06 21 28 03 CC Verify that that's the gamma ray, Ken. We show the mass spec going out.

06 21 28 13 CMP Oh, thank you.

06 21 28 30 CMP There goes the gamma ray out. You want me to go out and time the mass spec back in, so you'll know where it is?

06 21 29 08 CC Okay, Ken. What we'd like for you to do is take the mass spec all the way out and then retract it for 93 seconds.

06 21 29 19 CMP Okay. That sounds reasonable. Going all the way out and back in for 93.

06 21 29 24 CC That's affirmative. And that would get us back to the 10-foot point that I was just - just getting ready to call you for.

06 21 31 00 CMP Okay. I'm gonna bring the mass spec boom in now.

06 21 31 03 CC Okay, Ken. 93 seconds.

06 21 31 09 CMP Okay.

06 21 32 50 CMP Okay. Your MASS SPEC is OFF.

06 21 32 58 CC Okay. And we're ready for POWER, OFF, on the PAN CAMERA.

06 21 33 05 CMP Okay. PAN CAMERA POWER is OFF.

06 21 33 20 CC Have you had time to work up a crew status report yet, Ken?

06 21 33 27 CMP (Laughter). In between the other things? It's a short one. It shouldn't take me a second.

06 21 33 37 CC All right. Take your time. I was just trying to get all this dirty work out of the way so you'd have an uninterrupted eat period.

06 21 33 51 CMP (Laughter). Uninterrupted only by solar corona. Okay. About PRD, 1505^h; 7 hours; and none. And yesterday - let's see - well, shoot! They don't even have meal A in this book. I don't know why it's split this way, but - You can delete the - Well, the only thing I had out of meal B that's on the list there is the graham crackers and the cocca. I also had bacon squares, coffee, and some of that pineapple fruit cake, and an apricot bar, and orange juice, and another package of graham crackers spread out throughout the - the day. Meal C: You can delete the beef steak, and the chicken and rice, and the pecans. And you can add that lobster from meal B.

06 21 35 28 CC Okay, Ken. We got that.

06 21 35 34 CMP Okay. That should finish that - fill in that square, okay?

06 21 35 39 CC Hey, Ken? How's the air-to-ground been this morning? Has there been a lot of noise on it, or it's been clean to you?

06 21 35 47 CMP Just as quiet as ever. Beautiful comm.

06 21 35 50 CC Okay.

06 21 37 55 CC Casper, Houston. Could you give us RETRACT on the mass spec boom, 20 seconds? That's a change, 20 seconds.

06 21 38 05 CMP Okay; this is 20 seconds.

06 21 38 18 CMP Coming in now.

06 21 38 35 CMP It's OFF.

06 21 38 37 CC Roger.

06 21 40 25 CMP Hank, where is that extra crater that you said you had down there?

06 21 40 33 CC What was that, Ken?

06 21 40 37 CMP You said something about an extra crater down there. Aw, I've lost it now.

06 21 40 44 CC Oh. That was between Double Spot over where the LM was and down to the south there towards Stone Mountain. As they were coming back from the surface, it was very apparent there was a very large depression, a subdued crater. There was a - some - they estimated 300 meters, maybe even larger in diameter.

06 21 41 06 CMP Okay. I guess I looked in the wrong place. I looked short of the landing area.

06 21 50 55 CMP Henry, do you remember the little helmet-shaped - -

06 21 50 57 CC Yeah.

06 21 50 58 CMP - - area we had just south of the Rhiphaeus Mountains?

06 21 51 01 CC Yes, sir.

06 21 51 02 CMP They showed up in the color differentials. Well, it does have a different color to it. It's - in this sunlight, it seems like these - the things that were showing up on - those red-and-blue color

differences - they're showing up more in the low-Suns. Because I can see the mare differences back by Lassell in low-Sun. And they don't show up so well now. And now this one shows up very dramatically as this little - little piece of ... out here. And it's kind of - it's just a little tanner than the rest of the mare.

06 21 52 00 CC

That's a little - kind of interesting to find out that the color's different there than the surroundings.

06 21 52 10 CMP

Yeah, and the texture is a little different, too. I got the binocs on it now. The mare has a large number of very small pits in it, as well as a - it's almost a random distribution of crater sizes. This little patch of ground has - oh, I guess about the same distribution of the larger craters, but the little pits don't show quite as much. It's a - it has a ropy texture across the top, not - not as ropy as a - as a pahoehoe flow or anything like that, but just kind of has a little pattern to it. It has some lineaments that run kind of - I guess that's sort of northwest. And it looks like it may be associated with these other little clumps of material that stick out around it here. And - I was trying to compare that to the Rhipaeus Mountains, and it looks like - the material looks the same. And another thing I'd never noticed before that looking at the Rhipaeus Mountains here - I'm looking at the - at the step of the - let's see, this eastern edge. And if you're - remember that back around Flamstead there's a little foot, a little toe or ring that goes around the inside. And the Rhipaeus Mountains all have that little toe. Now whether that's a high-water mark or a second unit, it's hard to say. But all along the margin that I can see - there's that little toe. And it seems to be at the same elevation. And that's true for some of the little patches a little further back - back inland. It looks like a break in slope and a changing color both.

06 21 54 45 CC

What else do you see in there?

06 21 54 50 CMP I see that it's getting dark outside, and it's time for an eat period inside.

06 21 54 55 CC (Laughter). Roger.

06 21 54 59 CMP No, it's an interesting place, you just need to have more time to look at it.

06 21 55 17 CMP And I'm all set up for the solar corona. The cameras are all set. The checklist is complete down to turning the tape on.

06 21 55 28 CC Roger. Why don't you take time to eat then, and - I'll just check out with you at AO - at LOS.

06 21 55 37 CMP All right, sir. Thank you.

06 21 55 48 CMP Maybe everyone else in the world knew about that little toe in the Rhiphaeus Mountains. I just never had heard anyone mention that before.

06 21 55 58 CC Roger. That sounds interesting.

06 21 56 08 CC Farouk and the boys in the backroom have been eagerly absorbing your remarks the last couple of days.

06 21 56 18 CMP Yeah, but all the questions they ask, I can't answer.

06 21 57 12 CMP You know, Hank, one of the things I was thinking about last night that might help remember a lot of the things we've seen - do you suppose there's a - any DAC film that I can use to, say, set to look out the window? And I'll see if I can maybe just tape the DAC up somewhere and let it take a one-frame-per-second strip, or something that would give us some reasonable overlap - around the lighted part of the Moon.

06 21 57 47 CC Okay, Ken. We'll take a look at that.

06 21 57 54 CMP I think I could probably tape the camera somewhere so it would have a - a view approximately the same as what we've been seeing.

06 22 03 53 CC

Casper, no need to acknowledge. Your consumables look good, and, on the RCS, we're making a little money. We're about 188 pounds now above the rescue red line.

06 22 04 07 CMP

Okay. That sounds good.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 22 04 05 LMP-EVA Okay, if we can keep Crown Crater and that - there's a big one to the bottom, one down on the first terrace and then one on the second terrace. Those three sort of - in a line, coming home, we got it.

06 22 04 17 CDR-EVA Okay. Go initialize the NAV, Charlie.

06 22 04 21 LMP-EVA Okay. I'm coming. I got to go to MODE switch 1 before we start moving?

06 22 04 26 CDR-EVA Yeah. That in you checklist?

06 22 04 28 LMP-EVA Yeah.

06 22 04 30 CDR-EVA Okay, well, let me get me.

06 22 04 35 LMP-EVA Okay, why don't you bounce in?

06 22 04 39 CDR-EVA Don't put your arm there.

06 22 04 41 LMP-EVA Boy, that's - umm ...

06 22 04 54 LMP-EVA There it is and I support the NAV align by being able to get in the machine.

06 22 05 07 CDR-EVA Gee whiz, Charlie. I think you broke it.

06 22 05 08 LMP-EVA I hope not.

06 22 05 17 LMP-EVA Tony, a point - not that mission before, but this seatbelt adjustment was just perfect for me - from the airplane.

06 22 05 28 CC Okay, good data point.

06 22 05 29 CDR-EVA And - Me too? Seatbelt - seatbelts fastened?
Okay, we're going back to the normal configuration.

06 22 05 37 CC Okay, that's fine.

06 22 05 39 CDR-EVA PMW [sic] is in BOTH. And the DRIVE ENABLE is in - all those switches are up and the - steering is okay. Going to PRIMARY. We're in for a NAV align.

06 22 06 17 CDR-EVA I think I'd better get up here on this level spot.

06 22 06 20 LMP-EVA Umm. Now wa - what - wha -

06 22 06 27 CDR-EVA That feels pretty level.

06 22 06 28 LMP-EVA Yeah, I reckon.

06 22 06 29 CDR-EVA I reckon too.

06 22 06 31 CC Right. On the DRIVE ENABLES, we'd like the LEFT REAR and the RIGHT REAR to PWM-2.

06 22 06 41 LMP-EVA Yeah, we've got that. It's normal configuration.

06 22 06 43 CC Okay, good show. That's what we want.

06 22 06 45 LMP-EVA Okay, we're in 3 degrees right roll - 3 degrees right roll. Hey, the pitch needle is behind there, and I would say it's saying 2 degrees pitch up if the little needle was right in the middle. But it isn't very much, Houston.

06 22 07 03 CC Okay.

06 22 07 04 LMP-EVA What happened is the - on that - on that indicator is that the - is that the dial is falling off, if you can believe such a thing. The little needle is still back there. It don't know the dial's falling, and it's working fine. One degree right roll - -

06 22 07 19 CC Okay, we copy that, and we need an FFD [?].

06 22 07 21 LMP-EVA - - ... level pitch. Three de - 3-1/2 degrees right. Almost 4. No, 3 - 3 degrees right, excuse me.

06 22 07 31 CC Okay, copy.

06 22 07 33 LMP-EVA And we're are - our - -

06 22 07 38 CC And if - -

06 22 07 39 LMP-EVA - - heading is 264, if you can believe such a thing.

06 22 07 43 CC Okay, and if you want to power up - -

06 22 07 44 CDR-EVA It's about right on?

06 22 07 45 LMP-EVA Yeah.

06 22 07 46 CC I'd like the LRV readings.

06 22 07 51 LMP-EVA Okay. We're powered up. Okay, 60 on the left. Okay, zero - 264, 000, 000, 000, amp-hours is 60, 115; off-scale low, off-scale low - okay, volts are seven - 65, 65; 102, 120, off-scale low, off-scale low, and off-scale low, off-scale low.

06 22 08 27 CC Okay, we'll stick with the normal configuration you've got there, and we'd like to make - verify that you went back to amps on the read-out.

06 22 08 41 LMP-EVA That's verified.

06 22 08 43 CC Okay. Okay, we've got 258 on the torquing angle.

06 22 08 52 CDR-EVA The rascally thing is only off - Okay, 258.

06 22 09 08 CDR-EVA How about that? I put my DIVERTER in MINIMUM; I didn't think I'd reach it on this round.

06 22 09 13 LMP-EVA Okay. We're all set to go. And off we go.

06 22 09 16 CC Good show.

06 22 09 18 LMP-EVA Okay. First heading out of here, John, is 030. 030 supposedly. Okay. The DAC is ON.

06 22 09 33 CDR-EVA Shoot, that thing drifts.

06 22 09 51 CC Charlie, can you turn that DAC off for another 19 minutes?

06 22 09 54 LMP-EVA Okay, Tony. I'm going to be spinning it.

06 22 09 57 CC I'll give you a mark.

06 22 09 58 LMP-EVA Okay. Okay, it's off.

06 22 10 06 CDR-EVA I'll tell you, this ridge up here would be a good place to park the Rover, Houston, if you want - We're reading, I think it's working - it's reading 162 and 100 - 0.1 now. And that's how far away we are.

- 06 22 10 20 CC Good show.
- 06 22 10 21 CDR-EVA This ridge would be a good place to park the Rover. The Rover up north of it. I don't know if you can stand it thermally.
- 06 22 10 28 LMP-EVA I don't think they can pan the camera like that, when we lift off. Okay, Tony. We're topping out of the little ridge. We can now see Dome and Smoky. On top of the ridge, there are boulders in - much like we seen yesterday. Half a meter or so, cobbles about 5 percent of the surface. Looks like a lot of secondaries though. We have a - The - the boulder population is - is really concentrated around the secondaries, and we'll get some pictures of that. The regolith up here is identical. You can see these little lineations which is, I think, a function of Sun angle.
- 06 22 11 25 CDR-EVA I think the boulder population is starting to thin, Charlie.
- 06 22 11 27 LMP-EVA I do too. They're getting smaller, and the cobbles are getting smaller. Like we - Could be just out of this ray. We don't see any of the - maybe one or two of the half-a-meter-size boulders now, Tony.
- 06 22 11 41 CC Okay, we copy that. There are a couple of mounds mapped about 200 meters off to your left. We were wondering if you could see those.
- 06 22 11 51 LMP-EVA Nope. I got 1 - 179 at 180 now at 0.3, and - and topping out really on top of a ridge here, and -
- 06 22 12 05 CDR-EVA Better go over this way more, Charlie.
- 06 22 12 07 LMP-EVA Yeah. There's North Ray right up there. Look at the big rocks, John.
- 06 22 12 10 CDR-EVA Yeah.
- 06 22 12 11 LMP-EVA Okay, Tony. You got a good view of North Ray here, and as we look - as I look at it, there's a - a north-south - northeast-southwest line of boulders that come out from the southwest rim and go up the northeast rim out Smoky Mountain.

06 22 12 33 CDR-EVA See, there's Palmetto, too.

06 22 12 35 LMP-EVA Yeah, we see Palmetto. Coming down the ridge now, we look like we're going into a - a - a big sag-type area. It's at 12 o'clock of 300 or 400 meters, and we're now at 188 at 0.4.

06 22 12 53 CDR-EVA We may be into Palmetto right now, Charlie.

06 22 12 55 LMP-EVA Huh?

06 22 12 57 CDR-EVA May be Palmetto.

06 22 12 58 LMP-EVA No. That's over there on the rim, isn't it?

06 22 12 59 CDR-EVA Huh?

06 22 13 00 LMP-EVA That - that big thing right there? No, Palmetto's at - -

06 22 13 05 CC You should be about halfway to Palmetto.

06 22 13 06 LMP-EVA - - 2.1.

06 22 13 09 CC You're looking right below Turtle Mountain, we bet.

06 22 13 11 CDR-EVA Yeah. That's where we are.

06 22 13 17 LMP-EVA Okay. Up at station 11 and 12 - -

06 22 13 20 CDR-EVA Any resemblance between this and the topo is going to the devil.

06 22 13 23 LMP-EVA I'll tell you.

06 22 13 27 CDR-EVA It sure is.

06 22 13 28 LMP-EVA Okay; we're going downslope now, Tony, about a 5-degree slope, and we're going to go down perhaps 50 or 60 meters before we start climbing back out again towards Palmetto. And up around North Ray, we see two tremendous blocks at about station 11 and 12 that appear to be black in color, black with white spots. And there's a - we're just about out of the ray material now. We only see a few cobbles left.

06 22 14 02 CC Okay. It might be a good idea to try to get for our station 11.

06 22 14 10 LMP-EVA That's what I thought we were going to pick - those two big - big rocks.

06 22 14 14 CC Good show.

06 22 14 15 LMP-EVA It's right up on that ridge. That might be - that's Palmetto right there, I guess, off to the left there, isn't it, John? Course, we only been 0.6 though. Tony, we're at 195 at 0.6, and there's a big depression off to our 2 o'clock position on a heading of 030, with some white boulders on the inner rim. It's a very subdued feature, but it does have stuff - at least around the rim - the south - Wow! Great!

06 22 14 52 CDR-EVA All right, Charlie.

06 22 14 53 LMP-EVA The east side is a very shallow slope into this pit.

06 22 14 57 CDR-EVA How far are we supposed to go this way before we turn back?

06 22 15 01 LMP-EVA Just keep going. Straight out.

06 22 15 08 CC You should be heading of about 356 - -

06 22 15 10 CDR-EVA 345 ...

06 22 15 14 LMP-EVA Yeah. Now at 0.8, you can turn to about 356.

06 22 15 18 CDR-EVA Okay.

06 22 15 20 LMP-EVA Okay. Tony, this big depression off to the left that I was describing is - on the east side, it's a very shallow slope into it, about 4 or 5 degrees. But, on the far end, the west side and the southwest side, it has very steep walls, 20 degrees of slope - -

06 22 15 36 CDR-EVA Oh, yes ... - -

06 22 15 37 CC Right. Understand. You're looking right at the base of Turtle Mountain.

06 22 15 38 LMP-EVA - - piece of cake, John. Okay.

06 22 15 46 CDR-EVA Listen, Houston (laughter). I hate to tell you this, but these mountains don't look the same.

06 22 15 53 LMP-EVA Which mountains? Those straight - -

06 22 15 57 CDR-EVA Where's Turtle Mountain. Right here?

06 22 15 58 LMP-EVA - - It's off to the left, way off to the left. We just passed it. We could do a 360 and get a pan of it.

06 22 16 03 CDR-EVA How about that rock there, Charlie?

06 22 16 08 LMP-EVA And it's got some lineations in it, huh?

06 22 16 09 CDR-EVA Yeah. Look at the size of it.

06 22 16 13 LMP-EVA Oh, this big one coming up, you mean?

06 22 16 15 CDR-EVA Yeah.

06 22 16 16 LMP-EVA Yeah. Hey, Tony, it seems to me this is a - a more subdued surface over here than going towards South Ray. Not as many craters. It's almost - except for three or four meter-sized craters, it's all subdued and just hummocky and rolling.

06 22 16 37 CDR-EVA Yeah, that's true. It's much better driving. We're doing 10 clicks.

06 22 16 41 CC Outstanding. Could we have a - an AMP reading?

06 22 16 51 LMP-EVA Twenty. Hey, there's about a 4-meter boulder off to our - with a good fillet - -

06 22 16 59 CDR-EVA Oh, that's - that's nice. That's been there for a while.

06 22 17 01 LMP-EVA - - we're just passing at 195 at 0.9. It's rounded.

06 22 17 04 CC Okay. How are we doing now on the rounded versus the angular boulder - -

06 22 17 08 LMP-EVA And we can see into Ravine - we can - Okay; most of them over here are, I'd say, probably a good half and half rounded to - to angular.

06 22 17 25 CC - - Okay.

06 22 17 28 LMP-EVA There are some small, indurated secondary craters. And as we approach Palmetto, the boulder population is beginning to pick back up.

06 22 17 43 CDR-EVA This Palmetto right here, Charlie?

06 22 17 44 LMP-EVA Yes, it is. We've got to - I don't - I think it is, John. Yeah, right up there to the left. It's a - we've been 1 - I think that's 1.1, and we're not quite there yet. We've got to go on this heading for 1. Okay, Tony, as you look to the north-east, you get part of a - a spectacular terrain view of rolling hills occasionally pock-marked with large boulders. The craters are very subdued, and the hills almost appear smooth off to the northeast. Occasional craters - -

06 22 18 31 CC Okay. We copy that, and - -

06 22 18 32 LMP-EVA - - that might be a function of the Sun angle, though.

06 22 18 34 CC - - according to our track, you're a little bit east of - correction, west of course, and probably a 005 heading would take you right along the rim of Palmetto.

06 22 18 41 CDR-EVA Yeah. That's what I figure.

06 22 18 47 LMP-EVA I think we're coming up on the rim now, John.

06 22 18 50 CDR-EVA Right, Charlie.

06 22 18 51 LMP-EVA There it is.

06 22 18 53 CDR-EVA There it is. Beautiful.

06 22 18 57 LMP-EVA Okay. Tony, we copped out on the rim of Palmetto, and hit it right on the nose at 1.2 at 189, and it's a tremendous crater. The walls to the south - south-northeast - correction, northwest-south - Wow.

06 22 19 17 CDR-EVA Sorry, Charlie. I got to keep my eye on the driving.

06 22 19 20 LMP-EVA Beautiful. That's great. That's great. And to the southeast here are steeper than the walls to the northeast. Apparently, it looks like it's almost breached to the northeast.

06 22 19 34 CC Okay.

06 22 19 42 LMP-EVA John's cutting away from the rim now, because it's a little bit easier going. There's a good ejecta blanket of half-meter-size boulders around the rim of Palmetto into some of these secondary craters here.

06 22 19 58 CC Okay. Do you have an estimate of - -

06 22 20 00 CDR-EVA Palmetto is as big as Meteor, isn't it? It's an -

06 22 20 06 LMP-EVA Okay; of cobble size, in my usual size of being cobbles, I'd say 30, 40 percent of the surface. Let's make it 30 percent and the half-meter size, maybe one for every 10 square meters.

06 22 20 25 CC Okay.

06 22 20 27 CDR-EVA Okay. We're just traveling right around the - we're traveling about 100 meters inside the rim, and we're at 195, 1.4 now.

06 22 20 38 CC Okay.

06 22 20 39 CDR-EVA 1.7 is the distance.

06 22 20 44 LMP-EVA Okay; and to the northeast, Tony - northwest, correction - you can see large blocks on the rim on the - -

06 22 20 52 CDR-EVA Hey, Charlie, there's Dot.

06 22 20 53 LMP-EVA - - Yeah, I see Dot. Great. Hanging right in there, right on the rim. You won't be able to see the ro - you wouldn't be - yeah, you'll be able to see into Palmetto from there. Okay; the large boulders over there seem to be 3 or 4 meters to the northwest on the flank of Palmetto, but I think they came from North Ray. Over.

06 22 21 11 CC Okay. Understand they're angular?

06 22 21 21 LMP-EVA Angularity is sort of rounded.

06 22 21 24 CC Okay.

06 22 21 25 LMP-EVA The - Apparently, the only thing preserved here is - There's the large blocks out of North Ray, but don't see any - very - very many small ones. I think - I - Trafficability is going to be excellent, though it looks like a steep slope climbing that rim, doesn't it?

06 22 21 47 CDR-EVA No, not too bad. It's not near as bad as Stone Mountain.

06 22 21 52 LMP-EVA Okay. The - the - the boulder field out of North Ray does not reach Ravine, Tony. It stops on the outer flank of Ravine about 0.1 of a crater diameter away.

06 22 22 05 CC Okay.

06 22 22 15 LMP-EVA Okay. Most of the rocks here are - are rounded; have some real good secondaries. The types are very difficult to identify as we go by. We're now at 193 at 1.7. The nav system seems to be working super.

06 22 22 36 CC Outstanding.

06 22 22 38 LMP-EVA Palmetto has a very - a very definite raised rim to it, and we're going to be going off the rim down probably a 5- to 10-degree slope into a valley before we start climbing up to North Ray.

06 22 22 57 CDR-EVA That's a real valley, too, Charlie.

06 22 22 58 LMP-EVA Yeah. I'll say. And these valleys in here, Tony, tend to trend toward Big Sag.

06 22 23 09 CC And Charlie, could you go ahead and - -

06 22 23 10 CDR-EVA Hey, see Cat?

06 22 23 11 CC - - put that DAC on that?

06 22 23 12 LMP-EVA Yeah, there's - -

06 22 23 15 CDR-EVA Yeah, put it on now, Charlie.

06 22 23 16 LMP-EVA Okay.

06 22 23 19 CDR-EVA Wait a minute.

06 22 23 24 LMP-EVA Okay; it's running.

06 22 23 26 CC Good show.

06 22 23 28 CDR-EVA It's not pointing up at the edge.

06 22 23 30 LMP-EVA And I got it pointed off to the right - left.
Excuse me.

06 22 23 34 CC Your other right.

06 22 23 35 LMP-EVA Okay. We're now in an area, Tony, that's at 19 -
195 at 1.9, that is about a half-meter-size boulder
every 5-meter square. Some of these blocks are
angular; they're fractured. They appear to be
grayish in color, dust covered, and most all of
them have fillets. Man, look at that slope!
That's - that's End Crater right there, Tony - John,
just over that rim, there, just to your left. And,
Tony, End Crater is on - is on about a 10- to
12-degree slope, pointed toward South Ray - North
Ray.

06 22 24 25 CC Okay.

06 22 24 30 CDR-EVA Hey, we're traveling due east here for a while to
pick up a little smooth ground.

06 22 24 36 LMP-EVA What do you say? We're going down a 5-degree slope
here or 10?

06 22 24 41 CDR-EVA Yeah, Charlie; 5 to 10. More like 10.

06 22 24 43 LMP-EVA Yeah. Okay, Tony. We're about maybe a half-a-
crater diameter to the northeast of - of Palmetto,
about a 10-degree slope, and the boulder population
is about 5 degrees here. And the small cobbles

have just about disappeared. Very smooth regolith, except for these 20- to 30-centimeter boulders, which are not very numerous. We're really moving out downslope at about 12, 15 kilometers an hour.

- 06 22 25 27 CC Okay.
- 06 22 25 29 LMP-EVA It's remarkable how - how subdued all these craters are. It's almost a smooth plain except for a few of the 5-meter craters or so. The 1-meter size, and all, and smaller, are all just about gone. They're just - apparently, very subdued. Okay. John, we're at 22 at 195. We'll swing the camera around toward the Sun. It's looking off to the right now.
- 06 22 26 14 CDR-EVA Let's get a better heading here from 22 to 195, Houston.
- 06 22 26 19 CC Okay.
- 06 22 26 22 LMP-EVA Okay. End Crater was 21. You should - What they want is about - just directly north, John.
- 06 22 26 26 CDR-EVA Forward?
- 06 22 26 27 LMP-EVA Yeah. It looks great to me, that heading.
- 06 22 26 29 CDR-EVA Yeah. It looks like - Well, we're down to about where the rock population is almost nonexistent. I hope it stays that way for a while.
- 06 22 26 38 LMP-EVA It is.
- 06 22 26 39 CC Y'all are making some outstanding time there - -
- 06 22 26 40 LMP-EVA It's really easy going, Tony. Well, he's got it full blower at 11 clicks, and we're just going over an undulating terrain. The ridge lines here are predominantly - trend east-west, and they are about 5 meters in relief. And really, the only significant craters that you have out here are the ones that are 5 meters and larger, and they're only maybe - cover 30 percent of the surface.
- 06 22 27 18 CDR-EVA Look at that view! Look at those boulders!

06 22 27 20 LMP-EVA Look at those rocks! Tony, there are some tremendous boulders on North Ray, and they get bigger as we go nearer - near them.

06 22 27 27 CC Okay.

06 22 27 28 CDR-EVA Tell you one reason why North Ray is - looks like it had - looks like in the photos, it had such steep walls on one side, is because the rim is raised on one side higher than the other. Don't you get that impression, Charlie?

06 22 27 41 LMP-EVA Yeah. Sure do.

06 22 27 45 CC Do you think you'll be able to recognize the edge of the continuous ejecta blanket?

06 22 27 48 LMP-EVA Hey, Tony. It looks like - well, I don't - We - we'll give you a try at that. Right now, I can't - -

06 22 27 59 CDR-EVA I think we're starting to get into it right now, Charlie.

06 22 28 01 LMP-EVA Well, the cobbles and boulders are picking up. We're at 26, Tony, at 199, 192, and beginning to pick up a high frequency, maybe 10 percent now, of cobbles and boulders. John, I think it looks like those - See that white boulder dead ahead? Looks like the greatest variety of boulders is going to be over there. But that's part of the east and our station 11, but farther north than station 11 is called for. It's almost at the foot of Smoky.

06 22 28 43 CDR-EVA *** like ... up on the rim and see what we've got up here?

06 22 28 48 LMP-EVA Okay. I'd love to.

06 22 28 51 CC Okay; and you may get a caution flag on battery 2 temperature - -

06 22 28 53 LMP-EVA Okay, Tony.

06 22 28 54 CC - - just reset it, and press on.

06 22 29 00 CDR-EVA Understand. Reset, press.

06 22 29 04 LMP-EVA Okay. Tony, in this area now for 192 at 2.7, we're getting in a - a greater frequency of 1-meter-size craters, and it's making it a little bit bumpier ride.

06 22 29 16 CC Okay. You might watch for a change in soil - -

06 22 29 18 CDR-EVA Okay. The battery 2 temperature reads what ..., Charlie?

06 22 29 20 CC - - color, or albedo as you go along there.

06 22 29 24 CDR-EVA That's what we're watching for, and I get - the real change comes up - Oh, me - -

06 22 29 32 LMP-EVA Uh-oh. Oh, man.

06 22 29 33 CDR-EVA - - a little closer to the - That one (laughter).

06 22 29 38 LMP-EVA That's one of those sharp craters out - they call it - They map sharp out here in the plain. John, I don't think we're going to be - go straight between those two big rocks. I think we're going to have to - looks like to me that's a pretty steep slope. If we swing a little bit east here, and then go up just on the edge of that boulder ray right there, we'll make it.

06 22 30 01 CDR-EVA Over here?

06 22 30 02 LMP-EVA Okay. Okay. Tony, now that we get over here and can see down off the flank of North Ray, we can see good boulder rays out of North Ray that go for perhaps - I'm going to say a half-a-crater diameter - boulders greater than a meter size.

06 22 30 24 CC Okay. Could you take a look up at Smoky area there, and see what kind of structure and texture you can see on the face?

06 22 30 34 LMP-EVA Pete, been looking at that. Can't see anything except for a couple of rays of boulders out of North Ray that trend, one goes almost into Ravine that I described, and one goes on up to the top.

In the northeast wall of Ravine, you can see the lineation. To the northeast, they're horizontal. To the north, they are dipping east about 30 degrees.

- 06 22 31 01 CC Okay. Can you push your camera up that far to get a picture of that?
- 06 22 31 08 LMP-EVA I - I don't want to break my RCU bracket; I don't think I can - Wait a minute, I'll take the camera off and do it.
- 06 22 31 14 CDR-EVA Charlie, don't do that.
- 06 22 31 16 LMP-EVA No sweat.
- 06 22 31 33 CDR-EVA Take a picture of that crater. We're driving - We going - the - the road ahead I'm going through.
- 06 22 31 40 LMP-EVA Oh, yeah. I did.
- 06 22 31 41 CDR-EVA That's a nice one.
- 06 22 31 42 LMP-EVA Okay. Tony, there's a - that, to me, looks like just a big sink feature, John. Tony, the road had us - the map had us going - -
- 06 22 31 56 CDR-EVA Okay. We're definitely in the regolith right now, Houston, because see how these blocks are all laid in there?
- 06 22 32 03 LMP-EVA Yeah, I do.
- 06 22 32 04 CDR-EVA Remember how it was up at - at that crater - at Schooner?
- 06 22 32 09 LMP-EVA Yeah.
- 06 22 32 10 CDR-EVA Those rocks are laid into the ejecta blanket.
- 06 22 32 11 LMP-EVA Yeah.
- 06 22 32 12 CDR-EVA That's where they came from.
- 06 22 32 13 LMP-EVA Okay, Tony. At 191, at 3.1, we're coming into some good-sized whitish-looking rocks that are 3 and 4 meters across. They're fractured. There's probably a permanent shadowed sample - No, that wouldn't be - -

06 22 32 28 CDR-EVA If you didn't know better, you'd say that they were

bedrock outcrop, but they're just laid in there,
I'm sure, from North Ray.

06 22 32 36 LMP-EVA And as we go to the southeast side of North Ray,
there is a big sink feature, a big pit, that's
elongate east-west, and we could drive in it from
the - from the east. But once you get to the
south of South Ray, it is really a deep pit, Tony.
And that ridge line that we saw from the - the LM
is on the - the west side of that deep pit. It's
probably 100 meters below the rim of North Ray.
Over.

06 22 33 15 CC Okay. We copy that. And on the boulders you are
looking at now that you think might be thrown in,
you might talk about the - the fillet size away and
towards the crater and see if that corresponds with
the secondary.

06 22 33 32 LMP-EVA Okay. Well, we - Okay. We passed - we are not
close to any of them right now. We're in a very
smooth area. We're in this - At 3.4, at 190, we're
down in this area where I've just described it.
It goes into that big pit off to our - our west.

06 22 33 52 CC Understand.

06 22 33 54 LMP-EVA About a crater diameter from North - about a crater
diameter from North Ray off to the east, I see
some 3-meter boulders that are all rounded and
sitting in the ejecta with - or in the regolith
with good fillets. Okay. Now here's one, Tony,
off to the right - -

06 22 34 15 CDR-EVA The bag fell off again, Charlie.

06 22 34 17 LMP-EVA - - at 3.4. It did?

06 22 34 18 CDR-EVA Yeah.

06 22 34 19 LMP-EVA That's not supposed to happen. Okay. With the
2-meter-size boulder with a fillet that's equi -
looks like sort of equidimensional around the -
around the boulder.

60 22 34 35 CC Okay. Understand. Do you see any ... in these

06 22 34 37 LMP-EVA - - ... say - We just passed another 1 meter -
They just look whitish to me.

06 22 34 45 CC Okay.

06 22 34 46 LMP-EVA But that was another one we just passed, 1-meter
size. It had a big - the biggest fillet upslope.

06 22 34 51 CDR-EVA Here's a new crater right there, Charlie.

06 22 34 53 LMP-EVA Right to the right?

06 22 34 54 CDR-EVA Yeah.

06 22 34 55 LMP-EVA Yeah, I know it. Tony, these - these 1 - these
craters that we call secondary that are indurated,
I frankly think are very, very fresh craters,
because the - the - it looks very cloddy around
them, and the other ones that are secondaries do
not appear that way. Over.

06 22 35 16 CC Yeah. Okay. Understand.

06 22 35 17 CDR-EVA I'm not sure that this isn't such an old crater,
that the secondary - that the secondaries aren't
eroded down. We've really got good going right
here.

06 22 35 25 LMP-EVA Yeah.

06 22 35 27 CDR-EVA Now let's - Before we get too far along, let's
study this thing and see if we can figure out a
way to get up that rim without going through all
the boulders in the wall - -

06 22 35 34 LMP-EVA Okay, John. See that big one off to the right
over there?

06 22 35 38 CDR-EVA Yeah. I see that.

06 22 35 39 LMP-EVA Okay. I think up that slope, it looks to me to be
the best. Of course, it might be straight ahead
might be best.

06 22 35 45 CDR-EVA Well, I don't see any rocks straight ahead.

06 22 35 46 LMP-EVA All right. Let's go straight ahead. Okay. Tony, we're heading about 300 and 187. The large boulders, Tony, will be off to our right. There's a - a black to brownish looking one, and then there is a solid white one off towards - that's right at the base of Smoky Mountain and North Ray. That might be worth a little jog over there if it's not too far. It's the most unique white boulder we've seen.

06 22 36 21 CC Okay. We'll keep that in mind on the way back.

06 22 36 24 CDR-EVA ... - -

06 22 36 25 CC Give us bearing and range again.

06 22 36 26 LMP-EVA - - Yeah. See that white one over there, John? Okay, we're at 37 and 186. And we just passed some very frothy, two frothy-looking boulders. The biggest one is perhaps 5 meters across, and they have vertical joining or fracturing to them, and they have a frothy appearance to it. I'm about 20 meters from it now.

06 22 36 53 CC This sounds really great.

06 22 36 58 LMP-EVA Okay; so - Man, that is a big rock!

06 22 37 02 CDR-EVA Yeah.

06 22 37 04 LMP-EVA Okay, Tony. There are not any house-size rocks, but the biggest ones are maybe 5 meters. And it's really smooth except for the these big rocks out - out here. It's smooth going.

06 22 37 22 CC Could you - -

06 22 37 23 LMP-EVA ... fresh - There's a real fresh little crater right there. See the ray - -

06 22 37 25 CDR-EVA Yeah.

06 22 37 26 LMP-EVA - - off to the left?

06 22 37 27 CDR-EVA Yep.

06 22 37 28 LMP-EVA It's about a meter size - -

06 22 37 29 CC Hey, could you use a couple more words - -

06 22 37 30 LMP-EVA - - and it's 300 degrees at 183 -

06 22 37 31 CC - - to describe that frothy rock?

06 22 37 38 LMP-EVA It's - it's got a hackly surface to it - -

06 22 37 41 CDR-EVA It's black - black colored. Right, Charlie?

06 22 37 44 LMP-EVA Yeah.

06 22 37 46 CDR-EVA Okay; we're going up a pretty steep slope right now, Houston. ... I think we're almost at the rim, Charlie.

06 22 37 54 LMP-EVA Yeah, we are. Looks like we're just about 20 meters from the rim.

06 22 37 59 CDR-EVA I'm going to slow down here.

06 22 38 01 LMP-EVA Okay. (Laughter) Think you'll be all right? How about hooking a right, over here, John. The - -

06 22 38 10 CC We got you at about 400 or 500 meters from it yet.

06 22 38 11 LMP-EVA - - ... coming to the rim. Hey, I - I don't believe it, but -

06 22 38 23 CC Okay; we'd like you - -

06 22 38 24 LMP-EVA Well, you might be right.

06 22 38 25 CC - - to go to 12 frames per second.

06 22 38 29 LMP-EVA Okay. You got it.

06 22 38 34 CC Okay. This is going to make some great pictures here.

06 22 38 37 LMP-EVA Okay.

06 22 38 41 CDR-EVA We're on a relatively flat surface now.

06 22 38 45 LMP-EVA Okay. The rocks here, Tony, are all rounded. Well, not - most of them - 70 percent of them are rounded, and the other ones are subangular, mostly dust

covered, grayish in color. The big rocks are not on the rim, Tony. The big rocks are farther away from the rim. At least, we can't see any big rocks as we approach the rim, but we're still climbing upslope.

- 06 22 39 11 CC Okay.
- 06 22 39 17 CDR-EVA Man. Look, there's a tremendous one.
- 06 22 39 19 LMP-EVA There's a 10-meter boulder off to the right over there, John. There's a fresh crater, really fresh one, that has a white interior that's punched in about 2 meters deep, and that was at 181 at 4.0. Okay; it looks like to me we're - The rim - Hey, there's some beautiful white ones over there - -
- 06 22 39 49 CDR-EVA There we go, Charlie.
- 06 22 39 50 LMP-EVA - - John, at 2 o'clock. Think this is the rim, right here?
- 06 22 39 56 CC We still think you're about 500 meters from the rim.
- 06 22 39 59 LMP-EVA We'll be able to sample these white ones. Here's some - We are - There's the rim up there.
- 06 22 40 07 CDR-EVA Sure is.
- 06 22 40 11 LMP-EVA Sure is, Tony. You were right. We just climbed what we thought was the rim of one of these little hummocks.
- 06 22 40 17 CC Right - -
- 06 22 40 18 CDR-EVA Little hummocks! It was a pretty steep hummock.
- 06 22 40 20 CC - - ... just like mountain climbing, there's always another ridge.
- 06 22 40 27 LMP-EVA And I'm gonna pan - Okay. I'm going to pan the DAC around to get to that boulder field that goes up to north - Smoky Mountain. It's really tremendous. The boulders are very angular over there. They're gray - dark gray in color, and some of them are almost solid white. The most unique ones appear

to be solid white. Up on the rim here, they appear to be almost white; none of the dark ones. And we're at 180 at 4.1. Smooth regolith. John, the rim's left.

- 06 22 41 09 CDR-EVA The rim's right there.
- 06 22 41 10 LMP-EVA No, sir. I bet - I bet it's over there to the left where those rocks are. But you might be right. That's too far away. You're right. That's probably too far west.
- 06 22 41 22 CC We think the most direct route from where you are to the rim would be about a heading of 350.
- 06 22 41 33 LMP-EVA Okay. We're headed that way, and there's a some beauti - Those white rocks are - -
- 06 22 41 40 CDR-EVA Right on the rim, Charlie.
- 06 22 41 41 LMP-EVA - - right on the rim.
- 06 22 41 42 CC Outstanding. Can you see on around to see if there are any black rocks around at 3 o'clock in the crater?
- 06 22 41 51 LMP-EVA Well, we can't see in the crater. But around at 3 - at the 3 o'clock position, yeah, there's a biggy. The biggest one, Tony, is this 10- to 15-meter boulder that is on the rim, and it's blackish.
- 06 22 42 04 CC Okay. Is there any chance of working around towards that contact? And if we could get both the white and black - black in one stop, that would be really fine.
- 06 22 42 15 CDR-EVA No way.
- 06 22 42 17 CC Okay.
- 06 22 42 18 LMP-EVA Right. Pretty far. I think we can do it with a short stop over there. And we might - When we get up there, Tony, we might be able to find a black rock.
- 06 22 42 27 CC Okay. Fine.

06 22 42 28 LMP-EVA Okay. We're going through a - We're definitely on the ejecta blanket here, and oh, within 100 meters or so, I think, of the rim.

06 22 42 43 CC Right. We have you about 100 meters from it - -

06 22 42 44 LMP-EVA These rocks are just white, crystalline, white looking. Man, you guys are right on. If we copied, I think y'all are right on.

06 22 42 56 CDR-EVA Yeah. We're 179 at 4.4 right now.

06 22 43 00 LMP-EVA Okay. That's great, John.

06 22 43 08 CDR-EVA He wants us to park where?

06 22 43 10 LMP-EVA 360. Head on out to the rim. Okay; that's a breccia. That white one's a breccia.

06 22 43 20 CDR-EVA There's the rim.

06 22 43 22 LMP-EVA Yeah. There it is. Okay. I think we can get over there and maybe get them a picture. We're headed about 360, aren't we?

06 22 43 31 CDR-EVA Yep.

06 22 43 33 LMP-EVA That is that - that big - I can't believe the size of that big black rock over here. And I don't think that's a breccia, John. But, although it might be. I see some large white clasts.

06 22 43 48 CDR-EVA Oh, spectacular! Just spectacular!

06 22 43 54 LMP-EVA Okay.

06 22 43 56 CDR-EVA Okay, Charlie.

06 22 43 58 CC Charlie, the DAC should be out of film; you can turn it off.

06 22 44 04 LMP-EVA I can't reach it.

06 22 44 05 CC Okay, fine.

06 22 44 06 LMP-EVA ... to park at this heading?

06 22 44 09 CDR-EVA I don't - No, I guess not. What I'd like to do is park where it's flat, and -

06 22 44 23 LMP-EVA Okay. Okay. Where we came up over here, John, it - it won't be quite to - They get a better view. Right here's where they get a great view of the - of the interior of the upper third of the wall. Okay. Tony, we're on the rim.

06 22 44 46 CC Beautiful.

06 22 44 50 CDR-EVA There we go. If we spin - If we go 360 and park right here, it'll be flat.

06 22 45 04 LMP-EVA Great, John. Super! Can't wait to get off. Got to get off.

06 22 45 08 CC We can't wait for you to either. You're - -

06 22 45 09 LMP-EVA Okay, Tony. We're at 36 - -

06 22 45 10 CC - - about 17 minutes ahead of the time line.

06 22 45 15 LMP-EVA - - 360, 179, 5.5, 4.5, 60, 115, off-scale low, off-scale low, 130, 110, 2 - 225, 225 FORWARD MOTORS, 200, 200 REAR MOTORS.

06 22 45 43 CC Okay. What was that TEMPERATURE on BATTERY 1 again?

06 22 45 45 CDR-EVA Okay. PRIMARY is going to OFF.

06 22 45 49 LMP-EVA 100 and - about 110, I think.

06 22 45 52 CC Okay. Got it. And, Charlie, we'll need a frame count.

06 22 45 58 LMP-EVA Okay. Pan - Okay; stand by. I'm so dusty.

06 22 46 06 CDR-EVA Okay. Going to halfway between the INTERMEDIATE and -

06 22 46 18 LMP-EVA Gee, I don't know, Tony. I can't read it. Let John read it. John.

06 22 46 23 CDR-EVA What's that?

06 22 46 25 LMP-EVA Read my frame count.

06 22 46 28 CDR-EVA Okay. Hold still.

06 22 46 29 LMP-EVA Well, I wanted to get in the Sun so you could read it.

06 22 46 31 CDR-EVA 165. You better change that out.

06 22 46 33 LMP-EVA Okay. Took 165 pictures coming up here, Tony.

06 22 46 37 CC Okay; and we concur on the changeout.

06 22 46 44 LMP-EVA Okay. I'm going to put another black and white on Kilo.

06 22 46 54 CC Okay. Kilo.

06 22 46 57 CDR-EVA And look at - -

06 22 47 01 LMP-EVA Yeah, I'm walking down about a - John, I'll get the TV for you.

06 22 47 07 CC Okay; and DAC off.

06 22 47 08 CDR-EVA Charlie, I'll get the TV.

06 22 47 12 LMP-EVA Yeah, okay.

06 22 47 14 CDR-EVA Man, does this thing have steep walls.

06 22 47 16 LMP-EVA They said 60 degrees.

06 22 47 18 CDR-EVA Now, I tell you, I can't see to the bottom of it, and I'm just as close to the edge as I'm going to get. (Laughter) That's the truth.

06 22 47 30 LMP-EVA Okay, going to 2.

06 22 47 44 CC Okay. Our plan here is to range along the edge of the crater for about 80 meters, if you can do that. And, Charlie, if you'll start out with your pan 1 in the 500 millimeter, we'd also like you to shoot some more pictures of Smoky with the 500, and then take your far field stereo. And then if you range on out as far as you can go, we'd like - taking the 500 millimeter with you, take - and John with you - take a stereo of the inside of the crater with the 500 millimeter from as far - far away from the Rover as you can get, and then stick the stereo - or the 500 millimeter in John's SCB, and then do your other far field polarimetry, and then - from then on, all we've got is sampling.

06 22 48 41 CDR-EVA Okay. I think we probably ought to take all those things one at a time.

06 22 48 45 LMP-EVA I do too.

06 22 48 46 CC Okay, fine.

06 22 48 48 LMP-EVA Okay. Do you want me to start out with the 500?

06 22 48 50 CC Right. Go ahead and start out with your 500.

06 22 48 52 LMP-EVA Okay. You say, I start out with the 500? Okay. Okay. Tony, I have magazine Kilo, frame count 1, I think, it was.

06 22 49 06 CC And we've got a picture.

06 22 49 13 LMP-EVA Okay. Those rocks you're looking at now, Tony, are white and they look breccious to me. The big black one is off behind the TV. It's going towards the rim on the crater right now.

06 22 49 34 CDR-LM The unfortunate thing about it, Houston, is that rascally rim - It goes down - It slopes into it about - say, 10 or 15 degrees. It's the kind of slope I'm standing on right now, and then all of a sudden, in order to see to the bottom, I've got to walk another 100 yards down a - a 25- to 30-degree slope, and I don't think I'd better. Maybe we can drive around to the other side and see down into it.

06 22 50 13 CC Man, is that a hole in the ground!

06 22 50 14 LMP-EVA Okay, Tony. The inside - It really is. I see no bedrock, though. All I see is boulders around the crater. There's nothing that reminds me of bedding, just loose boulders. Though it might very well be; it's so shocked that they could be real boulders - I mean, real bedrock there.

- 06 22 50 37 CDR-EVA Now, the - the layering - the boulder layers are horizontally oriented and, of course, they are all colored - covered with talus. Over on the north wall, in particular, about 1/3 of the way from the top is a line of boulders that you probably ought to be able to see on the TV, but they're all oriented right in that line, which would lead one to think that it's bedding there. Don't you see - see that line right over there, Charlie?
- 06 22 51 11 LMP-EVA I - I don't - I'm ... trying to get this crazy camera going here.
- 06 22 51 17 CDR-EVA Okay. And the material is ... - -
- 06 22 51 24 CC Okay. That line of boulders on the north wall, what color were they?
- 06 22 51 30 CDR-EVA They - In this light, they appear to be dark - dark boulders.
- 06 22 51 36 CC Okay. Incidentally, the white rocks you see there. Do they look like the - the Cone Crater type white rocks?
- 06 22 51 48 LMP-EVA No, not to me.
- 06 22 51 51 CC Okay.
- 06 22 51 55 CDR-EVA Better let me get a piece of one, Charlie. I don't think - This is definitely a breccia right here, a big foot-and-a-half breccia. It's a white matrix with dark clasts, and it looks to be a three-rock breccia. Some of the dark clasts have even darker clasts than those.
- 06 22 52 24 LMP-EVA Okay, Tony. I picked up magazine Mike; it's on the 500.
- 06 22 52 29 CC Okay.

06 22 52 30 CDR-EVA Okay. Houston, I just picked up a grab sample of a breccia. It's very friable. It looks shocked; it has black clasts in it - black clasts a couple of millimeters across. And the - It's so worn down that you know what it really looks like? It looks like a - If I can use the analogy - I'm not sure what the heck it is. It looks like a - a tuft. It just looks like a rock with a - You see, the clasts are sticking out of it, is what I'm saying.

06 22 53 20 LMP-EVA Okay, Tony. What other pictures you want me to get with the 500? I've done the interior of the crater. You - you say you wanted Smoky or Stone Mountain?

06 22 53 29 CC Okay. We'd like some more pictures of Smoky.

06 22 53 38 LMP-EVA Okay.

06 22 53 41 CC And, John, in your mineral description there, could you see a crystal shape?

06 22 53 43 LMP-EVA Get up here where I can see.

06 22 53 44 CDR-EVA Okay. While Charlie's doing - Can I see a crystal shape? I saw one clast. One - No. Well, the clasts in there are very angular; maybe that's a zap crater; that's probably what that is. I don't see in the - The white matrix doesn't have any crystalline structure that I can recognize.

06 22 54 17 CC Okay, fine.

06 22 54 34 CC And, Charlie, verify that you turned the DAC off.

06 22 54 37 CDR-EVA And, Tony, what is it you want me to do here?

06 22 54 41 LMP-EVA Yeah, I think so. I'll check again.

06 22 54 44 CC Okay. After the 500 millimeter - -

06 22 54 45 CDR-EVA What is it you want me to do here, Tony?

06 22 54 48 CC We'd like Charlie there to go ahead and take his far field pan of the crater and go on around and do a full pan. It looks like you could probably do the thing from one place. And, John, we'd like you to start ranging out in the most - the best traverse direction for about 80 meters, if you can go that far. And survey the area as you go out, and Charlie will follow you along - along, and then sample as you come back.

06 22 55 17 CDR-EVA Okay. That'll be 80 meters to the northeast here.

06 22 55 22 CC Okay, fine.

06 22 55 23 CDR-EVA No problem to do that, and -

06 22 55 29 LMP-EVA Okay, Tony. Pan is complete, and I'm - I'm up to 165 on magazine Mike.

06 22 55 37 CC Okay.

06 22 55 38 LMP-EVA Okay, Tony. The - My description of the - of the crater. It's covered - 60 percent of it is covered with boulders up to 3 meters. Make that 50 percent of it on the interior; we cannot see the bottom. The boulders are splayed out from the center in rays that about every eighth of - to a quarter of a crater, you have a definite ray.

06 22 56 10 CC Okay. And, John, did you get a tag number on that?

06 22 56 12 LMP-EVA Can I - You still want me to take the 500?

06 22 56 16 CDR-EVA Ch, yeah. Excuse me. It's 373, I think.

06 22 56 20 CC Okay; we copy that.

06 22 56 21 CDR-EVA It's in the bottom of SCB-7. Anyway, I - I can identify that rock for you.

06 22 56 25 CC Okay, that's fine. Yeah, Charlie. After your 500 millimeter - -

06 22 56 28 LMP-EVA Tony, do you still want me to get - -

06 22 56 31 CC - - after your 500 millimeter, do the far field pan and the three polarizer settings of the far side of the crater. And then when you follow John along, take the 500 millimeter with you.

06 22 56 45 CDR-EVA Okay. You want me to help Tony to get - I mean Charlie to get the rocks - rocks. You want to get the near field first, Charlie?

06 22 56 52 LMP-EVA We're not doing it.

06 22 56 53 CC We're not doing a near field.

06 22 56 55 CDR-EVA - - ... today. Okay.

06 22 56 56 LMP-EVA Yeah, okay.

06 22 56 58 CDR-EVA Understand.

06 22 56 59 LMP-EVA Okay; John, I'm going to bring a sample bag with that 500 millimeter in it, so we won't - -

06 22 57 04 CDR-EVA Okay, I got - I got - I've got a sample bag here.

06 22 57 08 LMP-EVA Okay. Okay, Tony. I'm starting this polarimetry from - from about the 10 o'clock position of the Rover.

06 22 57 25 CC Okay. You're starting in the right position?

06 22 57 28 LMP-EVA Yeah. Yeah, I'm starting in the right position. I've got f/6, 1/25, at 74. And I'll do a partial pan with each film - with each setting. It's going to be about an eight-picture pan.

06 22 57 46 CC Okay, good show.

06 22 57 51 LMP-EVA Man, I wish I could see the bottom of this beauty.

06 22 57 55 CDR-EVA Did I drop my bags, Charlie?

06 22 57 57 LMP-EVA Yeah, you dropped your bags; I thought you dropped them off the Rover. Okay. That was in the right - going from right to left in the right setting. Center setting going from left to right.

06 22 58 18 CDR-EVA There they are.

06 22 58 20 LMP-EVA ...

06 22 58 28 CDR-EVA Should have told me I dropped them, Houston.

06 22 58 31 CC Sorry, John. Didn't see it.

06 22 58 34 LMP-EVA Okay. In the left - Okay, Tony. In the left setting going from right to left. Tony, we can look out at the 12 - at my 12 o'clock position here, I can look down and see a large block that's on this inner flank here that I can't - -

06 22 59 02 CC John, is there still something behind you?

06 22 59 03 LMP-EVA - - It's dust covered, and I can't tell you what type it is.

06 22 59 09 CDR-EVA Huh?

06 22 59 10 CC We thought we saw something still lying there where you fell over.

06 22 59 12 CDR-EVA ...

06 22 59 13 CC Okay.

06 22 59 27 LMP-EVA Okay, Tony. Magazine Kilo; I'm up to 40 with a - -

06 22 59 30 CC Okay.

06 22 59 31 LMP-EVA - - with a far field - -

06 22 59 34 CC Okay, very good - -

06 22 59 35 LMP-EVA - - and I'm in the left position; I'm going back to the right. Now - now, you want that stereo base, right?

06 22 59 42 CC That's right. We'd like you to leave the polarizer on and take the 500 millimeter with you also, and then range out your 80 meters. You can either take take a SCB - -

06 22 59 52 LMP-EVA Okay. We're gonna range - -

06 22 59 53 CC - - and stow the 500 millimeter, or stick the 500 millimeter in John's SCB when you're through with it.

06 23 00 01 LMP-EVA We'll take one.

06 23 00 02 CC Okay - -

06 23 00 03 CDR-EVA I've got one - I've got one, Charlie.

06 23 00 04 LMP-EVA Okay; your's fell off - Where's yours that was on your back?

06 23 00 14 CDR-EVA Oh, it fell off en route. I can't believe it. Dadgummit!

06 23 00 19 LMP-EVA Okay. Tony, if that thing fell off, the SES - the SESC was in it.

06 23 00 24 CC Okay.

06 23 00 25 CDR-EVA Probably get it on the way back, Charlie.

06 23 00 34 LMP-EVA This is giving us - these things are giving us more trouble than the whole - Hey, John, we'll save that one for rocks. I'll put the camera in this one.

06 23 00 44 CDR-EVA Okay.

06 23 00 46 LMP-EVA Okay. Have you got - I'm going to get the shovel. Tony, are you going to want a rake sample along the rim here?

06 23 00 58 CDR-EVA Yeah, let's do that now - -

06 23 00 59 CC No. Let's go get the polarizer first and - -

06 23 01 00 CDR-EVA ... Rover ...

06 23 01 01 LMP-EVA Okay.

06 23 01 02 CC - - polarizing pictures yet, and we'll do the sampling on the way back.

06 23 01 10 CDR-EVA This is about as far as I'd like to go.

06 23 01 14 LMP-EVA That's about 80 meters, John. Man, are we dusty.

06 23 01 19 CDR-EVA I can't see the bottom of the crater though.

06 23 01 20 LMP-EVA I know it. That's a shame. You see that big rock beyond John, Tony?

06 23 01 28 CC Yeah, we sure do. How about rolling that one over?

06 23 01 33 LMP-EVA (Laughter) No way.

06 23 01 45 CC And when you get to a convenient time there, we'd like an EMU check.

06 23 02 02 LMP-EVA Okay. Okay. Tony, right under the upper dull gray soil, there's a - a layer of a whitish material much like it was in South Ray.

06 23 02 25 CC Okay.

06 23 02 26 LMP-EVA Yeah. I'll go over, and there's the shovel you can use to pick that up with, John.

06 23 02 29 CDR-EVA Okay.

06 23 02 32 LMP-EVA Okay; I'm going to get the far field from right here, and I must have a 70- to 90-meter base, I'd say.

06 23 02 43 CC Good show.

06 23 02 46 LMP-EVA Maybe only 50 - Let me move - let me move down a little bit farther.

06 23 02 49 CDR-EVA Okay. Charlie, don't back into nothing now, you hear?

06 23 02 52 LMP-EVA I'm - I'm watching where I'm going (laughter).

06 23 02 56 CDR-EVA Okay, Houston. I'm going to pick up a sample which I think is a black-type rock, but it's sort of dust covered.

06 23 03 13 LMP-EVA Okay. Starting the pan in the right position, Tony.

06 23 03 15 CC Okay.

06 23 03 17 LMP-EVA From right to left.

06 23 03 33 CDR-EVA Oh, boy! Well, I was wrong; it was a very friable - very friable - looks - Must be shocked white rock with a lot of black clasts; 50 percent of the clasts in it are - or the clasts or the matrixes consist - Try that again. Looks like about 50 percent of the rock is black clasts, which was a lot more than the last rock I picked up, and it sure is friable, so that means it's taken a heck of a beating. And that's going into bag number 383.

06 23 04 40 LMP-EVA Hey, Tony, the pan is complete in all three settings, and I'm up to - I'm up to 80. Do you want a 500 from here also, Tony?

06 23 05 11 CC Right, sure do. You probably have 20 or 25 pictures left in that 500, so maybe that'll give you the entire inside of the crater there. We'll just shoot up the rest of the roll in there.

06 23 05 23 LMP-EVA Okay. Okay.

06 23 05 34 CC And if you're through with your far field, you can just throw that polarizer away.

06 23 05 41 LMP-EVA I will in a minute. Okay; you wanted an EMU check. Flags are clear; I'm at 38, and INTERMEDIATE, about INTERMEDIATE cooling.

06 23 05 55 CC Okay; and O₂?

06 23 06 01 LMP-EVA I think about 75 percent, but it's so dusty I can't read it right now, Tony.

06 23 06 04 CC Okay.

06 23 06 09 CDR-EVA Yeah. I - I can't see mine either, Houston.

06 23 06 12 LMP-EVA Can y'all see it down there?

06 23 06 14 CC Right. We've got about 67 percent - -

06 23 06 16 CDR-EVA I'm reading 25, I'm in INTERMEDIATE cooling. Okay.

06 23 06 23 CDR-EVA When you get dust on the RCU, you cannot read the O₂ quantity.

06 23 06 37 CC Okay, you are all doing fine down here.

06 23 06 40 LMP-EVA Okay, Tony. Okay, Tony. I'm doing some vertical stereo - stereos of these rays coming out of the crater. Oh! Out of film.

06 23 06 56 CC Okay. How much of the inside did you get?

06 23 07 02 LMP-EVA Oh, I got one partial pan of about three-quarters of the way up of the entire wall, and then two ray - two vertical - almost two vertical rays - -

06 23 07 16 CC Okay, we understand.

06 23 07 17 LMP-EVA - - before I ran out.

06 23 07 32 LMP-EVA Guess what, John?

06 23 07 33 CDR-EVA What's that, Charlie?

06 23 07 34 LMP-EVA My bags fell off, somewhere.

06 23 07 40 CDR-EVA Well, I've got mine hooked over my little finger. *** fall off from there.

06 23 07 54 LMP-EVA Look at this rock right here, John. Pure white.

06 23 07 59 CDR-EVA Yeah.

06 23 08 00 LMP-EVA Yeah, right - And it's really shocked, whatever it is. It - it looks like chalk, Tony, it's so shocked. It's about pebble size, and it's broken open. All right, let's - let's make it 5 centimeters long, broken open. John, could you bring me a - Let me get this one documented.

06 23 08 36 LMP-EVA Okay. The polarizing filter's coming off, I hope.

06 23 08 42 CC Okay, Charlie. And we'll just call that the end of the 500 millimeter.

06 23 08 48 LMP-EVA Okay. Sorry I ran out of film there. I thought I had plenty.

06 23 08 54 CC Oh, that's all right.

06 23 09 00 LMP-EVA Okay, Tony. I'm going back towards the MIN in cooling. I'm getting a little frosty.

06 23 09 09 CC Okay.

06 23 09 11 CDR-EVA Okay, Houston. The black clasts in this rock are really - really black material. It's either a very fine-grained black breccia - I'll tell you what it looks like. It looks like that black breccia, fine-grained line that had that white clasts in it on Apollo 15. Although here, the matrix is white, and the clasts are black.

06 23 09 54 CC Okay, understand. How large are the clasts?

06 23 09 56 CDR-EVA You remember that one, Houston?

06 23 09 57 CC Roger. I remember. Is this black breccia frothy too?

06 23 10 03 CDR-EVA Three centimeters. No, it's not frothy at all. It's dense.

06 23 10 08 CC Okay.

06 23 10 10 CDR-EVA It could be - it could be a very dense basalt-like rock. It is - it's cleavage - I mean it looks like it has the 90-degree cleavage on it, and I'm hard put to tell that. That's just the way it breaks. But it's sure shocked. It's too big to go in the bag, but I'm going to put it in there anyway.

06 23 10 33 CC Okay.

06 23 10 36 CDR-EVA At least it has a shocked appearance. What did you do with the shovel, Charlie?

06 23 10 42 LMP-EVA I got it. I'm sorry. I thought you weren't using it. I was just going to get this one over here.

06 23 10 46 CDR-EVA Okay.

06 23 10 47 LMP-EVA Yeah. I finally got the polarizing filter off, Tony.

06 23 10 52 CC Okay.

06 23 10 55 LMP-EVA Okay. Looking back from where we are, Tony, towards the west - the south, rather, I can see South Ray.

06 23 11 07 CDR-EVA I'd like to make sure we aren't overlooking something here, Charlie.

06 23 11 11 LMP-EVA That's why I'd like to go on down to that black rock down there, John.

06 23 11 15 CDR-EVA Hey, that's one (laughter) you've really got your eye on, I can tell.

06 23 11 19 LMP-EVA Big one.

06 23 11 20 CDR-EVA Yeah. Okay. Here's a small secondary up here on top of the - of the - of the rim. It's about a meter across, about a meter deep, and it has either angular - very angular black clasts or part of this black rock in total. And they must be - they must be 4 or 5 centimeters across in there, and I'll get one or two of those babies.

06 23 12 02 LMP-EVA Hey, John. Can I get a bag from you?

06 23 12 04 CDR-EVA Sure. Took my gnomon. You'll have to get - you'll have to get the shadow for scaling, Houston. Here you go.

06 23 12 15 CC Okay.

06 23 12 19 LMP-EVA Okay, Tony. I picked up that white -

06 23 12 25 CDR-EVA I'll get it for you.

06 23 12 26 LMP-EVA Thank you. That white shocked rock. It's broke in two, and here are two pieces of it. Partially documented - the befores anyway, and 384.

06 23 12 42 CC Okay, bag 384.

06 23 12 43 LMP-EVA And I'm going back and get some bags.

06 23 12 50 CDR-EVA There. I've got Charlie's shovel for scale for the before shooting.

06 23 13 01 CDR-EVA You can almost get local vertical on the shovel because you have to balance it before it will stand up.

06 23 13 07 CC Okay.

06 23 13 30 CC Okay. Charlie, did you bring the 500 millimeter back with you?

06 23 13 36 LMP-EVA See me coming?

06 23 13 38 CC No. We're pointed over at John - -

06 23 13 40 LMP-EVA It's in the bag. Oh, okay. Hey, y'all must really be zoomed in then.

06 23 13 48 CC We sure are.

06 23 13 49 LMP-EVA I'm just a few feet to the left of him.

06 23 14 04 LMP-EVA Y'all didn't see any bags fall off anywhere, did you?

06 23 14 08 CC No, we didn't see them.

06 23 14 09 LMP-EVA Your big eye.

06 23 14 13 CDR-EVA That - -

06 23 14 14 CC There we've got you, Charlie.

06 23 14 15 CDR-EVA The outer surface of that rock is dust covered. It appears to be a really black clasts that's going into 385.

06 23 14 25 CC Okay, 385.

06 23 14 39 LMP-EVA I can't believe it. What a spectacular view looking back to the east and to the south, Tony. See Eaby Ray, way on past Kennesaw where there's a bright fresh crater down there on its flank. Okay. I need to get some more bags, but I don't have a holder. My holder - -

- 06 23 15 03 CDR-EVA What really attracted me to this rock, even though it's dust covered, Houston, is the fact that - is the fact that it has right angles to it. It did before I picked it up.
- 06 23 15 30 CC Right. Remember those blocks up at Nevada Test Site? From the rim, they broke at right angles, too.
- 06 23 15 44 CDR-EVA Yeah. This next one that's going in, it is so dust covered after I picked it up and dropped it into the dirt, I can't describe it to you other than to say it's dust covered. It's going into bag 386.
- 06 23 15 56 CC Okay, 386.
- 06 23 16 01 LMP-EVA Okay, Tony. The 500 is complete. What do you want me to do now?
- 06 23 16 05 CC Just go back and sample. We'd like big boulder samples, and look for that - Well, I guess, we're just boulder sampling now.
- 06 23 16 16 LMP-EVA Okay. I'd like to go up to the southwest around the rim in the other direction from John, and try my hand at these large white rocks.
- 06 23 16 28 CDR-EVA Charlie, do you want to drive the - I don't think we can drive the Rover over to here.
- 06 23 16 31 LMP-EVA No, I agree. I - that's not very much - I was just going up here a little bit, John, and do some flight line stereo of this 3-meter block up here. Tony, some of these places are - are - Rocks are glass covered. They are all fractured.
- 06 23 16 59 CC Okay.
- 06 23 17 00 LMP-EVA - - ... 30 feet, up looking - -
- 06 23 17 01 CC That's fine, Charlie, if you want to go down that way.
- 06 23 17 06 LMP-EVA Okay, I'm going -
- 06 23 17 11 CDR-EVA If you're going to boulder sample, Charlie, I'd better come and help you.

06 23 17 14 LMP-EVA No, I'm just going to whack - I'm not really going to do the - the true thing. I'll be down there to help you in a minute.

06 23 17 21 CDR-EVA Yeah, let's - You want to go down to this big boulder down here?

06 23 17 24 LMP-EVA I'd like to, in a minute. I wanted to make sure we get this - what this - ever this is up here on these white rocks. I think you probably have it, but -

06 23 17 32 CC John, how far away is that big boulder?

06 23 17 38 CDR-EVA It is about, near as I can tell, 150 meters, but the rocks - rocks around it are really something else. That's the problem, the trafficability up to it.

06 23 17 58 CC If you think you can work up there, it sounds like an awful good place to work.

06 23 18 08 CC Charlie, you just dropped your bags.

06 23 18 11 LMP-EVA I know; it's empty. It didn't have a thing in it.

06 23 18 23 LMP-EVA Okay - here's an old glassy rock, Tony, that - the glass coated - coated. Anyway, it went into 415.

06 23 18 33 CC Okay; 415.

06 23 18 45 CDR-EVA And it was hackly looking on the surface. That's why I stopped to get it.

06 23 18 51 CC Okay.

06 23 18 57 CDR-EVA Charlie, we could probably get a pretty good cross section up here with just a rake sample.

06 23 19 01 LMP-EVA Yeah, I agree. Like here is - is a little - a little crater right there that was - had uncovered some -

06 23 19 26 LMP-EVA Okay, Tony. I'm going to give you a little stereo on this boulder.

06 23 19 30 CC Okay. If you see any clasts - -

06 23 19 31 CDR-EVA This is going ...

06 23 19 32 CC - - or anything in it, a closeup might look good.

06 23 19 36 LMP-EVA That's what I'm going to do.

06 23 19 37 CC Okay.

06 23 19 47 LMP-EVA Boy, it is hot out here today, I'll tell you.

06 23 19 49 CDR-EVA Want to give me a hand with this rake sample, Charlie, or want me -

06 23 19 54 LMP-EVA Yeah, if you'll - if you can stand by just a minute, John.

06 23 20 01 CDR-EVA Charlie described this boulder right here to you. Did you describe this one with the black streak running through it?

06 23 20 09 LMP-EVA No.

06 23 20 11 CDR-EVA Boy, that is absolutely beautiful! It has a black fracture pattern running right through the middle of it. It's about - about 6 - It looks like a subdued breccia, and that's the truth. I can't believe it.

06 23 20 31 CC Good. Maybe we can get some of that.

06 23 20 33 LMP-EVA And, Tony, I'm ... - -

06 23 20 35 CC And, Charlie, while you're up at that boulder, if you can, get - -

06 23 20 37 CDR-EVA ... reach for some of that, because that -

06 23 20 38 CC - - some of that fillet as well as the boulder.

06 23 20 43 LMP-EVA Okay; I don't have anything to fillet with, but we'll see.

06 23 20 50 CC Okay.

06 23 20 51 LMP-EVA Be advised that - Just dropped the bags.

06 23 20 55 CC Roger. We saw.

06 23 21 01 CDR-EVA Charlie, I think with these equipment problems, we'd better work together, and I'll handle one bag, and you handle the other bag, and be able to be more productive. Don't you?

06 23 21 10 LMP-EVA Yeah. I guess you're right, John.

06 23 21 11 CC We concur.

06 23 21 12 LMP-EVA There's one of these white rocks up here, John, that's got a fracture on it, if you'll just let me -

06 23 21 19 CDR-EVA Got a hammer?

06 23 21 20 LMP-EVA Yeah, I got the hammer. When it's this loose, the stuff is lying up there on the top.

06 23 21 30 LMP-EVA Hey, Tony, we'll fillet for you - sample for you up here.

06 23 21 39 CDR-EVA Got a shovel?

06 23 21 40 LMP-EVA Yeah, I - No, I don't have a shovel, but I got a - a hammer. Now I'm going to -

06 23 21 48 CDR-EVA I'll come up there and help you. We can do the rake sampling - I'm making it - -

06 23 21 57 CC Charlie, if possible, we'd like to sample some of that stuff on top of the boulder. I think that's what you're going to do there.

06 23 22 03 LMP-EVA What I'm going to do - That's what I'm going to do.

06 23 22 07 CC Good show. You're about ten steps ahead of us.

06 23 22 13 LMP-EVA I'm not going to give you any scale, though; it's just too - With our problems here, like John said, it's -

06 23 22 21 CC That's okay. If you bring it back, that will be enough scale.

- 06 23 22 27 LMP-EVA Okay. And it looks like it's the same thing that John has described. It's a friable breccia with a black clast, being an amphonitic. The largest clast I see is - oh, not in this sample, but it's a black one that's a centimeter across. It has a bluish tint to it, Tony. It looks like all those shocked rocks that Fred Hurst [?] was telling us about, exactly. And that's in bag 4 - wait a minute - 416.
- 06 23 23 19 CC Okay, 416. And from today's experience and yesterday's, it sounds like old Fred's briefings were pretty useful.
- 06 23 23 31 LMP-EVA It turned out pretty good, I think.
- 06 23 23 35 CDR-EVA Charlie, put that in my bag.
- 06 23 23 37 LMP-EVA Okay. You don't have a bag. It fell off. I see both of them. We'll just use this one. Okay? They want a fillet up here, John. Could we get a fillet up there where that gnomon is? I'll get the cross-Sun.
- 06 23 24 19 LMP-EVA I thought I'd use my little finger as a bag holder. Good. Okay; that fillet is 417, Tony.
- 06 23 24 33 CC Okay, 417.
- 06 23 24 36 LMP-EVA He put it - -
- 06 23 24 40 CDR-EVA Huh? Okay. I'll get the down-Sun here.
- 06 23 24 45 LMP-EVA Okay. There's an after, and I'll try to get a locator from up here. And you can almost - -
- 06 23 24 58 CDR-EVA Yeah, but - Did you get the boulder off the top?
- 06 23 25 01 LMP-EVA Yes, I did. I got that sample.
- 06 23 25 03 CDR-EVA Okay; it's - it's a multirock breccia. Boy!
- 06 23 25 09 LMP-EVA The matrix is the white - white, though, Tony, with the black being the clast.

06 23 25 15 CDR-EVA Yeah. I see at least two different colors of light dark clasts. They must be at least - must be at least a three rocker.

06 23 25 27 CC Good show. You feel like you got all three?

06 23 25 28 CDR-EVA Let's get a rake sample, Charlie.

06 23 25 29 LMP-EVA Okay; good idea, John.

06 23 25 35 CDR-EVA I can't imagine how they wouldn't be in the - the - the clast that Charlie picked up. Look at these rocks here that I just stepped on.

06 23 26 00 LMP-EVA Hey, John. I'm beat - I'm chipping out this little teeny - this big black clast here. It's coming right out.

06 23 26 05 CDR-EVA Okay.

06 23 26 06 LMP-EVA I don't think we got any of - in that sample I got.

06 23 26 17 LMP-EVA And that thing is so friable. Hey, I got it!

06 23 26 22 CC Very good. While you're looking around up there, you might keep your eye out for a permanent shadow area, and we'll go ahead and put it in the regular sample bag and forget the SESC.

06 23 26 35 LMP-EVA Okay, Tony. This black clast I chipped out is an amphonitic matrix with some - It looks like a basalt - typical basalt to me. And I'll show you - I can get a picture of it after I've chipped it out. I didn't think I was going to be able to, but it came out. Get a 5-footer crumb.

06 23 27 10 LMP-EVA It's going in 418.

06 23 27 13 CC Okay; 418. Sounds like a good one.

06 23 27 15 LMP-EVA And that's a rock - And I haven't - Yeah. I haven't seen a rock like that before in the Apollo samples.

06 23 27 22 CC Good show. Another first for 16.

06 23 27 38 CDR-EVA Okay, Houston. I have a rock here that is a fine white crystalline rock. It's pretty well dust covered, but I don't see any - I do not see any clasts in it.

06 23 27 52 CC Okay.

06 23 27 57 CDR-EVA Of course, it could be just a hunk of matrix that got busted loose. But as fine as these clasts are in it - That's going into bag 387. As fine as these rocks are, I don't see how you can miss - miss one.

06 23 28 16 LMP-EVA Sorry we're working behind that big rock there, Tony, from the tube. Why don't we get out - -

06 23 28 24 CC That's okay ...

06 23 28 25 LMP-EVA - - and do a rake sample ... where they can see us.

06 23 28 27 CDR-EVA I think - -

06 23 28 29 LMP-EVA Well, just anywhere we rake, we got to rake a good sample.

06 23 28 34 CDR-EVA Yeah. Charlie, let's get a - a - -

06 23 28 41 LMP-EVA Dadgummit. Do what, John?

06 23 28 48 CDR-EVA Let's get a soil sample right here.

06 23 28 51 LMP-EVA Okay.

06 23 28 54 CDR-EVA Stick this - I can get it with this.

06 23 28 56 LMP-EVA Okay. You want to document it?

06 23 28 59 CDR-EVA Yeah, we can, but I don't really see much -

06 23 29 08 LMP-EVA Boy, this equipment problem is really handicapping us.

06 23 29 24 LMP-EVA Okay. There's a - Wow! Boy, the regolith here, Tony, up on this crater rim is really soft. We're sinking in on these slopes about 6 inches or so.

06 23 29 43 CDR-EVA Okay.

06 23 29 46 LMP-EVA Oh, I missed it. That's a good one. Okay. The soil sample here out - is 419.

06 23 29 55 CDR-EVA Okay.

06 23 29 56 LMP-EVA Okay. That's good.

06 23 30 04 CDR-EVA The rake's on here.

06 23 30 07 LMP-EVA Let's get in a clear spot, John, to rake. Okay?

06 23 30 10 CDR-EVA Well, we can do it down there, too.

06 23 30 11 LMP-EVA Okay. Okay. It looks almost fruitless up here. Oh, no. There's some rocks.

06 23 30 18 CDR-EVA Lot of rocks there, Charlie. One rake sample.

06 23 30 21 LMP-EVA Okay. One rake sample right out here, Tony.

06 23 30 25 CC Sounds good.

06 23 30 27 LMP-EVA You can see us on the tube.

06 23 30 28 CC That's fine.

06 23 30 29 LMP-EVA It's going into 48 - it's going in 420.

06 23 30 33 CC Okay.

06 23 30 36 CDR-EVA Just hold still.

06 23 30 39 LMP-EVA Oh, he's got some nice ones there.

06 23 30 42 CDR-EVA See what I'm doing?

06 23 30 45 LMP-EVA That's it.

06 23 30 46 CDR-EVA That got them in there?

06 23 30 47 LMP-EVA Yep.

06 23 30 48 CDR-EVA Amazing.

06 23 30 51 LMP-EVA And so dust covered, I can't really see what they are. I can't believe all those bags dropped off. Put that one in.

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06 23 31 05 LMP-EVA Okay.

06 23 31 06 CDR-EVA Let me carry it.

06 23 31 07 LMP-EVA Where you want to go?

06 23 31 08 CDR-EVA Go on back to - -

06 23 31 09 LMP-EVA Oh! I got it. I got it, John.

06 23 31 12 CDR-EVA Let me get it, after that.

06 23 31 17 LMP-EVA Save you some energy. It is hot out here. Hey - here, give me my bag; I'm - I'll carry the bag. Got it.

06 23 31 35 LMP-EVA Okay, Tony. Why don't we go down halfway, John, and do another rake sample, and then go down to the black - big, black rock?

06 23 31 43 CDR-EVA All right. Yeah.

06 23 31 46 LMP-EVA And that's a good - That'll be about 150-meter radial - not radial, but concentric sampling. I'm on INTERMEDIATE cooling now, Tony.

06 23 32 05 CC Okay, we copy that.

06 23 32 08 CDR-EVA I'm halfway between.

06 23 32 13 CC While you two are working together, you may be able to put the bag shoe into the core cap holder on the side of Charlie's PLSS. You won't be able to run that way, but, at least, it'll be some place to hang it while you're working.

06 23 32 29 LMP-EVA Here, John, let me - I'll take this down, and we'll get down in this little hollow. If not, we'll use that for the - gnomon. How's that for the rake sample? Okay?

06 23 32 41 CDR-EVA Yeah. Let me see if I can stick my bag into your holder like -

06 23 32 44 LMP-EVA Won't be able to ride with it that way, huh?

06 23 32 46 CC No, it'll probably pop out, but you can look at it.

06 23 32 49 LMP-EVA I'll just keep it on my - -
06 23 32 50 CDR-EVA Keep it over your - Push it way up on your finger.
06 23 32 55 LMP-EVA Yeah. If I push it up on my middle finger, it
ain't going to fall off. I won't even know it's
there.
06 23 33 01 CC Okay.
06 23 33 03 LMP-EVA I'm going to get a down-Sun and a cross-Sun here.
06 23 33 14 LMP-EVA You got it.
06 23 33 24 LMP-EVA John, have I still got my SCB on my back?
06 23 33 29 CDR-EVA Yep.
06 23 33 30 LMP-EVA Okay.
06 23 33 35 CDR-EVA Come right down this way.
06 23 33 40 LMP-EVA Okay. John's getting about two rakes; he's done
two rakes, and he's got about 15 - 15 pebbles.
06 23 33 52 CDR-EVA There's not any there.
06 23 33 54 LMP-EVA That's a pretty good, little sample. There you
go. Look at that. That's a bagful now. Third
one was really fruitful.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 22 05 43 CMP Henry, are the surface guys out cranking up their
little car yet?
06 22 05 51 CC Yes, sir. They got out about 30 minutes early,
and they are moving on out.
06 22 08 40 CC Casper, Houston. John and Charlie are powering
up the LRV now, and FAO says you're cleared to
use magazine EE and KK. At the present, they
are on schedule.

06 22 08 59 CMP EE and KK. Okay, what kind are they? Are they CEX?

06 22 09 04 CC Both of those are CEX.

06 22 09 10 CMP Okay. And I'll just use the settings off the photo wheel the same as we use for the 250.

06 22 09 18 CC That ought to work out okay, Ken.

06 22 09 23 CMP Okay. Thank you.

06 22 11 43 CC Casper, we have been noting a little oscillation in the high gain at acquisition, and we were wondering if you're still noticing that discrepancy between the angles and the knobs when you're in the manual mode. It appears to us that it may be off a little bit in yaw.

06 22 12 07 CMP Okay, I'll - I'll set them on the - I've been setting them on the dials rather than on the knobs.

06 22 12 20 CC Right. That's preferable - to use the meter there.

06 22 12 28 CMP Okay.

06 22 12 30 CC Is that dial for setting the yaw - is it loose?

06 22 12 38 CMP No. No. Huh-uh. It just has that bias. It had it during - I guess it was the last time we were out there in the bird before flight for some test, I noticed that it had a difference in reading. I can't remember now what the occasion was, but I know that - that - that the biggest error is in the pitch channel rather than in the yaw channel.

06 22 13 14 CC Okay, we copy.

06 22 13 20 CMP Do you have a procedure you'd rather have me try at acquisition to help out?

06 22 13 37 CC Okay, if you see the signal strength oscillating a little bit, I guess the best procedure is to go to WIDE and wait.

06 22 13 47 CMP Okay.

06 22 15 45 CC Casper, we are about 3 minutes from LOS. Everything is looking good. The laser has degraded a little more, but other than that, everything is okay.

06 22 16 00 CMP Okay. I'll see you on the other side.

06 22 16 04 CC All righty.

(NO COMM FOR 51 MINUTES)

06 22 55 XX BEGIN LUNAR REV 48

06 23 06 59 CMP Hello, Houston. Are you there?

06 23 07 02 CC Hello, Casper. How is it going?

06 23 07 07 CMP Oh, pretty good. Got our solar corona done, and we got a little 16-millimeter strip ... - Unfortunately, I missed the first couple of minutes while I was changing mags, but you'll pretty close to a full rev. This has turned out to be a - I was looking through the Flight Plan to see a good rev, and it looked like this one has the hatch window pointing almost straight down; it's probably the best rev we got going.

06 23 07 40 CC Okay. Did you see anything worth talking about up there before AOS?

06 23 07 51 CMP No, sir. I spent all my time getting the camera set up.

06 23 07 58 CC Roger. John and Charlie are at North Ray now, and, boy, is that a big hole.

06 23 08 05 CMP Did they have any trouble getting up there? I guess not.

06 23 08 08 CC Negative. They whizzed right on up there. Unfortunately, they are not in a position they can see the bottom, and it looks like they might have to fall in it first.

06 23 08 21 CMP Well, let's not get that picture.

06 23 08 24 CC Roger. And also a surprise. They didn't see any evidence of bedding in the crater anywhere they looked.

06 23 08 34 CMP I don't see any from here, either. It looks like a little slumping, but that's all.

06 23 08 40 CC I guess those little things we saw in the photos just fooled us. It turns out that that little black spot on the east rim that was in the photo was really there. It turns out it's one huge dark-colored rock.

06 23 08 57 CMP Is that right? Wonderful. They're going to chip it and get a piece out of the center, huh?

06 23 09 04 CC Well, we wanted them to turn it over, but they decided against it.

06 23 09 22 CMP Did they make any comment on what the material looked like on their drive up to North Ray?

06 23 09 29 CC Most of it appeared to be breccia; however, they did pass one that was a frothy looking thing that - we probably saw our first basalt.

06 23 09 53 CMP Well, it still looks like to me that path that they drove up on is part of all that furrowed Descartes unit.

06 23 10 38 CMP Hank, would you give me a call at time 39 please?

06 23 10 45 CC Okay. Will do. And could you give us AUTO - -

06 23 10 49 CMP Thank you - -

06 23 10 50 CC - - for the HIGH GAIN?

06 23 10 52 CMP - - stopped again. You've got it.

06 23 11 16 CC And, Ken, if you like, I can go ahead and read up your plane change pad.

06 23 11 25 CMP Okay, let me - let me do a couple more cleanup chores and I'll be ready to copy.

06 23 11 29 CC Okay, and they are just putting on the finishing touches on the Flight Plan change.

06 23 11 38 CMP Okay.

06 23 13 12 CC Casper, if you will give us ACCEPT, we'll send up your state vector and target load.

06 23 13 27 CMP Okay; you have it.

06 23 14 06 CMP My water spout looks like a Christmas tree ornament. It's actually very pretty. It's got a nice big bubble of water about an inch and a half in diameter sitting there on it, just looking at me. And it's just as round - it looks like the cartoons of the - the Jello that all the little mice play in.

06 23 14 36 CC Roger.

06 23 16 17 CMP And, Hank, I took a couple of pictures on frame ZZ; that's frame numbers 22 and 23, of that water bubble, so the folks can see what we're talking about when we say that - that gas separator has a big bubble on the end of it.

06 23 16 38 CC Roger.

06 23 18 22 CMP Casper, the computer is yours.

06 23 18 29 CMP Okay, be with you - Okay, that's in BLOCK. And do you remember the guys - I think the folks from Marshall - saying that they thought if you had bubble of water and you hit it with another bubble in zero g that one bubble ought to go through the other one?

06 23 18 58 CC Roger.

06 23 19 03 CMP It seems like they said something like that. I don't remember all the details, but I thought here was a good chance. I had one bubble, I'd try a second one. And I put the water gun on it. And from where I was standing, I really couldn't see all the dynamics; but it looks to me like it splashed out the back side, and the bubble was still intact on the front. Now whether it went through or had a reflection and bounced off the the other side, I can't really tell. It did develop some air bubbles inside of the big bubble. So there may be some interesting dynamics there.

06 23 19 39 CC Hey, that sounds real interesting.

06 23 19 50 CMP Okay. I got my toys put up now and I guess next thing in order is to copy a little plane change pad, huh?

06 23 20 00 CC Roger. Are you ready to copy?

06 23 20 12 CMP Yes, sir.

06 23 20 18 CC Okay. LOPC-1, SPS/G&N; 38585; plus 0.45, plus 1.02; 169:17:39.49; minus 0001.5, minus 0124.7, all zips; attitude is all zips; 0 pitch - roll, pitch and yaw; NOUN 44, 0064.5, plus 0055.3; 0124.7, 0:07, 0113.0; the rest is NA; Sirius and Rigel; 197, 240, 301; two jets, 16 seconds; quads Bravo and Delta; other, HIGH GAIN angles for AOS and burn altitude, PITCH; plus 13; YAW, plus 258.

06 23 22 04 CMP Okay. I copy LOPC-1, SPS/G&N; 38585; plus 0.45, plus 1.02; 169:17:39.49; minus 0001.5, minus 0124.7, all zips; attitude is all zips; 0064.5 plus 0055.3; 0124.7, 0:07, 0113.0; Sirius and Rigel; 197, 240, 301; two jets for 16 seconds on quads Bravo and Delta; HIGH GAIN angles at AOS, PITCH plus 13, YAW plus 258.

06 23 22 44 CC Good readback, Ken.

06 23 26 18 CMP Hank, we didn't say anything about this VERB 48 at 167:20, but I assume we meant to delete that.

06 23 26 29 CC I called that up to you, Ken. I thought you got that. You acknowledged it.

06 23 26 39 CMP Okay. Well, that's another on my score, then.

06 23 28 37 CC Casper, we done passed your 39. It's 40 now.

06 23 28 44 CMP Okay. Thank you.

06 23 28 45 CC Sorry about that.

06 23 28 52 CMP Ha, that evens the score.

06 23 28 56 CC Roger.

06 23 29 10 CMP That's not fair. I was really going to - I really did forget, because I was going to engage you in some verbal discourse to distract you so that you would let me forget it and I could redeem myself.

06 23 29 25 CC Roger. I had - I had a diversion down here. We're fighting the Flight Plan.

06 23 30 33 CC And, Ken, we'd like to get your Flight Plan update up to you, and would you prefer to do it after your visuals or start on it now?

06 23 30 45 CMP Oh, let's see. How much time have I got? Probably I'd just as soon start now.

06 23 30 52 CC Okay, why don't we get going with it then? Okay, the first - the first change comes at 168:05.

06 23 31 13 CMP Okay.

06 23 31 14 CC At 168:05, MAPPING CAMERA, OFF, T-stop; VERB 49 maneuver to P52 attitude; that attitude is 142, 250, 042. MAPPING CAMERA, STANDBY - that should be 30 seconds, about the time you do that maneuver; IMAGE MOTION. OFF.

06 23 31 59 CMP Roger.

06 23 32 05 CC LASER ALTIMETER, OFF - and that's a verify; MAPPING CAMERA, RETRACT; X-RAY, STANDBY; MASS SPEC ION SOURCE OFF; MASS SPEC EXPERIMENTS, STANDBY. And there is a caution: wait 5 minutes before RETRACT; MAPPING CAMERA/LASER ALTIMETER COVER, CLOSED; ALPHA PARTICLE X-RAY COVER, CLOSED; GAMMA RAY, RETRACT; MASS SPEC, RETRACT: enable all jets.

06 23 33 37 CMP Okay, just a second and I'll read it back to you.

06 23 34 03 CMP How about if I read that back to you after I pass the landing site?

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

06 23 34 09 CDR-EVA Okay. Turn it - there you go. Hey, one of them had -- I could see vesicles in one of them.

06 23 34 17 LMP-EVA Yeah, I could too. Okay. That's in 421, Tony.

06 23 34 27 CC Okay, 421. And we'd like a soil here.

06 23 34 41 LMP-EVA Okay. And getting a soil. Those bags - that - my - my shopping bag idea would have worked, John. Those things are sitting right up - you just plop them down.

06 23 35 01 CDR-EVA Sure, sure it would have worked, Charlie. That's a good idea, too.

06 23 35 09 LMP-EVA Okay, 422 for the soil sample, Tony.

06 23 35 11 CC Okay.

06 23 35 13 LMP-EVA That's enough, John. That's a hundred grams.

06 23 35 17 CDR-EVA Okay. ... That's okay, 100 kilograms - ... kilometers.

06 23 35 29 LMP-EVA Okay, get an after of that, please, while I pick this bag up.

06 23 35 30 CDR-EVA Some large number.

06 23 35 37 LMP-EVA How's our time going, Tony?

06 23 35 38 CC Oh, you're doing really fine. We've got an extension here, and you've got about 25 minutes.

06 23 35 46 CDR-EVA Okay, Charlie. Let's go back to the Rover. Put your bag on there and head out for the big rock because you got a bag on your back, and we'll use it.

06 23 35 59 LMP-EVA Okay.

06 23 36 03 CC We think that sounds like a great plan.

06 23 36 07 LMP-EVA Didn't need - Look at the size of that biggy.

06 23 36 11 CDR-EVA It is a biggy, isn't it. It may be further away than we think because - -

06 23 36 17 LMP-EVA No, it's not very fur. It was just right beyond you.

06 23 36 19 CDR-EVA ... tically, huh?

06 23 36 20 LMP-EVA Yeah.

06 23 36 21 CDR-EVA Like everything else around here a couple of weeks later - -

06 23 36 23 LMP-EVA Okay. We - let's see - you got the - I got the shovel, ... the rakes best choice. And I got some bags and - -

06 23 36 30 CDR-EVA You - you got enough bags. I'll leave mine here.

06 23 36 33 LMP-EVA Well, I've only got - I got about - 10 or so.

06 23 36 37 CDR-EVA Okay. That's how many I got.

06 23 36 39 LMP-EVA Okay. Bring yours, too.

06 23 36 43 CDR-EVA A rake and a shovel, right?

06 23 36 44 LMP-EVA No, not the shovel.

06 23 36 45 CDR-EVA But the rake?

06 23 36 46 LMP-EVA Yeah, let's - the rake is the best way.

06 23 36 48 CDR-EVA That's what I got.

06 23 36 49 LMP-EVA Okay.

06 23 36 53 LMP-EVA We'll stop about halfway down here and do another rake. How's that?

06 23 36 57 CDR-EVA Darn good idea, Charlie.

06 23 37 00 LMP-EVA Ah, the old footprints on the crater rim.

06 23 37 13 CDR-EVA That's about halfway - maybe (laughter). Okay.
Let me just stop this down here somewhere. Well,
I think we'd get permanently shadowed under that
big rock. Look at that fillet on this side, Charlie.

06 23 37 31 LMP-EVA Okay. Well, we need the shovel for that.

06 23 37 33 CDR-EVA Get it with this here.

06 23 37 35 LMP-EVA Okay. Yeah, we can reach in there if it's - I see
what you mean.

06 23 37 40 CDR-EVA Uh-huh. Okay.

06 23 37 52 LMP-EVA Wait a minute. Wait, wait, wait. Don't know why
I'm taking it down-Sun, by the chart in there.

06 23 38 22 LMP-EVA Okay. He's getting a couple of - of whitish frags
and then dust-covered, gray-looking frags. Think
you got a bag full there, John.

06 23 38 34 CDR-EVA Yep, three scoops and a bag full. It's all salted
with that - that one white rock there.

06 23 38 48 LMP-EVA Super. Now, okay.

06 23 38 51 CC We agree. Super.

06 23 38 53 LMP-EVA Yeah, that's in 423, Tony.

06 23 38 55 CC Okay, 423.

06 23 38 57 LMP-EVA Okay.

06 23 38 59 CDR-EVA Hang onto this - ... That's going in Charlie's
S*B.

06 23 39 08 CC Okay.

06 23 39 09 LMP-EVA - - ... an after of that, John, and I'll get the soil
sample.

06 23 39 14 CDR-EVA There's the after.

06 23 39 15 LMP-EVA Okay. Man, it's hard under there, you know it?

06 23 39 22 CDR-EVA Yeah. That's why - that's why the - the rake
wouldn't go down.

06 23 39 25 LMP-EVA ...

06 23 39 27 CDR-EVA I'm not going anywhere. Hit it again.

06 23 39 32 LMP-EVA Tony, ri - there must be a big rock right under here.

06 23 39 35 CDR-EVA Yes. This -

06 23 39 37 LMP-EVA I can't get the rake in, but just - -

06 23 39 40 CDR-EVA Now, look at that, Charlie.

06 23 39 41 LMP-EVA I know, it's all white under here, isn't it?

06 23 39 42 CDR-EVA Yeah.

06 23 39 47 LMP-EVA Hey, Tony. Down about a - a centimeter or less, it's all white.

06 23 39 54 CC Okay. You feel like that's - -

06 23 39 55 LMP-EVA ... a little bit.

06 23 39 56 CC - - a rock surface?

06 23 39 59 LMP-EVA Yeah, I think it might be a rock surface, and we're just in its ... friable ones, the fractured ones, and we're just chipping off - Here, John, I can get a soil sample from where you kicked it up with your foot. Oh, boy.

06 23 40 21 CDR-EVA Okay. Get a -

06 23 40 23 LMP-EVA Okay. You want another one?

06 23 40 34 CDR-EVA Okay, Houston. That soil sample is going in bag -

06 23 40 41 LMP-EVA 388, Tony.

06 23 40 42 CC Okay, 388. And we better - -

06 23 40 45 LMP-EVA Okay - -

06 23 40 46 CC - - press on for the big boulder.

06 23 40 47 LMP-EVA ... keep it straight. Okay. We're headed that way. You get the tongs, John?

06 23 40 54 CDR-EVA Yep. I got them.

06 23 40 55 LMP-EVA I'll carry the rake. Hey, Tony. I'd - my guess is that most of these rocks around here are extremely shocked.

06 23 41 09 CDR-EVA ...

06 23 41 14 LMP-EVA All these in this area look - the same. Hope that thing is not coming off.

06 23 41 21 CDR-EVA Yeah. In the sunlight, Houston, this white rock has sort of a greenish hue to it, this white rock breccia. Which is what all this is we're walking on right now is this white rock breccia that Charlie chipped out of - Charlie chipped out of - and I guess this is probably the second layer up. I would reckon that this - if - if we could see to the bottom, we could say for sure if this big black rock is right out of the bottom. But my guess from the old photograph, is probably is.

06 23 41 59 CC Okay. That sounds like a good guess.

06 23 42 00 CDR-EVA Look. See this rock right here, Charlie.

06 23 42 03 LMP-EVA Look at the size of that rock!

06 23 42 07 CC We can see.

06 23 42 10 LMP-EVA The closer I get to it, the bigger it is.

06 23 42 13 CDR-EVA Yeah, but look at the permanent shadowed part, Charlie.

06 23 42 14 LMP-EVA On this side over here?

06 23 42 15 CDR-EVA Yeah. No, right here on this one. See that shadow? That must be permanent.

06 23 42 20 LMP-EVA No, I bet you it's not. The Sun's going down over there, John.

06 23 42 25 CDR-EVA Yeah, you're right.

06 23 42 26 LMP-EVA See. If you come back here in 2 weeks, and it'll be dark. Well, maybe a week and you'd have Sun over there. Okay, Tony, this is a very blocky area here.

06 23 42 43 CDR-EVA And look at those - look at the shape of that rascal.

06 23 42 50 LMP-EVA Yeah. We don't see any glass, though, particularly.

06 23 42 57 CDR-EVA No, I guess I'd have to call this a - a black matrix - looks like the matrix has reversed itself now, it's all black matrix.

06 23 43 11 LMP-EVA Well, Tony, that's your house rock right there.

06 23 43 14 CC Very good.

06 23 43 15 CDR-EVA Charlie, don't get too near the edge of that thing, it falls off. Look - look over on - look over at your right, it falls off pretty good.

06 23 43 21 LMP-EVA Yeah, I know. I'm gonna just take a little stereo here.

06 23 43 30 CDR-EVA Okay, now we had to come down a pretty good slope to get to this rock, so we may have to leave early to get back.

06 23 43 35 LMP-EVA Yes, sir. I agree.

06 23 43 36 CC You've got about 17 minutes before you'll have to drive off, so we'll have to hustle with this.

06 23 43 52 LMP-EVA Okay, John. Here's a - looky here. Can we whack with a - Hey, that's - look at that. See, it's glass coated, and this is just fractured off. We could pull that off. Big chunks of that'll come right off.

06 23 44 14 CDR-EVA ***

06 23 44 15 LMP-EVA And it looks - it's got a bluish tint to it, doesn't it?

06 23 44 19 CDR-EVA *** does.

06 23 44 20 LMP-EVA It doesn't look like - the - the real basalt.

06 23 44 24 CDR-EVA Look at that shatter cone right there, Charlie.
I'll be darned.

06 23 44 28 LMP-EVA It is. Yeah.

06 23 44 29 CDR-EVA I'm sure.

06 23 44 30 LMP-EVA Right there.

06 23 44 31 CC Outstanding.

06 23 44 32 CDR-EVA - - ... there's maybe two of them.

06 23 44 33 LMP-EVA Yeah. Put your ... - your tongs up there, and
I'll get a clo - I'll get a closeup - -

06 23 44 36 CC Yeah, make a good picture of that one for Muehlberger.

06 23 44 39 CDR-EVA Well, that settles that.

06 23 44 41 LMP-EVA Hey, move it down a little bit.

06 23 44 42 CDR-EVA That settles that, doesn't it, Houston?

06 23 44 45 LMP-EVA Okay, got it. Okay, here's a chunk of it. The
black rock looks - some of it's glass-coated, Tony,
and man, that is a shatter cone - -

06 23 45 00 CDR-EVA Charlie, let's let's get a piece of it.

06 23 45 01 LMP-EVA Okay, here you go. I got a piece.

06 23 45 02 CDR-EVA Okay.

06 23 45 03 LMP-EVA Give me a bag. Okay, could - on the next one, how
about stepping back and as I point to it, I'll
pull off another piece; and we'll put a couple of
pieces in here.

06 23 45 18 CDR-EVA Okay.

06 23 45 20 LMP-EVA Okay. That's in bag - going in bag 389.

06 23 45 22 CDR-EVA Wait a minute. Let me bolt it up.

06 23 45 23 LMP-EVA Okay. I'll - let's just - -

06 23 45 26 CDR-EVA Yeah, get ... pictures.

06 23 45 27 LMP-EVA Take a picture of that and I'll know where it came from.

06 23 45 29 CC Okay. We copy. 389.

06 23 45 31 LMP-EVA It's pretty badly shattered, Tony, so I don't know whether it's going to stay together - I don't know whether it's gonna stay together or not.

06 23 45 38 CDR-EVA Hit it, Charlie. I got the pictures. I really *** That's right near the shatter cone. Ha, ha.

06 23 45 47 LMP-EVA Yeah.

06 23 45 49 CDR-EVA I might suspect as much. Oh, don't worry about that.

06 23 45 57 LMP-EVA Okay. Let's pour the old samples - -

06 23 45 58 CDR-EVA Scoot back, and I'll get an after.

06 23 46 00 LMP-EVA Okay.

06 23 46 11 LMP-EVA Okay, five samples in 389, Tony - -

06 23 46 14 CC Okay, 389.

06 23 46 15 LMP-EVA - - of that black. There's a vein - Look at that veinlet running through - -

06 23 46 21 CDR-EVA Yeah.

06 23 46 22 LMP-EVA - - Right there, John - of a breccia. Man, that's a big rock. Wow. Whew. Okay, John. Here's this white stuff. Here's this - here's the rock, John, that is not - that is not a breccia - -

06 23 46 37 CDR-EVA Yeah.

06 23 46 38 LMP-EVA - - and it's, and it's - -

06 23 46 39 CDR-EVA A clast in the black rock.

06 23 46 40 LMP-EVA - - it's a clast in a black rock. Look here. How about that?

06 23 46 46 CDR-EVA Better put that in your bag.

06 23 46 47 LMP-EVA Okay.

06 23 46 48 CDR-EVA Put it back where - put it back where you got it for a second and let me - -

06 23 46 52 LMP-EVA Okay.

06 23 46 53 CDR-EVA Get a picture of it before - Well, they can't fit it in. No, just move away; they can fit it in. Okay. Is that how it was, more or less?

06 23 47 02 LMP-EVA Yeah, more or less.

06 23 47 03 CDR-EVA Okay, now get it.

06 23 47 06 LMP-EVA Get an after.

06 23 47 10 CDR-EVA See. That has a clast of that rock in it, too.

06 23 47 11 LMP-EVA Okay, that's a - I wish we could partially stick that in a bag.

06 23 47 15 CDR-EVA Why don't we stick it in your bag?

06 23 47 16 LMP-EVA Oh, okay. I mean one of these so - cause it might break up. Okay, that's 424.

06 23 47 23 CDR-EVA No, it ain't gonna break up.

06 23 47 24 LMP-EVA It ain't gonna - okay. Okay, Tony. That's in - unbagged, and it's grapefruit size. And it was a white matrix. It's not as nearly shocked, and it's a large clast - about a 3-meter clast - out of this big black rock - part of it.

06 23 47 41 CDR-EVA 3 meter?

06 23 47 42 LMP-EVA No, this clast is about 3 meters.

06 23 47 45 CDR-EVA Centimeters, Charlie.

06 23 47 47 LMP-EVA Huh? Well, it goes from here all the way up to there.

06 23 47 51 CDR-EVA Oh! That's - the one you're talking about.

06 23 47 52 LMP-EVA Yeah.

06 23 47 53 CDR-EVA Did you get a stereo of that? Did you get a flight line of that?

06 23 47 55 LMP-EVA Yeah. Uh-huh.

06 23 47 56 CDR-EVA Okay.

06 23 47 58 LMP-EVA Okay. Well, I got a pan of it. Okay, John, we'll whack off another - could you get a picture of this - where the hammer is? Let me get some of the unshocked or white stuff.

06 23 48 12 CDR-EVA Wait a second. Go.

06 23 48 16 LMP-EVA Okay. Got it?

06 23 48 19 CDR-EVA Yeah.

06 23 48 27 CDR-EVA Hard, isn't it?

06 23 48 28 LMP-EVA Yeah, it's hard. But it's gonna come - I'm gonna get a piece - of it.

06 23 48 33 CDR-EVA I got - I got it, Charlie.

06 23 48 34 LMP-EVA Okay. Here's a good piece right up here. Okay.

06 23 48 44 CDR-EVA Bag open.

06 23 48 46 LMP-EVA Okay, I got it. Okay, Tony. Of the white clast with - it's not nearly as shocked, is going in 425.

06 23 48 56 CDR-EVA Wait a minute. Here's - -

06 23 48 57 CC Okay. Bag 425.

06 23 49 01 LMP-EVA Okay. Here's another piece right there, John.

06 23 49 02 CDR-EVA Huh?

06 23 49 04 LMP-EVA And here's another big piece right over here.

06 23 49 07 CC Did y'all see a permanently shadowed sample around there?

06 23 49 13 CDR-EVA Nope, we don't.

06 23 49 15 LMP-EVA No. Sure don't.

06 23 49 16 CC Okay. Our best guess is that it should be on the south side - -

06 23 49 18 LMP-EVA There's a big hole.

06 23 49 19 CC - - if there's any.

06 23 49 24 CDR-EVA Well, we were over on the south side, and we didn't see any.

06 23 49 27 CC Okay. Fine.

06 23 49 29 CDR-EVA The hole, unfortunately, is a - sort of a - it's sort of an east-west split there, Charlie.

06 23 49 36 LMP-EVA I know it. It is an east-west split. Tony, we got an east-west split here, that we can get the rake in.

06 23 49 46 CC Why don't you go ahead and take some soil out of that.

06 23 49 48 LMP-EVA Here, John. Okay. Put that in mine. How's our time gunin - going?

06 23 49 55 CC Oh, you're gonna to have to leave after this sample.

06 23 50 01 LMP-EVA Okay. I was gonna say, it's probably a long hike back up that hill.

06 23 50 09 CDR-EVA In there or not, Charlie?

06 23 50 11 LMP-EVA Huh? Yeah, I can - I can get in here. Right up next to this rock right here will be a good place. I got it. Ha Ha.

06 23 50 26 CDR-EVA Get the bags square *** Okay.

06 23 50 33 LMP-EVA Wait a minute, I'll give you a little bit more.

06 23 50 46 CDR-EVA It's not a classic east-west split, Houston, but it's one.

06 23 50 50 CC Okay. Fine.

06 23 50 51 CDR-EVA Going in bag 390.

06 23 50 52 CC Okay. Bag 390. And we need a reference soil.

06 23 50 56 CDR-EVA Hold these tongs for a second?

06 23 51 01 LMP-EVA Okay.

06 23 51 05 CDR-EVA Don't go down there 5 meters. I don't want you - -

06 23 51 07 LMP-EVA I'm not.

06 23 51 14 LMP-EVA Here you go.

06 23 51 15 CDR-EVA Okay.

06 23 51 16 LMP-EVA Here you go.

06 23 51 19 CDR-EVA Okay.

06 23 51 23 LMP-EVA I guess you ought to stick the tongs in, and we ought to document this.

06 23 51 27 CDR-EVA Okay.

06 23 51 29 LMP-EVA I'll get - I'll just get a part - we'll do a partial, and I'll do a cross-Sun of it.

06 23 51 34 CDR-EVA If we're gonna do a reference sample, let's get that huge mass right there.

06 23 51 36 LMP-EVA Okay.

06 23 51 39 CDR-EVA The tongs are not gonna go in this ground, Charlie.

06 23 51 41 LMP-EVA I know it. It's a big rock down there. Why don't you just hold it there, and I'll - and I'll take the picture. Okay.

06 23 51 47 CDR-EVA Okay.

06 23 51 48 LMP-EVA Click. Click. Okay.

06 23 52 00 CDR-EVA ... can kick up some, Charlie. Got it - you got it?

06 23 52 10 LMP-EVA Okay, Tony. The soil here is very hard, and your - the rake really won't go into it. Bending the tines like we used to do in training.

06 23 52 20 CC Right. Understand. If you can see anything around there that's kind of loose and not in an east-west split, kind of scoop some of that up. If you can't, we'll just have to leave it.

06 23 52 34 CDR-EVA There's nothing loose. Charlie's got something.

06 23 52 35 LMP-EVA Okay, there's about 25 grams.

06 23 52 41 CC Okay. That's fine. That's all I need.

06 23 52 46 LMP-EVA Okay. Got it?

06 23 52 48 CDR-EVA That's all Tony needs. You PI on this one, Tony?

06 23 52 54 CC No. I said that's all they need.

06 23 52 58 CDR-EVA Okay.

06 23 53 07 LMP-EVA There's a real frothy rock right there, John. I - want to throw that in?

06 23 53 23 CDR-EVA Oh, man, I *** Here, can you hold this, Charlie?

06 23 53 28 LMP-EVA What? The tongs?

06 23 53 31 CDR-EVA Yeah. For a second.

06 23 53 32 LMP-EVA Yeah.

06 23 53 33 CDR-EVA Got to do that bag better ***

06 23 53 38 LMP-EVA Man, that rock had just cracked off just in the right - Okay, Tony. This large block is a very - The house-sized one, it's about 20, 30 - 20 meters long, by maybe 10 meters high, and it's a large breccia. Got a grab sample going in 393, white matrix with glass on it, and it's a - -

06 23 54 05 CDR-EVA Don't back up any more, Charlie.

06 23 54 06 LMP-EVA I'm sorry. Lost my balance. It's got some fractures
in it that run north - -

06 23 54 11 CDR-EVA Let's go on back.

06 23 54 12 LMP-EVA Okay. ... - -

06 23 54 13 CC Okay, and we'll have to start on back.

06 23 54 17 LMP-EVA - - Okay, here - would you - here you go. Here you
go, John.

06 23 54 19 CDR-EVA Huh?

06 23 54 20 LMP-EVA Here's your tongs. Would you pick up my bag and
let me move down and get a little bit stereo, and
I'll be right with you.

06 23 54 25 CDR-EVA Okay. Let's go on back..

06 23 54 26 LMP-EVA I am. Be right with you.

06 23 54 35 CC Did you see anything that you were pretty confident
was igneous?

06 23 54 43 CDR-EVA I'm thinking about the padded bags. (Laughter).

06 23 54 45 LMP-EVA Yeah, this rock we - oh.

06 23 54 51 CDR-EVA An igneous rock.

06 23 54 53 LMP-EVA Yeah, if we'd of brought the padded bags, this right
here is an igneous rock.

06 23 54 56 CDR-EVA The whole place looks igneous, Houston.

06 23 54 59 CC Were there any near the Rover?

06 23 55 01 LMP-EVA - - ... clast - These large clasts in it are
igneous - -

06 23 55 02 CC Roger. For the padded bags, we would wanted lying-
on - the - surface stuff.

06 23 55 08 CDR-EVA - - Is that what you're talking about, volcan - -

06 23 55 13 LMP-EVA I'll take the bags. Can you get them out - -

06 23 55 17 CDR-EVA ... get - -

06 23 55 18 LMP-EVA - - with the tongs?

06 23 55 19 CDR-EVA Well, you're gonna have to hold that so I can get the tongs unloose.

06 23 55 22 LMP-EVA Wait a minute.

06 23 55 23 CDR-EVA Hold the bag.

06 23 55 24 LMP-EVA I'm trying to.

06 23 55 30 CDR-EVA I can't believe it.

06 23 55 31 LMP-EVA Got it. I can't either. Let's go.

06 23 55 39 LMP-EVA Y'all see us all the way down here, Tony?

06 23 55 41 CC We're just seeing you now. When you were around the corner there, we didn't see you very much.

06 23 55 45 CDR-EVA Okay, take it easy. Take it easy, Charlie.

06 23 55 50 LMP-EVA Sorry. Sorry we had to get down in here, but that was a unique sample we thought, and - -

06 23 55 57 CDR-EVA Okay. This big black rock, this big black and white rock right here that we're just traversing by, is also the same kind of rock. Man, look at the size of it.

06 23 56 08 LMP-EVA They're all the same. There are two rock types here, Tony: that white matrix one, and then the black, the one with the black that - -

06 23 56 13 CDR-EVA And in places where the black and the white are about 50-50 down here too.

06 23 56 21 LMP-EVA Mm-hmm.

06 23 56 23 CDR-EVA But there are very few of those.

06 23 56 26 LMP-EVA And it has the same character of the rocks up close that I would think that South Ray rocks had, when you look on the rim of that crater.

06 23 56 35 CC Okay. Understand.

06 23 56 47 CDR-EVA Can we put those two rock bags under your seat, Tony, or you got too much stuff in there now?

06 23 56 52 LMP-EVA Rel - What did you say, Ralph?

06 23 56 57 CDR-EVA I said (laughter) - put those two rock bags under your seat.

06 23 57 02 LMP-EVA Sure.

06 23 57 11 CC If you see a fist-size igneous rock near the Rover, we'll use the padded bags here. If not, we'll just forget them - for now.

06 23 57 16 LMP-EVA Okay. Well - but - how - it's gonna - -

06 23 57 22 CDR-EVA Charlie, there's your polarimetry thing.

06 23 57 26 LMP-EVA It - I took it off and threw it away. It's gonna be - I bet you all this stuff up here is really shocked, Houston. You want any that's - does that make any difference to you? - And, therefore, is not gonna be too hard.

06 23 57 44 CC Roger. We understand. All right, if - if you find a good dense one that you - you think has got a good hard surface on it, we'll go ahead and take it.

06 23 57 59 CDR-EVA Take it, huh? Mn. ...

06 23 58 03 LMP-EVA Well, they're pretty dust covered. I'll tell you what, we'll pick one up and give it a try anyway.

06 23 58 07 CC Okay. That's the best we can do.

06 23 58 09 CDR-EVA - - ... I've got one right here.

06 23 58 10 LMP-EVA You would. Well, we're back. The old ticker is really pumping, I bet you.

06 23 58 22 CC No, you're doing fine. You got up to about 120 is all.

06 23 58 29 LMP-EVA Is that all?

06 23 58 31 CC Okay. 128, in fact.

06 23 58 38 LMP-EVA The old or - orange juice comes in great.

06 23 58 42 CC Right. Deke says if you'd been exercising the last few days, you'd be in better shape.

06 23 58 43 CDR-EVA Tell you one thing, ... geting the suit - -

06 23 58 50 LMP-EVA Man, we wore the rope out on the Exer-Genie.

06 23 58 54 CDR-EVA No. We didn't wear the rope out.

06 23 58 58 LMP-EVA (Laughter). I's just teasing, boss. (Laughter). John, I hope you got the shovel.

06 23 59 11 CDR-EVA Charlie, I ain't got the shovel. Didn't take it down there.

06 23 59 12 LMP-EVA No.

06 23 59 14 CC No. You didn't take it down.

06 23 59 16 CDR-EVA Where did we leave it?

06 23 59 20 CC Should be on the Rover.

06 23 59 21 LMP-EVA Here it is in your seat. Whew. Yeah. It's on the Rover.

06 23 59 30 CDR-EVA It'll be too big for a padded bag.

06 23 59 31 LMP-EVA No, it'll go in.

06 23 59 37 CDR-EVA I think it's too big, Charlie.

06 23 59 39 LMP-EVA Well, let's give it a go. Okay, Tony. While we were gone, we got a caution flag.

06 23 59 48 CC Okay. Understand.

06 23 59 50 LMP-EVA Something popped up - -

06 23 59 51 CDR-EVA ... battery temp.

06 23 59 52 CC That's the BAT 2 temp.

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06 23 59 53 LMP-EVA I think it's the battery temp. Number 2 is 135.

06 23 59 58 CC That's okay. When we drive off here, we'll put them all on battery 1.

07 00 00 05 LMP-EVA Okay.

07 00 00 19 LMP-EVA Okay. Now, I'm going to put these stuff under - there you go.

07 00 00 25 CDR-EVA Think that'll go under it?

07 00 00 26 LMP-EVA Yeah, just push it in - it'll go in. A little big, but it'll - it'll do it. Why don't you put it in - number 6 there, John. Now - let's see if I can find another one here.

07 00 00 51 CDR-EVA Okay, but get a smaller one, Charlie.

07 00 00 52 LMP-EVA I am.

07 00 01 15 CC If one of you are free there, we'd like to switch out - -

07 00 01 17 CDR-EVA That one won't work ...

07 00 01 18 CC - - the mag in the DAC.

07 00 01 28 LMP-EVA Okay. In about 2 seconds, we'll be free, Tony.

07 00 01 30 CC Okay. Good show.

07 00 01 31 LMP-EVA Boy, I'll tell you, this regolith is - is - is about a inch deep here in most places. It's - there's just lots of rocks under this stuff, Tony. This is a - tells me it's - -

07 00 01 47 CC That's really interesting. You know I didn't expect that.

07 00 01 50 LMP-EVA - - ... Anyway, you can barely get the shovel in anywhere. Okay. We got two rocks for your padded bags; but I'm not sure they are going to do you any good, they are so dust covered.

07 00 02 07 CC Okay. - -

07 00 02 09 LMP-EVA But I hit one - hit one with the -
I hit one with the shovel here that I've got in
my hand that you just saw me pick up, and it
didn't break anyway, so at least it's that hard,
if that's any criteria. Do you want me to cali-
brate myself?

07 00 02 24 CC No, that's all right - -

07 00 02 25 CDR-EVA Well, the Velcro just came off of that bag.

07 00 02 26 CC - - We'll take your word for it.

07 00 02 35 LMP-EVA Okay. What mag - just give me a magazine - let's
see, S on there - T or U, John, either one.

07 00 02 49 CDR-EVA T or U. Okay? Here's T, Charlie.

07 00 02 54 LMP-EVA Okay. How about Zee-ing this up for me?

07 00 02 55 CDR-EVA Okay. I'll do it.

07 00 02 56 LMP-EVA I'll put the mag on.

07 00 02 58 CDR-EVA That's a better sized one.

07 00 03 09 LMP-EVA Bats - guess what.

07 00 03 36 LMP-EVA Okay. I thought that thing hadn't run, Tony, but
the little ball had just stuck. Whew.

07 00 03 42 CC Okay. Understand.

07 00 03 43 LMP-EVA Oh, John!

07 00 03 46 CDR-EVA What was it?

07 00 03 48 LMP-EVA The mag - I did it. I'm sorry.

07 00 03 50 CDR-EVA Got it?

07 00 03 51 LMP-EVA Got it. Okay.

07 00 03 55 CDR-EVA It's already - it's already empty, right?

07 00 03 56 LMP-EVA Yes.

07 00 03 57 CC It's funny how a little hammering fixes most of the hardware.

07 00 03 58 CDR-EVA ...

07 00 03 59 LMP-EVA Okay.

07 00 04 12 CC And we want the DAC f/4 and 12 frames per second.

07 00 04 16 LMP-EVA Sounds like it - okay, it's set, and it - and it's on f - f/4 now.

07 00 04 29 CC Okay. Good show.

07 00 04 31 CDR-EVA Okay, Charlie. Here's bag 6.

07 00 04 35 LMP-EVA Okay, John. Both padded bags are in there. Okay.

07 00 04 39 CDR-EVA Now, Houston. The Velcro came off both those bags; and we weren't able to put them tight like they are supposed to be.

07 00 04 46 CC Okay. We understand. And they go under your seat, John.

07 00 05 01 CDR-EVA We put them in an SCB. You don't want them in an SCB?

07 00 05 05 LMP-EVA No. They don't.

07 00 05 06 CDR-EVA I think with the Velcro off of them, you can't hardly see them. I think we ought to leave them in the SCB. If they get in there with the film, we will be in trouble.

07 00 05 15 CC Okay, fine. Let's just leave them in the SCB.

07 00 05 18 LMP-EVA Good deal.

07 00 05 20 CDR-EVA Okay.

07 00 05 31 CDR-EVA Okay, Charlie. I'm gonna close the SCB.

07 00 05 33 LMP-EVA Okay. They're right on the top there, Tony, in number 6; and there's - there's no rocks on top of them. I think they'll be fine.

07 00 05 49 CC Okay. Good show.

07 00 05 52 LMP-EVA Hey, John. Let me put number 7 on - on your - try it again on your side.

07 00 05 56 CDR-EVA Charlie, we're just going to lose it. Why don't we just leave it under the seat?

07 00 05 59 LMP-EVA I can't get it under my seat.

07 00 06 02 CDR-EVA Yeah, but it's full of - full of nice things.

07 00 06 04 LMP-EVA Okay. Well, I'll hold it in my hand then. Oww.

07 00 06 09 CDR-EVA Want to see if you can put it on?

07 00 06 11 LMP-EVA Well, if you move away a little bit, yeah. A little bit more. Okay. That's fine. It's on there. You know, those things ought to have locks on them like that - the little green locks like the ones on the -

07 00 06 49 LMP-EVA Hold still. John, you got - Am I doing something to make you move? Okay, now that's cinched down. Tight.

07 00 07 11 CDR-EVA Got it, huh?

07 00 07 13 LMP-EVA And the Velcro is ... tight - but I ain't gonna guarantee anything.

07 00 07 19 CDR-EVA All righty.

07 00 07 20 LMP-EVA Okay. What's my mag count? I can't - my mirror is so dirty, I can't even see.

07 00 07 24 CDR-EVA It's 122, Charlie.

07 00 07 28 LMP-EVA Okay. Let's go.

07 00 07 30 CC And, John, what's yours?

07 00 07 35 CDR-EVA Mine's 102.

07 00 07 37 CC Okay.

07 00 07 46 CDR-EVA ...

07 00 07 53 LMP-EVA Good grab sample.

07 00 07 55 CDR-EVA Yeah, I thought you'd like that one.

07 00 08 02 LMP-EVA Okay. I'm gonna reset the caution flag.

07 00 08 04 CDR-EVA Okay.

07 00 08 05 LMP-EVA Okay. Frame count, far polar maneuver, we've done. Pan - I think we got enough pans; did Stone, Kiva, North Ray.

07 00 08 15 CDR-EVA Ain't turned off the tube.

07 00 08 16 LMP-EVA Okay. You turn off the tube, and I'll go back to MIN cooling.

07 00 08 21 CDR-EVA Okay. Okay. Houston. Going MODE switch to 1.

07 00 08 22 CC Okay. Fine. And when you get ready to drive off there, we'd like - -

07 00 08 31 CDR-EVA ... VW.

07 00 08 32 LMP-EVA I guess we're a little late - -

07 00 08 33 CC - - Like the rear DRIVE POWER to BUS Baker and the steering to BUS Baker; REAR STEERING.

07 00 08 46 CDR-EVA Okay, Charlie. You are in?

07 00 08 50 LMP-EVA Well, I can't - -

07 00 08 51 CDR-EVA No. You're not in, you're - there you go.

07 00 08 53 LMP-EVA No. I didn't think I was in. I can always tell. Okay.

07 00 08 58 CDR-EVA BUS Baker with the REAR DRIVE ... And - REAR STEERING to BUS - Baker.

07 00 09 07 LMP-EVA Okay, Tony. One final comment here. Again, no impression of - to me, anyway - of layering or of bedrock, just loose rocks in the walls. And they're splayed out in ray patterns - -

07 00 09 25 CDR-EVA Man, that is some hole.

07 00 09 26 LMP-EVA - - And there's about 1, 2, 3, 4, 5, 6, 7, 8, 9 rays coming out of there, intermixed red and white, and black rocks in each of the rays, and that's in about - maybe a half of the crater.

07 00 09 45 CC Okay, understand. And Station 13 - -

07 00 09 46 CDR-EVA Okay, Charlie. We're ready to go to ...

07 00 09 48 CC - - Now will be right down your tracks about a half a kilometer, and we'd like to stop in the midst of those big boulders you described on the way up.

07 00 09 59 CDR-EVA Okay. My kind of station 13.

07 00 10 05 LMP-EVA Okay. The DAC is running?

07 00 10 06 CC Good show. You beat me to it.

07 00 10 13 LMP-EVA There are your tracks. Look at that, John. How far - See them back over there?

07 00 10 16 CDR-EVA Looks to me like we just go around the circle here, Charlie.

07 00 10 19 LMP-EVA Yeah.

07 00 10 22 CDR-EVA (Laughter). Okay, station 13. right down the same way we came. Oh, my goodness.

07 00 10 30 LMP-EVA We can't see old Orion from here. This is going to be something going down this hill (laughter).

07 00 10 38 CDR-EVA Sure we - we didn't - I'm not sure we came up that hill.

07 00 10 45 LMP-EVA Yeah, we did. There's the tracks.

07 00 10 52 CDR-EVA We sure come off it, didn't we?

07 00 10 53 LMP-EVA Look at that slope! Be sure that you got the brakes on. Tony, this is at least a 15-degree slope we're going down, and that Rover came right up it and you never even knew it.

07 00 11 17 LMP-EVA Brake (laughter) - Easy, John. Man, are we accelerating. Super. I should have had the camera pointed forward. Hey, Tony, that was at - I think it was 170 at 4.4, that little steep slope there. Whoever said this was the Cayley Plain?

07 00 11 43 CDR-EVA Oh, that was down the rim of the crater here. We've just set a new world's speed record, Houston; 17 kilometers an hour on the Moon.

07 00 11 50 CC Well, let's not set any more.

07 00 12 00 CDR-EVA I'm with you.

07 00 12 02 LMP-EVA Okay, John. I got us out 2 hours and - -

07 00 12 05 CC Forty minutes.

07 00 12 06 LMP-EVA - - 40 minutes, it looks like.

07 00 12 10 CDR-EVA I guess that would be a new Moon speed record, wouldn't it?

07 00 12 12 LMP-EVA Yeah.

07 00 12 13 CDR-EVA ... thought about.

07 00 12 14 CC And all your - -

07 00 12 15 LMP-EVA We'll be going back - -

07 00 12 16 CC - - data looks good

07 00 12 17 LMP-EVA - - cross-Sun - Okay. Going back across Sun - the tracks, we just barely penetrated the regolith maybe an eighth of an inch or so. Whatever it is, it's going to be real firm here. Hopefully, we can get - isn't 13 a double-core one?

07 00 12 51 CC Negative. We'll have a double core - -

07 00 12 52 LMP-EVA Feel that old Sun coming down on your ...

07 00 12 55 CC - - back at the station 10 prime. Station - -

07 00 12 57 LMP-EVA Oh, good. That's - I think we might do it there. Here, I don't think - -

07 00 13 03 CC Okay. Station 13 has a rake soil, then documented samples until you run out of time.

07 00 13 12 CDR-EVA Okay. You want to go - We'll go up on this ridge here, Charlie, because that's where the big blocks were.

07 00 13 16 LMP-EVA Yeah.

07 00 13 17 CDR-EVA Remember?

07 00 13 18 LMP-EVA Yeah. That big one we thought was the rim and it was - -

07 00 13 21 CDR-EVA Yeah. Was sort of a - what we're up on now is a sort of a pre-rim rim of this impact crater. And it's - it's - it's 600 meters from the rim.

07 00 13 45 LMP-EVA Okay, Tony. I'm panning your camera around at various places here on the - 16 to get right and left.

07 00 13 51 CC Okay. It's probably out of film now.

07 00 13 52 LMP-EVA It really - again, the impression is that -
Already?

07 00 13 58 CC No, we're just going to turn it off now. I'm
sorry, Charlie.

07 00 13 59 CDR-EVA Turn around this way, Charlie, and I'll show you.
It's half full, Charlie.

07 00 14 08 LMP-EVA Okay. Turning it off.

07 00 14 10 CC Okay. Good show.

07 00 14 15 CDR-EVA Man, that's hard on the old fingers. Like, it's
still running, too.

07 00 14 27 LMP-EVA That's the Rover I hear - feeling that thing
vibrating.

07 00 14 31 CDR-EVA Charlie, here we go again.

07 00 14 34 LMP-EVA Remarkable, isn't it?

07 00 14 36 CDR-EVA Yeah.

07 00 14 39 LMP-EVA Tony, we just topped a - there's that - no, it
can't be that. There's a big rock over there,
but this other one is down at the bottom of this
hill here, John, we came by. We just topped
another rise, and we're looking to the southeast
across the - towards the back - towards the
Kent Plateau. It's an undulating surface, and
indented for about - I can't - It's difficult to
dudge - judge distances.

07 00 15 14 CDR-EVA Here's the big rocks down here, Charlie.

07 00 15 15 LMP-EVA That's them, yeah. But it's undulating until it
hits the scarp of - I think I'll call it the
Kent Plateau. That's the scarp on the map that
you can map around - like a little reentrant on
the map back to the east, and we can see back up
that way and all the way up onto the top of the
plateau.

07 00 15 39 CC Okay, and we won't want a nav update of station 13, so you can park either north or south, whichever is easiest for you.

07 00 15 49 CDR-EVA Okay.

07 00 15 51 LMP-EVA We almost spun out on that one, babe.

07 00 15 53 CDR-EVA That was great. Hey, let's go by that - see that big rock over there? Maybe that's a permanently shadowed one. Try it?

07 00 16 04 LMP-EVA I don't think so, but we can go look. You know, following our tracks back, we might find that - CSVC.

07 00 16 11 CDR-EVA That's right, that's what I'm thinking. If you see something that looks strange around here, that's it. Oh, man.

07 00 16 23 LMP-EVA Hey, Tony. On down this ridge, we're going down about a - at least a 5-degree slope. We have one real filleted rock that we're just passing now at 3.8 at 181 - 183, and then we have another rock down here that's the same size, about 3 meters across that has hardly any FILLET. And that's the one we're going to stop by.

07 00 16 46 CC Okay. Good show. And your - -

07 00 16 49 LMP-EVA Is that what you meant, John? For permanent shadow?

07 00 16 51 CDR-EVA Yes.

07 00 16 56 CC And your Cuff Checklist doesn't show TV here, but we'd like you to go through a normal TV powerup.

07 00 17 08 LMP-EVA Okay. I don't think we'll be able to align it here at - I didn't have - I haven't had any trouble aligning that thing though, in just about any position. If we park north, we'll be in good shape for them.

07 00 17 22 CDR-EVA Okay. Let's do that.

07 00 17 23 LMP-EVA Okay. Be able to see that biggy. That rock right there looks like that great big one we sampled up on the rim, John.

07 00 17 31 CDR-EVA Sure does.

07 00 17 33 LMP-EVA Okay. That's good. I just don't think it's going to be permanently shadowed, though.

07 00 17 37 CDR-EVA I don't - I don't either.

07 00 17 39 LMP-EVA Tony, we're here, and I'm getting off, and then I'll read you the readings when I can brush it off so I can see.

07 00 17 45 CC Okay. I understand.

07 00 17 58 LMP-EVA This thing is covered with dirt.

07 00 18 01 CC Roger. And our LCRU is heating up, so we'd like a good job on those. Even though we know you do it every time.

07 00 18 08 LMP-EVA Needs dusting - needs dusting, bad. Okay, Tony. We're at 2358, 184, 6.5, 3.8, 50, 120 - 110, yeah, 110, off-scale low, off-scale low; BATS of 120, 135; REAR is off-scale low on the LEFT, RIGHT is 200. Okay. FORWARD is off-scale low, LEFT; RIGHT, 200.

07 00 18 45 CC Okay. We copy.

07 00 18 56 LMP-EVA John, I'm gonna start a pan. *** little bit more cooling here.

07 00 19 07 CC Okay. The plan here is a rake soil first - together - and after you've done that, we'd like John to take an LPM and, Charlie, you can go sample.

07 00 19 20 LMP-EVA Okay. Let me get a pan first. Okay?

07 00 19 24 CC Sounds good.

07 00 19 25 CDR-EVA Charlie, how does this look - how does this look for the antenna point?

07 00 19 32 LMP-EVA Looks about right on to me.

07 00 19 34 CDR-EVA Okay.

07 00 19 35 LMP-EVA But I'd - what's the signal strength?

07 00 19 45 CDR-EVA I can ...

07 00 20 55 CDR-EVA Charlie, good. ... signal strength.

07 00 21 05 LMP-EVA Okay. We got it.

07 00 21 06 CDR-EVA Yeah. I got it. I got it. ...

07 00 21 07 LMP-EVA I can see you. ... Here's old ... center. Okay.
*** it into - Oh I know - That pattern on the
ground at the - mirror reflecting. Boy. That
faked me out. I thought we'd really found some-
thing, Tony.

07 00 21 34 CC How's that, Charlie? Hey, we got a picture again.

07 00 21 40 LMP-EVA How you reading, Tony?

07 00 21 42 CC Five by, Charlie.

07 00 21 43 LMP-EVA Okay. We had a little trouble pointing the antenna.
Okay. Hey, Tony, this area here is on a - we're
on a slope away - about a 5-degree slope away from
North Ray, and this big block that you'll see in
a moment is down-slope, filleted, predominantly
down-slope here. The surrounding terrain is cov-
ered with - not covered but 10 percent with cobbles.
It's very subdued on the meter-sized craters. In
fact, it's a very smooth plain, but on a slope.
The rock types here appear to be the same as we
sampled up on top, but we'll get you a rake soil
out in front of this big boulder over here.

07 00 22 31 CDR-EVA We need to get the bags and stuff.

07 00 22 55 LMP-EVA Okay, John. We got - both of us got bags on our
backs, so why don't we just take these little bags.

07 00 23 00 CDR-EVA Yep. Okay.

07 00 23 01 LMP-EVA Okay.

07 00 23 08 CDR-EVA Let me get tongs for a gnomon.

07 00 23 09 LMP-EVA Okay. That's a good idea.

07 00 23 18 CC Okay. Charlie, if you could grab the bottom of the gnomon and the sheath there, we could use that for our color and photometric scale. We won't have the level, but at least we'll get part of it.

07 00 23 36 CDR-EVA Yeah. You could if there wasn't so much igneous soil on it. When I have it, we'll put it out there.

07 00 23 46 CC Okay.

07 00 23 47 CDR-EVA I can't believe it (laughter) - I can't believe it. (Laughter).

07 00 23 58 LMP-EVA Hey, John. See those about four or five little - little rocks right there?

07 00 24 00 CDR-EVA Yeah.

07 00 24 01 LMP-EVA Stick her down right there and let me - I'm sort of turned around down here on my direction. I think I'm facing this - south is over this way. The Sun's up over Stone. I can't believe it.

07 00 24 11 CDR-EVA The Sun is so high. Old gnomon ***

07 00 24 28 LMP-EVA There's the down-Sun, and we'll - up the slope adroitly like a gazelle. Got to station 13, Tony, and it sure looks good.

07 00 24 50 CC Good show. It looks good here, too.

07 00 24 55 LMP-EVA And the regolith - -

07 00 25 00 CDR-EVA Hey, get a bag for me, Charlie.

07 00 25 01 LMP-EVA Okay.

07 00 25 12 LMP-EVA Okay. There's some glass in there, a black chip. In one rake, we got about 10 little - and the regolith here, Tony, is - seems to be - a little bit more loosely compacted than up on the top.

07 00 25 35 CDR-EVA *** No. I can't set my - I can't get my gnomon
in. That's okay. .

07 00 25 45 LMP-EVA Not very productive though, on the small chips.

07 00 25 50 CDR-EVA ***

07 00 25 51 CC We'll just take what you've got.

07 00 25 58 LMP-EVA ... would do if I'd rake up-slope though, I bet
you I'd get more.

07 00 26 19 CDR-EVA Here's some ...

07 00 26 20 LMP-EVA Okay ... some more.

07 00 26 21 CDR-EVA ... good ones.

07 00 26 29 CDR Okay.
LMP/EVA

07 00 26 30 CDR-EVA There's about 20 small rocks going into bag 343.

07 00 26 33 CC Okay. Bag 343.

07 00 26 34 LMP-EVA That's three scoopfuls, Tony.

07 00 26 37 CC Good show.

07 00 26 46 LMP-EVA Okay, and a soil.

07 00 26 51 CDR-EVA *** get another bag from you, Charlie.

07 00 26 53 LMP-EVA Okay.

07 00 27 01 LMP-EVA Ah, the old suit. Wins every time. I can't bend
this beauty like we could on the training grounds.

07 00 27 18 CDR-EVA *** Okay, that looks like 2 scoopfuls [sic] going
into bag 346.

07 00 27 26 LMP-EVA Sack it.

07 00 27 27 CC Okay, 346.

07 00 27 31 CDR-EVA Ah, isn't that beautiful. If it gets out of there,
we'll call it Houdini.

07 00 27 35 LMP-EVA (Laughter). Tony, it - -

07 00 27 41 CC And Charlie, you might look around - -

07 00 27 44 LMP-EVA - - Houston, the big eye is looking right at that big rock. What do you think of that beauty?

07 00 27 45 CC That's exactly what we're looking at - - .

07 00 27 48 LMP-EVA ...

07 00 27 49 CC - - While John's doing the LPM, we'd like you to hammer on that rock a bit.

07 00 27 53 LMP-EVA I am gonna hammer. I'll hammer chips from corners.

07 00 27 57 CC Okay. Good show.

07 00 27 58 LMP-EVA That's what I had in mind.

07 00 28 00 CC And if you get a chance, and it looks like some soil right on the south side, kind of underneath, might be permanently shadowed, you might take some of those and just put it in the bag.

07 00 28 11 LMP-EVA All righty.

07 00 28 27 CDR-EVA Well, Houston, I didn't park too good to do the LPM. If I go 45 feet from here, I'm going to be in the middle of a crater. Is that okay?

07 00 28 37 CC No. Pick a fairly level place - -

07 00 28 38 CDR-EVA ... slopes.

07 00 28 39 CC - - just go a different direction.

07 00 28 44 CDR-EVA Okay. You don't mind if I go out behind the Rover, for example.

07 00 28 47 CC No, that's fine.

07 00 28 50 CDR-EVA Instead of at right angles to it.

07 00 28 53 LMP-EVA John, where is that - those bags with the - the - that's still got the bracket on it - is it under your seat here?

07 00 28 58 CDR-EVA What?

07 00 29 00 LMP-EVA The bags that had the brackets on them?

07 00 29 01 CDR-EVA *** I think they were about out.

07 00 29 05 LMP-EVA No. Yeah. Here you go.

07 00 29 06 CC Okay, if you go out south, be a little careful on that cable - It'll be pulling - pulling at 90 degrees then.

07 00 29 16 CDR-EVA Okay, well I think I'll go out as far - I'll go out south - about east southeast.

07 00 29 30 CC Okay. Fine.

07 00 29 31 CDR-EVA It's off to our starboard bow or something.

07 00 29 35 LMP-EVA Tony, we're about out of bags. Did we sample that much?

07 00 29 38 CC Oh, you've been really packing them away.

07 00 29 40 LMP-EVA ...

07 00 29 41 CDR-EVA Yeah, we've only lost one set - set of bags, Charlie. Okay. Here we go. Well, we've got a few left here.

07 00 30 12 LMP-EVA Okay. I'm going to get on the sunset - sunlit side, Tony, so I'll know what - I'll know what I'm whacking on here. You know, Tony. That might be a permanently shadowed soil right in there. I think it is, as a matter of fact. It'll - it'll pass.

07 00 30 33 CC Good show, let's get one of those.

07 00 30 35 LMP-EVA I sure wish we had the S - okay, I'll do it. Hey, what's the settings in there - 250 at 56? Would that shine - would that look into there?

07 00 30 52 CC Let's try that.

07 00 30 53 LMP-EVA Yes sir, baby. That is - that is a perfect shadowed soil sample.

07 00 31 01 CC Outstanding!

07 00 31 05 LMP-EVA It is really perfect. John, you couldn't have picked a better rock.

07 00 31 07 CDR-EVA You're kidding.

07 00 31 08 LMP-EVA No, it's really perfect. Just great. I have to get my visor up to see something. Man, I can't believe I'm going to ... beauty.

07 00 31 52 LMP-EVA Well, I don't know how long that rock's been there, but that dirt has been shadowed ever since it's been there.

07 00 31 59 CC Okay. That's what we want, Charlie.

07 00 32 01 LMP-EVA I guarantee you. That's way - I got it - I got it from about a meter up under there, Tony.

07 00 32 08 CC Good show.

07 00 32 13 LMP-EVA And I'm sorry, but it's gonna have to go in a little old plastic bag here.

07 00 32 18 CC That's okay.

07 00 32 20 LMP-EVA And it's number 426.

07 00 32 21 CC Okay. Bag 426. Any chance of getting soil underneath that now for the control?

07 00 32 30 LMP-EVA Underneath - the shadowed, you mean?

07 00 32 33 CC Right. Underneath where you just touched, just dig deeper.

07 00 32 40 LMP-EVA That way - Yeah. Let me tip my visor down. That thing is bright. Get out of the Sun. Yeah, I can get that for you. That's about 100 grams, Tony, maybe 200.

07 00 33 07 CC That's all we need.

07 00 33 12 LMP-EVA Okay.

07 00 33 14 CDR-EVA Oh, I forgot to turn that thing off before I left the Rover. I don't know how to turn it off. Anyway, it's on now - at freeze. Okay, how long does it take it to warm up, Tony?

07 00 33 30 CC We're getting that, John.

07 00 33 32 CDR-EVA I'm back at the Rover. Huh? Say again.

07 00 33 39 CC Okay. We'll take a mark now, and go a minute and a half, and I'll tell you when.

07 00 33 46 CDR-EVA Okay. You go. Get a picture of it.

07 00 33 52 LMP-EVA That would have - John, that shopping bag would have been - should have gone down to the supermarket and bought one.

07 00 33 56 CDR-EVA They give it to you at the supermarket, Charlie.

07 00 34 04 LMP-EVA See how that sample bag is -

07 00 34 08 CDR-EVA Yeah.

07 00 34 09 LMP-EVA Is sitting up there - I mean that SCB is sitting up there, Tony.

07 00 34 11 CC Yep, sure do.

07 00 34 16 LMP-EVA What you need, looks like to me, is a bag like - that has two handles on it -

07 00 34 21 CDR-EVA Can I help you, Charlie? Let me put that in the bag.

07 00 34 24 LMP-EVA I got it.

07 00 34 25 CDR-EVA Okay.

07 00 34 27 LMP-EVA That ain't very much, but we'll keep trying. Oh, just kicked - well, I got enough. Go ahead.

07 00 34 35 CC Okay. That'll be good on the soil sample. And we'd like to spend the rest of the time, and there isn't much of it, hammering on that rock.

07 00 34 46 LMP-EVA Okay, there's about 50 grams in the control.

07 00 34 49 CC That's fine.

07 00 34 50 CDR-EVA It's going into bag 427.

07 00 34 53 CC Okay, 427.

07 00 35 00 CDR-EVA Boy. It just might be permanently shadowed, Houston, because - because it's down-slope, and when the - golly -

07 00 35 07 LMP-EVA I think it - John, I reached back in there about - pull your visor up and look under there. I pulled - reached in there about 2 to 3 feet, it looked like to me.

07 00 35 20 CDR-EVA Oh, that there is one of those gopher holes.

07 00 35 23 CMP-EVA Yeah.

07 00 35 27 CC Hey, John. You think you can push that one over?

07 00 35 30 LMP-EVA Do that in West Texas and you - No. You do that in West Texas, and you get a rattlesnake. Here you get permanently shadowed soil.

07 00 35 37 CDR-EVA One thing about this rock is it has some - this is the one that I noticed when we were coming up the way that had some of these holes in it - looked like vesicles, Charlie.

07 00 35 45 LMP-EVA Yep, they sure do, big ones.

07 00 35 47 CDR-EVA Biggies.

07 00 35 48 LMP-EVA I'm out of film, I think.

07 00 35 50 CDR-EVA Couldn't be zap holes.

07 00 35 53 LMP-EVA Hey, John - nothing.

07 00 35 54 CC Okay, Charlie. We'd like magazine Foxtrot on your camera.

07 00 36 00 LMP-EVA Okay.

07 00 36 01 CC And, John, you can do the LPM any time.

07 00 36 06 LMP-EVA What a time to run out of - okay.

07 00 36 08 CDR-EVA Okay. Let me take a picture for you, Charlie. Where at and how much?

07 00 36 09 LMP-EVA Oh - that's okay. Look at this. Tony, this is a black - a black matrix with some excellent crystals in it and also that are milky in color. Don't see any cleavage though or striations - about a centimeter across, and it has a matrix of the white - of that white rock like up on the rim - not a matrix, but some clasts of that.

07 00 36 43 CDR-EVA ***

07 00 36 50 LMP-EVA Tony, say again the - the mag?

07 00 36 54 CC You'll need magazine Foxtrot, and we're about out of time here - -

07 00 36 56 CDR-EVA Okay, Houston, we're ready to take the L - -

07 00 36 58 CC - - we'd like to sample - Okay. Go ahead, John.

07 00 37 03 CDR-EVA I'll take the LPM readings. Okay, 161, 711, 117; 160, 711, 120; 160, 712, 117.

07 00 37 27 CC Okay. We copied that, John, and visor down.

07 00 37 29 CDR-EVA Did you get that, Houston? I didn't put it up.
Thank you. READ SWITCH, OFF; POWER SWITCHES, OFF.

07 00 37 53 CC Okay, Charlie. Just get a couple of samples there,
and you should be about ready to go then when
John gets that reeled up.

07 00 38 02 LMP-EVA That's what I'm gonna do.

07 00 38 10 CDR-EVA *** rolled up or not here.

07 00 38 16 LMP-EVA Okay, I got a couple of - a handful of chips there.

07 00 38 33 CDR-EVA See here, Charlie, when you get under the dirt,
it's all white.

07 00 38 38 LMP-EVA I know. Okay. 428, Tony.

07 00 38 41 CC Okay.

07 00 39 18 LMP-EVA Great place to pick it. Two great places to whack
it. Oh, rats.

07 00 39 40 LMP-EVA John, I'm trapped.

07 00 39 41 CDR-EVA What do you mean?

07 00 39 44 LMP-EVA I'm - I'm against this rock.

07 00 39 47 CDR-EVA You can't get up?

07 00 39 50 LMP-EVA Well, I didn't - I didn't want to fall down - now
I got it. Yeah. There we go. I'm sorry. Give
me a hand. I'm okay. Thanks.

07 00 40 23 LMP-EVA Okay, Tony. I got three chips off the rock, scattered over about a 2-meter - a 2-meter area. One of them is too big to go in the bags, but the other - the one's right now are going in 429.

07 00 40 39 CC Okay, 429. And we'd like you to go back and start loading up.

07 00 40 45 LMP-EVA Okay, I am. Get this other rock. That zee-ing - that's swinging; it really works. John's got a long way to go, Tony, before he gets that thing reeled in.

07 00 41 14 CDR-EVA (Laughter). Charlie. Thanks for those words of encouragement.

07 00 41 17 LMP-EVA (Laughter). And, Tony, this rock here looks like the same as - it's the same character as the ones up on the rim.

07 00 41 33 CC Okay.

07 00 41 34 LMP-EVA That great, huge black one that we sampled, except we don't have any - that one up there didn't have any of these holes in it. I can't really say what these holes are here. They just look - they're vugs. Let's just call them vugs. What caused them, I don't know.

07 00 42 00 CDR-EVA Yeah. They - they look more vuggy to me, although they're round.

07 00 42 03 LMP-EVA They look like drill holes is what they look like.

07 00 42 05 CDR-EVA Yeah, that's right. They look like - you know what they look like? They look like those - -

07 00 42 10 LMP-EVA Help me.

07 00 42 11 CDR-EVA - - they look like those holes you get in rocks where the - here, put those up for me.

07 00 42 18 LMP-EVA Okay.

07 00 42 19 CDR-EVA They look like the - they look like the holes that you get in rocks where you have a venting of gas that comes up through there like a long - you know what I mean, Tony?

07 00 42 29 CC Sure do. Sure do.

07 00 42 31 LMP-EVA Vesicle pipe.

07 00 42 33 CDR-EVA Yeah, vesicle pipe. That's it.

07 00 42 34 LMP-EVA Vesicle pipes.

07 00 42 35 CDR-EVA There you go.

07 00 42 40 LMP-EVA Okay. Hi, big eye.

07 00 42 44 CC Hi there, Charlie.

07 00 42 46 LMP-EVA Okay, let's see. Yeah. Okay, John. I'll turn off the TV for you.

07 00 42 53 CDR-EVA Okay. Let me put the scoop back. Okay, going to 1 right now.

07 00 43 05 LMP-EVA Roger. ... counterclockwise. That is a beautiful little piece of gear.

07 00 43 21 CC Charlie, you've got about 4 minutes on the DAC - -

07 00 43 23 LMP-EVA Okay. He's sleeping.

07 00 43 24 CC - - at 12 frames per second; and you can either use it that way or one frame per second, either way you want, on the way back, whichever looks best to you.

07 00 43 35 CDR-EVA Why don't we go at one frame a second all the way back into the Rover?

07 00 43 39 LMP-EVA ... at -

07 00 43 41 CDR-EVA Huh?

07 00 43 42 LMP-EVA What am I hung up on, John?

07 00 43 45 CDR-EVA Your bag is hung up, Charlie.

07 00 43 46 LMP-EVA Oh shoot. You know, that's probably why yours came off.

07 00 43 51 CDR-EVA Yeah, you got to - There you go.

07 00 43 55 LMP-EVA Okay. Is it free now?

07 00 43 58 CDR-EVA Only if you tighten it down. There you go.

07 00 44 01 CC And, we'd like your frames before you load up.

07 00 44 03 LMP-EVA Thanks.

07 00 44 09 CDR-EVA Okay. Get yours, Charlie.

07 00 44 11 LMP-EVA Okay. I'm 6 on magazine Foxtrot, and I finished up -

07 00 44 17 CDR-EVA I'm a 112.

07 00 44 18 CC Okay.

07 00 44 21 CDR-EVA Big man, that time.

07 00 44 27 LMP-EVA Boy, that Smoky Mountain - -

07 00 44 28 CDR-EVA Make that 114, Houston.

07 00 44 33 LMP-EVA That Smoky Mountain is a steep-sided mountain, Tony. Ravine is - I got a good view of Ravine here, and it's steep sided on the Smoky Mountain side, but very undulating on the other side - on the Cayley side. And the - you can see Cat Crater, and it doesn't look very blocky, so I guess it's probably, it's sharper than the rest, but it's still no blocks around it.

07 00 45 14 CDR-EVA Okay, 1, 2. Uh-oh.

07 00 45 26 LMP-EVA What?

07 00 45 27 CDR-EVA I didn't shut off the TV.

07 00 45 28 LMP-EVA I did. I got it for you.

07 00 45 29 CDR-EVA Did you get?

07 00 45 30 LMP-EVA Yeah.

07 00 45 31 CDR-EVA In PMW-1?

07 00 45 32 LMP-EVA Yeah.

07 00 45 33 CDR-EVA Okay.

07 00 45 34 CC Charlie, if you haven't gotten on yet, we'd like to change that to 12 frames. Evidently, your DAC is about out of electrical power.

07 00 45 42 LMP-EVA Okay, it's going at 12.

07 00 45 46 CC Okay, fine.

07 00 45 50 LMP-EVA I'll - I'll start it when we get started, but it's on 12.

07 00 45 54 CC Good show.

07 00 45 56 LMP-EVA f/4.

07 00 45 57 CC Okay.

07 00 46 00 LMP-EVA Oh boy, Tony. This has been a good traverse up here ... - -

07 00 46 06 CC It sure looked good down here, I'll tell you.

07 00 46 08 LMP-EVA - - some spectacular scenery.

07 00 46 09 CC I'm sure glad we got this EVA-3 - -

07 00 46 11 LMP-EVA Hope we picked up the right rocks. I think there are two predominant types. Yeah, me too. But there's two predominant-type rocks here, the aphanitic black-looking ones that - that really appear to be crystalline to me, and not - not necessary - cessarily lava like.

07 00 46 33 CDR-EVA Okay. We're on our way, Houston.

07 00 46 34 CC Okay.

07 00 46 36 CDR-EVA And we're going to follow our tracks.

07 00 46 38 LMP-EVA Where - where - say - where station 10 is again?

07 00 46 41 CC Okay. Station 10 makes a triangle with ALSEP and the old station 10. We'll call it station 10

prime, and it's about 50 meters to the northwest of the old 10.

07 00 46 57 CDR-EVA Okay.

07 00 47 08 CDR-EVA Dadgummit, now I can't get the ...

07 00 47 20 LMP-EVA Okay. I'll take the same set of pictures coming back, Tony.

07 00 47 26 CDR-EVA Charlie, get your arm, you got -

07 00 47 27 LMP-EVA Oh, excuse me. Excuse me.

07 00 47 30 CDR-EVA Yeah.

07 00 47 31 LMP-EVA Hey, we took going out to get you a different Sun angle. This taking pictures from the Rover here is really good. The camera is just in the right position, Tony, so I - hopefully, they will come out. Okay, off to the right - we're at 3.7, 186 - off to our right, we have some more of the rounded rocks, whitish in character.

07 00 48 04 CDR-EVA Yeah. You know, so far on this trip, my personal estimation of Charlie's slope estimates that you can take them and double every one of them.

07 00 48 14 LMP-EVA (Laughing). That was always my problem.

07 00 48 20 CDR-EVA Oh, good.

07 00 48 25 LMP-EVA My 10 percents never added up to a hundred, John.

07 00 48 28 CDR-EVA Yeah, but you're not exaggerating here, I'll tell you that. You're sure - (laughing) you're sure under exaggerating.

07 00 48 35 LMP-EVA Houston, this is the roughest terrain to be plains I ever saw.

07 00 48 40 CC Gee. We've heard that before on almost every geology trip.

07 00 48 41 CDR-EVA You might ... compared to plains that looked like this.

07 00 48 48 CC I don't think the photo - photo geologists get close enough to their subjects.

07 00 48 56 LMP-EVA Okay, we can - Tony, looking back now at 2 o'clock, and we're heading 140, 188, 3.6, you can see End Crater right on the flank of Palmetto, and you can see the rim of Dot. Palmetto is one of the highest features around, and its rim is really raised. I can see some large blocks on the north side of it that I couldn't see before. And I would estimate 2 meters or so in size.

07 00 49 52 LMP-EVA Off to the right toward that - which we described going out, now I can see four or five 2-meter-size boulders, whitish in color, with no fillets around them.

07 00 50 10 CC Okay.

07 00 50 12 LMP-EVA I guess we would be off the ejecta blanket here, wouldn't you say, John?

07 00 50 15 CDR-EVA Yeah.

07 00 50 16 LMP-EVA This probably is right in between the North and South Ray ejecta because it - there's no - hardly any pebbles. It's almost a completely smooth surface, maybe 2 percent, Tony, with cobbles up to 5 centimeters. An occasional 20-meter - 20-centimeter block.

07 00 50 46 CC As that Sun gets higher, it must be about like looking in there at zero phase everywhere.

07 00 50 53 CDR-EVA Naw, the visibility gets pretty good at high Sun angles.

07 00 50 56 CC Good show.

07 00 50 57 CDR-EVA It's still bad going into the Sun - out of the Sun and into the Sun. But it's pretty good the way we're going right now.

07 00 51 04 CC Okay.

07 00 51 05 CDR-EVA You want to take a picture into Palmetto, Charlie?

07 00 51 08 LMP-EVA If we could get in there, I'd like to. Yeah, go up by Dot.

07 00 51 11 CDR-EVA Okay.

07 00 51 12 LMP-EVA That's going to be a pretty steep slope though.

07 00 51 15 CDR-EVA Ah, I'll tell you what. We'll go up there, and do a 360 pan. How would that be?

07 00 51 19 LMP-EVA Okay. I'll do use one frame setting. It'll be a little off on exposure, but - we'll see what it looks like.

07 00 51 31 CDR-EVA Developed a new technique for panning, Houston. 360 degrees on the Rover. It's clicking away. That ought to make stereo for you.

07 00 51 45 LMP-EVA Yeah, we look like we're in a - old - secondary area now, Tony, at 191 at 3.1.

07 00 51 54 CDR-EVA I think this is South Ray - Ray.

07 00 51 55 LMP-EVA You do?

07 00 51 56 CDR-EVA Yeah.

07 00 51 57 LMP-EVA Took - yeah, you're probably right.

07 00 51 59 CDR-EVA A big hunk of South Ray. Right? They're the same rocks and everything. And we're traversing it right now. It's a big rough - big old blanket full of South Ray material.

07 00 52 10 LMP-EVA Look at those big rocks up on the - off to the west there, John, up on the - you probably can't see them, but there are about 10 - stand out starkly against - -

07 00 52 20 CDR-EVA Yep. Yep.

07 00 52 21 LMP-EVA - - the sky line on the far ridge.

07 00 52 23 CDR-EVA Yeah.

07 00 52 24 LMP-EVA How far that is -

07 00 52 25 CDR-EVA Yeah, there's one of those black rocks like we got out of South Ray.

07 00 52 26 LMP-EVA Yeah.

07 00 52 27 CDR-EVA That's a couple of meter black rock. Houston, we've talked about that one when we passed by it the first time. That's the same rock that - that we saw on the - on the rim. That's the same class of rock, I would think, that we - that was that big house rock.

07 00 52 44 CC Hey, incidentally, we reduced the magnetometer reading now, and it's 313 gammas down, which is by far the strongest reading we've seen on the Moon. And DAC is coming off.

07 00 52 57 LMP-EVA Golly!

07 00 52 58 CDR-EVA I wonder what that - Guess we're out of power. (grunt) Dumb thing.

07 00 53 16 CDR-EVA Well, I wouldn't be surprised but what a big impact crater wouldn't - wouldn't change your magnetic field some.

07 00 53 23 LMP-EVA Tony, my impression right now could be proved totally wrong on the sample read - analysis, but -

07 00 53 35 CDR-EVA Are we up on the rim of Palmetto?

07 00 53 37 LMP-EVA No, we got a long way to go.

07 00 53 38 CDR-EVA Oh, yeah, there it is.

07 00 53 39 LMP-EVA See there is Dot. I mean -

07 00 53 40 CDR-EVA Oh, yeah, yeah.

07 00 53 42 LMP-EVA Dot's that white spot up on the top there, John.

07 00 53 45 CDR-EVA Right.

07 00 53 47 LMP-EVA Ah, is - is that - I've seen the same characteristics in South Ray rocks as North Ray rocks, being the black and the white. The streaks up the side of the craters are - are - are basically the same. But the - the North Ray you'd - you got to guess at it a little bit more, and that might be totally what my guess is. It could be wrong, but - I think - I kinda think they're at least a similar rock.

07 00 54 26 CDR-EVA That stumped them.

07 00 54 35 LMP-EVA So crazy they didn't even answer me.

07 00 54 40 LMP-EVA Houston, do you read? Over.

07 00 54 41 CC Oh, we sure do. Sorry, Charlie. We copy that.

07 00 54 45 LMP-EVA Okay. Fine. (Laughing). It's okay.

07 00 54 50 CC It was just mind boggling, as Freddo says here.

07 00 54 58 CDR-EVA Sure is. I'll tell you one thing.

07 00 55 05 LMP-EVA Yeah, I think you - I think we could make it up over there, John, if you broke right here, but I guess you want to follow the old tracks. We were pretty close to the rim there for one time.

07 00 55 13 CDR-EVA Yeah, we'll get there.

07 00 55 14 LMP-EVA Yeah. You know this - We know this way works.

07 00 55 19 CDR-EVA Certainly. Let's not - not do any R and D. Unnecessarily, that is.

07 00 55 28 LMP-EVA But, Tony, if we sample one of these very fresh craters with the indurated regolith it to me look like they're maybe the freshest thing around, can y'all date that with the - just from the regolith - the in - the glassy shards or whatever is in there?

07 00 55 51 CC Say again, Charlie.

07 00 55 53 CDR-EVA Here we go.

07 00 55 57 LMP-EVA I was just asking a question about whether you could date - the a - a - a fresh crater that has an indurated - with an indurated regolith?

07 00 56 09 CC Ah, we'll work on an answer on that. I don't know offhand.

07 00 56 15 LMP-EVA Okay. There's a lot of them around the rim, and I'd like to at least pick up some of that and see what y'all could do with it.

07 00 56 22 CC That sounds like a good idea. We've got a definite maybe from the back room there.

07 00 56 30 LMP-EVA Okay. And, Tony, we're looking into End Crater, and it's a blocky crater. There are blocks inside of it, and there's some on the rim, half meter size.

07 00 56 41 CC Right. And you were asking about a stop, we don't want to stop. We want to go on to 10 prime.

07 00 56 42 LMP-EVA And maybe 10 percent of it - naw let's make it - -

07 00 56 52 LMP-EVA Naw, we weren't talking about a stop. I was just describing End Crater there. It - it is a blocky-rim crater.

07 00 56 59 CC Okay, fine.

07 00 57 00 LMP-EVA That - as we suspected.

07 00 57 10 CDR-EVA How do you like this, Charlie?

07 00 57 11 LMP-EVA It's great.

07 00 57 12 CDR-EVA We're doing 14 clicks.

07 00 57 13 LMP-EVA This is smooth going. Boy, that rear wheel fender - not having that fender really sprays it up there over you, doesn't it?

07 00 57 23 CDR-EVA Yeah. It does.

07 00 57 24 CC And could we have an amp-hour reading - an amp reading ...

07 00 57 25 LMP-EVA Tony, occasionally, when we hit a big bump - 40 - about - between 30 and 40.

07 00 57 33 CC Okay.

07 00 57 40 LMP-EVA When we hit a bump, Tony, and bounce down, that rear wheel that lost the fender showers dirt all over the front of us, and that's what gets the LCRU and the camera so dirty.

07 00 57 59 CC Okay. We copy that.

07 00 58 22 LMP-EVA I'll give you - you earned your driver's license on this thing, John, I tell you. ...

07 00 58 28 CC Either that or lose it.

07 00 58 32 LMP-EVA You know, it takes - it takes just about any terrain. It's really a remarkable machine.

07 00 58 37 CDR-EVA Sure is climbing a slope right now, Charlie.

07 00 58 39 LMP-EVA Yeah.

07 00 58 40 CDR-EVA We're only doing - got a B max, and we're only doing 8 clicks. So you know this has got to be steep.

07 00 58 47 LMP-EVA We're pulling 40 - a little over 40 amps, Tony.

07 00 58 51 CC Okay.

07 00 58 58 LMP-EVA Don't anybody tell Ken how dirty we are.

07 00 59 02 CDR-EVA Yeah, he won't let us in the hatch.

07 00 59 04 LMP-EVA I know it. Okay, Tony, a - we're at End - just passing End Crater, and the rocks are - appear to be the same as we sampled, in texture. They may be not as shocked as the ones up on the rim. I could grab you one in about a minute.

07 00 59 40 CC No, we'd better press on.

07 00 59 42 LMP-EVA Let's go over and look at the rim, John, here. Okay.

07 00 59 48 CC Incidentally, we - we were able to track - track you in the Rover on the way out with the PSE and they are able to see you now on the way back with the active seismic geophones. We'd like to be sure that you are in the same tracks you were going out.

07 01 00 05 CDR-EVA That's true.

07 01 00 06 CC Okay.

07 01 00 07 LMP-EVA True, that's true. And we're at 192 - at 192 at 1.9. Hey, John. Right, babe. Look at that!

Hook a right, please. Get this old pickachur
[sic].

- 07 01 00 29 LMP-EVA Hey, Tony. We're going to drive over to the rim of Palmetto, which is a pretty good sight.
- 07 01 00 34 CC Okay.
- 07 01 00 36 LMP-EVA And, we see some block - some blocks on the inner rim, but nothing that really appears to be out-cropped. And it's really a deep crater, Tony. It's -
- 07 01 00 53 CDR-EVA Don't see the bottom.
- 07 01 00 54 LMP-EVA We can't see the bottom, and we're right on the rim. It must be a 100 meters or so deep.
- 07 01 01 01 CDR-EVA Pictures of it, Charlie?
- 07 01 01 02 LMP-EVA No, I didn't get it. I thought we were going to do a 13 - 180 -
- 07 01 01 05 CDR-EVA Okay. Here we go.
- 07 01 01 07 LMP-EVA Okay. Okay, starting now: click - click - click - click - click. Okay, that's about a four shot at it. It might not be completely overlapped, but I think it will be good enough.
- 07 01 01 30 CDR-EVA Okay.
- 07 01 01 31 LMP-EVA Okay. We're heading out, Tony.
- 07 01 01 33 CC Okay.
- 07 01 01 35 LMP-EVA And the rim is - the rim here is cobbly. I wouldn't say it's blocky, but it's cobbly.
- 07 01 01 43 CDR-EVA I think we've been averaging 11 or - 11 kilometers, Houston.
- 07 01 01 47 CC Okay.
- 07 01 01 51 LMP-EVA Look at that view back towards South Ray, isn't that spectacular?

07 01 01 55 CC Looking ahead - -

07 01 01 56 CDR-EVA Baby Ray.

07 01 01 57 CC - - at your tracks, could you tell when you picked up the softer regolith? On the tracks that you came out?

07 01 02 06 LMP-EVA They've all looked the same. Haven't they to you, John?

07 01 02 10 CDR-EVA Softer regolith coming out from the - from the - from the LM?

07 01 02 17 CC Right, you - -

07 01 02 18 CDR-EVA We're keeping up on it, Charlie.

07 01 02 19 CC - - mentioned up on North Ray that you only went in - -

07 01 02 20 LMP-EVA Yeah.

07 01 02 21 CC - - an eighth of an inch or so.

07 01 02 26 CDR-EVA Naw, the regolith does change character right past the LM, and it - it's a lot less - lot less blocky, you know? I think this ray right here.

07 01 02 30 LMP-EVA - - I think this - this is probably, ray. Yeah, yeah. It's probably either that or it came out of Palmetto.

07 01 02 48 CDR-EVA This was a good - would have been a good choice for a rocky traverse. See over there in the - in the west - over there in the far rim over there? Don't you see something that looks like - down in that ledge down there.

07 01 03 07 LMP-EVA Yeah. There are two spots over there that might be outcrop, Tony. There's - -

07 01 03 14 CDR-EVA They are actually a secondary from - that's probably a big rock clot from -

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07 01 03 20 CDR/ From North Ray.
LMP-EVA

07 01 03 21 LMP-EVA Yeah.

07 01 03 22 CDR-EVA Yeah. That's what it is. See there -

07 01 03 23 LMP-EVA I don't -

07 01 03 24 CDR-EVA It's hid in there and -

07 01 03 25 LMP-EVA Yeah. There's one further around, though on the southwest rim, John, that - that sticks out like it's eroded away from underneath it.

07 01 03 34 CDR-EVA Yeah.

07 01 03 35 LMP-EVA That has a hint of bedrock. But it's - and that - that's about on the southwest rim - about 20 percent down from the upper rim of Palmetto, Tony.

07 01 03 46 CC Okay. We copy that.

07 01 03 50 LMP-EVA But it's just one - it's one little isolated block. And I don't really think it's - means much. Still can't see the IM. We're on the - -

07 01 04 02 CDR-EVA See South Ray, though. Get a picture.

07 01 04 04 LMP-EVA I - I'm getting them, as fast as I can pull the trigger.

SEPARATE SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

06 23 34 20 CC Okay.

06 23 34 24 CMP Is that going to crowd us for time? You've got a better feel for it than I have.

06 23 34 30 CC I don't think so, Ken, if we can get right on it right after the visual.

06 23 34 37 CMP Okay.

06 23 36 55 CC Ken, John and Charlie are still at North Ray and they have found some basalt clast.

06 23 37 08 CMP Very good. Around the outside or up on the rim?

06 23 37 14 CC Roger. They are still on the rim.

06 23 37 41 CMP The thing that I find most puzzling about North Ray is that the albedo comes up - and I can see - as the sun comes up the albedo change shows some, but I can see the rays around there a lot better now. And the rays lay on top of that material that seems to run, that they drove up on. Well, I take it back, it looks like there's a little tongue of that material that's probably about where they drove. It doesn't appear to be as white as the stuff just a little bit further to the east. But all that material down to the east and all the stuff that goes over - goes over to Ravine all look like the same stuff and looks very similar in character to Smoky. I see no evidence of rays in North Ray except for some blocks on the sides there, probably just slump blocks in slump patterns. And taking a quick comparison with South Ray, the - I'm not so sure South Ray is much different. Okay; I'm ready to go back to copying updates.

06 23 39 18 CC Ah - Roger, do you want to read back what we had there for 168:05?

06 23 39 25 CMP Okay. Let's see - 168:05. Okay. I wanted to question - I had a T-stop time for the camera of 05:41, and you just gave me 05. Do you want me to stop it at that, or do you want me to go on to -

06 23 39 43 CC 05:41 is the correct stop time. We just - this is just putting in words what goes along about that time.

06 23 39 55 CMP Okay. And then VERB 49 to a P52 attitude, which is 152, 250, 042.

06 23 40 02 CC Correction on that. That's 142.

06 23 40 04 CMP MAPPING CAMERA to STANDBY. What did I read to you, 142, 250, 042?

06 23 40 15 CC That's correct.

06 23 40 19 CMP Okay. Then it's MAPPING CAMERA to STANDBY. That's at 30 seconds after we get OFF. Then IMC, OFF; LASER ALTIMETER, verify OFF; MAPPING CAMERA, RETRACT; X-RAY to STANDBY; MASS SPEC ION SOURCE, OFF; MASS SPEC EXPERIMENT to STANDBY; wait 5 minutes before retraction; then I can go ahead and close the MAPPING CAMERA LASER ALTIMETER COVER; the ALPHA X-RAY DOOR can be CLOSED; the GAMMA RAY can be RETRACTED and after the 5 minutes I can RETRACT the MASS SPEC. Then I will ENABLE a couple of thrusters.

06 23 40 58 CC Good readback. At 168:15 H₂ PURGE LINE HEATERS ON; P52 -

06 23 41 15 CMP Okay 168 - wait a minute, say that again, Henry.

06 23 41 22 CC Roger, the H₂ PURGE LINE HEATERS ON at 168:15, and following that a P52 option 3, and then an option 1. You are going from the landing site to the burn orient.

06 23 41 45 CMP Okay, that will be an option 1 and then on option 3.

06 23 41 51 CC That will be option 3 then option 1.

06 23 42 02 CMP Okay.

06 23 42 04 CC And just a reminder to use SCS for that, I guess you got that down as a standard procedure now.

06 23 42 14 CMP Okay. That's a good reminder nevertheless.

06 23 42 20 CC Well, what we are going to do here, Ken, is we're going - you're going to have to get a scratch pad now - we're - there's just no place in the Flight Plan we can do this conveniently. And we'll just give you times and things to do, and fill in the gap between 168:30 and 172:30. And if you want to do that, get your pad out. I'll read these things to you.

06 23 42 55 CMP Okay. I got a pad. Do you think we know enough to - right now that it'll pretty much sequential or do we need to leave spaces for alterations? You know, we got some of those real-time checklist sheets in the Updates book, lets see if that is appropriate.

06 23 43 14 CC I think that's probably a good thing to use. And Ken, I think we got a pretty good handle, too, on what should happen in sequence, so you wouldn't want to leave too many spaces.

06 23 43 37 CMP Okay. Well, we got lots of these Flight Plan update sheets, so why don't I use them? And I'm ready. Let me mark this so I can always find this page. Just a second before you read it to me.

06 23 44 21 CC And, Ken, we don't plan to update your platform before the burn, just the affirmation.

06 23 44 30 CMP All right. Okay. I've got my paper in hand. Ready to copy.

06 23 44 56 CC Okay. Time 168:30, configure for urine dump; 168:37, P30; VERB 49 maneuver to LOPC-1 attitude.

06 23 45 19 CMP Okay.

06 23 45 22 CC 168:40 H₂ and O₂ fuel cell purge, waste water dump, and urine dump.

06 23 45 44 CMP Okay. And you want me to dump them both at the same time, right?

06 23 45 49 CC That's affirmative. And 168: - -

06 23 45 54 CMP Okay.

06 23 45 55 CC - - :50 terminate waste water dump at 10 percent and H₂ PURGE LINE HEATERS OFF.

06 23 46 20 CMP Okay.

06 23 46 22 CC Okay. They couldn't work that MASS SPEC dump in there, Ken. They tried, but they couldn't. 168:55, pre-SPS SIM prep; set DET counting up to LOPC-1; secure equipment for LOPC-1

06 23 47 13 CMP Okay.

06 23 47 15 CC At 169:05, P40; at 169:13, AOS and that will be those angles you have, pitch, plus 13; yaw, 258; at approximately 169:17 is LOPC-1. And we hope we'll have a good lockup, but it's only about 4 minutes, there, and we hope we'll be locked up so we can watch. At 169:20 -

06 23 48 04 CMP Okay.

06 23 48 07 CC - POO. Okay. And, also, I guess I should tell you, you can use the burn table for that LOPC burn. It's on page 223 of the Flight Plan. That's got all your burn rules and so on.

06 23 48 29 CMP All right. Let me check that real fast.

06 23 49 04 CMP Okay. Those look like familiar rules.

06 23 49 12 CC Okay. And at 169:25 we'll up-link you a liftoff REFSMMAT, and at 169:30, your post-SPS-burn SIM prep, and that still leaves a gap there of about 3 hours, and that's your - after LOPC-1 we don't want to clutter up until we get through with that. But we'll go ahead and give you the rest of the things that fill in here.

06 23 49 44 CMP Okay. I'll still need the - plenty of time to get the cockpit squared away for rendezvous.

06 23 49 51 CC We plan to give you lots of time for that, Ken. Do you want to read back what you got there, just to make sure we agree?

06 23 49 59 CMP Yes sir. Let's see. Have we got anything coming up here that we are supposed to be watching before I read it back?

06 23 50 05 CC I'm watching your mapping camera.

06 23 50 33 CMP Okay. I'll read back. 168:30, configure for urine dump; 37 to P30, VERB 49, the lunar orbit plane change number 1 attitude; at time 40, hydrogen and oxygen fuel cell purge; we turn LINE HEATER ON back here at 168:15. Okay, at 40 we also do waste water and urine dump; at 50 terminate waste water dump at 10 percent, and turn the PURGE LINE HEATERS OFF; 55, pre-SPS SIM prep; set the DET counting up and secure equipment; at 169:05 it's P40; at 13 it's AOS, with a PITCH 13, YAW 256.

06 23 51 22 CC That's 258.

06 23 51 27 CMP At 17 it's plane change 1, 258. Okay. I got that on the other pad, too. All right, at 17 it's plane change 1, I use the burn rules off of page 223; at 20 I'll go to P00; at 25 you give me an up-link of the ascent REFSMMAT; at 30 I'll do the post-SPS SIM prep.

06 23 51 45 CM Roger. And I guess there you will use your modified burn card with a 509 et cetera.

06 23 51 54 CMP Okay. And I'll start the 509 right after my P52.

06 23 52 04 CC Okay.

06 23 52 15 CMP Then do an SCS; then I'll call 509; and then I'll take 509 down and I'll use the modified card where I start at gimbals - bring the bus ties on at 8 minutes.

06 23 53 18 CC That's a good plan, Ken, and the - where we are going to pick up the Flight Plan again is at 168:30, to start preparing for rendezvous, and from 168:30 on to 175 hours, if you add 4 hours to all of those times, they're close enough that we can use them all the way through the rendezvous.

06 23 53 46 CMP All right. That's a help.

06 23 53 54 CC In other words, 168:30 becomes 172:30 and so on down the line all the way through, and even the lift-off time is within a minute or so. You always get an update on that any how, so this section of the Flight Plan will be good.

06 23 54 11 CMP Okay. Swing. All right sir. I guess I got my work cut out.

06 23 54 30 CC And, Casper, you are about 15 seconds from T-stop on the mapping camera.

06 23 54 48 CMP All right. Thank you. And it's OFF.

06 23 55 53 CMP Okay. Our - maneuver is underway, MAPPING CAMERA is coming to STANDBY, the IMC is OFF, it's barber pole at gray, the LASER is verified OFF, MAPPING CAMERA is coming to RETRACT.

06 23 56 36 CMP MARK.

06 23 56 51 CMP The X-RAY is at STANDBY, the MASS SPEC ION SOURCE is OFF. MASS SPEC EXPERIMENT is in STANDBY.

07 00 00 19 CC Casper, we're showing a RETRACT on the MAPPING CAMERA. Does that agree with you?

07 00 00 25 CMP I'll check; just a second. Yes sir. That's about 3 minutes and 30 seconds or so.

07 00 00 39 CC Roger.

07 00 01 05 CMP Okay. Here comes the ALPHA and X-RAY DOOR. They're closed, and ALTIMETER's OFF, the camera's in, so here comes the CAMERA and LASER DOOR. That must have been in; the door closed. Okay. The gamma is coming to RETRACT, and I show it's been 6 minutes, so I'm gonna bring the MASS SPEC to RETRACT, too.

07 00 01 53 CC We concur.

07 00 01 58 CMP Okay. Then we'll start on my P52. Got the PURGE LINE HEATERS-ON a minute early so I won't forget those. Okay, I'm in SCS control and I'm gonna call P52.

07 00 02 28 CC Roger.

07 00 04 59 CMP I must have one of the planets right up there above, right in that area, too. Does that sound right? That's around Nunki.

07 00 05 11 CC Well, we'll take a look.

07 00 05 51 CMP (Laughter). Okay. Back and do an option 1 now.

07 00 05 59 CC Roger.

07 00 10 05 CMP Okay. I have these numbers if anybody wants them.

07 00 10 16 CC We got them.

07 00 12 07 CMP Okay. I don't think those are worth torquing, are they?

07 00 12 10 CC Negative.

07 00 12 18 CMP Yes, you have Jupiter in my field of view, and all his little moons.

07 00 12 26 CC Roger.

07 00 12 28 CMP He sure must be a long ways off, because even now he's not very big. You can see his moon, though. That's about all you can tell from it - tell who he is.

07 00 12 44 CC Okay, Ken, before LOS here, after you exit that 52, we'd like to check your boom talkbacks.

07 00 12 50 CMP Okay. Stand by, and I'll be with you. Okay. I've got - -

07 00 12 56 CMP The CMC MODE on the OPTICS on ZERO to resolve - All that's put to bed. I'm going to start the 509. I'll look at your talkbacks first. Oh, now I've got 2, I got 2 of these things that show barber pole. Both the MASS SPEC and the GAMMA RAY.

07 00 13 23 CC Okay. We show that both booms are not fully retracted; however, we do show them past the point where it's safe for an SPS burn. So we'd like for you now to take the DEPLOY-RETRACT switches on both of those to OFF.

07 00 13 42 CMP Okay. They are safe for burns. I guess we ought to try that in sunlight.

07 00 14 18 CC Okay, Ken. We're about 3 minutes from LOS.

07 00 14 21 CMP Okay. We - go ahead.

07 00 14 23 CC In case we don't get comm before the burn, and at this point you're GO for the burn, the only thing you haven't done is look at your target load. You still have to enable the jets, according to the Flight Plan, and when you do your pre-SPS burncard on the SIM BAY, you'll be turning the ALPHA PARTICLE and X-RAY OFF and going to BOOST on the PAN CAMERA.

07 00 14 53 CMP That's affirmative.

07 00 15 31 CC And, Ken, be sure you load your DAP before you load 509.

07 00 15 38 CMP Wilco. I was gonna try to let you take a look at the vector P40 before we got to LOS.

07 00 15 49 CC Okay.

07 00 16 03 CMP Okay. You've got it.

07 00 17 36 CC You had a good vector, Casper.

07 00 17 42 CMP Okay. And I've got the DAP loaded.

07 00 54 XX

(BEGIN LUNAR REV 49)

07 01 03 42 CMP Hello, Houston. How you doing?

07 01 03 44 CC Hello, Casper. How's it going? Are you all set up?

07 01 03 50 CMP All set to go. 509 is out, I'm in attitude, and we must be right, I'm going sideways.

07 01 03 56 CC Roger.

07 01 03 58 CMP Counting down at 155. I'm on VOX, and I'll give you the final couple of steps on VOX.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 01 03 02 CDR-EVA ... over there in that far rim over there, don't you see something looks like - down in that ledge down there?

07 01 03 06 LMP-EVA Yes. There are two spots over there that might be outcrop, Tony. There's a -

07 01 03 12 CDR-EVA No, that's probably a secondary slope - that's probably a big rock clot from -

07 01 03 18 LMP-EVA From North Ray.

07 01 03 19 CDR-EVA From North Ray.

07 01 03 20 LMP-EVA Yeah.

07 01 03 21 CDR-EVA Yeah. That's what it is.

07 01 03 22 LMP-EVA I don't -

07 01 03 23 CDR-EVA You see it in there?

07 01 03 27 LMP-EVA Yeah. There's one farther around though, on the southwest rim, John, that - that sticks out like it's eroded away from underneath it.

07 01 03 32 CDR-EVA Yeah.

07 01 03 33 LMP-EVA That has a hint of bedrock, but it's - and that's about on the southwest rim - about 20 percent down from the upper rim of Palmetto, Tony.

07 01 03 45 CC Okay. We copy that.

07 01 03 48 LMP-EVA But it's just one - it's one little isolated block, and I don't really think it means much. Still can't see the LM. We're on the -

07 01 04 02 CDR-EVA See South Ray though. Get a picture.

07 01 04 04 LMP-EVA I'm getting them as fast as I can pull the trigger. We thought we'd be able to see the rim from here, Tony, but we're - you can't - you can't do it - I mean the LM, but you can't do it. That thing says 194 or 1.4. I bet you that's right. We came farther east.

07 01 04 40 CDR-EVA Yeah. We're way east.

07 01 04 43 LMP-EVA Yeah. Okay, Tony. Between Gator and Palmetto -

07 01 04 48 CDR-EVA Uh-oh.

07 01 04 49 LMP-EVA Uh-oh. Ah! We missed it.

07 01 04 51 CDR-EVA Ahh, good suspension.

07 01 04 53 LMP-EVA Yeah.

07 01 04 55 CC Well, we're all holding on to our chairs.

07 01 04 57 LMP-EVA Between Gator and Palmetto - we almost hit a great big rock, but old Percy, here, avoided it. Look at that. 194, John, takes us right out our tracks. Between Gator and Palmetto, Tony, there's a swale - a depression that runs east-west that is apparently more cratered and a lot fresher craters there than what we've been driving on between Palmetto and North Ray.

07 01 05 44 CC Roger.

07 01 05 46 CDR-EVA I just finished my 2 pounds of potassium.

07 01 05 51 LMP-EVA You finished your 2 pounds already?

07 01 05 53 CDR-EVA Yeah. I don't know whether I'm driving or sloshing.

07 01 05 57 CC (Laughter) Okay. We copy that.

07 01 05 58 LMP-EVA Don't let's go unstable with a fuel slosh mode.

07 01 06 02 CDR-EVA That's right. (Laughter) My fuel slosh problem is getting to be something fierce.

07 01 06 10 CC And the command module just did their plane change burn, and it's a good burn.

07 01 06 16 LMP-EVA Good.

07 01 06 17 CDR-EVA Jce.

07 01 06 27 CDR-EVA Well, you old fink.

07 01 06 39 LMP-EVA Man. We are showered.

07 01 06 41 CDR-EVA Yeah.

07 01 07 07 CDR-EVA How many gammas did you say that LSM was, Tony -
300 and some?

07 01 07 12 CC 313.

07 01 07 16 CDR-EVA How many times higher than that? That's 10 times
higher than what the Apollo 12 guys got, isn't it?

07 01 07 26 CC No, it's not that much greater. It's about
100 more than they got on Apollo 14.

07 01 07 35 CDR-EVA Yeah. That's what I thought. Well, the magnetic
field of the Moon, in places, is a lot more than
anybody ever believed it would be.

07 01 07 44 CC That's right. From lunar orbit, it only looks
like - from high lunar orbit, it only looks like
2 or 3 gamma, at most.

07 01 07 53 LMP-EVA John, that looks like an endogenic crater right
over there to me.

07 01 07 56 CDR-EVA Which one?

07 01 07 57 LMP-EVA Off to 2 o'clock. It has no rim to it -

07 01 08 00 CDR-EVA Can't see too good - Yeah. I see what you're
saying there.

07 01 08 02 LMP-EVA See what I'm saying?

07 01 08 03 CDR-EVA A sink hole ...

07 01 08 04 LMP-EVA Looks like a sink hole - a big doodle bug hole.
And that's, Tony, at our 2 o'clock, and we're
presently at 0.9 at 198.

07 01 08 13 CC Roger. We know exactly which one you're talking
about.

07 01 08 15 LMP-EVA It's only about 100 meters or so from us.

07 01 08 17 CC Is it on top of a little dome?

07 01 08 23 CDR-EVA Yeah. We are.

07 01 08 24 LMP-EVA Yeah. We are.

07 01 08 25 CC Okay; understand.

07 01 08 28 LMP-EVA That crater - that crater I'm - Yahoo! Boy!

07 01 08 33 CC And you left the ground again.

07 01 08 38 LMP-EVA No, we almost - we spun out on my side.

07 01 08 44 CDR-EVA That's it. We're going -

07 01 08 50 LMP-EVA Tony, that's - this crater is about - I'd say, at least 200 meters across, has no rim, and no blocks associated with it, except for rays.

07 01 09 07 CC Okay. We copy that.

07 01 09 11 LMP-EVA Do we do a three -

07 01 09 15 CDR-EVA How about right here?

07 01 09 16 LMP-EVA Yeah. That's great.

07 01 09 26 LMP-EVA Or 9270; either one.

07 01 09 30 CDR-EVA Now.

07 01 09 32 LMP-EVA Make it about 115 - 270 - a little bit further right, John. That's good. Now you can go back.

07 01 09 41 CDR-EVA Okay. Here we go.

07 01 09 42 LMP-EVA Got it - I've got it. Okay? There - now there is a fresh crater with glass right in the bottom of that little fresh crater right back there - meter size.

07 01 09 54 CDR-EVA And 190 at 0.7; 198 at 0.7 is the crater that Charlie's talking about.

07 01 10 02 CC Okay. We copy.

07 01 10 12 CDR-EVA And that's not on the map, either. It doesn't even show up. I guess - I guess my opinion of this place is that on our - on our traverse maps, the rimless features - the very old, subdued, rimless craters - they just don't even show up, and they're just not there hardly.

07 01 10 34 LMP-EVA Fine.

07 01 10 36 CDR-EVA I mean unless they've got a raised rim, they don't make it. They don't show up in photography, apparently.

07 01 10 44 LMP-EVA Tony, that sink hole or whatever it was - subdued crater we passed back there - is really deep. I'm - I'm surprised - I really don't have a map right here with me, but it was probably 20 - 40 meters deep or so.

07 01 11 05 CC Right. We've got it on the map here.

07 01 11 06 LMP-EVA We couldn't see the bottom of it.

07 01 11 11 CDR-EVA This is an absolutely great suspension system, Houston. You should see some of the things we've run through, and this baby just bounces right out and keeps right on going.

07 01 11 22 LMP-EVA Okay. The nav is 196 at 0.5. We ought to see the old beauty when we top the rise here. John just ran over a basketball-size rock with the right wheel and just - There she is, John.

07 01 11 41 CC Well, that's good news.

07 01 11 46 LMP-EVA We're about on top of a ridge maybe 30 meters - maybe 30 meters above, and that nav system has us pointed right at the lunar module. Look at that.

07 01 12 00 CDR-EVA Okay, Charlie.

07 01 12 01 LMP-EVA Okay. It's 0.4. We're about 20 meters up - 30 meters up above it, Tony.

07 01 12 12 CC Okay. If you can recognize -

07 01 12 14 CDR-EVA Here's another real fresh one.

07 01 12 15 CC - - an edge of the ray in the neighborhood of 50 meters north of the ALSEP area, that would be a good place to pick station 10 prime. Our photo shows the edge of the ray in there.

07 01 12 30 CDR-EVA That would be a good place to look for it from, Charlie, right up here.

07 01 12 34 LMP-EVA Does he want to pick a ray?

07 01 12 36 CDR-EVA Pick the edge of a ray, 50 meters north of an ALSEP site - of the ALSEP site. Tony, I - I just don't - you can't hardly tell where one - they're not as distinct - the gradational pattern is - is just too gradual.

07 01 12 57 CC Okay. We sure understand. And just pick a site 50 meters north and we'll call that 10 prime.

07 01 13 06 CDR-EVA Okay.

07 01 13 17 LMP-EVA Tony, we must be out of battery power because this camera - this DAC stopped running - -

07 01 13 24 CC Okay; understand.

07 01 13 26 LMP-EVA - - with about 50 percent of the mag left.

07 01 13 27 CC Okay. That's fine. I guess our calculations were right.

07 01 13 33 LMP-EVA Okay, John. Let me get a picture of that. That is beautiful. Another picture? Okay. Back a little bit? I can't believe that big hole there. I just can't believe it - right behind her.

07 01 13 57 CDR-EVA It might be that - -

07 01 13 58 LMP-EVA Hook a right, John. Let me get another picture of old Orion. There we go. Might be what, John? You know that might be an end of a ray right there. See that. It's almost a blockless feature.

07 01 14 17 CDR-EVA Yeah.

07 01 14 18 LMP-EVA That might be just due to the downslope though.
Don't run into our home.

07 01 14 26 CDR-EVA Big Charlie.

07 01 14 30 LMP-EVA Home again, home again! Jiggety jig!

07 01 14 32 CDR-EVA Fifty meters. Where do you want to park this
thing, Houston? Fifty meters from the AL-

07 01 14 40 LMP-EVA To the northeast.

07 01 14 41 CDR-EVA To the northeast.

07 01 14 42 LMP-EVA The northwest.

07 01 14 43 CC Roger.

07 01 14 44 LMP-EVA That would be over this little ridge here.

07 01 14 46 CDR-EVA Right by that big rock.

07 01 14 50 CC Okay. We're looking for in the sampling here -
those vesicular basalts that you both described in
the area. And also we - -

07 01 15 04 LMP-EVA Okay. That might be one right over there, John.
It's the bluish -

07 01 15 17 CC - - and to make a triangle with the other double
core and deep core.

07 01 15 18 CDR-EVA Make a heading of 180?

07 01 15 20 LMP-EVA Yeah, or north. I can - Be either way.

07 01 15 26 CDR-EVA Man. That's a beautiful sight.

07 01 15 38 LMP-EVA Okay, Tony. We're stopped. And we're just about
directly north of the ALSEP.

07 01 15 52 CC Okay. Copy that.

07 01 16 00 LMP-EVA Ahh! Ugh! Ugh! Ugh! Come out, foot. There we
go. Got it. Okay. Wait a minute, and I'll give
you the Rover readings when I dust things off.

07 01 16 12 CC Okay.

07 01 16 20 LMP-EVA Okay. We're in our 180, 0, 188, 11.1, 0.1, 30, 120, off-scale low, off-scale low on the AMPS, bat - BAT TEMPS - looks like we had a failure on BAT TEMP 1. It's belly up off-scale low. Let me whack it once. Nope. BAT 2 is 140. LEFT - LEFT FRONT is 225; 210 RIGHT FRONT ... 225.

07 01 17 10 CC Okay, Charlie.

07 01 17 18 LMP-EVA Okay. And I'm starting out with frame count 80, magazine Foxtrot. Now get a - you want me to get a pan, Tony?

07 01 17 25 CC Yeah. A pan would be good. And after that we'll go on with the raked soil at this site.

07 01 17 35 LMP-EVA You want a double core?

07 01 17 40 CDR-EVA Charlie, where is the Earth? Should be right straight up.

07 01 17 44 LMP-EVA Nope, not quite. That's better.

07 01 17 55 LMP-EVA Let's see. No, you've got to go right some, John. More.

07 01 18 01 CDR-EVA There we go.

07 01 18 04 LMP-EVA Okay. That ought to be in the site.

07 01 18 19 LMP-EVA Right. Now down a little bit. That ought to be it.

07 01 18 25 CDR-EVA That's it.

07 01 18 26 LMP-EVA That's 435.

07 01 18 28 CC Okay.

07 01 18 30 LMP-EVA See it in the site?

07 01 18 31 CDR-EVA Yeah. Man, is it - is it -

07 01 18 37 CC Okay. And when you're on the console there, could you tap that AMP-HOUR meter and see if you can get that lower one to come up some?

07 01 18 50 LMP-EVA I banged the control panel hard, Tony, and nothing -
none of the meters changed.

07 01 18 56 CDR-EVA Uh-oh.

07 01 18 57 CC Okay.

07 01 19 00 LMP-EVA What happened, John? Did you get the -

07 01 19 12 CDR-EVA I don't believe that.

07 01 19 14 LMP-EVA The one in training never would - stay on - never
would stay on - -

07 01 19 16 CDR-EVA Stay on.

07 01 19 17 LMP-EVA - - never would stay on.

07 01 19 21 CDR-EVA Okay.

07 01 19 22 LMP-EVA Okay. You moved the antenna, John.

07 01 19 30 CC All right. We lost our picture. We lost our
picture.

07 01 19 34 LMP-EVA That's good, John.

07 01 19 39 CDR-EVA Get Tony, Charlie. ...

07 01 19 42 LMP-EVA Okay. Just a minute. I'm halfway through a pan
here. It'll take me 2 seconds. Okay. Here I
come. No, you've got it pointed up too straight.
Okay. It needs to come left, left - more left,
more, more; okay. Now down just a skosh. That's
it - Now left.

07 01 20 23 CDR-EVA That's beautiful.

07 01 20 24 LMP-EVA Okay.

07 01 20 26 CDR-EVA It gets very dim until it gets near the center.
Such a shrimp I can't - can't get my hand up in
there.

07 01 20 35 LMP-EVA Tony, a double core here, too?

07 01 20 37 CC Right. We'll need a double core.

07 01 20 42 LMP-EVA You cut out. Say again?

07 01 20 44 CC Yes, we would like a double core. The rake soil is highest - first priority and then the double core.

07 01 20 52 LMP-EVA Okay.

07 01 20 59 CDR-EVA Get your eyeball there.

07 01 21 01 LMP-EVA Huh? Oh.

07 01 21 05 CDR-EVA Okay. The Velcro on the side - the glue on the Velcro on the sunshield is - whatever it does. It's probably the same glue you used on the padded bags, because they came loose, too.

07 01 21 20 CC Okay.

07 01 21 21 CDR-EVA You want this sunshield on there, or do you want us to take it off and throw it away?

07 01 21 25 CC Well, if it's doing any good at all, let's just leave it on. It doesn't seem to be in the picture.

07 01 21 32 CDR-EVA Okay. Yeah. I'm gonna put the dustbrush under my seat. I don't want to go through that again.

07 01 21 58 LMP-EVA Oh, rats! I dropped the -

07 01 22 02 CDR-EVA I'll come get the - I'll come help you, Charlie.

07 01 22 03 LMP-EVA Dropped the gnomon right where I wanted a sample. There we go. Ah, the big eye is looking the wrong way. Okay. Boy, I just can't see anything when I get this camera in my sh - shadow.

07 01 22 24 CDR-EVA That's a good place, Charlie.

07 01 22 29 LMP-EVA There's the down-Sun, f/4; f/8, the cross-Sun. How long is this stop, Tony?

07 01 22 38 CC Okay. This is a 30-minute stop.

07 01 22 43 LMP-EVA Okay. Home again, home again! Look at that - that regolith. We've got some glass-coated frags here, Tony - -

07 01 23 13 CC Okay.

07 01 23 14 LMP-EVA - - in the rake. I don't see anything that looks like -

07 01 23 19 CDR-EVA *** get another -

07 01 23 20 LMP-EVA Okay. That was about a half a bagfull. One scoop.

07 01 23 30 CDR-EVA Bag's full. All right.

07 01 23 33 LMP-EVA Uh-oh! Uh-oh! Okay, Tony. Out of that scoop, we lost the two biggest rocks. I poured too fast.

07 01 23 46 CDR-EVA *** bag fast enough, Charlie.

07 01 23 53 LMP-EVA They just don't stop in - in this gravity field once they get moving. Okay. There we go, John.

07 01 24 01 CDR-EVA Hold the bags for a second?

07 01 24 03 LMP-EVA Yeah. I got bags on my camera here we could have used.

07 01 24 10 CDR-EVA Okay. That's in bag number 347.

07 01 24 13 CC Okay. Bag 347.

07 01 24 20 LMP-EVA Okay. Get an after, John?

07 01 24 23 CDR-EVA I'll get it.

07 01 24 25 LMP-EVA Okay. Okay. After. Old after.

07 01 24 38 CC Right. We're going to want a rake soil, over in the area of the old station 10, also. So it's up to you whether it's easiest to go get it now or to get the double core now. After you're through with this one.

07 01 24 51 CDR-EVA Let's get the soil, Charlie.

07 01 24 52 LMP-EVA We'll get the soil. Okay, we'll - I think it would be easier to go get it, John, because I've got to take - to do the double core.

07 01 25 00 CDR-EVA Right; I agree with you.

07 01 25 01 LMP-EVA I got to take this thing apart. We -

07 01 25 09 CC That's a good idea, Charlie. Then you won't need the rake anymore.

07 01 25 14 LMP-EVA Yeah. Okay. There's the two -

07 01 25 21 CDR-EVA Okay, and that's going into bag 348; 348.

07 01 25 25 CC Okay; 348.

07 01 25 38 LMP-EVA That's just right over the ridge there about 50 meters, isn't it?

07 01 25 41 CC Should be.

07 01 25 42 CDR-EVA What's that, Charlie?

07 01 25 43 LMP-EVA That's old station 10.

07 01 25 44 CDR-EVA Yeah.

07 01 25 50 LMP-EVA Ah, the old orange. Okay; get an after of that, John, and a scoop. How about you - swapping, I'll bag, and you rest.

07 01 25 59 CDR-EVA Yeah. You bet.

07 01 26 01 LMP-EVA Okay, I'll get the gnomon.

07 01 26 04 CDR-EVA Why don't you let me get the gnomon. I'll drop it over there, because I can get down a lot easier.

07 01 26 06 LMP-EVA Okay, go ahead.

07 01 26 12 CDR-EVA Got it.

07 01 26 18 LMP-EVA The old station 10.

07 01 26 19 CC You got that down ..., John.

07 01 26 21 LMP-EVA That was - yeah.

07 01 26 29 CDR-EVA Look at these neat little craters. You just run right through them. There's a lot of tracks around there, Charlie. That must be the old station 10 right there.

07 01 26 47 LMP-EVA It's right over here. It is, yeah. Here's where we had the double - You want it where we had the double core, Tony?

07 01 26 55 CC Say again, Charlie? The double core will be at this rake site, but while you've got the rake out there - -

07 01 27 01 LMP-EVA You want it wh - -

07 01 27 02 CC - - we might as well get the rake at the old double core.

07 01 27 05 LMP-EVA No, I meant - That's what I'm saying. This is the old double core site; we'll rake here.

07 01 27 13 CC That's exactly what we want.

07 01 27 17 LMP-EVA Okay. We're within 3 meters of it.

07 01 27 22 CDR-EVA Be a good place.

07 01 27 23 LMP-EVA Yeah. I think any of these places is a good place around here. The old - Man, that's a beautiful vehicle. Down-Sun.

07 01 27 44 CDR-EVA *** Sun. Okay, you locating it, Charlie?

07 01 27 53 LMP-EVA Yeah. Old Orion. Okay, we're sacking into 349.

07 01 28 10 CC Okay, bag 349.

07 01 28 20 LMP-EVA Not - there's not - John's got two scoops - two rakes full. Not nearly as productive over here.

07 01 28 29 CC Okay. You're probably on a different part of the ray, then. That's good.

07 01 28 36 CDR-EVA It is, huh? (Laughter)

07 01 28 39 LMP-EVA Two scoops and we got three little frags. One of them just dropped out.

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07 01 28 44 CDR-EVA Three is all we got?

07 01 28 46 LMP-EVA Two; one of them dropped out.

07 01 28 49 CDR-EVA Oh. That ain't very good.

07 01 28 53 LMP-EVA Tells them something. Here's a couple more. Okay.

07 01 29 16 CDR-EVA Okay, let me get one more, Charlie.

07 01 29 17 LMP-EVA Okay.

07 01 29 32 LMP-EVA (Laughter)

07 01 29 35 CDR-EVA That's ...

07 01 29 36 LMP-EVA He had about 20 pounds of soil, Tony, and he came up with one little frag. And it - We just dropped it.

07 01 29 44 CDR-EVA Charlie dropped it.

07 01 29 45 LMP-EVA That's enough.

07 01 29 46 CDR-EVA Yeah.

07 01 29 47 CC Yeah, let's just call that our rake sample.

07 01 29 48 LMP-EVA Okay, we got about 4 frags in 349 - Okay. It's 349.

07 01 29 54 CC Okay.

07 01 29 57 LMP-EVA Okay, we need a soil sample, John.

07 01 30 25 LMP-EVA That's great.

07 01 30 26 CDR-EVA Okay. Let me get one more scoopful.

07 01 30 37 LMP-EVA Okay.

07 01 30 38 CDR-EVA Okay.

07 01 30 39 LMP-EVA Okay. How about - -

07 01 30 42 CDR-EVA Get a little faster here.

07 01 30 51 LMP-EVA Hold that one and put it in my bag while I zee this one up. Okay. I think we got about 10 bags left, and that's it.

07 01 31 13 CC Okay. Was that bag 350? We didn't get a number.

07 01 31 22 LMP-EVA Yeah; 350, Tony. It was.

07 01 31 24 CC Okay.

07 01 31 30 LMP-EVA What are you supposed to be doing while I do the double core?

07 01 31 32 CDR-EVA I'm supposed to be sampling - -

07 01 31 34 CC Right. Be looking around for exotics - -

07 01 31 37 CDR-EVA - - do the double core.

07 01 31 38 LMP-EVA Yeah, I know.

07 01 31 39 CC - - especially things like that vesicular basalt you described.

07 01 31 45 LMP-EVA That's why I'm whacking on this one.

07 01 31 48 CDR-EVA Boy, Charlie.

07 01 31 50 LMP-EVA That is a hard rock right there, John.

07 01 31 59 CDR-EVA Now, Charlie. Okay. Let me get it - let me get it. Just - -

07 01 32 13 LMP-EVA I got it with the rake. You want - I got to go get - why don't you take that and put it in my sack, and I'll go over and get the double core?

07 01 32 23 CDR-EVA *** carry this one over there and throw it in the big bag.

07 01 32 26 LMP-EVA Okay, I'll do it. Okay, Tony, I just whacked off one that - it's - I thought it was basaltic looking, but it turns out it's glassy with the white matrix in it. John, I need that - I can use the scoop.

07 01 32 49 CDR-EVA Charlie, here you go.

07 01 32 50 LMP-EVA Okay.

07 01 33 13 LMP-EVA Hey, John?

07 01 33 14 CDR-EVA Yeah.

07 01 33 15 LMP-EVA Hey, come - Here's another one of those glass balls.

07 01 33 22 CDR-EVA Yeah, that's a big one.

07 01 33 23 LMP-EVA See it right there.

07 01 33 24 CDR-EVA Yeah.

07 01 34 31 CDR-EVA Where are your bags, Charlie?

07 01 34 32 LMP-EVA Right here on my camera.

07 01 34 35 CDR-EVA Let me have them.

07 01 34 36 LMP-EVA Okay. Well. Here's a couple that are torn off, you could use. *** one and -

07 01 34 46 CDR-EVA That son of a gun must be solid. That's -

07 01 34 48 LMP-EVA There you go.

07 01 34 51 CDR-EVA Houston, this glass ball that've I've got doesn't have any give to it.

07 01 34 58 CC Okay.

07 01 35 02 CDR-EVA Going into bag 380.

07 01 35 08 CC Okay, 380.

07 01 35 10 LMP-EVA Okay; double core's assembled. Give me the -

07 01 35 14 CDR-EVA Impact - Well, it's smooth on one side and has impact pits on the other. What do you need, Charlie?

07 01 35 21 LMP-EVA The scoop. I mean the rake.

07 01 35 25 CDR-EVA Pardon me.

07 01 35 27 CC Okay, and you've got about 17 minutes left here.

07 01 35 32 CDR-EVA Now, you're talking.

07 01 35 47 LMP-EVA You through with the rake, John?

07 01 35 48 CDR-EVA Yes, sir.

07 01 35 50 LMP-EVA Tony, we through with the rake?

07 01 35 52 CC Yeah, we sure are.

07 01 35 58 LMP-EVA Okay. Here it goes! Look at that beauty go.

07 01 36 21 LMP-EVA Hammer, hammer. There's the hammer.

07 01 36 25 CDR-EVA Okay, I'm gonna take these two big rocks and put them in the big rock bag, Charlie.

07 01 36 29 LMP-EVA Okay, because that muley's got to go in there, too.

07 01 36 33 CDR-EVA Okay.

07 01 36 46 LMP-EVA Well, this looks like as good as any. Okay, Tony. I pushed it all - in all - almost three-quarters of the way on the bottom core.

07 01 36 58 CC Okay.

07 01 37 00 CDR-EVA I'd like to hammer that one, Charlie.

07 01 37 02 LMP-EVA John, could you - -

07 01 37 04 CDR-EVA What do you need?

07 01 37 05 LMP-EVA - - take a picture of that for me? I - I don't have my - -

07 01 37 07 CDR-EVA Okay.

07 01 37 08 LMP-EVA - - camera.

07 01 37 13 CC And, John, while you're looking around there, our number 1 priority is a vesicular basalt.

07 01 37 21 CDR-EVA Yeah. Understand. I bet we aint' gonna find one.

07 01 37 45 LMP-EVA Grrr! Go in.

07 01 37 50 CC You're doing real good there, Charlie.

07 01 37 52 LMP-EVA This is the most frustrating job. You'd never make a living as a carpenter wearing a pressure suit, I'll tell you. Okay. John, how about spinning and taking one more picture of that in the ground. Could you?

07 01 38 11 CDR-EVA May as well. What's the setting?

07 01 38 15 LMP-EVA Above f/11 or so.

07 01 38 16 CDR-EVA It's f/11.

07 01 38 20 CC Smile, Charlie.

07 01 38 21 CDR-EVA Got it.

07 01 38 22 LMP-EVA Okay.

07 01 38 49 CDR-EVA Yeah, I could correctly identify this rock as out of North Ray. No, I can't. It sure looks like that rock that we saw.

07 01 39 10 LMP-EVA Okay, Tony. At the bottom of this core it looks whitish, and it's pretty coarse grained. It's not - not real fine. It's sort of like that - a crumbly shock - shocked rock.

07 01 39 48 CDR-EVA Well, Houston, I'm looking, but I'm not seeing any v - vesicular basalts.

07 01 39 52 CC Okay. After you get this core packed up, why don't you drive on back to the LM to the normal closeout position, and we'll let you sample around there. See if you can find one around there. You described something in a crater behind the LM.

07 01 40 10 CDR-EVA Okay.

07 01 40 53 LMP-EVA Okay. The bottom was 32, Tony. Top is 27.

07 01 40 57 CC Okay. We copy that.

07 01 42 07 CC Sounds to me like you fellows are going to have your rock quota.

07 01 42 17 LMP-EVA I think we'll do all right.

07 01 42 19 CC I sure think so.

07 01 42 20 CDR-EVA Okay, Houston. I just picked up another breccia, but it was interesting because it had some very dark clasts in it, and it was primarily a white matrix.

07 01 42 37 CC Okay.

07 01 42 38 CDR-EVA The clasts were very dark.

07 01 42 47 CDR-EVA Want this to go in your bag, Charlie?

07 01 42 49 LMP-EVA Yeah, why don't you - -

07 01 42 50 CDR-EVA Or put it in my bag?

07 01 42 51 LMP-EVA Stick it in mine. I think we got plenty of room in mine.

04 01 42 56 CDR-EVA Okay. Yours is about full.

07 01 43 01 LMP-EVA We got any bags left?

07 01 43 04 CDR-EVA No, I don't see any.

07 01 43 06 LMP-EVA You out of bags, too?

07 01 43 07 CDR-EVA Yeah. That's really bad, isn't it?

07 01 43 11 LMP-EVA Wait a minute.

07 01 43 12 CDR-EVA I dropped one over here. I'll go back and get it.

07 01 43 14 LMP-EVA Hey, here's some.

07 01 43 16 CDR-EVA Got some?

07 01 43 17 LMP-EVA Yeah, here's a whole kit full.

07 01 43 24 CDR-EVA Give me one.

07 01 43 25 LMP-EVA Okay.

07 01 43 31 CDR-EVA Got it.

07 01 43 33 LMP-EVA Okay. Oops.

07 01 43 38 CDR-EVA How much time we got here, Tony?

07 01 43 42 CC Say again, Charlie? Roger. You have plenty of time here, but we'd like you to drive on back to the LM.

07 01 43 46 CDR-EVA Okay, how much - Okay.

07 01 43 51 LMP-EVA Okay, I'm gonna run over, Tony, and look around and see if I can find what you want.

07 01 43 56 CC Okay. Fine. And, John, when you drive over we don't have to reconfigure the LCRU. Just drive it the way it is and then realign and brush it off when you got there.

07 01 44 07 CDR-EVA All right, will.

07 01 44 41 LMP-EVA You know, that UV's been looking right at me. Okay, basalts. Where are you?

07 01 45 49 CDR-EVA Okay, Houston. I just got a spectacular white rock. It - but it's kind of dust coated. But it is - it's so fine grained that I can't see any crystalline structure associated with it. It's sort of covered with zap - you can see plenty of zap pits. That's going in bag 1 - 13.

07 01 46 17 CC Okay, was that bag 113?

07 01 46 22 CDR-EVA Thirteen.

07 01 46 24 CC Okay.

07 01 47 29 LMP-EVA Okay, Tony. I just picked up one that is in bag 15 that is - has a black matrix - bluish-black matrix with a lathlike - either clasts or phenocrysts in it. And it's right behind the LM here. I don't know whether that's what we're looking for or not.

07 01 47 50 CC Okay. That sounds good, Charlie.

07 01 47 51 LMP-EVA There are a lot of rocks that I call vesicu -
There are some of the rocks that I call vesicular
basalts around here, but I don't know whether what
I really called was correct or not. That might
have led y'all astray.

07 01 48 07 CC That's okay. We've got - -

07 01 48 09 LMP-EVA It might have been just the glass coating on the
rock.

07 01 48 12 CC We've got about 10 more minutes of sampling, so
why don't you just pick up what looks interesting
to you there, and then we'll start closing out.

07 01 48 23 LMP-EVA Okay. John, you bringing the machine down here?

07 01 48 33 CDR-EVA Yes, sir.

07 01 48 34 LMP-EVA I got my hands full of bags and rocks.

07 01 48 42 CDR-EVA I'm gonna take it to the closeout place, Charlie,
I'll -

07 01 48 46 LMP-EVA Yeah; right. I'll come over there.

07 01 48 53 CDR-EVA Houston, you still got lock?

07 01 48 55 CC No, we've lost the picture. We can hear you,
though.

07 01 49 11 CDR-EVA Man, if we had landed anywhere but where we did,
we might have been in serious trouble. I can't
get over it. I'd have hated to work on any of
those slopes.

07 01 49 28 LMP-EVA Okay, Tony. I've picked up a rock here that has a
aphanitic matrix with perhaps 30 percent of it
white - whitish millimeter-size clasts or pheno-
crysts, and it doesn't look glassy to me.

07 01 49 47 CC Sounds good.

07 01 49 49 LMP-EVA It's about half of a grape - half of a grapefruit
size.

07 01 50 40 LMP-EVA Tony, do you read? Over.

07 01 50 42 CC Sure do, Charlie.

07 01 50 47 LMP-EVA Okay. Did you copy that about this rock I picked up - a half grapefruit size?

07 01 50 51 CC Yeah, we sure did. It sounds very interesting.

07 01 50 57 LMP-EVA Okay, and it's going in bag 17.

07 01 50 59 CC Okay. Bag 17.

07 01 51 05 CDR-EVA I don't think we need the gnomon anymore, Charlie.

07 01 51 07 LMP-EVA No, we sure don't, John.

07 01 51 11 CDR-EVA Want me to realign that LCRU, Houston?

07 01 51 14 CC That would be fine, John.

07 01 51 21 CDR-EVA Okay.

07 01 51 29 LMP-EVA Did you say my SCB's about full, John?

07 01 51 32 CDR-EVA Yes, sir.

07 01 51 33 LMP-EVA Okay. Let me get yours off your back right now so I can go use it to sample with.

07 01 51 37 CDR-EVA Okay.

07 01 51 41 LMP-EVA Okay. I got it.

07 01 51 45 CDR-EVA Okay, ... Charlie.

07 01 51 46 LMP-EVA Okay. Wait a minute. Okay. You got to come right, a lot, more, now - more, now up. Now right. Okay, right. You see them?

07 01 52 02 CDR-EVA No.

07 01 52 03 LMP-EVA Okay, right. Okay, right. They ought to be in there now.

07 01 52 08 CC Yeah, we're getting a picture.

07 01 52 14 LMP-EVA Let me -

07 01 52 15 CDR-EVA No I c - I can't do nothing with it.

07 01 52 18 LMP-EVA Okay.

07 01 52 29 CC We lost it again.

07 01 52 49 CDR-EVA Man, I don't see them. How did you see them?

07 01 52 52 LMP-EVA Pretty far up there. Okay, I got them about in azimuth. Need to go down.

07 01 53 01 CDR-EVA Oh, yeah. That's the - You need to come more to your *** There you go. You ought to have one *** I can't see it. It's -

07 01 53 25 LMP-EVA *** know how to do it.

07 01 53 29 CDR-EVA Now, you just tilted the whole works, Charlie.

07 01 53 31 LMP-EVA Yeah, I know it. Wait a minute. I'll go get it from this side. Push it over towards me. Give me - give me the handle.

07 01 53 44 CDR-EVA Okay. This way.

07 01 53 54 LMP-EVA Okay. Pull it - *** gum. We're having so much trouble with it this time. Hey, you got a signal that's about - -

07 01 54 05 CC Hey, there we've got a picture.

07 01 54 07 LMP-EVA - - 31, 32. Leave it there; that's good enough.

07 01 54 12 CDR-EVA Where?

07 01 54 13 LMP-EVA Just leave it. It's 32 - that's 32.

07 01 54 16 CC Yeah, let's just live with that.

07 01 54 17 LMP-EVA Yeah, it's going down. That's 35, John. It looks good.

07 01 54 23 CDR-EVA Okay.

07 01 54 24 LMP-EVA Okay. Spend 20 minutes adjusting the TV and then turn it off. Going back out to the right, here.

07 01 54 42 CDR-EVA Yeah, I want to dust it.

07 01 55 09 CC Okay. And, John, when you're ready, I've got a new UV setting.

07 01 55 16 CDR-EVA Okay. We'll reset the UV.

07 01 55 23 CC And, Charlie, you can continue sampling for about 5 more minutes, and then we'll have to load up.

07 01 55 31 LMP-EVA Okay. That's about three samples. I'll be about out of bags then, anyway.

07 01 55 38 CC Okay.

07 01 55 49 CDR-EVA Okay, with the new UV settings - Wait a minute.

07 01 56 01 LMP-EVA Tony, I'll say one thing, that the character of the regolith has really changed between here and Stone Mountain and - -

07 01 56 09 CDR-EVA Okay, Houston - -

07 01 56 10 CC Okay.

07 01 56 11 CDR-EVA - - I'm going to reset.

07 01 56 12 CC Okay, and your azimuth is 275, and the elevation is 66.

07 01 56 20 CDR-EVA 275 and 66. All righty.

07 01 56 25 LMP-EVA Okay; there's a grab sample in - in 18.

07 01 56 27 CC Okay. Bag 18.

07 01 56 33 CMP-EVA Well, it's partially documented, I should say, not a grab sample.

07 01 56 36 CC Right. We've got it on TV. The big eye's on you.

07 01 56 44 LMP-EVA The big eye. Okay. There's a neat rock. Right there. Doesn't look like a breccia.

07 01 56 54 CDR-EVA Okay, 275 - -
07 01 56 56 CC Roger.
07 01 56 57 CDR-EVA - - and 66.
07 01 56 58 CC Okay. That's affirmative.
07 01 57 01 CDR-EVA Boy, I hope this baby works.
07 01 57 03 CC Okay, Charlie. After this rock, we'd like you to start closing out.
07 01 57 10 LMP-EVA Okay. I'll do it. Bag number 19, Tony.
07 01 57 20 CC Okay. Bag 19.
07 01 57 31 LMP-EVA And, Tony, the last one I pick up is an igneous rock, no breccia.
07 01 57 37 CC Hey, outstanding.
07 01 57 38 LMP-EVA I am not kidding. And it's got lath crystals in it and a black matrix, but it is not - it is not basaltic.
07 01 57 50 CC Outstanding, Charlie.
07 01 58 01 LMP-EVA Well, it was going in bag 19; it's not anymore.
07 01 58 04 CDR-EVA I'll come over and help you, Charlie.
07 01 58 05 LMP-EVA No, I got it, John. It's in bag number 20, Tony.
07 01 58 09 CC Okay; bag 20.
07 01 58 13 LMP-EVA We got to start - he wants us to close out now, John.
07 01 58 16 CDR-EVA Okay.
07 01 58 21 LMP-EVA Okay. I guess we're through with those samples.

07 01 58 30 CDR-EVA (Laughter) Houston, this dust is just like an abrasive. Any time you rub something, you can no longer read it, and that's what's happened to our RCUs and our - and our - every piece of gear we've got. In other words, it's a mistake to rub something to clean it off.

07 01 58 52 CC Understand.

07 01 58 53 CDR-EVA Big mistake.

07 01 59 00 CC Okay, we're starting a little bit head - ahead of time on the closeout here, and we'd like you to take your time and make sure we get everything.

07 01 59 10 CDR-EVA Okay. So would we.

07 01 59 12 LMP-EVA You can bet we're not going to leave anything.

07 01 59 16 CC Good show.

07 01 59 28 LMP-EVA Okay. Okay, Tony. The core tubes are going in - in bag number 7.

07 01 59 36 CC Okay. Core tubes in bag 7.

07 01 59 47 LMP-EVA And it's hardly got any rocks in it. John, you want to off-load mine?

07 01 59 52 CDR-EVA Okay.

07 02 00 07 LMP-EVA ... you can throw them here. "EMU malfunctions," I don't want that page.

07 02 00 15 CC We're with you, John.

07 02 00 18 LMP-EVA Okay, LRV config - We got - Huh?

07 02 00 24 CDR-EVA Okay, Charlie, here you go.

07 02 00 25 LMP-EVA Okay.

07 02 00 26 CDR-EVA What we gonna do with it? Put it on - -

07 02 00 27 LMP-EVA Just put it in there, and I'll fill up the rocks.

07 02 00 30 LMP-EVA Want to - Want to pull my PLSS tool carrier?

07 02 00 32 CDR-EVA Better believe it.

07 02 00 34 LMP-EVA Harness.

07 02 00 35 CDR-EVA Best day of my life.

07 02 00 37 LMP-EVA Okay. *** get yours. I'm glad we didn't have an emergency; (laughter) quick release 10.

07 02 00 56 CC And -

07 02 00 57 LMP-EVA There you go. That's the one that we couldn't get snapped inside - -

07 02 01 00 CC And, John, you might try to keep a hold of the sample bags for when you go out and park the Rover. We may have you pick up a rock and put it on the LPM.

07 02 01 11 CDR-EVA Oh, yeah. I forgot all about that. You want me to - I'll take my camera with me, too.

07 02 01 21 CC Roger.

07 02 01 22 CDR-EVA Charlie's camera 1. You got any pictures left?

07 02 01 28 LMP-EVA Yeah; have you?

07 02 01 29 CDR-EVA No.

07 02 01 30 LMP-EVA You out completely?

07 02 01 31 CDR-EVA No, no. I'm on frame 150. I guess I got enough to cover it.

07 02 01 34 LMP-EVA Oh, you got enough. Yeah. You're not gonna drive out there yet, are you?

07 02 01 39 CDR-EVA Oh, no.

07 02 01 41 LMP-EVA Okay. *** put it in my teeth.

07 02 02 02 CDR-EVA You got some bags, Charlie?

07 02 02 05 LMP-EVA They - I threw them away, John. They said they were through with them. They're down - -

07 02 02 08 CDR-EVA Okay. Well, here's one right over here.

07 02 02 09 LMP-EVA They're down to the left of the LM, there.

07 02 02 11 CDR-EVA Here's one right over here.

07 02 02 25 CDR-EVA Okay. I've got to go get that SRC.

07 02 02 42 CDR-EVA Okay. Just leave it under your seat. Okay?

07 02 02 44 LMP-EVA Okay.

07 02 03 02 CDR-EVA Okay. Reset the far UV; PLSS tool carrier; unload CDR cosmic ray experiment: white ring to table. Okay, Charlie, I'm gonna be working on the table here for a second.

07 02 03 16 LMP-EVA Okay. Fine.

07 02 03 17 CDR-EVA I've got to get rid of this LCRU pallet so I can stick the -

07 02 03 29 LMP-EVA Hey, Tony.

07 02 03 30 CC Yeah, Charlie.

07 02 03 34 LMP-EVA Is Stu around?

07 02 03 36 CC Yeah, he's right here.

07 02 03 38 LMP-EVA If he is, tell him - if he is, tell him we -
64 Charlie just topped the Mount Whitney event.

07 02 03 50 CC Okay, we'll do that.

07 02 03 57 CDR-EVA Crypt code on Moon.

07 02 03 59 CC Okay. He evidently knows what you're talking about.

07 02 04 08 LMP-EVA Uh-huh. Okay.

07 02 04 40 LMP-EVA Got that ETB to left floorboard? Load ETB, left side.

07 02 05 06 LMP-EVA ***zine R is already in the spacecraft. Man, Tony. You don't know how much fun this has been.

07 02 05 16 CC I can tell, Charlie. Yeah, I think it's been obvious in your voice how much fun it's been. Okay, Charlie, any time you put anything in the spacecraft, would you call it off?

07 02 05 37 LMP-EVA I'm - I'm putting things in the ETB right now.

07 02 05 45 CC Okay. Could you call it off as you put it in there? We'll keep track, help you.

07 02 05 50 LMP-EVA O - Okay. All the film that we brought out, except the two mags - the mag on the DAC and the two mags on the camera - magazine F and magazine Echo are still on the cameras. John's seat bag is empty of film.

07 02 06 09 CDR-EVA Okay, Houston, the cosmic ray experiment plate will not pull out.

07 02 06 17 LMP-EVA Oh no.

07 02 06 21 CC Okay, we copy that.

07 02 06 24 CDR-EVA There - there isn't even a strap to pull it out with.

07 02 06 28 CC If you hold it upright and shake it, do you think it will come out the bottom?

07 02 06 36 CDR-EVA Want me to do that?

07 02 06 37 CC Yeah, why don't you try that?

07 02 06 38 LMP-EVA Why don't you pull and let me hold the - hold the thing.

07 02 06 49 CDR-EVA No.

07 02 06 52 LMP-EVA John, let me suggest something. Let me hold it - the frame - and you pull on it.

07 02 07 04 CDR-EVA Here we go.

07 02 07 06 LMP-EVA Moved, didn't it?

07 02 07 07 CDR-EVA Yeah, but nothing - there's no string to hold on to.

07 02 07 10 LMP-EVA How about your pliers?

07 02 07 12 CDR-EVA Hey, there you go.

07 02 07 14 LMP-EVA Okay, can you reach them? You want me to get them for you?

07 02 07 15 CDR-EVA Yeah.

07 02 07 19 LMP-EVA Move your arm up. Okay. There you go.

07 02 07 28 CDR-EVA Get it so I can get the thing open. So I can get the first frame out, then we can get it. I don't know, it may gonna be a struggle all the way.

07 02 07 48 LMP-EVA I didn't see it move at all.

07 02 07 49 CDR-EVA It moved - oh, about came out some. Okay.

07 02 07 57 LMP-EVA Is it coming?

07 02 07 59 CDR-EVA Pulling - pulling the thing off.

07 02 08 02 LMP-EVA Let's hit it a couple of times. Let loose. Looks like to me the thing is so - this thing is hot, I'll tell you. There it comes.

07 02 08 16 CDR-EVA There we go, there we go.

07 02 08 18 LMP-EVA Hot dog! It broke it loose.

07 02 08 19 CDR-EVA Yep.

07 02 08 20 LMP-EVA I think you got it now, babe. Woop! It's getting heavy.

07 02 08 25 CC Good show. Good work, Charlie.

07 02 08 27 LMP-EVA Can you stick it back in there?

07 02 08 28 CDR-EVA Yeah.

07 02 08 30 LMP-EVA Hey, that - Thanks for those pliers, boy. We'd have never done it. I could feel that through my gloves. Okay.

07 02 08 40 CDR-EVA Okay. The first panel is black at 180 degrees F.

07 02 08 44 CC Okay. We copy that.

07 02 08 49 CDR-EVA It was - it's on the back, and it was - was facing right into the Sun.

07 02 09 03 LMP-EVA Okay. I got the magazine off the DAC, Tony.

07 02 09 08 CC Okay.

07 02 09 10 LMP-EVA ETB to - DAC mag - magazine T to DAC. Okay. You don't want me to put any DAC - magazine T on the DAC, do you?

07 02 09 19 CC No. If it's out of battery, there's no point.

07 02 09 24 LMP-EVA Yeah, we're not gonna do that Descartes Olympics thing.

07 02 09 30 CC No. Okay. So let's not put anything on the DAC.

07 02 09 32 CDR-EVA Okay, the temp plate on the top one - -

07 02 09 36 LMP-EVA Okay. I'm just gonna leave it on the - -

07 02 09 38 CDR-EVA The temp plate on the top one is black at a 160 degrees F.

07 02 09 42 CC Okay.

07 02 09 44 CDR-EVA And the - the one that's A - the A temp plate on the top is black at 120 - is black at 120 and gray at 160.

07 02 09 54 CC Okay.

07 02 09 55 CDR-EVA So it must have stayed relatively cool.

07 02 09 57 CC Good show.

07 02 10 04 LMP-EVA Okay, Tony. When I - That thing was hot, I tell you. When I had the frame, I - after 5 - however many minutes there, I could start feeling it through my gloves.

07 02 10 17 CC Roger. We got that.

07 02 10 18 LMP-EVA John, those pliers are going to hang you up. You want me to unsnap them?

07 02 10 23 CDR-EVA Yeah.

07 02 10 24 LMP-EVA Okay. They're unsnapped. No, they aren't, either. You want them unsnapped?

07 02 10 28 CDR-EVA No, just throw it back in there.

07 02 10 29 LMP-EVA Okay, give it here. Wait a minute, wait, wait. Looks like it's hung up - climbing up. Let me Velcro that down. Okay, you got it. Okay, H; I'm gonna take my magnet off. Might get it into the MESA.

07 02 10 51 CDR-EVA Okay. Cosmic ray detector bag -

07 02 11 01 LMP-EVA Dust - motion - Okay. No more - Okay, Tony; we're not doing any Grand Prix anymore, are we?

07 02 11 13 CC Negative.

07 02 11 18 LMP-EVA You're clipping badly, Tony. Say again?

07 02 11 20 CC Negative. No Grand Prix.

07 02 11 25 LMP-EVA Okay, I'm gonna retrieve the cosmic ray now.

07 02 11 32 CC Okay. The solar wind. Roger.

07 02 11 35 CDR-EVA Charlie, I just retrieved it.

07 02 11 38 LMP-EVA I don't mean the cosmic ray, I mean the SWC.

07 02 11 42 CC Roger. We understand.

07 02 11 59 LMP-EVA Oh, just like in training.

07 02 12 05 CDR-EVA Okay. Cosmic ray detector is bagged, and as near as I can tell, there's no thumbprints on it - on any of the plates (laughter).

07 02 12 18 CC Okay.

07 02 12 20 LMP-EVA This thing's got a mind of - it's wild, Tony!

07 02 12 27 CDR-EVA Look at that, Charlie. Clean across the crater.

07 02 12 32 LMP-EVA Here goes the javelin throw.

07 02 12 35 CC Wow!

07 02 12 36 LMP-EVA Won't win any world's record, but - Okay - Okay, Tony. This thing, when it wound up, I - I tried to - It got away from me, and it tore just a little bit, but I think we'll be able to get it in the bag. Up at the upper part. Didn't wind up like a - a window shade.

07 02 12 59 CC That's okay; it'll work fine that way. Doesn't make any difference.

07 02 13 04 LMP-EVA Okay. I got it wound up.

07 02 13 12 CC And, John, I understand there's a temp label on the CRE bag. Did you get that?

07 02 13 26 CDR-EVA No, I'll get it later.

07 02 13 28 CC Okay.

07 02 13 29 CDR-EVA In fact, I'll get it right now. Okay. It's - it's all - all okay.

07 02 13 40 CC Okay. Understand.

07 02 13 53 CC Okay, Charlie, and verify - Remember the drum on the penetrometer.

07 02 14 02 LMP-EVA Yep. Thank you.

07 02 14 04 CC Okay.

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07 02 14 20 CDR-EVA Okay, Charlie. I put the big rock bag on the ladder hook.

07 02 14 25 LMP-EVA Okay. Actually worked, Tony. It came off.

07 02 14 32 CC Good show.

07 02 14 35 LMP-EVA Did you get the big rock out of the footpad?

07 02 14 38 CDR-EVA Yeah.

07 02 14 39 LMP-EVA Get old muley out of there?

07 02 14 54 CDR-EVA Okay, Charlie. Is this bag here for - for to go inside?

07 02 15 00 LMP-EVA I didn't put it there.

07 02 15 02 CDR-EVA That's one that was there from last time.

07 02 15 03 LMP-EVA Is it empty?

07 02 15 04 CDR-EVA Yeah, it's SCB-2. I'll throw that under the LM.

07 02 15 07 LMP-EVA Okay. This bag is pretty full. We got two full rock box - bags and a - and one that's partially full, John.

07 02 15 20 CDR-EVA Okay.

07 02 15 21 LMP-EVA We got - 4 and 6 are full, and 7 has got two core tubes and a - excuse me.

07 02 15 28 CDR-EVA Okay.

07 02 15 30 LMP-EVA Man, this shadow is almost gone.

07 02 15 35 CDR-EVA Are those core tubes - they got anything in them?

07 02 15 37 LMP-EVA Yeah. Sure do.

07 02 15 38 CDR-EVA Take care of them.

07 02 15 45 LMP-EVA Okay, are you finished? Let me get one more picture of you dirty.

07 02 15 51 CDR-EVA Okay.

07 02 15 52 LMP-EVA Okay. Turn around.

07 02 15 57 CDR-EVA Wait a second, Charlie.

07 02 15 59 LMP-EVA Okay.

07 02 16 00 CC Are you sure you want a record of that?

07 02 16 01 LMP-EVA Okay, Tony. I've got the magazine from the -

07 02 16 10 CC Go ahead, Charlie.

07 02 16 11 LMP-EVA Got the DACs, all the mags - Say again.

07 02 16 16 CC I just said go ahead, Charlie.

07 02 16 20 LMP-EVA Okay. Only thing we don't have in the ETB that I see is the - is the CRE, and that's going in right now.

07 02 16 27 CC Okay.

07 02 16 30 LMP-EVA What - Tony, what - Hey, John, you're taking a camera with a magazine out with you?

07 02 16 37 CDR-EVA Yes, sir.

07 02 16 38 LMP-EVA Okay.

07 02 16 50 CDR-EVA Okay, Houston. I got one more rock here that I was looking at out of the window of the lunar module. And I got plenty of pictures of it so you -

07 02 16 58 LMP-EVA Put it in the big rock bag - that ET - it'll go in that ETB.

07 02 17 01 CDR-EVA Yeah.

07 02 17 02 LMP-EVA Right there.

07 02 17 04 CDR-EVA It's not all that big.

07 02 17 25 LMP-EVA Okay, I'm gonna put magazine Foxtrot into the ETB, and it's got 130 frames exposed.

07 02 17 33 CC Okay.

07 02 17 37 LMP-EVA Hey, John.

07 02 17 38 CDR-EVA Yeah.

07 02 17 40 LMP-EVA Take a look.

07 02 17 43 CC Okay, Charlie; you should have - Charlie; you should have - -

07 02 17 56 LMP-EVA What did you say, Tony?

07 02 17 57 CC - - seven Hasselblads and three DAC magazines - actually be six in there right now; one's still on John's camera.

07 02 18 09 LMP-EVA Okay. Stand by.

07 02 18 32 CDR-EVA Where's the bag that the - that the - the good old UV - Hey, Charlie, did you throw my camera away?

07 02 18 43 LMP-EVA No, I didn't throw your camera away.

07 02 18 44 CDR-EVA Where is it? Over there?

07 02 18 46 LMP-EVA Yeah.

07 02 18 47 CDR-EVA Okay.

07 02 18 50 LMP-EVA The bag that the - What? The UV bag is upstairs. Just bring the cassettes.

07 02 18 59 CDR-EVA All right.

07 02 19 00 CC That's right.

07 02 19 03 LMP-EVA Okay, Tony. We got one, two, three, four, five, six Hasselblads; three DACs, an SWC; and a CRE; the maps; various other things.

07 02 19 24 CC Okay. And the penetrometer drum.

07 02 19 29 LMP-EVA Yeah, and that's in there, too.

07 02 19 31 CC Okay, good show. Sounds like you got it all.

07 02 19 35 LMP-EVA Okay, John; just your - Your mags go in there, John, and that's it.

07 02 19 39 CDR-EVA Okay. Let me drive this up the hill.

07 02 19 41 LMP-EVA Okay.

07 02 19 47 CDR-EVA Bearing 265.

07 02 19 51 LMP-EVA Tony, a special - a special salute to me - from me to the United States Air Force on their silver anniversary this year. From one of the boys in blue that's pretty far out right now.

07 02 20 08 CC You bet you, sir. That's outstanding.

07 02 20 24 LMP-EVA Okay, John. We got 4 hours and 15 minutes or so.

07 02 20 32 CDR-EVA Okay.

07 02 20 33 LMP-EVA Now my watch stopped. How about that? Hm. Okay. Let's see ... I'll start taking the - as you - turn - the LRV configure, you're gonna do - let's see - the DAC; driving; SWC; astro actions, we're gonna bypass - Okay. We got to clean the EMUs and stow antennas before you drive off.

07 02 21 04 CDR-EVA Okay.

07 02 21 07 LMP-EVA I guess.

07 02 21 09 CDR-EVA Here's the old dustbrush.

07 02 21 12 LMP-EVA I'll tell you what, why don't you park the Rover while I make sure everything's under the LM, and we'll dust when we get back. Okay?

07 02 21 21 CDR-EVA Okay. I'll br - Yeah, I'll bring the dustbrush.

07 02 21 24 LMP-EVA Okay. And I'll just take a couple of SCBs and take them in - here, I'll bring - Oh, you got to get that, don't you.

07 02 21 29 CDR-EVA They want ... out there.

07 02 21 31 LMP-EVA Oh, that's right; yeah.

07 02 21 33 CDR-EVA Okay. I'm gonna park the Rover, Houston. I think we got everything out of it there is to get, okay?

07 02 21 37 CC Okay. It sounds good. We think so, too.

07 02 21 44 CDR-EVA We were gonna do a - we were gonna do a bunch of exercises that we had made up as the Lunar Olympics to show you what a guy could do on the Moon with a backpack on, but - -

07 02 21 57 CC For a 380-pound guy, that's pretty good.

07 02 22 01 CDR-EVA They - they threw that out.

07 02 22 04 LMP-EVA Yeah, jump flat-footed straight in the air, 300 - about 4 feet. Wow! That ain't any fun, is it?

07 02 22 14 CDR-EVA Charlie!

07 02 22 15 LMP-EVA That ain't any fun, is it?

07 02 22 17 CDR-EVA That ain't very smart.

07 02 22 18 LMP-EVA That ain't very smart. Well, I'm sorry about that.

07 02 22 23 CDR-EVA Right. Now we do have some work to do.

07 02 22 32 LMP-EVA How about a hand, John? There we go. Okay.

07 02 22 37 CDR-EVA Okay. I want to park the Rover.

07 02 22 38 LMP-EVA Okay. I'm gonna start upstairs then.

07 02 22 42 CDR-EVA Well - No, you're too dirty to go up there.

07 02 22 44 LMP-EVA I'm not going in. I'm just taking some bags up, okay?

07 02 22 46 CDR-EVA Okay.

07 02 22 56 CDR-EVA Okay. Do you want the LCRU to switch 1 when we start out there, right Houston?

07 02 23 04 CC Yes, that's affirmative.

07 02 23 06 CDR-EVA Do you read? Over. Okay. Going to switch 1.

07 02 23 18 LMP-EVA Okay, Tony. I'm going to be taking the SCBs up onto the porch.

07 02 23 31 CC Okay, Charlie.

07 02 23 55 CDR-EVA Houston, the problem, as you must know - it was 085 at 0.1 - is that such a reading puts us through a crater that's about 18, 20 feet deep, and it's too steep to climb in and out of.

07 02 24 31 CC How far is it to the other side of it, John?

07 02 24 39 CDR-EVA It's - Oh, it's only a couple of feet. We - we'll get here at 085 at - at 100 meters.

07 02 24 48 CC Okay. That'll be fine.

07 02 24 57 CDR-EVA Some - something on here has reset the range. It's -

07 02 25 30 LMP-EVA Okay. One bag is up, Tony.

07 02 25 32 CC Okay. Was there - Did you see the number on that? Don't go back to look -

07 02 25 40 LMP-EVA I - I'm sorry I didn't - 6 or 7. We got 6 and 4 down here.

07 02 25 46 CC Okay. It must have been 7.

07 02 25 51 LMP-EVA Thank you.

07 02 26 14 CC And, Charlie; understand you got the muley rock and put it in the big rock bag?

07 02 26 20 LMP-EVA John did. Roger.

07 02 26 22 CC Okay.

07 02 26 39 CC And, John; once you get parked out there, we're going to need that whole front end brushed off. If you just want to start on the panel and work back, that's probably the best way. We'd like you to use the - -

07 02 26 51 CDR-EVA Understand.

07 02 26 53 CC Okay, we'd like you to use the small lens brush on the - the GCTA lens.

07 02 27 09 CDR-EVA Okay, Houston. I'm parked on a slope toward the - of about 10 degrees, or 5 or 6 or 7 degrees - toward the lunar module, and it's my guess that this will help your cooling some, because it's looking towards deep space - space a little, and I'm about 100 yards directly aft of the lunar module. Is that where you want this contraption to be?

07 02 27 44 CC Okay. It's heading 165.

07 02 27 49 LMP-EVA Yep. Heading is 165.

07 02 27 51 CC Okay. Fine. And before you turn it off, there, we'd like a complete read-out.

07 02 28 11 CDR-EVA Okay. I don't want to do any unnecessary brushing. How about somebody reading the EVA closeout decal to me. This thing is so dusty, I can't read anything. AMP-HOURS - Well, BEARING is 243, which can't be right; DISTANCE 11.4; RANGE 210. AMP-HOURS is 28, and 120 on 2; and AMPS, of course, are off-scale low. BATTER - VOLTS are 65, 65. FORWARD and REAR MOTOR TEMPs are off-scale low. And, of course, the - BATTERY 1 is off-scale low, and BATTERY 2 is reading 1 - 43.

07 02 29 17 CC Okay, we copy that; 43.

07 02 29 21 LMP-EVA That do it, Houston, for you?

07 02 29 22 CC Right.

07 02 29 25 CDR-EVA Okay, now. Pete, how about reading the closeout decal to me there, because I - I can't see it for the dust. Even after I brush it, I can't see it.

07 02 29 33 CC Okay. The closeout. Circuit breakers all open except AUXILIARY. BUS A and C should be closed.

07 02 29 54 LMP-EVA Okay, Tony; I've got two bags up, and I'm gonna have to wait and let John take in the rest, and I'm policing up the area, and it looks like everything is pretty much under the LM.

07 02 30 08 CC Okay. And, John, AUXILIARY CIRCUIT BREAKER BYPASS, ON.

07 02 30 16 CDR-EVA Okay. Wait a second here.

07 02 30 17 CC Okay.

07 02 30 22 CDR-EVA Okay. The BYPASS switch is coming ON.

07 02 30 25 CC Okay. LCRU POWER, EXTERNAL; and MODE 3, TV REMOTE.

07 02 30 37 CDR-EVA Okay. Let me line up the high gain.

07 02 30 52 CC And, John, while you're up in the front end, take the TV lens shade off.

07 02 31 01 CDR-EVA Take the lens shade off?

07 02 31 03 CC Roger. Just take it off and throw it away.

07 02 31 05 CDR-EVA What do you want to do with it?

07 02 31 19 LMP-EVA Tony, I tried some MAX cooling there for a second, and - on this PLSS, and it really freezes you.

07 02 31 33 CC Okay.

07 02 31 36 LMP-EVA Okay. How you doing, babe?

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

07 01 03 41 CMP Hello, Houston. How you doing?

07 01 03 44 CC Hello, Casper. How's it going? You all set?

07 01 03 50 CMP All set to go. 509 is out. I'm in attitude, and we must be right; I'm going sideways.

07 01 03 56 CC Roger.

07 01 03 58 CMP Counting down at 1:55. I'm on VOX, and I'll give you the final couple of steps on VOX.

07 01 04 12 CC Okay, Ken. We got data and everything looks good. You're still go.

07 01 04 22 CMP Okay. Thank you, sir.

07 01 04 54 CMP In 1 minute, the EMS is going to NORMAL. TRANSLATION CONTROL POWER is on. Translation controller and rotation controllers are armed.

07 01 05 09 CC Got it.

07 01 05 10 CMP The arm light is out; the SPS DELTA-V THRUST A is coming on -

07 01 05 15 CMP MARK.

07 01 05 26 CMP Average g is on. IPS [?] look good.

07 01 05 38 CMP Ullage. Good ullage. Attitude's good. Engine enable.

07 01 05 54 CMP There's ignition.

07 01 06 02 CMP Auto shutdown.

07 01 06 18 CMP Okay, residuals, I have - on Y is minus 0.1. I'll get you the VERB 6 NOUN 20s, and you can watch that while I turn the GIMBAL MOTORS, OFF.

07 01 06 44 CMP There's number 2's OFF; number 1's are OFF. NORMAL powers are OFF. Do you have the attitude, Houston?

07 01 06 54 CC That's affirmative.

07 01 07 00 CMP Okay; I see that is no trim.

07 01 07 30 CMP My DELTA-V_C was minus 9.1.

07 01 07 36 CC Roger; 9.1.

07 01 08 06 CMP And I assume you're handling the DSE now so - Yeah, looks like you got it.

07 01 08 11 CC That's affirmative, Ken.

07 01 08 16 CMP Okay; the BUS TIES came OFF normally. I noticed when I set it up that - just before putting them on that bus B - battery B was reading a little bit lower than the others. It was reading about 34.

07 01 08 30 CC That's Roger, Ken. And we're - just about ready to do a BAT B charge. I'll give you a call. And if you'll give us ACCEPT, we're ready to up-link the REFSMMAT.

07 01 08 43 CMP You have ACCEPT. And you want these fuel readings? I'm not sure they're valid, but it's 31.8 oxidizer, 32.8 on fuel, and a balance is now showing a minus - a decrease of 275, but we made the burn in the fixed position with secondary valves and NORMAL position.

07 01 09 11 CC Roger; copy.

07 01 10 58 CC Casper, the computer's yours, and we did your VERB 66 for you. And we'd like for you to start a BAT B charge.

07 01 11 10 CMP Okay. Let me finish my SIM bay configuration, and I'll be right with it.

07 01 11 34 CMP Okay; you'd like to have a battery B charge.

07 01 17 36 CMP You guys are awful quiet, Henry. You must be plotting.

07 01 17 45 CC Roger. We got some more Flight Plan changes for you. Let me just read you the first one, here, and let you get going. We want you to do a VERB 49 maneuver to a P52 attitude. And it's about a 15-minute maneuver; we want you there by 46. So why don't you go ahead and load it up, and I'll give you the angles there: 180, 075, 345.

07 01 18 16 CMP Okay; 180, 075, and 345. And can I put the computer in BLOCK?

07 01 18 25 CC The computer's yours.

07 01 19 22 CMP Okay, Hank. What time you need me there?

07 01 19 26 CC Roger; at 46. Looks like you gonna make it. And you might keep an eye on the middle gimbal angle on this thing. We're gonna watch it, too.

07 01 19 34 CMP ... with more than a minute. Oh, it should be clear. It's got a good bit of roll to go with that yaw. But I will keep an eye on it. Okay; why don't you read on?

07 01 20 01 CC Okay, at 169:46, P52, option 1. And we want to pulse torque to the ascent orient.

07 01 20 17 CMP Okay. And this time you want to do a pulse torque, P52, option 1, at 46.

07 01 20 21 CC Roger. And following that, open the alpha particle/X-ray cover, and then turn the X-ray on.

07 01 20 38 CMP Okay. Then open the alpha/X-ray cover, and the X-ray to on.

07 01 20 43 CC Roger. 169:51, VERB 49 maneuver to Moulton point attitude, to be there at 170:20. And that's about a 9-minute maneuver. The Moulton point attitude is 225, 233, 358.

07 01 21 21 CMP Okay, at time 51, I go to the Moulton point attitude: 225, 233, 358; and I have to be there by 170:20.

07 01 21 30 CC Roger. And HIGH GAIN to AUTO at your convenience.

07 01 21 37 CMP You've got it.

07 01 21 39 CC Okay; and following that maneuver, at that same time, go to the Experiment Checklist, gegenschein pass number 2, page X/2-3, steps 1 to 4.

07 01 22 04 CMP Okay; that's - Experiment Checklist, page X/2-3, gegenschein pass 2. Now you gave me some step numbers; does that mean I don't do the whole pass?

07 01 22 19 CC Well, we want the photos to start at 17:28.

07 01 22 29 CMP Okay; stand by a minute. Let me get to that.

07 01 22 45 CC What that's doing, Ken, is that's one of these things where you maneuver around to the Moulton point, to the antisolar point, and to the - do those sequences. So steps 1 through 4 get you through the Moulton point sequence, then you got to do a little maneuver to the antisolar point.

07 01 23 02 CMP Okay. Okay, but like I'm gonna do the whole sequence. When you read steps, I thought maybe there was something I was supposed to leave out. Okay. So all we need is another set of attitudes and some times. Now let me have this Moulton point time? It has to be done no earlier than some given time.

07 01 23 20 CC Roger. We want you to start at 170:28. 170:28.

07 01 23 30 CMP I will certainly try. But that's also the earliest. Is that correct?

07 01 23 34 CC That's affirmative. Following that sequence, at approx - well, that time is all wrong there. But we want you to do a VERB 49 maneuver to the antisolar point. That's about a 5-minute maneuver. And the attitude is 279, 223, 356.

07 01 24 18 CMP Oh, boy, - Hank, if we stick a 5-minute - a maneuver as long as that in there, I'm not sure we're gonna make it. Do you know why we're changing the roll that much? Last time we didn't charge roll at all. We just made a little pitch maneuver down there.

07 01 24 33 CC Okay. FAO'll check that. But that is the same place there on the page on the checklist, the next step.

07 01 24 45 CMP Okay.

07 01 24 47 CC They say here, if that is correct, that they want you at that attitude by 170:36, but as far as I'm concerned, you just step through the sequence.

07 01 25 00 CMP That's the only thing I can do, Hank.

07 01 25 02 CC Roger.

07 01 25 14 CMP What was that target time again? 170:36?

07 01 25 18 CC That's affirmative.

07 01 25 23 CMP Okay.

07 01 25 24 CC You won't be there by then if that - Oh, I see. FAO says what they're trying to do is combine deep-space measurements with the - with these photos.

07 01 25 47 CMP Okay.

07 01 25 50 CC And you're not going to be at that attitude by 36. It'll be more like 38.

07 01 26 00 CMP At the best; yes, sir. Now we can put in a higher rate; that's up to you folks. Is it worth the gas?

07 01 26 13 CC You got the gas if you want to do it.

07 01 26 21 CMP Well, I'd like to get as much data as I can, Hank. I don't know how to assess what's - worth keeping a little RCS for rendezvous. As opposed to -

07 01 26 32 CC Okay; press ahead and use the gas. Go to a higher rate and let's get these things.

07 01 26 39 CMP Okay. I'll - I'll set the - right after I get to the Moulton attitude, I'll change the DAP to the high rate.

07 01 27 06 CC Okay, is there any question on that gegenschein thing there, Ken?

07 01 27 13 CMP I'm just looking it over. Just a second. Okay; I'm going - I'm on my way to the P52 attitude, which we're gonna get, I guess, here in daylight. That should be no problem. That's why we're gonna do a pulse torque, and I'll open the alpha/X-ray covers and get the X-ray on. And at time 51, I'm gonna try to do a VERB 49 to the Moulton attitude, which is 225, 233, and 358, to be there at 170:20. I'll then do those - pictures, and try to start them at 170:28. If I get in attitude, I'm gonna

change the DAP to 10102. Then do a maneuver to the antisolar point at 279, 223, and 356. And those pictures should begin at 170:36. At the conclusion of that sequence, I'll turn the DAP to 10101.

07 01 28 27 CC Okay. That sounds good, Ken. And at 171 hours, we want to turn the X-RAY to STANDBY and CLOSE the ALPHA PARTICLE/X-RAY COVER.

07 01 28 48 CMP Okay, at 171, you want X-RAY to STANDBY and CLOSE the ALPHA/X-RAY COVER.

07 01 28 53 CC Roger; that's for Sun avoidance.

07 01 28 59 CMP Roger; thank you.

07 01 29 14 CMP Okay; is there something that comes after that? Do I go to another attitude, or what?

07 01 29 23 CC Stand by a minute, Ken.

07 01 29 28 CMP Okay.

07 01 30 01 CC Okay, Ken. Following this, we want you to - this attitude'll be good, all the way up to 172:30. And we want you to get an eat period in there. And at 172:15, do a P52.

07 01 30 19 CMP Okay. Just a second. You caught me without my book.

07 01 31 15 CMP Okay, Hank. Say again those events.

07 01 31 18 CC Okay. The attitude that you're in at the completion of the gegenschein will be good for that time until we pick up on the - in the Flight Plan at 172:30 where we marked it up. And the only thing we want you doing in this period is to eat. And at 172:15, do a P52.

07 01 31 49 CMP Okay. I'll eat, do a P52 at 172:15, and be in the Flight Plan at 172:30.

07 01 31 56 CC That is affirmative. And for your information, the next AOS is at 171:14.

07 01 32 06 CMP Okay. Thank you, sir.

07 01 32 25 CMP Okay, Hank, I got 23 frames used on magazine ZZ. I assume that's enough to get me through this new sequence. Right?

07 01 32 37 CC That's affirmative. That should be a seven-frame sequence.

07 01 32 44 CMP Okay.

07 01 33 27 CC And, Ken, for planning purposes, we're gonna delete your suit donning for the rendezvous, so you won't have to be worried about that.

07 01 33 39 CMP Okay. All right. That'll unclutter the time a great deal. Thank you.

07 01 37 30 CMP Can I go ahead and open the alpha cover?

07 01 37 41 CC Stand by.

07 01 38 01 CC Roger; go ahead, Ken.

07 01 38 06 CMP Okay. That baby's open.

07 01 40 52 CMP That ought to get your attention, shouldn't it?

07 01 40 58 CC Roger.

07 01 42 00 CMP Okay, the X-RAY is ON.

07 01 42 10 CC Copy.

07 01 45 36 CMP Well, we finally got a little serendipity, Hank.

07 01 45 40 CC How's that?

07 01 45 41 CMP I was almost in the right attitude to start with. Hey, now, would you guys, in a little bit, not look? It sure is nice to get somewhere more than a minute before you have to be there. And we're all set up. I got the window shade up and the camera installed, and we're all ready to go.

07 01 46 49 CC Casper, Houston. We'd like you to configure for a SIM bay jett.

07 01 46 58 CMP Okay.

07 01 47 11 CMP Got it.

07 01 47 23 CC And, Casper, could you reacquire on the high gain? We're having a little trouble. PITCH, minus 30; YAW, 80.

07 01 47 48 CMP How's that?

07 01 47 50 CC Hey, that looks good.

07 01 51 16 CMP Hank, just out of curiosity, all this - minor material that's sticking up through the mare down here has that same little bench on it that I described at Rhipaeus Mountains. That includes some of these circular craters that are sticking up.

07 01 51 37 CC Roger; that sounds pretty interesting.

07 01 51 45 CMP It has both a different color, and I think it has a different slope. But it looks just like a high-water mark on them, because everything around here is uniform.

07 01 52 02 CC Roger. Are you talking about the swirls?

07 01 52 08 CMP Twirls? No, sir. I'm talking about these little benches that are on the side of every piece of material that sticks up through the mare surface.

07 01 52 17 CC Roger.

07 01 58 43 CC Casper, Houston. After you get the Alpha particle/X-ray cover door closed at 171 hours, you can go back to coupled RCS.

07 01 58 59 CMP Okay, let's see. After I close the door at 171, then you want me to go back to couples.

07 01 59 07 CC We want you that way at LOS so FDO'll get some good tracking on you.

07 01 59 15 CMP Okay.

07 02 02 41 CMP Henry?

07 02 02 47 CC You call, Ken?

07 02 02 52 CMP Yes, sir. I'd like to verify what I'm supposed to be pointing at. It doesn't look like - you've got the camera in the 30-degree position according to the checklist. And it was my understanding that mark on my checklist on that star chart was the Moulton point, and it doesn't appear to me that my camera is pointing at that spot.

07 02 03 15 CC Stand by.

07 02 03 25 CC Okay. The checklist calls for the camera in the X position.

07 02 03 27 CMP Looks to me like my camera is pointing about Gienah.

07 02 03 39 CMP Oh, there it is. Okay. Now I'm glad we checked that.

07 02 08 00 CMP Hank, it still looks to me like I'm pointing closer to Spica than I am to Antares.

07 02 08 10 CC Ken, FAO's verified that attitude, and they say it's good.

07 02 08 16 CMP Okay. That's fine then.

07 02 13 33 CC Casper, Houston. We're a little over 2 minutes from LOS, and everything's looking good. INCO's got your recorder.

07 02 13 42 CMP Okay. Thank you very much.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 02 32 05 CC Okay, Charlie. If you're out of things to do there, why don't you go on out where John is and see if you can find an igneous or a hard breccia to put on top of that LPM. Use his camera to document it.

07 02 32 18 LMP-EVA Okay. I'll do that. I was just standing there. I don't have a camera, though, now, Tony.

07 02 32 29 CC Okay. Just use John's.

07 02 32 33 LMP-EVA All right.

07 02 33 05 CC Okay, John. Verify that the circuit breakers you still have in on the panel are at AUX and circuit breakers A and Charlie.

07 02 33 23 CDR-EVA Roger. We're staying here.

07 02 33 30 CC Okay. And if you have a chance to aim the high gain, we'll get our TV back.

07 02 33 35 CDR-EVA ... AUX POWER is in, BUS A is in, BUS B is in, and the rest of them are pulled.

07 02 33 44 CC Okay. We would - -

07 02 33 45 CDR-EVA ... circuit breakers ... pull. Okay. Wait a minute.

07 02 33 46 CC - - like B out, and Charlie in, and Delta out.

07 02 33 54 CDR-EVA That's the way I got it.

07 02 33 56 CC Okay. Fine.

07 02 34 03 LMP-EVA Where's your camera, John?

07 02 34 05 CDR-EVA Right here, Charlie.

07 02 34 16 LMP-EVA Okay. I got it. Okay. A hard breccia or an igneous rock.

07 02 34 38 LMP-EVA Here's a TV ...

07 02 34 44 CDR-EVA Charlie, ... me in again.

07 02 34 46 LMP-EVA I can't do it from here, John. Looks like to me you got to go right. Or down, to you, I guess it is.

07 02 35 06 CDR-EVA Okay. This one looks pretty good right here in the ...

07 02 35 20 LMP-EVA Do you want this rock brought back, Tony? That is - that I'm - for the LPM?

07 02 35 25 CC Roger. We'd like you to document it before you touch it, and then when you get the LPM first measurement, we'll put it on the LPM, take a picture of it on the LPM, and then we'll get an LPM measurement of it, and then we'll sack it and bring it back.

07 02 35 46 LMP-EVA Okay. It's a pretty good one, but it's too big to sack, unfortunately ... - -

07 02 35 51 CC Do you have a smaller one around that we can get in the sack?

07 02 35 57 LMP-EVA Yeah, let me look. That was a good -

07 02 36 01 CC And we're getting a picture.

07 02 36 02 CDR-EVA There it is. I tell you, when it gets to be a ..., that thing is really hard to see. Okay. I want to tighten down your little screw there.

07 02 36 16 LMP-EVA How about one a half-an-orange size, Tony?

07 02 36 21 CC That would be great. Really great.

07 02 36 27 LMP-EVA Okay. I'm going to get a close - a couple of cross-Sun stereos is all. Is that all right?

07 02 36 32 CC That's fine. We've got the location on TV. And, John, when you start dusting off the panel, we'd like to - -

07 02 36 39 CDR-EVA Oh, yeah.

07 02 36 40 CC - - reset the caution.

07 02 36 46 CDR-EVA Okay. (Laughter) Does that embarrass you?

07 02 36 48 CC No. (Laughter) It's just that you got a thermal leak there.

07 02 36 54 CDR-EVA Oh.

07 02 36 56 LMP-EVA Okay, Tony. It's an igneous rock, not a breccia.

07 02 37 00 CC Okay. Great.

07 02 37 04 LMP-EVA And it's got that sugary texture to it.

07 02 37 06 CC Okay.

07 02 37 22 CDR-EVA Yes. The batteries need dusting.

07 02 37 25 LMP-EVA John, why don't I do that, and you put the LPM out?

07 02 37 27 CDR-EVA Hey, there you go.

07 02 37 28 LMP-EVA Okay. Here's your rock.

07 02 37 31 CDR-EVA Okay. Why don't you set it on the seat, huh?

07 02 37 33 LMP-EVA Okay.

07 02 37 36 CDR-EVA Camera, too. Charlie, lay the camera up there.

07 02 37 39 LMP-EVA Yeah. Okay, Tony. That's frame count 156 and 157 - -

07 02 37 45 CC Okay.

07 02 37 46 LMP-EVA - - 155 and 156 for the - that rock.

07 02 37 49 CC Okay. We copy that.

07 02 37 53 LMP-EVA I'm not sure we got - We got a bag left, John?

07 02 37 56 CDR-EVA Yeah, I put a bag under the seat.

07 02 37 59 LMP-EVA Oh, good.

07 02 38 02 CDR-EVA Hear the power switches coming on, Houston?

07 02 38 04 CC Okay.

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07 02 38 22 LMP-EVA I dusted the back mirror, and then I dusted the front, and now I got to - be duster.

07 02 38 29 CC Right. And, Charlie, we'd like you to dust that panel and the top of the console.

07 02 38 36 LMP-EVA All right, sir. Just a moment.

07 02 38 38 CC Okay.

07 02 38 41 LMP-EVA What panel?

07 02 38 43 CC The L - the control panel on the LRV.

07 02 38 48 LMP-EVA Oh, all right.

07 02 38 54 CDR-EVA Why do you want to do that, Houston?

07 02 39 00 CC We want to keep the temperature of the panel down - -

07 02 39 02 CDR-EVA To see if anybody is on the back?

07 02 39 05 CC I guess so. Keep it nice for the next guy.

07 02 39 09 CDR-EVA (Laughter) Okay.

07 02 39 19 LMP-EVA Okay. The top of the panel is dusted, Tony.

07 02 39 28 CC Okay. Great.

07 02 39 32 LMP-EVA Sometimes I think I'm a ant.

07 02 39 35 CC And we'll need the - all sides of that console and I guess that panel you just dusted.

07 02 39 43 LMP-EVA All right.

07 02 39 56 LMP-EVA Okay. The top and the driver's side is dusted. The left battery's dusted. I'm going to dust the LCRU.

07 02 40 12 CC And, Charlie, after dusting the LCRU there, you'll have to tear off one of those thermal blankets and put it over the control panel on the LCRU.

07 02 40 25 LMP-EVA Okay.

07 02 40 26 CC The big one, the 65-percent one.

07 02 40 31 LMP-EVA The which one?

07 02 40 32 CC The 65-percent blanket. And, John, we saw you get back and we started your clock.

07 02 40 39 CDR-EVA Okay. Thank you.

07 02 40 50 CDR-EVA Let me show you what to do with that one, Charlie.

07 02 40 54 LMP-EVA Okay.

07 02 41 01 CDR-EVA Do you want a picture of that - you want a picture of it, don't you, Houston?

07 02 41 04 CC Yeah, it'd be a good idea.

07 02 41 07 LMP-EVA I think I see how it goes.

07 02 41 21 CDR-EVA You know, we sure hope you guys have enjoyed watching this as much as we've enjoyed doing it. There's one thing that's a real pleasure; it's this gravity environment.

07 02 41 31 CC Okay. And you've got a minute. And we've sure enjoyed watching, I can tell you.

07 02 41 40 LMP-EVA Well, I hope we got all the rocks, Tony, that are here.

07 02 41 45 CDR-EVA We got all the rock types that look different from any other rock type.

07 02 41 49 LMP-EVA John, is that right on the thermal blanket? It covers the thing. That's pretty good.

07 02 41 56 CDR-EVA No, it folds down, and - Let me show you.

07 02 42 05 LMP-EVA Oh, I see.

07 02 42 07 CDR-EVA *** something it attaches to down there.

07 02 42 09 LMP-EVA Yeah.

07 02 42 10 CDR-EVA Oh.

07 02 42 11 LMP-EVA You got it.

07 02 42 12 CDR-EVA Yeah.

07 02 42 13 LMP-EVA Super.

07 02 42 14 LMP-EVA I got one more battery to go.

07 02 42 18 CC And, John, do you want to get that? And don't walk towards the LPM there, Charlie.

07 02 42 25 LMP-EVA Roger.

07 02 42 38 CDR-EVA Okay, I'm going to read the LPM, Houston.

07 02 42 41 CC Okay.

07 02 42 50 CDR-EVA Okay.

07 02 42 51 LMP-EVA Okay, Tony. The center mirror on the Rover is a little streaky, but it's - -

07 02 42 57 CDR-EVA Charlie, can you read that? X is 322, Y is 530, Z is 510.

07 02 43 07 CDR-EVA Can't turn it on but 10 seconds at a clip. X is 322, Y is 531, Z is 507.

07 02 43 22 CDR-EVA X is 321, Y is 531, Z is 510.

07 02 43 29 CC Okay. We copy that - -

07 02 43 30 CDR-EVA ..., Houston.

07 02 43 32 CC - - And when you put the rock on, we'd like a couple of cross-Suns of it - -

07 02 43 35 CDR-EVA Okay. We'll start with a rock.

07 02 43 40 LMP-EVA Don't forget your camera, John.

07 02 43 41 CDR-EVA Okay.

07 02 43 42 LMP-EVA Here's the rock. I'll get the camera for you. And I guess I'll go on back and take the brush. Okay?

07 02 43 50 CDR-EVA Okay.

07 02 43 52 LMP-EVA I'll bring your camera out.

07 02 43 57 CC And leave that lens brush there for John to dust the lens with.

07 02 44 07 CDR-EVA You mean you didn't dust the lens, Charlie?

07 02 44 09 LMP-EVA No, I forgot it. I'll get it.

07 02 44 11 CDR-EVA (Laughter) Okay. Dust the lens over the mirror. Then you got to redust the mirrors.

07 02 44 18 LMP-EVA Yeah, I know. That's why I'm going to bring it around this way.

07 02 44 22 CC Good plan, Charlie.

07 02 44 28 CDR-EVA Better dust the LCRU.

07 02 44 30 LMP-EVA I will. Okay. Here's your camera. Okay, Tony. There's your lens dusted.

07 02 44 41 LMP-EVA Okay. You're pointed about 10 degrees down, out to the Rover - -

07 02 44 49 CC Okay. Fine.

07 02 44 53 LMP-EVA - - 7 o'clock.

07 02 44 55 CDR-EVA Those mirrors are as clean as we can dust them, Houston. If they don't cool down, then there's a problem with thermal - -

07 02 45 03 CC Okay.

07 02 45 07 LMP-EVA Going on back, John.

07 02 45 08 CDR-EVA Sir?

07 02 45 09 LMP-EVA I say I'm going back.

07 02 45 11 CDR-EVA Okay.

07 02 45 12 LMP-EVA I promise not to get in until you dust me.

07 02 45 14 CDR-EVA Okay.

07 02 45 15 LMP-EVA Sorry about falling down there, bump.

07 02 45 17 CDR-EVA (Laughter) Okay.

07 02 45 19 LMP-EVA It's only my fifth time, I think.

07 02 45 21 CDR-EVA Five times in how many hours is not too bad, Charlie.

07 02 45 23 LMP-EVA Trying to show off.

07 02 45 51 LMP-EVA Can't get over this big crater, John, behind us.

07 02 46 03 CDR-EVA Okay. It's still - still level and the SUN SHADOW is still aligned.

07 02 46 09 CC Okay.

07 02 46 14 LMP-EVA Tony, is your TV camera working?

07 02 46 16 CC Yeah, it is. We're driving it around now - -

07 02 46 18 LMP-EVA Yeah, I see it moving.

07 02 46 19 CC - - We'll be around by John in a minute.

07 02 46 21 LMP-EVA Okay.

07 02 46 29 CDR-EVA Close the handtool carrier.

07 02 46 31 LMP-EVA Hey, don't forget that mag on that camera.

07 02 46 33 CDR-EVA Okay, Houston. I'm back at the - -

07 02 46 36 CC Okay. And I started the clock - -

07 02 46 37 CDR-EVA - - at the Rover.

07 02 46 38 LMP-EVA You got the dustbrush?

07 02 46 39 CC Did you get a picture of it while you were out there?

07 02 46 40 LMP-EVA You got the dustbrush?

07 02 46 44 CDR-EVA Yeah, two - a stereopair.

07 02 46 46 CC Okay. Fine.

07 02 46 47 LMP-EVA Yeah. I got the dustbrush, John.

07 02 46 49 CDR-EVA Okay.

07 02 47 04 CDR-EVA Okay. Go to it, Charlie. You're giving me that minute, aren't you, Houston?

07 02 47 11 CC Yeah, I sure am. You've got about 20 seconds.

07 02 47 16 CDR-EVA I just got a picture of one of the great moments in history, Houston.

07 02 47 21 CC How's that?

07 02 47 23 CDR-EVA (Laughter) Charlie looking down into a crater that's (laughter) 10 feet (laughter) 10 feet - -

07 02 47 32 CC Okay -

07 02 47 33 CC MARK, John.

07 02 47 37 CDR-EVA - - 10 feet to the rear footpad, and 25 foot deep - sir?

07 02 47 47 CC Go ahead.

07 02 47 48 CDR-EVA Okay.

07 02 47 58 CDR-EVA Okay, Houston. 317, 525, 5 - 317, 525, 513. 320, 526, 513. 321, 526, 513.

07 02 48 20 CC Okay. We copy those.

07 02 48 21 CDR-EVA Get those, Houston.

07 02 48 25 CC Okay. If you'll bag that one -

07 02 48 27 CDR-EVA And the REV switch is going off.

07 02 48 28 CC We've got it here, and you go on in.

07 02 48 30 CDR-EVA What do you want? Okay. What do you want me to do with the LPM, want to get it out of the way so it doesn't flap around and hit the LCRU at lift-off or something?

07 02 48 45 CC We're not too worried about it, just leave it there.

07 02 48 51 CDR-EVA All righty.

07 02 49 03 CC And, John, when you bag that, we'll need a bag number.

07 02 49 15 CDR-EVA Charlie, this is a pretty good rock.

07 02 49 16 LMP-EVA It is, isn't it?

07 02 49 18 CDR-EVA It's got a spectacular little zap pit in it. It's lined and it's all silvery and glassy. Fred Horz will appreciate this rock.

07 02 49 29 LMP-EVA Yeah.

07 02 49 30 CC We'll appreciate them all.

07 02 49 33 LMP-EVA You can see those sugary-textured ones.

07 02 49 37 CC And we better - -

07 02 49 38 CDR-EVA Okay, Charlie, bag 331.

07 02 49 39 CC - - hustle on back in, we're getting up against - Bag 331.

07 02 49 44 CDR-EVA Oh, okay.

07 02 49 49 LMP-EVA We're getting what, Tony?

07 02 49 50 CC We're getting up against the time limit. We'd like you to get on in.

07 02 49 56 LMP-EVA Yeah, I'm standing at the footpad ready - -

07 02 49 57 CC That's not a PLSS time limit.

07 02 49 58 LMP-EVA - - ready to get dusted and get my antennas. Say again.

07 02 50 04 CC That's not a PLSS time limit. That's in time for getting ready for lift-off.

07 02 50 11 LMP-EVA Yeah.

07 02 50 12 CDR-EVA Yeah. Understand.

07 02 50 21 CC And, Charlie, I interrupted. What - what were you saying?

07 02 50 24 LMP-EVA Kind of looks - oh, I don't remember.

07 02 50 35 CDR-EVA Boy, Houston, the beauty of this place is absolutely incredible.

07 02 50 47 CC We agree. And there's another spectacular view, the pilot who missed the crater.

07 02 50 57 LMP-EVA Watch out. Watch out, John.

07 02 51 01 CDR-EVA Yeah.

07 02 51 02 LMP-EVA To your left is that crater.

07 02 51 05 CDR-EVA That'd be - be pretty good to miss it on landing and fall in - fall in on it before taking off, huh?

07 02 51 13 LMP-EVA Well, the way I've been falling, I probably would. That's why I steered way clear. Boy, this back-pack, once you get it torqued off, you can't - can't stop it.

07 02 51 26 CDR-EVA Not without moving.

07 02 51 27 LMP-EVA That's right. There. Okay. Yeah, I'll put the rock - You take the camera off - I'll put the rock in the - in this SCB over here.

07 02 51 37 CDR-EVA Okay.

07 02 51 38 LMP-EVA Okay. Did you give them the bag number?

07 02 51 40 CDR-EVA Yeah.

07 02 51 46 CDR-EVA Okay, Houston. I'm up to frame count 168 on magazine E.

07 02 51 52 CC Okay.

07 02 52 08 LMP-EVA Okay, John. Ready to be dusted.

07 02 52 14 CDR-EVA Boy, that's the last one. It's not going to come out, because -

07 02 52 19 LMP-EVA Yeah, you're going to have to take it off.

07 02 52 21 CDR-EVA We got to take it off.

07 02 52 24 CDR-EVA Just shot 169 of the old Rover sitting there. Boy, that's a good machine.

07 02 52 30 LMP-EVA Yeah, it's an incredibly good machine.

07 02 52 46 LMP-EVA Okay, okay, there you go. Hang on.

07 02 52 50 CDR-EVA Now, we got some work to do here, boy. You're all dirty.

07 02 52 54 LMP-EVA You ought to see your back. I couldn't have gotten any dirtier than you.

07 02 53 04 LMP-EVA The only other thing we need, John, is the f - the far UV mag.

07 02 53 08 CDR-EVA Yeah.

07 02 53 11 LMP-EVA I think this stuff is just ingrained into the suit right now.

07 02 53 14 CDR-EVA Yeah, I don't think we're going to be able to get it off.

07 02 53 24 LMP-EVA A little bit's coming off your arm when I whack it. There we come.

07 02 53 30 CDR-EVA Well, the message is clear.

07 02 53 32 LMP-EVA What?

07 02 53 33 CDR-EVA Don't lose the fender off the Rover.

07 02 53 35 LMP-EVA Yeah, you ought - go - ought to see the top of your helmet. Looks like it's rain - little mud drops.

07 02 53 47 CDR-EVA Get a little farther away, Charlie?

07 02 53 49 LMP-EVA Yeah.

07 02 54 17 LMP-EVA I'll get it off my legs, John.

07 02 54 19 CDR-EVA Okay.

07 02 54 21 LMP-EVA Could you close that pocket so that dirt, so the dirt - -

07 02 54 22 CDR-EVA Want to get the pockets off?

07 02 54 24 LMP-EVA Well, I don't think we have time. Let's get - I just - just get - I just want to get the things closed.

07 02 54 30 CDR-EVA Okay. There we go. I got it. Now that's great.

07 02 54 36 LMP-EVA That's where all that dust came in from yesterday, was - Yours is closed.

07 02 54 40 CDR-EVA Okay.

07 02 54 42 LMP-EVA Okay, let me try you now. I'm off your shoulder. Uh-ch, did I turn your comm? No, it's on.

07 02 54 55 CDR-EVA No. Golly, that Rover, really. Okay. Let me get under here. There we go a little bit, it's working.

07 02 55 14 CDR-EVA Boy, I tell you, Houston, if we just had some air up there - here, we could plow this.

07 02 55 22 LMP-EVA Turn around, John.

07 02 55 23 CDR-EVA Sure is good-looking dirt, I'll tell you that.

07 02 55 29 CC Well, maybe some day.

07 22 55 36 LMP-EVA Okay. Spin.

07 02 55 41 CDR-EVA Man, it is brand new.

07 02 55 45 LMP-EVA Yeah, I think I got most of that stuff off that Rover wheel because your - it's - real - your ... on my side - -

07 02 55 54 CDR-EVA Is the worst?

07 02 56 10 LMP-EVA Is the worst. Yeah. Can you put your arm over your helmet? There we go. Okay. Let's - let me spend some time here. Okay. That's probably about as good as we're gonna do, John.

07 02 56 11 CDR-EVA Okay.

07 02 56 12 LMP-EVA Okay. Antennas, and I guess I'm ready to gli - climb in.

07 02 56 17 CDR-EVA Well, you know, I don't think we need to worry about the antennas, but let me get yours. Golly, look at the top of your - let me worry about that; let me get the top of your PLSS cleaned off.

07 02 56 26 LMP-EVA Okay.

07 02 56 28 CDR-EVA Here, come on by the ladder.

07 02 56 29 LMP-EVA Okay. ...

07 02 56 35 CDR-EVA ...

07 02 56 44 LMP-EVA Is it on the OPS?

07 02 56 45 CDR-EVA All over it.

07 02 56 46 LMP-EVA Oh, yours is dirty, too, I didn't - couldn't reach it though; gonna bypass it. It might be a good idea to let me - -

07 02 56 52 CDR-EVA Well, we're gonna keep the OPSs, Charlie.

07 02 56 55 LMP-EVA I know it. We better - You better lean over and let me get yours.

07 02 57 03 CDR-EVA That rock bag is filthy. I heard of dusting off, but I didn't know we were going to have to go from the top down. Stand up, Charlie, and let me get the back of it.

07 02 57 26 LMP-EVA You know that engine bell didn't even blow out that big old rock over there.

07 02 57 30 CDR-EVA I know it.

07 02 57 32 LMP-EVA Well - -

07 02 57 33 CDR-EVA There you go.

07 02 57 34 LMP-EVA - - PLSS side anyway.

07 02 57 36 CC Okay, fellows. We should be pressurized in about 5 minutes.

07 02 57 40 CDR-EVA There you go.

07 02 57 41 LMP-EVA Oh, that's great. Boy, is that dirty up there. Can you -

07 02 57 53 CDR-EVA Yeah.

07 02 57 58 LMP-EVA My - my knee on your antenna.

07 02 58 01 CDR-EVA Okay.

07 02 58 02 LMP-EVA Okay, turn around just a little bit. Whoa.

07 02 58 05 CDR-EVA You want me to get down?

07 02 58 06 LMP-EVA No, you're great - right there's fine. Okay, that's the best I can do, John.

07 02 58 18 CDR-EVA Well, boy, that's about it, Charlie.

07 02 58 21 LMP-EVA Okay.

07 02 58 22 CDR-EVA That's about the best we can do.

07 02 58 23 LMP-EVA Let me - Bend over and I'll get your antenna. I'll put my visor down.

07 02 58 50 LMP-EVA About had it and it slipped out. Five-minute operation here.

07 02 58 57 CDR-EVA Man, Houston, this portable life-support system is really a good piece of gear.

07 02 59 05 CC Okay.

07 02 59 07 LMP-EVA Okay, it's down now.

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07 02 59 08 CDR-EVA Houston, are you reading us? Over.

07 02 59 11 CC Yeah, we are. Are you copying us?

07 02 59 14 CDR-EVA Ain't reading us, are they?

07 02 59 16 LMP-EVA Doesn't sound like it, does it?

07 02 59 17 CDR-EVA Houston, are you reading us? Over.

07 02 59 20 CC We copy you 5 by. How us?

07 02 59 23 CDR-EVA Go on and get in. Why don't you go ahead and get in?

07 02 59 24 LMP-EVA Get that - you want to get that antenna?

07 02 59 27 CDR-EVA Your antenna?

07 02 59 28 LMP-EVA Yeah.

07 02 59 29 CDR-EVA No. We don't need it anymore, do we?

07 02 59 30 LMP-EVA Okay. No.

07 02 59 31 CDR-EVA Okay. Okay. I don't know what happened to the comm.

07 02 59 43 CC Hello, Orion; this is Houston.

07 02 59 48 CDR-EVA Hi there. We lost you for a while.

07 02 59 50 CC Yeah, we sure did. We're getting kind of back on the time line, we'd like to hus - to hustle you on in there.

07 02 59 59 CDR-EVA Charlie's climbing through the door right now, Houston.

07 03 00 01 CC Okay. And you've got the UV to get yet?

07 03 00 07 CDR-EVA That's right.

07 03 00 08 CC Okay.

07 03 00 10 LMP-EVA What happened to the comm, Tony?

07 03 00 12 CC I think we had a dropout down here.

07 03 00 16 LMP-EVA Okay.

07 03 00 17 LMP-LM Okay, Tony. I'm inside.

07 03 00 19 CC Good show.

07 03 00 24 LMP-LM With two rock bags.

07 03 00 35 CC Okay. And we'll skip the track light test, and just let you get on in.

07 03 00 43 LMP-LM It works. Ken saw it during the - -

07 03 00 46 CDR-EVA Yeah, we've already tested it once.

07 03 00 48 CC Okay, fine. Let's - let's not do it now.

07 03 01 07 LMP-LM I'm sorry, John, but I brought some dirt in with me.

07 03 01 23 CDR-EVA Okay, Charlie. I'm - I'm going to bring up the - Houston, I'm going to reset the far UV camera.

07 03 01 34 CC Okay, reset three times.

07 03 01 38 CDR-EVA And rem - remove the mag.

07 03 01 41 CC Okay, and camera off.

07 03 01 42 CDR-EVA One, two, three. Okay, then - camera's put - coming off, and - can is full, cassette is being removed. It's out.

07 03 02 07 CC Good show.

07 03 02 09 CDR-EVA And - and it and the - it and bag 6 are gonna go up the ladder this time, I guess.

07 03 02 20 CC Okay. And, Charlie, you - you're going to get a feedwater flag pretty soon. Just leave it. Don't put on the auxiliary.

07 03 02 32 LMP-LM Okay. What's our time, Tony?

07 03 02 37 CC Okay, you've been out 05:31.

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07 03 02 38 LMP-LM Boy, you just hit it right on the nose - there it goes.

07 03 02 44 CDR-EVA Okay. Fine.

07 03 02 49 LMP-LM Boy.

07 03 02 50 CC We'll be down about 10 minutes when you get in.

07 03 02 56 LMP-LM Okay. I forgot to wind my watch, so that's why I was asking.

07 03 03 10 CDR-EVA Okay, Charlie, this bag is coming open. Wait a minute.

07 03 03 14 LMP-LM Okay. Here - Here's a bag.

07 03 03 22 CDR-EVA Okay. Let me get up on the porch - get it in there to you.

07 03 03 27 LMP-LM I can't reach it.

07 03 03 28 CDR-EVA I'll get it to you. Okay. There you go.

07 03 03 30 LMP-LM I got it.

07 03 03 32 CDR-EVA Okay, here's the cass - here's the UV cassette.

07 03 03 36 LMP-LM I got it. I hope that baby worked.

07 03 03 42 CDR-EVA I'm gonna bring the ETB up now.

07 03 03 44 LMP-LM Okay, and you got a big rock bag - on your left.

07 03 03 46 CDR-EVA Yeah, I understand.

07 03 03 57 CDR-EVA Get up there. Go.

07 03 04 09 CC And, John, verify you took the magazine off your camera.

07 03 04 12 LMP-LM Boy, you got that up fast.

07 03 04 16 CDR-EVA That's verified.

07 03 04 18 CC Okay, and the UV cassette is in the ETB?

07 03 04 24 CDR-EVA No. The UV cassette is in the spacecraft.

07 03 04 27 CC Okay. Good show.

07 03 04 30 CDR-EVA I brought that - I brought it up separately.

07 03 04 34 CC Okay. We're all for that.

07 03 04 41 CDR-EVA I'll go down and get the big rock bag now, Charlie.

07 03 04 42 LMP-LM Okay.

07 03 05 18 LMP-LM Well, that's the last of the old orange juice junk - just finished it.

07 03 05 25 CC Okay, we copy that.

07 03 05 37 CDR-EVA Can't make the ETB stay closed.

07 03 05 42 LMP-LM Huh?

07 03 05 44 CDR-EVA Have - have to take it up open.

07 03 05 46 LMP-LM What, the big rock bag?

07 03 05 47 CDR-EVA Yeah.

07 03 05 48 LMP-LM It won't - there's no - there's some snaps on it, but we'll get - don't worry about that. We'll get that later if you can bring it up open.

07 03 05 54 CDR-EVA Okay.

07 03 06 15 CDR-EVA Okay. I'm disconnecting the LEC and dropping it under the - LM.

07 03 06 52 LMP-LM Okay, John. After I bring this in, wait 2 seconds and let me get behind the hatch and -

07 03 07 08 LMP-LM I got it.

07 03 07 09 CDR-EVA Okay.

07 03 07 10 LMP-LM Man, that's a big rock right there. That thing's big.

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07 03 07 23 CDR-EVA Okay.

07 03 07 29 LMP-LM Okay.

07 03 07 31 CDR-EVA Okay, Charlie's getting behind the hatch, Houston.

07 03 07 34 CC Okay.

07 03 07 35 CDR-EVA So I can - get in that baby.

07 03 07 43 CDR-EVA Hung up on something.

07 03 07 46 LMP-LM Okay, I'm back as far as I can get, John.

07 03 07 49 CDR-EVA Okay, let me get my visor up here - see what I'm doing.

07 03 08 12 LMP-LM Okay, you got it coming great. Okay. You're going to have to come right a little bit - left a little bit. Clear your PLSS.

07 03 08 25 CDR-EVA That's as far left as I can get, Charlie.

07 03 08 26 LMP-LM Okay. Okay, it's clearing - just made it.

07 03 08 39 LMP-LM Okay, just about got it.

07 03 08 43 CDR-EVA Okay.

07 03 08 45 LMP-LM Okay. Let me get my bum out of your way. Okay, John's in, Tony.

07 03 08 51 CC Okay.

07 03 08 54 CDR-LM Wait a minute. ...

07 03 09 08 LMP-LM Okay.

07 03 09 09 CDR-LM Don't - close the door.

07 03 09 10 LMP-LM I forgot to turn off your feedwater - let me get your feedwater.

07 03 09 14 CDR-LM Okay.

07 03 09 17 LMP-LM Okay, yours is closed.

07 03 09 18 CDR-LM Okay. Let me get yours.

07 03 09 19 LMP-LM Okay.

07 03 09 22 CDR-LM With this running out like that, I still have to get it, huh, Houston? Probably 20 minutes worth - -

07 03 09 25 CC That's probably a good idea.

07 03 09 26 LMP-LM Yeah.

07 03 09 31 CDR-LM "Probably a good idea." Okay, feedwater's off.

07 03 09 42 LMP-LM Okay. Start with the post-EVA, John. I think -

07 03 09 47 CDR-LM Okay, PRIMARY WATER's off - that CLOSED. Front hatch closed and locked.

07 03 09 51 LMP-LM Okay.

07 03 09 54 CDR-LM I'll get that.

07 03 09 55 LMP-LM Okay.

07 03 10 11 CDR-LM Okay, that's closed and locked, Charlie.

07 03 10 13 LMP-LM Okay, let me - I'm going get the - if you can scootch over just to the right just a little bit. Let me get this dump valve. Okay, we're in AUTO.

07 03 10 31 CDR-LM Okay, dump, AUTO.

07 03 10 34 LMP-LM That's affirmative on the aft - on the overhead.

07 03 10 37 CDR-LM Okay, CABIN REPRESS to AUTO.

07 03 10 39 LMP-LM Okay. It is.

07 03 10 41 CDR-LM Circuit breaker (16) ECS: CABIN REPRESS to close.

07 03 10 44 LMP-LM Here we come.

07 03 11 00 LMP-LM Okay.

07 03 11 01 CDR-LM PRESS REG A and B to CABIN.

07 03 11 02 LMP-LM Okay, they are.

07 03 11 17 CDR-LM You got the PLSS OXYGEN, OFF?

07 03 11 20 LMP-LM Yeah. It's OFF.

07 03 11 28 CDR-LM I think I got mine.

07 03 11 29 LMP-LM Here, I'll get it.

07 03 11 32 CDR-LM Not sure.

07 03 11 37 LMP-LM Yeah, it was, John. Let me turn it off ... Okay.
It's OFF.

07 03 11 46 CC Okay. You had a 5-hour and 40-minute EVA. And
the backroom - -

07 03 11 49 CDR-LM ...

07 03 11 51 CC - - sends a great big "Outstanding."

07 03 11 57 CDR-LM Thank you.

07 03 11 58 LMP-LM Thank you very much, Tony. They kept us going
and thinking. So, it was a - two - a two-way st -
a two-way street.

07 03 12 07 CDR-LM Okay, the CABIN warning light's off. Cabin pres-
sure stable at 4.6 to 5. Use purge valve to
depress PGA as req-ed [sic]. We don't have to.

07 03 12 16 LMP-LM We don't have to?

07 03 12 17 CDR-LM No. Stand by the EV circuit breaker configuration.

07 03 12 20 LMP-LM Okay.

07 03 12 22 CDR-LM Okay. Verify circuit breaker configuration.

07 03 12 27 LMP-LM Mine is good. I'm gonna put the SUIT FAN DELTA-P and the SUIT FAN 2, in.

07 03 12 33 CDR-LM Okay. SUIT FAN DELT - 2, closed; SUIT FAN DELTA-P, closed.

07 03 12 36 LMP-LM Okay, that's done.

07 03 12 37 CDR-LM ECS caution and WATER SEPARATE lights out. Okay. Doff - doff gloves and stow on the comm panel.

07 03 12 43 LMP-LM Turn up your a - ANUN/NUMERICS, John, so we can see this thing.

07 03 12 47 CDR-LM Okay.

07 03 12 48 LMP-LM Yeah, they are.

07 03 12 55 CDR-LM You get those gloves off, I don't know if we're ever gonna get them back on again.

07 03 12 59 LMP-LM Me either.

07 03 13 04 CC And, John, verify you locked the forward hatch.

07 03 13 08 CDR-LM Man, I got one of them off.

07 03 13 09 CC John, verify you locked the forward hatch.

07 03 13 11 CDR-LM The forward hatch is locked.

07 03 13 12 CC Okay.

07 03 13 18 CDR-LM (Laughter) But I don't know - If there's somebody out there that wants to come in - Are you guys pulling my leg, down there? You keep -

07 03 13 30 CC No, we sure don't want anybody to get in.

07 03 13 34 CDR-LM Yeah, that's right. There's 5000 psi on that door. At least. Whew. Verify safety on the dump valve.

07 03 13 51 LMP-LM Okay, it is.

07 03 13 54 CDR-LM The one up top you did?

07 03 13 55 LMP-LM Wait a minute. No, I didn't get that one. Sorry, John. I was looking at the one down below.

07 03 14 00 LMP-LM Okay, it's safe.

07 03 14 02 CDR-LM DESCENT WATER VALVE to OPEN.

07 03 14 03 LMP-LM Okay, it's OPEN.

07 03 14 04 CDR-LM Remove purge valve, stow in purse. Disconnect OPS O₂ hoses.

07 03 14 11 LMP-LM Okay.

07 03 14 17 LMP-LM Huh?

07 03 14 21 CDR-LM Okay. I can't get that, Charlie.

07 03 14 27 LMP-LM I'll get it. You'll get your hands dirty.

07 03 14 32 CDR-LM (Laughter) Before this is over with, those hands are going to be -

07 03 14 41 LMP-LM You know - Oh, it was already open. Had to pull it out. Okay. Safety, DESCENT, we did - Disconnect OPS hoses.

07 03 14 56 CDR-LM Disconnect OPS hoses.

07 03 15 06 LMP-LM That's the wrong one. The wrong one.

07 03 15 12 CDR-LM Quit your complaining, Charlie. Back yet?

07 03 15 16 LMP-LM Okay. Huh?

07 03 15 18 CDR-LM Back yet?

07 03 15 19 LMP-LM Huh? Yeah, that's beautiful. I -

07 03 15 22 CDR-LM Okay, let me get yours - the outboard one here, too.

07 03 15 29 LMP-LM Okay, yours is off.

07 03 15 46 LMP-LM Okay, now we got to get the LM O₂ hoses.

07 03 15 50 CDR-LM Okay, let me get just one water.

07 03 15 52 LMP-LM No, we got to take - see, we got to leave these on and -

07 03 15 57 CDR-LM Okay, you're right.

07 03 15 58 LMP-LM This thing, see?

07 03 15 59 CDR-LM You're right, you're right, you're right.

07 03 16 00 LMP-LM We got to depress right away.

07 03 16 02 CDR-LM Okay.

07 03 16 16 LMP-LM And in locked?

07 03 16 19 CDR-LM It'd be a miracle if I can get that -

07 03 16 32 CDR-LM Okay. Got it finally.

07 03 16 34 LMP-LM Routed it under - here, let me get mine off.

07 03 16 54 CDR-LM Okay, let's get everything over here.

07 03 17 00 LMP-LM ...

07 03 17 01 CDR-LM Yeah; excuse me, Charlie.

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07 03 17 02 LMP-LM Okay.

07 03 17 03 CDR-LM Why don't you - Here we go.

07 03 17 09 LMP-LM Those things seem backwards to me, the PLSSs.

07 03 17 11 CDR-LM They sure are.

07 03 17 44 CDR-LM There you go - and they're locked.

07 03 17 48 LMP-LM Okay.

07 03 17 59 CDR-LM They're locked.

07 03 18 00 LMP-LM Okay, SUIT ISOL, both, going to SUIT FLOW. Let me turn the - Hmm, that feels good. Turn the PUMP, OFF, and the FAN, OFF. Okay, disconnect PLSS H₂O from PGA, connect LM H₂O.

07 03 18 20 CDR-LM There goes yours. Okay, your water hose - here it is. That's almost spaghetti.

07 03 18 35 LMP-LM That thing's about 95 feet long, John.

07 03 18 46 CDR-LM Okay, I got it.

07 03 18 47 LMP-LM Okay.

07 03 18 54 CDR-LM Let me get your water.

07 03 18 55 LMP-LM Yeah.

07 03 19 04 CDR-LM That's yours.

07 03 19 05 LMP-LM Mine's right here.

07 03 19 16 CDR-LM Okay.

07 03 19 17 LMP-LM Okay. Disconnect PLSS H₂O from PGA. Connect PLSS mode, both, to off - 0, rather. We open the CBs and connect to LM comm. Okay.

07 03 19 26 CDR-LM Okay.

07 03 19 27 LMP-LM Tony, we're going off comm for a second.

07 03 19 29 CC Okay.

07 03 20 36 CC Okay, and, Charlie, when you get a chance, could you pull that MESA circuit breaker?

07 03 21 10 CDR-LM Okay. Terrible, isn't it? AUDIO circuit breakers, close; SQUELCH, VHF B, LMP noise threshold, plus 1-1/2; AUDIO, CDR and LMP: VHF A to RECEIVE; B to OFF; ICS/PTT.

07 03 21 42 CC And, when you get a chance up there, the MESA circuit breaker, open.

07 03 22 13 LMP-LM Tony, y'all want HI bit rate? Over.

07 03 22 17 CC Stand by 1. Did you catch that about MESA circuit breaker?

07 03 22 27 LMP-LM It is open.

07 03 22 28 CC Okay, good show. No, we can't handle HI bit rate now.

07 03 32 50 LMP-LM Okay, Houston; Orion. We've performed the OPS checkout and they are both good. John's OPS is reading 6000; mine's 6200. Over.

07 03 33 03 CC Okay. We copy that.

07 03 38 35 LMP-LM What are you doing with a - such a mess of spaghetti, there?

07 03 38 44 CDR-LM Cabin's clear.

07 03 38 47 LMP-LM Just for now.

07 03 38 59 LMP-LM Well, we've got to get these return items out of here. Stow in the ISA - big pocket.

07 03 39 17 LMP-LM There's really not anything in there but the shovel.

07 03 39 32 LMP-LM Yeah, I don't think it's necessary to put that in - back in the sack. All they're doing it for is weight - weight. You don't have to assemble it - just - unstow scale, weigh buddy SLSS/rock bag, and collection bags. Then, here we go with the - push the big rock ...

07 03 40 11 LMP-LM 65 pounds max - supposed to be 35 -

07 03 40 30 LMP-LM John. Yeah, number 7.

07 03 40 45 LMP-LM We can get one rock in there, I think.

07 03 40 56 LMP-LM Yeah? One that's been in the shade. Get that one in there, that one will go in, too.

07 03 41 11 LMP-LM That one will go. Try it now. That's all that's in there?

07 03 41 32 LMP-LM Baby rocks. Well, let's call it 40, and see what they say. They'll let us go with that, I'll bet you. Buddy SLSS bag is 40. Bag 7 here.

07 03 41 47 LMP-LM Huh?

07 03 43 23 LMP-LM Houston, Orion. Over.

07 03 43 25 CC Go ahead, Charlie.

07 03 43 30 LMP-LM Okay. We've got some weights for you, if you're ready to copy.

07 03 43 33 CC All set.

07 03 43 37 LMP-LM Okay. The BSLSS rock bag, the big rocks will weigh 40 pounds; bag 7, SCB number 7 is 33; SCB number 4 is 25; SCB number 6 is 20. I get a total out of that of about 118. Over.

07 03 44 01 CC Okay, we concur.

07 03 45 06 CC Okay. We're working those numbers over here.

07 03 45 20 LMP-LM Okay, Tony, we've got a weight saver for you. The ISA only weighs 10.

07 03 45 26 CC Okay. ISA weighs 10.

07 03 45 29 LMP-LM Actually, it weighs 8 pounds.

07 03 45 31 CC Okay, 8.

07 03 45 33 LMP-LM Make that 8.

07 03 49 52 CC Hey, fellows, you have 245 pounds of rocks. That's not including the weights or the SRCs.

07 03 50 05 CDR-IM Okay, has some got to go back?

07 03 50 09 CC No, I think we're going to be able to find a way. You got an in-plane launch, so things look pretty good. But we're working it here.

07 03 50 20 CC Probably have to throw that big one away, John.

07 03 50 22 CDR-IM Okay, we're getting - we're getting to the point where we got to know - Say again?

07 03 50 29 CC We'll probably have to throw away that big one.

07 03 50 39 CDR-IM Okay.

07 03 50 43 IMP-IM Well, we don't want to throw away any - any that don't need to be thrown away. That's for sure.

07 03 50 54 CDR-IM I tell you, there's a couple more tons up here we missed.

07 03 51 02 CC Say again, John.

07 03 51 07 CDR-IM I say, there's a couple of tons up here that we didn't pick up.

07 03 53 11 CC Okay, Dynamics, thank you very much.

07 03 56 14 CDR-IM Houston, we're about to the point we're thinking about the jettison bag.

07 03 56 19 CC I'm sorry, Charlie - John, say again?

07 03 56 25 CDR-IM Roger. We're ready to try for jett bag.

07 03 56 28 CC Okay. We're still trying to get a decision on these rocks down here, if you could hold on l.

07 03 56 38 CDR-IM Don't want to miss the launch. I'm just kidding. Take - take as long as you need to. ... however long that is.

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07 03 57 08 CDR-LM Tony, if it helps you out, this morning we jet-
tisoned the CWGs, the LCGs, all of the sleep
restraints, everything like that. That was a
pretty big bag.

07 03 57 20 CC Okay.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

07 02 52 XX BEGIN LUNAR REV 50

07 03 04 58 CMP Hello, Houston.

07 03 05 00 CC Hello, Casper. How's it going?

07 03 05 05 CMP Oh, we're still here. Done all our chores. Got
your SIM bay buttoned up. We're in couples; and,
in lieu of anything else, I just switched to WIDE
DEAD BAND just - because it didn't seem like there
was any reason not to.

07 03 05 24 CC Okay.

07 03 05 35 CMP I understand from your comment last time, Hank,
that there are no other activities tentatively
scheduled until the rendezvous sequence starts, so
I can go ahead and start stowing things and getting
set up for that in the next ...

07 03 05 54 CC Roger, Ken. The only thing scheduled is that P52
about an hour from now.

07 03 06 02 CMP Okay. And I got you a P52 on the last pass if
that'll help. And I used starts 27 and 31, and
the torquing angles were plus 0.108, plus 0.061,
plus 0.001, and I torqued that at time 170:59:30.

07 03 06 29 CC Roger, copy. Okay, you can delete the P52 an hour
from now, then.

07 03 06 40 CMP Okay, thank you.

07 03 06 54 CMP And the plan is still to do the nominal rendezvous sequence up through bringing some of the basic equipment over, and then power down, and we'll jettison the LM tomorrow. Is that correct?

07 03 07 11 CC That's affirmative, Ken. That's still the plan.

07 03 07 18 CMP Okay.

07 03 07 33 CC Casper, Houston. We're riding right at the edge of the high gain scan limit; we would like for you to roll left 15 degrees.

07 03 07 43 CMP Okay. Roll left 15.

07 03 09 52 CMP Okay, Henry. Is that angle gonna be all right now?

07 03 09 58 CC Roger, Ken. That's good.

07 03 14 51 CC Casper, Houston.

07 03 14 55 CMP Yes, sir.

07 03 14 57 CC I got some updates for you in the Flight Plan, back in table 2-15, the transfer-after-docking table; table number 2-8, page 2-15.

07 03 15 11 CMP Okay, could you just - could you stand by for just a minute?

07 03 15 16 CC Will do.

07 03 15 58 CMP Okay. Where's this now, Hank?

07 03 16 02 CC Roger. In the table, under item number 8.

07 03 16 12 CMP (Chuckle) Well. Tell me the page again.

07 03 16 16 CC Oh, it's page 2-15; it's transfer-after-docking table - table 2-8.

07 03 16 36 CMP Okay.

07 03 16 38 CC Okay; under item 8, where - We want to delete the LCG plugs; the PGA electrical connector covers, and the neckring dust covers. Those three items will be on the suits. And delete the DSEA. They'll take care of that tomorrow.

07 03 17 06 CMP Okay. I take it from that they're coming up unsuited.

07 03 17 17 CC They're gonna take their suits off in the LM, Ken.

07 03 17 23 CMP Oh, I see what you mean. Okay.

07 03 17 26 CC And the - the rest of these deletions are because they'll be taken care of tomorrow, also. Delete item number 12. And on the next page - -

07 03 17 40 CMP Okay.

07 03 17 41 CC - - item number 15, delete the second and third lines. And delete items 26, 27, and 28.

07 03 18 13 CMP Okay. Let's see if I got all that, now. I got - under item 8, delete the LCG plugs, the PGA pocket contents, the neckring dust covers, and the DSEA. I deleted item 12. I deleted the second and third lines of item 15. I deleted number 26, 27, and 28.

07 03 18 37 CC That's affirmative.

07 03 18 42 CMP Okay.

07 03 20 25 CC And, Casper, I have two P24 pads for you, whenever you're ready. The first one is at 173:20, in the Flight - -

07 03 20 34 CMP Okay.

07 03 20 35 CC - - Plan.

07 03 20 39 CMP This is after the numbers have been changed, right?

07 03 20 42 CC That's affirmative.

07 03 20 47 CMP Okay, how far - let me see here how far ahead I need to change the numbers. I better do that right now, so we don't get - at first.

07 03 20 55 CC Okay. That's at the old 169:20.

07 03 21 01 CMP Well, we're gonna - Let's all talk in the - in the real GETs and I'll change my numbers in the book right now.

07 03 21 08 CC Ok. . 173:20.

07 03 21 58 CMP I'll copy those numbers.

07 03 21 59 CC Okay. And all of these are at 173 hours plus, Ken;
so T_1 is 173 plus 15:02, 19:52, 21:32, 22:20; south
10 nautical miles.

07 03 22 26 CMP Okay. And I guess we got another one over here at
173:50.

07 03 22 37 CC That's affirmative. They're all 173 for the first
number. T_1 is 39:18, 44:08, 45:48, 46:36; north
1 nautical mile.

07 03 23 02 CMP Okay. For Descartes, 173:39:18, 44:08, 45:48,
46:36, north 1. F-1, 173:15:02, 19:52, 21:32,
22 - that's 22:20 for T_3 , and south 10.

07 03 23 28 CC Good readback, Ken.

07 03 26 33 CC Casper, Houston. For your planning, I don't know
whether it's been passed up or not, but no TV for
rendezvous or docking.

07 03 26 44 CMP Oh, okay. No, I hadn't gotten that.

07 03 27 03 CC The reason for that, Ken, is that the - the tele-
vision interferes with the LM comm. They've been
having a comm problem there with their steerable.

07 03 27 14 CMP Okay. Well, that's one less big item to not have
to unstow.

07 03 30 11 CC Casper, Houston. While you're working there, I'll
just read you part of a little note I got from
Farcuk in the backroom. He says that "We feel that
your descriptions of the visual targets have been
very accurate and extremely significant." Also,
concerning your comments on the site, the traverse-
planning troops were very happy to have them, and
many of your comments were taken into consideration
in planning EVAs 2 and 3.

07 03 30 42 CMP Thank you. That's awfully kind.

07 03 36 28 CMP Hey, Hank.

07 03 36 30 CC Go ahead.

07 03 36 34 CMP How about giving me a call about 5 minutes before we pass over the landing site and about 5 minutes before we hit the Rhiphaeus Mountains.

07 03 36 47 CC Will do.

07 03 37 38 CC Ken, I think you just passed the landing site.

07 03 37 43 CMP Oh. Okay. Well, better luck next time. How about the Rhiphaeus Mountains, then?

07 03 37 50 CC Okay. I'll give you a call 5 minutes prior.

07 03 43 33 CC Casper, Houston. You're approximately 5 minutes from the mountains.

07 03 43 40 CMP Okay. Thank you very much.

07 03 48 50 CMP Sorry about that.

07 03 49 05 CC What's that you're sorry about, Ken?

07 03 49 12 CMP Oh, the camera got the Velcro on the lip mike and caught it in the Velcro on the back of the camera. I thought it was probably making a lot of noise at you.

07 03 49 22 CC We could hear the camera cycling.

07 04 01 16 CMP Hank, before I throw out the electrophoresis, I'd like to verify that's still the intention.

07 04 01 22 CC Okay. I'll have them check on it.

07 04 02 09 CC That's still in the plan, Ken.

07 04 02 13 CMP Okay.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 04 05 59 CC Okay, Orion. We're go with the rocks you've got.

07 04 06 07 CDR-LM Outstanding! Thank you very much. Okay. We're going to press on with the old integrity check now.

07 04 06 55 LMP-LM Hey, Tony. We're on VOX. How do you read?

07 04 06 56 CC Five by, Charlie.

07 04 07 01 LMP-LM Okay. Just donning our gloves, now.

07 04 07 05 CC Okay.

07 04 07 23 CDR-LM Got it.

07 04 08 10 CDR-LM Nope ...

07 04 08 23 CDR-LM It feels like it snaps at the bottom.

07 04 08 28 LMP-LM ...

07 04 08 48 LMP-LM Twist it over ... Try to hook it and ... Material caught or something. Take my hat off slowly.

07 04 09 07 CDR-LM Huh?

07 04 09 08 LMP-LM Go - Let's try it.

07 04 09 17 LMP-LM That sounded like it was gonna go.

07 04 09 19 CDR-LM I - I'm - I'm sure I went last time.

07 04 09 44 CDR-LM Take your hat off before you - -

07 04 09 46 LMP-LM Yeah.

07 04 09 48 CDR-LM - - I'll -

07 04 09 50 LMP-LM I'll do it. You're all suited up. Let me -

07 04 09 54 CDR-LM ... Push the button. Now hold that down.

07 04 10 57 CDR-LM Okay.

07 04 10 58 LMP-LM Okay, Houston - Give me a towel.

07 04 10 59 CDR-LM ... 4 versus -

07 04 11 09 LMP-LM ...

07 04 11 19 CC Say that again, Charlie, please.

07 04 11 24 MS ...

07 04 11 25 CDR-LM Go ahead.

07 04 11 28 LMP-LM We've got a problem with the connectors to - to the suit fittings. We're going to have to take them off, and blow the dirt out of them ... so we can get them open and closed.

07 04 11 38 CC Okay, we copy.

07 04 11 40 LMP-LM We'll have to take our helmets off to do that.

07 04 12 32 CDR-LM ...

07 04 12 50 CDR-LM ... Okay. There we go.

07 04 13 02 LMP-LM Okay, got it.

07 04 13 32 LMP-LM Hey. Yeah, there we go. I'm locked up. Okay. We got it, Tony. And we're ready for the pressure integrity check.

07 04 13 41 CC Okay, good show.

07 04 13 49 CDR-LM Here, let me read it to you.

07 04 13 50 LMP-LM Starting right in here.

07 04 13 51 CDR-LM GAS DIVERTER, PULL to EGRESS. Verify.

07 04 13 52 LMP-LM Go ahead.

07 04 13 55 CDR-LM CABIN GAS RETURN to EGRESS. Verify.

07 04 13 58 LMP-LM Go ahead.

07 04 13 59 CDR-LM CIRCUIT RELIEF, CLOSE.

07 04 14 00 LMP-LM Go ahead.

07 04 14 01 CDR-LM PRESS REG A to EGRESS.

07 04 14 02 LMP-LM Go ahead.

07 04 14 03 CDR-LM PRESS REG B DIRECT O₂.

07 04 14 05 LMP-LM Okay, going up.

07 04 14 06 CDR-LM Monitor cuff gage 3.7 to 4.0. PRESS REG B, EGRESS.

07 04 15 13 LMP-LM ... 3.5.

07 04 15 16 CDR-LM Okay, Charlie. PRESS REG B to - -

07 04 15 19 LMP-LM Okay, going to EGRESS. Okay?

07 04 15 23 CDR-LM Yeah. Monitor cuff gage for 1 minute.

07 04 15 25 LMP-LM Okay. Give us a mark, Tony, when - -

07 04 15 27 CC Okay, will do.

07 04 15 30 CDR-LM ... clock.

07 04 15 43 CDR-LM This ...

07 04 15 45 LMP-LM (Laughter) Mine is too ... 0.05. It's amazing.

07 04 16 22 CC Okay, Orion -

07 04 16 23 CC MARK.

07 04 16 28 LMP-LM Okay, mine went down about 1.15. Okay - -

07 04 16 33 CDR-LM Okay, Houston. Mine went down about 0.15.

07 04 16 40 LMP-LM CIRCUIT RELIEF's going AUTO.

07 04 16 41 CDR-LM Okay.

07 04 16 43 LMP-LM We're coming down.

07 04 16 53 CC Okay.

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07 04 17 06 CDR-LM ... read in that book.

07 04 17 14 LMP-LM What does it say to do, John? It's up here.

07 04 17 18 CDR-LM I don't know.

07 04 17 20 CC Okay, and when you're ready, you're GO for DEPRESS.

07 04 17 25 LMP-LM Roger.

07 04 17 47 CDR-LM Okay. We're GO for DEPRESS, Charlie.

07 04 17 50 LMP-LM Okay.

07 04 17 53 CDR-LM Circuit breakers, 16.

07 04 17 56 LMP-LM Check.

07 04 17 58 CDR-LM CABIN REPRESS, open.

07 04 18 00 LMP-LM Okay, it's open.

07 04 18 01 CDR-LM Overhead or forward dump valve, OPEN, then AUTO.

07 04 18 04 LMP-LM Okay, I - I'm getting - -

07 04 18 05 CDR-LM ... ought to do it.

07 04 18 15 CDR-LM OPEN, then AUTO at 3 and a half. Can you hear me okay? Keeps missing a little bit.

07 04 18 19 LMP-LM Yeah.

07 04 18 20 CDR-LM ...

07 04 18 23 LMP-LM ... There, it is AUTO.

07 04 18 26 CDR-LM AUTO.

07 04 18 27 LMP-LM Okay. OPEN?

07 04 18 28 CDR-LM Yeah.

07 04 18 29 LMP-LM Coming down.

07 04 18 30 CDR-LM AUTO at 3.5.

07 04 18 31 LMP-LM Give me a hack.
07 04 18 33 CDR-LM Okay; 3.9, 3.8, 3.5.
07 04 18 35 LMP-LM Okay, closed.
07 04 18 38 CDR-LM Okay. Pressure looked up at 11. Okay.

07 04 18 53 LMP-LM Look at it for a minute.
07 04 18 54 CDR-LM Yeah, let's look at that one. Hold off here ...
07 04 19 06 LMP-LM Okay. Why don't we go ahead and get - okay, here we go. Coming OPEN.
07 04 19 09 CDR-LM Okay, ... for depress.
07 04 19 13 CC Okay.
07 04 19 42 LMP-LM There's 1 pound, John.
07 04 19 59 CDR-LM Huh?
07 04 20 29 LMP-LM Get down to a 10. Why don't you try it there, John?
07 04 20 45 CDR-LM Well, wait a minute, darn it.
07 04 20 46 LMP-LM (Laughter) Okay.
07 04 21 08 CDR-LM They go?
07 04 21 09 LMP-LM Yeah.
07 04 21 10 CDR-LM All right. Go out, Charlie.
07 04 21 15 LMP-LM Okay. Wait a minute. Let me go AUTO on the ...
Okay, it is in AUTO.
07 04 21 24 CDR-LM Okay. Valve to AUTO. Hatch still open.
07 04 21 28 LMP-LM Still open.

07 04 21 51 CDR-LM Kick.

07 04 21 53 LMP-LM Got it. Clear. For the ground.

07 04 22 03 LMP-LM All right, John Young.

07 04 22 05 CDR-LM Heck.

07 04 22 09 LMP-LM You do this right. You kicked that one plum off the step.

07 04 22 23 CDR-LM ...

07 04 22 24 LMP-LM It does. All clear, John.

07 04 22 33 CDR-LM Okay, jettison the following: PLSS, PLSS, ISS. They clear? Close and lock the hatch.

07 04 22 42 LMP-LM Jettison complete, Tony.

07 04 22 44 CC Okay, we copy that.

07 04 22 53 LMP-LM Hatch is closed and locked, Houston.

07 04 22 56 LMP-LM Okay. I'm gonna go AUTO - valve to AUTO. REPRESS is gonna go AUTO ... Here we go. Circuit breaker's coming in. MA, cabin light.

07 04 23 12 CDR-LM PRESS REG A and B to CABIN, Charlie. Cabin pressure's increasing.

07 04 23 17 LMP-LM When it starts increasing?

07 04 23 19 CDR-LM ...

07 04 23 21 LMP-LM Huh?

07 04 23 22 CDR-LM Verify cabin pressure's increasing.

07 04 23 24 LMP-LM It is. Then CABIN?

07 04 24 24 LMP-LM It's good.

07 04 24 26 CDR-LM ... and verify it's stable at 4.6 to 5.

07 04 24 33 LMP-LM CABIN REPRESS, off. Cabin's still coming on up. It is 4.6.

07 04 24 38 LMP-LM Doff gloves, stow on the comm panel. Doff helmets with visors, lower shades, stow in helmet bags. Verify safety on dump valve. Verify that first. I'll get it.

07 04 24 55 LMP-LM Eight.

07 04 25 25 LMP-LM Now?

07 04 26 06 CDR-LM Move that thing there. Now, press.

07 04 26 25 CDR-LM Okay, now.

07 04 26 40 LMP-LM Same problem I've got. Here, let me help you.

07 04 27 27 LMP-LM Try mine.

07 04 28 06 LMP-LM Feels gluey - like it's got something on them. Seen that before.

07 04 28 32 LMP-LM That's on the heater, I think.

07 04 28 38 CDR-LM What?

07 04 28 39 LMP-LM Huh?

07 04 28 40 CDR-LM What?

07 04 28 54 CDR-LM We've got to move those things.

07 04 28 57 LMP-LM I have no where to move them.

07 04 28 59 CDR-LM Hope you find something ...

07 04 29 25 CDR-LM Hurts, Charlie.

07 04 29 31 LMP-LM Huh?

07 04 29 54 CDR-LM That's how far it opens, isn't it?

07 04 29 56 LMP-LM Yes.

07 04 30 06 CDR-LM Try again.

07 04 30 16 LMP-LM Oh, do you know what it was? Orange juice - orange juice. Yours is the same way..

07 04 30 29 CDR-LM Get those bags out of there.

07 04 30 31 LMP-LM Okay, Houston. Do you read us? Over.

07 04 30 35 CC Yeah, we read you fine, Charlie.

07 04 30 40 LMP-LM Okay. We had one heck of a time getting our helmets off. It turns out that this orange juice is the best cement you've ever seen. It seeped down in between the seals and the helmet and the ring, and we couldn't get the thing unlocked without a great effort, but we managed - We're both out now.

07 04 31 04 CC Well, we may have a new market for orange juice - glue.

07 04 31 09 LMP-LM Yeah, we'll clean them off before we redock here.

07 04 31 14 CC Okay.

07 04 31 16 LMP-LM Okay. Verify safety - Okay, we've got to stow those helmets - we've got to stow those helmets - helmet bags. I want to clean mine off first though. I need it really. Okay, Tony. We're going to go out ... PTT. It'll be about 10 minutes cleaning up these helmets.

07 04 31 37 CC Okay.

07 04 36 01 CC And, Orion; Houston. We have your bag stowage whenever you want it.

07 04 36 12 LMP-LM Okay. Thank you, Tony. I don't - I'm afraid ... yet.

07 04 36 17 CC Okay.

07 04 38 33 LMP-LM Okay, Houston. We're going through the Surface Checklist.

07 04 38 40 CC Okay.

07 04 41 24 CDR-LM Okay, Houston. The PRD reading - Charlie, 2112 - 2 - 29. And, mine is 22060.

07 04 41 38 CC Okay. I missed Charlie's. Say that one again, please?

07 04 41 45 CDR-LM 21129.

07 04 41 47 CC Okay; 21129 and 22060.
(NO COMM FOR 18 MINUTES)

07 05 00 27 LMP-LM Okay, Tony. Orion here. We've got the SCBs in the sample containment bags; 7 is in 7, 6 is in 6, 4 is in 8. Over.

07 05 00 42 CC Roger. Jim's on now, Charlie. Give me those bag numbers again. And we have some information for that weight summary for you.

07 05 00 54 LMP-LM Okay. SCB-7 is in sample containment 7. SCB-6 is in sample containment 6. SCB-4 is in sample containment 8. Over.

07 05 01 09 CC Okay. And I have some information for the bottom of the collection bag stowage if you don't have that information.

07 05 01 19 LMP-LM No, we don't. Go ahead.

07 05 01 21 CC Okay. We want bag 7, of course, in cover 7. Next line, bag 4, and then the next line there is bag 5 in the RHSSC, bag 4 in the LHSSC and cover 8. The next line is 3 and then 6 in cover 6. Over.

07 05 01 57 LMP-LM Boy, you lost me, Jim. Give me the sample containment bag numbers. That's all I need.

07 05 02 06 CC Okay. It's a summary on the collection bag stowage down below. In those blanks, the first blank is - -

07 05 02 14 LMP-LM Roger.

07 05 02 15 CC - - bag 7. The next line there is bag 4. The next line there, we want number 5 in the right-hand side. Number 8, in the left-hand side. And the next line down, we have two blanks - it's 3 and 6. Over.

07 05 02 41 LMP-LM Okay, got you. Line 1 is bag 7. Line 2 is bag 4. Line 2 - line 3 is bag 5, right-hand side; 8, left-hand side. The DISA [?] is 3 and 6.

07 05 02 55 CC That's right.

07 05 04 22 CC Orion, this is Houston.

07 05 04 30 LMP-LM Go ahead, Jim.

07 05 04 31 CC Just a reminder. We'd like you to get the LGC IMU powered up. Should have had that done about 15 minutes ago. That's page 7-9.

07 05 04 57 CDR-LM Okay, that's in work.

07 05 07 43 CC Orion, let's go HIGH BIT RATE.

07 05 07 46 LMP-LM Okay, Houston - okay, Houston. We're running the computer check now.

07 05 08 30 CC Okay, Orion; this is Houston.

07 05 08 36 LMP-LM Go ahead, Jim.

07 05 08 37 CC Roger. For your reference, if you can just add 4 hours to all the times listed in your checklist there, you will be very close - within 1 minute - for your timing purposes.

07 05 08 52 LMP-LM Okay. Just as soon as we get a clock running, we'll be more than happy to do that.

07 05 08 59 CC Okay. The only thing we're anxious to have you do now is the LGC IMU powerup.

07 05 09 07 LMP-LM That's in work.

07 05 09 08 CC Roger.

07 05 09 13 LMP-LM Okay. You want your E-memory dump?

07 05 09 16 CC Stand by. We don't have data yet - so stand by.

07 05 09 36 LMP-LM Okay. The computer test is successful. And we're holding for your dump.

07 05 09 45 CC Okay. We're standing by until we get data.

07 05 09 50 LMP-LM Okay.

07 05 10 42 LMP-LM You must have a big dish of some kind. You're clear as a bell.

07 05 11 55 CDR-LM Hey, Jim. Don't - don't feel - We don't have any idea what time it is. Be our guest on helping us out - Where we should be in the time line.

07 05 12 07 CC Okay. We're at about 173:23, and we're ready for your E-memory dump.

07 05 12 19 CDR-LM On the way.

07 05 13 32 CC Okay. If you'll go to DATA, we'll send an up-link.

07 05 13 42 LMP-LM You have it.

07 05 13 44 CC Roger.

07 05 14 45 CC And, Orion; this is Houston. I have some changes to your - the range and range rate after insertion whenever y'all want to copy it.

07 05 15 01 LMP-LM That's for the Timeline Book? Right, Jim?

07 05 15 06 CC Yeah, that's the first portion there - you know, after insertion - that little square or box up on the left-hand corner?

07 05 15 16 LMP-LM Yeah, know it well.

07 05 16 05 LMP-LM Okay, Jim, go ahead.

07 05 16 07 CC Okay, at insertion. I'll read range and then range rate. Insertion, 171.0, minus 492. At 1 minute, 166, minus 490; 2 minutes, 161, minus 486; 3 minutes, 156, minus 482; 4 minutes, 152, minus 478; 5 minutes, 147, minus 472; 6 minutes, 142, minus 467; 7 minutes, 138, minus 461; 8 minutes, 133, minus 454; 9 minutes, 129, minus 447; 10 minutes, 124, minus 439; and at TPI minus 10 minutes, should be 44, and minus 155. Over.

07 05 17 42 LMP-LM Okay, we copy - starting at insertion, 171, minus 492; 166, minus 490; 161, minus 486; 156, minus 482; 152, minus 478; 147, minus 472; 142, minus 467; 138, minus 461; 133, minus 454; 129, minus 447; 124, minus 439; TPI minus 10, 44, minus 155.

07 05 18 15 CC Good readback, Charlie.

07 05 20 12 CC Okay, Orion. The computer is yours.

07 05 20 24 LMP-LM Okay. Boy, that's nice. That's the first time in 3 days we've known what time it is. 153:30:22.4, huh?

07 05 20 42 CC Roger. We're glad to see you guys get on time. You've done pretty good without a clock.

07 05 21 07 CC Okay, Orion. This is Houston. I have the lift-off time for your P57.

07 05 21 23 CDR-LM Okay. Just a second, Jim.

07 05 21 25 CC Okay.

07 05 21 37 CDR-LM Okay, go ahead with it.

07 05 21 38 CC Okay. Lift-off time, 175:43:35.18. Over.

07 05 21 52 CDR-LM 175:43:35.18.

07 05 21 56 CC Good readback.

07 05 22 29 CC And, Orion, we're just standing by for your P57.

07 05 22 38 LMP-LM Okay. Is that a good T_{ephem}?

07 05 22 41 CC Stand by.

07 05 22 48 CC Okay. T_{ephem} looks good.

07 05 22 51 LMP-LM Okay.

07 05 28 44 CC Orion, this is Houston. Casper is going to try a VHF check here shortly.

07 05 28 52 CDR-LM Okay. Okay, we're on VHF A to RECEIVE.

07 05 29 02 CC Roger.

07 05 29 10 CDR-LM Is he - is he on A SIMPLEX, Jim?

07 05 29 14 CC Stand by.

07 05 30 06 CC Okay, John. The configuration for - -

07 05 30 08 CDR-LM - - guys copy those angles?

07 05 30 12 CC Stand by.

07 05 30 14 CC Casper's trying to call you now. And the configuration is on 7-12, on your checklist.

07 05 30 35 CC Okay, we copied the angle.

07 05 30 41 CDR-LM Okay, Casper. This is Orion. How do you read? Over.

07 05 30 47 CC Okay, Orion. Casper is reading you.

07 05 31 04 CDR-LM Okay, I'm not reading him.

07 05 31 12 CC Orion, verify that your B RECEIVER's ON.

07 05 31 26 CDR-LM Okay, Casper. How do you read? Over.

07 05 31 35 CDR-LM Roger. We read you 5 by, Ken. With a little squeal.

07 05 31 46 LMP-LM How's things up there?

07 05 31 52 CDR-LM Good show.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

07 04 03 27 CC Casper, Houston. I know you're gonna love these words, but I got one more Flight Plan change.

07 04 03 38 CMP (Laughter) Okay. Hang on a second and I'll be with you. Let me get things tied down. Well, it looks like that last - last month of training was well worthwhile.

07 04 04 54 CMP Okay, Hank. Read away.

07 04 04 56 CC Okay. First one is at 173:50.

07 04 05 09 CMP Okay.

07 04 05 19 CMP Go ahead.

07 04 05 25 CC Okay. At - Does it say something there about a VERB 49 maneuver to a P52 COAS cal? That's after that. 173:55. Want to change that attitude to 180, 255, 357?

07 04 05 44 CMP Okay, that COAS cal attitude will be 180, 255, 357.

07 04 05 49 CC Roger. And the high gain angles are minus 75, 249.

07 04 06 00 CMP Okay. Minus 75 and 249.

07 04 06 03 CC Okay. Next page, 174:09; delete the configure for urine jump - dump, and the H₂ purge line heaters on.

07 04 06 17 CMP Okay.

07 04 06 18 CC Same page, at the bottom, 174:28. Delete the fuel cell purge and the dumps.

07 04 06 30 CMP Okay, that's done.

07 04 06 32 CC Next page at 174:36, starting with CM4 TV bracket. Delete all through don PGA.

07 04 06 53 CMP Okay. I ought to be well ahead by then. If you'd like for me to wear the suit, why, it's no problem. I'm not requesting to wear it, but if you'd like for me to, why, it's no sweat.

07 04 07 07 CC Not required, Ken. That takes some time out after the docking, Ken. That helps that time line.

07 04 07 24 CMP Okay. Anything there is a big help.

07 04 07 26 CC Okay. At 175:13.

07 04 07 29 CMP Okay. I got those deletions. Go ahead.

07 04 07 34 CC At AOS, we want to change the angles there to minus 75, 249; and put these REACQ and WIDE. And this REACQ and WIDE's gonna help the LM comm.

07 04 07 52 CMP Okay.

07 04 07 54 CC At 177:19 -

07 04 08 06 CMP Say again the time?

07 04 08 08 CC 177:19.

07 04 08 20 CMP Okay.

07 04 08 21 CC Delete TV, on. And anywhere else in there you run across that TV, just delete it.

07 04 08 32 CMP All righty.

07 04 08 33 CC And the last change is at 178 hours, at the top of the page.

07 04 08 45 CMP Okay.

07 04 08 46 CC P20, option 5, minus-X forward SIM bay attitude. I'll get you your dead band on that in a second. Following that, "ALPHA PARTICLE/X-RAY COVER, OPEN. ALPHA PARTICLE, OK - - "

07 04 09 10 CMP Hey, you give me minus-X - Start that whole P20 thing again, Hank.

07 04 09 20 CC Okay. It's P20, option 5, minus-X forward. That's the SIM bay attitude.

07 04 09 27 CMP Okay. And do you say you do not have a dead band yet?

07 04 09 33 CC Three degrees.

07 04 09 38 CMP Say again?

07 04 09 40 CC NOUN 79 will be a 3-degree dead band.

07 04 09 45 CMP Okay.

07 04 09 47 CC Okay. "ALPHA PARTICLE/X-RAY COVER, OPEN. ALPHA PARTICLE experiment, ALPHA ON. X-RAY, ON. GAMMA RAY, DEPLOY. MASS SPEC, DEPLOY." And after the MASS SPEC is DEPLOYED, "MASS SPEC EXPERIMENT, ON. ION SOURCE, STANDBY."

07 04 10 33 CMP Okay. Got all that. P20, option 5, minus-X; 3-degree dead band; the ALPHA door comes OPEN; the ALPHA comes ON; the X-RAY comes ON; the GAMMA goes out; the MASS SPEC goes to DEPLOY; the MASS SPEC EXPERIMENT comes ON when it is DEPLOYED; and ION SOURCE to STANDBY.

07 04 10 49 CC That's a good readback, Ken. That should take you on up past rendezvous and docking.

07 04 10 56 CMP (Laughter) You care to have a little friendly wager?

07 04 11 07 CC Negative, because I just got another change. If you'll flip back a page to the 177:55?

07 04 11 17 CMP (Laughter) Okay, go ahead.

07 04 11 22 CC Want to delete the VERB 49 maneuver to LM jets since we're not doing that tonight.

07 04 11 32 CMP Okay.

07 04 11 38 CC And that's about revision U - Uniform; I'll have Victor for you here shortly, probably.

07 04 11 49 CMP Okay, no sweat. Whenever you get it, give me a call. Meanwhile, I'll be picking up toys here.

07 04 12 18 CC Casper, you're looking good going around the hill, and INCO has your recorder.

07 04 12 26 CMP Okay. Thank you very much. I'll see you in a few minutes.

07 04 50 XX BEGIN LUNAR REV 51

07 05 03 07 CMP Hello, Houston. Do you read?

07 05 03 13 CC Casper, Houston. Reading you weak and noisy.

07 05 03 45 CMP Hello, Houston. Do you read?

07 05 03 47 CC Casper, Houston. I'm reading you very weak with lots of noise. Over.

07 05 04 11 CC Casper, OMNI Delta.

07 05 04 44 CMP Houston, do you read Casper?

07 05 04 48 CC Casper, Houston. Reading you very weak. If you read, go OMNI Delta.

07 05 06 20 CMP Houston, can you read Casper? Over.

07 05 06 26 CC Casper, Houston. How do you read?

07 05 07 00 CC Casper, DAC on.

07 05 07 46 CMP Houston, how do you read Casper?

07 05 07 48 CC Casper, Houston. Reading you very weak. Coming up on 10 seconds to T-2.

07 05 11 02 CC Casper, OMNI Delta.

07 05 11 15 CMP Okay. How about that one?

07 05 11 17 CC Hey, a lot better now, Ken. We had a bad antenna, I guess, on this acquisition. The mark should have gone on the tape recorder, though.

07 05 11 31 CMP Okay, I - The tape recorder wasn't running. So I started it on LOW BIT RATE for you.

07 05 11 37 CC Thank you.

07 05 12 38 CC Ken, for your information, the LM is not going to do a P22.

07 05 12 45 CMP Okay, thank you.

07 05 15 04 CC Casper, Houston. It looks like we got a - about 10 minutes here or so that's free. I got Flight Plan change Victor here.

07 05 15 17 CMP (Laughter) Okay. Let me make one quick note on what I marked on there and - on F-1 and I'll - be with you.

07 05 15 31 CC Okay.

07 05 15 32 CMP That's an awfully big target to be marking on. So I picked a little target on the side of it.

07 05 16 14 CMP Okay. I'm ready for change Victor.

07 05 16 18 CC Okay. And for your information, Ken, the stowage for the items transferred from the LM to the CSM will be nominal. First change is at 179:20. And I guess we should have brought that page up to add the 4 hours to.

07 05 16 39 CMP 179:20. I did that. That's 79:20. Go ahead.

07 05 16 51 CC Okay, just to make sure we're at the right place, that's the old 175:20.

07 05 16 58 CMP Yes, sir.

07 05 17 00 CC Okay. At that place - -

07 05 17 02 CMP Big blank area right there.

07 05 17 03 CC Right. At that place put, "On LM request, connect LM/CM umbilical and transfer power to the CSM."

07 05 17 33 CMP Okay. "On LM request, connect the LM/CM umbilicals and transfer power to the LM" at 179:20.

07 05 17 42 CC Roger. At 179:45, "Close LM hatch -

07 05 17 48 CMP And?

07 05 17 52 CC "Hatch installation decal, LM TUNNEL VENT valve to LM/CM DELTA-P; tunnel lights, off."

07 05 18 29 CMP Okay. You want to close the LM hatch, and I take it you want to install the command module hatch.

07 05 18 36 CC That's - -

07 05 18 37 CMP And we'll do a LM/CM DELTA-P for the position, and the tunnel lights off.

07 05 18 44 CC Roger. And delete the update block, the weight block, and the VERB 40 load - VERB 48 load. And right under that, put "MASS SPEC ION SOURCE, ON."

07 05 19 08 CMP Okay. All right, go ahead.

07 05 19 11 CC That's right under where I had the VERB 48. This is 480 hours but - just to get it in there. "MASS SPEC ION SOURCE, CN. VHF AM B, off, center." And begin the eat period.

07 05 19 34 CMP Okay. Now somewhere I need to load the - the LM weight into CS - add it to the CSM weight. Or at least I have the LM weight on there for the DAP. Let's see - Is that already taken care of? You're gonna give me a LM weight sometime earlier. So it will be covered. Okay.

07 05 20 04 CC Okay, that ought to occur right after docking, Ken.

07 05 20 10 CMP Yeah, I got it. Okay.

07 05 20 14 CC Okay. You can start turning pages now, I guess, and we want to - at the old 176, we want to scrub that whole page. Actually, we are gonna scrub everything from 176 on up through 181 up - well, up to 181. So page 176, 176:30, scrub those two columns. On the next page, the 177, the - -

07 05 20 45 CMP You're not gonna want to use them again tomorrow?

07 05 20 48 CC Negative. They say not. Don't scrub them too heavily.

07 05 21 01 CMP Okay. I don't want to copy all that over again tomorrow (laughter).

07 05 21 05 CC At this point, let's just skip over them - -

07 05 21 07 CMP Yeah, we won't do anything ...

07 05 21 17 CC Okay. Anyhow, go on over to 181 hours. And this is the real - -

07 05 21 28 CMP Okay, 181 - -

07 05 21 29 CC - - 181. What it says right there in your Flight Plan. And put LiOH canister change - -

07 05 21 36 CMP Okay, and that's the same for both, huh?

07 05 21 39 CC That's affirmative.

07 05 21 42 CMP LiOH change?

07 05 21 44 CC Roger; 15 into Bravo. Stow 12 in Alfa three.

07 05 21 55 CMP Okay.

07 05 21 57 CC And if you want to write "Hallelujah" or something in there, we're back on the nominal plan again.

07 05 22 05 CMP (Laughter)

07 05 22 09 CC Still in the morning. You notice - -

07 05 22 10 CMP (Laughter) I think that's called a champion event.

07 05 22 12 CC Roger. We just got in there for the rest period.

07 05 22 18 CMP (Laughter) Well, I'm glad you didn't decide to scrub that one.

07 05 22 28 CC And that's it for right now, Ken.

07 05 22 33 CMP (Laughter) Okay. I'll go back and see if I can pick up the - Orion and the landing site.

07 05 22 41 CC Okay.

07 05 23 07 CMP Okay, Hank. One of the things we didn't talk about was I got 509 running now, and I'm gonna turn it off when I finish this next P24. Does that sound right?

07 05 23 18 CC Stand by.

07 05 23 37 CC That's a good plan, Ken.

07 05 27 18 CC Ten seconds to T-2 - T-1.

07 05 27 25 CMP Okay. Thank you.

07 05 28 24 CC Casper, are you gonna do the comm check with the LM?

07 05 28 31 CMP Okay. It has another minute or so.

07 05 29 28 CMP Orion, Casper on Victor Hotel. How do you read? Over.

07 05 30 09 CMP Orion, this is Casper. Over.

07 05 30 23 CC Ken, they should be configured here in just a second.

07 05 30 36 CMP Hello, Orion. You got the combination. Good afternoon.

07 05 30 44 CMP Loud and clear, John.

07 05 31 00 CMP Orion, this is Casper. Reading you loud and clear.

07 05 31 15 CMP Loud and clear, John. How me?

07 05 31 24 CC Casper. DAC on.

07 05 31 29 CMP Loud and clear, John. How me?

07 05 31 42 CMP Okay. You're loud and clear, Charlie.

07 05 31 48 CMP Oh, just fine. Smile, I'm gonna take your picture here in a minute.

07 05 31 59 CC Casper, the DAC should be running.

07 05 32 04 CMP DAC is running.

07 05 32 12 CC And you're coming up on 10 seconds to T-2.

07 05 32 19 CMP Okay.
07 05 32 44 CMP Man, that's hard to see in this sunlight.
07 05 33 19 CMP Okay. On target.
07 05 33 30 CMP In this Sun angle, that Flag and Spook are hard to see until you are right on top of them.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 05 36 54 CDR-LM Houston, how do you like those torquing angles?

07 05 36 59 CC Stand by.

07 05 37 19 CC Okay, we've copied the angles.

07 05 37 32 CDR-LM Okay, ... at 153:49:15.

07 05 37 37 CC Roger.

07 05 38 25 CC Orion, let's go LO bit rate.

07 05 39 48 CC Orion, this is Houston. Verify rendezvous RADAR breakers are closed. For the antenna position.

07 05 39 59 CDR-LM Yeah, it's in work.

07 05 40 00 CC Thank you.

07 05 40 42 CC Orion, this is Houston, with a change for your Surface Checklist.

07 05 40 49 CDR-LM Okay. Go ahead, Houston.

07 05 40 51 CC Okay, it's on page 8-16. We want you to close SYSTEM A MAIN SOV prior to SYSTEM A ASCENT FEED, 2, open. Over.

07 05 41 18 CDR-LM Okay, understand. Say again what page it's on.

07 05 41 25 CC That's 8-16. Just before you open the ASCENT FEEDS, we want you to close SYSTEM A MAIN SOV.

07 05 41 50 CDR-LM Okay, close SYSTEM A SHUTOFF VALVE, just before opening the ASCENT FEEDS.

07 05 41 57 CC Roger.

07 05 42 08 LMP-LM Jim, can you give us some words about MAIN SYSTEM A?

07 05 42 13 CC Stand by, Charlie. We'll get a story for you. In the meantime, perhaps while you're grabbing a bite to eat, I've got a lot of time line book changes, if you'd like to eat while I read them up to you.

07 05 42 31 LMP-LM Could you stand by a minute? We've got a couple of more stowage items to do.

07 05 42 36 CC Okay, just let me know when you're ready.

07 05 43 51 CC And, Orion, I have the ascent pads also, when you all are ready to copy.

07 05 44 06 LMP-LM Okay, Jim, it'll be - you can hold off for 10 minutes or so. I'm - gonna - I'm putting the GPSs on the floor now.

07 05 44 13 CC Okay.

07 05 55 15 LMP-LM Okay, Jim, I'm ready for the ascent pads. Over.

07 05 55 19 CC Okay, Charlie, I'll give you the direct pad first and I'm reading: 175:43:35.18. I'll verify that one. Next line, 5525.2, 0032.0, plus 000.2; plus 37762; minus 76550; plus 58556; plus 57018; plus 0032.0; plus 0397.9; 176:37:52.00; LM weight, 10945; T_{ig} , one rev late, 177:42:06; and the CSM orbit is 65 by 55. Over.

07 05 56 41 LMP-LM That's 55 by 65. Okay, reading back, direct: 175:43:43.18; 5525.2, 0032.0, plus 0000.2; 37762; 36550; 58556; 57018 - and the 053 was a minus 76550 - 231, 57018; 0032.0; 0397.9; 176:37:52.00; LM weight, 10945; CSM orbit 65.0, 55.0; one rev late, 177:42:06. Over.

07 05 57 36 CC Okay, the seconds on T_{ig} is 35.18 and DEDA 53 is minus 76550. Over.

07 05 57 50 LMP-LM Yeah, I got that, minus 76550 and T_{ig} is 43:35.18.

07 05 57 57 CC Good readback. And now I'm ready for the coelliptic. Will you give us HI bit rate first, Charlie?

07 05 58 12 LMP-LM You got it.

07 05 58 14 CC Okay, on the coelliptic: 175:46:09.37; 5523.5, 0039.0, plus 000.2; plus 37762; minus 76550; plus 58519; plus 57018; plus 00390; plus 0404.6; TPI, NA. Over.

07 05 59 07 LMP-LM Okay, copy. 175:46:09.37; 5523.5, 0039.0, 000.2; 37762; minus 76550; 58519; 57018, 0039.0; 0404.6; TPI and the rest is NA.

07 05 59 34 CC Good readback, and here's the P32 CSI pad: 176:44:33.91; 178:37 all zeros; 057.1, plus all zeros; 0404.6, 0517.0; plus 057.1, plus all zeros, plus 001.3. Over.

07 06 00 17 LMP-LM Okay, Jim, I need the NOUN 11 CSI T_{ig} seconds and everything after DELTA-V_Y.

07 06 00 27 CC Okay, NOUN 11 seconds is 33.91. Over.

07 06 00 35 LMP-LM Roger. And start with DELTA-V_Y and read the rest of the pad.

07 06 00 40 CC Okay. Starting at DELTA-V_Y: plus all zeros; 0404.6, 0517.0; plus 057.1, plus all zeros, plus 001.3. Over.

07 06 01 04 LMP-LM Okay, I got it that time. 176:44:33.91; 178:37:00.00; plus 057.1, plus all balls; plus 0404.6, plus 0517.0; plus 057.1, plus all balls, plus 001.3. Over.

07 06 01 28 CC Good readback.

07 06 01 33 LMP-LM Okay, we're ready for the time line update.

07 06 01 36 CC Okay, I'll read it. Most all of these items occur after docking, so if we run into any time problem, why, we'll just break it off and pick it up af - when y'all come around the corner.

07 06 01 52 LMP-LM Okay. Jim, we got all our stuff stowed. We're sitting here getting a bite to eat. And if we can gather, we're at lift-off minus 115 in the checklist.

07 06 02 03 CC Okay. We're showing about 129 here, so you got about 15 minutes if you want to spend that time copying these changes.

07 06 02 14 LMP-LM I'd rather spend it eating. I haven't even started yet. If you can hold off on that.

07 06 02 18 CC Okay, why don't y'all get something to eat. And, Charlie, we can read these things to you real time after docking.

07 06 02 31 LMP-LM That sounds best. Thank you.

07 06 02 39 CDR-LM Yeah, Jim, it doesn't look like - you can't quite do all of that stowage as fast as we planned it. You probably know what I mean.

07 06 03 01 LMP-LM We look pretty presentable now though, Jim. An hour ago, I wouldn't have given two shakes though.

07 06 03 10 CC In other words, you're on time now, and you're all stowed.

07 06 03 16 LMP-LM Yeah, we're all stowed. We're grabbing a quick bite.

07 06 03 21 CC Okay, that's good.

07 06 03 59 CC Okay, Orion, this is Houston with some words on your RCS. At the present source pressure of 1200 psi, you've got 44 percent, system A. If you should lose that pressure - in other words, a blowdown mode, you'll have 38 percent. Over.

07 06 04 17 LMP-LM Right, sounds great. Thank you.

07 06 06 55 LMP-LM Jim, pass on to the backroom that that muley rock weighs 40 pounds.

07 06 07 01 CC Understand, 40 pounds. Hate to tell you, but the backroom has all disappeared.

07 06 07 12 CDR-LM Either that or 140. It was a big rock.

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

07 05 33 19 CM Okay, on target. By this Sun angle, that Flag and Spock are hard to see until you're right on top of them.

07 05 39 15 CC Casper, Houston. We've got a bunch of pads to get up to you. The first one I've got for you is your - a range update, whenever you're ready to copy.

07 05 39 29 CMP A range update.

07 05 39 30 CC Roger. The -- the ranges that you have are a little bit in error. I'd like to give you the correct ones, so that when you compare your ranging, it'll lock more better to you.

07 05 39 46 CMP You mean the nominal ranges in the rendezvous profile?

07 05 39 51 CC That's affirmative, sir.

07 05 39 55 CMP Oh, okay. All righty.

07 05 40 00 CC Okay. Range at insertion should be 171 nautical miles.

07 05 40 15 CMP Okay, that'll be 171. Ready.

07 05 40 20 CC Insertion plus 6 is 142.

07 05 40 31 CMP Okay.

07 05 40 33 CC OMNI Alfa, Casper.

07 05 40 42 CMP You've got it.

07 05 40 43 CC Okay. Insertion plus 9 is 129.

07 05 41 00 CC And insertion plus 12 is 120.

07 05 41 12 CMP Okay, let's see, that's - those aren't the same figures I've got in here, are they?

07 05 41 25 CC They should be about 15 miles different as I understand.

07 05 41 35 CMP Hey, what was the last one you gave me? Insertion plus how much?

07 05 41 39 CC Plus 12. And it was 120.

07 05 41 43 CMP Okay.

07 05 42 02 CMP Okay.

07 05 42 06 CC And I have that big bug-a-boo, the P27 update.

07 05 42 22 CMP Okay, I'm ready to copy.

07 05 42 24 CC Okay. CSM L - Correction, 71; GET, 175:43:30; index, 21; starting with 02, 01501, 00002, 00337, 02513, 00006, 35240, 77727, 75532, 77055, 73120, 61613, 77570, 70222, 51111, 07425. Break, OMNI Bravo.

07 05 44 08 CMP You got it.

07 05 44 10 CC Roger. And starting with 21, 04510. And that's the end of that column. Starting on the next one, LM 71 -

07 05 44 25 CMP Hang on a minute, Hank. Stand by.

07 05 44 51 CMP Okay, Henry, go ahead.

07 05 44 53 CC Okay, starting with LM, vector 71; GET, 175:55:00; index 21; data, 01501, 77775, 00270, 04377, 77662, 70436, 77660, 74724, 67755, 61614, 62362, 55364, 72047, 52342, 07431, 13320. End of read.

07 05 46 30 CMP Okay. Suppose I read it back to you as VERB 71, CSM 175:43:30; 21; 01501, four balls 2, 00337, 02513, four balls 6, 35240, 77727, 75532, 77055, 73120, 61613, 77570, 70222, 51111, 07425, 04510. LM; VERB 71; 175:55:00; 21; 01501, 77775, 00270, 04377, 77662, 70436, 77660, 74724, 5 - Correction, 67755, that's line 12. Starting on line 13, 61614, 62362, 55364, 72047, 52342, 07431, 13320. Over.

07 05 48 00 CC Good readback, Ken.

07 05 48 05 CMP Amazing.

07 05 48 08 CC And if you'll give us ACCEPT and bring up the high gain, we'll get your state vector up.

07 05 51 10 CC Casper, I have a correction to that range update I gave you.

07 05 51 19 CMP Okay. Stand by just a second.

07 05 51 34 CMP Okay. Go ahead.

07 05 51 36 CC Roger. The insertion plus 12 should read 116.

07 05 51 52 CMP Okay. Plus 12 is 116.

07 05 51 55 CC Okay, I owe you a consumables status. Everything's great there. We're nominal. And on the RCS, we're 153 pounds over the redline.

07 05 52 07 CMP Okay.

07 05 52 09 CC And the CSM weight that's stored in the CSM - CMC is okay.

07 05 52 21 CMP All right.

07 05 52 31 CMP You want to give me a hack at the LM weight, or I'll just guess at 5900 again?

07 05 52 41 CC Stand by, Ken.

07 05 53 00 CC LM weight is 5953.

07 05 53 05 CMP Okay, thank you.

07 05 55 18 CC Casper, you can terminate the BAI B charge now.

07 05 55 24 CMP Okay. Battery B charge is off.

07 05 56 03 CC Casper, the computer's yours.

07 05 56 09 CMP Okay, thank you.

07 05 58 04 CC Casper, I have an ascent pad for you.

07 05 58 09 CMP Okay, stand by.

07 06 00 01 CMP Okay. You got the numbers?

07 06 00 18 CC We got the angles, Ken. Torque them.

07 06 00 35 CC You copy, Casper? You're clear to torque?

07 06 00 41 CMP Roger. Torqued.

07 06 02 04 CMP Hey, Hank. Do we have enough time to let me take a look at this COAS star, or do you want to get your pad first?

07 06 02 15 CC Okay, we've got about 10 minutes to LOS.

07 06 02 22 CMP Okay, Ed. We're in good shape then, because the star is right here.

07 06 02 25 CC Okay. Why don't you press ahead with the COAS?

07 06 02 28 CMP Okay. All righty. I'll be done with it in just a jiffy.

07 06 04 06 CMP That's pretty close, isn't it?

07 06 04 10 CC Roger.

07 06 04 11 CMP Okay, I'm ready to copy your pad.

07 06 04 16 CC Okay. Direct ascent first.

07 06 04 22 CMP Okay.

07 06 04 25 CC T_{ig} is at 175:43:35.18; NOUN 37, 176:37:52.00.
Coelliptic: lift-off, 175:46:09.37; NOUN 11, 176:44:33.91; NOUN 37, 178:37 all zips.

07 06 05 24 CMP Okay, direct lift-off: 175:43:35.18; TPI, 176:37:52.00. Coelliptic pad: lift-off, 175:46:09.37; CSI, 176:44:33.91; TPI, 178:37:00.00.

07 06 05 50 CC Good readback, Ken.

07 06 07 42 CC Hey, Casper. You better stand by for a load. John and Charlie are bringing 271 pounds of rocks.

07 06 07 50 CMP (Laughter) Outstanding.

07 06 09 57 CC Casper, Houston. About 3 minutes from LOS. Everything looks good here.

07 06 10 04 CMP Okay. See you next time around.
07 06 10 09 CC Roger.

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

07 06 12 37 CC Orion, this is Houston. I have a basic plan here for postdocking that y'all can listen to while you're eating.

07 06 12 49 CDR-LM Okay, Jim. Go ahead.

07 06 12 51 CC Okay, number 1 is you'll doff suits in the LM. Item 2 is postpone some of the LM transfer until postsleep. Of course, the changes that I'll read up to you will take care of some of that. Then item 3 is we'll power down the LM and dry out the water boiler. Item 4: be ready to close out the LM at 179:20; that's AOS plus 10 minutes, the next pass after docking. Then item 5: you'll reenter the LM tomorrow and transfer completion and LM jettison. Item 6: you will need the LM Timeline Book and LM Contingency Checklist at docking to accomplish deactivation. Over.

07 06 13 56 CDR-LM Okay, understand.

07 06 13 58 CC Okay, and at AOS there, we have about 25 minutes to read you the changes if we don't get them to you while you're on the surface.

07 06 14 14 CDR-LM Okay.

07 06 14 44 LMP-LM Okay, Jim, we're starting in on our launch prep.

07 06 14 48 CC Roger. Understand launch prep.

07 06 17 41 CC Orion, this is Houston. When you power up AGS, we have a couple of more quantities that we'll be asking you to read out for verification.

07 06 17 58 LMP-LM Okay.

07 06 21 56 LMP-LM Okay, Jim, I've got the AGS up. I'm at 7 - on page 8-4.

07 06 22 04 CC Okay, we see it. Before you do the 400 plus 6 at the bottom of the page, we'd like you to read out address 537 and 640.

07 06 22 24 LMP-LM Okay, 537 is minus 77752.

07 06 22 29 CC That's good.

07 06 22 30 LMP-LM And give me the other one?

07 06 22 32 CC 640.

07 06 22 40 LMP-LM 640 is plus 00004.

07 06 22 44 CC Roger. That's a good entry.

07 06 23 00 CDR-LM Okay, Houston. ... for the temperature is reading 95. Want to go ahead and do the radar test?

07 06 23 06 CC Stand by. Roger. Let's go ahead.

07 06 23 29 CDR-LM Okay, you got 1.4 on the AGC, transmitter power is 3.4, shaft error is 2.1 to 2.65, trunnion error is 2.2 to 2.65.

07 06 24 49 CC Orion, this is Houston with a late change to your time line at T_{ig} minus 2.

07 06 25 00 LMP-LM Okay, go ahead.

07 06 25 02 CC Roger. We want you to eliminate the line there "AUDIO MODE to VOX." We want you to say - stay ICS/PTT. For the ascent, stay in your present comm configuration of DOWN VOICE BACKUP.

07 06 25 21 LMP-LM Okay.

07 06 29 40 CDR-LM ... passed the gyro test okay.

07 06 29 48 CC Say again, John?

07 06 29 53 CDR-LM ... passed the gyro test. You got a new LM weight for us?

07 06 30 00 CC Yeah, I thought I gave you one on the ascent pad.

07 06 30 01 CDR-LM We have it.

07 06 30 07 LMP-LM We got it.

07 06 30 57 CC Orion, this is Houston. We're standing by for your hot fire check if you want to move on.

07 06 31 04 CDR-LM Okay, that's what we're doing.

07 06 31 11 CC And we're showing about an hour from lift-off.

07 06 31 17 CDR-LM Roger.

07 06 31 59 CC Charlie, when you get a chance, we need your 554 through 6 read-outs. I see you got them now.

07 06 32 15 LMP-LM Roger, Jim, the read-outs. Stand by. Okay, before we started the cal, they were minus 116, plus 052, minus 068. After the cal: minus 113, minus 064, minus 064. Over.

07 06 32 40 CC Update of the start values are minus 116, plus 052, minus 068; and afterwards, they are minus 113, minus 064, and minus 064?

07 06 32 56 LMP-LM That affirmative.

07 06 33 15 CC Okay, Charlie, will you read out 545 again for us?

07 06 33 24 LMP-LM Roger. Minus 0 - Okay, wait a minute. Okay, it's plus 060. Excuse me.

07 06 33 38 CC Okay, we have it.

07 06 33 44 LMP-LM Okay, VERB 11 now?

07 06 34 30 CC And, Orion, I have a K factor for you whenever you're ready.

07 06 34 48 LMP-LM Okay, Jim, ready for the K factor.

07 06 34 52 CC Roger. Plus 00170, plus all zeros, plus 00004. Over.

07 06 35 04 LMP-LM Roger. 17000, plus 00004.

07 06 35 09 CC Roger.

07 06 35 10 LMP-LM And do you have an up-link for us before we start in the P57?

07 06 35 15 CC Stand by. Okay, if you'll go to DATA, we'll send you an up-link.

07 06 35 39 LMP-LM Okay, you have it.

07 06 35 40 CC Roger.

07 06 37 12 CC Okay, Orion, we're finished with your computer.

07 06 37 19 LMP-LM Roger.

07 06 40 52 CC And, Orion, this is Houston. Hot fire check looked good down here.

07 06 40 59 CDR-LM Yeah, looked good up here, too.

07 06 41 00 CC Roger.

07 06 41 03 LMP-LM Yeah, this beauty's gonna rock this whole spacecraft, Jim.

07 06 41 09 CC Very good.

07 06 45 55 LMP-LM Can you see our torquing angles, Jim?

07 06 45 56 CC Roger. We have then.

07 06 46 01 LMP-LM Okay, we're going to torque.

07 06 46 04 CC Roger.

07 06 46 05 LMP-LM Mark at 174:57:52.

07 06 46 51 LMP-LM Jim, you want us to bring ascent bats on or wait until about 35 minutes?

07 06 46 56 CC Stand by. Okay, you can go ahead and bring them on, Charlie.

07 06 47 02 LMP-LM Okay.

07 06 48 02 CC Okay, Orion, I have an 047, 053 value for you.

07 06 48 09 LMP-LM Okay, stand by. Go ahead.

07 06 48 12 CC Okay, 047: plus 37762; 053: minus 76552. Over.

07 06 48 26 LMP-LM Plus 37762, minus 76552.

07 06 48 31 CC Good readback. And, Orion, this is Houston. As far as we can tell, there'll be no PIPA or gyro updates for you.

07 06 48 47 LMP-LM Excellent.

07 06 50 16 CC Orion, this is Houston. On that rendezvous radar position, we saw a plus 33 instead of 33300. Over.

07 06 51 09 LMP-LM Hey, Jim, I slewed the thing up through the optics all the way so it's looking at me. Is that all right?

07 06 51 20 CC Okay, it's fine, Charlie. Thank you.

07 06 51 55 LMP-LM Hey, Jim, we loaded your LM ascent weight, but I think the DAP is limited to 10900 because it comes back up 10900 every time.

07 06 52 07 CC Roger.

07 06 54 07 CC Orion, this is Houston. For your information, your total EVA time was 20 hours 14 minutes and 55 seconds. Over.

07 06 54 20 CDR-LM Gee whiz. That's not bad for a three rev slip, huh?

07 06 54 32 CC Very good, John.

07 06 55 20 CC Orion, this is Houston. 10900 is the max that you can load into the DAP.

07 06 55 28 CDR-LM Roger.

07 06 55 55 LMP-LM Okay, Houston, we selected SUIT FAN 1.

07 06 56 02 CC Roger.

07 06 57 31 CDR-LM Okay, Jim, we're on 8-12 waiting to don our helmets and gloves in about 20 minutes.

07 06 57 38 CC Roger. We're following you.

07 06 58 04 CDR-LM Jim, what does ... say on our consumable status?

07 06 58 24 CC Roger. You look great on consumables. Actually, you have about 18 hours left on your electrical and about 10 more pounds of water. Over. Would you like to do a fourth EVA?

07 06 58 38 CDR-LM Roger. Thank you.

07 06 58 41 LMP-LM If you'd let me sleep, I wouldn't mind.

07 06 59 34 LMP-LM Houston, our AGS lunar align appears to be about a quarter or a half degree off the PGNS.

07 06 59 42 CC Roger; we copy. What axis is that, Charlie?

07 06 59 53 LMP-LM It's in pitch. I'm reading about - in AGS - almost 2 degrees. When I switched to PGNS, it slipped down about 1 - Take that back; it's only about a quarter degree, Jim, between about 1-3/4 and 1-1/2.

07 07 00 19 CC Okay, it's normal, Charlie. And it'll be in agreement at lift-off?

07 07 00 26 LMP-LM Thank you. Oh, that's right. I forgot about that.

07 07 01 11 CC Casper, this is Houston. How do you read?

07 07 01 16 CMP Loud and clear.

07 07 01 17 CC Okay, the LM is right on the time line; in fact, quite a bit ahead. You can terminate your cabin buildup at the present time.

07 07 01 29 CMP Okay. I've already done that.

07 07 02 08 LMP-LM Jim, that has 500 feet to go on terminating the ascent B. Do you want that just nominally - done nominally?

07 07 02 22 CC It's nominal except for that change we read up to you about closing SYSTEM A MAIN SOV before you open the ASCENT FEEDS.

07 07 02 34 LMP-LM Okay, fine. Thank you.

07 07 03 38 CC Orion, this is Houston. You can expect a roll moment offset due to the TG [?] change. We've had a loss of RCS SYSTEM A. And then at 500 feet to go, when you open the MAIN SHUTOFF VALVE, you can expect an RCS warning at that time; otherwise, it'll be nominal procedures during ascent.

07 07 04 05 CDR-LM Orion. Roger.

07 07 04 15 LMP-LM Okay, Jim, we got an RCS caution light and RCS A REG light on right now.

07 07 04 21 CC Roger.

07 07 04 27 LMP-LM Our quantity in SYSTEM A reads zero.

07 07 04 31 CC Okay, it should read that.

07 07 04 39 LMP-LM That's what we figured. Thank you.

07 07 05 29 CC Orion, let's go BIOMED, LEFT.

07 07 05 42 CDR-LM Roger. You have it.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 07 09 45 LMP-LM Okay, Jim. We're suited. We're going to get on the ASCENT O_2-H_2O .

07 07 09 51 CC Roger.

07 07 10 11 CC Casper, we want you to go WIDE BEAMWIDTH.

07 07 11 05 CDR-LM Okay, Houston. We've got the vents open, and the talkbacks are gray. The REG's going - the REG vent's going open now.

07 07 11 12 CC Roger.

07 07 12 33 CC Orion, this is Houston. Recommending PGNS for the direct rendezvous.

07 07 12 40 LMP-LM Understand. PGNS for the direct rendezvous.

07 07 16 34 LMP-LM Okay, Houston. Can I take BATs 2 and 4 OFF now?

07 07 16 37 CC Roger. We're ready.

07 07 19 28 CC Orion, we'd like CABIN GAS RETURN in EGRESS.

07 07 19 48 LMP-LM Roger. It's in EGRESS.

07 07 21 36 LMP-LM Jim, how does the tube look? We're ready to pressurize the APS now.

07 07 21 43 CC We're standing by. You have the GO for press.

07 07 21 51 LMP-LM Okay. MASTER ARM's ON. We have two lights. Going to TANK 1.

07 07 22 03 CDR-LM ASCENT HELIUM PRESS, FIRE, TANK 1. Pressurized right up.

07 07 22 19 LMP-LM How does that look to you, Houston?

07 07 22 21 CC Stand by.

07 07 22 34 CC TANK 1 looks good. GO for TANK 2.

07 07 22 39 LMP-LM Roger.

07 07 22 50 LMP-LM Okay. There's TANK 2.

07 07 22 53 CC Roger.

07 07 23 09 CC Roger.

07 07 23 15 CDR-LM Okay. We're crossfeeding with the new procedure you just gave us, Houston.

07 07 23 18 CC Roger.

07 07 23 21 CDR-LM ...

07 07 23 42 CC Orion, you're GO for lift-off.

07 07 23 48 CDR-LM Roger.

07 07 29 50 CDR-LM Okay, Houston. MASTER ARM is coming ON.

07 07 29 53 CC Roger.

07 07 29 54 LMP-LM Two lights.

07 07 29 56 CC Roger.

07 07 32 00 LMP-LM ... Pitchover is on time.

07 07 32 02 CC Roger. We saw lift-off.

07 07 32 07 LMP-LM What a - what a ride. What a ride.

07 07 32 52 CC Orion, you're GO at 1.

07 07 32 56 CDR-LM Roger. Looking good here.

07 07 33 47 CC Orion, you're GO at 2.

07 07 33 52 CDR-LM Looks good.

07 07 34 48 CC Orion, you're GO at 3.

07 07 34 53 CDR-LM Roger. Looking good.

07 07 34 58 LMP-LM AOS and PGNS tracking right together, Houston.

07 07 35 01 CC Roger.

07 07 35 47 CC Orion, you're GO at 4.

07 07 35 51 CDR-LM GO at 4.

07 07 36 45 CC Orion, you're GO at 5.

07 07 37 48 CC Orion, you're GO at 6.

07 07 38 39 LMP-LM Ascent terminated, ASCENT FEED, Houston.

07 07 38 41 CC Roger.

07 07 39 05 CDR-LM Okay.

07 07 39 07 LMP-LM Insertion ... - -

07 07 39 08 CDR-LM Insertion, Houston. On time minus 3/10, minus 10, and plus 1.7.

07 07 39 25 CC Orion, stand by for tweak.

07 07 39 53 CC A reminder to hit the STOP button, John.

07 07 40 01 LMP-LM Say again. Over.

07 07 40 04 CC You're okay.

07 07 40 10 LMP-LM Say again, Houston.

07 07 40 13 CC Never mind. You're standing by for tweak. I have the tweak for you.

07 07 40 22 CDR-LM Okay, go ahead.

07 07 40 24 CC 175:54:05, minus 2.0, minus 0, minus 10.0. Over.

07 07 40 40 LMP-LM Copy at 175:54:05, minus 2.0, minus 0, minus 10.0.

07 07 40 48 CC Good readback.

07 07 43 20 LMP-LM Tweak complete, Houston.

07 07 43 22 CC Roger. Copy.

07 07 43 47 CC Orion, we'd like you to use the - B SYSTEM, so open the CROSSFEED and close the MAIN SOV on SYSTEM A.

07 07 44 00 CDR-LM Roger.

07 07 44 01 LMP-LM Okay, Jim. You got it. We're CROSSFEEDING SYSTEM Bravo - -

07 07 44 05 CC Roger.

07 07 44 06 LMP-LM - - for a P20 auto maneuver pitching up.

07 07 44 09 CC Roger.

07 07 44 23 CMP And, Houston, Casper. Will need a state vector for a - ... to be ready?

07 07 45 06 CMP Houston, Casper.

07 07 45 08 CC Go ahead, Casper.

07 07 45 12 CMP Roger. I'll need a state vector. How soon do you expect to have one?

07 07 45 15 CC Stand by.

07 07 46 15 CDR-LM Okay, Casper. We have you visually.

07 07 46 23 CMP Glad to hear that. I don't have you yet.

07 07 46 39 CMP Houston, Casper is standing by.

07 07 46 42 CC Roger. We're still working on it, Ken.

07 07 47 11 LMP-LM Okay. We got the AGS and AUTO update, Jim?

07 07 47 14 CC Roger.

07 07 47 54 CC Okay, Ken, if you'll go to ACCEPT, we'll send an up-link for you.

07 07 48 09 CMP You have it.

07 07 48 10 CC Roger. Should be on its way.

07 07 48 54 LMP-LM Boy, Jim, the sunset is spectacular.

07 07 48 58 CC Bet it is.

07 07 49 37 CC Orion, there will be no PIPA update.

07 07 49 44 CDR-LM They're saying no PIPA update.

07 07 49 49 CC Casper, the computer's yours.

07 07 49 54 CMP Thank you.

07 07 50 09 CMP And, Orion, I've got about 2.2 volts on the signal -
on the radar. Can you give me a better reading?

07 07 50 17 CDR-LM Roger. We're at 113 miles.

07 07 50 29 CDR-LM And I have you visually opposite the bright star.

07 07 50 36 CMP Okay. We need to try to reacquire. I'm several
miles off from you. We'll reacquire on the A
channel.

07 07 51 03 LMP-LM Houston, what time is LOS?

07 07 51 06 CC Stand by.

07 07 51 25 CC We have a 176:23, Charlie.

07 07 51 31 LMP-LM Okay. Thank you.

07 07 51 53 CMP How about another range check when you get a chance
to, please.

07 07 51 58 CDR-LM Okay. We're at 106.5 miles ... the stationkeeping.
That could be a couple miles off though.

07 07 52 14 CDR-LM Okay. A VERB 83 says we're at 105.50 ...

07 07 53 42 CMP Okay. You go ahead ...

07 07 54 44 LMP-LM Jim, we got 5 minutes away from the ... Look okay?

07 07 56 45 CMP Okay. Do you have your tracking ...?

07 07 56 57 CMP Okay. Tallyho. Tallyho.

07 07 57 10 CDR-LM Good show, Ken.

07 07 57 20 CC Orion, this is Houston with TPI solution.

07 07 57 26 LMP-LM Okay. We're all ears.

07 07 57 28 CC Okay. Delta- V_X , plus 77.6; Delta- V_Y , plus 3.8; Delta- V_Z , plus 3.1; for a total of 77.7. TPF is 29. Over.

07 07 57 55 LMP-LM Roger. Copy plus 77.6, plus 3.8, plus 3.1, TPF 29.

07 07 58 03 CC Good readback.

07 07 59 45 CDR-LM Okay, Houston. We're ...

07 07 59 52 CC Roger. We copy.

07 08 00 02 CDR-LM ... I'll tell you.

07 08 00 12 CC We'll read it down here, John. We can't read you very well. It's just excessive noise on the loop.

07 08 00 20 CDR-LM Okay.

07 08 01 09 CC Okay. We copied it, John.

07 08 01 54 LMP-LM Okay, Ken. We did a recycle. We're looking at 78.0, plus 2.7, and minus 0.2 on the ...

07 08 02 06 CC Roger. We copied.

07 08 05 57 LMP-LM Hey, Houston; Orion. How do we look for an APS TPI?

07 08 06 06 CC Orion, you're GO for an APS TPI.

07 08 06 13 LMP-LM All right, ... What's your estimate of the burn time?

07 08 06 39 CC Orion, are you requesting burn time? Over.

07 08 06 45 LMP-LM Affirmative.

07 08 06 47 CC Roger. Stand by.

07 08 07 27 CC Okay, Orion. Burn time for TPI should be about 2.5 seconds.

07 08 07 39 LMP-LM Roger. Thank you, 2.5.

07 08 08 55 CDR-LM Hey, Houston. With 21 marks and 17 minutes, you want to just keep marking as opposed to VERB 93ing, right?

07 08 09 05 CC Stand by.

07 08 09 10 CDR-LM The answer to that, Jim, is yes, I'm sure. Just want to make sure somebody thunk [sic] about it.

07 08 09 21 CC Okay. Just continue marking, John.

07 08 09 25 CDR-LM Understand.

07 08 09 32 CC Okay, you're coming up on 2 minutes to LOS, and you're looking good.

07 08 09 38 CDR-LM You're on, Jim.

07 08 09 39 CC - - and all solutions have converged.

07 08 10 31 CC Orion, you could do your final comp at 10 instead of 8. Your preference.

07 08 10 44 CDR-LM Okay.

07 08 11 31 CMP Orion, this is Casper on Victor Hotel. How do you read?

07 08 11 34 LMP-LM Read you loud and clear, Ken.

07 08 11 38 CMP Hey, this stuff is working pretty good today, isn't it?

07 08 11 41 LMP-LM It really is, Ken.

07 08 11 47 CMP Man, that - I can see that thing - light of yours at 70 miles on the telescope, even.

07 08 11 52 LMP-LM Yeah, I can see your ...

SEPARATE, SIMULTANEOUS COMMUNICATIONS LINK IN USE BETWEEN CC AND CM

07 06 49 XX

BEGIN LUNAR REV 52

NO COMMUNICATIONS

TRANSCRIPT OF COMMUNICATIONS BETWEEN CC AND LM RESUMED

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 08 47 XX BEGIN LUNAR REV 53

07 08 58 12 LMP-LM Houston, Orion. Over.

07 08 58 15 CC Orion, this is Houston. Go ahead.

07 08 58 19 LMP-LM Okay, Jim, we're 3 miles out and closing. We did a TPI of plus 78.0, plus 2.7, plus 0.7, and we burned two midcourses of minus 0.3, minus 0.1, plus 0.9; plus 0.5, plus 0.2, plus 0.7, and we got a visual.

07 08 58 44 CC Roger; I copied all that.

07 08 58 52 LMP-LM Guess we don't need to tell you, but this is a sweet machine.

07 08 58 58 CC You're so right.

07 08 59 36 LMP-LM You are just a little tiny black dot to the unaided eye.

07 09 03 04 CMP Okay. I still have you at 28 feet per second on the ...

07 09 04 43 CMP Okay. I show you as a little black ...

07 09 05 22 CMP I think that's right. You need to go to your ... need to go to your ...

07 09 06 10 CMP That's negative.

07 09 06 20 CMP I thought the idea was we'd take turns.

07 09 06 30 CMP Okay.

07 09 07 14 CMP Okay.

07 09 07 56 CMP Okay. Man, that looks good.

07 09 09 00 CMP That's a nice ... myself.

07 09 09 56 CMP You look a lot smaller in the daytime. At the same range.

07 09 10 23 CMP Now, your - your forward-firing thrusters look like little flashlights when they fire.

07 09 10 34 CMP Okay, well, wait until you get back around there and take a look. We know they aren't out very far, but want you to look at the covers.

07 09 10 45 CMP Beautiful.

07 09 11 46 CMP It is looking more like an animated cartoon as we go along.

07 09 12 05 CMP Okay, I'm ready to go to attitude whenever you are.

07 09 12 09 CC Orion, this is Houston. When you're stationkeeping, let me know. We have some words for you.

07 09 12 18 CDR-LM Okay, we're stationkeeping.

07 09 12 20 CC Okay. John, looking at the pictures of the lift-off, it appeared that something might have come loose - skin on the - the back of the vehicle so, for that reason, we want Ken to take some pictures of the LM, so we have a slight modification to the Flight Plan. We'll be asking you to do a yaw 360 after Ken does his VERB 49 maneuver to the docking attitude. Over.

07 09 12 52 CDR-LM Roger; I see - Yaw 360 after Ken does a VERB 49 to the docking attitude.

07 09 13 04 CMP Okay, then okay, right here I've got good lighting ... - -

07 09 13 10 CC There's a lot of noise so we can't hear you very well, but - -

07 09 13 13 CMP - - ... pitchover or something here.

07 09 13 18 CDR-LM Let me pitch up ... Want me to do that?

07 09 13 21 CMP Stand by, I'm - let me get my camera ... - -

07 09 13 23 CC 16, this is Houston. Let me just recap here the procedure. Ken, we want you to do the - Ken, do the VERB 49 maneuver to the SIM bay attitude per

Flight Plan and then do the 360-degree roll and, of course, following that, you do the VERB 49 maneuver to the docking attitude. Then I have a change for the Flight Plan whenever you're ready to copy.

07 09 13 57 CMP Okay. We're in perfect position to take pictures of the LM right now. All they've got to do is to pitch. He prefers to go to the other sequence, is that correct?

07 09 14 08 CC Okay. If you're in a position to take pictures of the LM, we wanted the LM to do a 360-degree yaw, and you're to take pictures of the - the minus-Z portion of the ascent stage, using the same camera setting that you have on the DAC and the EL, except the focus on the EL should be changed to infinity. Over.

07 09 14 37 CMP Okay, we'll just take you up on that, Hank, and take pictures of the - where's minus Z? Let's see that's - that's - -

07 09 14 46 CC Okay. Ken, it's the back side of the LM.

07 09 14 53 CMP Roger. I'm with you and I'll turn the DAC on, and I'll a - fix the EL ... stationkeeping now.

07 09 15 03 CC Okay. And, Ken, if you observe anything there, will you please relay your observations?

07 09 15 14 CMP Yes, sir; certainly will.

07 09 15 26 LMP-LM Oh, Houston. On lift-off, one of the MESA blankets flew out in front of the LM and hit the ground about 200 meters in front of the LM. Over.

07 09 15 37 CC I understand a portion of the MESA blanket's still on the - on the front.

07 09 15 45 LMP-LM Yeah, that might have been what you saw. It came pretty high in the air and it went straight out to the west.

07 09 15 51 CC Okay. We copy.

07 09 15 56 CMP Okay, everything on the plus-Y side looks clean - just the surface is a little flaky with paint ...

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07 09 16 19 CMP Okay, on the - on the back side - -

07 09 16 22 CC Orion, will you go FORWARD omni?

07 09 16 23 CMP - - it looks like the - the -

07 09 16 36 CMP Looks like some of the thermal blanket around the ECAs on the back end there is pretty badly chewed up.

07 09 16 46 CC Okay. We copy.

07 09 16 47 CMP The stuff is torn - a couple of panels are torn off. And some of the stripping in between it is - it looks like it was struck by something, but it looks like all the Mylar blankets underneath are still intact.

07 09 17 03 CC Roger.

07 09 17 26 CMP Okay, we got some more stuff on the other side ... - -

07 09 17 29 CC Ken, can you observe whether it's possible for sunlight to directly impinge on portions of the spacecraft equipment?

07 09 17 40 CMP No, sir; it's not possible from the back; I can't tell about the bottom; but, on the back side, the Mylar blankets are still intact - it's only that outer covering that's broken.

07 09 17 54 CC Okay, we copy.

07 09 17 58 LMP-LM I - I tell you, this thing really flies beautifully.

07 09 18 03 CC Orion, AFT omni.

07 09 18 11 CDR-LM Sure wish airplane flying was this easy.

07 09 18 13 LMP-LM You better believe it.

07 09 18 24 CC Okay, 16; we assume you're pressing on with the Flight Plan?

07 09 18 25 CMP Okay, I'm ready to go to my attitude.

07 09 18 32 CDR-LM Roger; we're pressing.

07 09 18 34 CMP Okay, John, are you ready for me to go to my attitude?

07 09 18 38 CDR-LM After - wait a second, until we get this -

07 09 18 42 CMP Okay, I'm just going to do a little - it'll be a roll and ... - -

07 09 18 47 CC Orion, will you go NORMAL VOICE?

07 09 18 49 CDR-LM Okay, I pitched down.

07 09 18 52 LMP-LM Okay.

07 09 18 54 CMP Okay, it will be a half degree a second. Are you all set?

07 09 19 07 CMP Okay, you have stationkeeping; I'm maneuvering.

07 09 19 22 CC Casper, we need RATE 2 in the BMAG.

07 09 19 27 CMP You've got it.

07 09 19 29 CC Roger; you're fast.

07 09 20 06 CMP Hey, Charlie, have you got a FORWARD VHF there?

07 09 20 12 CMP Okay, the things I'd like for you to look at are - you remember on the aft shelf of the SIM bay, there's two booms back there. The one on my - the most - plus-Y one is the mass spec - It's got a white cover and it - it's kind of a rectangular shape cover. The one on the left or - it's really in about the center of the SIM bay - at the aft end and it has a silver cover and that's the gamma ray. Would you take a look and see if either of the covers are not quite closed because we have indications in the spacecraft that they're not closed and indications on the ground that they are.

07 09 20 57 LMP-LM Are you maneuvering, Ken?

07 09 21 01 CMP Yes, sir. This is one of the fastest maneuvers I've made in a long time. Well, I'm not there yet, Charlie. I'll tell you when I get there.

07 09 21 31 CMP Got about 20 degrees of pitch and about 90 degrees of roll. Now then, I wait for you to take a look. And then, after you do that, why, I will do a 360-degree rotation about my X-axis while you take pictures of the thermal coating.

07 09 22 02 CC Omni Delta, Casper.

07 09 22 09 CMP Houston, did you call Casper?

07 09 22 10 CC Yes, omni Delta.

07 09 22 16 CMP Okay, thank you.

07 09 22 38 LMP-LM Can you tell me which side of the LM SIM bay?

07 09 22 46 CMP Okay, it's a dark Inconel cover.

07 09 22 50 LMP-LM Okay, and it's partially open.

07 09 22 53 CMP Okay, can you - you don't see anything white sticking out from under it? Okay, because the Inconel shield on the mass spec is - black. Okay, do you see the gamma ray door?

07 09 23 06 LMP-LM Yeah.

07 09 23 08 CMP Okay.

07 09 23 14 LMP-LM No, no, I'll - I'll tell you -

07 09 23 53 CC Orion, you have 32 minutes until darkness.

07 09 24 02 CMP Okay.

07 09 24 24 LMP-LM On the quad above the SIM bay - do you mean the A quad?

07 09 24 37 CMP Yep.

07 09 24 59 CMP Okay, good; can you get some pictures of those, too? Okay, and I'm ready to start my 360 roll when you get some pictures of those things. Okay, I'm going to roll left.

07 09 27 53 CMP You guys are pretty bad; there's even debris outside up here. It was nice and clean before you came back.

07 09 28 41 CMP Okay.

07 09 28 54 CMP Okay, I'm getting ready to - to spin over to - to a new attitude. Very close to the attitude we came up in. All set?

07 09 29 54 CMP Beg your pardon, John.

07 09 29 58 CMP Yes, sir; I'm going to docking attitude. And it - it's almost identical to our rendezvous attitude.

07 09 31 01 CC Casper, go omni Alfa.

07 09 31 12 CMP Well, I got 90 degrees of roll to go.

07 09 31 17 CMP Well, I got about 10 degrees in pitch.

07 09 31 29 CMP Houston, could you ...?

07 09 31 39 CDR-LM Houston. Casper wants the logic GO and omni.

07 09 31 44 CC Roger; you're GO.

07 09 31 50 CDR-LM Yeah, they gave you GO, Ken.

07 09 31 58 CC Casper, omni Alfa.

07 09 32 14 CC Casper, let's hold up on the PYRO ARM.

07 09 32 35 CMP Yes, sir. I thought you just gave me a GO; but I guess not.

07 09 32 49 CC Okay. Casper, let's take the LOGICs, OFF, and we'll go through it again.

07 09 32 55 CMP Okay. LOGICs, OFF.

07 09 32 58 CC Stand by.

07 09 33 11 CC Say, Ken. You're GO for PYRO ARM - I'm sorry, LOGICs, on.

07 09 33 18 CMP Okay. The LOGICs are coming on. There's number 1, and there's number 2.

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07 09 33 31 CC Okay, Casper. You're GO for PYRO ARM.

07 09 33 37 CMP Okay. PYRO ARMs coming on. 1; there's 2.

07 09 33 46 CC Roger. Looks good here.

07 09 34 00 CDR-LM Okay, Ken. You there?

07 09 34 02 CMP I'm about 5 degrees from it. You can go ahead and start your maneuver, I'll take stationkeeping.

07 09 34 08 CDR-LM Okay. You have it.

07 09 35 32 CMP Okay. I'm approaching. Your attitude looks good.

07 09 35 40 CMP I'll tell you when we have capture.

07 09 37 46 CMP Say again.

07 09 38 45 CMP (Laughter)

07 09 38 58 CMP Okay, about 5 feet.

07 09 40 37 CMP Doesn't look like it. I don't have any barber poles. There we go. Took a couple of extra blurps to get you. Okay. Are you free?

07 09 40 52 CMP Okay.

07 09 41 00 CMP Okay, it looks - looks pretty fair. How about if I just retract you?

07 09 41 25 CMP I believe we're there.

07 09 41 27 CMP Casper's captured Orion!

07 09 41 30 CC Very good. We were wondering what took you so long.

07 09 41 35 CMP Yeah, he's all locked on.

07 09 41 38 CDR We - we were doing these fancy maneuvers up here. Hardly anybody ever gets to do a 360-degree yaw on the Moon.

07 09 41 52 CC Orion, this is Houston. We're about 28 minutes to LOS, and I have about five pages of time-line changes, whenever you're ready to copy.

07 09 42 03 CDR Yes, sir. Charlie's about ready.

07 09 42 08 CC And, Orion, you can close the CROSSFEED and open A MAIN SOV.

07 09 42 36 CC Casper, let's hold off on the P20. We need good comm to get all these changes up.

07 09 42 43 CMP Okay. Is this attitude good?

07 09 42 46 CC Very good.

07 09 42 48 LMP Okay, Jim, go ahead.

07 09 42 51 CC Okay. Timeline book changes - start on page 13 and change 173:55 to 177:54. And under "Configure S-band," item 1, change CS - CSM maneuver to jettison attitude" to "CSM maneuver to SIM bay minus-X forward attitude" and delete "Proceed with prep" et cetera. Over.

07 09 43 34 LMP Roger. We copy. Go ahead.

07 09 43 36 CC Okay. Item 2, delete Item 3, change "PRIM" to "SECONDARY" first line, change "RIGHT" to "OFF" and "HI" to "LO." Add a second line, "S-BAND antenna, AFT"; and delete remainder of step 3. Add the following: "EXTERIOR LIGHT, OFF; perform docked deactivation (staged), steps 1 to 7 of the Contingency Checklist, page 3-9." Over.

07 09 44 22 LMP Okay. Delete all of step 2. That's the "Verify jet attitude." Step 3, sec - "S-BAND, SECONDARY, OFF, and LO." Delete - mixed - all the steerable stuff, and add "External Light - EXTERIOR LIGHT, OFF," which it is, and "Docked deactivation (staged), steps 1 through 7" in the Contingency Book.

07 09 44 49 CC Okay. Next is change 1 - 174 hours to 177:59 under "Prep for transfer" and step 3, change line 4 to read "LMP purge valve (1, aft LHSSC)."

07 09 45 30 LMP Okay. That's - all I did was add in "LMP purge valve." All the - all the rest was there.

07 09 45 36 CC Okay, I have a - a question here, Charlie, but then, on the next line, it's - under neck ring, they said add "Stow commander's purge valve" - oh, that's "Serial number 194 in ISA bottom pocket."

07 09 46 00 CC Okay, your purge valve apparently is serial number 197, and John's is 194. That make sense to you?

07 09 46 09 LMP Yeah, I got it. I know which one.

07 09 46 12 CC Okay, if you've got that, I'm doing a step 5 - it's delete first two lines. Over.

07 09 46 24 LMP Hey, we've been using the purge valves interchangeably. I don't know who was using whose when we were out on the Moon.

07 09 46 33 CC Okay, we'll talk about that later. Let me get the - the rest of the change to you. Under step 9, after "SE AUDIO, open," add "ECS LCG PUMP, OPEN." Delete remainder of step. Insert the following: "CABIN GAS RETURN, OPEN; SUIT CIRCUIT RELIEF to AUTO - that's a verify; SUIT ISOL valve, both, to SUIT DISCONNECT. Both, disconnect hoses and stow. Both, doff suits - suits, install PGA electrical connector covers from the purse, and stow LCG plugs in suits from the purse. Install neck ring dust covers in the purse. Transfer suit to CMP." Then configure circuit breakers per 3-10 and 11 of Contingency Checklist. Over.

07 09 47 40 LMP Okay, copy. "CABIN GAS RETURN," add after "SE AUDIO, open." "LCG, open" - correction, "LCG PUMP, open; CABIN GAS to OPEN; SUIT CIRCUIT RELIEF to AUTO; SUIT DISCONNECT - suit to hose disconnect; doff suits; put on electrical connectors, the LCG plugs, dust covers." And then go to 3-10 for the CBs on Contingency Checklist.

07 09 48 11 CC Okay. Then on page 14, step 11, delete "PPKs, three, on the left-hand midsection and the aft SRCs." That's in parentheses. The next item is the flag kit. Next item is flight data file. Then add Timeline Book and LM Contingency Checklist. Over.

07 09 48 56 LMP Okay. Scratch PPKs, the flag kit, the flight data file, and add the Timeline Book and the LM Contingency Checklist.

07 09 49 05 CC Okay. Step 14, delete. And delete "MSFN up-link, update, target PGNS, and configure AGS, step 1." Over.

07 09 49 22 LMP Okay, "MSFN up-link, update, delete step 1."

07 09 49 29 CC Okay, then on page - we'll delete page 15, 16, and 17, and then on page 18, under "IVT to CSM," delete step 2, and prior to "LM to CM transfer list," add "Perform final deactivation per Contingency Checklist, page 3" - -

07 09 49 55 LMP Hey, hold on a minute - hold on a minute - hold on, Jim.

07 09 49 58 CC Okay.

07 09 50 02 CDR You're going faster than he can move.

07 09 50 05 LMP I can't turn the pages that fast. I'm on - I've deleted page 16 and 17, and I'm on page 18. Go ahead.

07 09 50 14 CC Okay, under "IVT to CSM," delete step 2, and prior to "LM to CM transfer list," add "Perform final deactivation per Contingency Checklist, page 3-12 to 3-15." Over.

07 09 50 55 LMP Okay, on "IVT to CSM," delete step 2. Perform final deactivation per 3-12 to 15 in Contingency Checklist.

07 09 51 08 CC Okay, and then under the transfer list, delete "DSEA, PPKs, flag kit, flight data file in the jettison bag, purse and contents, unused food, used urine bag, and used fecal bags." Over.

07 09 51 39 LMP Okay. We copy that.

07 09 51 41 CC Okay. And then go back to page 14, Charlie. Let me know when you're there. I think we've missed something there.

07 09 52 02 LMP Okay, go ahead.

07 09 52 04 CC Okay, on the right-hand side of that page, we want to delete, essentially, three blocks there; the "MSFN up-link/update," all the steps under that - the five steps; then the next, "target PGNS"; and then "Configure AGS." All that portion is to be deleted.

07 09 52 23 LMP Yeah. I got you. Go ahead.

07 09 52 29 CC Okay, under "Configure AGS," all those AGS - the four AGS entries there are - are deleted. We pick up there with step 2.

07 09 52 39 LMP I got you.

07 09 52 40 CC Okay, then the - the following are changes in the LM Contingency Checklist on page 3-9. Step 4, add "Verify" - Do you want me to wait until you get to the Contingency Checklist, Charlie?

07 09 52 59 CDR Yeah. You - you better wait until he floats over there to it.

07 09 53 02 CC Okay. Let me know. We've got 17 minutes to LOS. Shouldn't take us long to go through the Contingency Checklist changes - -

07 09 53 10 CDR What page did you say?

07 09 53 12 CC Starting at page 3-9.

07 09 53 44 LMP Okay, go ahead.

07 09 53 46 CC Okay, on page 3-9, step 4, add "Verify" after "MASTER ARM, OFF." Then delete "AUDIO, COMMANDER"; and step 6, add "Verify" after "MODE CONTROL, both, OFF." Then step 7, delete first two lines. And then on - Why don't you repeat up to that point? Over.

07 09 54 24 LMP I got it all, Jim. Step 4: "Verify MASTER ARM, OFF"; delete "AUDIO, COMMANDER; MODE CONTROL, both, OFF, verify." "Window shades and commander transfer," delete. We'll just leave him over here, huh?

07 09 54 38 CDR Hey, Jim, I - I - I guess I think that to verify the MASTER ARM, OFF, is kind of a silly change to make Charlie copy, if you got 25 pages of that.

07 09 54 50 CC No, listen, John; we've just about one more page, and we'll be finished.

07 09 54 55 CDR Okay.

07 09 54 56 CC Okay, on page 3-10, SECONDARY POWER AMP, close. And then on page 3-11 - let me know when you're there.

07 09 55 20 LMP You speak.

07 09 55 22 CC Okay, row 3, SE AUDIO, open, and PRIMARY AMP, open. Row 4, S-BAND ANTENNA, open. And then we'll go to page 3-12. Let me know when you're there.

07 09 55 49 LMP I'm there.

07 09 55 51 CC Okay, step 2, change "AUDIO, LMP," to "AUDIO, both." Change line 2 to read "VHF B and VHF A TRANSMITTER and RECEIVER, OFF." Then step 4, add, after "SECONDARY S-BAND TRANSMITTER and RECEIVER, open," "SECONDARY POWER AMP, open," and delete "PRIMARY POWER AMP, open." Then step 5, delete three lines and add "Connect LM/CM umbilicals." Over.

07 09 56 32 LMP Okay, what was that last one?

07 09 56 35 CC The last one was step 5 to delete three lines and add "Connect LM/CM umbilicals." Over.

07 09 56 52 LMP Okay, copy.

07 09 56 58 CC Okay, then on step 6, under "To use CSM Power," and "LM power dash 1 and LM power dash 2, MAIN B, circuit breakers, closed, and CSM - in parentheses." Over.

07 09 57 32 LMP Okay, we copy.

07 09 57 34 CC Okay then, page 3-13, looks like we just have about three or four more changes here.

07 09 57 44 LMP Go ahead.

07 09 57 46 CC Okay, on 3-13 on - und - under row 3, open UTILITY LIGHT. On row 5, open TRANSLUNAR BUS TIE, and then the next change is on page 3-14. Over.

07 09 58 07 LMP Go ahead.

07 09 58 12 CC On 3-14, row 2, open ASA; row 4, open S-BAND ANTENNA and TRANSLUNAR BUS TIES. Over.

07 09 58 30 LMP Roger. Go ahead.

07 09 58 32 CC Okay, next, and the last is on page 3-15, Charlie. Let me know when you're there.

07 09 58 40 LMP Turn the page; I'm there.

07 09 58 42 CC Okay. Step 9, add, after "ASCENT WATER, CLOSE," "CABIN GAS RETURN to EGRESS," and last change is step 9. Delete the first line. Over.

07 09 59 03 LMP I got you.

07 09 59 05 CC That's it.

07 09 59 10 LMP Okay, what's the plan, Jim? Just to power this moose down, and then come back in tomorrow and fire it up again for jettison?

07 09 59 22 CC That's affirmative, Charlie, and will you get the AGS MODE CONTROL, OFF?

07 09 59 34 LMP It's OFF.

07 09 59 35 CC And, Orion, if you'd like, I'll go through the - the basic plan here, postdocking, so it's - be clear in your minds. The first step, of course, is to doff suits in the LM, and, of course, we're going to postpone some of the LM transfer until after you

wake up. We're powering down the LM, and we are going to - we're drying out the water boiler. And we'll be ready to close out the LM at - at 179:20. That's AOS plus 10 minutes on this next pass. And then step 5 is - we'll - y'all will get in the LM tomorrow and complete the transfer and LM jettison, and you will need the LM Timeline Book and the LM Contingency Checklist at docking to accomplish the deactivation. Over.

07 10 00 29 CDR I got you.

07 10 01 34 CMP I'll be with you in just a minute.

07 10 01 47 CMP Okay, I got the drogue out - I mean the probe and the hatch out and I'm ready for the drogue, so if you're going to do anything that affects the pressurization, let me know.

07 10 02 02 CMP Yeah, I read you.

07 10 03 03 LMP Houston, Orion. Over.

07 10 03 05 CC Go ahead, Orion.

07 10 03 09 LMP Okay, that first part, "Docked deactivation stage," was that just steps 1 through 7 or the whole thing?

07 10 03 17 CC No, steps 1 through 7.

07 10 03 28 LMP Okay.

07 10 04 27 CMP Yeah, you'll have to open the door and find out.

07 10 04 41 LMP Okay, Houston -

07 10 04 42 LMP MARK. PRIMARY EVAP FLOW is CLOSE.

07 10 04 45 CC Okay, we copy. And, Casper, you can go into your P20 attitude, minus-X forward.

07 10 05 00 LMP John verifies that the MASTER ARM is OFF.

07 10 05 04 CC All right (laughter).

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07 10 05 13 CC And, Casper; this is Houston.

07 10 05 19 CMP Go ahead.

07 10 05 20 CC Roger, Ken. We're finished with that update, so you can press on with the minus-X forward.

07 10 05 28 CMP Okay.

07 10 10 04 CC Okay, 16, we're about 30 seconds from LOS. And AOS, 1 - -

07 10 10 14 CDR Okay, when you see us next time, we'll be ...

07 10 10 18 CC Okay. And AOS time, 179:08; and your angles are zero - zero and 170.

07 10 10 30 CDR Okay. Thank you, Jim.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 10 46 XX BEGIN LUNAR REV 54

07 10 59 33 CC 16, this is Houston. How do you read?

07 10 59 39 CMP Loud and clear, Jim.

07 10 59 42 CC Roger. There's still excessive noise. We can
just barely hear you.

07 10 59 54 CMP Well, we're here.

07 10 59 56 CC Okay.

07 11 00 19 CC Orion, we'd like for you to switch omni antennas.

07 11 02 11 CC Ken, do you know whether John and Charlie still
have their comm carriers on? Are they monitoring
comm with us?

07 11 02 19 CMP No, Jim, they're not. And Charlie just said that
he's got a ... bus off-scale low, but the battery
looks okay.

07 11 02 37 CC Okay. Ken, will you have them close the circuit
breaker on panel 11, SIGNAL CONDITIONER 1, on
row 3?

07 11 02 48 CMP Okay.

07 11 03 56 CMP Jim, is there something in particular that you
want? I'll see if I can get them for you.

07 11 04 01 CC No. We're just interested in getting data from
the LM to - so we can go ahead with the closeout.

07 11 04 12 CMP Okay.

07 11 07 31 LMP Houston, Orion. How do you read?

07 11 07 34 CC Orion, this is Houston. We read you loud and clear.

07 11 07 42 LMP Okay. Somebody wanted me up for comm for some data
or something, Jim.

07 11 07 46 CC Roger. We just - they just wanted to look at the LM status.

07 11 07 49 CMP Okay, Jim, I guess he's not copying you.

07 11 07 56 CC And, Orion. We were wondering, you know, whether you begun the - -

07 11 08 00 LMP Okay.

07 11 08 01 CC - - postdocking checklist.

07 11 08 05 LMP Yes, sir. We're down - we're transferring gear. We've completed the deactivation - dock to deactivation sta - stage, rather. Over.

07 11 08 20 CC Can you confirm PCM - PCM bit rate, IO?

07 11 08 32 LMP It's LC now.

07 11 08 43 CC And, Charlie, you did call PRIMARY EVAP FLOW number 1, CLOSED, I believe. Do you confirm?

07 11 08 59 LMP That's right, Jim. It was CLOSED. I gave you a mark on that.

07 11 09 03 CC Roger. I copied.

07 11 11 27 CC Orion, this is Houston. Verify that you have ASCENT WATER selected and verify PRIME EVAP FLOW number 2, CLOSED. And verify DESCENT WATER, CLOSED. DESCENT WATER selected.

07 11 11 57 LMP Okay. It's all CLOSED.

07 11 12 16 LMP Jim, that PRIMARY EVAP FLOW 1 and 2 that just went CLOSED, I got the wrong valve. I'm sorry. It's CLOSED.

07 11 12 23 CC Okay. We copy.

07 11 13 28 CC Casper, this is Houston. Verify that you're in SIM bay attitude. Are you - -

07 11 13 36 CMP ...

07 11 13 37 CC -- in the proper RCS configuration for SIM bay operation?

07 11 13 44 CMP Well, that may not be. I'll see.

07 11 14 10 CMP Okay. It is now. It was not.

07 11 14 13 CC Okay.

07 11 14 23 CC And, Orion, this is Houston. Could you tell us where you are in the Timeline Book?

07 11 14 33 LMP Yeah, I'm putting the buddy - the BSLSS rock bag in the - Ken's stowage thing here.

07 11 14 41 CC Okay. You didn't get down to step 9 in the post-docking time line yet, did you?

07 11 14 54 LMP John's got his suit off. I've still got mine on. And the - everything else has been done.

07 11 15 02 CC Okay. I'm looking under step 9. I gave you some changes there, which included configuring circuit breakers per the Contingency Checklist.

07 11 15 19 LMP No, I haven't done that. I was going to wait until I got my suit off. You want me to do that now?

07 11 15 24 CC No, just stand by - -

07 11 15 25 LMP ... 310.

07 11 15 27 CC Okay. We know where you are now, Charlie.

07 11 15 34 LMP Okay. Can I press on?

07 11 15 40 CC Yes, go ahead, Charlie.

07 11 20 05 CC Casper, this is Houston.

07 11 20 10 CMP Yes, sir.

07 11 20 12 CC Roger. We'd like to verify MASS SPEC EXPERIMENT switch, ON, and ION SOURCE to STANDBY. We're not receiving any data down here.

07 11 20 28 CMP I thought that the EXPERIMENT was ON but it looks like it's OFF. I don't know whether we didn't turn it on or it got knocked off. But it's ON now and SOURCE is in STANDBY.

07 11 22 38 CC Orion, this is Houston.

07 11 22 45 LMP Go ahead.

07 11 22 48 CC Roger. It's going to take some load to dry out that water boiler. So, don't do step 9 yet. And, we're thinking of bringing some more equipment back on to reduce that dryout time. Over.

07 11 23 09 LMP Roger.

07 11 23 28 CC Casper, will you go AUTO on HIGH GAIN?

07 11 23 37 CMP Who did you call, Jim?

07 11 27 53 CC Orion, this is Houston.

07 11 28 01 LMP Go ahead, Jim.

07 11 28 03 CC Roger. A few things that we want you to activate here to put a load on that water boiler. Have five items, if you're ready to copy.

07 11 28 23 LMP Why don't you just read them to me and I'll turn them on?

07 11 28 26 CC Good idea. SUIT DIVERTER valve to CABIN.

07 11 28 36 LMP Go ahead.

07 11 28 38 CC SUIT FAN number 1 circuit breaker on panel 11, closed. While you're at panel 11 - -

07 11 28 47 LMP Go ahead.

07 11 28 49 CC - - get INVERTER 1, closed, on panel 11.

07 11 28 55 LMP Go ahead.

07 11 28 56 CC And, then on panel 16, INVERTER number 2, closed, and ATCA, closed. Over.

07 11 29 05 LMP Roger. Roger. Got them. That all?

07 11 29 13 CC Yeah, that's all. For now.

07 11 31 46 CC Orion, this is Houston. If it's convenient, Charlie, will you put the BIOMED into the RIGHT position?

07 11 32 01 LMP How's that?

07 11 32 04 CC Stand by.

07 11 32 15 LMP Sure looks like a duststorm in this cockpit right now.

07 11 43 17 LMP Hey, Jim, all the gear has been transferred into ... and we're gonna - I'm getting out of my suit now. We'll be off comm for about 10 minutes.

07 11 43 27 CC Okay. Very good.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 11 51 18 CC Casper, this is Houston.

07 11 51 28 CMP Go ahead, Jim.

07 11 51 30 CC Okay, Ken. We'd like you to advise John and Charlie that we'd like them to be on biomed tonight. Tell them we'd just like to make sure that - get a comparison of their good performance on the surface. See if it's the same in orbit. Over.

07 11 51 56 CMP Roger.

07 11 55 32 CC Casper, this is Houston.

07 11 55 37 CMP Go ahead, Jim.

07 11 55 38 CC Yeah, Ken. Is Charlie gonna get back on comm again shortly in the LM? If not, I have a short procedure here for you to give to him.

07 11 55 53 CMP I think - -

07 11 55 54 LMP Jim, I'm back on.

07 11 55 57 CC And we want MASS SPEC ION SOURCE, ON in Casper.

07 11 56 05 CMP Okay.

07 11 56 10 CC Yeah, Charlie. We want you to - -

07 11 56 11 CMP It's ON.

07 11 56 12 CC - - open those four circuit breakers which you've closed. And I'll repeat them for you. That's SUIT FAN number 1 on panel 11, INVERTER 1 on panel 11, and then on panel 16, INVERTER 2 and - and ATCA. Those four circuit breakers, open.

07 11 56 41 LMP Okay, Jim. They're all open.

07 11 56 43 CC Roger.

07 11 56 45 LMP And looks like the boiler's drying out. The glycol temp's up to 55. We got a GLYCOL light.

07 11 56 52 CC Roger. We'll advise you on that in a few moments.

07 11 59 39 CC Orion, this is Houston.

07 11 59 50 LMP Go ahead.

07 11 59 52 CC Roger, Charlie. You have a GO for closeout. However, dryout will not be complete until 180:30, at which time you can continue with your deactivation.

07 12 00 15 LMP Okay, Jim. What - what do you mean, a GO for closeout, then? You want me to wait until the water boiler dries out before I do anything else?

07 12 00 26 CC Before you pull any more power off. In other words, do your circuit breakers. We want you to wait on that until 180:30, which is about 18 minutes from now.

07 12 00 43 LMP Roger. We copy. Only thing we got left over here is the suits, and we'll get them over now.

07 12 00 50 CC And at that time, Charlie, you should be on page 3-12 of the Contingency Checklist.

07 12 01 04 LMP Roger.

07 12 04 34 LMP Okay, Jim. Give me that time again for water boiler dryout. And I'll start taking off the comm and stuff.

07 12 04 46 CC Roger, Charlie. That was 180:30.

07 12 04 52 LMP Okay. 180:30. What time is it now? We don't have a clock.

07 12 04 58 CC 180:16.

07 12 05 04 LMP Okay. I'm gonna go off comm over here, then, and - but won't pull any more breakers until 30. Over.

07 12 05 13 CC Okay. That sounds good.

07 12 09 06 CC Okay. We're going LOS in about 10 seconds.
(NO CCMM FOR 54 MINUTES)

07 12 45 XX BEGIN LUNAR REV 55

07 13 03 13 CC Okay, Apollo 16, Houston.

07 13 03 32 CMP Houston, Casper.

07 13 03 35 CC Oh, hello there, Ken. We'd like you to go to ACCEPT, and we'll st - send up a revision to your state vector, and we'll send up your jet monitor and activate it.

07 13 03 50 CMP Houston, Casper.

07 13 03 56 CC Casper - Apollo - this is Houston. You copy?

07 13 04 03 CMP Yeah. That's the first we'd heard from you.

07 13 04 05 CC Okay.

07 13 04 28 CC Okay. Ken, we're having a little trouble with our comm link, here. We'll get back to you in a minute.

07 13 04 38 CMP Okay.

07 13 04 43 CC And we have a TEI-60 pad here, whenever you want to take it.

07 13 05 57 CMP Okay, Tony. Ready for your TEI-60 pad.

07 13 06 00 CC Okay. TEI-60, SPS/G&K; 38581; plus 0.67, plus 0.98; 192:34:58.71; plus 3035.0, plus 0582.1, minus 0127.8; roll's 181, 088, 013. The rest is NA. Comments: GDC align, Sirius and Rigel; roll align, 131; pitch, 029; yaw, 016. Ullage, two jets, 17 seconds. And the longitude at T_{ig} is minus 171.96. That's it.

07 13 07 36 CMP Okay, Tony. TEI-60 pad, SPS/G&N; 38581; plus 0.67, plus - plus 0.98; 192:34:58.71; plus 3035.0, plus 0582.1, minus 0127.8; 181, 088, 013. Sirius and Rigel are set stars; roll align, 131; pitch, 029; yaw, 016. Two jets, 17 seconds. Longitude at T_{ig} , minus 171.96.

07 13 08 19 CC Okay. Good readback. And we'd like you to go ACCEPT, and we'll update your state vector and send up the jet monitor. And we'll go ahead and activate it.

07 13 08 33 CMP Okay. Understand you'll update the state vector and activate this jet monitor when you get it set up.

07 13 08 42 CC Roger.

07 13 08 49 CMP Are you going to spend all day there, Tony?

07 13 08 54 CC Oh, my wife's gotten so tired of me being around the house, she just sent me out. I might as well stay here. Gee, I was in 2 hours today.

07 13 09 03 CMP Get serious. I'll be darned.

07 13 09 15 CC Jerry, here, says he hasn't had a chance to congratulate you on an outstanding job up there, so the - this whole team's sending up a "Well done."

07 13 09 28 CMP Hey, man. We really appreciate the stuff they've been doing for us, I'll tell you. We're gonna have to get a thing going at the - at the place down there when we get back.

17 13 09 40 CC Roger. Everybody - everybody agreed with that in a hurry.

07 13 09 53 CC He calls it a happening.

07 13 10 15 CC Okay. And, John, could you go ACCEPT, please?

07 13 11 58 LMF Houston, 16.

07 13 11 59 CC Go, Charlie.

07 13 12 04 LMP Hey, Tony, how about a few words on what the general plan is for tomorrow?

07 13 12 10 CC Okay; stand by 1, and I'll get them ready.

07 13 13 08 CC Okay, Apollo 16. For tomorrow, we'll give you a Flight Plan update in the morning, but just a resume here. We'll have you wake up at 189:30. That'll give you a good night's sleep, there. And we'll transfer back over the LM and get the rest of the gear back over and activate the LM. Come back to the command module and don the suits, and jettison the LM, and jettison the satellite. And towards the end of the day, we'll do a TEI. We've got a plan for using the mapping camera and altimeter most of the - I think it's most of the day. And we have some pan camera passes also. We'll get the details on that up tomorrow.

07 13 14 11 CMP Okay, we're not going home with any blank film, are we, Tony?

07 13 14 26 CC Okay, Ken. All the pan will be used up, but it looks like we'll have several hundred feet of the mapping camera.

07 13 14 36 CMP Okay.

07 13 15 10 CDR Well, one thing about it, Tony with one suit on and one suit off a day, it - you don't have to worry about your exercise periods.

07 13 15 20 CC You're not going to wear out the ropes tomorrow, huh?

07 13 15 32 CDR Doing the suit donning and doffing is the equivalent of wearing out a set of ropes.

07 13 15 37 CC I believe it. You guys will be all set for a Houdini act.

07 13 15 45 LMP Hey, Tony, did - Tony, did you say we get up at 8 - 189:30?

07 13 15 54 CC That's affirmative. It's 181:27.

07 13 16 01 LMP That's amazing. That's what I was just looking at.

07 13 16 08 CC Don't you think you can sleep that long? Golly, I'd think you'd sleep 12 hours.

07 13 16 26 CC And y'all have an estimate on when you'd be ready to go to bed?

07 13 16 35 LMP Probably - I - we just started eating.

07 13 16 39 CC Okay. And you can go back to BLOCK, and your EMP is running.

07 13 17 07 CC And our plan here is - once you get to bed, we'll do all we can to not disturb you until it's necessary to meet the schedule for tomorrow.

07 13 17 25 CDR Which is 189:30, right?

07 13 17 30 CC We may have to - -

07 13 17 31 CDR If we stay up all night, tomorrow morning we're gonna be awake at 189:30.

07 13 17 36 CC Okay.

07 13 17 43 CC There's some slop in that, John. We may be able to even slide that some.

07 13 17 56 CDR I'd just as soon get up a couple of hours earlier and use the mapping camera film.

07 13 18 09 CC You're really socking it to us here.

07 13 19 23 CC I wonder if you could give us an estimate on how much time you're going to need in the LM tomorrow before you get to the LM activation.

07 13 19 42 CDR Around 30 minutes would probably do it, Tony.

07 13 19 46 CC Okay.

07 13 20 24 CDR ... tomorrow, this ...

07 13 21 30 CC Incidentally, John, you got three dots from the Cape.

07 13 21 39 CDR Now you're talking.

07 13 22 24 SC (Laughter)

07 13 22 32 CC Apollo 16, somebody may be on VOX, there. Every once in a while, we have you keying down here.

07 13 23 58 LMP Thank you, Tony. We appreciate it.

07 13 24 23 CC And, Apollo 16, we were a little late on acquisition, there. We'd like you to verify that your HIGH GAIN's set up on zero PITCH and YAW 170.

07 13 24 39 CMP That's where she is. We saw you with a low signal strength, and -

07 13 24 50 CC Okay.

07 13 24 52 CMP Okay, but we're - we're in AUTO instead of REACT [sic].

07 13 24 58 CC Okay. Understand.

07 13 25 01 CMP Which accounts for it.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 13 32 07 CC Okay, Apollo 16, if you have a chance, there,
we'd like an E-MOD.

07 13 32 19 CMP On the way.

07 13 32 21 CC Okay.

07 13 35 14 CC And, Apollo 16, we've got all we need for the
night. Why don't you press on through there and
then, your presleep, just record the read-outs.
Don't bother sending them down, and we won't
bother you anymore. Just hit the sack. See you
in the morning.

07 13 35 41 CMP Roger. As the Sun sinks slowly in the west, we
bid a fond farewell to all MCC.

07 13 35 50 CC Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 14 43 XX BEGIN LUNAR REV 56

07 16 42 XX BEGIN LUNAR REV 57

07 18 40 XX BEGIN LUNAR REV 58

REST PERIOD - NO COMMUNICATIONS

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 20 39 XX BEGIN LUNAR REV 59

07 21 18 14 CC Apollo 16, Houston.

07 21 18 51 CMP Hello there.

07 21 18 52 CC Good morning.

07 21 18 59 CMP Already?

07 21 19 03 CC Were you still snoozing?

07 21 19 08 CMP You betcha.

07 21 19 16 CC How's your writing arm this morning?

07 21 19 23 CMP Now, now.

07 21 19 33 CDR Wait until he gets the sleep out of his eyes.

07 21 19 38 CMP Okay. The first thing I want to do, Hank, is to check on the lithium canister. I got - I had some trouble getting that one out of - out of B last night; and let me go down and check that other one before I do anything else and make sure I don't get it stuck. These things are swelling a little bit now, and they've been a little - a little difficult to get to.

07 21 20 01 CC Roger. Copy.

07 21 20 40 CDR Okay, Houston. Charlie's going off biomed here for a while.

07 21 20 45 CC Roger.

07 21 21 17 CDR Ken really had a hard time getting that LiOH canister out last night. He had to wiggle it back and forth about 20 times and go - and come forward and then he'd push it back, come forward, and push it back. Finally got it worked out of there. But what he was worried about and what - what worried me is, is there a possibility of busting that nylon strap on there off? In which case you'd probably never get it out.

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07 21 21 50 CC I don't know, John. I'll question them on that.

07 21 21 56 CDR Okay. I think I remember breaking off one some-time a long time ago, and I just wondered if they'd beefed that thing up any.

07 21 22 25 CC 16, Houston. Is the A side free?

07 21 22 35 CMP I just checked them, Hank. They're - they're both okay now. I had a little trouble getting the one out - let's see, which one was it last night? It was the - it was the B, and I had just a little trouble getting the one out yesterday morning, or whenever it was we made the other change of A. But it was just a little sticky; it wasn't like this. I think we may have had a little extra humidity because the windows are starting to fog up more often now.

07 21 23 06 CC Roger.

07 21 23 39 CMP Okay. I killed the jet monitor, and I - I am ready to copy.

07 21 23 52 CC Okay, Ken. The first change occurs at 189:46 in the Flight Plan.

07 21 24 08 CMP Okay.

07 21 24 09 CC Okay. At 189:46, add "IMAGE MOTION, ON; MAPPING CAMERA, ON," and you might make a note there to perform this before opening the mapping camera/laser altimeter cover. What we're going to do here is to turn the camera on before we open the door and use the gamma-ray boom as a reference. They want to try to get an idea of what's happening on this extend/retract on the mapping camera; and, later on, we'll do the same thing. We'll turn the camera on and retract it all the way with it running and close the door before we turn it off.

07 21 24 54 CMP Aren't you guys clever? Okay.

07 21 24 59 CC Okay. At 189:51, delete "IMAGE MOTION, ON; and delete MAPPING CAMERA, ON, T-start." Change the "IMAGE MOTION, INCR - -

07 21 25 15 CMP Okay. I'd better get my maneuver going here before we do anything else.

07 21 25 21 CC Okay. Press on with that, and let me know when you're ready to go again.

07 21 25 29 CMP Okay. Would you check my LOGIC POWER, on, on 181, please?

07 21 25 43 CC Yes, sir.

07 21 25 57 CMP Okay. I didn't think I got to them last night to turn them off.

07 21 26 00 LMP ...

07 21 26 02 CMP There's two guarded switches down there.

07 21 26 05 CC Ken, are you on VOX this morning?

07 21 26 06 CMP On the bottom row. Yeah.

07 21 26 11 CMP Yes, sir. Thank you.

07 21 26 29 CMP Okay, Hank. While I'm getting this roll going, why don't you give me some more of that stuff? The last thing I copied was the deletion at 189:50 of the IMAGE MOTION and the MAPPING CAMERA, ON.

07 21 26 41 CC Okay. And the "IMAGE MOTION, INCREASE," change the "Barber pole" to "Barber pole plus 1."

07 21 26 51 CMP Okay. That's BP plus 1.

07 21 26 53 CC And at 189:57, "Charge battery A."

07 21 27 07 CMP Okay. Charge battery A at 189:57.

07 21 27 13 CC Okay. On the next page, at 190:15, P52 - -

07 21 27 19 CMP Before I leave that, Hank, do you have a camera stop time?

07 21 27 31 CC Stand by 1.

07 21 27 47 CC Casper, would you give us ACCEPT, please?

07 21 27 54 CMP You have it.

07 21 27 55 CC Okay. We're going to send you a new state vector; and FAC advises that stop time will be read up with the updates.

07 21 28 05 CMP Okay.

07 21 28 17 CC I think - you - you got your roll attitude now?

07 21 28 23 CMP Yeah. Let me get that straightened out first.

07 21 29 32 CMP That's good.

07 21 29 42 CMP Hank, there's no way we're going to make it to this attitude on time.

07 21 29 48 CC It's not critical, Ken.

07 21 29 50 CMP I guess that's agreeable with everybody. Okay. But I assume that - we might just as well hold off on this camera extension and all that until daylight. It looks like it's going to be dark or do you want to do that right now while we're - -

07 21 30 07 CC We want to - we want to do it now.

07 21 30 09 CMP - - do that, and get this attitude, and take whatever lighting happens to be out there? Okay.

07 21 30 19 CMP Okay, let me - it'll work. No, it's still daylight. Make sure. It should be. Yeah. Okay. Get *** this dirty?

07 21 30 51 CMP Yeah, you got it all dirty.

07 21 31 01 CMP IMC is ON; it's barber pole and - gray. The MAPPING CAMERA is coming ON -

07 21 31 13 CMP MARK. The LASER ALTIMETER door is coming open -

07 21 31 21 CMP MARK it. Barber pole, gray. MAPPING CAMERA is going to EXTEND -

07 21 31 40 CMP MARK. It's barber pole and running. While I'm here, I'll get the GAMMA RAY SHIELD, OFF, and the LASER ALTIMETER, ON.

07 21 32 09 CMP Okay, IMAGE MOTION is set, and ready to copy some -
some more.

07 21 32 16 CC Okay, at 190:15. Next page. P52, option 3 -

07 21 32 25 CMP Go ahead.

07 21 32 27 CC - - followed by GDC align.

07 21 32 38 CMP Okay.

07 21 32 40 CC Okay. The next thing occurs at 191 hours. I guess
you can get it right at the top of that page, "CMP,
open LM hatch."

07 21 32 58 CMP Okay.

07 21 33 00 CC At 191:05, may have to use an arrow to get it in
there, "IMAGE MOTION, INCREASE, barber pole, ON."

07 21 33 14 CMP Okay. IMC to barber pole at 191:05.

07 21 33 22 CC Roger. And for planning, about 191:06, we plan to
start reading up the LM changes if we can get
through these. At 191:16, from that MSFN up-link
block, delete the LOPC target-load information
there in the desired orient.

07 21 33 50 CMP Okay. That's deleted.

07 21 33 52 CC AT 191:16, you'll have to use an arrow again - -

07 21 33 55 CMP For planning purposes, what block should the LM
guys have available to write in?

07 21 34 00 CC Okay. The LM Contingency Checklist and the LM
Timeline.

07 21 34 07 CMP Okay. We'll have those out.

07 21 34 12 CC Okay. 191:16, we want the "IMAGE MOTION to - -

07 21 34 17 CMP Go ahead.

07 21 34 18 CC - - barber pole plus 4."

07 21 34 23 CMP Okay, BP plus 4 at 191:16.

07 21 34 28 CC And delete the update block at 191:18.

07 21 34 38 CC HIGH GAIN to AUTO.

07 21 34 50 CMP You've got it.

07 21 34 53 CC Okay, and I'll - stand corrected on that update block. We'll give you a TEI pad there.

07 21 35 04 CMP Okay.

07 21 35 06 CC Okay. At 191:33, delete everything down to orbital science photos.

07 21 35 23 CMP Okay. Well, that one I can do.

07 21 35 26 CC Okay. And at 191:50, here's where we're going to close that mapping camera up; I guess the best thing to do is just scratch through all that stuff there and write out to the side the order we want to get it in, which is as follows: "LASER ALTIMETER, OFF; MAPPING CAMERA, RETRACT; MAPPING CAMERA/LASER ALTIMETER COVER, CLOSED - that's after it's retracted, of course - "MAPPING CAMERA, OFF." And I think you're at attitude now, Ken, if you want to start your P20. It's not at attitude, stand corrected.

07 21 36 17 CMP Thank you, sir.

07 21 36 20 CC Yeah, it must have bumped a stick there.

07 21 36 26 CMP *** Thank you. I'm glad somebody is awake this morning.

07 21 36 46 CC Okay. After the "MAPPING CAMERA OFF, wait 30 seconds, MAPPING CAMERA, STANDBY; IMC, OFF." They want to do a VERB 49 to the LM comm, deep-space measurement attitude to arrive at 192:10. The attitude is 322, 115, 305. HIGH-GAIN angles for AOS acq: PITCH, minus 35; YAW, 238. And along about 213:00, beg - Stand corrected - 191:55, want to start transferring equipment from the LM.

07 21 38 10 CMP Okay. Now, give me that time that you've got to be in attitude again. I didn't get that one.

07 21 38 17 CC 1 - 192:10.

07 21 38 29 CMP 192:10. Okay. And you didn't say anything about the X-RAY. Do you want it to go to STANDBY?

07 21 38 43 CC We want to leave the X-RAY, ON.

07 21 38 49 CMP Okay. So all the rest of that block up there, I delete, right?

07 21 38 52 CC That's affirmative.

07 21 38 55 CMP And leave the alpha-particle cover open and all that. Okay. I'll just delete all those guys, and let me read you what I have. That's the "LASER ALTIMETER - Starting at 191:50 we'll go "LASER ALTIMETER, OFF; MAPPING CAMERA/LASER ALTIMETER when it's in, the "MAPPING CAMERA/LASER ALTIMETER COVER" is to "CLOSE," the MAPPING CAMERA" then comes "OFF," and we go through a little ditty of "30 seconds, STANDBY; IMC, OFF." While we're doing this, we can do a VERB 49 to the attitude 322, 115, 305; AOS HIGH GAIN angles will be PITCH, minus 35; YAW, 233. I need to be in attitude by 192:10. Starting about 191:55, you want to start transfer of LM equipment.

07 21 39 50 CC That's affirmative. Now, if you'll make a little note there, go to 214 hours, page 323.

07 21 40 07 CMP Go to - Say again?

07 21 40 10 CC 214 hours, that's on three hundred and - page 323.

07 21 40 21 CMP Ah-hah.

07 21 40 33 CMP Okay.

07 21 40 36 CC Okay. I'm going to give you both times. If you like, you can write in the - your clock times over these. 214 hours becomes 192:10 -

07 21 40 46 CMP Hey, Hank - Hank, I'm getting - I'm getting confused. Would you give an overall picture, so that I can have some - some perspective of what we're doing. It - it'd sure make it a lot easier. I can copy this line by line, but I'll never - never keep it all straight here if -

07 21 41 02 CC Okay. We're gonna do the items in the Flight Plan up to 192:00, and then we're gonna go over to 214 hours in the Flight Plan and pick up these items in there - until we get over to about 216:15. And then we're gonna jump back to 176:55, and pick up the LM jett procedures. And when we get through with that, we're gonna jump back to - -

07 21 41 41 CMP Okay, now - just a second - -

07 21 41 42 CC - - 217 - for the subsat - -

07 21 41 43 CMP - - Wait a minute - wait. Let me absorb what you're saying. Okay, Hank. When you say you're gonna pick up these things over here at rev 72, I guess you're looking at all these visual targets and photo targets.

07 21 42 08 CC Actually, we're scrubbing most of that.

07 21 42 10 CMP And, of those - Oh, okay. All right. I was gonna say, because we're in - we're on a groundtrack that isn't very compatible with some of those things. Okay, so then you're gonna do that and then you're gonna go back and do the LM jettison, and then come back up to the subsat?

07 21 42 29 CC Roger. And we're trying to work at a - -

07 21 42 31 CMP Oh, okay.

07 21 42 33 CC - - clock update in here somewhere to get all this to look right.

07 21 42 37 CMP (Laughter) Okay - -

07 21 42 40 CDR That'll be the trick of the year.

07 21 42 42 CMP Can you do that with a clock sync? You're even better than I thought you were.

07 21 42 46 CC Nobody down here - -

07 21 42 47 CMP All right, let me - -

07 21 42 48 CC - - even knows what time it is now.

07 21 42 50 CMP - - change the - the - Don't tell us things like that. Let me - all right, let me - let's - so we can make sure we're all talking in the same hours, I would like to do like we did the other day and - and correct the - the - times in the Flight Plan that are printed now to be the times that we'll really do it. And then you talk to me in times that we'll really do it and forget what it says in the Flight Plan.

07 21 43 22 CC Okay. I'll do that.

07 21 43 24 CMP That worked out real good with the rendezvous. Okay, so now the pages I need to fix the times on are going to be - starting at page 323.

07 21 43 34 CC That's affirmative, and 214:00 becomes - -

07 21 43 37 CMP And 214 hours will be - -

07 21 43 39 CC 192:10.

07 21 43 43 CMP 19 - uh-oh. 192:10?

07 21 43 47 CC That's affirmative. You have to subtract 21 hours and 50 minutes from these times.

07 21 43 53 CMP (Laughter) SIM SUP is having a field day. Okay. This will take me a few minutes, but I'll - I'll get there.

07 21 44 09 CC I'm considering resigning after this shift.

07 21 44 15 CMP (Laughter) Okay. Just a second, Hank, let me - I'll - I'll get this page done, and then we can work on it, and I'll be right with you.

07 21 44 42 CMP Okay. Let's see.

07 21 44 56 CC Ken, can we get a SHIELD on, GAMMA RAY?

07 21 45 01 CMP Yes, sir. Try 9-A.

07 21 45 08 LMP It's on, Ken.

07 21 45 09 CMP Thank you. It's on, Hank.

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07 21 45 25 CC You're at attitude now, Ken.

07 21 45 31 CMP Thank you.

07 21 45 50 CMP Hang on a second.

07 21 45 52 LMP Just a minute, Ken.

07 21 45 55 CMP How about L-3?

07 21 45 56 LMP L-3.

07 21 46 00 CC Say again, Ken.

07 21 46 06 CMP I'm sorry. We got - we got a lot of things going at one time here. Okay. I've got page 323 times corrected now, if you want to - if you want to correct those - those events before I work on the next page?

07 21 46 26 CC Okay. At 192:10, delete the galactic photo sequence.

07 21 46 39 CMP Okay.

07 21 46 42 CC In fact, delete everything in that page, and then, at 192:23, IM activation begins. Actually, everything in the left-hand column, I should of said, should be deleted.

07 21 47 10 CMP Okay. IM activation goes where all that other stuff is.

07 21 47 14 CC That's affirmative.

07 21 47 23 CMP Go ahead, Hank.

07 21 47 25 CC Okay. The next column, delete all the P20 stuff; and at "Acquire MSFN," the HIGH GAIN - -

07 21 47 34 CMP Okay. Now, what about this Skylab contamination at the bottom of the page?

07 21 47 37 CC Delete.

07 21 47 48 CMP Okay. Start over again now in the next column.

07 21 47 51 CC Roger. Delete the P20. The MSFN angles are minus 35, yaw, 238.

07 21 48 08 CMP Okay.

07 21 48 09 CC Delete the orbital science prep - the configure camera, et cetera, and the orbital science. At 192:55 there, we're going to up-link to the LM - just for your information - a state vector lift-off time P23 - P30 load and P99.

07 21 48 40 CMP I hope that's not a lift-off time.

07 21 48 44 CC Negative.

07 21 49 00 CC The computer is yours.

07 21 49 03 CMP Okay. Thank you.

07 21 49 07 CC At 193:04, we're gonna give you the LM jettison pad.

07 21 49 24 CMP Okay. And where will that go? We're gonna go back to the other - the other part of the book?

07 21 49 32 CC Roger. You'll copy that at - on page 283. That's at 176:15 in the original Flight Plan.

07 21 49 42 CMP (Laughter).

07 21 50 02 CMP If you pull it out, I think you'll probably find more behind it there. Okay, Hank.

07 21 50 14 CC Okay. On the next page, we need to change all those times again. 215 becomes 193:10.

07 21 50 42 CMP Yeah. Let me see what time that was.

07 21 50 44 IMP It's just 10 minutes.

07 21 50 46 CMP Okay, we're - oh - let me - which battery?

07 21 51 02 CMP Okay. We're charging battery A.

07 21 51 05 CC Roger.

07 21 51 09 CMP There.

07 21 51 50 CMP Go ahead, Hank.

07 21 51 52 CC Okay. At - at 193:10, VERB 49 maneuver to LM jett pad attitude.

07 21 52 24 CC Delete the shape target load there in the MSFN up-link.

07 21 52 41 CMP Okay.

07 21 52 42 CC Delete the targets - the orbital science stuff there - delete the rest of the things in that column; and, at 193:23, begin suit donning.

07 21 53 20 CMP Okay. And we're all waiting with bated breath to find out what time you end suit donning.

07 21 53 30 CMP 206:25.

07 21 53 35 CC I guess just when the end is end. I - Let's - let's lock here at the next column, 193:40.
Delete - -

07 21 53 41 MS (laughter) ... discouraging.

07 21 53 42 CC Delete down through "MAPPING CAMERA LASER ALTIMETER/COVER, CLOSE."

07 21 54 04 CMP Okay. Are you - are you sure we wouldn't do better starting with a clean page like we did the other day once?

07 21 54 11 CC I've been thinking the same thing.

07 21 54 13 CMP I don't mean to be facetious about that, Hank - because it seems like I'm doing more deleting than I am writing, and it's getting so that - it's getting so confused, I may miss writing down - You know, when it comes time to execute, I may miss something.

07 21 54 39 CC Well, if we had it to do over, I think this is what we ought to do. This thing was just handed to me a few minutes ago, and we're trying to straighten it out. You want to continue with this, or do you want to try to salvage - -

07 21 54 50 CMP Okay. Well, let's - yes, sir. Let's press on. Let's press on to this sequence until we get to LM jett, and see how it works.

07 21 55 00 CC Okay. At - at 193:46, and I guess you're just going to have to write this in the left-hand column and point over there because that's what I had to do. We want "MASS SPEC, ION SOURCE, OFF; MASS SPEC EXPERIMENT to STANDBY."

07 21 55 23 CMP Okay, Hank. Hank, let me - let me regroup now. I got everything deleted out of all that stuff that's on there down through "MAPPING CAMERA COVER, CLOSE." That leaves the alpha cover to be closed. Is that correct?

07 21 55 41 CC That's correct.

07 21 55 59 CMP Okay. Now read me the write-in.

07 21 56 02 CC Roger. It's "MASS SPEC, ION SOURCE, OFF."

07 21 56 10 CMP At what time?

07 21 56 11 CC 193:46. "EXPERIMENT to STANDBY." And then there's a little caution, wait 5 minutes before retracting mass spec boom. "GAMMA RAY, RETRACT; X-RAY to STANDBY; and then at 193:51, which is your 5 minutes, MASS SPEC, RETRACT."

07 21 57 00 CMP Okay. So I've deleted all that stuff that's there, except for the alpha cover close. At 193:46, we'll take the mass spec ION SOURCE, OFF, and EXPERIMENT to STANDBY. Start our 5-minute time. The gamma-ray boom gets retracted, the X-RAY goes to STANDBY, and after 5 minutes, I retract the mass spec boom, and the alpha-particle cover will come closed.

07 21 57 27 CC That's affirmative. And then you'll do the - you'll do the purge line HEATERS, ON, configure for the dump, and the rest of the things there.

07 21 57 38 CMP Okay.

07 21 57 40 CC And on the next page, at 194:10 -

07 21 57 45 CMP Hey, Hank - Okay. This - This PGA donning, with things going on during it, bothers me a little bit. We - this PGA donning in our present configuration is - is a three-man effort, even if one man's job is to get in the corner and stay there - stay out of the way; and I'd like for us to do the minimum activity while we're putting those suits on.

07 21 58 26 CMP If we can do it in the LM, I guess that will relieve a lot of the load here.

07 21 58 33 CC Okay. I guess we're just gonna have to do the best we can, Ken, and we'll try to help as much as we can from down here.

07 21 58 43 CMP Okay. It's not so much a problem entirely, it's just keeping track of things, and you just - once a guy starts putting that suit on, he commands the rest of the volume in the spacecraft. It's a - that A7LB is a real - real interesting operation. If we can use the LM for it, that will help out a great deal.

07 21 59 06 CC I don't see why not.

07 21 59 11 CMP Okay. We'll plan to do that.

07 21 59 16 CC Okay. At 194:10, delete the P52 and the "P20, CMC MODE, AUTO, GDC align." Do the purges and dumps, delete the P30 remark there; and, at 194:23, we're going to close the hatches.

07 21 59 43 CMP Wait a minute. Did you say delete the dumps?

07 21 59 46 CC Negative. Do the dumps.

07 21 59 50 CMP Okay. Do the dumps and the purge, delete the P52, and the alignment and the F3C stuff.

07 22 00 01 CC Roger. And, at 194 - -

07 22 00 02 CMP Okay, now. Let me write the times on this page.

07 22 00 29 CMP Okay, Hank. Go ahead.

07 22 00 31 CC Okay. At 194:23, we've closed the hatches, and you do the "PURGE LINE HEATERS, OFF," and terminate the waste water dump; and, at this point, we're going to jump in the Flight Plan. I think that's as far as we ought to go on this rev. We're about 2 minutes from LOS. But, at this point, you're going to jump back to 176:55.

07 22 00 55 CMP Okay. You're starting to break up.

07 22 01 03 CC Okay. We'll - -

07 22 01 06 CMP If you'll tell me time bias to put on that page, I'll have that ready.

07 22 01 17 CC We'll catch that the next rev, Ken.

07 22 01 21 CMP Can you give me the time bias so we can - I can do that? Update the times on the page?

07 22 01 31 CC We weren't planning on doing that section. We were just going to do all those steps. There's about 45 minutes of stuff in there getting ready for the jett before we do it.

07 22 01 44 CMP Okay. How about the - if I'm standing by with a blank page and just let you read me a new time line.

07 22 01 54 CC We'll have it ready for you, Ken.

07 22 01 59 CMP Thank you, sir.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

07 22 37 XX BEGIN LUNAR REV 60

07 22 49 51 CC Apollo 16, Houston. Would you bring up the
HIGH GAIN, please?

07 22 51 49 CC Apollo 16, Houston. Could you give us HIGH GAIN?

07 22 53 31 CC Apollo 16, Houston.

07 22 53 38 CMP Go ahead.

07 22 53 42 CC Hello, there.

07 22 53 51 CC Would you like to finish the updates?

07 22 54 00 CMP Okay. Just a minute.

07 22 54 25 CMP Okay; Hank. I'm ready to copy. I think I need
the Updates Book.

07 22 54 31 CC Okay. In the form of review, Ken, when we get
to 192 hours, we're going to flip over to what
was originally 214:00 in the Flight Plan, and
that's going to become 192:10. There's a
10-minute pad in there. And, at 192:10, we work
through those changes down to the point where I
read you "Start hatch closing" at 194:23. And,
at 194:27, we want to jump back to the "LM jett
procedures," and there is only one change in that.
So, I think that's the best place to go, which was
at 176:50, originally.

07 22 55 29 CMP Roger. You want to go at 194:27 - is when you
want to go the "LM jettison procedures?"

07 22 55 38 CC Roger. And, that's at 176:50 in the original
Flight Plan, and 176:50 becomes 194:27.

07 22 55 53 CMP Okay; now stand by.

07 22 56 15 CMP Okay; 176:50 becomes what, Hank?

07 22 56 18 CC 194:27.

07 22 56 33 CMP Okay; that means that all these things now are gonna be off by this screwy number. Is that correct?

07 22 56 41 CC Roger. Until we get - That makes LM jett come out on time by going to this screwy number here, 194:27. And, we pick up there, and we don't - -

07 22 56 51 CMP And, that's the equivalent to 176:50?

07 22 56 55 CC That's affirmative.

07 22 57 00 CMP Okay; I have crossed out 176:50, and I've called it 194:27.

07 22 57 06 CC That is correct. Now we do not - -

07 22 57 10 CMP Okay.

07 22 57 11 CC We delete the "VHF AM" and the "Configure the camera" business, and we pick up with the hatch closing. We already start with that. Now, you can start those things early. There is a - a little more time in here than was originally in the Flight Plan. And you don't have to do the - -

07 22 57 28 CMP Yeah. We're going to need a little more with those suit donnings.

07 22 57 32 CC Okay; and the "DIRECT O₂ VALVE, closed," you can delete that.

07 22 57 46 CC Now, other than changing your time columns like, turning the page there, the 177 there becomes 194:37. Everything is good through the sep maneuver. The only change is that at 194:49, the NOUN 81, make - -

07 22 58 06 CMP Okay; wait a minute. Let me get the time column changed.

07 22 58 56 CMP Okay. I got the time changed on the page. Now you can read me some times.

07 22 59 01 CC Okay; 194:49, "The NOUN 81 becomes minus 2.0 and 00." The CSM sep is at 2-foot-per-second retrograde. This is so we can get the CSM out in front of the LM for TEI.

07 22 59 29 CMP Okay. Is the LM not going to impact before we do TEI?

07 22 59 38 CC I think the planning is now for about 3 hours after TEI. What they need to do is wait for the 210 antenna to come up so they can get data - -

07 22 59 47 CMP We're not even going to get pictures of it, huh?

07 22 59 51 CC That's affirmative; no pictures. Okay; at 195:18 - -

07 23 00 01 CMP All right.

07 23 00 04 CC - - after "Roll (4), off," - that's the completion of the little block following the sep, you can insert a remark "Doff PGA's," and at this time, we jump back over to what was - -

07 23 00 20 CMP Wait a minute. I haven't found "Roll (4), off" yet.

07 23 00 22 CC Okay, that's in the block after P00, after CSM sep 195:17.

07 23 00 31 CMP 195:17 - I have as the first number on the top of the page.

07 23 00 39 CC That should be 195:07.

07 23 00 45 CMP Okay; I mislabeled it. Thank you. Let me redo them.

07 23 01 10 CMP Okay; now, at 195:17, say again?

07 23 01 13 CC Okay; 195:18, after the completion of that little block, - that ends with "Roll (4), off," enter a little comment, "Doff PGAs," and go to page 327. That was originally 217 hours in the Flight Plan.

07 23 01 42 CMP If I ever find my way through here.

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07 23 01 56 CMP Okay; I've got page 307.

07 23 02 01 CC Are you there, now?

07 23 02 07 CMP Yes, sir. Now, we want to do all these steps that are down here at 195:20 or so, don't we? It says "Doff PGAs" there, but we really want to do all these things that are in that group, right?

07 23 02 28 CC Stand by.

07 23 03 04 CMP I tried to dry them out.

07 23 03 24 CMP There's a towel that's right over your left shoulder, if you need it. If you'll wrap it around there.

07 23 03 43 CMP Oh, isn't space flight glamorous.

07 23 04 03 CMP Stick them into the - -

07 23 04 10 CC Ben, I guess I meant for you to do everything there except doffing the biomed harness, and the - of course, delete the up-links and the other stuff.

07 23 04 26 CMP Okay. Then, we go to page 327.

07 23 04 30 CC That's affirmative.

07 23 04 31 CMP Is that right?

07 23 04 32 CC And 217 hours becomes 195:10, and that's the time bias from then on, if you want to start updating your times. And, where we come back in there is at the place - place where we're supposed to up-link the vector. Where we start there is 95:16.

07 23 04 56 CMP Okay. Now, 217 is what?

07 23 05 01 CC 217 becomes 195:10.

07 23 05 17 CMP Okay. And then we follow the rest of the Flight Plan all the way out?

07 23 05 20 CC Roger. We start at 195:18, actually. We don't do those up-links. And, we pick up there at 195:18 and then from then on, we just follow sequentially - with all those little - -

07 23 05 36 CMP Why is it that there is no up-link in that?

07 23 05 45 CC Well, I've been advised that there's another Flight Plan change coming that's going to move the subsat blocks back a little bit, and to get in some mapping camera stuff. Okay; I got it straight now. We will not track the subsat.

07 23 06 05 CMP You will not track the subsatellite. Not even a little bit. Is that correct?

07 23 06 13 CC That's affirmative. They're going to run the cameras to try to use the film.

07 23 06 35 CMP All right, Hank. How about doing one thing for us, then? If this is going to be the basic time line, and we're going to use these pages, is it reasonable to get you to give us a clock sync somewhere - so we - I'm afraid if I keep scratch - scratching out times and all in here, I'm going to miss something important.

07 23 06 57 CC Well, Ken, to fill you in on a little bit here, we originally planned a clock sync and that's why some of the confusion this morning. Then we found out that it wouldn't work, because it put the lift-off time prior to time of midnight and wasn't sure it would work, and we couldn't find out in time enough before we had to start giving you this up through the LM jett, so we're going to work on that possibility.

07 23 07 24 CMP Well, okay. But for the time being, let's - let's just take one plan and run with it, and that is to update the times on every page.

07 23 07 32 CC That's what we're doing.

07 23 07 34 CMP Once we have - Yeah, okay. Okay. All right - -

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07 23 07 48 CC You have your NOUNs 93, Ken?

07 23 07 49 CMP -- you want to talk to the LM guys while I do some page updatings? Huh?

07 23 07 54 CC Do you have your NOUN 93s from the P52?

07 23 07 56 CMP What do you need, Hank? Ch, you want our -- Well, let me find it. I don't know what page that's on now.

07 23 08 21 CMP You put them up there. How's the DELTA-P?

07 23 08 32 CMP Okay.

07 23 08 52 CMP Here we go, Hank. There was minus 0.1, plus 0.002, plus 0.095. That was torqued at 190:21:00.

07 23 09 08 CC Roger; copy. And, we need barber pole, plus 4.

07 23 09 20 CMP Yes, sir. Yes.

07 23 09 26 CC And, Ken, the last thing, if you can give us A/C ROLL, and we're -- then we'll be ready for the LM updates.

07 23 09 38 CMP Okay; A/C ROLL.

07 23 10 17 CC 16, Fredo's going to read up the LM changes, if you give us the word whenever you're ready to copy.

07 23 10 26 CMP Okay, stand by. You ready to copy the -- the -- Yeah.

07 23 13 35 CMP Hank, I'm a little confused. It looks like in places we've got a 12-minute difference, and in other places we've got a 10-minute difference from the times that are marked on here. Is that correct? Did I interpret that properly?

07 23 13 49 CC Yeah, that's affirmative. We go back to the -- to the LM jett procedures. There's just -- You know, we fitted in to fit with the actual jett time, so that time difference is correct.

07 23 14 06 CMP Okay. Does that mean things like AOS and all that will move the same amount, or is that different?

07 23 14 14 CC We plan to give you updates on those as we go along.

07 23 14 21 CMP Okay.

07 23 14 54 CC 16, Houston.

07 23 15 00 CMP Go ahead. Go ahead, Fredo.

07 23 15 03 CC Okay; we got quite a batch to give you here out of the Contingency Book in the time line. And I guess you'll have to drag out a different color writing utensil than you used yesterday, because you're going to be writing over some things you already did on the Time Line Book.

07 23 15 24 CMP Well, right now, Fredo, we'll - we'll have to stand by for a minute.

07 23 15 29 CC Okay.

07 23 15 50 CMP We've got all colors, especially black, Fredo.

07 23 16 00 CC That's nice.

07 23 16 20 LMP Okay, Fred.

07 23 16 24 CC Okay. Is this Charlie?

07 23 16 39 LMP How's that, Fred? How are you reading now?

07 23 16 42 CC Okay; loud and clear, Charlie. And, where you need to be is on page 2-1, phase 1, of the Modular Activation.

07 23 16 55 LMP That's where I am.

07 23 16 58 CC Okay. Right at the top there, when you IVT to the LM, there's a note that says "Use the CSM comm umbilical." As bad as that LM's comm has been, we're not really going to be in good shape there until almost before LOS, when we get to steerable attitude. Okay; and otherwise there - -

07 23 17 20 LMP Okay; what do you mean?

07 23 17 22 CC Okay; in step 1, you can scratch the second line, and write in "Carry CSM O₂ hose across."

07 23 17 39 LMP Okay.

07 23 17 40 CC Okay; at the end of step 2 - And incidentally, we need the hose because we're not going to bring on the suit fans - At the end of step 2 there, put a note in that says to give us the CE configuration on 11 and 16. And I guess all we really need is the ones closed, because there shouldn't be too many that are closed.

07 23 18 13 LMP Okay.

07 23 18 16 CC Okay; item 3, first line, make that "ASCENT H₂O," and the second line, make it the - -

07 23 18 26 LMP That's reasonable.

07 23 18 28 CC Yes. And likewise, second line is number 1 ASCENT O₂.

07 23 18 36 LMP Okay.

07 23 18 37 CC Okay; you can scratch the "CABIN REPRESS to AUTO," the next line, and substitute "PRESS REGS A and B to EGRESS," and that is indicated as being a verify.

07 23 18 55 LMP Okay.

07 23 18 57 CC We'd like to retain the next line there, that "CABIN REPRESS breakers," so you've got the caution and warnings.

07 23 19 07 LMP Go ahead.

07 23 19 09 CC Okay. Another little block you might write out to the left there, label it "Transfer items." And, maybe you've already done some of these, but this will take care of the ones we missed having you do yesterday. And they're the PTK, the Flight Kit, the Flight Data File, the purse with the unused food, and the used fecal-urine bags, and lastly the DSEA.

07 23 19 57 LMP Okay.

07 23 19 59 CC Okay; beside the subheading near "Power transfer" write in 192:15.

07 23 20 10 LMP Okay.

07 23 20 12 CC Okay, now that whole block that says "If no CSM power," we're going to use to effect the transfer except we're kind of changing it around, so you can just scratch that "If no CSM power." Go down - -

07 23 20 28 LMP Okay.

07 23 20 30 CC - - go down to the fourth line and change the "ASCENT ECA CONTROL, close" to "ASCENT ECA, close."

07 23 20 45 LMP Okay.

07 23 20 46 CC After that, add a step that is "CROSS TIE BUS and BALANCE LOADS, open."

07 23 21 03 LMP Okay.

07 23 21 04 CC Now, that's gonna temporarily wipe out the LMP bus, but don't worry about it. The next step is "BAT 5 NORMAL FEED, ON," so we'll get it back there. Okay - -

07 23 21 14 LMP Okay.

07 23 21 16 CC - - after the "BAT 5 step," add in, and you'll have to write it out to the left there, I guess, "CSM LM POWER, off," followed by "BAT 6 NORMAL FEED, ON, talkback gray."

07 23 21 39 LMP Okay.

07 23 21 41 CC Okay. Out beside "CB (11) and (16) EPS," scratch the first line there. That's "DESCENT ECA CONTROL, two, close."

07 23 21 52 LMP Okay.

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07 23 21 55 CC Okay, and then starting two lines down where it's "BAT 1 LOW VOLTAGE, ON," et cetera, just scratch the whole rest of those lines in that box.

07 23 22 07 LMP Okay.

07 23 22 10 CC Okay, below that, step 1, "Transfer to LM power," you can scratch all of those lines, all five.

07 23 22 19 LMP Okay.

07 23 22 21 CC Step 2, "FLOOD LIGHTS to ALL," but then scratch the next three lines.

07 23 22 31 LMP Okay.

07 23 22 34 CC Okay. Page 2-2, under step 1, you can scratch everything in parentheses.

07 23 22 44 LMP Okay.

07 23 22 46 CC Under step 2, line 2, scratch "DESCENT ECA CONTROL, close."

07 23 22 57 LMP Okay.

07 23 22 58 CC Then all four items that are under "CB (16) STAB/CONTROL," from there on, those four lines scratch.

07 23 23 10 LMP Okay.

07 23 23 13 CC Okay. Now, the next step 3 items, plus the block there about "When bus volts less than 27, high voltage taps," scratch all that clear on down on down to "ECS activation."

07 23 23 27 LMP Okay.

07 23 23 29 CC "ECS activation," step 1, third line, CB (11) - you can scratch - Stand by 1.

07 23 24 00 CC Okay, Charlie. That's correct. "CB (11) ECS SUIT FAN 1, close," scratch that line.

07 23 24 08 LMP I got it scratched.

07 23 24 10 CC Okay; and the circuit breaker below that, "GLYCOL PUMP, two, close," change the two to a one.

07 23 24 20 LMP Okay.

07 23 24 22 CC Okay; then the next two lines at the bottom there, "PRESS REG A and B," "SUIT GAS DIVERTERS," scratch those.

07 23 24 32 LMP Okay.

07 23 24 33 CC Add a line below that, "GLYCOL to PUMP 1."

07 23 24 41 LMP Okay.

07 23 24 43 CC Okay, ready for 2-3, and step 2, you can scratch the first line about "If LM is to be active," et cetera. And, just the PRIME EVAP "FLOW 1, OPEN." That's step 2, now.

07 23 25 04 LMP Okay.

07 23 25 06 CC Okay. "Configure AUDIO" block here, delete steps 1 and 2.

07 23 25 15 LMP Okay.

07 23 25 18 CC Okay; step 3, the second line, "COMMANDER AUDIO, close," scratch that one.

07 23 25 30 LMP Okay.

07 23 25 32 CC In its place, write in "SECONDARY POWER AMP, close."

07 23 25 40 LMP Okay.

07 23 25 43 CC Next line, "SIGNAL SENSOR, close," scratch that one.

07 23 25 48 LMP Okay.

07 23 25 50 CC Okay; let's go to step 4. On the S-BAND at - -

07 23 25 54 LMP Okay.

07 23 25 56 CC - - across there, it should read "PM SECONDARY" and change "PRIMARY to SECONDARY."

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07 23 26 09 LMP Okay.

07 23 26 11 CC Okay; the second line there, rather than "OFF/RESET," make it "RANGE."

07 23 26 19 LMP Okay.

07 23 26 20 CC And, rather than "LO," make it "HI."

07 23 26 27 LMP Okay.

07 23 26 29 CC And, since you're not gonna be plugged in, you can scratch that "Hot mike to MSFN."

07 23 26 36 LMP How about that.

07 23 26 41 CC Yeah, we'll really miss that. Okay, Charlie. The next line "S-BAND ANTENNA," we want "FORWARD." So, you can scratch the "or AFD."

07 23 26 56 LMP Okay.

07 23 27 01 CC Next block, "Caution and warning turn on." Under the "Warning" light, the "RCS A REG" - They put a parenthesis here; it's possible, you can scratch "RCS B REG."

07 23 27 21 LMP Okay.

07 23 27 23 CC Under "Caution" lights, you can scratch "PRE AMP."

07 23 27 28 LMP Okay.

07 23 27 31 CC Okay; and under the "GLYCOL" note, you can add two more caution lights, "RCS and ECS."

07 23 27 44 LMP Okay.

07 23 27 48 CC Okay; let's go to the circuit breaker page 2-4.

07 23 27 56 LMP Okay.

07 23 27 58 CC Let's go third row down. The change - -

07 23 28 04 LMP Okay.

07 23 28 06 CC - - the change there will be "ATTITUDE DIRECT CONTROL breaker should be open," and "LOGIC POWER A should be open."

07 23 28 12 LMP Okay.

07 23 28 14 CC So, your "Five closed" will be "Three closed."

07 23 28 21 LMP Okay.

07 23 28 23 CC Okay, the next row down, the fourth row, SUIT FAN 1 breaker should be open.

07 23 28 33 LMP Okay.

07 23 28 36 CC Sounds like you're not quite awake yet there, Charlie. And, one more on that row - -

07 23 28 43 LMP Everybody else is putting me to sleep.

07 23 28 46 CC (Laughter) Okay. SECONDARY S-BAND POWER AMP should be close.

07 23 28 54 LMP Okay.

07 23 28 56 CC Okay; the bottom row, Charlie. The "DESCENT ECA CONTROL" and the "DESCENT ECA, both open."

07 23 29 06 LMP Okay.

07 23 29 11 CC Okay; the next page, panel 16.

07 23 29 18 LMP Go ahead.

07 23 29 21 CC Second row, LOGIC POWER B should be open; ASA, OPEN.

07 23 29 28 LMP Okay.

07 23 29 32 CC Third row, "SUIT FAN (2), open, DIVERTER VALVE, open, CO₂ SENSOR, open."

07 23 29 43 LMP Okay.

07 23 29 47 CC Okay; and the bottom row, "DESCENT ECA and DESCENT ECA CONTROL, open" - -

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Page 1718

07 23 29 55 LMP Go ahead.

07 23 29 58 CC - - and the "CROSS TIES, close" - -

07 23 30 01 LMP Okay.

07 23 30 02 CC "CROSS TIES BUS and BAL LOADS, close."

07 23 30 07 LMP Okay.

07 23 30 08 CC Okay; and, do you have a docking tunnel index?
I'd like to get started to work on something there.

07 23 30 21 LMP Okay; stand by. John is going to get it.

07 23 30 25 CC Okay.

07 23 30 28 CDR Plus - plus 4.5, Fredo.

07 23 30 31 CC Okay; plus 4.5. Roger. Okay; let's go to 2-6,
which is a pretty easy page.

07 23 30 43 LMP Here I am.

07 23 30 45 CC Okay; all you do is retain the top line, the "RCS
SYSTEM A/B to AUTO." Scratch the whole rest of
the page.

07 23 30 56 LMP Okay.

07 23 30 59 CC 2-7.

07 23 31 06 LMP Go ahead.

07 23 31 07 CC Okay; a note at the top is "CSM maneuver to
steerable attitude," if not there.

07 23 31 19 LMP Okay.

07 23 31 21 CC Okay; jump down to the "S-BAND steerable antenna
activation," step 2.

07 23 31 27 LMP Okay.

07 23 31 29 CC Scratch "HIGH GAIN PITCH and YAW angles" there.

07 23 31 36 LMP Okay.

07 23 31 38 CC You can scratch the "Wait 30 seconds after SLEW."
We've tried that trick several times. And, write
in "A PITCH angle of 155 and a YAW of minus 12."
The only one you can get.

07 23 31 59 LMP All right. Okay.

07 23 32 02 CC Step 3, scratch "TRACK MODE to AUTO."

07 23 32 10 LMP Okay.

07 23 32 14 CC Okay. Down at "PGNS turn-on" now, step 1.

07 23 32 21 LMP Go ahead.

07 23 32 22 CC Starting with the "V35 ENTER," scratch the rest,
including the "V35 ENTER."

07 23 32 31 LMP Okay.

07 23 32 34 CC Okay; the next page, 2-8.

07 23 32 40 LMP Go ahead.

07 23 32 41 CC Scratch the whole "PGNS self-test" section there,
steps 1 through 5.

07 23 32 50 LMP Okay.

07 23 32 53 CC Okay; let's go to circuit breaker page 2-9.

07 23 32 59 LMP Okay.

07 23 33 01 CC Row - row 3, "ATCA PGNCS, close and ATTITUDE
DIRECT, open, LOGIC POWER A, open."

07 23 33 04 LMP Okay.

07 23 33 16 CC Next row down, the fourth row, "SUIT FAN 1, open,
UPDATA LINK, close."

07 23 33 27 LMP Okay.

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Page 1720

07 23 33 29 CC The last row, "DESCENT ECA CONTROL, DESCENT ECA, both open."

07 23 33 37 LMP Okay.

07 23 33 38 CC Panel 16, second row from the top, "LOGIC POWER B, open, ASA, open."

07 23 33 48 LMP Okay.

07 23 33 50 CC Okay; the third row, we want the "A TRANSMITTER and B RECEIVER, close." We're going to get some VHF ranging.

07 23 34 03 LMP Okay.

07 23 34 04 CC And the "PRIM S-BAND POWER AMP and TRANSMITTER/RECEIVER breakers, both open."

07 23 34 13 LMP Okay.

07 23 34 14 CC Way over to the right there, "SUIT FAN 2 and DIVERTER VALVE and CO₂ SENSOR, all three, open."

07 23 34 25 LMP Okay.

07 23 34 26 CC Bottom row, it's "DESCENT ECA, DESCENT ECA CONTROL, open, and the CROSS TIE BUS and BALANCE LOADS, both closed."

07 23 34 41 LMP Go ahead.

07 23 34 44 CC Okay; fantastic. Page 2-11 doesn't have any changes.

07 23 34 52 LMP Amazing.

07 23 34 54 CC Let's go to 2-12.

07 23 34 59 LMP Go ahead.

07 23 35 00 CC The "VHF checkout" section, scratch the whole thing, steps 1 through 4.

07 23 35 10 LMP Okay.

07 23 35 12 CC Okay; 2-13 is another easy one. You can scratch the whole page.

07 23 35 22 LMP Okay.

07 23 35 23 CC Let's go to 2-14 and "PGNS/AGS align." You can scratch that whole section there, all four lines.

07 23 35 37 LMP Okay.

07 23 35 38 CC And before you turn the page - before you turn the page there, we need to write in down at the bottom of that page, "UPDATA LINK to DATA."

07 23 35 54 LMP Okay.

07 23 35 55 CC Followed by a "MSFN up-link," and if you're interested in what that is, it's a state vector on LGC time. A P30 and a P99 load.

07 23 36 14 LMP Okay.

07 23 36 15 CC Okay; after we get done with the up-links, put "CSM maneuver to jett attitude and select FORWARD omni."

07 23 36 25 LMP Okay.

07 23 36 29 CC Okay. You got the "Select FORWARD omni?"

07 23 36 34 LMP Yeah.

07 23 36 35 CC Okay. At - -

07 23 36 36 LMP Okay; to go to jett attitude - -

07 23 36 38 CC Go ahead.

07 23 36 39 LMP Wait a minute, Fredo. We maneuver to jett attitude, and select FORWARD omni?

07 23 36 44 CC That's affirmative, Charlie.

07 23 36 48 LMP Okay.

07 23 36 49 CC We just went to the steerable attitude, so we can get all these up-links in.

07 23 36 59 CC Okay; then we - next note is "Verify jett attitude, CSM NARROW DEAD BAND, ATT HOLD."

07 23 37 10 LMF Okay.

07 23 37 12 CC Then it's "Window shades, three, closed." That's to keep the heat leak down for that 8 hours' latter time the LM had to do.

07 23 37 28 LMF Okay.

07 23 37 29 CC Then we'll go to LM Timeline Book, page 14, right-hand column.

07 23 37 40 LMF Stand by.

07 23 37 42 CC hey, you ought to write that note there, Charlie, so - -

07 23 37 46 LMF Okay.

07 23 37 55 LMF Yeah. I got it.

07 23 37 56 CC Okay. The whole left column there is just scratched, and I guess they need to know what kind of shape you're in over on the right side. I understand you scratched through a bunch of this already.

07 23 38 12 LMF Yeah, but I think I know what to do. Just target the PGNS and get a go for closeout, looks like it's all I got to do.

07 23 38 23 CC Yeah. Okay. If you're ready, then, at step 1 there, delete - -

07 23 38 31 LMF Go ahead.

07 23 38 37 CC Stand by 1, Charlie. Ken, it's about 30 seconds to start bringing up the SIM bay configuration.

07 23 38 50 CME Well, if the hats can do that for us; okay. I'll sure get it on there as fast as I can, and I'd like to have some clarification. I just turned off two hydrogen fans - their heaters, and I have had nothing in the way of fans on tank 3.

07 23 39 10 LMP Watch it, John. Don't let that big hatch ...

07 23 39 13 CC Okay; I'll continue on here while they're thinking about that, Ken. Charlie, step 4 there, scratch the "V47 ENTER," et cetera, and substitute with the "VERB 77 ENTER."

07 23 39 35 LMP Okay.

07 23 39 36 CC Scratch step 5.

07 23 39 40 LMP Okay.

07 23 39 41 CC Under "Target PGNS" there, step 1 - -

07 23 39 43 LMP Are you going to read it?

07 23 39 44 CC - - Add after the third line there, "P00," "V96 ENTER."

07 23 39 55 LMP Okay.

07 23 39 56 CC Scratch the "Configure AGS," step 1 there.

07 23 40 05 LMP Okay.

07 23 40 07 CC Go to page 15.

07 23 40 12 LMP Go ahead.

07 23 40 13 CC Okay; "Configure LM for jett," step 1, "AGS MODE CONTROL, ATT HOLD," fourth line down, scratch it.

07 23 40 24 LMP Yeah; okay.

07 23 40 26 CC And line 6, INVERTER 2, "Verify INVERTER 2," scratch that one.

07 23 40 33 LMP Okay.

07 23 40 34 CC Go - go to step 4 now.

07 23 40 38 LMP Okay.

07 23 40 41 CC Scratch the third line. "CB (11) COMM."

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07 23 40 50 LMP Okay.

07 23 40 51 CC Scratch the fourth line, and the fifth line, and the sixth line.

07 23 41 00 LMP Okay.

07 23 41 01 CC Okay. Then "CABIN GAS RETURN to EGRESS." You have to write that in.

07 23 41 13 LMP Okay.

07 23 41 14 CC And the "SUIT GAS DIVERTER to EGRESS."

07 23 41 22 LMP Okay.

07 23 41 26 CC Okay; that's it on that page. Let's go to page 16.

07 23 41 35 LMP Okay.

07 23 41 36 CC Panel 11, top row, "S-BAND ANTENNA, open. AGS AC BUS B, open."

07 23 41 46 LMP Okay.

07 23 41 47 CC Fourth row down, "SECONDARY S-BAND POWER AMP, closed."

07 23 41 58 LMP Okay.

07 23 41 59 CC Let's go to panel 16 on page 17, second row. It's "ASA, open." I'm sorry. Let's back up one. It's "AEA, open," first, then "ASA."

07 23 42 20 LMP Yeah; okay.

07 23 42 21 CC Then "ATCA."

07 23 42 22 LMP Yeah.

07 23 42 23 CC "ATCA, open," and "ATCA (AGS), open."

07 23 42 28 LMP Okay.

07 23 42 30 CC Third row down, the "PRIMARY S-BAND POWER AMP, open; S-BAND ANTENNA, open."

07 23 42 38 LMP Okay.

07 23 42 39 CC And the one on the far right.

07 23 42 40 LMP Okay.

07 23 42 41 CC Far right one, "CO₂ SENSOR, open."

07 23 42 47 LMP Okay.

07 23 42 48 CC And the bottom row. "S-BAND heater" - under "HEATERS," "S-BAND ANTENNA, open."

07 23 42 59 LMP Okay.

07 23 43 04 CC Okay; and then INVERTER 2 should be open.

07 23 43 08 LMP Okay.

07 23 43 21 CC Okay; and I guess you've - you've got the idea here, Charlie, that everything else that's indicated on this, you're going to have to configure. Like a bunch of these you're going to be closing.

07 23 43 34 LMP Yeah, I know.

07 23 43 35 CC Okay. Okay; page 18.

07 23 43 43 LMP Okay.

07 23 43 45 CC Under "IVT to CSM," delete step 1.

07 23 43 54 LMP Yeah. Guess so.

07 23 43 56 CC Okay; step 2. I guess the way you want to suit, with that "Transfer to CSM" step, fifth line there under step 2, you can scratch and write it as "Don suits and then transfer."

07 23 44 16 LMP Okay.

07 23 44 18 CC Okay; then everything "LM to CSM transfer list," the rest of that column on the left side, and the whole right side, we can scratch. If you wanted to, I guess you - -

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07 23 44 30 LMP Okay.

07 23 44 31 CC - - You could use it for one final verification there, Charlie, but we should have picked all those items.

07 23 44 39 LMP Okay.

07 23 44 41 CC And that's it.

07 23 44 42 LMP I got one question, Fred. Have - On the PPKs, I took a peek at them yesterday, and there was only one bag in there, and it says three here. Are we only supposed to have one bag?

07 23 44 56 CC I'll check that, Charlie. Stand by.

07 23 45 07 CC Okay; the word I get, Charlie, is there is only one PPK pack.

07 23 45 15 LMP Yeah, I thought so, but I just wanted to make sure.

07 23 45 20 CC Must have been a small cannon ball.

07 23 45 25 LMP Yeah. (Laughter) Okay; look, I'm going on over to the LM and get started on this stuff. Okay?

07 23 45 36 CC Okay. That sounds excellent, and I guess we need to talk to Ken now.

07 23 45 44 LMP Okay.

07 23 45 59 LMP Hey, Ken, could you turn off my VOX, please? Okay; open hatch.

07 23 46 21 CC Ken, I don't know where you are on the procedures now, but it's about time to start that maneuver, if you get a chance.

07 23 46 32 CMP All right, Henry. I'll be there in just a minute. I just finished your SIM bay stuff. And, Henry, could you have an EECOM check and see if our sensor and accumulator looks like it's been working properly in the last hour?

07 23 47 04 CC Okay; will do. Okay, EECOM says that they can see it's receiving the stroke signal, but they - they have no way of telling if it really does stroke.

07 23 47 25 CMP Okay. Seems like it has gotten a little stuffy and the humidity has built up a little bit, and I was just wondering is there some way I could verify that it is working without having to watch this high O₂ FLOW on - watch the O₂ FLOW sensor. Can they - they have the FLOW sensor; can they tell if it - if it's been getting its flow pulse?

07 23 48 01 CC Ken, EECOM says that he can see the flow pulse, but he has no way of checking that it's working or stroking. He suggests maybe go over to AUTO 2 and see if that improves things.

07 23 48 14 CMP Okay; I'm in AUTO 2 now. And I'm changing the DAP to NARROW DEAD BAND.

07 23 48 26 CC Roger.

07 23 48 35 LMP Houston, 16 - Orion.

07 23 48 38 CC Go ahead.

07 23 48 46 LMP Okay; the CBs are in - as per page 3-13 and 3-14, staged deactivation, that we left them last night at Moon. [?]

07 23 49 00 CC Roger; copy.

07 23 49 04 LMP No. I thought I had my own.

07 23 49 58 CC Ken, it only took your mapping camera 2 minutes and 28 seconds to retract, that time.

07 23 50 08 CMP Yeah, we noticed that.

07 23 50 36 CC Ken, while you are maneuvering there I'd like to get a quick check on the cryo configurations.

07 23 50 43 CMP Okay.

07 23 50 45 CC What we'd like to have is O₂ HEATERS 1 and 2, OFF, 3, AUTO.

07 23 50 56 CMP O₂ HEATERS 1 and 2 are OFF, and 3 is in AUTO.

07 23 50 59 CC And HYDROGEN TANK HEATERS 1 and 2, AUTO. And all three fans off.

07 23 51 11 CMP Okay; HYDROGEN HEATERS 1 and 2 in AUTO, and the three fans are off. Thank you.

07 23 51 17 CC Okay; and we should be on the 100-watt heaters.

07 23 51 23 CMP Yeah, that's what we've been running on - I don't - -

07 23 51 48 CC Ken, the LiOH canister you had trouble with, has it already been put in the LM for good?

07 23 51 57 CMP No, sir. I've got it stowed on board.

07 23 51 59 CC Okay; real good. We'd like to bring that thing home.

07 23 52 00 CMP It was the one I took out last night; it should be - Okay; I had a little trouble with the one yesterday morning, but not so much, and it's already in the LM. Last night I was getting concerned that we picked up some humidity and it was swelling.

07 23 52 17 CC Roger.

07 23 52 29 CC Okay. Ken, what we'd like to do, is get canister number 13 to the LM in place of the one we're bringing home.

07 23 52 43 CMP Say again, Henry.

07 23 52 45 CC I said did you make a substitute for the one that you're going to keep there or - -

07 23 52 55 CMP I'm sorry, I still haven't understood you. Say again, one more time, please.

07 23 53 01 CC Okay; we're going to keep the canister that's bad. We're going to bring it home so we can look at it, so did you substitute another one to be jettisoned with the LM?

07 23 53 13 CMP No, sir. I packed all that stuff yesterday sometime, and it's over in the LM in a jett bag, and if we have extra canisters, I'd just as soon leave it that way if we could.

07 23 53 24 CC We concur.

07 23 53 28 CMP We're having enough trouble staying up the time line, without digging through a jett bag looking for a canister.

07 23 53 31 CC We don't want to do that.

07 23 53 37 CMP Easy on that baby. ... Okay, Hank. You got the one that stuck last night. It's down in - in A - A-3, I believe it is the first one. And let's leave it at that.

07 23 53 53 CC We concur.

07 23 54 39 CMP Okay; and Orion's back on internal power at 192:06.

07 23 54 46 CC Roger. Copy.

07 23 56 37 CMP Man, Henry, we're not going to be in attitude until 192:14. Is that acceptable?

07 23 56 44 CC That's okay.

07 23 58 14 CC 16, Houston. We have a block data we need to get up before LOS. Okay; 16, we're about 2 minutes from LOS. I don't think we can get it in now. We'll give it to you next rev. AOS will be at 194 - 193 - 192:58.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

08 00 36 XX BEGIN LUNAR REV 61

08 00 47 53 CC Apollo 16, Houston.

08 00 47 59 CMP Go ahead, Henry.

08 00 48 01 CC Roger. How is it going?

08 00 48 06 CMP Well, we're waiting for some LM - stuff, I
guess.

08 00 48 11 CC Okay. Pads and everything are in the work. May-
be we could clean up a few things now. We need
the NOUN 20s on page 212 in the Contingency
Checklist. That's from the LM.

08 00 48 31 CMP Okay, Hank. Here we go with the 212. The
NOUN 20s were for the command module: 33294, 11631,
30499. In the LM, 34091, 29673, 05443. Over.

08 00 48 56 CC Roger. Copy and the GET?

08 00 49 04 CMP Okay. At 192:36:40.

08 00 49 09 CC Roger, copy.

08 00 49 29 LMP Okay, Hank. We're ready for the up-links. We're
sitting in HI bit rate; we've got DATA and good
signal strength. You should be able to sock it
to us.

08 00 49 43 CC Roger, Charlie. And they are not quite ready
with those up-links.

08 00 49 53 LMP Okay. Hank, let me ask a question. Over.

08 00 50 04 CC Go ahead.

08 00 50 08 LMP Okay. Did it occur to anybody down there that
last night if we'd stayed powered up, we could
have gotten rid of this contraption, and it
wouldn't have taken up all this time today? Or
was that ever discussed?

08 00 50 23 CC It was discussed, and the decision was made to power down.

08 00 50 30 LMP Yeah. Well, we're gonna do about four times the work to do whatever it is they would have done. And I'm not really 100 percent sure we're going to be right on this, because we never practiced it.

08 00 50 45 CC Roger. Understand. And we'd like to get the S-REND VOICE FUNCTION switch OFF in Orion.

08 00 50 59 LMP It's OFF. And the comm configuration you read it was the DOWN VOICE BACKUP.

08 00 51 10 CC Roger. We want to get a little ranging, and we'd like to verify who was on biomed last night.

08 00 51 22 CDR I guess all of us were, weren't we? I think we all were, Hank.

08 00 51 28 CC Okay. Understand all three.

08 00 51 36 LMP Can't you tell?

08 00 51 47 CC I guess for some reason, they didn't copy the CDR.

08 00 51 56 CDR Well, it was plugged in.

08 00 52 02 CMP Hank, we've got a - the vacuum cleaner stalled out sometime on us, and if you guys want it back for failure analysis, we'll bring it back. Otherwise, we're gonna toss it out. Do you have any thoughts on that?

08 00 52 18 CC We'll check into it, Ken. And would you by chance have a crew status report?

08 00 52 34 CMP No, Henry. I haven't gotten around to doing that kind of bookwork yet. Can we just sort of let that go for a while?

08 00 52 40 CC Affirmative.

08 00 52 43 CMP We're all here.

08 00 52 44 CC Okay. I have a TEI-63 pad I'd like to get up, block data.

08 00 53 13 CMP All righty. Go right ahead.

08 00 53 17 CC Okay. TEI-63, SPS/G&N; 38491; plus 0.67, plus 0.97; 198:33:20.08; plus 3186.7, plus 0731.6, minus 0118.9; 181, 083, 015; the rest is NA; ullage, 2 jets, 17 seconds; ascent REFSMMAT, assumes sep maneuver.

08 00 54 33 CMP Okay. TEI-63, SPS/G&N; 38491; plus 0.67, plus 0.97; 198:33:20.08; plus 3186.7, plus 0731.6; minus 0118.9; 181, 083, 015; two jets for 17 seconds on the ascent REFSMMAT and that's assuming sep maneuver.

08 00 54 55 CC Good readback, Ken.

08 00 55 10 CMP I have a HI O₂ FLOW and I can't figure out why. No, it's been just been sitting there.

08 00 55 20 CDR ...

08 00 55 22 CMP At 4. I turned it off a long time ago, John.

08 00 55 37 CMP Well, if - if that's the only problem, you're right; but - but high O₂ flows are caused by things not - not - I don't care about the end result.

08 00 55 53 CDR Why don't you change the ...?

08 00 55 55 CMP I've already done that. Our cabin has dropped to - I guess that's the prob - that's why the flow is up.

08 00 56 08 CDR ...

08 00 56 12 CMP Maybe last night, which I think you got something this morning.

08 00 56 15 CDR ...

08 00 56 18 CMP That ought to - that ought to tighten it up. Self-sealing tanks.

08 00 56 44 CC Ken, if you - wanted to get your Flight Plan in order, if you took pages 283 through 286 and just stuck them between 326 and 327, they should all be in order.

08 00 57 01 CMP Okay.

08 00 57 16 CMP Take 283.

08 00 58 02 CMP Okay, Hank. That's page 283 through 285 and -

08 00 58 09 CC Roger. And just insert those between 326 and 327, and then - then you'll be in order just to flip the pages.

08 00 58 20 CMP That's a good plan; wish I'd thought of that.

08 00 58 37 CC And, Charlie, I have your fine align torquing angles for page 214.

08 00 58 47 LMP Would you stand by just for a second, please?
Okay, Hank.

08 00 58 56 CC Roger. Plus 02620, plus 07950, plus 04770.

08 00 59 37 LMP Is that a good readback, Hank?

08 00 59 39 CC I didn't read you, Charlie.

08 00 59 45 LMP Okay. I read back plus 02620, plus 07950, plus 04770. Over.

08 00 59 56 CC Roger. Good readback. And we'd like to get another set of NOUN 20s after you torque those.

08 01 00 13 CMP Okay, Hank. Our book is rearranged per your suggestion. That should help a great deal.

08 01 00 20 CC Roger.

08 01 00 24 CMP And can you give me a jettison pad, yet?

08 01 00 29 CC They're working on the pads, Ken. Looks about like 10 more minutes.

08 01 00 40 CMP Okay. I just noticed I'm supposed to be there already.

08 01 01 12 CC And, Ken, the decision is to bring the vacuum cleaner home with you.

08 01 01 21 CMP Okay, Hank. I'll bring the vacuum cleaner home.

08 01 01 33 CC And, Charlie, when you get to NOUN 20, just hold them - -

08 01 01 35 LMP Okay, Hank. Here's the NOUN - -

08 01 01 36 CC - - and we'll copy.

08 01 01 40 LMP Okay. I was just going to read them to you. We got them.

08 01 02 36 CC Charlie, we have the NOUN 20s.

08 01 02 43 LMP Okay.

08 01 03 12 CMP Hank, I'd also like to verify that it's okay to leave the CSM-to-LM umbilicals hooked up in the tunnel.

08 01 03 21 CC Okay. I'll check that out.

08 01 03 36 CC And, Ken, to give you a few more words on that - cancelling that subsat tracking. We're trading that off for photography - mapping camera, pan camera, and X-ray. And we're getting 16 degrees more of the lunar surface that's never been photographed before.

08 01 03 54 CMP Okay.

08 01 04 02 CC And, Ken, it's okay to leave the umbilicals hooked up.

08 01 04 07 CMP All right. Thank you.

08 01 05 50 CC 16, Houston.

08 01 06 10 CMP Go right ahead, Henry.

08 01 06 13 CC Roger. We'd like to verify once again the docking angle.

08 01 06 23 CMP Okay. We'll read it one more time. Turn to your right. Your right. There it is.

08 01 06 40 CDR Plus 4.5 degrees!

08 01 06 44 CC Roger. Copy. Plus 4.5.

08 01 07 15 CC What the problem is there, John, is we're still getting a torquing angle required, and we're having a little trouble with it. And we're just trying to figure out what's wrong.

08 01 07 31 CDR Right. You want to check our arithmetic? That's probably a possible problem.

08 01 07 44 CC Roger. We did another NOUN 20, so we got a problem with the X - X-axis.

08 01 12 01 CC 16, Houston. Charlie, I got a new set of torquing angles for you.

08 01 12 12 LMP Okay. Stand by a second.

08 01 12 26 LMP Go ahead, Hank.

08 01 12 29 CC Okay. Minus 02900, minus 08320, minus 04930. And we'd - after you've torqued that, would you get us another set of NOUN 20s on the DSKY?

08 01 12 50 LMP Okay. I copy minus 02900, minus 0820 - minus 08320, minus 04930.

08 01 13 02 CC Good readback, Charlie.

08 01 14 57 LMP Okay, Ken. You have the NOUN 20s on both DSKYs at 193:26:35.

08 01 15 07 CC Roger. We're copying them.

08 01 17 29 CC Orion, verify DATA. We're ready with the up-link.

08 01 17 39 LMP That's verified, Hank.

08 01 18 07 CC Orion, your alignment's GO.

08 01 18 16 LMP Roger.

08 01 18 19 CC And, Casper, I have a LM jettison pad.

08 01 18 25 CMP Ready to copy.

08 01 18 27 CC Roger. 195:10:all zips; 137, 020, 016.

08 01 18 45 CMP 195:10:00.00; 137, 020, 016, and -

08 01 18 54 CC Roger. And if you'd flip the page, I'll give your sep time.

08 01 19 03 CMP Okay.

08 01 19 04 CC Sep T_{ig} is 195:15:all zips.

08 01 19 22 CC And, Casper, don't do this VERB 49 until we tell you to, please.

08 01 19 30 CMP Oh, very well.

08 01 19 32 CC We need to keep the LM comm up is the reason.

08 01 19 38 CMP Roger. I understand.

08 01 19 43 CC And if you'd flip the page again, I'll give you your subsat jett pad.

08 01 19 54 CMP Okay.

08 01 19 55 CC 196:13:46; 089, 246, 000.

08 01 20 09 CMP Okay. 196:13:46; 089, 246, and all zeros.

08 01 20 16 CC Good readback, Ken.

08 01 20 22 CMP Okay. Can you give me some of these photo pads so I can get them going, because this time after jettison is going to be pretty crowded, too?

08 01 20 30 CC They're in work.

08 01 20 31 CMP I'd like to get those down right now, before we get all suited up and ready to go.

08 01 20 35 CC That's a good plan. I'll try to have them for you in a couple of minutes. And, for Orion, I have the LM deorbit pad.

08 01 20 56 CMP Okay, he'll be with you in just a second, Hank. He's halfway in a suitwork.

08 01 21 01 CC Roger.

08 01 21 12 LMP Okay. Speak to us, Henry, with the pads.

08 01 21 16 CC Roger. LM deorbit, 203:08:09.50; minus 0238.9, minus 0103.1, plus 0254.5; NA down to FDAI inertial, 197, 023; the rest is NA; LM weight, 5275.

08 01 21 52 LMP Hank, Hank, stand by. Stand - Hey, stand by. I ran out of ink. Stand by.

08 01 22 00 CC (Laughter) Roger.

08 01 22 04 CDR What'd you do with the pencil I gave you? It doesn't run out.

08 01 22 11 LMP (Laughter) Okay. Go ahead. Start with - I got the DELTA-Vs, but everything after that I missed.

08 01 22 15 CDR (Laughter) That ought to tell them something about the changes.

08 01 22 18 CC Okay. FDAI is 197, 023. The rest is NA; LM weight, 5275.

08 01 22 37 LMP Roger. I copy 203:08:09.56; minus 0238.9, minus 0103.1, plus 0254.5; 197, 023; NA; LM weight, 5275.

08 01 23 00 CC Roger. And on the NOUN 33, the seconds is 09.50.

08 01 23 07 LMP Okay, 09.50. Is that running out of ink tell you something about the changes we've had, Ken, I mean, Hank.

08 01 23 19 CC Roger. It does.

08 01 23 41 CDR Yeah, but don't get behind the power curve because this cooling loop down here ain't got much.

08 01 23 50 CMP Okay.

08 01 23 53 CC Ken, which pad is it that you want? Those on page 324 don't - don't apply.

08 01 24 06 CMP Okay. You mentioned something about we're gonna get a whole lot of mapping and pan camera stuff in there in those revs between there and TEI. And I just thought that, if we had some idea of what's coming, we could do a better job of getting ready for it.

08 01 24 28 CC Roger. This all occurs on the rev after next.

08 01 24 34 CMP I know. I'd - I'd like to be able to plan a little further ahead. If you don't get ahead - plan ahead, you just run a real good chance of not getting all the things done the way you'd like to.

08 01 24 45 CC We agree. And I'll try to have some words for you here in a few minutes.

08 01 24 51 CMP Okay. I understand your problems. That's - that's no sweat.

08 01 25 42 CC And, 16, for your information, LOS is at 194:11.

08 01 25 54 CMP Okay.

08 01 27 53 CC Orion, all your loads are in.

08 01 28 01 LMP Okay. Can we start to maneuver to the jett attitude?

08 01 28 06 CC Stand by.

08 01 30 10 CC Casper, Houston. We'd - we'd like for you to start on the callouts that are at 193:46.

08 01 30 21 CMP Okay. I'll do those now.

08 01 30 24 CC Roger. We want look at data on telemetry before we start to maneuver because, when we do that, we go into LOW BIT RATE and an omni.

08 01 30 34 CMP Okay.

08 01 30 49 CMP Okay, the MASS SPEC ION SOURCE is OFF. The EXPERIMENT is STAND BY. GAMMA RAY goes to RETRACT.

08 01 30 56 CMP MARK. Barber pole; X-RAY to STANDBY.

08 01 31 48 CMP Okay, the alpha and X-ray covers are coming closed.

08 01 31 53 CMP MARK.

08 01 31 55 CC Roger.

08 01 31 56 CMP They're closed.

08 01 32 40 CC Orion, Houston.

08 01 32 47 CMP I haven't got time right now, Charlie. He's calling you.

08 01 32 52 LMP Go ahead.

08 01 32 57 CC Okay, Charlie. In that setup, we forgot to get things configured for auto transfer protection on the glycol system there. So I've got a short read-out here to make sure that's configured.

08 01 33 13 LMP Okay. Go ahead.

08 01 33 15 CC Okay. On panel 11, and I think you're already there - you checked, you got PUMP 1, PUMP 2, and the AUTO TRANSFER breakers closed.

08 01 33 30 LMP That's affirm. It's set up.

08 01 33 33 CC Okay. Switch to PUMP 2.

08 01 33 45 LMP Okay. PUMP 2.

08 01 33 46 CC Okay. Open the AUTO TRANSFER circuit breaker and then switch back to PUMP 1.

08 01 34 01 LMP You're back to PUMP 1.

08 01 34 03 CC Okay. And, lastly, Charlie, close the AUTO TRANSFER breaker, and we're back in business.

08 01 34 11 LMP Okay.

08 01 35 39 CC Casper, we're ready for MASS SPEC, RETRACT.

08 01 36 14 CMP Okay. The mass spec is coming now.

08 01 36 18 CC Roger.

08 01 37 20 CC Orion, Houston. Did you load your DAP before you started the P30?

08 01 37 51 CC We need AUTO on the HIGH GAIN, Casper.

08 01 38 55 CC And, Ken, our plan for the - for the camera work is, at about 196:45, somewhere in there, it's sunrise. We plan to run the mapping camera/laser altimeter throughout the - the daylight part of that rev, up to about 197:50. And we'll bring the pan camera on at about - oh, a third of the way through that daylight portion, about 197:15, and run it until darkness. And we'll do a solar corona just prior to that, and maybe some handheld photography, which we'll read up to you after you doff your suits on the next rev.

08 01 40 30 CMP Houston, Orion.

08 01 40 35 CC Go ahead.

08 01 41 04 CC Ken, it looks like the mass spec is jammed. Would you give a 15-second DEPLOY - -

08 01 41 07 CMP Houston, Orion.

08 01 41 08 CC - - and then a RETRACT?

08 01 41 16 CMP Houston, Apollo 16.

08 01 41 19 CC Go ahead. Apollo 16, Houston. Go ahead.

08 01 41 40 CC Apollo 16, Houston. Go ahead.

08 01 41 52 CMP Houston, Apollo 16. Over.

08 01 41 55 CC Apollo 16, Houston.

08 01 42 18 CT Madrid comm tech, Houston comm tech, net 1 voice check.

08 01 42 20 CMP Hey, Hank, you read us? 16?

08 01 42 22 CC Roger, 16. Houston's reading you.

08 01 42 25 CT Got a voice? Houston comm tech, net 1.

08 01 42 27 CT Got a voice?

08 01 42 28 CT Okay. We seem to be out with Madrid.

08 01 42 31 CT Roger; stand by.

08 01 42 45 CT Casper, this is -

08 01 43 01 CMP Okay. We'll just stand by until they get through with it. Thank you very much, sir.

08 01 43 06 CT You're welcome. I enjoyed it.

08 01 43 07 CMP How's everything in Madrid?

08 01 43 09 CT Everything's fine here.

08 01 43 15 CMP Good.

08 01 43 16 CC Apollo 16, Houston.

08 01 43 21 CMP Hello, Henry. Glad to have you back.

08 01 43 23 CC Roger. We had a little trouble with the network there. It appears that the mass spec boom is jammed, and we'd like for you to give it a 15-second DEPLOY and then back to RETRACT.

08 01 43 38 CMP Okay. 15-second DEPLOY and back to RETRACT. Stand by.

08 01 43 43 CMP DEPLOY.

08 01 43 50 CMP How far did it look like it went before it jammed?

08 01 43 55 CC About a third of the way in.

08 01 44 01 CMP Okay. There's 15 seconds, and I'm going to RETRACT.

08 01 44 28 CMP Okay, Hank. Charlie has a visual on it, and it stopped again.

08 01 44 34 CC Our data confirms that, Ken.

08 01 44 39 CMP Okay.

08 01 44 57 CMP I've got the switch in the OFF position now.

08 01 45 03 CC Roger. Ken, would you give us one more of those 15-second DEPLOY and back to RETRACT?

08 01 45 15 CMP Okay. How about if I just take it all the way out?

08 01 45 32 CC Okay. Why don't you go ahead and try it? We have data shows it's stalling both ways.

08 01 45 42 CMP It's going out now.

08 01 46 32 CC Orion, we'd like you to verify FORWARD omni before you secure the LM.

08 01 46 47 CMP Okay, Hank. It - it didn't go all the way out and Charlie can visually verify that it is not all the way out.

08 01 46 56 CC Okay. Would you try another RETRACT?

08 01 47 02 CMP It's going to RETRACT now.

08 01 48 43 CMP Houston, can we start the new maneuver to the jett attitude? Over.

08 01 48 49 CC Stand by 16.

08 01 49 25 CC 16, Houston. Give us the SIM bay roll-jet configuration and start your VERB 49. I think that's what you've got in there now.

08 01 49 38 CMP Yes, sir. It is.

08 01 49 44 CC And you are NO GO for coupled jets. I think we're going to have to jettison that boom. We're look at that now.

08 01 49 56 CMP Okay. Is that a requirement for - the LM jettison, you mean?

08 01 50 10 CC We'll get you an answer to that.

08 01 50 32 CC Okay. We're gonna keep the boom for LM jett, but keep the SIM bay jet configuration, so we don't go coupled.

08 01 50 46 CMP Okay. If we stay in the SIM bay jet configuration, what's this gonna do to our translation capability for the maneuver? We gonna have to line it all up in one axis?

08 01 51 32 CC Roger, Ken. Minus X is what we want to do on that sep maneuver, anyhow.

08 01 51 39 CMP Roger. But that's probably not going to line up with the - with the attitude I'm undocking in, is it? Normally that turns out to be a three-axis burn.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

08 01 51 54 CC Maneuver to get it all in minus-X, and then do it.

08 01 52 05 CMP Okay. So you want me to maneuver to the minus-X attitude first.

08 01 52 12 CC Roger. We want to get the sep maneuver all in X, and I've got FDO trying to get you an attitude for that.

08 01 52 20 CMP Well, I can probably figure that out from NOUN 41, I mean, P41.

08 01 54 30 CC Casper, FDO says the maneuver attitude to get that minus-X thruster is pitch, 327; yaw, 0; and roll, whatever you have.

08 01 54 52 CMP Okay. That'll be whatever roll we have, pitch of 327, and a yaw of 0.

08 01 54 58 CC Roger. And we'd like to remind you we will need omni Delta for AOS next time and to change the "verify" to a "configure the DSE after LOS to LOW BIT RATE; RECORD; FORWARD."

08 01 55 15 CMP Roger.

08 01 55 59 CC Apollo 16, Houston. You're looking good at LOS, and AOS will be at 194:57.

08 01 56 10 CMP Roger. And we're feeling good, too.

08 01 57 11 CC And, Ken, to reiterate: as far as that boom is concerned, it's the roll jets we're concerned with. They're the only ones we have to keep single jet on.

08 01 57 26 CDR Ken is off comm; he's suiting up.

08 01 57 28 CC Roger.

08 01 57 38 CC Hey, John, would you - would you tell Ken that on that boom out, our only concern is going coupled on the roll. So when he gets ready to do this burn, if he just wants to use X and Z and just leave his Y-translation - you know, make a 90-degree roll and burn a Z. Now, Ken can handle it any way he wants, but just let him know our only concern is coupled jets in roll.

08 01 58 09 CDR Okay. Understand.

(NO COMM FOR 49 MINUTES)

08 02 35 XX BEGIN LUNAR REV 62

08 02 47 12 CC Orion, Houston.

08 02 47 21 CMP Hello, Houston.

08 02 47 24 CC Roger. Where are you in the checklist now?

08 02 48 21 LMP Houston, 16.

08 02 48 22 CC Hello, 16; this is Houston. Go ahead.

08 02 48 29 LMP Okay, Hank. We're closed out. The tunnel vent - the tunnel is being vented now. One question on that LM - that was a pretty big bird. You got enough RCS - I did not crossfeed. You got enough RCS?

08 02 48 47 CC Stand by.

08 02 49 36 CC Apollo 16, Houston. Would you verify that you left Orion in AUTO and not ATTITUDE HOLD?

08 02 50 07 LMP Okay. I went to ATT HOLD. Over.

08 02 50 13 CC Roger. Copy, ATT HOLD.

08 02 50 23 LMP Hank, we had everything scratched out there. I had so many erasures on this page that it just got by - left in ATT HOLD.

08 02 50 33 CC Roger. Understand.

08 02 54 20 CMP Houston, can we go ahead with the logics check?

08 02 54 28 CC Roger. Proceed with the logics check, and we're trying to get a GO/NO GO on the jett right now.

08 02 54 37 CMP Okay. We're going to be tight. We're still doing the integrity check.

08 02 54 48 CMP Okay; the logics are both on.

08 02 54 50 CC GO for PYRO ARM.

08 02 54 59 CMP Say again, Hank.

08 02 55 00 CC Roger. You're GO for PYRO ARM.

08 02 55 06 CMP Okay. Okay.

08 02 56 23 CC Apollo 16, Houston. We're GO for LM jett.

08 02 57 17 CC Apollo 16, you have a GO for LM jett.

08 02 57 24 CMP Roger. We have a GO for LM jett. We'll try to make it.

08 02 57 55 CC 16, make sure your suit integrity checks are okay before you do it.

08 02 58 53 CMP Okay, Houston; we're going to be about 45 or a minute late. Is that okay?

08 02 59 02 CC That's okay.

08 02 59 54 CMP LM jett complete.

08 02 59 57 CC Roger. Copy. Jett complete.

08 03 00 43 CMP Houston, the LM doesn't seem to be holding attitude.

08 03 00 48 CC Roger. Understand doesn't seem to be holding attitude?

08 03 00 54 CMP That's affirmative. Okay. And, Hank, would you run over my RCS select procedures again? I'm not sure I got the right combination for you.

08 03 01 22 CC Okay, Ken. We don't have HIGH BIT RATE. The way you can do this is - -

08 03 01 29 CMP What should they be, please?

08 03 01 33 CC Okay. We just want the single-jet authority in roll. That's the only thing we have to worry about the boom. And you're gonna have to burn out the - your Y as if you were trimming the plane-change burn, using that same roll and - roll 90 degrees to get rid of your Y.

08 03 02 08 CMP If I go into attitude, I can get it all in - get rid of the Y anyhow, can't I?

08 03 02 12 CC Say again, Ken?

08 03 02 19 CMP If I get over to zero yaw, I can get rid of this Y. Isn't that correct.

08 03 02 24 CC Stand by.

08 03 03 18 CC Okay, Ken. And, of course with - you can't trim plus-Z. That's just like as if you were trimming on TEI. You're going to have to roll 90, and trim out your - your plus-Z.

08 03 03 31 CMP Okay.

08 03 03 32 CC Roger. You've got the stick.

08 03 03 46 CMP Roger.

08 03 05 31 CC Casper, give us OMNI Charlie.

08 03 05 49 LMP You've got OMNI Charlie.

08 03 05 51 CC Roger. Thank you.

08 03 06 14 CC Apollo 16, Houston. Give us your best omni.

08 03 06 31 LMP You're in Bravo.

08 03 06 33 CC Roger. That sounds pretty good, Charlie.

08 03 06 43 CMP The residuals of NOUN 85 at the time we quit burning were plus 0.2, plus 0.2, and minus 0.1. I'll give you the angles. NOUN 20: 270.08, plus 011.74, plus 001.94.

08 03 07 07 CC Roger. Copy, Ken. And we have a boom jettison attitude for you.

08 03 07 56 LMP Okay. Could you say what your boom jettison attitude is, Hank?

08 03 07 59 CC Roger. 140, 357, 000; and the jett time is - We've selected as 195:35, but the time is good from 00:25 to 00:45.

08 03 08 19 LMP Roger.

08 03 08 36 CC And, 16; Houston. The high-gain angles for that attitude are plus 6, 345 yaw.

08 03 08 53 LMP Hey, Houston; 16. Do they have control of the LM?

08 03 09 02 CC Doesn't appear that we have, Charlie. That pitch angle was 357.

08 03 09 16 LMP Okay, 357. 140, 357, 000 for boom jett.

08 03 09 21 CC That's affirmative. And we need manual and WIDE on the HIGH GAIN for that - those angles I gave you.

08 03 09 41 LMP Okay. Say again the high-gain numbers, again.

08 03 09 45 CC Roger. Plus 6 for pitch, yaw 345, manual and WIDE.

08 03 10 15 LMP Okay, Houston. Tell me what you think went wrong on that LM jett.

08 03 10 23 CC Stand by. We're still trying to psych it out.

08 03 11 56 LMP Houston, Orion didn't look like she fired any jets when we separated at all.

08 03 12 04 CC Roger. Copy. No jet firing. And we didn't see any on the telemetry that we had down here, either.

08 03 12 37 CDR That Orion was a mighty good spacecraft. Real beautiful flying machine and a real great lunar base, too. We'll miss her.

08 03 13 16 LMP When you had data there, Hank, on Orion, how did the RCS system look?

08 03 13 28 CC They locked good, Charlie.

08 03 16 07 CC Apollo 16, Houston. If possible, we would like to have somebody watch when you jettison that boom; see if they can see it going.

08 03 16 18 CMP Okay.

08 03 16 29 CMP Hank, would you give me the jettison time again, please?

08 03 16 34 CC Roger. We have given you a time of 195:35, Ken, but anywhere between 00:25 and 00:45 is good.

08 03 16 48 CMP Okay. That goes for 00:25 to 00:45.

08 03 16 57 CC This attitude should put the CSM out in front of everything, the boom and the LM.

08 03 21 01 CC Apollo 16, Houston; could you bring up the high gain?

08 03 21 07 CMP Okay.

08 03 21 33 CC And, Apollo 16; for your information, that boom jett velocity is somewhere in the neighborhood of 7 feet per second.

08 03 21 44 CMP Okay.

08 03 21 49 CC REACQ and NARROW on the HIGH GAIN, please.

08 03 21 54 CMP Okay.

08 03 23 12 CMP Okay. We're about to jettison the boom.

08 02 23 14 CC Roger.

08 03 23 23 CMP Boom clear.

08 03 23 30 CC Understand the boom blew clear. Is that correct?

08 03 23 35 CDR That's affirmative. That's about as stable as you can get. That thing isn't tumbling, rolling, doing a thing.

08 03 23 43 CC Hey, it's great to know one thing works.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

08 03 24 25 CC Apollo 16, if you can get to it, we'd like to terminate the BAT A CHARGE.

08 03 24 43 CMP That's terminated, Hank.

08 03 24 44 CC Roger. Thank you.

08 03 26 20 CC Apollo 16, Houston. We've got a Flight up - Flight Plan update we would like to get up to you, if we could get one of you to doff a suit right quick. It would be easier to copy.

08 03 26 31 CMP I'll just copy right now, Hank. Doffing suits is nothing easy for anybody.

08 03 27 28 CMP Hank, can we go ahead and go to the satellite launch attitude?

08 03 27 34 CC That's affirmative.

08 03 27 56 CMP Okay, and is there any reason not to have couples on now?

08 03 28 10 CC That's negative. You can go couple now, Ken.

08 03 28 26 CMP Okay. I have.

08 03 28 34 CC Okay, Ken, and the first changes we want to get to, start at page 3 - 328.

08 03 28 53 CMP Go ahead.

08 03 28 55 CC Roger. Now, 218 hours there is now 196:10. And you have a constant delta - -

08 03 29 01 CMP Yes, sir.

08 03 29 02 CC - - constant delta from now on of subtracting 21 hours and 50 minutes, and this will apply through TEI.

08 03 29 14 CMP Okay, that's a minus 21:50 through TEI, and I think I have marked all my pages with that amount already.

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08 03 29 28 CC All righty. Then the first change is at 196:21. Delete the "VERB 48" and the "P20" and the "Set omni." Just delete that group of data.

08 03 29 53 CMP Okay.

08 03 29 54 CC At 196:35, add "Enable all jets, except A-1, A-2, B-1, Bravo 2, Delta 1, Delta 2."

08 03 30 19 CMP Hank, is that the SIM jett - jett configuration?

08 03 30 21 CC Negative. This gives you couple jets in all axes but roll, and we want quad 3 providing roll control. Now this is so FDO can get good tracking for TEI, and this is being coordinated with OSC and is acceptable to the mapping camera pads.

08 03 30 40 CMP Okay, why don't you - you read me a list of jets not to have on. Is that right?

08 03 30 48 CC That's affirmative. Everything on, except Alfa 1 and Alfa 2 - -

08 03 30 53 CMP Okay, now - Keep going.

08 03 31 02 CC - - Bravo 1, Bravo 2, and Delta 1 and Delta 2.

08 03 31 14 CC This just gives you B/D ROLL, off.

08 03 31 22 CMP Yea, that LOGIC probably should go back to - No, center. Bottom position's okay, too. That's it.

08 03 31 44 CC Do you have that, Ken?

08 03 31 49 CMP Okay, at 35 - that's 196:35, you've got enable everything except these, and the exceptions are A-1, 2, B-1, B-2, D-1, and D-2.

08 03 32 00 CC That's correct. And following that, P20 option 5, plus-X forward SIM attitude - to be there at 196:41. NOUN 79, 0.5-degree dead band. HIGH GAIN, PITCH 10; YAW 0 for ACS acq.

08 03 32 43 CMP Okay, Hank, does that mean that the - that the jettison attitude is going to be very close to the P20 attitude?

08 03 32 58 CC Should be about a 6-minute maneuver.

08 03 33 08 CMP Well, was there any reason for not doing all that stuff earlier?

08 03 33 15 CC What are you referring to, Ken?

08 03 33 20 CMP Well, you just gave me a maneuver here to be done after I enable the engines at 00:35 and - and to be there by 00:41. And, we keep running into these things where you roll out and start the camera; and, if that's the case, I'd like to start the maneuver a little earlier. I'd like to have some padding there.

08 03 33 50 CC Okay, I guess I don't see any magic about - about the time when you do that. If you want to back it up, that's fine.

08 03 33 59 CMP Okay. We'll do so. Thank you very much. But we'll be there in any event by 00:41.

08 03 34 06 CC Roger. And at 00:42, and I don't see why you can't do this one early either, MAPPING CAMERA/LASER ALTIMETER COVER, OPEN; MAPPING CAMERA, EXTEND.

08 03 34 27 CMP Okay. We'll get the mapping camera covers open and the camera extended.

08 03 34 34 CC At 196:47, LASER ALTIMETER, ON; IMAGE MOTION, ON; MAPPING CAMERA, ON; T-start; IMAGE MOTION, INCREASE, barber pole plus 1. And your T-start is 196:49:43.

08 03 35 11 CMP Okay. T-start is 196:49:43.

08 03 35 25 CMP And we'll have the LASER, ON, and the IMC, ON, and we'll go to barber pole plus 1.

08 03 35 33 CC That's affirmative. And at 196:52, orbital science visual, King. That's Victor 4. It's on charts Delta 4 and Delta 5, window 5. And note that the visual runs until 197:02.

08 03 36 16 CMP Okay. We'll cover King on window 5 when we go by it.

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08 03 36 23 CC Roger. And at 196:56: acquire mix - MSFN, MANUAL, WIDE, PITCH 10, YAW 0.

08 03 36 45 CMP Okay. We'll acquire MSFN at PITCH 10 and YAW 0 in MANUAL and WIDE.

08 03 36 50 CC Okay, Ken, and we'll save the rest of this until the next rev. You can go ahead and start dopping [sic] and getting ready for the satellite jett.

08 03 37 00 CMP Okay. Thank you.

08 03 39 40 CDR Okay, Houston. Going off comm for doffing the suits.

08 03 39 44 CC Roger. Copy.

08 03 39 59 LMP Hank, before tomorrow, we'd like - well, right away, would - would you guys ask the suit people what we could do to get some lubrication into these wrist rings? John and mine are real tight, and we're get - finding them very difficult to lock. Over.

08 03 40 19 CC Okay, Charlie. I'll do that.

08 03 55 01 CMP Houston, 16.

08 03 55 04 CC Go ahead.

08 03 55 08 CMP Hank, I'm looking ahead here trying to find out where we have a pan camera turnon, and I don't see it. Maybe I'm missing it somewhere. Can you - I thought you said something about we're supposed to have both a mapping camera and a pan camera pass.

08 03 55 22 CC Roger, Ken. We get it on it just after AOS at 197:03. We got some more changes for you for that rev, and we thought we'd read them up the first part of the rev, rather than clutter you up right now.

08 03 55 37 CMP Why don't you clutter me up right now with those things, please.

08 03 55 41 CC You want them now? Okay, 197:03 -

08 03 55 46 CMP Yes, please. Go ahead.

08 03 55 55 CC Okay, 197:03; IMAGE MOTION, INCREASE; barber pole, ON; PAN CAMERA, STANDBY, STEREO, POWER; 197:05, configure camera for orbital science; CM5/EL/250/CEX intervalometer. That's f/8, 1/250, infinity. You'll be taking 128 frames, magazine Romeo Romeo. 197:14, PC - -

08 03 57 10 CMP Okay, what's that going to be a target of, Hank?

08 03 57 13 CC Okay, we're going to pick up that long run you had that started down at Vogel and - and went - and it went up to Lassell and Alpetragius and stopped. And then you picked up at the one down at Bullialdus. Well, Bullialdus is too far south. So what we're going to do is, we're going to start at Vogel, make a jog at Alpetragius, and go all the way to the Helmet on past Gassendi. And we're about up on LOS now; I'll tell you more about that at AOS.

08 03 57 48 CMP Okay, Hank. Thank you.

(NO COMM FOR 46 MINUTES)

08 04 35 XX BEGIN LUNAR REV 63

08 04 44 30 CC Casper, Houston. How do you read?

08 04 44 45 CC Casper, Houston. How do you read?

08 04 45 22 CC Casper, how do you read Houston?

08 04 45 30 CMP Hello there.

08 04 45 32 CC How you doing?

08 04 46 28 CMP Okay, looks like we got a good lock now.

08 04 46 32 CC Okay. And, Ken, would you verify that you copied the Flight Plan changes at 197:03 and 197:05 that were given just prior to LOS.

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08 04 46 51 CMP Well, I don't know if I copied the ones that you think you gave. I copied some that said, "IMC to barber pole, and PAN CAMERA, STANDBY, STEREO, POWER," and then something got started about orbital science photos, and that was all I got.

08 04 47 06 CC Okay, the first one there that you just read back was at 197:03; and at 197:05, we have "Configure camera for orbital science, command module 5/EL/250/CEX intervalometer f/8, 1/250, infinity, 128 frames, magazine Romeo Romeo."

08 04 48 30 CMP Don, you gonna give me some words on what that target is?

08 04 48 35 CC Stand by 1. I'll get you that.

08 04 48 41 CMP Okay, why don't you - can you give me some idea of how long it'll be? I'm - I - I don't know whether I have time to take my suit off or what.

08 04 48 57 CC Okay, Ken, that - that target position you're going to add are Vogel, and - and that goes all the way up through the cinder cone there. Actually, you're changing over at Alpetragius - a little jog, and then on up past the cinder cone. And you were originally scheduled to look at Bullialdus, and we're going to have to delete that because your track is too far to the north now. So, we're going to bring your groundtrack from the cinder cone right on up through Helmet and Gassendi and on up to Mersenius Rille, from D-11, 12, and 13.

08 04 49 41 CMP Okay, you want to take one continuous strip.

08 04 49 43 CC That's affirmative.

08 04 49 44 CMP Make one continuous strip from Vogel to Alpetragius to the cinder cone to the Helmet to Gassendi to the Mersenius Rille.

08 04 49 54 CC That's affirmative; except there will be that little jog at Alpetragius over to - to the right there and then on up through cinder cone and straight on up through Helmet, then Gassendi and on up to the rille.

08 04 50 08 CMP Yeah, I understand that. I'm going to have to have some help on the f-stops, and I guess I'd rather have you call them out to me rather than have me try to write them down and jot them on a map and all that jazz.

08 04 50 20 CC Okay; we'll do that.

08 04 50 25 CMP Okay; thank you. And can you give me a time for passage of Vogel?

08 04 50 30 CC Okay, hang on a minute.

08 04 50 45 CC Okay, it looks like 197:29 is for Vogel. And it'll be a continuous pass from that point on.

08 04 50 59 CMP Okay; thank you.

08 04 51 07 CC Okay, and I have a couple of other updates at 197:14 and 15.

08 04 51 18 CMP Go ahead.

08 04 51 19 CC Okay, at 197:14, it's PAN CAMERA, OPERATE; T-start 197:14:18.

08 04 51 33 CMP Okay, that's 197:14:18 for the pan camera to be running. We'll get it.

08 04 51 37 CC Roger. And right now, you're up to that point where you should go IMAGE MOTION, INCREASE, and PAN CAMERA, STANDBY, and all that stuff at 197:03.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

08 04 51 42 CMP Okay.

08 04 51 50 CC Okay; and at 197:15, we want IMAGE MOTION, INCREASE.

08 04 51 57 CMP Stand by, please.

08 04 52 02 CC Okay. Standing by.

08 04 52 37 CMP Okay, Don. Go ahead.

08 04 52 38 CC Okay, at 197:15, we want IMAGE MOTION, INCREASE, barber pole, plus 3 steps/ON.

08 04 52 52 CMP Okay. Barber pole plus 3 at 15.

08 04 52 56 CC That's affirmative.

08 04 53 04 CMP Okay. Is that - is that all for about 10 minutes, please?

08 04 53 08 CC That's affirmative.

08 04 53 10 CMP Okay.

08 04 54 12 LMP Houston, 16.

08 04 54 13 CC Go ahead, 16.

08 04 54 19 LMP Okay. I think, looking back at the procedures during the back side pass, I think I've figured out what's wrong with the IM, but I'm not really sure.

08 04 54 31 CC Okay. Go ahead.

08 04 54 37 LMP Okay. With the changes from yesterday that were not updated this morning, it looks like to me on pages 16 and 17 of the Timeline Book, we came out of there with no AC power. Both INVERTER breakers are open.

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08 04 54 58 CC Roger; understand. Due to the changes yesterday that were not updated today, on pages 16 and 17 of the Timeline Book, you came out without AC power.

08 04 55 10 LMP That's apparently what happened, and I think that the ATCA/PGNS needs AC to fire the jets - but I'm not really - to get the control voltage, but I'm not really positive.

08 04 55 21 CC They're saying here, Charlie, that AC is not required to fire the jets.

08 04 55 28 LMP Okay. Then that didn't - hmm. Okay. Well, I don't know what happened, then.

08 04 55 34 CC Roger. Don't worry about it, Charlie. We're not.

08 04 55 48 LMP Okay; fine. It's just - disappointing. Except for that one switch, I left everything just like you wanted it.

08 04 56 01 CC Roger.

08 04 59 58 CC Again, Casper, as a reminder, you should now be about through configuring the camera for orbital science, and we're about 2 and a half minutes away from the PAN CAMERA, OPERATE.

08 05 02 57 CC Casper, we've got a REFSMMAT for you any time you can let us have the computer.

08 05 03 13 LMP Okay; you got - computer.

08 05 03 19 CC Right.

08 05 03 24 CDR Okay, Houston. You have the computer.

08 05 03 27 CC Roger; copy.

08 05 08 51 CC And, Casper; would you go HIGH GAIN, AUTO.

08 05 15 30 CC 16, Houston. I've got some SPS cue card changes, and have a request on SECONDARY PROPELLANT FUEL PRESSURE switches OPEN, if somebody can copy.

08 05 15 46 CMP Could you wait on that SPS cue card stuff until I get through the photo strip, Don?

08 05 15 51 CC Roger.

08 05 15 52 CMP Will it be too crowded for that?

08 05 15 53 CC Negative. I don't think so.

08 05 15 59 CMP Say again, Don.

08 05 16 01 CC We'll hold off. Go ahead with your strip.

08 05 16 18 CC Okay. Looks like we're about a minute from Boboland [?].

08 05 16 24 CMP Okay. I'm all set; thank you. And I'm starting with an f/8 and 1/250. And I'll wait for you to tell me when to change settings.

08 05 16 35 CC Roger. We'll do it.

08 05 22 54 CMP Don, one of the things that I just noticed in passing Alphonsus is the dark halo craters. And each of those has a little amount of light material inside of the crater itself, just like all the rest of these craters around here. So maybe a dark halo is really an early stage in development.

08 05 23 15 CC Roger. We copy. And in a couple of minutes, Ken, we'll have you go to f/5.6. I'll call you on time.

08 05 23 32 CMP Thank you.

08 05 24 55 CC Okay, Ken. In about 15 seconds, you should be north of Bullialdus, and we'll have you go to f/5.6 at that point.

08 05 25 10 LMP Hey, right now, I'm just passing Lassell C, looking straight down.

08 05 25 14 CC Roger.

08 05 25 56 CC Okay, Ken. Go to 5.6 as you get up - a beam of Bullialdus.

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08 05 26 09 CMP Okay. A beam Bullialdus; I'll go to 5.6.

08 05 26 12 CC Roger.

08 05 27 03 CC Okay, Ken. In about a minute or so, we'll be up by Helmet. And, at that time, we'll want to change the shutter to 1/125.

08 05 27 18 CMP Okay.

08 05 28 10 CC Okay, Ken. Looks good on 1/125 on the shutter, and you should be coming up by Helmet pretty soon now.

08 05 37 32 CC Okay, Ken. We show pan camera T-stop now.

08 05 37 46 CMP Okay. And it's in STANDBY. I've completed the photo strip. I have 160 frames on magazine RR. And magazine Victor, I finished it off with, and it now has 160 frames showing.

08 05 38 01 CC Roger. Understand 160 frames on RR and on Victor. We'll also go MAPPING CAMERA, OFF, now.

08 05 38 16 CC And on the MAPPING CAMERA -

08 05 38 17 CMP It's OFF.

08 05 38 18 CC Okay. We'll wait a few more seconds here, 30 seconds total. And then we can go MAPPING CAMERA, STANDBY.

08 05 38 31 CC Okay. And you can go PAN CAMERA, OFF, now. And you can go LASER ALTIMETER, OFF.

08 05 38 46 CMP Okay. The LASER's OFF. The PAN POWER's OFF. And I'm going to STANDBY on the mapper.

08 05 38 52 CC Roger.

08 05 39 02 CMP And the IMAGE MOTION is OFF.

08 05 39 04 CC Roger. Okay. And then we want to do MAPPING CAMERA, RETRACT.

08 05 39 53 CMP MAPPING CAMERA's RETRACTING.

08 05 39 56 CC Okay.

08 05 41 01 CMP Okay, Don. You want to talk about that - the cue card change, or whatever it was you were getting ready to do awhile back?

08 05 41 07 CC Roger. And verify that you've got MAPPING CAMERA/LASER ALTIMETER COVER CLOSED.

08 05 41 16 CMP No, sir, I haven't. Just now got the camera in.

08 05 41 20 CC Okay; then we want MAPPING CAMERA/LASER ALTIMETER COVER CLOSED, and enable all jets.

08 05 41 28 CMP Okay. We got the COVER CLOSED.

08 05 42 07 CMP Okay. The jets are configured.

08 05 42 09 CC Okay. We need to go to BLOCK on the computer. And, Ken, it looks like that circ flag has not been set. I'm sorry; it's set. It needs to be reset.

08 05 42 27 CMP You mean - you mean the numbers, VERB 45?

08 05 42 33 CC Stand by a minute. VERB 45, Ken.

08 05 42 54 CC Okay, Ken. And we've got one note on the service module RCS system. I got a TEI pad, couple more changes to the Flight Plan, and a SPS cue card change for you. And you can copy them in any order you want.

08 05 44 15 CMP Okay. Let's start with your RCS notes. And then following that, let's take the Flight Plan, and the - I think - Let's take the RCS, the cue card, the Flight Plan, and finally the pads.

08 05 44 30 CC Okay. The RCS note is we want the SERVICE MODULE RCS SECONDARY PROPELLANT PRESSURE switches, four, OPEN. And that's to prevent the primary fuel tank depletion during TEI.

08 05 44 47 CMP Don, did you copy?

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08 05 44 54 CC Roger, Ken. I copied you. And I had started reading there on the RCS note. Did you read that?

08 05 45 02 CMP No, sir. I hadn't ... - -

08 05 45 03 CDR No, we missed you.

08 05 45 07 CC Okay. I'll - I'll try it again here. The SERVICE MODULE RCS SECONDARY PROPELLANT FUEL PRESSURE switches, four, OPEN. And the purpose for that is to prevent primary tank fuel tank depletions during TEI.

08 05 45 31 CDR Do that right now?

08 05 45 36 CC Stand by 1. That's affirmative. That's affirmative. We want to go ahead and do it now.

08 05 45 58 CDR Got four, OPEN.

08 05 46 02 CC Okay. Now the SPS cue card. Let me know when you're ready to copy.

08 05 46 16 CMP Okay, Don. Go ahead. And why don't you give me an outline of what is first, so I have some idea of what to do, and then I'll work on the card. We can go back and do it in detail.

08 05 46 24 CC Okay. First of all, about a third of the way down the page, we've got a note on the - on the PUGS operation for TEI, and then we've got a couple or three words to add down about nine lines from the bottom on the gimbal trim and verify manual thrust vector control. And we're gonna say there, "Except YAW." And seven lines from the bottom, we're going to have you open the PITCH 2 and YAW 2 BATTERY 3 circuit breakers to keep the secondary system from getting an - or sensing an overcurrent and shutting itself down. And on the back of the card, we're going to reclose those two circuit breakers after the DELTA-V THRUST stop.

08 05 47 13 CMP Okay. Is there some reason you think that we need that added protection this time?

08 05 47 19 CC I guess it's just a feeling that if you get into TEI and you lose the primary system and you're on the secondary system, you don't want the secondary system to - to sense an overcurrent and shut down. And we're gonna pull these circuit breakers to make sure that that control system continues to function.

08 05 47 41 CMP Okay. That's always the case. I just wondered if there was some reason that you were suspicious that might be more appropriate thing to say this time.

08 05 47 51 CC Negative. We don't have any - any evidence that says that's likely to happen or any more likely to happen.

08 05 48 06 CMP All right. Is that the - that's the context of the changes?

08 05 48 11 CC That's affirmative.

08 05 48 21 CMP Okay. Now let's take it from the top.

08 05 48 24 CC Okay. About a third of the way down the page then, we want to add, "PUG MODE, AUX; OXIDIZER FLOW VALVE, NORMAL, SECONDARY." And in a comment, we want to add - "Do not - -

08 05 48 49 CMP Would this be - Is there something different about this than what we've done here - for all of the other burns?

08 05 49 03 CC I think just the "PUG MODE, AUX" is the only change.

08 05 49 14 CMP Okay. You want to go PUGs, MODE to AUX. You want to leave the OXIDIZER FLOW VALVE in SECONDARY. And the position of the valve in NORMAL. Is that correct?

08 05 49 26 CC That's affirmative. And we do not want to move the OXIDIZER FLOW VALVE during the burn.

08 05 49 35 CMP Okay.

08 05 49 36 CC Okay. Then nine lines from the bottom, where it says "Set GPI trim, verify MTVC," we want to add the words, "EXCEPT YAW."

08 05 49 57 CMP Roger.

08 05 50 01 CC Okay. And seven lines from the bottom, we'd like to add "Circuit breakers PITCH 2 BATTERY B, open," and "YAW 2 BATTERY B, open."

08 05 50 20 CMP Okay.

08 05 50 23 CC Okay. And on the back of the page, after the "DELTA-V THRUST, two, OFF," we want to close those circuit breakers. That's PITCH 2 BATTERY B, closed, and YAW 2 BATTERY B, closed.

08 05 50 43 CMP Okay.

08 05 50 46 CC Okay. That does it for the cue card.

08 05 51 08 CMP All right. Give me the Flight Plan now, if you will, please.

08 05 51 11 CC Okay. At 198:40 in the Flight Plan.

08 05 51 21 CMP All right.

08 05 51 23 CC Okay. We want to add a waste water dump to 10 percent.

08 05 51 34 CMP Okay. We'd have gotten that down further, but we just - just couldn't get it all done the last time.

08 05 51 39 CC Okay. And that's somewhere between the P52 and AOS, anywhere you want to stick it.

08 05 51 47 CMP Okay.

08 05 51 52 CC Okay. And at 199:45 -

08 05 52 10 CC At 199:45, we want to add - -

08 05 52 12 CMP Don, you gave me that at 199:40, didn't you?

08 05 52 16 CC Negative. That - -

08 05 52 17 CMP You gave me that waste water dump at 199:40 or 45?

08 05 52 21 CC Negative - -

08 05 52 22 CMP You had me -

08 05 52 23 CC - - It was 198:40 on the waste water dump.

08 05 52 29 CMP Okay. That makes more sense. Thank you.

08 05 52 35 CC And at 199:45 - -

08 05 52 37 CMP All right. Go ahead.

08 05 52 39 CC At 199:45, we want to add "Load EMP 509."

08 05 52 50 CMP Okay. "Load 509 at 199:40."

08 05 52 55 CC Okay. That's 199:45. And now I've got the preliminary TEI-64 pad.

08 05 53 15 CDR Go ahead. Over.

08 05 53 17 CC Okay. Preliminary TEI-64, SPS/G&N; 38332; plus 0.61 plus 0.95; 200:33:20.44; NOUN 81's plus 3265.6, plus 0808.0, minus 0215.1; 180, 000, 000; H_A is not applicable, H_P plus 0021.7; 3371.0, 02:42, 3351.7; sextant star 23,183.7, 37.5; boresight star is not applicable; NOUN 61's minus 00.72, minus 156.04; 1049.4, 36277; 265:49:12. Set stars Sirius and Rigel; 118; 311; 007. Ullage, two jets, 17 seconds. Use quads A Alfa and Charlie. Under other: number 1, pad based on TEI REFSMMAT; number 2, sextant star not available until 200 hours GET, and we do not have a single-bank burn time for the preliminary pad. We'll get you one for the final pad. And we're about a minute from LOS now. You can try a readback if you want.

08 05 56 16 CDR Okay. Pre-TEI-64, SPS/G&N; 38 - -

08 05 56 24 CC 3833 - -

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08 05 56 25 CDR

38332; plus 0.61, plus 0.95; 200:33:20.44;
plus 3265.6, plus 0808.0, minus 0215.1; 180, 000,
000; plus 21.7; plus 3371.0, 2 minutes 42 seconds,
3351.7; sextant star 23, 183.7, 37 and a half;
latitude, minus 7.2, minus 156.04; 1049.4; 36277 - -

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

08 06 32 XX BEGIN LUNAR REV 64

08 06 47 35 CC 16, Houston. How do you read?

08 06 47 40 CMP Loud and clear, Pete. How are you?

08 06 47 42 CC Loud and clear.

08 06 48 27 CMP Okay, Houston. The gyro torquing angles on the P52 option 3, with the star angle difference all balls, minus 0.032, plus 0.001, plus 00, - plu - excuse me - plus 0.034. And that was at a GET of 198:24:35. And those angles were so small they weren't torqued, because we went into the option 1.

08 06 49 00 CC Roger.

08 06 49 20 CC And, 16, I've got a map update - rev 65 - at about 200 hours 30 minutes in the Flight Plan - TEI.

08 06 49 42 CMP Okay.

08 06 49 45 CC Okay. It's around 65 instead of 76. And the numbers are 200:07:27; 200:31:33; with TEI, 200:43:09; without TEI, 200:52:48.

08 06 50 18 CMP Okay. 200:07:27, 31:33, 43:09, and 52:48.

08 06 50 26 CC That's affirmative.

08 06 50 57 CMP (Laughter) I would suspect that you can probably throw this one back in that jett bag, too, then. There. Thank you.

08 06 51 13 CC And, Ken, you're on air to ground.

08 06 51 19 CMP Thank you.

08 06 52 31 CC Okay, 16. I've got some numbers on the RCS DELTA-V. I believe they're at 200 hours and about 15 minutes in the Flight Plan now.

08 06 52 45 CMP Okay. Go ahead now.

08 06 52 48 CC Okay. Pre-TEI, you've got 75 feet per second; post-TEI, you've got 111 feet per second.

08 06 53 01 CMP Okay. Pre is 75 and post is 111.

08 06 53 05 CC That's affirmative.

08 06 53 10 CC And, Ken, have you got a couple of minutes to listen to a few words about servo loop.

08 06 53 19 CMP Okay. Go right ahead, Stu.

08 06 53 21 CC Okay. That's a real good system you've got on your second loop. We have got the simulator swinging right with the characteristics of your spacecraft. And this is the way it's going to look to you if you have to use it. Prior to ignition, the gimbal is going to be oscillating plus or minus - approximate - at about a degree - 0.9 - something like that or, in other words, 1.8 peak to peak. But once you get THRUST ON, there's a side load on your bell from the LOI burn, and this side load acts as a damper. Since the load is cyclic, it really doesn't matter which direction the load is; it damps out. Under CMC control, it will damp out in a few seconds and burn very steady. In SCS, AUTO, it damps almost immediately and then is steady throughout the rest of the burn. In RATE COMMAND, however, since you're continually pulsing it with an input, it continues to oscillate pretty much at this same magnitude, or amplitude, throughout the burn. However, as far as you controlling it, it really doesn't matter. However, sitting in the simulator, we don't get the real live shake effect that you're going to get. The spacecraft is going to shake and shudder; however, your attitude will remain virtually unchanged. And, I guess, the only advice that I could say would be that if you download - if you could go to SCS, AUTO, you would save those excessive clutch currents that you get under RATE COMMAND with this continual oscillation. And I guess I'll stop there, if you've got any questions.

08 06 55 26 CMP

No, that sounds - that's good information, Stu. I'm glad to hear that. Do you - you got any cute tricks in the back of your mind on how you can download from RATE COMMAND and then go back to AUTO without getting a big transient due to the mistrims?

08 06 55 45 CC

No. I - I think - now I tried it - purposely having at least, say, a degree mistrim and - when I would switch, and you'll get the transient, but the bell will - will steady out. Now, I think going ahead and flying it in RATE COMMAND is - is acceptable; however, you are - you are getting the bell oscillating, and you are putting, you know, the currents through there. This attitude - -

08 06 56 14 CMP

Okay. I get the - Sounds like - if you could - you could damp the rates - damp the oscillations quickly by getting it into RATE COMMAND - I mean the - AUTO and then use the old thumbwheel procedure to change the pointing accuracy if you aren't pointing in the right direction.

08 06 56 44 CC

Yeah. You - you don't have much control with that - with that thumbwheel in - in the AUTO. I think, probably, I would take it in RATE COMMAND, go back to my attitude, recycle my BMAGs, uncage them again at my - at the attitude I wanted, and then accept the trim - the mistrim in the - in the gimbal and - and let that damp out. I think you're going to be hard put to try to guess - guess your thumbwheel setting. However, let us think about that a little bit; and, also, I'd like to say this has been checked. I talked with North American this afternoon. This all agrees with the hardware evaluator, as far as our characteristics, so I think we're pretty close to your spacecraft.

08 06 57 39 CMP

Okay. That's outstanding. Sounds like you guys have done a mighty thorough job. My first choice then would be to - I think, based on what you said right now, just do the natural thing and take the oscillations unless they're excessive, and look - just download in the normal manner and ride it out.

08 06 58 01 CC Okay. That sounds - I think that's very - -

08 06 58 03 CMP So, as the first choice, I think we'll do the normal thing and burn CMC.

08 06 58 12 CC By all means, yes. CMC is - is prime, or you can - you can download - -

08 06 58 15 CMP Yes, okay.

08 06 58 16 CC - - You'll be in RATE COMMAND, and you will have the bell shaking. It'll start to damp a little bit; but every time you hit with an impulse, why, you'll excite the oscillation again.

08 06 58 31 CMP Okay. Thank you very much, Stu.

08 06 58 39 CC Roger.

08 06 59 19 CC And one other thing, Ken. After convincing you that that system is - is real good, which we believe it is, we'd like to say - and I'm - I'm assuming that you would do this anyway - that if everything isn't checking out real good - primary-system-wise or anything else, you'll just come around and let us take another look at it.

08 06 59 42 CMP Yes, sir. If there's any problem with the primary system or anything abnormal, we'll come around and talk it over.

08 06 59 49 CC Okay. Very good.

08 07 00 43 CC 16, would you verify BMAGs in RATE 2.

08 07 00 53 CMP Will now. Thank you, Don.

08 07 00 54 CC Roger.

08 07 01 04 CC And, 16, if you'll give us the computer, we'll up-link a state vector and the target load for you.

08 07 01 14 CMP You have it.

08 07 01 15 CC Roger. Thank you, and go AUTO on the HIGH GAIN.

08 07 02 35 CC 16, we'd like to go to a different configuration on the cryo O₂ tanks 1 and 2, AUTO, and TANK 3, OFF.

08 07 02 49 CMP Got it.

08 07 04 27 CC Okay, 16. It's your computer, and I've got the TEI pad any time you're ready.

08 07 04 58 CMP Okay, Pete. Go ahead.

08 07 05 00 CC Okay. TEI-64, SPS/G&N; 38332; plus 0.61, plus 0.95; 200:33:20.42; plus 3264.4, plus 0809.9, minus 0225.7; 180, 000, 000; H_A is not applicable, plus 0021.7; 3370.9; 2:42, 3351.7; sextant star 23, 183.7, 37.5; 013 - stand by 1 - down 09.6, left 3.1; NOUN 61s, minus 00.72, minus 156.04; 1049.4, 36277; GET 265:49:12. Set stars, Sirius and Rigel; 118, 311, 007. Ullage, two jet, 17 seconds; use quads Alfa and Charlie. Other -

08 07 07 17 CC Okay, under other. Comment 1: pad based on TEI REFSMMAT; 2, sextant star not available until 200 hours GET; single-bank burn time, 2 minutes 48 seconds; number 4, boresight star not available until 200:26:00.

08 07 07 56 LMP Okay, Pete. We copy. TEI SPS/G&N 38332; plus 0.61, plus 0.95; 200:33:20.42; plus 3264.4, plus 0809.9, minus 0225.7; 180, 000, 000; NA for H_A; plus 0021.7; 3370.9; 2:42, 3351.7; 23, 183.7, 37.5; 013, down 09.6, left 3.1; minus 00.72, minus 156.04; 1049.4, 36277; 265:49:12. Sirius and Rigel; 118, 311, 007. Two jets, 17 seconds; use quads A and C. Notes: TEI REFSMMAT; sextant star available at 200 hours; single-bank burn time 2 plus 48; boresight 2 - sight stars 200:26.

08 07 09 06 CC The readback's correct, 16.

08 07 09 12 CMP Okay. Thank you.

08 07 10 54 CC And, 16, I've got some block data, TEI-65.

08 07 11 09 LMP Okay. Go ahead.

08 07 11 10 CC Okay. TEI-65, SPS/G&N; 38332; plus 0.61, plus 0.95; 202:32:31.35; NOUN 81s plus 3337.3, plus 0869.0, minus 0183.4; 180, 358, 001; rest of the pad is NA; set stars Sirius and Rigel; 118, 311, 007. Two jets, 17 seconds; use quads Alfa and Charlie.

08 07 12 18 LMP Okay, Pete. We copied TEI-65, SPS/G&N; 38332; plus 0.61, plus 0.95; 202:32:31.35; plus 3337.3, plus 0869.0, minus 0183.4; 180, 358, 001; NA, rest of the pad; Sirius and Rigel; 118, 311, 007. Two jets, 17 seconds, Alfa and Charlie. Over.

08 07 12 52 CC The readback's correct, 16.

08 07 13 53 CMP Hey, Don. Could you have someone check on the proper exposure settings for CEX film for post-TEI?

08 07 14 01 CC Will do, Ken.

08 07 14 06 CMP Thank you, sir.

08 07 17 18 CC 16, I've got about four more updates to the Flight Plan, any time you want to copy. At about 200 hours and 43 minutes is the first one.

08 07 17 32 CMP Okay. Go ahead.

08 07 17 35 CC Okay. There's a list of items at 200 hours and 43 minutes, and we want to add to that list "Pan camera V over H override to high altitude."

08 07 17 51 CMP Okay, pan camera V over H to high.

08 07 17 56 CC And at 200 hours 46 minutes, we want to change from "Barber pole plus three steps," to "Barber pole plus two steps."

08 07 18 10 CMP Okay. That's plus two.

08 07 18 12 CC Roger. And at 200 hours and 56 minutes, we want to change from "GAMMA RAY, DEPLOY" to read "GAMMA RAY, DEPLOY to 8 feet," and that's "59 seconds."

08 07 18 31 CMP Okay. GAMMA RAY, DEPLOY at 8 feet, 59 seconds.

08 07 18 40 CC Okay. And at 201:08, we've got "Maneuver angles to Moon UV attitude are roll, 174; pitch, 212; yaw, 64; and the HIGH GAIN ANTENNA angles are PITCH, minus 73; and YAW, 12."

08 07 19 09 CMP Okay; 174, 212, and 064 for the attitude, and HIGH GAIN, minus 73 and 12.

08 07 19 18 CC Readback correct, and that's all the Flight Plan updates we've got right now.

08 07 19 25 CMP Okay, Don. Down here where it says "Pan camera, mapping camera film should be expended," I'm gonna let those things run until you guys tell us that you're either tired of taking pictures or something, because we're not going to run out, I don't imagine - at least not at this point.

08 07 19 44 CC Okay, 16. Understand the pan camera will probably run out, but the mapping camera may take quite awhile.

08 07 19 53 CMP Okay. I suspect it's probably to our advantage, even though the cutter works good, that we probably ought to go ahead and run it out. That's your call though.

08 07 20 05 CC Okay, 16. I think that's what we plan to do.

08 07 20 10 CMP Okay.

08 07 20 22 CC And, 16, it'll take about 3 hours to get rid of that mapping camera film, if we run it all the way out.

08 07 20 30 CMP Okay. Is that what you want to do or did you want to just go ahead and cut it tomorrow? It's no difference to us.

08 07 20 39 CC We'll let it run out, Ken.

08 07 20 44 CMP Okay.

08 07 22 10 CC 16, can you verify that the subsatellite deployed on time?

08 07 22 18 CMP Yes, sir. Sure can.

08 07 22 21 CC ...

08 07 22 23 CDR How's it doing?

08 07 22 38 CC Okay. I guess we're not able to see it until the LM electrical power runs out.

08 07 22 46 CMP Yes, sir. It went on time. Of course, it was in the dark and we couldn't see it to verify it visually, but - all indications were that everything was a normal deployment.

08 07 22 57 CC Roger. Understand.

08 07 23 05 CMP And you can tell all our friendly G&Cs there, Don, that I don't understand it, but in 100 seconds, EMS now only shows a 0.4 change, which looks like the EMS gets better as time goes on.

08 07 23 18 CC Roger. Understand you think the EMS is getting smarter.

08 07 30 38 CMP Houston, is it okay for 16 to go to the burn attitude?

08 07 30 43 CC Stand by 1. Okay, 16. You can go to burn attitude.

08 07 30 51 CMP Okay. Thank you, sir.

08 07 32 03 CC 16, would you verify LIMIT CYCLE switch, OFF.

08 07 32 10 CMP No. As a matter of a fact, it's on right now.

08 07 32 16 CC Okay. We'd like to have that switch OFF, please.

08 07 33 07 CC And, 16, we'd also like you to verify once more, although we're sure you're going to do it this way anyway, that you're going to leave the OPTICS POWER switch on during the burn, because that will decrease the probability of the - of the glitch occurring.

08 07 33 26 CMP Okay. I didn't realize that it would. We would have left it on, but thank you for telling us.

08 07 33 31 CC Roger.

08 07 40 01 CC Okay, 16. I've got those camera settings for
after TEI. Can you tell me you're ready to copy?

08 07 40 12 CMP Go ahead.

08 07 40 14 CC Okay. For the first 15 degrees past the terminator,
the settings are 5.6, 1 over 125, and infinity; from
15 degrees to 30 degrees, it's 5.6, 1 over 250,
and infinity; and past 30 degrees, it's 8, 1 over
250, and infinity.

08 07 40 48 CMP Okay. Thank you, Don. The first 15 degrees, it's
5.6, 1/125; and, from 15 to 30, it's 1/250; and,
from 30 on, it's f/8 and then 1/250. Thank you.

08 07 41 00 CC Roger. And just a couple of additional comments
here. The P20 attitude is going to differ slightly
from what you've got in the Flight Plan, due to the
fact that we're using a different TEI REFSMMAT.
It's a very small change and probably not very
significant. But we didn't want it to surprise
you. And the TEI rev is different, of course.
That's going to give us a slightly different termi-
nator, so we've been advised that you can turn the
mapping camera and the pan camera on a couple or
three minutes early, if you'd like since we got
a lot of film.

08 07 41 39 CMP Okay. We'll put those things on as soon as it's
practical. And you - did you want to change the
NOUN 78 load, or are you just saying that that will
give us a different set of gimbal angles?

08 07 41 53 CC The NOUN 78 load is correct. It'll just give you
a slightly different set of gimbal angles.

08 07 42 00 CMP Okay. Thank you.

08 07 42 02 CC Roger.

08 07 42 09 CMP And the 509 flag is set.

08 07 42 13 CC Roger.

08 07 42 58 CC And, 16, you're GO for TEI.

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08 07 43 06 CDR 16 is going for TEI.
08 07 43 10 CC Roger.
08 07 50 32 CMP Okay, Houston. We have a successful star check.
08 07 50 36 CC Roger. Understand successful star check.
08 07 50 42 CMP That's affirmative.
08 07 54 31 CC About 45 seconds to LOS. See you coming home.
08 07 54 39 CDR Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

08 08 31 38 CC 16 Houston. How do you read?

08 08 31 43 CDR Hello there, Houston. ...

08 08 32 08 CC 16, I can't make out the words. We can hear you calling.

08 08 32 17 CDR Roger. ...

08 08 32 21 CC Roger. Understand.

08 08 33 16 CC 16, Houston. Let's try it again.

08 08 33 22 CDR Do you read us now, Don?

08 08 33 23 CC Roger. You're a lot better now.

08 08 33 28 CDR Roger, Just saw you come up like thunder, and that's how we're coming up. Just going away from it like - nothing.

08 08 33 39 CC Roger.

08 08 33 40 LMP It's better than an AB climb, Pete.

08 08 33 41 CC Roger. Understand.

08 08 34 22 CDR Okay, Houston. We're working some mapping stuff. The burn was completed nominal. We'll give you the status report in - just as soon as we finish.

08 08 35 03 CDR Okay, Houston. Burn status report follows. There is no ΔT_{ig} . Burn time, 242.4. There was no trim. And the residuals were measured at 184, 005, and 351 degrees; 0.2, V_{gx} ; 1.2, V_{gy} ; 0.1, V_{gz} ; all pluses; minus 19.1 ΔV_c . 3.9 is the oxidizer, and 5.2 is the fuel.

08 08 35 57 CC Roger.

08 08 36 06 CDR It was really beautiful; that baby just hummed right out of there.

08 08 36 10 CC That's great, John.

08 08 36 11 CDR ... can really put on the power. It's - it's kind of refreshing to get a whole half g from her.

08 08 36 18 CC Roger.

08 08 36 25 CDR The boys are all at the windows taking pictures.

08 08 36 27 CC Roger.

08 08 36 31 CDR We got - we got some pictures of earthrise as we were climbing out. I bet they're really spectacular.

08 08 36 39 CC Roger. Hope they come out nice.

08 08 36 47 CDR This Sun is really - is really a fascinating satellite. Boy, there's something new and different, and - and you can sure see a lot of variety in this view right here. This is almost - this is even more spectacular almost than the Moon - Moon in earthshine when we were coming in here just - oh, 4 or 5 days ago, however long ago it was.

08 08 37 16 CC Roger.

08 08 37 32 CDR I think the general agreement in the cockpit is that morale around here just went up a couple 100 percent.

08 08 37 46 CC Roger. Morale looks pretty good here, too.

08 08 38 15 CDR Hey, Houston, how do you read on the HIGH GAIN?

08 08 38 19 CC You're loud and clear now.

08 08 38 22 CDR Okay. I missed your last thing; we're switching over.

08 08 38 28 CC Roger.

08 08 38 39 CDR We're now getting a view of - on the horizon, and there's Crisium. Way up north there, Charlie.

08 08 39 15 CC 16, we need a VERB 58.

08 08 39 21 CDR You want a VERB 58?

08 08 39 22 CC That's affirmative.

08 08 40 40 CDR Boy, Pete, this is really a spectacular view. Really get the curvature.

08 08 40 48 CC Tell us about it.

08 08 40 50 CDR Yeah, the old crescent Earth coming up there - The - the earthrise was just beautiful. It just came up like gangbusters. We were looking right out the window and - and there you came, and right now you're a - almost a - just a crescent Earth, just a very sliver out there. And, I tell you, we can hardly wait. I know we've got a couple of things to do before we get there, but we're looking forward to it.

08 08 41 22 CC Roger.

08 08 41 39 CDR Houston, another great view that we had right before TEI was your prime earth earthset. Your crescent was - your - the lit - light portion of the Earth was tangent to the lunar horizon, and when down, you ended up looking like a big bull horns up there.

08 08 42 01 CC Roger. 16, let's go HIGH GAIN, AUTO.

08 08 42 15 CDR You have it.

08 08 42 17 CC Thank you.

08 08 44 09 CDR Houston, we now have, looking out the center hatch window, the whole - the - the Moon fills the whole window. I can see from horizon to horizon by just being about 4 inches from the center hatch window. What a spectacular view.

08 08 44 23 CC Roger.

08 08 44 28 CDR That's from horizon to horizon along the equator. And we are really climbing away from the planet. You can just see it getting smaller by the second.

08 08 44 39 CC You're really moving out, huh?

08 08 44 45 CDR Yeah. We're - doing just like old 97, really really moving down the track.

08 08 44 52 CC Roger.

08 08 44 57 CMP Almost as fast as John was driving that Rover yesterday.

08 08 44 58 CC Roger.

08 08 48 15 LMP Pete, out of window 5, I can already see the whole sphere.

08 08 48 23 CC Roger.

08 08 50 15 CMP I just can't get these new guys away from the windows.

08 08 50 16 CC Roger.

08 08 50 23 CDR That view is just beautiful.

08 08 50 50 CC And, 16, we're showing the IMAGE MOTION, ON, and we'd like you to go OFF, if it is ON.

08 08 51 03 CMP Okay. That's in work.

08 08 51 05 CC Roger.

08 08 51 35 CMP Don, I'll have to stop the camera and start it again. Is that okay?

08 08 51 40 CC We concur, 16.

08 08 52 41 CMP Okay, Don. I've got the camera running again. What barber pole setting did you want on the - on the speed?

08 08 52 52 CC Barber pole plus 2, 16.

08 08 53 13 CMP Okay. You've got it now. Is there anything else we have out of configuration?

08 08 53 17 CC I think not, but stand by a minute.

08 08 53 41 CMP You know, you can sort of sense a - From where we're looking right now, you can sense a swingout in this big arc back toward the Earth. I'm looking right now at my 12 o'clock out the hatch window. Seems like we're almost climbing right away from the center of the Moon. And I can see the whole - Mare Crisium is spread out up to the north, and on our groundtrack, well, just north of our ground-track, you can see Messier A and B Craters and Langrenus.

08 08 54 30 CC 16, we can go ahead and get the GAMMA RAY deployed to 8 feet. That's 59 seconds.

08 08 54 40 CMP Okay. I'll do that. 8 feet to 59 seconds. And this is the one place we can get a good view of Humboldt that we got on our first pass there.

08 08 54 57 CC Roger.

08 08 55 17 CMP Okay. Don. You want those deployed for 59 seconds. Is that affirmative?

08 08 55 20 CC Roger.

08 08 55 30 CMP I guess in SIM bay attitude, the only thing we have been able to see so far is Sea of Kovalsky, and Charlie said he got a view of it out his window. So I guess we've - just about now we're able to see the whole Moon. Boy, we're really moving away fast.

08 08 55 50 CC Roger.

08 08 55 53 CMP That's the whole Moon out - out a window. Back from it about 2 inches.

08 08 56 25 CMP Okay. The GAMMA RAY is out.

08 08 56 30 CC Roger.

08 08 56 55 CMP From this distance, the color is very much the same as it was when we were orbiting it. And that is that no three men on any one crew can agree on what the color really is.

08 08 57 10 CC Roger.

08 08 57 14 LMP Looks like to me, Pete, that the mare right now just picked up a bluish-black cast to them.

08 08 57 21 CDR Charlie, those maria are brownish-black casts.

08 08 57 24 LMP John says brownish.

08 08 57 27 CC Roger. Understand a bluish-brownish black cast. You guys have invented a new one this time, anyway.

08 08 57 33 LMP That's right. We'll get Ken's opinion. Stand by.

08 08 59 59 LMP Pete, did CST come back with anything on those wrist rings?

08 09 00 06 CC Stand by 1, Charlie. We'll check on it.

08 09 00 32 CDR You know, as we move out from the Moon, I think that by looking at the varied structures on the surface, that we can see from here, I guess my impression of it is that the Moon may be 4 billion years old plus, but it sure had a - and it may eventually have stopped growing after the first 500 million or changing dynamically, like the Earth changes, but during that first 500 million years, it was certainly busy cause it really has a lot of variety down there, and we haven't even begun to scratch the surface of the con - complexity of the story. That's my personal opinion.

08 09 01 20 CC Roger. Charlie, on the problem with the rings, I guess we don't really have an answer for you, and we may get some more in the morning. But there's no apparent good way to do anything about that. We don't have a cleansing agent or a lubricant that we can use on them. I guess you'll just have to use more force on them.

08 09 01 45 LMP Okay. Fine. With - we can get them locked with a little force, and they pass checks okay, once we get them on.

08 09 01 53 CC Roger.

08 09 04 19 CC And, 16, I've got a couple of Flight Plan changes for you at 201:30 and 201:35.

08 09 04 32 CMP Okay. Wait a second.

08 09 04 35 CC Roger.

08 09 04 37 CMP Can you stand by just a second on those.

08 09 04 39 CC Sure can. Just call me before you do the VERB 49. We've got some attitude changes.

08 09 04 51 CMP Okay. We won't go anywhere.

08 09 06 43 CC Okay, 16. The VERB 49 at about 201:07 in the Flight Plan, for the UV photography, should have been started, oh, about 10 minutes ago.

08 09 06 57 CMP Okay. We'll go to it now.

08 09 07 00 CC Roger. And it's correct as you have it now.

08 09 07 43 CMP Okay, Don. This is the 174, 212, and 64, right?

08 09 07 47 CC That's affirmative.

08 09 08 08 CC And, 16, we've got a REFSMMAT, if you're ready to accept?

08 09 08 20 CDR Roger. Stand by on that for a second.

08 09 08 23 CC Roger.

08 09 10 40 CC And, 16, if you can copy, I've got this Flight Plan update; I guess we need to go ahead and get it in.

08 09 10 48 CMP Okay, Don. Give me 30 seconds.

08 09 10 49 CC Roger.

08 09 12 44 CMP Okay, Don. Go ahead with your updates.

08 09 12 47 CC Okay. I've got this VERB 49 maneuver that's at 201:30. We want to change that from a maneuver to thermal attitude to a ramu - maneuver to Sco X-1 attitude. And the angle - the new angles are at 347, 071, 000, and the HIGH GAIN is minus 36, and YAW is 176. And we also want to add ALPHA PARTICLE/X-RAY COVER, OPEN, at that point.

08 09 13 38 CMP Okay. And we've got a VERB 49 maneuver to Sco X-1 and the attitude is 347, 071, and 000. The HIGH GAIN is minus 36 and 176, and we'll open the alpha/X-ray cover.

08 09 13 52 CC Roger. And at 202:25 -

08 09 14 02 CMP Okay. Just a second, I had - we hadn't updated our time this far. Well, we're going to get a clock sync here when we - -

08 09 14 08 CC Okay, Ken. I wouldn't bother updating the time very much further because you're going to do a clock resync here at 202:20.

08 09 14 22 CMP Okay. Well, I stopped an hour too soon.

08 09 14 34 CC Ken, all you really need to do is, in the old - -

08 09 14 36 CMP All right sir.

08 09 14 37 CC - - going by the old numbers where it was 224:18 or so, which is now about 202:25 or so, we want to delete that VERB 49 maneuver. And at 202:25 or thereabouts, we will resync the clocks, and that'll bring you up - the clock'll come 226:30, so we'll pick up with the nominal Flight Plan, which will have you going to bed a couple hours earlier tonight.

08 09 15 10 CMP Okay. Very good. Thank you, sir. Okay, and then what do we do about this - can we do our PTC REFSMMAT change at the same time we're in this attitude?

08 09 15 27 CC Say again?

08 09 15 31 CMP Can we do our PTC REFSMMAT change while we're in this Sco X attitude?

08 09 15 42 CC Oh, I'll have to advise you, Ken. Stand by a minute.

08 09 15 57 CMP No, sir. I'm timing it.

08 09 16 00 CC 16, you can go ahead with the maneuver. You'll have about a 68-degree gimbal angle.

08 09 16 11 CMP Say again.

08 09 16 17 CC And, 16, we need to up-link a RFFSMMAT to you before you get into the P52.

08 09 16 25 CMP Roger. You have the up-link now.

08 09 16 29 CC Okay.

08 09 16 30 CMP I guess the question - I'm not sure if we got the right question and answer together. Can we do the PTC REFSMMAT platform change in the Sco X-1 attitude? Maybe that's the question you answered, I'm not sure.

08 09 16 56 CC 16, the answer to that apparently is yes, but you will wind up with a 68-degree gimbal angle.

08 09 17 05 CMP Okay. Did you plan for us to do it some other time? Or -

08 09 17 25 CC Oh, 16, if the 68-degree middle gimbal angle is acceptable to you, we would like for you to go ahead and press on with it.

08 09 17 33 CMP Okay. We'll do that, and that'll get us back on time. And we're looking at a 64-degree angle now, so 4 more isn't going to be that different.

08 09 17 44 CC Roger.

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08 09 18 57 CC And, 16, we're finished with the up-link.

08 09 19 03 CMP Roger.

08 09 21 47 CC Ken, we want the PAN CAMERA to STANDBY, and you can deploy the gamma ray boom the rest of the way out.

08 09 21 51 CMP Okay, PAN CAMERA to STANDBY, and we'll deploy the gamma ray.

08 09 22 36 CMP Okay. The gamma ray's going out.

08 09 22 38 CC Roger.

08 09 24 09 CC Okay, 16. Go PAN CAMERA, POWER OFF.

08 09 24 14 CMP Okay. PAN CAMERA POWER's coming OFF.

08 09 25 47 CC And 16, there's an advisory - when you do it - going to the P52. You'll probably get a L01 alarm, which means that you've exceeded 60 degrees middle gimbal angle. You can go on with it, anyway.

08 09 25 58 CMP Okay.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

08 09 26 20 CMP Okay.

08 09 32 25 CC 16, Houston. We've got some words on the LiOH canister any time you're ready to listen.

08 09 32 43 LMP Stand by 1, Pete. Ken's eyeballing it.

08 09 32 46 CC Roger. There's no hurry.

08 09 34 09 CC 16, did you call?

08 09 34 14 CMP No, sir. Be with you in a minute.

08 09 34 15 CC Okay.

08 09 34 56 CMP Okay, Don; go ahead.

08 09 34 58 CC Okay, on the LiOH canister, the words we got on it are that we'd never had one of those straps break on a flight unit. However, apparently if you put more than 128 pounds of force on them you - you can break them. And what we'd like you to do now is go ahead and change - make that change so that we don't miss it when we do the clock sync. I believe it's listed at - -

08 09 35 26 CMP Now, Pete, that's some good thinking. Yes, sir; I've got it at 202:20.

08 09 35 32 CC Roger. And we were afraid we'd get the clock - -

08 09 35 34 CMP - - get that out of the way.

08 09 35 35 CC Okay.

08 09 35 40 CMP Say again, Don.

08 09 35 41 CC I'm just saying it's up close to the time we're gonna sync the clocks. We're afraid we might omit it.

08 09 35 50 CMP Yep, that's good thinking. Okay; while we're changing that out, if you want to - you want to do your thing with the computer, or do you want us to do the P52 first?

08 09 36 06 CC Stand by 1.

08 09 36 30 CC Ken, you talking about the clock sync?

08 09 36 36 CMP Yes, sir.

08 09 36 38 CC Okay, I guess we'd like you to do the P52 first.

08 09 36 43 CMP Okay. We'll get on with that in just a minute as soon as we get the ... changed here.

08 09 36 55 LMP Hey, Pete, y'all got any ideas why old Orion didn't hold attitude jettisoned?

08 09 37 03 CC I guess I don't have a complete briefing on it. We've got a couple of suspect conditions. I'll try to get back to you later.

08 09 37 13 LMP Okay. No hurry on that one.

08 09 37 15 CC Roger.

08 09 37 33 CMP Hey, Don, in order to keep our lithium things from driving us buggy on the way home with the time change, we're just going to go ahead and exchange the canisters as they're called out in the Flight Plan here. And we'll just be skipping the couple that'll be unused. Okay?

08 09 37 48 CC Okay. That sounds good, Ken.

08 09 42 17 LMP Hey, Pete, is Tony coming on tonight?

08 09 42 18 CC That's affirmative. About midnight, I guess. About 2 hours and 15, 20 minutes from now.

08 09 42 29 LMP I guess that's after - after we go to bed?

08 09 42 31 CC I believe that's right, Charlie.

08 09 51 20 CC Good, 16. We copy the torquing angles. They look real good.

08 09 51 30 CMP Okay. That was at time 202:03:00.

08 09 51 34 CC 202:03:00. Roger.

08 09 52 16 CMP Don, how long we gonna be in this attitude?

08 09 52 19 CC Stand by 1. About 30 or 40 more minutes, 16.

08 09 52 33 CMP Okay, thank you.

08 10 02 48 CMP Okay, Houston. Would you like to take over our clock?

08 10 02 53 CC Stand by. We're just about ready to do that.

08 10 04 52 CC Okay, 16; if you'll go ACCEPT, we'll uplink this clock sync. And while they're doing that, I'll tell you kind of what's going to happen. But - We're going to do it. The total change will be 24 hours 34 minutes and 12 seconds. And what we would like you to do is on, let's see here, page 338 in the Flight Plan, we'd like you to pick up at about 226:30 in the Flight Plan - -

08 10 05 22 CMP Hey, Don, (laughter) I'm sorry you're gonna - Hey, Dcn, you're gonna have to start over again. Just as you started talking, our cabin fan let out a great big moan, and so we turned it off then, after all sitting up straight to see what it was. So would you start over again?

08 10 05 41 CC Okay, I'll do that. If you'll go ACCEPT, we've got the clock sync ready to go, and it'll be a 24 hour 34 minute and 12 second total change in the clocks. And what we would like you to do is pick up the Flight Plan at the old - at the old point of 226:30, actually pick up those events, although your clock may not come out exactly on that time. And what we're saying is we may cut a little bit into your rest period.

08 10 06 12 CMP Okay; but we're planning to do a little stowage here that we never have had a chance to get done.

08 10 06 19 CC Roger.

08 10 06 20 CMP So we're going to have to do some of that stuff now.

08 10 06 23 CC Okay. The items we'll pick up with, I guess, are the ones immediately following 226:30 in the old Flight Plan.

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08 10 06 35 CMP Okay.

08 10 07 17 CC Okay. Ken, your clock should be changed now. And if you'll pick up with - on page 338 where it says, "GAMMA RAY, SHIELD OFF," you can go ahead and finish that stuff up.

08 10 07 29 CMP Okay. I take it we're gonna hold off on this PTC for a while until you've had enough time in this attitude?

08 10 07 40 CC Stand by 1.

08 10 07 53 CC Roger. We'd like to stay away from the PTC for about 15 more minutes.

08 10 08 00 CMP Okay; we'll do that.

08 10 09 32 CC Okay, 16. We'd like you to close the ALPHA PARTICLE/X-RAY COVER now, but we want to leave the X-RAY on for an extra 30 minutes because we failed to get some calibration data, and I'll call you when it should go off.

08 10 10 52 CC 16, did you copy on the ALPHA PARTICLE/X-RAY COVER?

08 10 11 03 LMP Roger.

08 10 11 05 CC Okay. We want to get that closed and leave the X-RAY on, and I'll call you when it should go off. About a half hour from now.

08 10 11 15 LMP Okay, I closed the cover.

08 10 11 19 CC Okay. And, also, we'd like you to read out T_{ephem} for us. That's VERB 5 NOUN 1 1706 enter.

08 10 11 51 CDR How's that look to you, Houston?

08 10 11 54 CC Stand by 1; we'll take a look at it.

08 10 12 01 CC Okay, 16. That looks good.

08 10 12 04 CDR That's three balls 11; okay.

08 10 13 03 CC Okay, 16. On those numbers you've got on the DSKY there, if you'll go to the G&N Checklist, page 9-4, you can load register 2 and 3 in column Bravo, lines 4 and 5.

08 10 13 26 LMP Okay, G&N Checklist, 9-4, what - load what?

08 10 13 30 CC Load register 2 and 3 in column Bravo, line 4 and 5.

08 10 13 47 LMP Okay.

(NO COMM FOR 30 MINUTES)

08 10 44 21 CDR Houston, Apollo 16; over.

08 10 44 23 CC Go ahead, 16.

08 10 44 28 CDR Roger. We're gonna go ahead and service the accumulator to - to 55 percent if that - that's all right with y'all.

08 10 44 38 CC Stand by 1. Okay, you can go ahead with that, John.

08 10 44 46 CDR Trying to - okay, we're trying to get as many of these nitpickies out of the way for this EVA tomorrow.

08 10 44 52 CC Okay, and in connection with that, the surgeon advises that the CMP will need a new biomed harness prior to the EVA. We do not have any requirement to monitor the CMP tonight. We would like to monitor either you or Charlie.

08 10 45 18 CDR Roger.

08 10 45 58 CDR Okay; we decided you can look at me tonight.

08 10 46 01 CC Okay, John.

08 10 46 09 CDR I'll put on a biomed tonight, but I've got a bunch of things to do before - before I can get to it. Okay?

08 10 46 15 CC Okay, sir.

08 10 51 12 LMP Pete, looking out of the hatch window towards the -
back at the Moon, I think this view's even getting
more stunning, and - just brilliant whites and
grays against a stark black background - looks
like it's not even real.

08 10 51 30 CC Roger.

08 10 52 39 LMP Hey, Pete, how far out from the Moon are we now?

08 10 52 44 CC How far out from the Moon?

08 10 52 48 LMP Yeah.

08 10 52 49 CC Stand by a minute.

08 10 53 00 CC Charlie, you're 7294 miles out.

08 10 53 05 LMP Thank you.

08 10 53 58 LMP Hey, Pete, we'd like to send you a picture of
this if y'all got - can take the - the TV. This
is really a spectacular sight.

08 10 54 15 CC Okay; stand by, Charlie. We'll see what we can do.

08 10 54 38 CC Charlie, while we're working that, can you copy
about four short items into the Flight Plan at
226:40?

08 10 54 44 LMP Yeah, wait a minute.

08 10 55 00 CC Charlie, you can go ahead and start getting that
camera out. We'll work up the lines here.

08 10 55 06 LMP Okay.

08 10 55 15 CDR Okay, 226:40; go ahead.

08 10 55 20 CC Okay; at 226:40, we want to RETRACT MAPPING CAMERA,
close the door, put the MAPPING CAMERA to STANDBY,
put the X-RAY to STANDBY, and then pick up at
226:50 there in the Flight Plan.

08 10 55 58 LMP Okay. ...

08 10 57 15 LMP Pete, did y'all copy that?

08 10 57 17 CC Negative. I guess we lost comm there temporarily. Say again, Charlie.

08 10 57 21 LMP Okay; you gave us a Flight Plan update for 226, and our clocks now say 227 - -

08 10 57 29 CC That's affirmative.

08 10 57 30 LMP - - 23.

08 10 57 31 CC We're going to have to go back to 226. It's just prior to where you go into PTC and pick up these four items, and then get into PTC.

08 10 57 41 LMP Well, why don't you give us a call when you want us to do those, since we don't know when 226 is.

08 10 57 46 CC Okay.

08 10 57 53 CDR Is 226 right now, there, Pete?

08 10 57 58 CC Say again?

08 10 58 02 CDR 226 is supposed to be right now?

08 10 58 05 CC Negative, negative. Right now we're showing 227:44:07, 8, 9.

08 10 58 16 CDR Okay, but I mean you're saying what - When do you want us to do those items at 226?

08 10 58 21 CC We'll call you when we want you to start in. That's just where we want you. That's the items we want done and then I'll tell you when to start them.

08 10 58 33 CDR Okay.

08 10 58 36 CC Okay, 16; I'm - 16; I've been advised it really doesn't matter when you do them, as long as we get them all done before you go to sleep.

08 10 58 47 CDR Okay.

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08 10 59 20 CDR Houston, you're saying we can - we're now cleared
to take the GAMMA RAY, SHIELD OFF, the X-RAY to
STANDBY, the ALPHA/X-RAY COVER to CLOSE, and so
forth, right?

08 10 59 32 CC That's affirmative.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

08 11 02 27 LMP Pete, could we take the S-BAND AUX switch out of SCI to get the - monitor set up?

08 11 02 35 CC Stand by 1.

08 11 03 11 CC Okay, 16. We need to get the MAPPING CAMERA, OFF - Stand by. Get the MAPPING CAMERA to STANDBY, and the GAMMA RAY, shield on, prior to going out of the SCI position.

08 11 03 30 LMP Okay. The camera has retracted. We're gonna go to OFF on the MAPPING CAMERA, and the gam - and the shield is on.

08 11 03 39 CC 16, want the MAPPING CAMERA to STANDBY, and the GAMMA RAY, shield on.

08 11 03 45 LMP Okay. Yeah; okay.

08 11 04 00 LMP Okay. Can we go to TV?

08 11 04 03 CC Affirm. You can go to TV.

08 11 04 39 CMP Okay. I'm gonna have to hit a COMMAND RESET. Is that all right with Super Tech - Comm?

08 11 04 45 CC Stand by 1. That's affirmative. Go ahead.

08 11 04 56 LMP Okay.

08 11 08 12 LMP Okay, Houston. You should have a picture coming now.

08 11 08 16 CC Roger.

08 11 08 56 CDR Does that look like the Moon to you, Houston?

08 11 09 03 CC Not yet, I guess.

08 11 09 52 CC Charlie, we'd like you to verify that you've got that camera pointed at the right one this time.

08 11 10 00 LMP I happen to be not pointing those cameras this time.

08 11 10 04 CDR They don't let - We don't let Charlie make that choice any more; Ken's doing that kind of work now.

08 11 10 09 CC Roger. Understand. It's a beautiful picture, Charlie.

08 11 10 18 CDR I tell you - yeah. And it's just about that big, too, from where we're looking. It just - just fills the window just about like that.

08 11 10 29 CC That's really a great looking -

08 11 10 30 CDR Are y'all getting it real time?

08 11 10 33 CC Affirmative. We just happened to have the lines up for an LCRU picture, so we're getting it real time.

08 11 10 47 LMP Ah, great.

08 11 10 48 CDR Is the LCRU still working?

08 11 10 53 CC It was last night, they say.

08 11 10 57 CDR I'll be darned. Did they watch lift-off and everything?

08 11 11 05 CC Affirmative. Had a beautiful lift-off. Got to watch all of it almost.

08 11 11 11 LMP How much did you see, Pete?

08 11 11 24 CC We got to see about the first 30 or 40 seconds of it real good.

08 11 11 32 LMP Hey, great! That's wonderful.

08 11 11 37 CC That was something. I guess we'll have to tell you that was spectacular, because you didn't get as good a view of that as we did, I guess.

08 11 11 45 LMP Man, I tell you. That ascent engine coming on, you - you - it was a real - It wasn't what I expected, anyway. At ignition, there, it seems like it sort of sits a little bit, then it grabs you and, boy, off you go! And it takes you a while - at least, it did for me - to get my eyeballs uncaged. And we were - then all I saw out the window was the MESA blanket; then we were back on the gages.

08 11 12 15 CC Roger. It looked like you lifted out of there pretty rapidly.

08 11 12 21 CDR Yeah; that machine just flies so nice. It's just unbelievable! But once you get to ascent stage, it's really light and responsive. Boy, you fire one of those thrusters and it does exactly what you want it to.

08 11 12 36 CC Roger.

08 11 12 45 LMP And this is what you look like after 4 days with no shaving.

08 11 12 51 CC Roger.

08 11 13 05 CDR And we refuse to show you the pressure suits.

08 11 13 10 CC Roger.

08 11 13 11 CDR You can tell Charlie's real adapted to zero gravity. A couple of days ago, he couldn't spin that pencil.

08 11 13 20 CC (Laughter)

08 11 13 30 LMP It takes us country boys a little while to adapt to things, Pete.

08 11 13 34 CC Right. I'm with you, Charlie.

08 11 14 07 LMP You know, Pete, if you took this view that y'all just saw of the Moon and put in a movie, everybody would say you're faking it. It doesn't look like that. And it's just - you can't see any stars, just pure blackness, and that white-gray body sitting out there is really -

08 11 14 43 LMP This is what the well-dressed LMP on Apollo 16 has been wearing for the last - well, ever - all the way out and all the way back.

08 11 15 05 LMP If y'all get tired of looking, you can just cut off the lines or go to COMMAND RESET or something.

08 11 15 11 CC Roger.

08 11 15 22 LMP One final shot of the beautiful Moon.

08 11 15 26 CC Roger.

08 11 15 40 CC Say, Charlie, why don't you try to give us a closeup of each guy, and maybe we can get a playback for the wives tomorrow.

08 11 15 49 LMP Okay; we'll do that.

08 11 16 17 LMP Okay; we got it off. We'll turn - bring it up in just a second.

08 11 16 21 CC Roger.

08 11 17 45 LMP This is the relaxing attitude for the world - for the seasoned space traveler.

08 11 18 01 LMP Boy, I can hardly believe the last 3 days, Pete. That was - The Cayley Plains is really the most fascinating place I've ever been in my life and will ever hope to go, and we sure had a good time collecting all the rocks.

08 11 18 19 CC Roger.

08 11 18 27 LMP Ken. I'll let you look at somebody else now.

08 11 18 31 CC Charlie, everybody else is doing a mental interpolation. The Surgeon's standing on his head.

08 11 18 40 LMP You say - what - what was that?

08 11 18 43 CC I said everybody in the MOCR is doing a mental interpolation except the Surgeon, and he's standing on his head.

08 11 18 50 LMP (Laughter) Okay. That's great.

08 11 19 07 LMP Okay; Ken just turned the camera over, you can have him turn the other way now.

08 11 19 14 CC Roger. (Laughter) I'll have him - -

08 11 19 16 LMP And then the rest of you will stand on your heads.

08 11 19 41 CDR Okay; I don't know if you can see this or not. See this dirty hand?

08 11 19 46 CC Oh yeah, we can see that.

08 11 19 47 CDR See that? Can you see the dirt under those fingernails - can you see the dirt under those fingernails?

08 11 19 52 CC Roger.

08 11 19 53 CDR That's Moon dust. You talk about a - you talk about two dirty human beings. It took 10 minutes before we could get Ken to open the door. As soon as he saw us, he wanted to close it.

08 11 20 09 CC Roger. We understand. He runs a neat ship.

08 11 20 12 CDR And we're still that way. Yeah, wait'll you see some of these rocks. And we've - and some of the data that Ken's got. That's really something. The Moon around Alphonsus. I got a chance to look at it today for the first time, and - it's really - it's really a strange place. How's everybody doing down there at MCC. Is everybody starting to take it easy for a change?

08 11 20 45 CC Oh, I think we're all breathing easy now. And if we can, we'd like to get a quick look at the CMP because we're going to have to give up the lines here in a couple of minutes.

08 11 20 55 LMP Okay. Will do.

08 11 21 08 CC The only - the only really neat guy on the crew.

08 11 21 21 LMP What'd you say? You must be blind.

08 11 21 27 CDR He does dress pretty well.

08 11 21 30 LMP Notice the reflection off the bald head?

08 11 21 42 LMP Did the Surgeon do a back flip on that one?

08 11 21 46 CC Negative. He's not agile enough.

08 11 21 57 LMP Ken doesn't look like he is either.

08 11 22 02 CDR (Laughter) I told you, in a J-mission spacecraft, you - you either have to be a midget to do that, or have thought about it a lot before you try it.

08 11 22 17 LMP Okay. We're going to sign off here.

08 11 22 25 CC Okay. Thanks a bunch, guys. We'll be talking to you again in a minute.

08 11 22 31 LMP Okay. Thanks, Pete. We'll go back to SCI on the S-BAND AUX.

08 11 22 43 CC Okay. And for thermal reasons, as soon as you can, we'd like to go on now and get into PTC.

08 11 22 50 LMP All right. We'll start up.

08 11 22 52 CDR We're for that.

08 11 23 06 LMP What's happening down in there?

08 11 23 11 CC Say again, Charlie.

08 11 23 17 LMP Get any newsy items for today?

08 11 23 22 CC No. I guess we don't have anything going on right now, Charlie. Everything's routine. If you want a news report, we can dig one up, I think.

08 11 23 37 LMP No, it's not important. Wondered what - We haven't had an update for a while; y'all must have ran out of paper.

08 11 29 04 CDR How does the midcourse look, Pete?

08 11 29 10 CC Stand - stand by 1.

08 11 29 28 CC Okay, 16. All we have is the G&N data. We don't have tracking data because you are uncoupled. However, based on the G&N data, it looks like less than 1 foot per second.

08 11 29 42 CDR Yeah; but - course, I - Yeah, I forgot us - about us being uncoupled.

08 11 29 51 CC Doesn't look like anything very big. About a foot per second.

08 11 29 56 CDR Yeah. Well - I - the G&N - thought it did a good thing.

08 11 30 01 CC Yeah, we concur. G&N looks great.

08 11 32 25 LMP Houston, 16 on OMNI Alfa. Over.

08 11 32 28 CC Roger, 16. You're loud and clear.

08 11 32 33 LMP Okay. We dropped up-link, it looked like, for a while. Signal strength went to zero on all antennas, and I had a COMMAND RESET, and we're OMNI Alfa, if that's okay.

08 11 32 53 CC If you'll go PITCH minus 70 and YAW 130, we can reacquire on the high gain, 16.

08 11 33 03 CDR In where?

08 11 33 04 LMP Okay.

08 11 33 45 LMP Okay. There you are, Pete.

08 11 33 47 CC Okay. You're loud and clear.

08 11 34 27 CC Okay. Charlie, a little while back, you were asking what time Tony was going to come aboard, and he's just walked in here and gotten plugged up if you've got anything for him.

08 11 34 40 LMP Okay. Say again.

08 11 34 42 CC Earlier you were asking what time Tony was going to come in, and he's on board right now.

08 11 34 50 LMP Okay.

08 11 35 07 CDR Hey, Tony, this is John. Over.

08 11 35 11 CC Yeah. Go ahead, John.

08 11 35 15 CDR I don't know if we told you or not, but Charlie and I think you really did one whale of a job doing those EVAs. We know how tough that is to do all those real-time changes. We just thought you did one heck of a good job, and we sure appreciate it. Just wanted you to know that.

08 11 35 34 CC

Oh, thank you much. But you guys made it awful easy.

08 11 35 42 LMP

Hey, Tony. I was sitting here today thinking about those rocks we got, and the thing that really strikes me is that there was - I really don't think we got any volcanic rocks to speak of. Maybe some of those little black clasts were volcanics, but otherwise - I don't think we got any. There wasn't any there. The - there was one other - one other point that could have been - Those ones we were calling shocks could have been a tuff breccia, since they were so friable. But - that we might - that might prove to be the case; but to us, they looked shocked due to the other features that we saw that - that - applied a shocked metamorphism. Over.

08 11 36 37 CC

Right. We - From your description, we had thought there was a good chance that you might have gotten a tuff breccia there. I think, also, the fact that a lot of the breccias were one-rock breccias would in - would mean that you may have your basalts or gabbroic anorthosites or whatever, and that they're just broken up. If they're one-rock breccias or two-rock breccias, it still has most of the information of the - of the rocks we're looking for. It's not like a - you know - if you remember, it's not like a soil breccia, where everything is lost. So we - we're very happy with what you found. Also, did anyone brief you on the newest on the X-ray results?

08 11 37 17 LMP

No. Go ahead.

08 11 37 18 CC

Okay. You remember the first look I gave - The first look that I reported to you indicated that the aluminum-to-silicon ratio was sort of intermediate. Well, they've gone back; and with the newer data and a better analysis, it turns out that Descartes has one of the highest ratios on the Moon. The only place we've seen like it right now is on the east side of Smythii. We don't really have a good comparison yet with the east of Crisium. But anyway, it indicates that if any place has anorthosites, you've found them.

08 11 37 56 LMP I tell you, Tony, some of those rocks that we picked up - I was leaning, with the color and the crystalline structure that we had - they really gave me the - I didn't want to call it that, but they were certainly crystalline rocks; and there was no question in my mind. They had a sugary texture - the whitish ones. That big - one on the - rim of North Ray, there, with the shatter cone that had - a - a bluish tint to it in the crystalline structure. Though, it might have been just the - an aph - I say crystalline structure, or it might have been an aphanitic matrix; but y'all are gonna sort all of that out when you get bagged ones. I tell you, it really wasn't what we thought - I thought we were going to find up there. I imagined a lot of volcanics; and frankly, if the - if these shocked rocks turn out to be tuff breccias, that will be the only volcanics we found.

08 11 39 02 CC Right. Understand. I think - -

08 11 39 04 CDR ...

08 11 39 05 CC - - the fact that you recovered from the picture we had given you before you went and went ahead and found out what was there and sampled it so well - I think that's - a good indication that the training was good and you guys are really on the ball.

08 11 39 26 LMP Well, we tried hard, anyway, Tony; and I think we got every - a piece of every rock that was up there. I really do. They were - and that's, I think, because we were lucky, and the rocks were identifiable.

08 11 39 46 CC You know, the - -

08 11 39 47 LMP ...

08 11 39 48 CC - - difference between a rock being identifiable and not being identifiable is the level of training. That just says you guys were well trained.

08 11 39 58 LMP Well, you guys tried to beat it into us long enough, I'll tell you that. Hope we did a good job.

08 11 40 08 CC I just got a set of questions that the geology team - -

08 11 40 11 LMP It looks like - -

08 11 40 12 CC - - would like to send up to you sometime. Maybe sometime during the transearth coast, we'll have a chance. I haven't really read through them, so I don't know what they're all about yet.

08 11 40 26 LMP Okay. Well, we're gonna go into an eat period and an EVA prep and try to get some rest before the EVA tomorrow, so - we'll wait on those. Okay?

08 11 40 34 CC That's fine. Hey, we have the TV back on on the Moon up there, and everything's looking fine. It hasn't changed much since you left.

08 11 40 47 LMP Well, we were glad that y'all were able to watch lift-off. We heard that they got about 30 or 40 seconds, which, I think, was neat. It took me about that long to uncase my eyeballs when that ascent engine lifted off.

08 11 41 01 CC (Laughter) Yeah. Great.

08 11 41 03 LMP It certainly wasn't what I thought I was going to - experience.

08 11 41 09 CC Yeah. INCO was really on the ball. They tracked you right up.

08 11 41 15 LMP Well, that's just super.

08 11 41 21 CC I don't know - We don't know whether Ken understood the up-link while ago on the biomed harness. The idea is that he's going to have to change it before the EVA in the morning. So, if he'll sleep better without one on tonight, he could take the old one off, now.

08 11 41 40 CDR Okay. We'll tell him.

08 11 42 23 LMP And, Tony, the only - on that - on the rocks, back to one other little point, there. That - You know, we called the whitish rocks tuff breccias - I mean, shocked rocks. But we're cou - at least, I'm personally convinced that there are at least two endogenic craters that we passed, and - the big one on the way to North Ray and the big one coming back from - from stop 8. And so, that might have been a source of a tuff - if that's what they turn out to be.

08 11 43 03 CC Very good. I just want to emphasize again that - -

08 11 43 10 CDR ... situation, though.

08 11 43 12 CC Right. I understand. I just think it was outstanding, maybe serendipity, that we probably - your landing there at Descartes probably sampled the most differentiated place we could find on the front side of the Moon. I think that's really outstanding.

08 11 43 34 LMP That's the feeling I got when we started seeing those rocks. That - that basalt that I called under the engine bell there, I think, might end up to be that blackish-bluish rock that we sampled up at North Ray, and so - we'll - but we'll see. We couldn't get any of what I call real basalt in rocks. Maybe some of the clasts will be, though.

08 11 44 03 CC Okay.

08 11 44 05 CDR Could you tell from the TV, Tony, how rough that place was? Could you see all those - those swales and valleys that we didn't have mapped on our - that didn't show up on our map that were maybe, some of them, 30, 40, 50 meters deep?

08 11 44 24 CC Yeah, I sure could. It reminded me of a dune area.

08 11 44 30 CDR Yeah. That's what it sort of looked like, sort of a dunes plains.

08 11 44 36 CC Incidentally, somebody here is kind of worried about - -

08 11 44 39 CDR I'll tell you -

08 11 44 40 CC - - thermal problems, and we would like to get into PTC as soon as possible.

08 11 44 45 CDR Okay, as soon as the thing - as soon as the rates get low enough, we will.

08 11 44 49 CC Okay.

08 11 44 51 CDR Are the rates good enough now?

08 11 44 54 CC Negative.

08 11 45 06 LMP Tony, that one - that crater at - the endogenic one that we described coming back from North Ray and going out, it - I was guessing 80 meters, John said about 50, but it was really deep; and I'm surprised that we didn't - I sure had no feel for that before we started.

08 11 45 32 CC Right. Understand.

08 11 45 44 LMP I'll tell you one thing, your hair sure doesn't feel very good aft - up here after 3 days with it full of orange juice.

08 11 45 52 CC I don't know. It may do great things.

08 11 45 57 LMP That stuff is great glue, I'll tell you. Boy, we were really worried about those hel - getting those helmets off, but they came - came right on off after we eventually broke the thing and got them cleaned up then.

08 11 46 11 CC Okay, and on your Flight Plan there, at right about 227:00, for setting up for PTC, I guess your DAP has to be set up for B/D ROLL.

08 11 46 24 LMP Okay.

08 11 48 45 CDR Houston, can you give us a holler when these rates get good enough to start PTC?

08 11 48 50 CC Sure will.

08 11 50 18 CC Apollo 16, last time you changed the LiOH canister, did you happen to wiggle the other one and see if it had swelled up in there?

08 11 50 28 CDR No, we sure didn't. That one out of B just came right out.

08 11 50 32 CC Okay.

08 11 50 43 CC Okay. Don't worry about it, then.

08 11 50 52 CDR Okay.

08 11 52 13 CC Just a brief report from the home fronts here. Everybody's healthy, and happy, and not just a little bit proud.

08 11 52 27 CDR Boy, you had me worried there for a second.
08 11 52 30 LMP Thanks, Tony. Appreciate it.
08 11 58 58 CC Okay, Apollo 16. You've got a GO for spinup.
08 11 59 04 LMP Okay. Thank you.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS

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APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

08 20 44 37 CC Apollo 16, Houston.

08 20 45 09 CMP Good morning, Henry.

08 20 45 10 CC Good morning. Is everybody wide awake and feeling great this morning?

08 20 45 19 CMP You even gave us an extra hour.

08 20 45 35 CC We're coming up on antenna switch, and I think the comm is a little bad; but, right off the bat we'd like for you to remain in PTC.

08 20 45 47 CMP Okay.

08 20 45 50 CC And we'd also like for you to take the UP TELEMETRY COMMAND switch OFF for 3 seconds. We've got that same commanding problem we had during coast out to the Moon.

08 20 46 14 CMP Okay. It's OFF and back to NORMAL.

08 20 46 17 CC Roger.

08 20 46 45 CC That cured up the commanding problem.

08 20 46 52 CMP Good show.

08 20 47 12 CMP Hank, before we copy the Flight Plan updates, do you want us to start on the 236-hour item?

08 20 47 22 CC Roger. We'd like for you to get started on the postsleep checklist. And, rather than read you a bunch of things to start with, I think I'll just remind you of a few things to catch you up. I've got a list of them here. While you're doing that, if we could get somebody to pull the gamma ray boom in, I'd appreciate it.

08 20 47 41 CMP Okay. You want that all the way in?

08 20 47 51 CC That's affirmative. And, you'll need your LOGIC POWERS to get that in.

08 20 47 53 CMP All righty. Thank you, sir.

08 20 48 12 CC And we'd like to get the S-BAND NORMAL MODE switch to VOICE.

08 20 48 24 CMP That already is voiceing.

08 20 48 27 CC Okay.

08 20 48 32 LMP We couldn't talk to you if we weren't in VOICE, Pete.

08 20 48 40 CC Roger. We were in DOWN VOICE BACKUP there and then COMMAND in NORMAL.

08 20 48 50 CMP I got you.

08 20 49 23 CC And, Ken, for your information, we've scrubbed the corona window calibration and the Skylab contamination photos.

08 20 49 33 CMP Okay.

08 20 49 35 CC And we're gonna stay at PTC right up to the mid-course 5. And if you're - can get to it now, Ken, I'd like to get the IMAGE MOTION, ON; and the MAPPING CAMERA, ON. And, then give me barber pole plus 2.

08 20 49 58 CMP Okay. Just a second. Let me catch up here.

08 20 50 46 CMP Hank, you say you want the MAPPING CAMERA IMAGE MOTION, ON; and then the cameras on ...

08 20 50 57 CC That's affirmative, Ken. We want to get the IMAGE MOTION, ON; the MAPPING CAMERA, ON; barber pole plus 2. And we're gonna leave it shut up in there. We're just running the film out.

08 20 52 42 CC Apollo 16, Houston.

08 20 52 47 CMP Hello.

08 20 52 48 CC Roger. For your information, old mother Earth's got you now, and you're coming home.

08 20 52 58 CMP That's nice to know - -

08 20 53 00 CDR Hey, Hank it had us - -

08 20 53 01 CMP - - ...

08 20 53 02 CDR - - last night.

08 20 53 04 CC Roger. We're just now showing you crossing under the Earth's in - sphere of influence.

08 20 53 09 CMP What's some words on midcourse 5.

08 20 53 10 CC Roger. Midcourse 5 will be about 4 feet per second. It'll be an RCS burn.

08 20 53 24 CMP Roger

08 20 55 06 CMP Hank, would you say again what you wanted done with this mapping camera, please?

08 20 55 09 CC Roger, Ken. We just want to run the film out and leave the door shut. We want to get the IMAGE MOTION, ON; MAPPING CAMERA, ON; and barber pole plus 2. That gives us a higher speed.

08 20 55 23 CMP Okay.

08 20 56 18 CC And, 16, Houston. Whenever you get a chance, we'd like to get yesterday's crew status and today's crew status report.

08 20 56 26 CMP Okay. That's in work now, Hank.

08 21 02 51 CC Apollo 16, Houston. When you get a break there, I do have a few Flight Plan changes I'd like to get up.

08 21 02 57 CMP Okay, Hank. Let me finish this status report thing. It all uses the same book.

08 21 03 03 CC Okay.

08 21 03 40 CC Ken, we need the GAMMA RAY BOOM switch OFF. It didn't quite make it all in. The motor's still running. It's to a safe position.

08 21 03 44 CMP Okay, thank you. Thank you, sir.

08 21 09 32 CC 16, Houston. We'd like to verify that you heard my transmission on holding PTC to midcourse 5.

08 21 09 42 CDR That's affirmative. Hold PTC until midcourse 5.

08 21 09 49 CC Roger, and for planning purposes, we'd like to get a P52 in sometime in the next 25 minutes.

08 21 10 02 CDR Well, for work purposes, Ken is putting up the optics now.

08 21 10 08 CC Outstanding.

08 21 10 25 CDR Okay. Here's the crew status report, starting with the - A - item A-1 for the commander. Skip the PRD. It's in the pressure suit, which is in the bag, and it's down - and it's very dusty, and I'd like to wait until we get ready to suit up for the EVA and I'll read you the PRD then.

08 21 11 02 CC Okay, John.

08 21 11 03 CDR A-3: day 8, 7 hour - 7 hours, good sleep, nope.
A-4: none. Day 9: still skip the PRD reading for the same reason; 6-3/4 hours, good sleep.
A-4: none. On the CMP, day 8: B-1, 15059.
B-3: 5.5, good sleep. B-4: none. Day 9: B-1, 1564. B-3: 7 hours, good sleep. B-4: none. On the LMP, day 8: skip the PRD, and suit was out of the way then. C-3: 7 hours, good sleep.
C-4: none. And, Charlie remembered to get his PRD reading - reading machine out today, and C-1 is 21143. C-3: 7 hours, good sleep, C-4: none.

08 21 13 16 CDR Did we lose you doing any of that, Hank?

08 21 13 20 CC Negative, John. We got it all.

- 08 21 13 25 CDR Okay. Now, on to the menu. When we got back to the - to good old Casper here - We're working on day 8, meal C. And for the CDR, substitute a hamburger for beef gravy, and scratch the gingerbread. And for day 9, meal A: scratch the peaches and the grits. Day 9, meal B: scratch the hamburger and add meatballs with sauce. For day 9, meal C: scratch the pecans. And, for the CMP -
- 08 21 15 54 CDR Okay. For the LMP, with all of day 8, scratch the mixed fruit, the ham steak, the white bread with jelly. On meal B: scratch the pea soup, the meatballs, the pork, and escalloped potatoes. Meal C: scratch the chocolate bar and a gingerbread and add pi - pineapple and a hamburger. On day 9; scratch the peaches, the scrambled eggs, and the bacon squares on meal A. On meal B: scratch the hamburger and white bread, the instant breakfast and the cereal bar. Meal C: scratch the pecans only. On the LMP [sic], day 8, last meal, scratch the beef and gravy and substitute a hamburger. And, scratch two-thirds of a chocolate bar. Scratch the gingerbreads. On day 9, meal A: scratch the peaches. And on meal B: scratch the hamburger and - in a wetpack and the - and the cereal bar. And, add turkey and gravy. On day 9, meal C: scratch the pecans only and add an orange drink. I think that about does it.
- 08 21 18 47 CC Thank you, John. The surgeon's happy, and we didn't get any biomed on you last night. Could you check your system. Or, you have any idea why it didn't work?
- 08 21 19 07 CDR I sure had it plugged in. I had it plugged in the night before last, too. I don't understand that. I got the leads tight -
- 08 21 19 31 CC Okay. We're getting a - the carrier, John. We're just not getting modulation. So, there must be something fouled up in the system, there.
- 08 21 19 41 CDR Okay. Well, why didn't you tell me, I could have changed this sensor out - or this - it's probably in this box here, don't you reckon?

08 21 20 01 CC Okay. When you get a chance, John, just check it cut.

08 21 20 32 CC And, we were - we lost our data on the antenna switching with your P52. Could we get those angles, please?

08 21 21 00 CDR You - you have any idea what it might be that I could do to fix this - -

08 21 21 55 CC 16, Houston.

08 21 24 37 CC Apollo 16, Houston. We just went through an antenna switch there, and I lost anything you said, then. And, John, if you're asking about the sensor there, the only thing we could suggest is to check the connections there into the blue signal conditioner and maybe change out your sensors or service them.

08 21 24 59 CDR Okay. I can't - I can't believe that if you got the carrier that changing out the sensors is going to change anything. These things are really stuck on there. Let me try something.

08 21 25 23 CC Okay. Whatever you did, John, worked. We got us a signal there.

08 21 25 31 CDR I didn't do anything.

08 21 25 46 CDR ... working now?

08 21 25 49 CC It's working now. And what - what angles are you showing on your HIGH GAIN now, on your meter?

08 21 25 58 CDR Showing - 50 - minus 50 in PITCH - make it 45, and about -

08 21 26 21 CDR 2 - 260 in YAW.

08 21 26 35 CC Okay. They want to know now what's on the knobs.

08 21 26 44 CDR Okay. It's - right now, it's reading minus - We'll get the PITCH, minus 40 and minus 40 on the knob - and it's reading 90 DEGREES in YAW and still about 265 in YAW in - on the indicator.

08 21 27 04 CC Roger. And, 16, we'd like to get the P52 data.

08 21 27 21 CMP Okay. We've got stars 50 and 22; NOUN 05: all zeroes; NOUN 93: minus 0.040, plus 0.030, plus 0.058; torqued at 213:23:55.

08 21 27 38 CC Roger. We got them.

08 21 28 38 CC And, 16, whenever you're ready, we'll give you a few of these changes.

08 21 29 11 CDR Okay. Charlie's ready to copy.

08 21 29 13 CC Okay. At 238:20 in the Flight Plan.

08 21 29 26 LMP Okay. Go ahead.

08 21 29 29 CC Roger. GAMMA RAY SHIELD, OFF. Stand by, Charlie. They say it's already off - -

08 21 29 37 CDR The SHIELD's OFF right now, Hank.

08 21 29 39 CC - - ... scratch that.

08 21 29 43 LMP We just turned it OFF, Hank.

08 21 29 45 CC Okay. In that next group of data there, delete anything that refers to the MASS SPEC, since we don't have it any more.

08 21 29 54 LMP Okay.

08 21 29 58 CC And, about 238:50, we want GAMMA RAY SHIELD, ON.

08 21 30 13 LMP Okay.

08 21 30 16 CC And, the group of data concerning the P30. We want to start the P30, actually, around 238:46. But, we'll have to get you up-linked, and we're working on that now.

08 21 30 34 LMP All right.

08 21 30 40 CC And, you'll exit PTC prior to that - just put that in just ahead of the P30.

08 21 30 48 LMP Okay. Exit PTC right in front of the P30.

08 21 30 52 CC Roger. Using the SIM bay jett configuration.

08 21 31 09 LMP All right.

08 21 31 10 CC And, as soon as we get the sextant star check there on over at 239, we'll go ahead and get the dumps out of the way.

08 21 31 24 LMP Okay. We will. We'll start the dumps right after the star check.

08 21 31 28 CC Okay. At 239:30, the HIGH GAIN angle -

08 21 31 34 LMP Hold the phone a minute.

08 21 32 11 LMP Okay. Go ahead.

08 21 32 13 CC At 239:30 -

08 21 32 37 CC Do you read, Charlie?

08 21 33 03 CC 16, Houston. How do you read?

08 21 33 09 LMP You're 5 by, Hank. Go ahead.

08 21 33 12 CC Okay. At 239:30, those HIGH GAIN angles should be minus 16 and 58.

08 21 33 27 LMP Copy. Minus 16 and 58.

08 21 33 30 CC Okay. And if you'll flip on over to page 351.

08 21 33 39 LMP Go ahead.

08 21 33 40 CC Okay. As we call - we need another hour for suit donning. So, that time there at 241, at the top of the page, will now be 242. So, there's actually an hour's gap between the previous page and this one. And, you can change your time accordingly, adding an hour on to - You get down to hatch opening or until you get on the EVA cue card. And, then we'll pick up the Flight Plan after the EVA. Now, at 242 hours - that's after it's changed there where it says VERB 49 maneuver to EVA attitude, the new attitude is 037, 043, 038, and the HIGH GAIN angles are minus - -

08 21 34 26 LMP Roger. 03 - -

08 21 34 27 CC - - high gain is minus 10, 244.

08 21 34 41 LMP Okay. We change VERB from 49, angles to 037. The other two are the same. HIGH GAIN, minus 10, 244.

08 21 34 57 CC Okay, Charlie. They just changed that YAW angle while I was reading it up. It's 224.

08 21 35 07 LMP Okay. 224.

08 21 35 10 CC Okay. Down about - a few lines down where it says, "Load MEED attitude - that attitude now is 071, 051, 039.

08 21 35 30 LMP Copy. 071, 051, 039.

08 21 35 40 CC Okay. And if you'll flip the page now - page 352 - the new time there is 243:40. Where it says, "Maneuver to MEED attitude," we want to change that again to 071, 051, 039, and the HIGH GAIN angles are minus 34, 218.

08 21 36 18 LMP Okay. At the - this whole page has slipped an hour, and it's at 243:40; 071, 051, 039, to minus 34 and a 218.

08 21 36 35 CC Roger, Charlie. And, we need to make those - those appropriate changes on the cue card and then the EVA Checklist. And, I - I have those locations, if you want to do that.

08 21 36 52 LMP Well, we'll do that, Hank. We promise.

08 21 36 55 CC Okay.

08 21 37 17 LMP Is that all you've got for now?

08 21 37 19 CC That ought to take us through the EVA, Charlie.

08 21 37 23 LMP Thank you, sir.

08 21 37 52 LMP Okay - 2 - 38.5 ...

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08 21 38 00 LMP ..., John.

08 21 40 59 CC Apollo 16. ON the HIGH GAIN, go MANUAL and WIDE,
and then REACQ NARROW.

08 21 41 55 CMP Go ahead.

08 21 43 03 CC Apollo 16, Houston. If you read, MANUAL WIDE
and then REACQUIRE NARROW.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

08 21 53 53 CC Apollo 16, Houston. I have your midcourse 5 pad, and if you'll give us ACCEPT we'll up-link the target load and vector.

08 21 54 03 CMP Okay. Stand by 1.

08 21 54 08 CC And we're also sending you a PIPA bias with that load.

08 21 54 26 CMP Okay. You got the computer.

08 21 54 41 CDR Hank, go ahead with the pad.

08 21 54 44 CC Roger. MCC-5, RCS/G&N; 27409; NOUN 48 is NA; 239:20:55.86; NOUN 81 plus 0003.4, all zips, all zips; 079, 306, 346; H_A is NA, plus 0021.7; 0003.4, 0:08, 0003.4; 04, 047.9, 39.1; boresight star 056, up 27.0, left 3.5; and for Ken's information, that's Beta Centauri, and it's on the white chart and it lies between Atria and Acrux. Continue with NOUN 61, minus 00.73, minus 156.19; 1046.3, 36277; 290:24:04; Sirius and Rigel; 219, 166, 313; four jets, plus-X. High gain angles: pitch, minus 90; yaw, 285; and a note that the EMS is not bias for drift.

08 21 57 23 CDR Okay. We copy midcourse 4, RCS/G&N, 27409; NA for NOUN 48; 239:20:55.86; plus 0003.4, plus all balls, plus all balls; 079, 306, 346; H_A is NA, plus 0021.7; 0003.4, 0:08; 0003.4; 04, 047.9, 39.1; 056, up 270, left 35; Beta Centauri, minus 00.73, minus 156.19; 1046.3, 36277; 290:24:04, Sirius and Rigel; 219, 166, 313; four jets, plus-X. High gain: plus pitch, minus 90; yaw, minus 285 - pitch, minus 90; yaw is 285; EMS is not bias, for drift.

08 21 58 42 CC Good readback. And we'd like to get the GAMMA RAY, shield on.

08 21 58 55 CMP The GAMMA RAY shield is now shielding.

08 21 59 49 CC Apollo 16, Houston. We're having a little trouble getting the high gain to acquire, so we'll be calling you omni switches, so we can maintain voice.

08 21 59 59 CDR Okay.

08 22 00 04 CMP Hank, I had a question here. You said to exit the - use the SIM bay jett configuration. Then, I notice where you called out for a plus-X four jet on the midcourse. Are those two things compatible?

08 22 00 28 CC Roger. What happened there, Ken, was we were gonna do a gamma ray extension for a little - out a little ways, and we've - we've canceled that now, so that's not even a requirement anymore. You can use normal jet configuration.

08 22 00 48 CMP Okay; thank you.

08 22 00 51 CC And, 16; OMNI Alfa.

08 22 01 05 CDR Okay; you have OMNI Alfa with a COMMAND RESET.

08 22 01 08 CC Roger.

08 22 01 20 CMP And, Hank, can I go - go ahead and stop PTC passing 79 degrees roll, this time?

08 22 01 28 CC That's affirmative.

08 22 01 34 CMP Okay. And how about the status of the computer? You guys still using it?

08 22 01 49 CC Computer's yours.

08 22 01 55 CMP Thank you.

08 22 06 26 CC OMNI Bravo, 16.

08 22 06 37 CMP You have it.

08 22 06 40 CC Roger.

08 22 07 12 CC How big is the Moon this morning?

08 22 07 21 CMP Haven't gotten around to looking yet, Hank.

08 22 10 37 CDR Okay, Hank, at arm's distance, if you cup your fingers around it, it's about as big as a 50-cent piece. But you can sure tell that it's changed size for the smaller, but we still feel like we're still pretty close to it. Like I - I don't know how far away from it we are, but, probably about - maybe 25 or 30,000 miles. No, Ken tells me 53.

08 22 11 14 CC Roger. We show you about 30,000.

08 22 11 15 CDR Somebody left the computer running. 30,000? Okay.

08 22 11 23 CC Take it back; they rewrote about 38,000.

08 22 11 28 CDR Okay.

08 22 11 44 CC And, 16, when you get the attitude, we'd like for you to bring up the high gain, and you're there.

08 22 11 53 CDR Roger.

08 22 13 32 LMP Okay. Henry, how do you read on the high gain?

08 22 13 34 CC Reading you 5 by 5, Charlie.

08 22 13 41 LMP Okay, you're in REACQ in error.

08 22 16 01 CC Apollo 16, Houston. We're getting close to that midcourse, and we'd like to go ahead and get the dumps out of the way. Platform alignment looks good, so you can omit the star check, if you like.

08 22 16 15 CDR We just looked at the boresight star. That's a good one. We're not going to mess with the sextant check, and we're in process of dumping.

08 22 16 22 CC Real good. Could you find that - star 56?

08 22 16 29 CDR Oh, yeah. Alpha and Beta are two of the prettier stars you can find. Even I can recognize those.

08 22 16 38 CC Roger.

08 22 17 02 CC Ken, we got a list of questions here on the SIM bay inspection - when you get out on the EVA, and we can handle them any way you like. It's about a page and a half of them. Would you rather I read them up after you're out or - -

08 22 17 17 CMP Okay. Could you? Okay. No, I'd like to hear them first, but, not right this minute.

08 22 17 23 CC Okay, I just want - -

08 22 17 24 CMP I'll give you a call in just a minute when we get squared away here.

08 22 17 27 CC I just wanted to apprise you of the fact that I had them, and then whenever you're ready we'll talk about them.

08 22 17 59 CC 16, Houston. Did you have any trouble with your LiOH canister change today?

08 22 18 06 CMP No, sir.

08 22 23 25 CC 16, we show you about 10 percent on the waste tank.

08 22 23 30 CDR Thank you, boss.

08 22 31 27 CMP Hey, Henry?

08 22 31 31 CC Roger.

08 22 31 36 CMP Hey, I've put on some new sensors. How about seeing if your friends over on the left there are happy with that.

08 22 31 44 CC Okay.

08 22 32 05 CC They look great, Ken.

08 22 32 11 CMP Okay.

08 22 33 40 CC 16, Houston. You're looking good, and you're GO for the burn.

08 22 33 47 CMP Okay.

08 22 36 44 CDR Okay, Houston, I guess as you saw, the burn was nominal. Our residuals: minus 110, plus 0, minus 110; and you probably saw our NOUN 20 for the attitude. Over.

08 22 36 57 CC Roger. We copy the NOUN 20.

08 22 37 25 CMP Hank, you want to leave the mapping camera on; is that correct?

08 22 37 28 CC That's affirmative, Ken.

08 22 37 32 CMP Okay.

08 22 37 48 CC And, Ken, the mapping camera is out of film, but the stellar camera is still feeding a little.

08 22 37 57 CMP Okay. We gave it lots of stars to look at, just then.

08 22 38 08 CDR Hank, is the high gain gonna track us to this maneuver, or should we set it MANUAL and REACQUIRE when we - -

08 22 38 17 CC Seems to be tracking good now.

08 22 38 18 CDR Never mind.

08 22 38 23 LMP Hey, I'm going to start BATTERY B CHARGE.

08 22 38 25 CC Copy.

08 22 39 25 CMP Hey, Hank, when we were allowed to sleep through the eat period there, did we move the EVA back or anything like that?

08 22 39 34 CC Negative. The EVA is - at the nominal time - including that hour, you know, that we had to put in there. One-hour slip from what was originally in the Flight Plan.

08 22 39 50 CMP Okay. We just traded off eating and sleeping this morning, is that it?

08 22 39 57 CC We were hoping you were grabbing some snacks in there early this morning.

08 22 40 06 CMP Man, with three guys in here, Hank, you just - when it comes time to eat, you just bring everything to a halt and go do that that's - because everything has to be done in the kitchen. You got to take your 52s and you got to do everything else right in one place. We'll grab something and we'll be pressing on here; we'll - we'll probably come pretty close to the schedule.

08 22 40 25 CC Okay; we're scheduled for hatch opening at 242:55.

08 22 40 33 CDR Okay; we'll - we'll try to be there, and if we don't make it there; why, we'll get it as soon as we get there.

08 22 40 37 CC Okay.

08 22 40 55 CDR Hey, Hank, we just looked at - at the battery compartment pressure. We're reading 3.4. You want us to vent that thing?

08 22 41 04 CC Stand by.

08 22 42 20 CMP Okay, Hank. And I can copy your comments about the SIM bay now if you'd like to give them now, while - -

08 22 42 28 CC Okay. In regard to the mapping camera, they want to check the interference. Inspect the periphery of the mapping camera and laser altimeter for any evidence of interference. The last attraction on that thing was nominal - -

08 22 42 44 CMP Okay.

08 22 42 45 CC - - so it's kind of puzzling, you know. It started out real slow and each retraction it got faster.

08 22 42 53 CMP ... it's just getting warmed up.

08 22 42 55 CC Roger. Some of the things they suggest you might look for is - around the cable, there, between the mapping camera and the shelf, is there any damage to the cable? Clearance in that area of the cable? And whether the cable is caught or curled - -

08 22 43 15 CMP Okay. Now, that cable is located on the - on the plus-X side of the camera over on the - towards the A quad, is that correct?

08 22 43 28 CC That's affirmative.

08 22 43 31 CMP Okay. Thank you.

08 22 44 05 CC Okay. We want to know if that cable is caught or curled or is it smooth, you know, like it's supposed to? That's between the - what I would call the top of the mapping camera and the bay, there, by the handhold.

08 22 44 20 CMP Okay. I know the area. I'm not sure we're gonna have enough light to see down in there in the EVA attitude, but we'll take a look at it.

08 22 44 34 CC And we'd like to know a little something about the cuckoo door. You know which one that is? The little white door that goes over the stellar lens?

08 22 44 45 CMP Okay. I won't be able to tell you much about that in the retracted position, either.

08 22 44 51 CC Roger. If possible, we'd like for you to lift up that door and inspect the clearance between the hinge and the top of the mapping camera, and look for any scrape marks on the camera or on the door and any evidence of twisting or bending of the stellar lens glare shield.

08 22 45 11 CMP Okay.

08 22 45 13 CC Any question on that part with reference to the mapping camera, Ken?

08 22 45 20 CMP Say again.

08 22 45 21 CC Did you have any question about any of those mapping camera items?

08 22 45 26 CMP No, sir.

08 22 45 30 CC Okay. In regard to the pan camera, we'd like for you to look at the exposure sensor. And that's the ones that's immediately to the left of the lens barrel.

08 22 45 49 CC And we need AUTO on the HIGH GAIN.

08 22 45 55 CDR Got it.

08 22 45 58 CC Okay. In - In regard to that automatic exposure control sensor there, Ken, what we're looking for is foreign objects or contamination.

08 22 46 13 CMP Okay.

08 22 46 14 CC And the little thermal shield that goes around the periphery of the lens barrel, we want to inspect that for contamination, and also, the lens barrel itself. And we're really looking for contamination really on all of the pan camera, and the same goes for the V over H sensor.

08 22 46 36 CMP All right.

08 22 46 39 CC And just to refresh your memory, the V over H sensor is the one that's on the right side that's got the little hood on it.

08 22 46 47 CMP Okay.

08 22 46 52 CC And for the gamma ray boom, what we'd like to do is inspect the cover for any damage. You know, that thing has closed a couple of times and - or the boom has retracted all the way a couple of times and a couple of times it hasn't. So - so we're expecting that the gamma ray boom right now is about 6 inches out; but we're not sure. We'd like for you to look at the cover, and if it's not fully closed, give us an estimate of how far it's open. Full open is about 134 degrees.

08 22 47 24 CMP Foger. I'm familiar with that.

08 22 47 26 CC Okay. If the cover is partially open - -

08 22 47 27 CMP Okay. Is Brad [?] taking bets on where it is?

08 22 47 38 CC He's not - he's not too brave. He'll bet you a cup of coffee it's about 6 inches.

08 22 47 48 CMP Okay. I heard that. He's on.

08 22 47 51 CC He said he takes it. And we'd like to know how far that rail protrudes through the bind there, and if you can see any obstructions to retractions, you know, like the harness, or the guides, or the boom cable fingers, proximity switches, any of those things - report them.

08 22 48 10 CMP Okay.

08 22 48 12 CC And that's all we want to know, Ken, other than any other things you might pick up from looking around out there.

08 22 48 22 CMP Okay; do you require any kind of documentation on this?

08 22 48 30 CC I guess we'll have to take verbal comment.

08 22 48 37 CMP Okay.

08 22 48 48 CC And, Ken, we'd like to vent the battery compart - compartment to 1 volt on your meter. Stop it at 1 volt.

08 22 49 01 CMP Okay; well, all righty.

08 22 49 04 CDR It drops like a stone; I don't know if we can do that or not. We'll try it.

08 22 49 17 CC Give it a try.

08 22 49 43 CDR We got 1.2 on there; you want to press and try for 1?

08 22 49 48 CC That's real good, John. We'll hold it right there.

08 22 49 53 CC And, Ken, the stellar camera's out of film, if you want to use a normal shutdown procedure on the mapping camera.

08 22 50 01 CMP Okay.

08 22 50 49 CC 16, Houston. He kind of would like to know if that's the first time you've noticed that BAT vent or bat - battery compartment pressure above 1.5 volts?

08 22 51 17 CMP John says that when they did the first charges they had to take it and vent it, but the charges I did I never saw it above 1.5.

08 22 51 27 CC Roger. Copy. We'll probably be asking you for a check of that here in a little while, just to make sure it's not charging way on up there again.

08 22 51 35 CDR Okay; we reported the other times that we vented it.

08 22 51 40 CC Roger, John.

08 22 52 00 CC And, 16; Houston. I'm gonna go off the loop a couple of minutes; Phil will cover for me.

08 22 52 08 CMP That's not fair.

08 22 52 12 CC But it's necessary.

08 22 52 18 CMP Now you understand.

08 22 53 25 CMP How are you doing today, Philip?

08 22 53 28 CC Doing very well, sir; thank you. And yourself?

08 22 53 34 CMP Oh, we're having a ball. Just wanted to hear you on the loop.

08 22 53 37 CC Well, you've certainly done that. It's another first.

08 22 53 45 CMP Well, always nice to have a few of those.

08 22 54 39 CC 16, Houston. Are you gonna get to the mapper in a little bit?

08 22 54 49 CMP Sure will; thank you.

08 23 00 00 CC Apollo 16, Houston. Could you dial in your high gain angles for the thermal attitude?

08 23 03 34 LMP Hank, 16.

08 23 03 37 CC Go ahead.

08 23 03 41 LMP Okay; the BAT B CHARGE is underway, and we've been watching this battery compartment, and we're back up to 2 now.

08 23 03 52 CC Roger. Copy.

08 23 05 32 CMP Hank, I don't really know what's going on with our antenna. It's - I get you the best signal strength by going to MANUAL and NARROW, and every time we switch to either AUTO or REACQ, why, it seems to break - break some kind of beam switch lock, or something, and we've tried going to MANUAL and WIDE and working in through REACQ and then bringing it down and things, and that doesn't help any. Would there be any future in trying the secondary electronics, the servos?

08 23 06 07 CC Okay; INCO says we're just right on the line there. Why don't we just leave it in MANUAL and NARROW.

08 23 06 17 CMP Okay.

08 23 07 04 CC And, Ken, I'd appreciate it if from time to time, you'd just give me a idea of where you are in the checklist.

08 23 07 12 CMP We is at the eat period.

08 23 07 14 CC Hey, that's a good plan.

08 23 07 24 CMP We'll be ready to start in on that checklist in probably about 10 minutes or so; but it just didn't seem like it was proper to go ahead and press on the rest of the day without stopping for something.

08 23 07 39 CC I agree with you, and I guess we'd better terminate that BATTERY B CHARGE and keep an eye on that thing. If it gives - gets above 3, give us a call. And also -

08 23 07 53 CMP Okay; why don't you call us back in about 30 minutes and ask us to look at it, because that's not the kind of position where we can keep an eye on it without making a conscious effort at it.

08 23 08 01 CC Okay; we'll give you a reminder, and if it's above 3 or in that neighborhood, we're gonna want to vent it again back down to 1.

08 23 08 12 LMP Okay; do you want to vent it now. It's at 2.

08 23 08 16 CC Negative. We want to see if it'll stabilize.

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08 23 08 22 CMP Okay; you've got the - the BAT B CHARGE is terminated, and we'll watch the battery's compartment pressure.

08 23 08 46 CC While you're eating there, I'll tell you a little local sports news. The Astros have won seven in a row now, and they are tied for first place in the division.

08 23 08 57 CDR Now, that's outstanding. Congratulations.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

08 23 10 27 CC 16, if it's convenient, could we get a check on the BAT C voltage?

08 23 10 41 CMP Okay. It's 36-1/2.

08 23 10 43 CC Roger. Copy 36.5.

08 23 10 56 CMP Okay, Hank. And John stuck the eyeball right closer to the meter, and it's 1.9 instead of 2.

08 23 11 03 CC Roger, 1.9.

08 23 12 23 CDR Okay. We're going to vent the battery - the bat compartment again, it's 2 and -

08 23 12 43 CC Okay. If you want to try a vent, go ahead and see if you can stop it at 1.

08 23 12 50 CDR Okay.

08 23 12 51 CMP What - What's wrong if we go below 1, Hank?

08 23 12 56 CC Well, the problem is there, Ken, if it's - at 1 volt, we're - at 1.5 volt, we're roughly equal to cabin pressure in there and, if you go much below 1 and we do have a battery that's venting, you could lose the battery, if it goes all the way to vacuum.

08 23 13 18 CMP Okay. And that's the only problem?

08 23 13 21 CC Roger. In other words, if the - if the battery - a battery has vented and the - and the vent doesn't reseal - and it - and it's not resealed, if you go to vacuum, the electrolyte couldn't go - go out of it.

08 23 13 35 CMP Roger. I understand that. That's the only problem, though. Is that correct? It won't affect the other batteries?

08 23 13 40 CC That's affirmative. It shouldn't affect the other batteries.

08 23 13 45 CMP Okay. Thank you. We'll try it for 1 again.

08 23 14 04 CMP Okay, it's reading 1.2 - about 1.3, I guess. We'll leave it at that for a few minutes.

08 23 14 53 LMP Can y'all see the BAT CHARGER current down there, Hank?

08 23 15 01 CC That's affirmative, and it's reading zero now, Charlie.

08 23 15 06 LMP Okay. When I started BAT B charge, I was looking at BAT BUS B, and we got a negative amp - looked like to me a negative amps, off-scale, low on BAT B, and then I went to BAT CHARGER, but that should - but that didn't look right to me, so I stopped. And then I went to BAT CHARGER and started it and - again, and the bat charger current went up to about 2, which - or so, which looked nominal. The only question was that it looked like a reverse current or something, and - I guess that is true, isn't it, though, when you reverse current into a battery to charge it?

08 23 15 45 CC That's affirmative.

08 23 15 50 LMP Okay. So that's nominal? Okay. Thank you.

08 23 16 12 CC Okay, Charlie. What we saw down here, I guess, when you started the - started the charge, it - it looked like that perhaps you hadn't pulled the BAT RELAY circuit breaker; then you stopped and then - then it looked normal to us.

08 23 16 37 LMP Okay. It's - it was open and the breaker is pulled. Or it's closed now, since the charge is terminated.

08 23 17 00 CC And they also saw some funnies in your data. It looked like the charge started out on BAT A and then it went to BAT B.

08 23 17 13 LMP Well, you got to go to the A position to get to B.

08 23 17 18 CC Copy.

08 23 21 43 CMP Okay, Hank. We're right - unstowing from A-2 into the top of page 3-2 now.

08 23 21 50 CC Okay. Thank you.

08 23 23 29 CC 16, Houston, we got a - an answer to your question about the wrist rings on your suit.

08 23 23 41 CDR Okay. We're not ready for that answer right now, thank you.

08 23 23 45 CC Okay. Whenever you're ready, holler.

08 23 23 49 CDR Okay.

08 23 33 52 LMP Hank, on the battery compartment, we vented back down to 1, and it's back up to about 1 - 1.3 we vented to, and it's back up to about 1.8 now and seems to be stabilized.

08 23 34 08 CC Okay, Charlie. Thank you.

08 23 35 42 CDR Okay, Houston. We got 5900 pounds in the OPS, and it's regulating at 3.7.

08 23 35 51 CC Roger. Copy 5900 pounds, regulating at 3.7.

08 23 45 48 CDR We're - Hank we're down to the TV and DAC Prep, and we're just before installing the meter covers.

08 23 45 56 CC Okay. Real good, John. Thank you.

08 23 53 14 CC Ken, we'd like to see the turnoff of the SIM bay that's on 3-6 before you turn our data off.

08 23 53 29 CMP Okay. Understand; the SIM bay turnoff on 3-6 before we turn data off.

08 23 53 35 CC Roger. And we'll need that data switch - the S-BAND AUX TV switch in SCI in order to see the data. And we have some additions to that turnoff, too. Whenever you're ready to do some of those, I'll call them out to you.

08 23 53 53 CMP Okay.

08 23 53 56 CC Okay. We want the MAPPING CAMERA, OFF; the GAMMA RAY, OFF; and we want to verify that the MASS SPEC, even though we don't have it, we want to verify that the MASS SPEC experiment is OFF, and the ION SOURCE is OFF; LASER ALTIMETER, OFF; and IMAGE MOTION, OFF.

08 23 54 38 CC And all of those items are in addition to the ones that are listed on page 3-6.

08 23 54 49 CMP Okay, that's where they'll go, on page 3-6.

08 23 54 53 CC Okay.

09 00 02 18 CC 16, Houston. Could you give us a check on the battery compartment now?

09 00 02 53 CMP Okay, it's up to 2.0, just a little higher than it was last time.

09 00 02 58 CC Roger. 2.0.

09 00 13 38 CDR Okay, Hank. We're on the bottom of page 3p-4, and we're taking the couch out now.

09 00 13 44 CC Roger. Copy.

09 00 18 16 CC 16, Houston. When you get around to - prior to suit donning, we recommend that you lubricate those wrist rings using the maintenance kit that's stored in A-8. And you might try to work some of that lube in around the locking rings and work the ring several times to try to free them up a little bit - the locking rings.

09 00 18 41 LMP Okay, Hank. We've already done that. We did that when we doffed the suits yesterday as best we could.

09 00 18 48 CC Okay.

09 00 18 52 LMP I'm not sure it had much effect, but we did it.

09 00 19 23 CC Charlie, did you do the full lubing and cleaning, including the zippers, in accordance with the instructions in the EMU maintenance kit?

09 00 19 33 LMP Yes, sir. Just like we done it on the surface. We did the zippers, all of the O-rings, the neck rings, the wrist rings, and it seems to me, Hank, it's really not where the O-ring is. It's in the sliding part between the suit part and the locking part of it. It's stiff. You could see dust down in there, but you can't get it out too well.

09 00 19 57 CC Roger. Copy. Only thing we could recommend there, which I'm sure you've already done, is just sock it a few times - see if you can free it up.

09 00 20 11 LMP Okay. Thank you, sir. I think they'll be okay.

09 00 34 01 CC 16, Houston. We'd like to get another read-out on the battery compartment, and we suggest you leave the meter setting there so we can read it during the EVA if we have to - or you can read it.

09 00 34 12 CDR We're leaving it set.

09 00 34 27 CDR 2.15.

09 00 34 29 CC Roger. At 2.15.

09 00 34 31 CDR Get - Roger.

09 00 37 02 CC Apollo 16, Houston. For your information, we just commanded the SUBSAT on, and it's alive and well.

09 00 37 12 CDR Good show.

09 00 40 33 CDR Okay Houston, we're just about to start with the - with the SIM bay turnoff here on page 3-6, and we'll do those additions that you talked about.

09 00 40 45 CC Okay. Good show.

09 00 41 27 CC And, 16, before you start your suit donning, we'd like to vent that battery compartment one more time down to about 1 volt.

09 00 41 38 CDR Okay. We'll do that.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

09 00 44 41 CDR Okay, Houston. We're on page 3-6, and we're starting our PGA donning right now.

09 00 44 48 CC Roger.

09 00 44 53 CDR I think we've made up 45 minutes on our late wakeup - hour late wakeup this morning.

09 00 45 00 CC Great. And we're standing by for that battery compartment reading.

09 00 45 36 CDR Okay. Charlie just superbly vented it to 1.0.

09 00 45 41 CC Roger. 1.0.

09 00 45 45 CDR Right.

09 01 00 40 CDR Okay. Ken's completed donning his suit now, and Charlie's going to start on his.

09 01 00 45 CC Roger. Copy, John.

09 01 02 49 CMP Hello, Henry. You still there?

09 01 02 52 CC Roger, Ken. How do you read?

09 01 02 56 CMP Loud and clear.

09 01 02 58 CC Okay. You're loud and clear.

09 01 03 03 CMP Okay.

09 01 04 53 CMP Hank, instead of making this maneuver to the EVA attitude at 242:00, suppose we do it as soon as we finish suit donning.

09 01 05 07 CC Roger, Ken. You can do that whenever you're ready. When you do do the maneuver, we'd like for you to go WIDE on the HIGH GAIN.

09 01 05 17 CMP Okay.

09 01 06 34 CC And, Ken, in regard to the - the attitude and angle changes, - the only thing on your EVA cue card that - that I saw that required changing was the high-gain angles.

09 01 06 44 CMP Okay. Stand by. Stand by. Stand by, please.

09 01 08 16 CMP Okay, Hank. Say again what you had to say about the attitudes now, please.

09 01 08 20 CC Roger. I read up the new attitudes and high-gain angles to Charlie, and he was going to change the checklist and the cue card; and I just wanted to say that the only place on the cue cards I see that needs a change is the back side of your EVA card, the high-gain angles right by the 50 18.

09 01 08 41 CMP Okay. I've got that, and - it was minus 24 and 220; and now we want something different, huh?

09 01 08 55 CC That's affirmative.

09 01 09 02 CMP Okay. Now I've got a minus 34 and 218. Shouldn't that track throughout the maneuver? It used to. The old angles did.

09 01 09 22 CC We hope it'll work in AUTO TRACK, Ken, but this is just a precaution. We've been having a little trouble with that high gain.

09 01 09 32 CMP Okay. Thank you, sir.

09 01 10 05 CMP And, Hank, on that - on that battery thing, it's back up to about 1.6 now. It came right up to 1.5, which it - that you're - that means that it's up to 1.6. Do you want us to vent that thing during the EVA to keep from getting excessive pressure in that chamber, while we have the cabin depressed?

09 01 10 29 CC Negative, Ken. We'd like to watch it awhile.

09 01 10 36 CMP Okay. That battery compartment will take it when we get the cabin down, right? Or at least relieve through the cabin?

09 01 10 53 CC That manifold should take 200 psi, Ken. That was what it was qual'ed at, and the burst pressure is 600.

09 01 11 03 CMP Okay. That's fine. You guys think there's a relief valve on one of those batteries that's ...?

09 01 11 11 CC We're not - we're not sure. We kind of think that may be what's happening.

09 01 11 18 CMP Okay. Do you have any evidence yet as to which battery?

09 01 11 24 CC Negative.

09 01 11 27 CMP Okay. Thank you.

09 01 11 46 CC All those batteries are manifolded together, and all the voltages look normal. If we do drop a cell on one of the batteries, we should be able to pick that up.

09 01 12 00 CMP Roger.

09 01 14 02 CMP Okay. Charlie's suited.

09 01 14 07 CC Roger.

09 01 18 52 CC 16, Houston. Go WIDE on the HIGH GAIN.

09 01 19 00 LMP Hank, I just hit the yaw knob. What are the settings in our present attitude?

09 01 19 13 CC PITCH minus 14, YAW 58.

09 01 19 20 LMP Okay. We got it.

09 01 19 53 CC 16, we'd like to stay WIDE and MANUAL in the HIGH GAIN.

09 01 20 05 LMP Okay. You've got it.

09 01 20 07 CMP Are you going to want that during the EVA, Hank?

09 01 20 20 CC That's affirmative, and we'll call it when we start the maneuver.

09 01 20 28 CMP Okay. WIDE gives you enough margin on the TV?

09 01 20 51 CMP That was really a question, Hank. (Laughing) I didn't mean it as a statement.

09 01 20 56 CC Okay. What's going to happen is: when we do get in attitude, we can bring it back to AUTO and get it locked up; but we will need the NARROW BEAM.

09 01 21 06 CMP Okay. Because that's a - that's going to be a very difficult thing to try and tweak up in a hard suit.

09 01 21 12 CC Roger. Understand.

09 01 23 13 CC 16, Houston. We're noticing that the glycol evap out temp is coming on down, and we need to adjust that mixing valve in. But rather than crawling under there and doing that right now, what we want to do is get you to take the TEMP IN switch from MANUAL up to AUTO, and we'll give you a call when to put it back in MANUAL and see if that will cut it.

09 01 23 39 CMP Okay. Is that going to have enough time delay - on your call that's going to - I guess - I guess I'm concerned about making it worse.

09 01 23 52 CC Well, the temperature's dropping. We're going to have to adjust it one way or the other, Ken, and we're going to lead it.

09 01 24 01 CMP Okay. We can always go back and do it manually if it doesn't work. All right. Do you want to do that - let's do it right now before our maneuver and make sure we don't lose comm in the middle of it.

09 01 24 09 CC That's right. We'd like to do it now - -

09 01 24 11 CMP Going to AUTO -

09 01 24 12 CMP MARK.

09 01 24 13 CC Okay.

09 01 25 27 CC Ken, I know this is going to sound funny, but it looks like that mixing valve is working now. It didn't go up like we thought it would.

09 01 25 41 CMP Okay. But we're going to have to make a configuration setting before we start the EVA, because we won't be able to get to it then. If we can find a place where it looks good, I'd like to leave it in MANUAL throughout the EVA, and we can try the AUTO feature some other time.

09 01 26 01 CC Okay. We'd like to put the switch back to MANUAL and maneuver to the EVA attitude, and we'll take a look when we get good comm there.

09 01 26 12 CMP Okay. The TEMP IN switch is in MANUAL, and I'm going to the EVA attitude.

09 01 26 17 CC Roger.

09 01 28 17 CMP Okay. Suiting is completed.

09 01 28 21 CC Roger. Understand, suiting completed.

09 01 30 27 CC 16, OMNI Delta.

09 01 32 08 LMP Hank, we'll be switching comm here again for a minute.

09 01 32 12 CC Okay.

09 01 32 29 CC 16; if you read, OMNI Alpha.

09 01 32 38 LMP You got it.

09 01 32 40 CC Thank you.

09 01 36 19 CC OMNI Charlie.

09 01 37 06 CC Apollo 16, if you read, OMNI Charlie.

09 01 37 36 CC Apollo 16, OMNI Charlie.

09 01 38 54 CMP Going OMNI Bravo now.

09 01 38 57 CC Okay. We're reading you again.

09 01 39 04 CDR Roger. Loud and clear.

09 01 39 26 CDR Okay. We're down to page 3-8 on the pressure gage static check we're running through now, Hank.

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09 01 39 32 CC Okay.

09 01 41 19 CC Apollo 16, Houston. Could you acquire with your high gain?

09 01 41 28 LMP Didn't work.

09 01 41 55 LMP Okay, Hank. How's that in - WIDE BEAM?

09 01 42 02 CC Okay. Would you go REACQ and NARROW?

09 01 42 12 LMP Okay. You have it. REACQ and NARROW. Good signal strength.

09 01 42 19 CC Okay. It looks good, Charlie.

09 01 50 18 CMP I have VOX now. VOX SENSITIVITY is up. PAD COMM's OFF. S-BAND's T/R. AUDIO mode is NORMAL. *** T/R. AM's OFF.

09 01 50 42 CC We're reading you, Ken. And for your information, the mixing valve setting is good.

09 01 50 49 CMP Okay. Thank you, sir.

09 01 51 03 CMP Are you going to check - going to check out the TV? Charlie, did you get that? Okay. Let me see if I got a picture here. Okay. I'm ahead with this. You got a - got anything on there yet? You got a picture? You got a - the monitor's working, isn't it? Bet that'll help. (Laughing) Okay. Okay. That is the end of it. Get your monitor adjusted so it shows you what you'd like. I'll open it up so you can see something inside, and I'll close it down before we go outside. Take the zoom all the way out. Is that all right? Okay. Set the zoom back to where it was supposed to be. What's the zoom setting? Zoom. All right. Okay. Houston, are you getting a picture?

09 01 52 31 CC That's affirmative.

09 01 52 34 CMP Okay. We won't worry about dressing it up till we get outside.

09 01 52 40 CC Okay.

09 01 52 48 CMP Wait a minute, John. Let me put this back up.
Watch your head there. Big thing.

09 01 53 08 CMP Okay. We got the TV power off, did you say? Okay.
And the camera's back in place. All right. Okay.
We've been doing that. You might check them. Be
sure you can.

09 01 53 21 CDR Okay, Houston. You read me okay on the CDR's loop?

09 01 53 25 CC Houston's reading you 5 by 5, John.

09 01 53 31 CDR Okay.

09 01 53 43 CMP PRESSURE ALARM is coming ON. I have the warning
tone. It's going back OFF, and the tone is off.

09 01 53 59 CMP You can call VERB 49, and it will already be loaded.
Yeah. You've got to PRO out of this.

09 01 54 26 CMP It may be out of attitude, but - Okay. ... take
2 PRO's to go to the MEED ATTITUDE. Okay?

09 01 54 52 CMP Okay, the REPRESS O₂ is about 865.

09 01 55 10 CMP No, that acts as a supplement to the SURGE tank.
All right.

09 01 55 32 CMP Okay. Let me check NOUN 351. Okay. The REPRESS
valve is OFF. That's verified. That's verified.

09 01 56 26 CMP It is.

09 01 56 59 CMP Yeah. Can you get this in your - -

09 01 57 01 LMP You want me to stuff it in my TSB?

09 01 57 02 CMP I'll see. I'll see.

09 01 57 03 LMP Yeah.

09 01 57 04 CMP Okay.

09 01 57 06 LMP I'll tell you what, I'm gonna put it up here
just - I don't want to lose this one.

09 01 57 29 CMP Okay, that's Flight Plan is stowed in R3.

09 01 58 12 CMP Okay. I've got it.

09 01 58 30 CMP Yes, sir. And I have the valve in the open position, and would you verify that that's open. Counterclockwise - No, what does it say on the arrow? Okay. And it's locked.

09 01 59 20 CMP Okay. Wrist tether's out, *** stowed. Yep. My hoses are disconnected and stowed. Yes, sir. Interconnect is in. Suit flow is OFF, the interconnect is in. It's locked on two sides, and stowed on the strut. I have it. Okay. I've got it in LO. Okay. It's installed and locked. Nope. That's mine. It's OFF. Yes. Okay.

09 02 01 31 CMP Okay, I've got the adapter plate on.

09 02 02 29 CMP Yes, sir. And I've unconnected the - disconnected the OPS hose. They're snapped. They're installed. Yes, sir. Attached.

09 02 03 25 CMP Just a little bit easier.

09 02 04 57 CMP Am I getting that twisted? I want to go over the umbilical. That's it, thank you. Thank you. Okay. The OPS is installed, the gas connector is installed, and it's locked. Yes, sir. Yep. If you can. May have to disconnect this thing to get it down there. All right, thank you. It'll stay. Yeah, that's nice. Oh, I'm sorry, I didn't hear you. Okay. O₂ flow is coming ON.

09 02 05 02 CMP MARK. I have flow. Yes, sir. But - Will you watch cabin pressure for me? Want me to read those while you guys do the integrity check? Okay. Let me get up here. You want me to read those things while you - you have both hands -

09 02 06 02 CMP Hey, where's - where's the other - Here's your helmet, where's my - laid it down. Okay. I'll get it out for y'all. Here's yours, John. Those are your gloves, Charlie, or - okay. Okay, my gloves should be down there to your right somewhere, I think. Yeah, ... get them out of the way. Okay. All right, thank you.

09 02 06 15 CMP Yes, sir. Okay. Get this little strap on here, and we'll be all set. Okay. I will not steal the pen. Okay. Where is it? All right. Okay. Around here, you mean? That looks clear in the back. Put your head over here a second. That looks clear. That looks good. Yeah, that's - The little skirt around the back gets in the way I didn't hear it click. No. Want to take the LEVA off so we can get more pressure on it? Goes on so much easier than it comes off. That sounded good. Okay. That about in the center for you? Okay. Lock it. That's good. Covered and all buttoned up. Hey, that was easy.

09 02 09 46 CDR Okay, Houston. Charlie's donning his helmet and gloves with the - for the suit integrity check we're about to get into here for CDR/LMP.

09 02 09 57 CC Roger. Copy.

09 02 10 03 CMP Hey, that's really nice. Okay. I got two locked. That one's locked, and your helmet is locked. Got one, two. Gas connectors are locked. Okay. All right, John. Okay. I'll take the checklist. I'll hold it out of the way for you. That'll be temporary, but as soon as we get the hatch open, that wire will get taut. Why don't you loop it under that little dog [?] by the - the window frame there?

09 02 11 20 CMP Houston, battery compartment's 1.9. You happy with that now?

09 02 11 29 CC Roger. We're happy with that, Ken.

09 02 11 33 CMP Okay. Thank you. Okay. You got your alignments checked? Okay. And you got the gloves. They're in and they're locked. Okay. Both of you checked the connections, comm, oxygen and gas connector plugs. All locked? Okay. John, if you'll go to VOX. Okay. And let's try the sensitivity; that's probably gonna be pretty good. Try it with the ground and see if - -

09 02 12 03 CDR Houston, how do you read me on VOX? Over.

09 02 12 09 CC Go ahead.

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09 02 12 14 CDR Houston, this is Apollo 16. How do you read on VOX? Over.

09 02 12 18 CC Roger. Reading you - reading you loud and clear, John.

09 02 12 22 CDR Okay.

09 02 12 24 CMP Okay. And the last - last - The next thing is to stow the checklists. Okay, do you have a suit circuit integrity check on there? I don't think you do on the cue card. It's on the panel.

09 02 12 38 CDR Over behind the

09 02 12 39 CMP Okay. Panel 380. SUIT CIRCUIT RETURN valve to closed.

09 02 12 43 CDR Okay. SUIT CIRCUIT RETURN valve to close?

09 02 12 55 CMP Yes, sir. Push in.

09 02 12 57 CDR Okay. It's in.

09 02 12 58 CMP Okay. Panel 7, DIRECT O₂ close: clockwise.

09 02 13 04 CDR Panel 7.

09 02 13 06 CMP DIRECT O₂. Make sure it's closed.

09 02 13 09 CDR Okay. It's closed.

09 02 13 10 CMP Okay. The SUIT PRESSURE indicator is reading 5.2 - it's about 5. I'm gonna bleed this a little bit. Okay, Houston. I have the EQUALIZATION VALVE, OPEN a little bit. Will you keep an eye on the cabin pressure for us, please?

09 02 13 35 CC Roger. Would you vent it down to about 5.1? It's up now.

09 02 13 41 CMP Okay. I've got the VALVE, OPEN. Would you keep an eye on the cabin pressure, please?

09 02 13 45 CC Will do.

09 02 13 51 CMP Okay. The flow is normal; suit pressure, okay. We're ready to go on to suit circuit integrity check. And SUIT TEST valve to PRESS.

09 02 14 05 CDR SUIT TEST valve to PRESS. Going to PRESS.

09 02 14 10 CMP Okay. You got it in PRESSURE?

09 02 14 15 CDR In PRESSURE.

09 02 14 16 CMP All right. DIRECT O₂ flow, OPEN.

09 02 14 19 CDR Okay. We're OPEN in DIRECT O₂.

09 02 14 20 CMP Okay. You're gonna start to pressurize now. Okay. You might - at - give it another psi, and then cycle the SUIT CIRCUIT RETURN.

09 02 14 32 CDR Okay.

09 02 14 33 CMP You have a MASTER ALARM; that's HI O₂ FLOW.

09 02 14 36 CDR Okay.

09 02 14 40 CMP I'll get it off, Charlie. I'm putting the caution and warning back to normal.

09 02 14 48 CC Ken, you're down to 5 psi on the cabin.

09 02 14 54 CMP Okay. And the valve is closed.

09 02 14 58 CDR What's my suit pressure, Charlie?

09 02 15 00 CMP You're at - You should have about 1.2 DELTA-P.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

09 02 15 09 CDR What does it say on the gage over there?
09 02 15 11 LMP 0.2 DELTA-P.
09 02 15 17 CDR 0.2 DIRECT O₂. I want to get it up to -
09 02 15 19 CMP Okay, why don't you cycle the SUIT CIRCUIT RETURN valve?
09 02 15 25 CDR Okay.
09 02 15 37 CDR Cycle once.
09 02 15 40 CMP Okay, that's good. It's back in.
09 02 15 45 CDR It's back in.
09 02 15 46 CMP All right.
09 02 15 47 CDR Cycled twice.
09 02 15 57 CMP Your suit pressure is still only about 1.5; have to turn that thing up some to get it a little - -
09 02 16 02 CDR Okay, I'll get it up there.
09 02 16 15 CMP And, Hank, it looks like we're gonna be about 10 minutes late on hatch open.
09 02 16 20 CC Roger.
09 02 16 33 CMP Okay, you should have 2 psi.
09 02 16 35 CDR Okay. Call it off.
09 02 16 38 CMP Okay.
09 02 16 39 CDR Call it off to me, Charlie.
09 02 16 43 LMP When do you want me to shut the DIRECT O₂ off, Ken?
09 02 16 45 CMP About 4.

09 02 16 47 LMP Okay.

09 02 17 02 CMP Okay, why don't you turn the DIRECT O₂ off?

09 02 17 05 LMP DIRECT O₂'s off.

09 02 17 07 CMP Okay. Okay, it - it ought to get up to almost 4.5.

09 02 17 42 CMP Have full pressure now? What's your suit pressure?

09 02 17 47 CDR 4.4's where it went last time.

09 02 17 59 CDR Yeah, that's where it regulates to, right there, about 4.5.

09 02 18 03 CMP And the flow should start to drop here.

09 02 18 29 LMP How's your suit pressure? Is it stable?

09 02 18 33 CDR Okay, Houston, how long does it take before the flow starts to drop on this integrity check?

09 02 18 47 CC Stand by, John.

09 02 18 53 CMP Get you a little DELTA-P there, probably help.

09 02 19 03 CMP There you go.

09 02 19 04 LMP Coming down.

09 02 19 08 CMP That's all it needed was that bump, that little bit. Okay, I'm turning my flow off -

09 02 19 14 LMP MARK.

09 02 19 15 CDR Okay -

09 02 19 16 LMP Okay - I -

09 02 19 18 CMP Okay, and my check is that the flow remains stable and low.

09 02 19 23 CDR I wouldn't consider it low, Ken; it's climbing right back up.

09 02 19 27 CMP Less than 0.97. In other words, it doesn't peg.

09 02 19 38 CDR Oh, the rascal.

09 02 19 41 CMP It stopped.

09 02 19 42 CDR 0.7. Okay, the flow is holding right now at 0.72 and - on me and Charlie. That ought to do it.

09 02 19 55 CMP Okay. That's ... good.

09 02 19 56 CC Roger; that sounds good, John.

09 02 19 58 SC (Coughing)

09 02 20 00 CDR Now it's up to 0.8. Now it's pegged; for some reason, it just pegged.

09 02 20 04 CMP How about the cyclic accumulator? Just a second.

09 02 20 10 CDR Yeah, that's probably what it was, 8, 9, 10 - Yep, there's a cyclic accumulator; hmm. Okay.

09 02 20 20 CC Roger; we confirm that down here.

09 02 20 21 CMP ... Why don't you just go to DEPRESS on the SUIT TEST valve?

09 02 20 26 CDR Okay. Going to DEPRESS.

09 02 20 36 CMP Okay, you'll come down pretty slow. ... - -

09 02 20 41 CDR I won't come down at all, unless I can find the valve. There we go.

09 02 20 57 CMP You're in DEPRESS.

09 02 21 14 CDR I tell you, it's pretty good for these old suits to be holding air with all this Moon dust in them, Houston.

09 02 21 19 CC Roger; we copy.

09 02 21 47 CMP Okay. I got my PURGE valve pin pulled. And my PURGE valve is activated to LOW. The DIVERTER valves are rechecked into vertical. We get your suits back down and get the systems stable, we'll go to the EVA card.

09 02 22 08 LMP Okay.

09 02 22 14 CDR I'm 2.8 now and coming down.

09 02 22 23 CMP Well, it's comforting to know that there's some sunlight out there. When we - when we - vented the cabin, some of the particles went out, and you could see the sunlight out on them. Otherwise, it's just black as all get out.

09 02 22 44 CDR Hey, you want to open that black bag down there and put a vent on it?

09 02 22 47 LMP ...

09 02 22 51 CDR ... crack it. Yeah.

09 02 22 58 CMP You got it loose? I can get it. I'll get it.

09 02 23 07 LMP Okay.

09 02 23 08 CMP Did you snap it, Charlie? I - I got bare hands here. I can do that. Okay. Okay. Can you - Snap's all the way in the back. Oh, you did vent it.

09 02 23 33 LMP Wait, I need my helmet (laughter).

09 02 23 37 CDR Okay. Are we in this card here?

09 02 23 41 CMP Okay. You back to normal yet?

09 02 23 42 CDR Not quite.

09 02 23 45 CMP That, - that card picks up as soon as I get this thing back to - get you back to normal on this - -

09 02 23 49 CDR Right, right.

09 02 23 50 CMP - - configuration.

09 02 23 51 CDR I remember that now.

09 02 23 55 CMP Now I'm turning my O₂ flow back on. Houston, can keep an eye on the cabin pressure for us, if you will, please.

09 02 24 02 CC Roger. We're up to about 5.3, 5.4 now.

09 02 24 07 CMP Okay. I just turned my flow back on, so it'll start to rise again.

09 02 24 29 CMP Got about three-quarters of a psi to go. Am I in the way?

09 02 24 35 CDR No, it's no problem.

09 02 24 37 CMP Okay.

09 02 25 05 CMP ... and get us little head start so we don't get interrupted on our check.

09 02 25 38 CMP Okay, your equalization valve is closed.

09 02 25 44 CDR All righty. We're down now, aren't we?

09 02 25 49 CMP Yeah, that's good.

09 02 25 50 LMP Okay.

09 02 25 51 CDR Okay. I'm going to SUIT TEST valve to OFF.

09 02 26 00 CMP Okay, you verify that the DEMAND REGs are in BOTH.

09 02 26 04 CDR CABIN REGs are in BOTH - I mean, the DEMAND REGs.

09 02 26 08 CMP Okay. I'm going to put the cue - put this in the stowage locker - done with him. Want it turned around the other way?

09 02 26 17 CDR Okay.

09 02 26 30 CMP Those rings won't quite fit. Well, we're going to need it during the - I'm going to put it right in here. How's that? Okay, John, I'm ready to press on.

09 02 26 50 CDR Okay. Beginning of the card. Don helmet and lock.

09 02 26 54 CMP Yes, sir. Helmet's coming on. Yes.

09 02 26 59 CDR Roger. Grab this over here.

09 02 27 15 CMP That should have it.

09 02 27 16 CDR You - you still got a little of your - Wait a minute, you get it? That's a good thing. I'll hold it down. That do it?

09 02 27 43 CMP Okay, it's locked.

09 02 27 45 CDR Okay, I can verify that.

09 02 27 47 CMP And these stripes ought to line up pretty good, do they? Can you see under the - -

09 02 27 51 CDR Hey, your lock stripe is to the - about - you got to come this way - the other way. Whoa, too much. There you go, perfect.

09 02 28 02 CMP Okay. Give me the thermal stuff down there, Charlie.

09 02 28 11 LMP That's good.

09 02 28 12 CMP Okay.

09 02 28 13 CDR Okay, don wrist tether, ring forward.

09 02 28 17 CMP I've got it on my glove.

09 02 28 19 CDR Okay. Don LEVA - that's done - Verify alignment. Don the comfort gloves.

09 02 28 25 CMP Okay.

09 02 28 27 CDR Don one glove and lock. Okay, following that, panel 603, EVA O₂, OFF; and then don the other glove and lock it.

09 02 28 39 CMP Okay. All right, thank you.

09 02 28 55 CC 16, Houston. Like to get a voice check with Charlie.

09 02 29 03 CDR Charlie, talk to them, Charlie.

09 02 29 05 LMP I'm reading everybody, Hank. How me?

09 02 29 07 CC Okay. Reading you 5 by 5.

09 02 29 12 CMP Okay. I've got the other - -

09 02 29 13 LMP Okay, I'm keying.

09 02 29 14 CMP - - glove on and locked.

09 02 29 16 CDR Okay. All right, panel EVA O₂, ON. Let me verify those locks again.

09 02 29 21 CMP All right, sir.

09 02 29 24 CDR Okay. Okay. Verified.

09 02 29 27 CMP Okay. My other glove, Charlie?

09 02 29 30 LMP Here you go.

09 02 29 32 CMP Thank you, sir.

09 02 29 43 CMP Okay.

09 02 29 44 CDR Here comes the right - Well, I'll turn it OFF.

09 02 29 51 CMP My flow is OFF. The glove is coming on.

09 02 30 05 CMP And that looks locked.

09 02 30 06 CDR Yeah, it's locked.

09 02 30 07 CMP Okay, the flow is coming back ON. Next?

09 02 30 13 CDR Modulate ON and OFF as required to pressurize the CMP.

09 02 30 17 CMP Okay, we're coming up.

09 02 30 19 CDR Cuff gage 3.7 to 4.0. And then you should get the panel 604 SUIT PRESSURE ALARM, ON.

09 02 30 27 CMP Okay, I'll turn the switch ON.

09 02 30 28 CDR Yeah.

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09 02 30 29 CMP I have a tone at this time.

09 02 30 30 CDR Verify the tone's off.

09 02 30 32 CMP Yeah. Tone will come off when the pressure comes up.

09 02 30 35 CDR Right.

09 02 30 38 CMP How am I doing on the instrument panel, Charlie?

09 02 30 40 LMP Fine.

09 02 30 42 CMP Okay.

09 02 31 00 CMP The tone goes off at 3.2 and climbing.

09 02 31 03 CDR Okay. Fine. Okay, on panel 10, adjust CMP's master volume, if required.

09 02 31 12 CMP I can hear you guys just fine. Yeah, it's perfect.

09 02 31 16 CDR Great. LMP panel 351, EMERGENCY CABIN PRESSURE to OFF.

09 02 31 24 CMP How's that cabin pressure doing, I wonder?

09 02 31 27 CDR I don't know. Houston, how's the cabin - -

09 02 31 29 CC Roger. It's 5.6.

09 02 31 33 CMP Okay.

09 02 31 34 CDR Okay. We'll make it.

09 02 31 38 CMP Vertical is OFF. Vertically down is OFF, isn't it? Isn't it?

09 02 31 51 CMP Okay. Don't I do a suit integrity check, John?

09 02 31 53 CDR Yeah.

09 02 31 54 CMP I'm sorry, I didn't turn the flow OFF. Okay, my flow is coming OFF. Nope, it's going up the ... there.

09 02 32 06 CDR Wait a minute. You've got to do the EVA warning tone check first.

09 02 32 08 CMP Okay. The - All right - read me the steps.

09 02 32 13 CDR CMP monitor cuff gage, set the PURGE valve to HI.

09 02 32 21 CDR Let me do that for you.

09 02 32 29 CDR And verify the EVA tone - -

09 02 32 31 CMP Okay, it's HI.

09 02 32 32 CDR Okay, verify the EVA tone comes on at 3.1 to 3.4.

09 02 32 36 CMP Comes on at 3.2.

09 02 32 37 CDR Comes on at 3.2. Okay. Then PURGE valve to close.

09 02 32 40 CMP Okay, I'm going to have to - have some - I've got this purge valve stuffed in my pocket, because it came out of that container.

09 02 32 47 CDR Right.

09 02 32 48 CMP Going to have to get the soft suit to get it.

09 02 33 18 CC Ken, your cabin's up to 5.8. We suggest a vent.

09 02 33 23 CMP Okay, that's going to VENT. Okay, you're at VENT.

09 02 33 38 CC Roger.

09 02 33 42 CMP Thank you, Hank. You've got to push it in first.

09 02 33 48 CDR Oh, yeah.

09 02 33 53 CMP I tell you what. Put it in to LO first, and let me build up my pressure slow.

09 02 33 59 CDR That way LO?

09 02 34 01 CMP Yeah. ... - -

09 02 34 02 CC Okay, Ken. Would you close the - -

09 02 34 04 CMP - - ... Now you can close it.

09 02 34 05 CC - - side hatch dump?

09 02 34 10 CMP Okay. Thank you, Houston.

09 02 34 13 CDR Okay, it's closed.

09 02 34 15 CMP Okay.

09 02 34 16 CDR Okay, your pin's in, Ken.

09 02 34 17 CMP Okay, is it set on HI flow?

09 02 34 20 CDR Okay, going back to HI.

09 02 34 24 CMP HI flow is counterclockwise.

09 02 34 34 CDR Okay, it's on HI flow.

09 02 34 38 CMP What's the MASTER ALARM for?

09 02 34 39 CDR O₂ FLOW HI.

09 02 34 40 CMP Okay, maybe I - How low is the cabin?

09 02 34 43 CDR Huh?

09 02 34 45 CMP Can you see the cabin pressure?

09 02 34 46 CC You're at 4.7.

09 02 34 49 CDR 4.7.

09 02 34 50 CMP Okay, that's why you got the HI O₂ FLOW.

09 02 34 53 CDR Why?

09 02 34 54 CMP Your cabin's at 4.7. I vented the cabin - below where the regs go.

09 02 35 01 CC Roger; we verify cabin reg.

09 02 35 02 CDR ... shut off.

09 02 35 03 CMP You've got the emergency regs shut off.

09 02 35 05 CDR Okay.

09 02 35 06 CMP You don't have the main regs shut off because there's no switch on them.

09 02 35 10 CDR Okay. Okay, well, let's press on. Integrity check. Panel 603 EVA O₂ to OFF.

09 02 35 19 CMP Okay. Excuse - There we go. Okay. See what I'm hung up on, Charlie?

09 02 35 36 CMP Okay. Thank you.

09 02 35 39 CDR Monitor - monitor cuff gage to verify PCV closes.

09 02 35 42 CMP Okay.

09 02 35 43 CDR Monitor pressure decay for 1 minute. Verify at less than 0.8.

09 02 35 49 CMP Okay, that's - I got the tone.

09 02 35 51 CDR Okay, there's a mark on a minute.

09 02 35 57 CMP Falling. It started at 3.65, and it's slowly coming down.

09 02 36 23 CDR Okay, can you hear a crossfeed on it?

09 02 36 26 CMP Okay, I'm gonna turn the oxygen back on.

09 02 36 30 CDR Okay, Ken, that was - what was it? This looks pretty good right now.

09 02 36 33 CMP Huh?

09 02 36 34 CDR How much was it?

09 02 36 36 CMP 3.6.

09 02 36 37 CDR Okay, fine. You got a tight suit.

09 02 36 40 CMP Tone is on. I mean the EVA oxygen on panel 603 is ON.

09 02 36 45 CDR Okay.

09 02 36 46 CMP And the guard is down.

09 02 36 48 CDR Install the guard.

09 02 36 50 CMP It's down and locked.

09 02 36 51 CDR Verify PGA pressure, 3.7 to 4.0. Verify tone is off.

09 02 36 55 CMP Tone is off, and I have 3.9.

09 02 36 59 CDR EVA sta -

09 02 37 01 AA ...

09 02 37 06 CDR That makes me sick. That ...

09 02 37 09 CMP I didn't hear that.

09 02 37 10 CDR Okay, EVA station pressure gage 100 to 500 psi.

09 02 37 15 CMP Okay. It's 1, 2, 3 - looks like it's just slightly over 300.

09 02 37 23 CDR Okay. Fine. Verify surge tank pressure greater than 750.

09 02 37 31 CC Apollo 16, you're GO for cabin depress.

09 02 37 36 CDR Okay.

09 02 37 37 CMP The surge tank is reading 860.

09 02 37 44 CDR Okay, GO for depress. GN₂ valve handle, pull.

09 02 37 49 CMP Okay, GN₂ is to PULL.

09 02 37 51 CDR Gage minimum, leave in vent position.

09 02 37 54 CMP Say again.

09 02 37 56 CDR Gage - Gage to minimum. Leave in the vent position.

09 02 37 59 CMP Okay, the gage is minimum, and it is in vent.

09 02 38 04 CDR Verify helmet and gloves locked.

09 02 38 07 CMP Okay, I got two gloves that are locked. You checked my helmet.

09 02 38 13 CDR Right.

09 02 38 14 CMP Okay.

09 02 38 18 CDR Confirm GO for depress from Houston. We got that.

09 02 38 20 CMP All set.

09 02 38 21 CDR EVA warning tone may come on momentarily during depress. Side hatch dump valve to open. O₂ FLOW HI warning light may come on before cabin pressure regs lock up.

09 02 38 32 CMP Okay.

09 02 38 33 CDR Close the dump valve at 3.25. Can you see that, Ken?

09 02 38 38 CMP I'll close it, and see how we're doing.

09 02 38 41 CDR Okay. Houston, can you give us a call at 3.25?

09 02 38 45 CC Will do.

09 02 38 48 CDR Are you ready? All set?

09 02 38 50 CMP Yeah.

09 02 38 51 CDR Okay, equalization valve's coming open.

09 02 39 10 CMP Okay, coming down through 4.5.

09 02 39 31 CMP Yeah. We may get a jettison before we get the cabin dumped. Okay, going through about 3.5.

09 02 39 39 CC Roger; 3.

09 02 39 44 CMP 3.25.

09 02 39 45 CC Okay, 3.2.

09 02 39 48 CMP Okay, equalization valve is closed.

09 02 39 52 CDR Okay, O₂ FLOW indicator is less than a half. It is. It's reading - Well, wait a second. Let it stabilize here. Got another accumulator cycle.

09 02 40 08 CC Accumulator cycle, we confirm.

09 02 40 12 CDR Okay, right down now.

09 02 40 22 CMP Okay, that's great. Go ahead and -- Ready to go?

09 02 40 26 CDR Yeah.

09 02 40 27 CMP Okay, cabin's coming down.

09 02 40 29 CDR Okay.

09 02 41 02 CMP Okay, I show 2.5. Want to get that one in there.

09 02 41 17 CDR Okay.

09 02 41 32 CMP Cabin pressure is 2.0.

09 02 41 36 CDR Okay.

09 02 41 37 CMP Fixing to get ... off the peg pretty soon.

09 02 42 20 CMP Okay, I'm showing 1.3.

09 02 42 24 CDR Okay.

09 02 42 52 CMP Cabin shows about 1. I'm going to open it a little more; that can help it.

09 02 43 04 CDR How's your keying, Ken?

09 02 43 05 CMP I'm fine.

09 02 43 06 CDR Good.

09 02 43 08 CMP It's a lot better when you get the cabin depressurized.

09 02 43 40 CMP Well, I'm still showing about three-quarters.

09 02 43 47 CDR Don't - don't let that screw go in there, Ken.

09 02 43 49 CMP Oh, I tried.

09 02 43 52 CDR Did it go in?

09 02 43 55 CMP It looks like it went in here, I can't tell.

09 02 44 33 CMP Okay, looks like we're down pretty low.

09 02 44 40 CDR Okay, verify suit pressure stable, 3.5 to 4.0.

09 02 44 43 CMP My pressure is steady at 3.75.

09 02 44 46 CDR Okay, verify O₂ FLOW HI light is off. That's verified. How's your cuff gage, Charlie?

09 02 44 58 CDR Okay. Mine, too. EVA station pressure gage 100 to 500. No tone.

09 02 45 03 CMP Okay, still setting on 300, and no warning tone.

09 02 45 06 CDR Okay, panel 3 S-BAND AUX TV to TV.

09 02 45 09 CMP Okay.

09 02 45 11 CDR I'm going to INTERCOM/PTT.

09 02 45 13 CMP Oh, let's see. I'm not sure that cabin's really down out of that pazhan [?] region. How about reading me that - that step again when I get the hatch?

09 02 45 31 CDR It doesn't matter right now? Okay.

09 02 45 34 CMP If you can get it on, fine; if not, don't worry about it.

09 02 45 43 CDR Okay.

09 02 45 48 CMP I can't read the parallax in the gage. It looks like it must be just about down though.

09 02 45 52 CDR Okay, well let's ask the ground. Houston, what do you show the cabin pressure?

09 02 45 54 CC Roger; we're showing you 0.1.

09 02 46 00 CMP That ought to be enough, huh?

09 02 46 02 CDR Okay. Yeah, that's enough. Okay, I'm going to INTERCOM/PTT.

09 02 46 08 CMP And, Houston, is that low enough pressure to turn the TV on?

09 02 46 32 CMP Henry, did you read - -

09 02 46 33 CC Roger. We copy. Press on with the - with the - turning it on.

09 02 46 38 CMP Okay. Thank you, sir.

09 02 46 57 CMP You have TV on.

09 02 47 06 CMP Okay, it's unlatched.

09 02 47 12 CMP That's affirmative. Okay, there. It's unlatched. *** you. Okay.

09 02 47 43 CMP Okay, what do I do now? I've put the handle up and - Okay, it's set on L. It's stowed. I am. I am. It's stowed. How about the gear box? Okay, gear box is to latch. Okay. My inner visor is down. Okay.

09 02 48 59 CMP Okay. How about if I get rid of the jett bag first? Okay. Yep. Yep.

09 02 49 17 CMP Bye-bye, bag. Okay. Okay, I'll go out and get the TV.

09 02 49 46 CMP-EVA Ooh! Charlie, you'll need the outer visor as soon as you get into the hatch.

09 02 50 03 CMP-EVA Okay.

09 02 50 14 CMP-EVA You can use the visor shade, too, when you get out. How's that?

09 02 50 31 CMP-EVA Oh, just me (laughter).

09 02 50 42 CMP-EVA I did. Sorry about that (laughter). Oh-no. Okay, where's the camera? Yeah, get my - I've got to get my umbilical up here first, John.

09 02 51 07 CC Charlie, could you check and see if the GLYCOL mixing valve got bumped into AUTO, the TEMP IN?

09 02 51 15 CMP-EVA John, you can check that.

09 02 51 22 CDR In MANUAL.

09 02 51 29 CC Roger; copy MANUAL.

09 02 51 33 CDR Yeah, the GLYCOL EVAPORATOR TEMP IN is in MANUAL.

09 02 51 43 CMP-EVA John, I'm hung up on some cable there.

09 02 51 48 CDR There it is.

09 02 52 03 CMP-EVA Yeah. All right. I will when I get here. Looks like it's hung up on something there.

09 02 52 17 CC 16, if you'll take the TEMP IN switch to AUTO, please.

09 02 52 28 CDR Okay.

09 02 52 38 CC Okay, back to MANUAL on the TEMP IN.

09 02 52 44 CMP-EVA I need some more cable there, Charlie.

09 02 52 57 CMP-EVA Yep.

09 02 53 08 CC Roger; you verify you're in MANUAL in TEMP IN?

09 02 53 14 CDR Yeah, that's affirmative.

09 02 53 25 CMP-EVA Charlie, I'm going to have to back in here so I can get a little better grip. I've got to turn the pole around. Get my foot on something. Okay, thank you. See now - let me see if I can -

09 02 53 46 LMP That's it. Panel 16 [sic] POWER, ON.

09 02 54 02 CMP-EVA Yeah, I can feel it. How's the - how's the photos of the SIM bay? Does it - do I need to adjust it?

09 02 54 11 CC Looks pretty good down here, Ken.

09 02 54 12 CMP-EVA Houston, is that picture okay? All right, I'm going back to the SIM bay.

09 02 54 24 CMP-EVA It - it really is ripe.

09 02 54 41 CMP-EVA Okay.

09 02 54 56 CMP-EVA Are you ready, Charlie?

09 02 55 01 CMP-EVA Yeah, on your egress, you sure will.

09 02 55 10 CMP-EVA All set?

09 02 55 17 CMP-EVA Okay.

09 02 55 20 CC Charlie, can you verify the TV pole's aligned?

09 02 55 24 CMP-EVA Okay, I'd say the service module is pretty well blistered. Did the picture shift? Are you not getting a good picture, Hank?

09 02 55 38 CC It looks like it might be swung - swung a little too far to the left. We're not sure. That would be to Charlie's left.

09 02 55 45 CMP-EVA Okay, I'll fix that in a minute. All right. Okay. Stand by. No, we can't put it there without moving the door. Let's get this done. Number 1, I'm at the mapping camera, and the stellar cover door is open, and the stellar cover is jammed out, and jammed against the handrail. Copy, Hank?

09 02 56 13 CC Roger; copy.

09 02 56 17 CMP-EVA I am.

09 02 56 29 CMP-EVA Yeah.

09 02 56 59 CMP-EVA Oh, man. Man, the old Moon's out there. Okay, going after the pan camera. Okay, here comes the hard cover - gone.

09 02 57 32 CMP-EVA Soft cover has gone. Okay, I'm going after the hook.

09 02 57 43 CMP-EVA Okay, good.

09 02 58 00 CMP-EVA Boy, that old visor of yours - that outer visor on the glare shield really comes in handy. Okay.

09 02 58 23 CMP-EVA The pip pin it out, and I'm throwing it away.

09 02 58 35 CMP-EVA Oh, they'll open, not much I bet. Not at all, there it is, it's out.

09 02 59 11 CMP-EVA Okay, get my feet out. There's one. There's two.

09 02 59 28 CMP-EVA Okay.

09 02 59 40 CC Ken, the TV is just right. It doesn't need adjustment.

09 02 59 49 CMP-EVA All right.

09 03 00 33 CMP-EVA It is that, all right. I don't even see any stars.

09 03 01 10 CMP-EVA Okay, Charlie, will you hook that back to my ring?

09 03 01 24 CMP-EVA You don't need to lock it.

09 03 01 28 LMP Thank you.

09 03 01 30 CMP-EVA All right, going back for the mapper.

09 03 01 47 CMP-EVA No, the mapper is still out here, I betcha.

09 03 01 54 CMP-EVA Oh, man!

09 03 02 10 CMP-EVA All righty. I got my feet well locked, and I got a good suit pressure, and cooling is just fine, and let me tell you a few things about the old SIM bay. Okay. The first thing that's real obvious to you out here is the - is the amount of bubbling on the service module paint. It's more - it's a bit more than I anticipated seeing and the radiator panel down to the right side of the SIM bay looks nice and clean. There's no bubbles on the paint or anything like that. The area right under the quad - I'll have to raise my visor to see - Yeah, I got the inner one still down. I will. Yeah, you don't need to remind me of that one.

09 03 03 13 CMP-EVA Okay, the area directly under the quad doesn't look to me like it's blistered any more than the areas everywhere else around here. That's just a qualitative comment. The - in fact, the paint on the quad itself is as blistered. The area directly under the nozzle on the - the plus-Z jet on quad B is all blistered. I can see that in the Sun. I can't tell about the other surfaces. Okay, looking now at the mapping - at the mass spec and the gamma ray, I'm going to have to move aft to do that.

09 03 03 51 CC Ken, I'd like to caution you on the mass spec to steer clear of that door there. It's very soft and it could bend and break and leave a jagged edge.

09 03 04 01 CMP-EVA Roger. I won't touch it.

09 03 04 10 CMP-EVA Yeah.

09 03 04 17 CMP-EVA Sorry about that.

09 03 04 33 CMP-EVA Okay, I've got a good handhold over here on the pan camera - this rail, so that's a good one, and now I'm over the gamma ray door and it's about open at, say, 30 degrees.

09 03 04 58 CMP-EVA And I can't - I can nudge it, and it looks like it's hitting on the top of the gamma ray spectrometer itself. No, it isn't. It's not touching the spectrometer. And I'm not real sure what it is jammed on. I can't see anything anywhere. The cover just feels like it's a little bit loose at about a 30-degree jiggle, and I can't see the mechanism to tell whether it's broken. The - -

09 03 05 32 CC Roger; can you see if the guide rails come through the SIM?

09 03 05 34 CMP-EVA - - mapping camera - Oh, let me take a look; I don't think I can get my head over there far enough to tell that. Yes, they do. They come right up to the pointed edge.

09 03 05 49 CC Roger. Copy.

09 03 05 52 CMP-EVA Okay, and on the mass spec, there's nothing there but the door wide open. Was there something in particular you'd like me to look at back here - on the mass spec?

09 03 06 03 CC Negative.

09 03 06 06 CMP-EVA Okay, anything else on the aft end? I don't see any blistering of paint or anything. It's all clean in the aft shell.

09 03 06 17 CC Okay. Copy.

09 03 06 32 CMP-EVA All right; thank you, Charlie. Now, I'll put my feet in here, and we'll take a look at the old mapper. Okay, while I'm standing on top of the DAC camera, the V-over-h sensor looks perfectly clean. There's nothing on the sensor. I see no evidence of contamination on the sensor, either the - the light meter or the V over h. The barrel is clean, all the decks and surfaces of the pan camera installation are clean.

09 03 07 13 CC Very good, Ken.

09 03 07 28 CMP-EVA Okay, here comes the mapping camera cover - hard cover. The soft cover. Okay, that'll be next. Yeah, that's my wrist tether.

09 03 07 55 CMP-EVA Okay.

09 03 08 12 CMP-EVA Ready?

09 03 08 26 CMP-EVA Okay, I'm putting the tether on now, John.

09 03 09 05 CMP-EVA Oh, I'm having trouble with this hook. I - If I can get it on, I can get it locked.

09 03 09 48 CMP-EVA Stand by.

09 03 10 41 CMP-EVA Oh, yeah. I just can't get the darned insulation out of the way. It's a little stiffer than the -

09 03 10 56 CMP-EVA Okay, it's on.

09 03 11 20 CMP-EVA Okay.

09 03 11 49 CMP-EVA Okay, why don't you wait until I get to the hatch?

09 03 12 12 CMP-EVA I see them.

09 03 12 24 CMP-EVA Yes, sir. Yes, sir.

09 03 12 39 CMP-EVA If you get it hooked on, you can pull the tether off my hand there, Charlie.

09 03 12 53 CMP-EVA No, sir. Okay, how we doing on umbilical now? How we doing on umbilical? You got most of it inside? Okay. Go ahead.

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09 03 13 21 CMP-EVA Yes, after Charlie gets in.

09 03 14 07 CMP-EVA Hey, let's go on back to the - Let's see - okay.
Yeah, yeah. Let me - turn around here and get my
feet in.

09 03 14 40 CMP-EVA Okay, wait a minute. Got to - Let me see if I can
find a place to put my feet here. Is that a safe
place for my right foot? Okay.

09 03 15 07 CMP-EVA You got - You got anything on the TV?

09 03 15 12 CC Not right now. Yeah, we got something there.

09 03 15 20 CMP-EVA Yeah, I'm not very steady here.

09 03 15 24 CC Looks like the old Moon.

09 03 15 28 CMP-EVA That's her, babe. Right off the nose.

09 03 15 35 CMP-EVA Okay. that's all for today on that.

09 03 15 48 CMP-EVA Okay, I'm going to have to pull myself in. Let
me - send this thing in to Charlie. All righty.

09 03 16 23 CMP-EVA Okay.

09 03 16 24 LMP Go ahead.

09 03 16 25 CMP-EVA Let me get my umbilical down here. Yes, sir.
Okay, Houston, we're maneuvering to the MEED
attitude.

09 03 16 43 CC Roger.

09 03 16 50 CMP-EVA Don't move my feet. I'll lift.

09 03 17 01 CMP-EVA Out the - All you got to do is pull the - Okay.

09 03 17 11 CMP-EVA I got the pole. Okay.

09 03 17 24 CMP-EVA Okay, let me pull this rail down to hold on to and
we'll play ride'em cowboy.

09 03 17 45 CMP-EVA Is that enough out of the way, Charlie? Okay.

09 03 18 06 CMP-EVA Easy. How's that?

09 03 18 40 CMP-EVA Okay. No, it's in the two-bar. No, Charlie's going to unstow it. Okay. Oops! How about if I slide over here? Will that - Okay. All right? Let me - No, I got it here, I think. From here you can't either? Okay, all right, okay. Okay. I got to come in to turn around, then. Hold th - hold this pole until I get out. It - If you let John hold it, then I won't have - it'll be easier to - Okay. The visor back down -

09 03 19 52 CMP-EVA Okay. How's that?

09 03 20 10 CMP-EVA And, right now, I've got the Earth peeking over the side of the fuselage, just a little crescent. Okay, coming in.

09 03 20 40 CMP-EVA Fine. Yeah, okay, I got that. And hold -

09 03 21 10 CMP-EVA Okay, Houston, we've reached the MEED attitude.

09 03 21 16 CC Roger.

09 03 21 19 CMP-EVA Wait a minute. Okay. ... It's locked. Of course, we got it. Okay, out with the MEED.

09 03 21 54 CMP-EVA Seven. I found a sight here. Wait a minute.

09 03 22 03 CMP-EVA I don't know. I can't - I've got this visor stuck down and can't see what it is. Got a lot of dirt on it.

09 03 22 20 CMP-EVA Yeah, it wouldn't hurt. Okay, I got to rotate this another few degrees. You got both my feet there? Okay.

09 03 22 43 CMP-EVA Okay, all right, let go of my feet there, get up here to attitude - there's my foot there - I don't have to go outside, I don't think. Let's see, Charlie, - you're going to have to - let me see -

09 03 23 26 CMP-EVA All right, just a second. Oh, that's just what we didn't think about. That Velcro strip lays right in front. Yep. Hang on; I've got my scissors right here. I'll be right with you. Yes, sir. Okay, okay, okay. Okay, what we do need to do is to pitch up, minimum impulse. Oh, you've got to go about 3 degrees.

09 03 24 50 CMP-EVA Put in - input yet? Okay, go - pitch down then. Yeah. Okay, up should be in the right direction on this thing. I said up the first time and that - that looked like it went the wrong way. Oh, okay; well, you need to go up about 3 degrees then.

09 03 25 25 CMP-EVA I can't tell that you're moving. Has the attitude changed? Yeah, yeah, and that's moving now. Moving in the right direction. Let it ride at the slow rate for about another minute. What's that - Oh, is that right (laughter). Boy, how's that for luck?

09 03 26 19 CMP-EVA Okay, John we got another 30 seconds to drift and we'll be there. Yes, sir. Yeah. Nope. Okay.

09 03 27 02 CMP-EVA Okay.

09 03 27 16 CMP-EVA Okay. Why don't you go to AUTO?

09 03 27 22 CMP-EVA Okay, are you ready?

09 03 27 40 CMP-EVA Stand by.

09 03 28 01 CMP-EVA Hey, can you hold my feet?

09 03 28 19 CMP-EVA There it is.

09 03 28 22 CMP-EVA Okay, pull me in. I'll pull myself in.

09 03 28 31 CC Is the MEED open now, Ken?

09 03 28 36 CMP-EVA Yes, sir.

09 03 28 39 CC Okay, I didn't get your mark.

09 03 28 40 CMP-EVA It's been open 15 or 20 now. Sorry.

09 03 28 42 CDR Yeah, it's on 22 seconds now.

09 03 29 38 CMP-EVA What kind of pressure do you have now?

09 03 29 49 CMP-EVA How about our suit gages?

09 03 30 15 CMP-EVA Okay.

09 03 30 21 CMP-EVA I'm very comfortable.

09 03 30 29 CMP-EVA 3.85. Like a champ.

09 03 30 38 CC John, could you give us a cuff gage reading?

09 03 30 44 CMP-EVA Okay, I got 3.85, Hank.

09 03 30 58 CC Roger. Could we get one from John and Charlie?

09 03 31 00 CMP-EVA Do you want all of them or just mine? Okay, say again what you had, John. John has 3.55.

09 03 31 08 CC John has 3.55. Roger.

09 03 31 11 CMP-EVA Charlie has 3.95.

09 03 31 13 CC 3.95.

09 03 31 28 CMP-EVA Probably getting some off the bulkheads, too, drying this place out.

09 03 31 40 CMP-EVA Hey, how's the time coming?

09 03 31 45 CMP-EVA Okay, it's sure not.

09 03 31 57 CMP-EVA Houston, you are now win - witnessing one of the longest 10-minute periods in history.

09 03 32 02 CC Roger.

09 03 32 22 CMP-EVA (Laughter) Yeah, I think that one was longer. I'm looking at our dump nozzles out here. And there is very little buildup on the waste dump.

09 03 32 43 CMP-EVA (Laughter) I don't plan to have that.

09 03 32 51 CMP-EVA Okay.

09 03 32 56 CMP-EVA Henry, was there anything else you wanted to know about the SIM?

09 03 33 02 CC Roger. When you were arou - around the mapping camera, did you happen to notice the condition of the cable that lays between it and the bulkhead there?

09 03 33 12 CMP-EVA I couldn't see down in there. There's too many shadows.

09 03 33 15 CC Roger; copy. And, on the stellar camera door, how far out was it?

09 03 33 22 CMP-EVA Oh, I'd say the - the - the last folding lip is up against the handrail. Well, it - yeah, just about that far.

09 03 33 32 CC Roger.

09 03 33 37 CMP-EVA All right, thank you. Oh, I'm just fine. I got nothing to do but just loop my finger around this thing.

09 03 33 57 CMP-EVA No, sir.

09 03 34 07 CMP-EVA Right.

09 03 34 25 CMP-EVA Fine.

09 03 34 36 CMP-EVA (Laughter) I wish you wouldn't put it that way. No.

09 03 35 21 CMP-EVA (Laughter) No wonder that was such a long time. Hank, we got another one of those event timers that's timed to some base other than universal time.

09 03 35 33 CC Say again.

09 03 35 34 CMP-EVA But don't worry about the MEED; we got a watch on it.

09 03 35 37 CC Okay, I'm timing you down here, too.

09 03 35 41 CMP-EVA Okay, we got regular - regular watches on it, so it's okay. Why don't you check us at 8 minutes, Hank?

09 03 35 50 CC Will do.

09 03 36 17 CC Coming up on 8 minutes -

09 03 36 21 CC MARK.

09 03 36 26 CMP-EVA Okay, thank you, Hank. We're right with you.

09 03 36 48 CMP-EVA You get a good look at the Earth, Charlie?

09 03 37 05 CMP-EVA I'm really surprised I don't see any stars.

09 03 37 21 CMP-EVA (Laughter) What time is it? Okay, 9 minutes.

09 03 37 51 CC Got about 30 seconds, Ken.

09 03 37 54 CMP-EVA Okay, I'm on my way to the experiment. Charlie, can you hold my feet there? And would somebody give me a call at 10?

09 03 38 11 CMP-EVA Man, that sight's right on.

09 03 38 12 CC Ten seconds.

09 03 38 14 CMP-EVA Okay. We're counting down the last ten.

09 03 38 22 CMP-EVA Closed.

09 03 38 24 CC Okay, make sure it's closed and locked, Ken.

09 03 38 29 CMP-EVA It's closed; I'm working on the lock.

09 03 38 42 CMP-EVA Charlie, can you hold my feet real good there? Hold both of them. Okay.

09 03 39 17 CMP-EVA Well, I didn't get it locked. Yeah, I'm - I'm working on that, John. I got to compress the seal. I'm trying to get some leverage on it.

09 03 39 50 CMP-EVA Wait a minute.

09 03 40 10 CMP-EVA Well. No. No.

09 03 41 01 CC Ken, you having any luck with that lock yet?

09 03 41 03 CMP-EVA Not yet.

09 03 41 11 CC Okay, that goes clockwise and then closes, and then counterclockwise.

09 03 41 18 CMP-EVA Yes, sir, I've got the sequence. It's the lock I don't have.

09 03 41 25 CDR How about if we bring it in and tape it closed?

09 03 41 28 CMP-EVA I'm gonna do that in just a second, if I don't get it on this try. Well. Hey, there we go, I think. Let me try that now.

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09 03 41 52 CMP-EVA I feel it coming.

09 03 42 13 CMP-EVA Well, I'm going to have to let it have - a little extra UV.

09 03 42 28 CMP-EVA Because I can't hold it shut and bring it in. Charlie, you got my foot?

09 03 42 42 CC Ken, do you intend to use the TV any more?

09 03 42 47 CMP-EVA No, sir. Okay, I've got to get that thing closed here - at least out of the UV. Okay, I've got it. It was - Hank, it was open for about 3 seconds.

09 03 43 08 CC Roger.

09 03 43 27 CMP-EVA You got it?

09 03 43 34 CMP-EVA All right.

09 03 43 42 CMP-EVA Let me - let me get my hand out of here, that's what's holding me up; now you can pull it in.

09 03 43 55 CMP-EVA Wrap a piece of that tether around it until we get the cabin pressurized. You got it? Okay.

09 03 44 16 CMP-EVA You can probably stick the whole thing under there.

09 03 44 27 CMP-EVA Take your time and get it all cleaned up. All righty.

09 03 44 56 CMP-EVA I see a piece of tether coming up here, is that the MEED? Okay. Yeah. Don't - don't disconnect the lanyard.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

- 09 03 45 15 CMP-EVA Okay. I'll turn around and start in. (Laughter)
Rub-a-dub-dub. Okay, you got my umbilical in
sight?
- 09 03 45 40 CMP-EVA Okay. Let me get my - I've got to get - Something's
under my foot there. Okay, I've got to get my foot
low in order to get in. Want me to go back out?
Hey, okay; swing. Oh, not quite. Got to get this
thing up where I can see something.
- 09 03 46 42 LMP Look at that!
- 09 03 46 50 CMP-EVA Get the - John, you sure have a lousy LEVA. It's
closed and the hatch is clear. Just a second.
Okay. All right. Before I take it any further,
let me try and ... some of those latch seals ...
You're right. Can you see the latch seals? I
can't see the top. Can you see the top, John?
I just want to make sure I don't have something
stuck - a lanyard stuck in there somewhere. Okay?
Yeah. Hey, the - the handle - the indicator looks
latched. Yes, sir.
- 09 03 48 35 CC Okay, Ken. Before you pressurize the cabin, we'd
like for you to verify that the switch on the TV is
in STANDBY, and that the S-BAND AUX TV is OFF.
- 09 03 48 48 CMP Okay. What's the next step on the latches, here?
I think you read one I did miss. And on ... It's
latched. Okay, let me - I can get that TV switch.
Hey - Okay. That's a big help. The switch is OFF.
That's affirmative. Oh, and the - I can't find
that. Wasn't on the checklist. Yes, you do.
Right up there. I'm trying to get the visor up
so I can see. (Laughter) No, I'm going to use
this hatch right here. If I can read through
this thing. Beg your pardon? It's right there.
Okay. Dump valve coming close. Okay; the PRESSURE
EQUALIZATION VALVE is CLOSED. Okay, watch this.
I'll just sort of hit it once and see how it works.
- 09 03 51 39 CDR Okay. Houston, can you call us at a cabin pressure
of 1?

09 03 51 42 CC Will do.

09 03 51 43 CMP I'll get it.

09 03 51 44 LMP Say again.

09 03 51 45 CC Roger. We'll give you a call at 1 psi.

09 03 51 53 CDR Okay. We're repressuring now. Okay.

09 03 52 07 CMP I show not quite 1 on the gage. Okay, Henry. We're showing almost 1 on our gage, and we're letting it - watch for a minute or so.

09 03 52 27 CC Roger. We're showing 0.5 down here.

09 03 52 32 CMP Okay.

09 03 52 34 CC 0.6 now.

09 03 52 35 CMP ... cabin check, isn't it?

09 03 52 42 CC That's affirmative.

09 03 52 43 CMP He says it's 0.6. Okay. And what time - What, - we have a minute here? Three minutes? Thirty seconds. Okay. Looks closed to me. Okay, Houston, we're content with the check.

09 03 53 23 CC Looks pretty good from down here.

09 03 53 24 CDR REPRESS ...

09 03 53 29 CMP Dump open?

09 03 53 40 CMP I am. Nigh unto there. Just about.

09 03 54 11 CMP Just a second.

09 03 54 24 CMP Cabin pressure I show 2 - oh, about 2.0.

09 03 54 31 CC Roger. We're showing 1.9.

09 03 54 36 CMP Okay.

09 03 54 37 CC 2.0 now.

09 03 54 41 CMP Okay, it's CLOSE. You can? How you doing that?
(Laughter) Oh, you rolled over. Oh, I see. Oh, I
see. I was gonna say, you got pretty good periph-
eral vision if you can see around the corner that
way.

09 03 55 25 CMP (Laughter) That's 1265.

09 03 55 51 CMP (Laughter) Yeah.

09 03 56 23 CMP All right, sir. We've got about 2 - 4, it looks
like. Yeah. (Laughter) Sure is; 85. It's 5 inches
wide.

09 03 58 06 CMP Charlie? Doesn't seem like it, does it? (Laughter)
I guess that depends on your point of view, huh?

09 03 58 32 CMP And this umbilical isn't putting out an awful lot
compared to this big volume.

09 03 58 39 CDR And the umbilical is bringing it up slowly, Houston,
but it looks normal.

09 03 58 45 CC Ken, is it convenient for somebody to start a
VERB 49 to the thermal attitude?

09 03 58 53 CMP Yes, sir. If you can read it to us. We don't
have any books out or anything.

09 03 58 59 CC Okay, your NOUN 22 is 175, 283, 340. And we want
to change the DAP first. VERB 48 will be - And
if you can get to it, we enable all the jets.

09 03 59 31 CMP You want me to move, John? Oh, Okay. What do you
want on the DAP, Houston?

09 03 59 38 CC Okay, after enabling all jets, we want 11101, and
then all 1's.

09 04 00 09 CMP *** A/C. Okay, leave the B/C [sic] ROLL jets OFF.
Just leave enable coupled. Yes, sir. Just turn -
turn the A/C ROLL on. Okay; and all of the PITCH
and YAW. Push the three, maybe, or four, maybe,
circuit breakers back in. Okay. Okay, you're in
business. You have the auto coiled? [?]

09 04 01 18 CDR Hank, say again those numbers for the attitude?

09 04 01 20 CC Okay, R-1 is 17500, plus 28300, plus 34000. And would you check jet Charlie 1, on.

09 04 02 03 CMP Do they want it on or OFF? Well, I don't think we've got quite that yet.

09 04 02 35 CDR Hey, Houston, I don't know what that problem we had with the GLYCOL EVAP TEMP was. But there was a lot of ice crystals coming off from that side of the cockpit, and maybe it was affecting some of the temperatures over underneath that region, which are probably covered with condensate.

09 04 02 57 CMP Got to roll over so John can get to my ... valve.

09 04 03 02 CC Roger. That may have been it, John.

09 04 03 09 CMP Look at that. I did it. (Laughter) Boy! When I get off VOX, I'll tell you. Okay. Why don't you do something to my suit so I can get depressurized, there?

09 04 03 36 CC Roger, Ken. We're showing you at 3 psi now.

09 04 03 40 CMP Okay. Thank you. Read the card there. Well, I think we're going to pump the cabin up with it, Charlie. Just read the - Yep.

09 04 04 00 CMP (Laughter) You got it! They didn't make the string quite long enough. Okay? Where is it? (Laughter) Well, we'll find it if it comes - Well, I don't want to let it come loose on the panel. Can you reach the - You got it? Okay, I'm gonna open it. Okay? All set? Here we go. I've gotta open the purge valve. I can reach the purge valve. (Laughter.)

09 04 05 27 CMP Yeah. Why don't you punch it off, so you - It's under your card, there.

09 04 05 46 CMP Five and a half. Might as well go first class. Might as well. We want to empty it before entry.

09 04 05 58 CC 16, could we have AUTO on the HIGH GAIN.

09 04 06 01 CMP (Laughter) In a minute. Can you reach it? Okay. Good thing you can reach it. I think that's where my OPS is.

09 04 07 01 CMP Okay, how's the cabin? Is it? Maybe I won't have to turn this thing off. Is it flowing, Charlie? Cabin regs are off.

09 04 07 17 CC Ken, we're showing 5.0 down here.

09 04 07 22 CMP Okay, thank you.

09 04 07 37 CMP I'll buy that. (Laughter) When I closed it, I understood what you meant (laughter).

09 04 08 03 CMP Right.

09 04 08 23 CC Ken, would you shut the OPS off? We show 5.5.

09 04 08 28 CMP Okay. Is there anything wrong with taking it a little higher?

09 04 08 37 CC You can take it on up to about 5.7, 5.8, Ken.

09 04 08 42 CMP Okay, if you don't mind.

09 04 09 19 CC We're showing you 5.8 now, Ken.

09 04 09 24 CMP Okay, it's off. Okay, I'm gonna pop the purge valve.

09 04 10 01 CMP Yes, sir.

09 04 10 32 CC Ken, did you ever get the MEED locked?

09 04 10 36 CMP Yes, sir.

09 04 10 38 CC Okay. Verify it was locked.

09 04 10 40 CMP It probably got another 5 seconds of exposure.

09 04 10 43 CC Okay, real good.

09 04 10 44 CMP Got another 5 seconds of exposure, not all of which was on indirect UV. But as soon as we got it in the cockpit where a couple guys could get at it, it was locked.

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09 04 10 57 CC Good show. OMNI Delta, 16.

09 04 11 07 CMP Can you get OMNI Delta?

09 04 11 26 CMP I don't know. Hey, why don't you hold tight there. Okay. That'll do it. You've got it.

09 04 12 10 CMP (Laughter.) Uh-oh. (Laughter) It's up in the - it's up in the LEVA in the tunnel. Oh, there's more accessory bags up there. Just get one of them out. Okay, both of them have an accessory bag in them. Why don't you take me off the VOX, too? Thank you.

09 04 12 44 CC Ken, we were enjoying that. Sounds like you're having a lot of fun.

09 04 13 00 CDR I mean to tell you. I believe he was enjoying it.

09 04 13 03 CC Sure sounded like it.

09 04 13 09 CDR Charlie's already said all he can say about it. And he said it 45 or 50 times already.

09 04 13 16 CC (Laughter) Roger.

09 04 13 17 CDR Want to hear Charlie's words?

09 04 13 18 LMP Boy! Is it black out there!

09 04 13 50 CC 16, can one of you see the battery compartment reading now?

09 04 14 00 CDR It's 2.0, Hank.

09 04 14 01 CC Roger; 2.0.

09 04 21 25 CC 16, Houston. When you get a chance - no rush - we'd like to switch over to B/D ROLL.

09 04 24 11 CC Apollo 16, Houston.

09 04 24 16 CDR Go ahead. Over.

09 04 24 18 CC Roger, John. When y'all get through stowing and cleaning up there, whenever you're ready to pick up in the Flight Plan, give us a call. We got a little change to that SIM bay configuration, and we won't bother you with it now until you're ready for it.

09 04 24 34 CDR Okay. Thank you, Hank. Hey, listen. We could go to a SIM attitude or something and clean up in that attitude. We don't have to stay in this attitude, Hank, because it's gonna take us a long time to get these suits off and get all this stuff stowed. Maybe like an hour or so.

09 04 25 01 CC Okay, John. We're working that up now, and if you can do that, we'll give you a call here in a few minutes and start out on it.

09 04 25 10 CDR Sure, we pretty well have to do it one at a time because of - we're sort of loaded with things now. Like rocks and film and experiments.

09 04 25 21 CC Roger. I understand.

09 04 26 00 CC 16, Houston. We're going to do a shift change now. Don's coming on. That was a real great job.

09 04 26 08 CDR Thank you, Hank. We enjoyed it. We sure do appreciate your support in looking at some of those gages for us, when we - We didn't realize we were able to see them in one g, but zero g, you sort of float up in front of them. Thank you very kindly.

09 04 26 22 CC Roger; that's what I'm here for.

09 04 31 03 CC 16, Houston.

09 04 31 08 CDR Go ahead. Over.

09 04 31 10 CC Okay. As soon as you can get to it, we'd like you to maneuver to that X-ray pointing attitude that's listed in the Flight Plan at 245:20. But we do not want you to configure the SIM bay. We'll give you that item by item after you get in attitude.

09 04 31 31 CDR Okay, that's in work.

09 04 31 33 CC Roger.

09 04 39 18 CC 16, go OMNI Charlie.

09 04 39 31 LMP Okay, Pete. You got it.

09 04 39 33 CC Roger. Thank you.

09 04 41 21 CC 16, we're going to try to bring up the HIGH GAIN on PITCH 48, YAW 330. Go MANUAL and WIDE.

09 04 41 36 LMP Okay, plus 48, 330. Stand by.

09 04 41 39 CC Roger.

09 04 41 45 LMP Okay; we got pretty good signal strength, about three quarters.

09 04 41 50 CC Roger. 16, let's try going NARROW on the HIGH GAIN.

09 04 42 08 LMP Okay, coming in NARROW.

09 04 42 41 LMP Okay, Pete, I tweaked up the pitch, and you got pretty good signal strength in NARROW BEAM.

09 04 42 47 CC Okay, thank you.

09 04 42 58 LMP Hey, Pete; 16 here. We'd like to see if EECOM can come up with a - something on this battery compartment pressure increase. It appears to us that something is venting in there. I'd like to tell you - Before we started the BAT B CHARGER, 3 or 4 hours ago - whenever it was. We failed to check it before we started. And when we started the charge, there was a slight odor that's hard to identify, but it smelled like insulation. Then we stopped the charge, reconfigured again - Mainly I stopped the charge because I was looking at the wrong thing. I was looking at BAT BUS B and I saw the currents go negative which is nominal, but - so I stopped the charge and went back to BAT B CHARGE, and it looked okay. And there was no odor. And then we looked at the SYSTEMS TEST and we had 3 - 3 volts. We been venting it now on y'all's request. And we'd vent it to 1, and then it immediately starts climbing back to 01.45, and then it slowly increases and usually stabilizes out at about 2 or so. Over.

09 04 44 29 CC Roger; we copied. That's in work.

09 04 44 41 LMP And I'd like to know right now how many amps we got in A, B, and C.

09 04 44 47 CC Okay, stand by 1.

09 04 45 19 CC Okay, 16. I've got the SIM bay basic configuration that we'd like to get you into as soon as we can. And I'll read them to you one at a time, and you can configure as we go along. The first one is AUTO RCS SELECT, OFF, except A1, B2, A3, C4, B3, D4.

09 04 45 52 LMP Okay, stand by. That was a little fast. John is starting - you got A1. Go ahead, now.

09 04 46 13 CC Okay, Charlie. It's - -

09 04 46 15 CDR Say again what thrusters you want.

09 04 46 17 CC Okay, we want AUTO RCS SELECT, OFF, except the following: Delta 1, Bravo 2, Alfa 3, Charlie 4, Bravo 3, Delta 4.

09 04 46 48 CDR Okay, you got D1, B1, [sic] A3, C4, B3, and D4.

09 04 46 54 CC Roger; copy. Okay, we need to go PCM BIT RATE HIGH.

09 04 47 05 LMP We were in HIGH.

09 04 47 07 CC Okay. And S-BAND AUX TV to SCI.

09 04 47 14 LMP SCI.

09 04 47 16 CC ALPHA/X-RAY EXPERIMENT COVERS, CLOSE.

09 04 47 30 LMP Okay. ALPHA/X-RAY EXPERIMENT COVERS ARE CLOSED.

09 04 47 34 CC Roger. GAMMA RAY BOOM DEPLOY to OFF.

09 04 47 40 LMP Stand by. Roger.

09 04 47 54 LMP It is OFF.

09 04 47 57 CC Roger. GAMMA RAY BOOM JETT to off.

09 04 48 18 LMP Okay. It's off.

09 04 48 20 CC Okay. GAMMA RAY, EXPERIMENT ON.

09 04 48 26 LMP GAMMA RAY's coming ON.

09 04 48 31 CC Okay. MASS SPEC, EXPERIMENT off.

09 04 48 35 LMP Okay, it is off. MASS SPEC, off. Roger.

09 04 48 39 CC MASS SPEC, ION SOURCE. Verify off.

09 04 48 45 LMP It's off.

09 04 48 46 CC DATA SYSTEM's ON.

09 04 48 53 LMP It's ON.

09 04 48 59 CC X-RAY, ON.

09 04 49 08 LMP X-RAY is ON.

09 04 49 10 CC And LOGIC POWER 2 to DEPLOY/RETRACT.

09 04 49 16 LMP Okay, stand by on those two.

09 04 49 26 CC Okay, 16. We've lost the HIGH GAIN. Let's go WIDE and REACQ, and then step to NARROW like a normal acquisition.

09 04 49 37 LMP Okay. Okay, we got the HIGH GAIN, REACQ and NARROW. Okay, Pete, the LOGIC switch is at DEPLOY/RETRACT. Go ahead.

09 04 50 07 CC Okay, 16. We need ALPHA ON, and that will complete the SIM bay configuration.

09 04 50 18 LMP ALPHA's ON.

09 04 50 20 CC Roger. Thank you.

09 04 51 01 CC Let's go GAMMA RAY, DEPLOY, for 17 seconds.

09 04 51 10 LMP Roger. The GAMMA RAY's going to DEPLOY for 17 seconds.

09 04 51 18 CC And, 16, would you verify GAMMA RAY ON?

09 04 51 24 LMP Yes, sir. The EXPERIMENT is ON.

09 04 51 27 CC Roger.

09 04 51 35 LMP Hey, Pete, our SERVICE MODULE/AC POWER is OFF right now - on 181.

09 04 51 43 CC That's the way it should be, 16. And - -

09 04 51 49 LMP Okay. Stand by and I'll get - Go ahead.

09 04 51 56 CC Okay, Charlie. Did you get the GAMMA RAY, DEPLOY, 17 seconds?

09 04 52 01 LMP I'm gonna do that right now. Stand by.

09 04 52 03 CC Roger.

09 04 52 31 LMP Hey, Pete. All our watches have floated off. Could you - I'll give you a mark, and give me a call in 17 seconds. Okay -

09 04 52 38 LMP MARK. Deploy.

09 04 52 53 CC Now, Charlie, on the GAMMA RAY DEPLOY.

09 04 52 59 LMP Say again.

09 04 53 01 CC Stop the GAMMA RAY DEPLOY.

09 04 53 10 LMP I think I copied you. I'm now in OFF on the DEPLOY switch.

09 04 53 28 LMP Pete, are you reading? Over.

09 04 53 30 CC Roger. Say again, Charlie.

09 04 53 34 LMP Roger; I wanted a mark on that GAMMA RAY DEPLOY. We didn't have any ticktocks. All ours floated off here, and I couldn't see the EVENT GET MISSION TIMER. And I gave you a mark, and then I think you said turn it OFF, so I'm now in OFF on the DEPLOY switch.

09 04 53 50 CC Okay. We copy, Charlie.

09 04 53 54 LMP Okay.

09 04 54 52 CC Okay, 16. Would you confirm that SEB 2 circuit breaker is closed?

09 04 55 00 LMP No, they're both open too. We powered down the SIM bay as - per checklist for the EVA.

09 04 55 07 CDR ... for some things that you guys threw in there as per usual.

09 04 55 18 LMP You want me to close instruments in ... equipment, too?

09 04 55 23 CC That's affirmative, 16.

09 04 55 27 LMP Okay, Going closed -

09 04 55 28 LMP MARK.

09 04 57 44 CC 16, on your request on the amp-hours on the batteries: BATTERY Alfa is 36, BATTERY Bravo 30.3, and Charlie 39.0.

09 04 57 58 LMP Okay. Thank you very much.

09 05 00 26 CC 16, on the cryo configuration, we'd like O₂ tanks 1 and 2 to AUTO; tank 3, OFF.

09 05 00 37 LMP Roger. You have it. 1 and 2 AUTO; 3 is OFF.

09 05 00 40 CC Roger.

09 05 01 32 CC And, 16, on the SIM bay, we'll call all the changes on the SIM bay in real time until you're cleaned up there and in a position where you can get back to the Flight Plan.

09 05 01 44 LMP Thank you very much.

09 05 03 41 CC Okay, 16, and now we'd like to go ALPHA PARTICLE/X-RAY COVER, OPEN. And we'd also like to get one more reading on the battery compartment.

09 05 03 53 LMP Okay, ALPHA/X-RAY is going OPEN.

09 05 03 57 CC Roger.
09 05 04 00 LMP And the battery is holding at about 221. Right
around there.
09 05 04 06 CC Roger; copy.
09 05 04 07 LMP And it might be climbing slightly, too.
09 05 04 08 CC Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

09 05 39 01 CC 16, Houston. We've got a maneuver - VERB 49 maneuver at 246:30. I've got the attitudes and high gain angles when you're ready.

09 05 39 12 LMP Go ahead.

09 05 39 15 CC Okay; VERB 49 maneuver to X-ray attitude will be 174, 133, 032. And the HIGH GAIN angles are PITCH, minus 14; YAW, 105; they want to go REACQ and WIDE on the HIGH GAIN, and then step to NARROW in the normal way. And if you lose comm, go to OMNI Delta.

09 05 39 45 LMP Okay, Pete. We're - we'll start maneuvering at 30, and we'll go to 174, 133, 032. Angles on the HIGH GAIN, minus 14 and 105 and the normal acquisition.

09 05 40 02 CC Roger.

09 05 40 45 LMP Okay. Do you want us to wait until 30, or can we start maneuvering now?

09 05 41 01 CC Stand by a minute; we'll check it. Okay, 16; you can go ahead with the maneuver now.

09 05 41 22 LMP Okay.

09 05 43 47 CC 16, let's go OMNI Delta. We reacquired a HIGH GAIN when we went into a new attitude.

09 05 43 55 LMP Okay.

09 05 48 20 CDR Houston, we still got 1300 psi on the OPS.

09 05 48 27 CC Roger; we copy.

09 05 48 28 CDR That's being reported as per page - page X3-22.

09 05 48 36 CC Roger; copy.

09 05 48 39 CDR In the middle of the page.

09 05 55 39 LMP Houston, 16 on the HIGH GAIN.

09 05 55 41 CC Roger; loud and clear, Charlie. Or was that Charlie?

09 05 55 53 LMP Say again.

09 05 55 55 CC Roger. Wasn't sure I'd recognized your voice. You're loud and clear.

09 05 56 01 LMP It's me. Got a mouth full of chewing gum.

09 05 56 10 CC Roger.

09 05 57 13 CC 16, we've got a update to the G&C Checklist on the PIPA bias changes, and also we're gonna play a little game with the mixing valve to try to reset it for the transearth coast. We can do that whenever you're ready.

09 05 57 32 LMP Okay; do - we have something to copy for the PIPA bias?

09 05 57 36 CC That's affirmative. It's in the G&C Checklist, page 9-4.

09 05 57 44 LMP Okay; could you hold off on that? And we're sort of cluttered here now, and we - give me the mixing valve. Is that procedure down on below the couches or just up on the cockpit?

09 05 57 57 CC We can do this all from up in the cockpit. What we're gonna do - and I don't want you to do it now - but what we're gonna do is put it in AUTO, and EECOM will sit here and watch the flow-rate change, and when we a - get to a certain lead point on what we think is the desired flow rate, he'll cue me, and I'll cue you, and we'll go to MANUAL.

09 05 58 21 LMP Okay; we're ready at your - Give me a mark.

09 05 58 26 CC Okay; stand by. Okay; go to AUTO, 16.

09 05 58 39 LMP MARK. AUTO.

09 06 02 45 CC Okay; Charlie, the - the valve didn't act the way we thought it was going to. It's been oscillating down and back up on the flow rate, and we were gonna try to catch it in midcycle. And this time, when we went to AUTO, it just went up pretty high and it's oscillating a little, but it's staying high. We're gonna watch it for a couple or 3 more minutes, and if it doesn't work, we'll probably have to go down below the couch here and play with the manual valve.

09 06 03 12 LMP Okay. That'll be the trick of the week in our present configuration.

09 06 03 19 CC Well, we can wait awhile for that.

09 06 06 21 CC Okay, Charlie. Stand by, and I'll give you a hack when I want you to go MANUAL.

09 06 06 26 LMP Okay.

09 06 06 30 CC It had started down, but it's hung up again.

09 06 07 54 CC Charlie, it looks like it went back up again. We'll give you another little warning here if it starts back down.

09 06 08 02 LMP All right.

09 06 09 22 CC Okay; Charlie, let's try cycling that switch from AUTO to MANUAL and back to AUTO, and see if we can get the flow rate to come down.

09 06 09 33 LMP Okay; here we go. MANUAL. AUTO. Hey, Pete, there's a - -

09 06 09 45 CC Go to MANUAL, Charlie. Go to MANUAL now, Charlie.

09 06 09 47 LMP - - an awful lot of static on the up-link. Could you - -

09 06 09 48 CC Go to MANUAL now.

09 06 09 54 LMP Okay; we got MANUAL. And there's an awful lot of static on the up-link. Could you check - have network check it?

09 06 10 01 CC Roger; will do, Charlie.

09 06 10 07 LMP Sounds like a wind - wind blowing.

09 06 10 39 CC Charlie, on that noise that you're hearing, is - are John and Ken also hearing the same thing?

09 06 10 47 LMP Yeah, what it is, is John has his comm carrier off but connected, and it - in his PGA, one of the mikes was down in the neck ring, and the - the vent tube was blowing on it. It's okay. It's up here. Thank you.

09 06 11 02 CC Okay; we understand.

09 06 11 04 LMP It sounded exactly like radio - it sounded exactly like the radio static, though.

09 06 11 09 CC Okay.

09 06 11 45 LMP Pete, we've still got quite a bit of stowage left. If you could keep us advised on the Flight Plan, we'd appreciate it.

09 06 11 53 CC Okay. Will do.

(NO COMM FOR 22 MINUTES)

09 06 33 43 CC 16, if you read, go MANUAL and WIDE on the HIGH GAIN.

09 06 33 53 LMP Roger. We're with you, Pete. Looks like either our antenna's acting up, or the up-link's been dropped.

09 06 33 59 CC Roger.

09 06 34 05 LMP Do you want me to try REACQUISITION?

09 06 34 08 CC Let's try REACQ and WIDE. And you won't try to step to NARROW. We won't try to step to NARROW.

09 06 34 20 LMP Okay; the PITCH is osch - oscillating right now between about plus - minus 10 and minus 40.

09 06 34 32 CC Okay; let's stay where we are until it settles down, if it will.

09 06 34 42 LMP Okay; you're in REACQ and WIDE.

09 06 34 44 CC Roger. Is it oscillating now, Charlie?

09 06 34 58 LMP Not in REACQ. No, it settled out in minus - about minus 15.

09 06 35 07 CC Okay; let's go to NARROW.

09 06 35 12 LMP Okay.

09 06 35 23 LMP And it doesn't look like it took, Pete.

09 06 35 28 CC Say again?

09 06 36 03 LMP Okay; Pete, I went to MANUAL and tweaked up the PITCH a little bit, and then went to NARROW and REACQ, and it looks like we've got it now.

09 06 36 14 CC Okay; looks good to us too now, Charlie.

09 06 43 13 CC 16, we'd like to DEPLOY the GAMMA RAY to 4 feet, and that's 13 seconds from where you are now.

09 06 43 23 LMP Okay; in work.

09 06 43 48 LMP Okay; exactly 13 seconds.

09 06 43 51 CC Roger. Thank you.

09 06 44 33 CC And, 16, could you give us a battery manifold pressure read-out, please?

09 06 44 43 LMP You mean the battery compartment?

09 06 44 46 CC That's affirmative.

09 06 44 50 LMP Yeah, it's a - just a minute. It's about - I think it's crept up to about 2.2 now, Pete. Yeah, it's 2.2.

09 06 44 57 CC Okay. Thank you.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

09 07 17 51 LMP Houston, 16.

09 07 17 55 CC Go ahead, 16.

09 07 17 59 LMP Okay, Pete. I was just looking through the Flight Plan. We're a little off on the biomed. I'm still on the biomed; Ken and John are off now. They're - stowing suits.

09 07 18 11 CC Okay, Charlie. And while I've got you on the subject of biomed here, the doctor advises that they were unable to monitor you during the EVA this afternoon; and it looks like you may have to do some troubleshooting on the thing. And you were scheduled to be monitored tonight; however, that's not a hard and fast requirement. They could monitor the CMP tonight instead, and that'd give you a little more time to work with your harness.

09 07 18 40 LMP Okay. What are they seeing right now?

09 07 18 42 CC They're not seeing anything right now.

09 07 18 48 LMP Ah so. Well, I put some new sensors on this morning before we got suited. When I get my suit off, I'll check it.

09 07 18 59 CC Okay.

09 07 24 24 LMP Houston, 16.

09 07 24 28 CC Go ahead, 16.

09 07 24 31 LMP Okay, Pete. The biomed doesn't work very well unless you hook it up. When I put on the suit, I forgot to hook it.

09 07 24 38 CC Okay, we copy. Okay, Charlie. We'll stick with the nominal plan then. We'll monitor you tonight.

09 07 24 55 LMP Okay, that's fine. I'll be up in just a little bit.

09 07 24 58 CC Okay.

09 07 26 06 LMP Okay, Pete. We're back up again on the steerable.

09 07 26 09 CC Okay. And you're loud and clear.

09 07 26 14 LMP Okay. And for some reason here - we're sitting in REACQ and NARROW, and I can move the yaw - yaw - plot and - drive the antenna.

09 07 26 26 CC Okay, we copy.

09 07 27 02 CC Charlie, we're thinking about it. We'll get back to you in a minute.

09 07 27 07 LMP Okay.

09 07 28 16 CC Charlie, apparently the problem is that the position we're in now - we're right at one of the scan limits of the antenna; and when it comes up on that limit, it automatically switches to MANUAL. And so, intermittently, it would be in a situation where you could drive it.

09 07 28 33 LMP Ah so. I see. Thank you.

(NO COMM FOR 15 MINUTES)

09 07 43 09 CC 16, we've got a station handover here in about a minute. And because we are on the scan limit on the high gain, we may lose contact temporarily.

09 07 57 11 CC 16, Houston. I've got a VERB 49 maneuver for you, and we need a battery - -

09 07 57 17 CMP Understand. A VERB 49 maneuver.

09 07 57 20 CC Roger. Coming up at 45 minutes past the hour here - a couple of minutes away, and it's maneuver to 332, 280, 000. High-gain angles are PITCH, 10; YAW, 260.

09 07 57 52 CMP Okay, Pete. VERB 49 maneuver. Say the time you want to do it at.

09 07 57 58 CC Oh, about a minute from now.

09 07 58 02 CMP All right. A minute from now. 332, 280, 000?

09 07 58 08 CC That's affirmative. It's not real time-critical - -

09 07 58 12 CMP And plus 10 and 260.

09 07 58 15 CC That's affirmative. And that maneuver is not time-critical.

09 07 58 23 CMP And - and that's - It's not?

09 07 58 28 CC Negative. Just - You can go ahead and do it now, or you can wait a few minutes; whatever you want. And, 16, we'd like another read-out on the battery compartment, too.

09 07 58 50 CMP It's reading 2.2 - about 5. 2.25.

09 07 58 56 CC Roger; 2.25

09 07 59 50 CC OMNI Delta, 16.

09 08 01 43 CC Would you close the X-ray alpha cover - as soon as you can?

09 08 05 38 CC 16, you're getting up high on yaw angle. And - want to watch your middle gimbal angle, and you're in FREE right now.

09 08 05 54 CDR Ken is watching it.

09 08 05 57 CC Roger.

09 08 06 11 CDR In fact, he was just flying around it.

09 08 06 17 CC Roger.

09 08 08 23 CC OMNI Charlie, 16.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

09 08 17 56 CC 16, would you try to bring up the HIGH GAIN now on PITCH 10, YAW 260, and you can follow it up by getting the ALPHA PARTICLE/X-RAY DOOR, OPEN, and the GAMMA RAY, SHIELD OFF.

09 08 18 11 CDR Roger; understand HIGH GAIN, minus 10 and 260 on HIGH GAIN.

09 08 18 18 CC It's plus 10, 16.

09 08 18 20 CDR Follow that up by the GAMMA RAY - GAMMA RAY door - ALPHA/X-RAY DOOR to OPEN and the GAMMA RAY, SHIELD on.

09 08 18 28 CC GAMMA RAY, SHIELD OFF, and that's plus 10 on the HIGH GAIN.

09 08 18 33 CDR Plus 10 on the HIGH GAIN.

09 08 18 36 CC That's affirmative.

09 08 18 45 CDR Okay; the door's open and the SHIELD's OFF.

09 08 18 48 CC Roger.

09 08 22 10 CC 16, we need the HIGH GAIN, if you can bring it up.

09 08 22 40 CC Okay, 16. We're getting it now.

09 08 22 44 LMP How does that look to you, Houston?

09 08 22 47 CC That looks real good.

09 08 30 33 CC Okay, 16. We need to go extend - or DEPLOY on the GAMMA RAY for 26 seconds.

09 08 30 49 CDR Okay; that's in work.

09 08 30 53 CC Roger; and we do not want to retract it first; just extend it for 26 seconds from your present position.

09 08 31 03 CDR

Okay.

09 08 35 36 CC

And, 16, we've got some national and local news here for you while you're finishing up with your chores there. The - first of all, Ken Mattingly made the headlines today in connection with the EVA, and we got a big cartoon here showing the Apollo 16 Intercelestial Hauling Company coming back from the Moon with a big load of rocks. Looks like they've made a - a railroad car out of a SIM bay here and got a big pile of rocks on it there. Moon in the background, and all that sort of thing. Got a couple of things here, one from Vietnam. Communist tanks drove retreating South Vietnamese soldiers toward the provincial capital of Kontum in the Central Highlands today, forcing Government troops to abandon two more artillery bases in the town of Dac To. Seven bases in the Central Highlands have fallen to the Communists since Sunday. Ten waves of B52s bombed Communist troop positions during the night in an effort to stop the offensive that appeared aimed at Kontum. And from Northern Ireland, some guy found a new use for a baby carriage. He packed it with gelignite, which one of our backroom guys here tells me is a - an explosive, and bombed Northern Ireland's main telephone exchange during the night in a major attempt to disrupt the province's communications. The carriage exploded in a sheet of flames shortly before midnight Monday outside the Belfast Telephone Exchange, injuring two British soldiers and a civilian, and toppling part of the wall of the seven-story brown brick building. And the Astros amazed everybody, I guess, by winning a - their seventh straight today. Chicago's Ron Santo and Houston's Lee May bashed two-run homers for each side in the first inning, and then the two teams battled tenaciously without another score until John Edwards smashed an 11th inning home run that gave the Houston team a 3-to-2 victory. That makes it seven in a row for the Astros, and brought them a first-place tie with Los Angeles in the National League West, and gave them the best nine-game start, that's seven wins and two losses, in the team's 10-year history.

09 08 38 02 CDR Go get them, Astros.

09 08 38 06 CC Okay; got another little thing here in the local paper you might be interested in. Houston paper reports that the city is moving to annex a 50-square-mile area west of Houston, including the Federally-owned Addicks and Barker Reservoirs and the land between them and the present city limits. The annexation reportedly would open the way for the city to develop the reservoir areas for recreational purposes. And I guess that does not - the annexation would not include about 4 square miles of Barker Reservoir in Fort Bend County, which is outside the city's extraterritorial jurisdiction. And three U.S. Representatives have studied a feasibility study of deepwater ports in the Gulf of Mexico and have recommended the Texas Coast as a possible site. Texas Representatives Jack Brooks of Beaumont, Bob Eckhardt of Houston, and John Young of Corpus Christi appeared here Monday at a U.S. Corps of Engineer public hearing to voice their opinions on such a facility.

09 08 39 37 CC Okay; the weather here is real nice. Houston and vicinity was fair all day and tonight. Becoming partly cloudy Wednesday. Warm afternoons, cool again tonight the paper says. High today was in the upper-80s, low tonight in the upper-50s, and high Wednesday in the mid-80s. And dry, cool air prevailing over most of the U.S. And of more immediate interest, the weather in the recovery area is excellent and forecast to stay that way.

09 08 40 16 LMP That's the best news we've heard in a long time.

09 08 40 21 CC And we got one final item here I thought you might find interesting. The Memphis Better Business Bureau couldn't help the man who complained that a car dealer refused to refund his \$50 downpayment after he decided not to buy the car. Apparently he hadn't told the Better Business Bureau all the facts, because it turns out the dealer suggested he take the car for a test ride and he did, but he was gone 3 days and put 1500 miles on the car.

09 08 40 50 CDR (Laughter) Beautiful.

09 08 40 56 LMP And then he didn't want to buy it?

09 08 41 00 CC He didn't want to buy it, and he wanted his money back, his \$50 downpayment.

09 08 41 05 LMP (Laughter)

09 08 41 17 CC You can probably find a lot of flaws with that kind of test procedure.

09 08 41 22 LMP Yeah, sure could.

09 08 41 33 CDR How did the TV look down there with Ken outside? I was watching it on the monitor. It seemed like - in places it was too bright, and other places, not bright enough. And I guess that's the way the - I guess that's - unfortunately, that's the way the sunlight is up here.

09 08 41 50 CC Yeah, I guess we agree with that, but the pictures were overall real good, John. They looked - looked real good to us. You could see a lot of the detail, and I don't think we missed very much. There were some - some dark areas.

09 08 42 06 CDR Okay; fine.

09 08 42 09 CMP I'll tell you, the darkest area, Pete, is looking away from that Sun. Boy, is it black out there.

09 08 42 14 CC I bet.

09 08 42 17 CDR That's time number 47.

09 08 42 50 CDR I know you guys won't believe this, but after spending 3 days among the rocks, ever so often, when we're sitting around in here, we see a pebble go by. And that's the truth. I don't know what we're gonna do with them.

09 08 43 06 CC Just a pebble, huh?

09 08 43 07 CDR They just seem to - I guess they'll all get collected in ECS. Yeah. When we came back in our suits, it - it got in. I guess we pretty well tracked a lot of dirt into the LM unavoidably, and we weren't able to clean it up. So when we docked, we tried to keep it all in the lunar module, but it - this - the inflow valve over here was the only thing that was really working once we got powered down. And then when we went back in there and powered up everything, we took the command module hose over with us and that circulated the air. And I think we ended up with quite a few unexpected little pieces of Moon rock in the command module.

09 08 43 47 CC Roger, understand.

09 08 43 50 CDR And every time - and every time Charlie sees one float by, he picks it up and changes his story.

09 08 43 57 CC He's still analyzing them, huh?

09 08 44 01 CDR Yeah.

09 08 44 02 LMP I got it all straight now though, Pete.

09 08 44 04 CC Good.

09 08 44 10 LMP I will be unswayed by the facts when we get back.

09 08 44 15 CC Roger, understand. And would you give us GAMMA RAY, SHIELD on, now, please?

09 08 44 21 LMP Roger.

09 08 46 02 CMP I tell you, Pete, looking away from - on that EVA, looking away in it out into that blackness, you get the distinct impression that you don't want to let go.

09 08 46 14 CC Yeah, I - I can believe that.

09 08 46 24 CC Even on TV it looks pretty dark out there.

09 08 46 31 CDR I - I guess - we're sitting around talking about it here when we had a few slack moments, and one of the things we think is that no matter what you see on the pictures, or what you see on the TV, or what you'll see when we get back with these pictures, you just don't have a feeling of about how stark and brilliant these colors are. Like Descartes was the most dazzling place I believe I've ever been. It just absolutely - brilliant colors that contrast in that bright Sun, and the same way for this EVA that Ken and Charlie just finished. Why it - looking out that hatch it - the black that you can take with a camera is not gonna show up the way that that black actually was.

09 08 50 03 CC 16, we've got about three more small items. We've got an update to the G&C Checklist, one change to the Flight Plan at 251:45, and we need to get John's PRD reading.

09 08 50 26 CDR Okay; well, I just packed the thing away in the suit locker. If you want me to dig it out, I'll get it, but it's gonna be a job.

09 08 50 34 CC Stand by 1.

09 08 50 36 CDR I'm sorry about that, but that thing is just hard to get a hold of and keep a hold of.

09 08 51 00 CC Okay; John, I guess we'll try to get to it some-time tomorrow, maybe.

09 08 51 12 CDR Well, in other words, you tell me that you want me to go in there and dig that thing out, and I don't mind doing it if it's got to be done, but I mean - I can't see I'm getting anymore PRDs than the other two guys.

09 08 51 35 CC Stand by, John. We - we're having a little discussion here.

09 08 51 45 CMP He's been within a couple of counts of me, Pete, during the whole flight.

09 08 51 52 CC Roger. While we're waiting, you want to go ahead and get this change in the Flight Plan at 251:45?

09 08 52 02 CMP Yeah.

09 08 52 28 CMP Okay, Don. Go ahead.

09 08 52 30 CC Okay. At 251:45 where it says "GAMMA RAY, RETRACT and then DEPLOY," we want to strike out the part that says "RETRACT," and also we want to change the "45 seconds" to "12 seconds." What we're gonna do is just bring it back in from its present position. And we want to make that a "RETRACT" instead of a "DEPLOY."

09 08 52 53 CMP Okay; that's a RETRACT to 16 feet, and that's 12 seconds from the existing position.

09 08 52 57 CC That's affirmative. And also I've got this update on page G9-4, G&N [sic] Checklist.

09 08 53 12 CDR Okay; I'll have to - I'm gonna have to unstow that thing to see where we put it.

09 08 53 17 CC Okay.

09 08 53 33 CDR Hey, Don, have you got a pencil out there?

09 08 53 36 CC Affirmative.

09 08 53 39 CDR Okay; we've got a - a Flight Plan update that starts at 249 hours and 39 minutes. It's called "Crew Eat Period."

09 08 53 49 CC Roger.

09 08 53 53 CDR Just thought we ought to be able to make some real-time changes from up here too.

09 08 53 57 CC Roger. That sounds reasonable. I think we've done our share in the last couple of days.

09 08 54 03 CDR Yes, I'm sure you'll - you have earned the medals you will receive.

09 08 54 12 CC That sounds tragic.

09 08 54 14 CDR (Laughter) Okay. How about - I got G9-4 here.

09 08 54 23 CC Okay. We want to change in column A, line 5 should now read 03753, and line 7 should read - -

09 08 54 40 CDR Okay, that's 03753, line 5 in column A.

09 08 54 45 CC That's affirmative. And in column A, line 7, that one should now read 76605.

09 08 54 56 CDR 76605, for column - 7 in column A.

09 08 55 01 CC That's affirmative, and that completes that update.

09 08 55 06 CDR Okay.

09 08 55 11 CC And I believe that's everything we got for you.

09 08 55 15 CDR All righty.

09 08 55 53 CDR And in line with our 20-plus-hour clock sync, we had to go to day 10, meal B to catch up.

09 08 56 07 CC Say again, John.

09 08 56 10 CDR And it looks overwhelming.

09 08 56 17 CMP John says in order to catch up with the clock sync, you're making us eat day 10, meal B, and the task is overwhelming.

09 08 56 24 CC Roger; understand. Is that why you scheduled the extra eat period tonight?

09 08 56 36 CDR Just remember they come in pairs.

09 08 56 40 CC Roger.

09 08 56 41 CDR We missed the one that was supposed to start 3 hours ago, or whenever it was.

09 08 56 46 CC Roger. I understand.

09 08 57 29 CC 16, the decision has been made. We'll leave the suits stowed, and we won't worry about the PRD. And, also, we'd like to advise you that we're now back on the Flight Plan at 250 hours.

09 08 57 48 CDR Okay; we'll take it.

09 08 57 51 CC All righty.

09 08 57 57 CDR We sure appreciate you helping us. If you could have seen what we were looking at a couple hours ago, you wouldn't believe it. We couldn't - we had so much stuff piled up in here that none of the three of us could see each other, and that's the truth.

09 08 58 10 CC Roger.

09 08 58 12 CMP Which the way we look right now, isn't really such a bad deal.

09 08 58 16 LMP (Laughter) Roger.

09 08 58 20 LMP John was reading the checklist, and Ken was down there - we couldn't even see him, and all of us - Every once in a while, a hand would come through this mass of Beta cloth and mapping camera cassettes and things, and reach out and grab something.

09 08 58 35 CC It's amazing to me you found a place to put it all.

09 08 58 41 CDR Well, Ken's super well organized on that EVA, boy, I'll tell you. We just got - he's got everything all put away, and we're just about ready for entry.

09 08 58 50 CMP Well, not quite. We haven't found a place to put all of it, to be honest with you. But we're looking.

09 08 58 57 CC Roger.

09 09 00 05 CDR After 8 days, we finally got organized on this eating. Ken cuts it open, I fill it with water, and Charlie eats it.

09 09 00 14 CC Roger.

09 09 04 34 LMP Hey, Houston, 16. The LMP is on biomed now.

09 09 04 38 CC Understand, LMP is on biomed.

09 09 04 52 CC And, 16, right now we're not getting a readable signal, but we're gonna run some checks here first.

09 09 05 01 LMP Okay.

09 09 07 37 CC Okay. Charlie, apparently your biomed is still not functioning properly, and the surgeon would like to go to the CMP to monitor for tonight.

09 09 07 50 LMP Okay.

09 09 07 57 CC And, 16, could you give us another reading on the battery compartment?

09 09 08 09 CDR 2.3, Houston.

09 09 08 11 CC Roger; 2.3.

09 09 08 21 CDR Hey, Don, does that mean if I break mine tonight that I don't have to put it on again?

09 09 08 26 CC I'm not sure we'd concur with that.

(NO COMM FOR 19 MINUTES)

09 09 27 45 LMP Houston, 16.

09 09 27 48 CC Go ahead, 16.

09 09 27 54 LMP Roger. Pete - Pete, we're wondering if you could get FAO working and - on the Mars attitude sequence and see if he could come up with one that - during our normal Flight Plan where we got some Sun in the windows, so we could get some interior photography?

09 09 28 13 CC Stand by. We'll take a look at it. Okay; FAO says he thinks he can - -

09 09 28 20 LMP I'd appreciate it.

09 09 28 22 CC FAO says he thinks he can work that in, and also we need to remind you, I guess, that we need a P52 before you go to bed tonight.

09 09 28 31 LMP Roger. Just as - soon as John gets out of the kitchen, Ken's gonna give you one.

09 09 28 37 CC Roger. Understand.

09 09 34 35 CDR We're just looking at the Flight Plan here, and we just finished day 10, meal B, and 10 minutes from now, we got to start on day 10, meal C.

09 09 34 43 CC Roger; copy.

09 09 34 53 LMP That was John.

09 09 34 56 CC Roger. They said that sounds like some of the flight planning that's been going on down here.

09 09 35 18 LMP If Alex - Pete, if Alexander the Great had had this kind of chow, he could feed his whole army for 2 days on what we eat in one meal.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

09 09 54 02 CC 16, we've got the torquing angles. You can go ahead and torque them.

09 09 54 08 CMP Okay.

09 10 06 55 LMP Hey, Pete. Will Tony be on before we go to sleep? He said he had some geology questions for us.

09 10 07 06 CC Doesn't look like it now. He's scheduled to be here in a couple of hours. Or maybe he might come in a little sooner than that.

09 10 07 14 LMP Thank you.

09 10 17 14 CC And, 16; Houston. I've got about five items for you here that'll wind it up for the night, I think. First of all, I'll start out talking about this battery compartment. We've looked at it now, over quite a period of time, and we feel that the pressure rise is due to a very tight cabin battery compartment that prevents any leakage from the compartment to the cabin. And also to the increased battery venting. Now, the - the increased battery venting resulted from recharging the batteries longer than normal. And that in turn resulted from the high discharges during LOI and DOI burns. We really don't feel there's anything wrong with the batteries. In fact, right now, we're looking at a requirement from now until the end of the mission of about 30 amp-hours. And we've got about 100 amp-hours in the batteries right now. We'll continue to check the battery compartment pressure, but we really don't expect to have to vent the compartment or to perform any additional battery charging prior to entry. We'd like to get one more read-out prior to your going to sleep. We'll periodically check tomorrow, but in summary, we feel that there's really not a problem. And the odor that you mentioned is - is probably not from the battery compartment, but is more characteristic of the battery charger.

09 10 18 42 CDR Okay, Pete. Thank you very much. It makes me feel better to - I was just a little gitchy about recharging, especially bat B, since - that's where we first experienced that odor. We had not done that previously, and that makes that sound like a pretty good story. And we haven't been monitoring that compartment on the systems test meter very much, so we really can't give you a history of it. But that sounds pretty good to - to me. Thank you. What else?

09 10 19 17 CC Okay. We do want to monitor the CMP on the biomed, and I guess we're still showing that you're on the - on the - on the biomed monitoring system right now. Also, your equipment - -

09 10 19 32 CDR That's right.

09 10 19 39 CC Also, Charlie, your e - -

09 10 19 41 LMP Go ahead.

09 10 19 42 CC - - your equipment is apparently still not functioning properly. So we'll need new - a new biomed harness on you, probably for tomorrow night. We need to get that on sometime tomorrow.

09 10 19 56 LMP Okay, fine. I'll be glad to do that. What - what appears to be wrong with the signal?

09 10 20 02 CC Stand by 1.

09 10 20 15 CC They - they think it's the sensors are probably loose again with maybe some drying of the electrolyte under the sensors, but rather than try to troubleshoot that, they figure it's better just to go to a new harness.

09 10 20 29 LMP Okay, will do. I just put these on this morning, new, but we'll - we'll - we'll swap out in the morning.

09 10 20 43 CMP Hey, Don, what film magazines do we have allocated for our little - little - F-equals-MA experiment?

09 10 20 55 CC Hang on just a minute. I'll get it for you. Let me give you one more item here while I'm - then I'll get that for you. All right. We'd like to - Right after we go into PTC and get onto the omnis, we'd like to put the TELCOM GROUP 2 to AC2. The reason for doing that is we just want to return the spacecraft to a nominal configuration because that's the way all our doc - documents and onboard checklists and so on are written.

09 10 21 28 LMP All right, we'll do that. When we spin up - go on the omnis - we'll go to GROUP 2 to AC2.

09 10 21 34 CC Roger; thank you. And also, we'd like to get an OPS read-out sometime prior to your going to sleep tonight.

09 10 21 48 LMP Okay. We gave you one earlier, and it's stowed in A-8 now. And it was 1300 at that time. You want another one?

09 10 21 59 CC Roger. I guess we'd like to get one more, Charlie.

09 10 22 03 CDR That was plenty of time after it had - it was probably at least an hour and a half after it'd had a chance to - to equalize after the blowdown.

09 10 22 14 CC Roger. Okay, 16; if it's not readily accessible, that's okay. It's not that big a deal.

09 10 22 40 LMP Is that all?

09 10 22 47 CC That's affirmative, 16. I believe that covers everything.

09 10 22 52 LMP You know, Pete, on that battery, I took a peek at it every once and awhile during the EVA, and it didn't vent at all into the cabin.

09 10 23 03 CC Roger.

09 10 23 07 LMP My only other question is, why does the - when you vent it to 1, why does it climb so rapidly back up to about 16 or so?

- 09 10 23 22 CC Stand by a minute, Charlie. We're thinking about that.
- 09 10 23 34 CC Oh, on the questions on the trying to get some Sun in the windows tomorrow, you'll be in PTC a great deal of the time; and during the - a lot of those PTCs, you will have enough sunlight in the window for interior photography.
- 09 10 23 49 LMP Okay, thank you.
- 09 10 23 51 CMP Yeah. I just was wondering if one of the other periods might also place the Sun in our window. Because - when you do it PTC, although it comes by very often and you want to photograph a continuous sequence, it kind of chops it up pretty quickly. It takes an awful lot of planning to hit the lighting at the same time you want to do something.
- 09 10 24 13 CC Roger.
- 09 10 24 17 CMP But it doesn't justify another attitude or anything like that. This is just so we can get some better pictures inside.
- 09 10 24 23 CC Okay; I'll see what I can do on that, Ken.
- 09 10 26 57 CC Okay, Ken. We've got magazine LL that's unscheduled and has CIN film.
- 09 10 27 05 CMP Okay, thank you very much.
- 09 10 30 51 CC 16, on the sunlight coming in the window in a fixed attitude tomorrow, the - the situation doesn't really look real good. About the best one, I guess, is at one point we'll have the Sun about 40 degrees from the normal to the hatch window and about 20 degrees - that's 40 degrees off in pitch and about 20 degrees off in yaw. So - and that's about the closest we have to having sunlight coming right down normal to any of the windows.
- 09 10 31 59 CC Ken, I think I said that was 40 degrees in pitch and 20 degrees in yaw, and it's actually 40 degrees in pitch and 20 degrees off in roll on that Sun angle.

09 10 32 14 CMP Hey, Don, I just plugged back in. Would you say again, please?

09 10 32 17 CC Okay, on this business of getting sunlight in the spacecraft windows, about the best we're gonna be able to do is one attitude gives you sunlight which is - if you take the normal to the hatch window, the Sun is about 40 degrees off of that in pitch and about 20 degrees off in roll. And that's about the closest we're going to have to having sunlight coming directly in a window. Oh, and, Ken - -

09 10 32 41 CMP Okay. Well, we'll do with what we have, then.

09 10 32 43 CC Okay; I've just been advised that that's not the hatch window, it's window 5. And that attitude occurs about 269:30 in the Flight Plan.

09 10 32 54 CMP Okay; well, we'll - we'll just get all the lights as bright as we can get them, and use the standard interior procedures.

09 10 33 02 CC Roger. That sounds like probably a better way to go.

09 10 33 09 CMP I was just thinking if we had more illumination like that, that we could save ourselves a little time. Be a better pic -

09 10 33 35 CMP That's a pretty nice, slow ride, Don.

09 10 33 59 CC Roger.

09 10 34 24 CC Okay, Charlie, are you on the loop?

09 10 34 31 LMP Roger; go ahead.

09 10 34 32 CC Okay, on this battery compartment problem. The reason for it coming back up so rapidly right after you vented is that there is pressure built up in the batteries. And when you vent the compartment, the - the batteries simply then are venting to a very low pressure or see a very low pressure. And they tend to - to vent very rapidly for a while until you get the pressure built back up, and then they vent at a much slower rate.

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09 10 34 59 LMP Okay. Fine. That makes sense. Thank you very much.

09 10 35 04 CC Roger.

09 10 43 22 LMP Houston, 16. We're going through the pre - pre-sleep check - checklist. If you're ready, we'll send you an E-MOD.

09 10 43 30 CC Stand by 1. Okay, go ahead.

09 10 45 22 LMP And, Pete, y'all satisfied with our cyro configuration for tonight?

09 10 45 30 CC That's affirmative.

09 10 52 19 CMP Don, do you want us to use standard high gain procedures tonight?

09 10 52 25 CC That's affirmative, 16.

09 10 52 30 CMP Okay; thank you, sir.

09 10 57 31 CC Okay, Ken. The rates look good for a spinup.

09 10 57 48 LMP Okay.

09 10 57 51 CC And, Charlie, we'd like one more reading on the battery compartment.

09 10 58 11 LMP It's almost about 2.4, Pete, about 2.35, I'd say now.

09 10 58 18 CC Okay; 2.35.

09 10 58 21 LMP Yeah. It seems to have just about stabilized. I should say stabilized. At least the rate of increase is very slow, now.

09 10 58 32 CC Roger.

09 11 08 41 LMP Hey, Pete. Do y'all want a E-memory dump?

09 11 08 46 CC Stand by a minute.

09 11 08 52 LMP Did you say affirmative, Pete?

09 11 08 54 CC Stand by just a minute, Charlie.

09 11 08 58 LMP Okay, and I'm going to AC2 on TELCOMM GROUP - AC2.

09 11 09 02 CC We're ready for the memory dump, Charlie.

09 11 09 22 CC Charlie, we - we would like to get the memory dump, and we'd like to keep the high gain until we get that.

09 11 09 32 LMP Okay. Maybe I'm not up to speed. Do we lose the high gain if I put GROUP 2 to AC2?

09 11 09 41 CC That's affirmative. That's - that's why I wanted to wait until we're on the omni to make that switch.

09 11 09 50 LMP I understand.

09 11 14 51 CC 16, we're starting to see some very low SIM bay temperatures. We'd like to go ahead and get into PTC.

09 11 15 01 LMP Okay.

09 11 15 02 CC And the rates are excellent right now.

09 11 15 08 LMP And you see some low what, Pete?

09 11 15 11 CC Say again, Charlie.

09 11 15 15 LMP You said you were beginning to see some very low something.

09 11 15 25 CC Can't read you, Charlie.

09 11 15 31 LMP Okay, we're spinning up right now.

09 11 15 34 CC Okay.

09 11 20 30 LMP Okay, Pete, we're putting TELCOM GROUP 2 to AC2.

09 11 20 34 CC Roger.

09 11 23 17 LMP Houston, 16.

09 11 23 20 CC Go ahead.

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09 11 23 22 LMP Pete, are y'all satisfied with our antenna setup?
09 11 23 35 CC Put TRACK MODE to REACQ and NARROW BEAM.
09 11 23 45 LMP Okay; you've got REACQ, NARROW BEAM, and HIGH
GAIN selected.
09 11 23 51 CC Okay. That's fine, Charlie. Thank you.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

09 11 46 07 CC 16, Houston. I've got about three or four more little small items for you here. First of all, we'd like you to verify that you're going to use the OPS to bump the cabin up to 57.

09 11 46 23 CMP Okay, Don. We will.

09 11 46 25 CC Okay. And, Ken, you look good on the - on the biomed data. It's all checking out okay. And there's a couple items on the GAMMA RAY. We want to RETRACT for 12 seconds and GAINSTEP up 4 steps.

09 11 46 44 CMP Okay. RETRACT for 12, and GAINSTEP up 4. Is that right?

09 11 46 48 CC That's affirmative. And let us know before you turn the voice subcarrier down.

09 11 47 00 CMP Okay.

09 11 55 16 CC And, 16, could we get you to tweak the evap out temperature to about 45 degrees? Looks like it's about 38 right now, and that's going to be a little cold after you get into PTC.

09 12 00 23 CC Okay. 16, your evap out temp looks good now.

09 12 00 31 CMP Okay, Don. I was just going to let it - see how it does - I just moved it to about the middle amount I could. And the OPS is now reading 800 psi.

09 12 00 43 CC Understand. 800 psi on the OPS. Thank you.

09 12 00 47 CMP That's affirmative. And what else do you have before we call it a day?

09 12 00 55 CC Stand by 1, but I believe that's got everything.

09 12 01 35 CC Okay, Ken, I guess that's it. You guys get a good sleep.

09 12 01 45 CMP 66-2/3 percent RDR [?]. Who else is on down there with you tonight? Who is your flight director?

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09 12 02 14 CC Say again, Ken?

09 12 02 18 CMP I say who's - who's on with you tonight? Who's the flight director?

09 12 02 23 CC Don Puddy is on right now. We're getting ready to leave, and Jerry Griffin's going on.

09 12 02 29 CMP Ah so. Okay. Well, I'm glad you guys are getting off at a reasonable hour for a change. Although I just looked at my watch, and I guess it's about 3:29 (laughter). Sorry about that.

09 12 02 41 CC It's pretty reasonable by comparison.

09 12 02 43 CMP Appreciate all your looking out for us today.

09 12 02 46 CC Roger.

09 12 02 47 CMP Okay. You're sure a big help in taking care of all the things we did today while we were trying to get things restowed up here. We still - You can see daylight now anyhow. So I'll see you folks tomorrow.

09 12 03 00 CC All righty now. See you in the morning.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD - NO COMMUNICATIONS

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

09 19 37 16 CC Good morning, Apollo 16; Houston.

09 19 37 38 CDR Morning, Tony.

09 19 37 40 CC Good morning up there. Say, I think we may have driven your high gain into the stops. Could you check on 225 the HIGH GAIN FLIGHT BUS and GROUP 2? If one's out, push it in.

09 19 38 32 CDR They're in, Tony, and can't move it.

09 19 38 41 CC Which ones were out?

09 19 38 46 CDR They're in!

09 19 39 38 CC Okay, John, on that HIGH GAIN, could we put it to PITCH at minus 40, to YAW at 90, REACQ, and NARROW?

09 19 40 04 CDR Okay, that's where we are right now.

09 19 40 08 CC Okay, and we understand that no circuit breaker was popped.

09 19 40 15 CDR That's correct. There was no circuit breaker popped.

09 19 40 21 CC Okay, thank you.

09 19 40 34 CC And, after you finish your postsleep up there, before you stop PTC, we'd like to update your checklist or Flight Plan. We've got a couple of changes on the - the PTC initiation, there.

09 19 40 56 CDR Changes on initiation before we stop, huh? Okay. Okay, don't blow our record, now.

09 19 41 05 CC Okay.

09 19 41 17 CDR You're talking about the super gal, huh? I'm ready to copy, Tony.

09 19 41 23 CC Okay. Okay, for the PTC initiations at 260 plus 44 and 264:01, we'd like to change the PTC procedures and the G&C checklist to keep the PTC coning within plus or minus 3 degrees in pitch and yaw. Okay, if we could go to the G&C 8-2.

09 19 41 57 CDR Okay, why don't you just tell me first what the general scheme is, how you're going to do that, while we're getting the book out.

09 19 42 03 CC Okay, fine. We'll use you B/D roll, but we'll keep the pitch and yaw jets - D3, D4, C3, and C4 jets - on. And we're gonna leave the roll jets on, too.

09 19 42 32 CDR In other words, you want this thing to - to remain in attitude control throughout the PTC?

09 19 42 38 CC That's right.

09 19 42 44 CMP Oh, delete the P from PTC.

09 19 42 49 CC You're right (laughter). I guess we'd call it ATC now.

09 19 43 01 CMP There you go. How about AGS? You got to figure out what that stands for, but it's better.

09 19 43 17 CMP You're a scientist; that shouldn't be hard, Tony.

09 19 43 29 CC Active galaxy st - scan?

09 19 43 31 CMP Do you want us to try - that's very close. You get a 95.

09 19 43 38 CC (Laughter) I want to quit your course.

09 19 43 45 CMP (Laughter) Oh, It's right down there, John. How you doing on the HIGH GAIN? I don't know if you shifted to it or not; looks like we're where you could pick up, now.

09 19 43 59 CC We're gonna try it down here. If we lose comm, why, we'd like you to go ahead and try to acquire it yourself.

09 19 44 07 CMP Oh, okay.

09 19 44 21 CC And let me know when you're ready with the G&C.

09 19 44 31 CMP I'm ready. No. No.

09 19 45 12 CC Ken, Houston.

09 19 45 16 CMP Go ahead.

09 19 45 21 CC Did you acquire or did we do that?

09 19 45 26 CMP You did that.

09 19 45 27 CC Oh, good show. Okay, in the G&C Checklist, perform steps 1 through 4. After the rates are damped in step 5 under the "Auto RCS select," use B/D roll and D3, D4, C3, C4 jets. And you might just sort of write this in at the side - not cross anything out because later on you'll go back to the normal procedure.

09 19 46 03 CMP Roger; I understand.

09 19 46 04 CC Okay, in step 6, use a minus 0.30 degrees a second, and 3.0 degrees in NOUN 79.

09 19 46 20 CMP Okay.

09 19 46 21 CC And delete the last two steps.

09 19 46 23 CMP As long as we're remaining active, why - as long as we're remaining active, why are we trying to damp the rates, Tony?

09 19 46 49 CC Okay, I guess they're not going to let you - they're not going to ask you to damp it down too long. They're just going to get it down to a reasonable rate and then start it up.

09 19 47 00 CC Okay, and delete step 7.

09 19 47 01 CMP Okay. Roger. I understand.

09 19 47 10 CC Okay, and a note here for the PTC attitude at 275 plus 50, use the normal PTC procedures. Okay, now we can go to the updating on the Flight Plan.

09 19 47 28 CMP Okay, what you're really saying is that except for this - these two special things, we're just gonna do what we always do, right?

09 19 47 36 CC That's affirmative. I just say it the long way.

09 19 47 42 CDR All righty.

09 19 47 44 CC Okay, from 262 plus 00 to 262:20, we're gonna schedule in some geology debriefing for EVA-3 for John and Charlie.

09 19 48 38 CMP Okay; Tony, I got that - it's written down.

09 19 48 40 CC Okay, fine. At 264:30, change "Purge O₂ fuel cell 1" to "O₂ fuel cell purge." And then right under that, cancel out all that mass spec exercise between 264:35 and 264:45. Essentially, all you've done is take all that out and you've done an O₂ fuel cell purge and then ended up with an H₂ fuel cell purge.

09 19 49 23 CMP Okay.

09 19 49 24 CC Okay at 267:00 -

09 19 49 30 CMP Go ahead.

09 19 49 31 CC Change our - the HIGH GAIN PITCH and YAW to PITCH, 9; YAW, 257.

09 19 49 42 CMP Okay.

09 19 49 43 CC From 268:10 to 268:40 - You're gonna love this. Schedule a TV press conference.

09 19 50 04 CMP You knew we had it stowed, didn't you?

09 19 50 09 CC Well, we just waited - -

09 19 50 11 CMP You knew we took 2 hours to do that yesterday.

09 19 50 12 CC - - until you had tucked it away.

09 19 50 14 CMP Okay. Okay.

09 19 50 18 CC Okay, at 268:30, delete "Charge bat A."

09 19 50 34 CMP That's done.

09 19 50 35 CC Okay.

09 19 50 36 CMP Go ahead.

09 19 50 37 CC At 269:23, delete "ALPHA PARTICLE/X-RAY COVER, CLOSE; X-RAY, STANDBY; and VERB 49 maneuver to thermal attitude." Delete that whole block.

09 19 50 50 CMP Okay.

09 19 50 53 CC Okay, delete all activities between 269:55 and 270:10 - mass spec, RCS jet test.

09 19 51 30 CMP Go ahead, Tony.

09 19 51 31 CC Okay, at 270:50, change your VERB 49 attitude to 090, 180, 010.

09 19 51 48 CMP Okay, 090, 180, 010, at 270:50.

09 19 51 52 CC Okay, and your HIGH GAIN attitudes there are PITCH, minus 75; YAW, 40.

09 19 52 01 CMP Minus 75 and 40.

09 19 52 05 CC And note that your ALPHA PARTICLE and X-RAY COVER are OPEN and X-RAY is ON throughout the Skyli - Skylab contamination photos, so you just don't worry about that.

09 19 52 18 CMP Okay.

09 19 52 19 CC At 271:15, change your VERB 49 attitudes - 032, 299, 010.

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09 19 52 36 CMP Okay.

09 19 52 37 CC And your HIGH GAIN: PITCH, minus 40; YAW, 229.

09 19 52 45 CMP Okay, minus 40 and 229. And an attitude of 032, 299, and 010.

09 19 52 51 CC Okay, at 271:50, change the roll in the VERB 49 attitude to 140. And the HIGH GAIN is - -

09 19 53 06 CMP From 141 to 140?

09 19 53 08 CC - - PITCH, minus - Right. And the HIGH GAIN's PITCH, minus 47, to YAW - and YAW, 59.

09 19 53 18 CMP Minus 47 and 59.

09 19 53 20 CC Roger. At 272:10 -

09 19 53 27 CMP Okay.

09 19 53 28 CC VERB 49 attitude, 088, 082, 041, and the HIGH GAIN: PITCH, minus 49; and YAW, 220.

09 19 53 48 CMP Okay, that's 088, 082 and, 041, and a minus 49 and 220 on the gain.

09 19 54 02 CC Roger. At 273, delete "X-RAY, ON."

09 19 54 09 CMP Okay.

09 19 54 11 CC At 273:30, delete "ALPHA PARTICLE/X-RAY COVER, OPEN."

09 19 54 18 CMP Okay.

09 19 54 19 CC At 274:15, on your VERB 49 attitude -

09 19 54 25 CMP All right.

09 19 54 26 CC New attitude is 164, 134, 035; HIGH GAIN is minus 23 and 101.

09 19 54 42 CMP Okay; 164, 134, 035; minus 23 and 101 at 273.

09 19 54 50 CC Okay. And that's all I've got.

09 19 54 56 CMP Okay.

09 19 55 00 CDR Oh, shoot, Tony, you can do better than that. Haven't you got any more?

09 19 55 04 CC Well, we're - we're - I'm sure FAO will have some here in a few minutes, but that's guaranteed all until you get back.

09 19 55 12 CDR Oh, okay. Well, good. I don't want to see FAO stopping this quick.

09 19 55 28 CC And I guess we don't know why that high gain hung up while you were asleep. We're going to just continue trying normal procedures.

09 19 55 39 CMP Okay.

09 20 02 08 CMP Hey, Tony, I'd like to do a - a VERB 46 and I think that was one of the ones that they had on my list of things that I shouldn't do.

09 20 02 17 CC Okay. I'll check on that.

09 20 02 19 CMP Could you - could you see what conditions I need to satisfy in order to do that?

09 20 02 24 CC Okay.

09 20 02 26 CMP Like - I'm not sure whether I've got a switch out of position or what here, but it - it looks like the DAP isn't - isn't running. And I don't really understand why.

09 20 02 40 CC We'll work that.

09 20 02 44 CMP Hey, I may have something out of configuration. I just don't see it right offhand.

09 20 03 04 CMP I did find the switch.

09 20 04 00 CMP How about our cycling the cryo fans while we can - take them back off.

09 20 04 09 CMP Remembered it. Huh?

09 20 04 16 LMP Did John forget to turn off the cryos?

09 20 04 23 CC Yes, you can cycle the cryo fans and our G&N says everything's all right here.

09 20 04 32 CMP Okay. They're cycled. Yeah, we - I had the FDAI SELECT in 1; I was getting ready to do a GDC align when you - when you're - asked for these other things and I left it there and the needles weren't centering, so I was - I overlooked that one. Thank you.

09 20 11 25 CC And, Ken, you're GO to start PTC any time you're ready. You're damped well enough.

09 20 11 44 CMP Okay.

09 20 15 03 CDR Okay, and the ATC is operating.

09 20 15 07 CC Okay.

09 20 22 48 CMP Okay, Houston. Standing by with the crew status report.

09 20 22 55 CC Okay. Go.

09 20 23 06 CMP Okay.

09 20 23 09 CDR For the commander, working on day 11 to keep it in sync with the - with the clock around here. A-1 is down in the bow of the ship, stowed; A-3 is 7 hours; A-4 is none. For the CMP: B-1, 15067; B-3, 6-1/2; B-4, none. For the LMP: C-1, 21159; C-3 is 6-1/2; C-4 is none.

09 20 24 29 CC Okay, we copy that.

09 20 24 33 CDR And all those sleeps were good to better.

09 20 24 38 CC Good to better, huh? Okay.

09 20 25 03 CDR Okay, and we're using - Yesterday we were using the day 10 meals to try to help clean out the B-2, so we can stow the mapping camera film in there, and on that day for breakfast, the - on the - on the CDR's, scratch the fruit cock - fruit cocktail.

09 20 25 38 CC Okay.

09 20 25 41 CDR For dinner, scratch - for - for lunch, scratch the turkey and gravy and sub - substitute beef and gravy and add an orange drink, and then you can either scratch - We never got around to eating supper because we missed lunch and we substituted - we substituted sup - supper, or I mean lunch, for supper.

09 20 26 11 CC Okay, copy that.

09 20 26 23 CDR And on the CMP for breakfast, scratch the fruit cocktail, the sausage patties, and the spiced fruit cereal.

09 20 26 38 CC Okay.

09 20 26 41 CDR For lunch, scratch the vanilla pudding in a can; the white bread, 1; and the peanut butter parentheses WP; and add a chocolate bar and coffee.

09 20 26 58 CC Okay.

09 20 27 10 CDR For the LMP, for breakfast, don't scratch anything. For lunch, or supper, your choice, scratch the - turkey and gravy and add beef and gravy and scratch the vanilla pudding in a can; the white bread, 1; and the peanut butter. Okay?

09 20 27 38 CC Okay. We copy that. Ken didn't eat his peanut butter, huh?

09 20 27 46 CDR We couldn't find it after we cleaned out - after we cleaned out that locker to stow the mapping camera cassette, the peanut butter mysteriously vanished.

09 20 27 55 CC Oh, I understand. Charlie stole it.

09 20 27 50 CDR We're looking for the guy - we're looking for the guy with the key to the peanut butter locker right now.

09 20 28 11 CC You know, of course, you're going to have to eat up all that food on the day you lost.

09 20 28 20 CDR How about if we do that aboard the ship?

09 20 31 51 CC And, Apollo 16, the GAMMA RAY SHIELD, ON, per the Flight Plan.

09 20 32 21 CDR Okay, she's ON.

09 20 32 23 CC Okay.

09 20 34 40 CC Apollo 16, Houston. If one of you have a chance, would you read out the battery compartment pressure reading?

09 20 34 51 CDR 2.5 and holding.

09 20 34 54 CC Okay.

09 20 35 02 CDR Okay. Ken says he looked at it several times during the evening and it's been there most of the night.

09 20 35 09 CC Okay, fine.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

09 21 11 41 CC Apollo 16, Houston.

09 21 11 47 CDR Go ahead.

09 21 11 49 CC Okay. I tried to get Hank to send this up, but he wouldn't touch it either. I guess we'd like John on the biomed today and Charlie on it tonight. And just a reminder, for today we'd like items 5 and 6 in the crew status recorded.

09 21 12 10 CDR Yeah, we - We're working both of those problems in.

09 21 12 23 CC Okay, and we'd like to scrub the P52 at 262:30.

09 21 12 40 LMP That was the only thing he had that he's looking forward to all day, and you scrubbed it.

09 21 12 45 CMP You know how to hurt a guy, don't you?

09 21 12 51 CC We're just trying to give you some time to hunt for the peanut butter.

09 21 16 48 CC Apollo 16, Houston. Whenever you're ready for the geology, we'll press on with that.

09 21 16 59 CDR Yeah, we're ready.

09 21 17 01 CC Okay. Our first question here on the portable magnetometer - I forgot to re - I forgot to ask you. It was my omission. I was wondering what the temp label on the - on the electronics box read, if you remember.

09 21 17 21 CDR Tony, you got to be kidding.

09 21 17 24 CC I was afraid of that. Okay. And for Charlie there, we'd like to verify that on the third EVA when he was driving out to station 11 with the polarizer on, that he used nominal camera settings. He didn't allow for the polarizer.

09 21 17 51 LMP I did just what was on the top of the camera, Tony. Filter - I used 5.6 at 1/25 in the right position.

09 21 18 01 CC

Okay. That's fine - that's great - That's what we needed to know. Okay. The next question we'll - we'll get when we get the rocks back, but I think - Well, maybe the best way to do this is to describe a theory that's coming up as a result of the rocks you've - that you saw there. It looks as if - or - A possibility is that an older theory that was discarded a few years ago may be the right one, that the Cayley is an outer fluidized ejecta from Imbrium. Fra Mauro would be an inner ring, and then Imbrium sculpture would be outside of that, and then the Cayley would be sort of slosh that filled up all the valleys farther on out. But some of the questions that the geologists are - are pressing here is something that might help them define that. And a lot of it is that they're just - can't wait for the rocks to get back. But anyway, at station 11, you described some rocks you thought to be tuff. Looking back at station 5 and 6, after seeing these at 11, do you think you might have seen the same kind of rock there? What we're thinking about is where you described the - the square crystals and the needlelike crystals in clasts. And also, in the same question, were these crystals by themselves or were these - I mean, were the cras - clasts single crystals or were the crystals in clasts?

09 21 19 38 LMP

Recalling station 11, the - the rocks - that big rock in particular was a two-rock breccia, and - I feel. And within the - within the bluish-black matrix, which made up one clast - one of the rock types - there were needlelike crystals in that. And the white matrix also had crystals in it.

09 21 20 19 CC

Okay. And how - how does - how did those rocks compare to what you saw at station 5 - 5 and 6?

09 21 20 40 CDR

Tony, I'm afraid I'm not gonna do any better with the answer to these questions than I do on an average field geology trip where you got 10 stations.

09 21 20 49 CC

Understand.

09 21 20 50 CDR

And the rocks - You know, the rocks that we're picking up at 5 and 6 - that was a long time before station 11 and -

09 21 21 00 CC Understand. Don't - don't worry about it - -

09 21 21 01 CDR And I can't remember what the dang rocks looked like, to be honest with you.

09 21 21 04 CC We're gonna have an antenna switch.

09 21 21 34 CC Okay. I'll try to stick here to questions that were impressions, and we're going to get the rocks back anyway. I don't - I don't really think there's any point in pressing - pressing with questions where we'll get the answers in a few days. Out-bound on EVA-3, you noted 1- to 5-meter craters. And then, 10-meters craters going north and you called them secondaries. We're wondering what evidence there was that - if any, that they came from North Ray. Do you think you saw any secondaries from North Ray? And if so, where would they be? And could you compare them to the size and character of the South Ray secondaries?

09 21 22 21 LMP There was out - out around Palmetto. There were a couple of craters, if I recall - I don't know exactly whether it was Palmetto or not, but as you're going out that way, there were some craters with some blocks in them. And that's the reason I called it secondary. They - they were not as fresh - in fact, craters going toward North Ray were a lot more subdued than the craters going down to Stone Mountain. The North Ray had - something had - either they're older or something, but they were a lot more subdued and there was less blocks around. But we did have one or two that had some blocks in them, and that's why I called them secondaries.

09 21 23 13 CC Okay. Were the blocks as angular as the ones you described from South Ray?

09 21 23 23 LMP In general, our impressions were no.

09 21 23 26 CC Okay. As you were coming off of - and going up into North Ray area, could you give a guess at the relative proportions of - and the size and shapes of the white and the dark rocks.

- 09 21 23 51 CC In other words, was there a change ra - radially outward from North Ray?
- 09 21 24 04 CDR Yeah, this is just an impression, Tony. But I'd say that the - that the dark rock was less prevalent as you went outbound, generally speaking - as you went away from the crater.
- 09 21 24 21 CC Okay.
- 09 21 24 22 CDR I could be 100 percent out - wrong on that. But we sure drove over a lot of - in the regolith there in particular. The upper layer in regolith, which contained these - I mean the - the ejecta blanket - which contained - the upper layer in the ejecta blanket contained a lot of boulders with just their heads sticking through, and those were the ones I was looking at because I was trying to go around them. And they - and I don't ever remember seeing a - a dark brecc - breccialike rock in those boulders.
- 09 21 25 01 CC Okay, sounds good. And that very large rock you sampled up there, Charlie, you mentioned there was white and dark rock in the one rock. Could you describe the contact? Was one contained in the other, or did the contact meander through the whole rock?
- 09 21 25 18 LMP Just sort of meandered through, Tony. It was a - it was a - again I'll say a two-rock breccia, where it was a white and the black. And the clasts were very large, up to a meter size. I think the - the predominant rock was black. At least, the overall color gave you a black, but when you looked closely, you could see white clasts in it. So the - and the contact just meandered. I think we've got a couple of closeups of - of how the contact just meandered through. It was sort of a angular clast in this predominantly blackish matrix.
- 09 21 26 03 CC Okay. The white rock, was it - that was in this big boulder - was it like the white rock that you sampled to the southwest of where you parked the Rover?
- 09 21 26 14 LMP Yes, it was all - yes, uh-huh.

- 09 21 26 17 CC Okay. Incidentally, that shadow cone that you saw on the big boulder - Did it - Did the surface on the cone go right through the clasts, or did the clasts poke out kind of like nodules on the cone?
- 09 21 26 35 LMP Well, they - No, it didn't. The shadow cone was in - was fortunately, or unfortunately, depending on your point of view, in - in the black matrix. And it was - it was a crystalline rock where the shadow cone occurred.
- 09 21 26 50 CC Okay. Understand. Okay. Now that you've seen both North and South Ray ejecta blocks, could you say a few - a little bit about the ray material in the area from the LM to Flag? Do you feel that all that material is characteristic of the bigger ray blocks that you identified near either North Ray or South Ray?
- 09 21 27 24 CDR Yeah. I - -
- 09 21 27 26 CC Go ahead.
- 09 21 27 27 CDR I guess my impression might be that some - at some places, we had some of each and - but most of it was from South Ray. And around the LM, I'm - We saw - Once we got going toward North Ray, those - that material around the LM, by gosh, the breccia - and I collected several of them at that last station - in hand specimens - some of them were like the material we got out of South Ray, clear of South Ray blanket, and - but several of them were from North Ray. At least, that was my impression.
- 09 21 28 14 CC Okay. Understand. We always had the feeling - -
- 09 21 28 17 CDR I'd say the most of them for - from South Ray.
- 09 21 28 19 CC Okay. We seem to have the feeling that the rocks you were describing in the LM area were just somehow just a little bit different than what you were picking up either down South or up North. I guess we'll get that all straight when the rocks get home.

09 21 28 36 LMP Tony, I think that's - that the breccias were different. We've been - Maybe I'm going way out on a limb when I say this, but you - we've been collecting little fragments that have been floating around the cockpit here and looking at them, and they're crystalline - crystalline fragments that - with little white powdery exterior on part of it, and it - chalky appearance. And to me, this is - was characteristic of the rocks - some of the rocks around the Cayley, which - now I'm really leading to a tuff breccia - but the matrix being the ash with these crystalline frags, and the crystalline frags looked just like the rocks - the crystalline rocks around North Ray. At least, the black ones - at least, the couple I found here floating around. Now that's not to say that the fragments are - there are some fragments from whitish rocks, but they were a little bit dif - more difficult to see in this white matrix of what looks like tuff now, because it's very powdery.

09 21 30 03 CC Okay. Understand. I wonder if you could describe that - those vesicles in that rock at station 13.

09 21 30 15 LMP Well, they looked like - I call them drill holes. Let's see if John has a different word for it.

09 21 30 37 CDR They look like those pipes that you see in rocks. Like Charlie says, they just look like drill holes.

09 21 30 48 CC Okay. Understand - -

09 21 30 49 CDR And they were about a couple of - up to 2 to 3 centimeters across.

09 21 31 00 CC Okay - -

09 21 31 01 CDR - - in diameter, and perfectly circular. It appeared to me to be.

09 21 31 04 CC And how deep did they go? Could you tell - I mean, did they go straight in, or did they seem to meander around?

09 21 31 12 CDR They seemed to go straight in, and I couldn't tell how deep they were, because they only go in a - They disappear from sight. I didn't try reaching into any of them.

09 21 31 21 CC Okay.

09 21 31 22 LMP Tony, they were - there wasn't anything in them. You could just look in and you'd just - and they looked clean, and - and - just like somebody drilled out the rock.

09 21 31 34 CC How about the orientation? Were they all perpendicular to the surface, or did they all have a preferred orientation?

09 21 31 49 LMP I got the impression that they were parallel to the - to the surface. The rock was - As you stood and faced the rock, you could see - see these little holes sticking out at you that - with most of them parallel to the - to the regolith.

09 21 32 13 CC Okay. How about when you went around on the other side? Did they poke out at you there, or were the - What I'm trying to get a feeling is - Did it indicate a top and bottom in the rock, or did it just poke out all over the rock?

09 21 32 33 LMP I'm - We don't - we only remember seeing them on one side, Tony. And that was the south side or the east side of the rock. The rock was facing - the side we saw them on was away from North Ray.

09 21 32 46 CC Okay. Understand.

09 21 33 09 CC Okay. And - Stand by.

09 21 33 51 CC Okay. Charlie, just before you left the - or during the LM closeout time, you started to make a remark about the change in character between the regolith - between the LM area and Stone Mountain, and somehow we got interrupted there and you didn't finish your statement. I wonder if you could finish what you're going to say - if you happen to remember? Can you characterize the difference in regolith between the LM area and Stone Mountain?

09 21 34 25 LMP Stand by 1 on that one.

09 21 34 27 CC Okay.

- 09 21 35 22 LMP Tony, I think that - We're just sitting here trying to decide - recall, and I - right now the only impression is that you tended to sink in more up on Stone Mountain, which could be downslope movement of particles, and - It was a - just very loosely consolidated up there. Everywhere you'd - you'd step, you'd sink in a couple of inches. And on the slopes around the LM, it was the same way. And even, in fact, where we landed. Up around the ALSEP site, it was very loosely consolidated, and as you walked you could - your foot would leave quite a imprint. And once we had pretty well turned over the surface around the LM and up on Stone, it would look like freshly raked ground and - to me. Stone Mountain - Smoky Mountain - or excuse me, North Ray, wasn't like that at all. It was very thin regolith and as we commented, we had a tough time raking because it was so rocky right up - within a couple of centimeters, at the top of the regolith. Over.
- 09 21 36 47 CC Okay. Understand. I think your downslope movement there on Stone was probably - probably right. Although that wouldn't explain why it was harder at 5 and 6 than at 4. Well, anyway. Next question here - On that half-orange-sized rock that you put on the LPM, wonder if you could estimate - estimate how common that type rock was around.
- 09 21 37 22 LMP Well, John picked up one just like it up on - It was a grab sample up on Sto - yes, Stone Mountain. And it was one of the crystalline rocks with that sugary crystalline texture to it. Huh? Yeah. And it was one of those whitish rocks that was a little dusty. I think that - I think it's fairly common. We'll just have to see when we get the samples back, but it was my impression it was one of the three predominant rock types there.
- 09 21 37 56 CC Okay. Understand. And the soil at station 8 - was it white underneath the top surface like you described up at station 4 and a lot of other stations?

09 21 38 27 CDR We kicked - we kicked some of that, and I - I can't remember whether it was or not at station 8.

09 21 38 36 CC Okay.

09 21 38 37 CDR I think it - Anyway, we sampled the soil sample there, and it's in the - it's in - it's in the box somewhere. But I can't - I certainly can't remember whether it was a - white underneath or not.

09 21 38 51 CC Okay. Understand. And just subjectively, could you compare - now that you've been up fairly close to Smoky and on Stone - could you compare the two - two structures?

09 21 39 09 CDR They looked the same to us.

09 21 39 13 CC Okay. Well, that's all of the geology - -

09 21 39 15 CDR I - Okay, I wouldn't be surprised but what they aren't the same. When Ken and I and Charlie looked at it in this real low Sun angle, I - I guess that's - As far as geometric form, it certainly looked - it was the hummocky material from the Descartes region is the way it looked. Right across Smoky - right through that whole region, it looked like a single unit, and - and I guess that would be my interpretation of it at this point. But it's pure speculation, but I would guess that tonight. I wouldn't be surprised but that we don't find a lot of these rock types on one region very close to another region being about the same.

09 21 40 08 CC Okay. Understand. The reason - -

09 21 40 09 LMP Tony - That was - I was just going - -

09 21 40 13 CC Go ahead, Charlie.

09 21 40 14 LMP - - to add to that, I was just - I had the same impression. Looking at the - the South Ray, with the black and white streaks up the wall - up on the interior of the crater, and also at Baby Ray, being very stark in contrast. And then in North Ray, having that same impression but more subdued. And the rocks appearing to be very similar - I

think there's a good lateral - and you guys can demolish this when you analyze the rocks, but right now my impression is that - the - the two craters penetrated are very similar - or two very similar rock units. The white and the bluish black.

09 21 41 11 CC

Okay. Understand. The reason for a lot of these questions - and we know the answers are in the rock boxes and bags there and we'll all get when you get home. But there's a lot of interest since the model - the model that we have of the whole area is being changed because of the high aluminum-to-silicone ratios and because of all of your rock descriptions there. And everybody's ... Well, we switched antennas there. There's a lot of push here to reformulate a new model. The press is kind of pushing, and you'll probably get some questions this afternoon in your press conference. I was wondering if there's anything you wanted to ask the geology team about this - this new model, since I don't think you've ever been briefed on it.

09 21 42 09 LMP

No, I'd sure never heard it was slosh from the Imbrium at the Cayley.

09 21 42 14 CDR

I'd say it's premature to be making those kind of statements, Tony. And I would like to wait until we get all that data in and take a look at it. It's just too soon to be on - on hearsay and - and - and not having the real evidence and not having the - all the data analyzed. It's too soon to be making any major conclusions about the region. It's just - I can't see how you could do that.

09 21 42 38 CC

I sure agree with you, John. But, you know, everybody's - Everybody's excited and trying to press with it. But, anyway, I thought you might want to - to hear a little bit about that, if you're going to be asked on it this afternoon. That isn't - Now, of course, that isn't to say anyone's saying that Kant Plateau or Descartes Highlands are slosh. It's just the Cayley part. Anyway, that's all - that's all we have here, if you just want to press on there.

09 21 43 11 CDR No, I just don't see how you can come to that conclusion this quick without any evidence, Tony. It's - It'd be nice to do that, but I - boy, I would - I would not press for that sort of thing this early in the game. And I wouldn't answer questions to anybody to amount to anything on that kind of stuff because that's too speculative.

09 21 43 30 CC Okay.

09 21 43 31 CDR In other words, it ain't good - it ain't good science.

09 21 43 35 CC Yeah, John. I think - I think you're right on, and I hope they heard you in the backroom, because I - I think I said the same thing this morning.

09 21 43 59 CC And we have a slight change to the Flight Plan at 264:10. We'd like to change the NOUN 79 dead-band to 2 degrees.

09 21 44 18 CMP Okay. The NOUN 79 changed to 2 degrees at 264:10.

09 21 44 24 CC Roger. And I'll see y'all tonight. I'll come back and tuck you in.

09 21 44 32 CMP Okay, Tony. Thank you.

09 21 44 35 CC Thank you.

09 21 48 17 CC Apollo 16, Houston.

09 21 48 21 LMP Hello.

09 21 48 22 CDR Go ahead, Henry. Good morning to you.

09 21 48 25 CC Good morning. Like to give you a little change here - or an addition, I guess, at 264:50 - waste water dump. Says there we're supposed to specify the percentage and that's 35 percent. However, we'd like to call the start and stop - start and stop of that maneuver. EECOM would like something to do this morning.

09 21 48 52 CMP Okay. You going to put us in attitude and do a midcourse correction with it?

09 21 49 02 CC I don't guess we need that - -

09 21 49 04 LMP Tell EECOM we got some - Hey, Henry. Tell EECOM we got some good pictures of a dump when we were stationkeeping up there while y'all were deciding whether we could land. Ken did his dump, and we had perfect lighting for it and so we got some DAC film of it and it was really coming out of there.

09 21 49 25 CDR Not only that, he had perfect position on the stationkeeping when he started to dump and it just pushed him right over to the - It just pushed him right over out of plane.

09 21 49 37 CC Hey, I bet that was pretty, too, wasn't it?

09 21 49 42 CDR Yeah.

09 21 54 22 CC 16, Houston. I've got a few deletions in your Flight Plan.

09 21 54 30 CDR Hey, there you go. Just a second.

09 21 54 55 CMP Okay. Go ahead.

09 21 54 57 CC Okay, at 266 hours.

09 21 55 06 CMP 266 hours. Go.

09 21 55 08 CC Roger. Delete "GAMMA RAY, SHIELD, OFF." And a little further down there at about 266:15, delete that whole line where it refers to the "GAMMA RAY, GAINSTEP, on," et cetera.

09 21 55 32 CMP That's deleted.

09 21 55 35 CC Okay. And at 268 hours, at the top of the page - page 374.

09 21 55 43 CDR Go ahead.

09 21 55 44 CC Delete that GAMMA RAY comment.

09 21 55 56 CMP Okay. Go ahead.

09 21 55 57 CC That's all of them for right now. Thank you a lot, fellows.

09 21 56 01 CMP Okay.

09 21 56 10 CC Later on in the day, we're gonna do some of these gainsteps, but we'll call them real time.

09 21 56 18 CMP Okay. We'll be awaiting your call. Or where else would we be?

09 21 56 27 CC (Laughter) Roger.

09 21 59 07 CC Ken, sometime when it's convenient - anytime you can get to it, we'd like to get a film status.

09 21 59 29 LMP Okay, Henry. He'll - Thank you.

09 21 59 34 CC Roger. No rush on that, Charlie. Just whenever you work it in.

09 21 59 39 CDR Okay. You mean you want him to pull out every magazine and see how it's doing, or what do you want?

09 21 59 51 CC Let me see how detailed they want it.

09 21 59 56 CDR And ask why! I mean, because we got some of these things stowed where you wouldn't believe. It's not gonna be too easy. We're gonna have to take the entry stowage apart to get at them.

09 22 00 20 CC We don't want to outstow anything. If he - If he's got it written down up there somewhere, that will be satisfactory; whatever his records show. If he doesn't, let's just forget about it.

09 22 00 30 CDR Okay. Understand.

09 22 00 31 CMP Hey, Henry?

09 22 00 32 CC Roger.

09 22 00 33 CMP What are you looking for? What are you looking for, Henry? Maybe I can - I can help you. If you're looking for mags that have film on them, I can - that might not be so hard to track down, but - do you just want to know what pictures we took?

09 22 01 00 CC We got an antenna switch coming.

09 22 01 54 CC Ken, I haven't gotten a real satisfactory answer on this. Apparently, this is for the Photolab. They just kind of want to get - get an idea of your usage. But the way it looks to me, I wouldn't - I wouldn't do anything special, unless you got it written down there somewhere.

09 22 02 10 CDR Okay, Henry. You can tell the Photolab that they're in real trouble, because they're going to be developing film for a long time.

09 22 02 22 CC Okay.

09 22 02 41 CMP Most of the 70s are - are - are already exposed, with maybe like 10 frames remaining on each or something. And the 16s, I don't really know what their status is. We'd have to go through and look at each mag. It's my impression that most of them are only partially used. There's about four that I can think of offhand are empty. And we'll know all that as soon as we get out of the ship.

09 22 03 14 CC Okay. That's good enough, Ken.

09 22 03 18 CMP Thank you, sir.

09 22 05 10 CC Charlie, your better half says she would like for you to bring your mustache home with you.

09 22 05 19 LMP I'm not gonna do it.

09 22 05 22 CC Roger.

09 22 05 36 CDR Henry, what she said was - she said was she'd be tickled if Charlie brought his mustache home with him.

09 22 05 41 CC Roger. (Laughter)

09 22 05 57 LMP I can't wait to shave this off. We've had a little failure with this shaving gear and that's our prob - that's been our problem.

09 22 06 08 CC Roger. Understand.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

09 22 07 36 CDR Hey, Henry. I got the biomed hooked up now. Ask the friends on your left there how it looks.

09 22 07 43 CC Okay. Looks good.

09 22 07 50 CDR Okay. How does it feel?

09 22 07 54 CC (Laughter)

09 22 11 43 CMP Hey, Henry.

09 22 11 44 CC Yes, sir.

09 22 11 48 CMP Can you tell us if we have the tape recorder running on board in a forward direction, so we can record on it. And looks like we need about an hour's worth of tape. Or are they in a playback cycle, or what are they doing?

09 22 12 04 CC Okay, I'll check it, Ken.

09 22 12 07 CMP Thank you.

09 22 12 09 CDR We're gonna start checking these light flashes.

09 22 12 12 CC Okay. The TAPE RECORDER is in REWIND and as soon as we get an antenna switch, we'll start it off for you.

09 22 12 19 CMP Okay. I still think these things are manufactured by the same guy that makes the emperor's clothes.

09 22 12 28 CC (Laughter)

09 22 12 31 LMP Don't believe it. They're everywhere! They're everywhere!

09 22 14 00 CC 16, your TAPE RECORDER is running FORWARD.

09 22 14 06 CMP Thank you, Henry.

09 22 19 26 CC 16, Houston. The light-flash folks request that if you see one of those things and - identify yourself when you call the mark so they - if the tape is bad, they'll be able to still tell who made the mark.

09 22 19 50 CMP Okay.

09 22 41 06 CC Apollo 16, Houston. The PIs say that you should be calling your marks also down on the loop - on the air to ground.

09 22 41 45 CMP ... I think Charlie's seen about seven or eight.

09 22 41 49 CC Roger.

09 22 42 03 CDR They're just not coming out too well today, Hank.

09 22 42 06 LMP MARK. There's one, Henry, for you - right eye - that's Duke. On the bottom - bottom of the right eye is a little bright dot.

09 22 42 17 CC Roger.

09 22 42 20 CDR MARK. In the outboard of the left eye - Young. A dot flashed that terminated toward the center.

09 22 44 10 CDR MARK. Soft photoflash in the center of the - center right of the right eye - Young.

09 22 44 30 CDR MARK. Dot in the upper left center of the left eye - Young.

09 22 45 50 CDR MARK. Light streak in the lower part of the left eye - Young.

09 22 51 34 LMP MARK. Duke - right eye, upper center - a thin white streak.

09 22 52 21 CDR MARK. Young - and in the upper right eye, a couple of streaks from - looked like they were going from left to right - out at - about 2 o'clock out.

09 22 53 39 LMP MARK. Duke - bright dot, lower center, right eye.

09 22 55 30 LMP MARK. Duke - right eye, upper outboard, a bright dot.

09 22 56 47 LMP MARK. Duke - upper right eye - right eye, upper center, a bright dot.

09 22 57 14 LMP MARK. Bright dot, very center, right eye - Duke.

09 22 58 27 LMP MARK. Duke - upper right eye - a fuzzy flash.

09 22 58 43 CDR MARK. Young - a streak at the top of the right center of the right eye, going from - going out the top.

09 23 00 26 LMP Okay, Hank. The first part of that - I was looking out the plus-X. Now I'm turning over on my right side and I'm looking out the Y-axis now - out window 5. And I'll see if that's going to make any difference.

09 23 00 48 CDR Okay, Hank. On the first part of mine, I was - first 30 minutes, I was right side up in the LEB with my head against the optics covers. And now I'm upside down in the LEB with my head against the optics covers to see if that makes any difference.

09 23 01 11 CC Roger. Copy.

09 23 02 34 LMP MARK. Faint white dot on the left eye, lower in-board - Duke.

09 23 06 28 LMP MARK. Duke - lower right eye - a faint, fuzzy flash.

09 23 06 43 CDR MARK. Young - left eye - a streak going from top to bottom in the - in the outboard part of the left eye.

09 23 07 18 LMP MARK. Duke - right eye, lower center - a bright dot.

09 23 08 43 LMP MARK. Bright dot - upper right eye - Duke.

09 23 09 01 LMP MARK. Left eye - bright dot - Duke - outboard.

09 23 10 07 LMP MARK. Duke - a fuzzy flash in the upper left eye, simultaneously with a bright dot in the right eye.

09 23 11 28 LMP MARK. Upper left eye - little faint dot. That was Duke.

09 23 14 20 CC Apollo 16, Houston. We show your ALFMED period up.

09 23 14 27 CMP Okay.

09 23 14 42 CC And, 16, when you get ready to maneuver to this new attitude, if you don't have Bravo 1 enabled, your present jet configuration is okay.

09 23 14 56 CMP Okay, Hank. I'll check it.

09 23 15 06 CDR That new attitude I went to was great, Hank. I almost went to sleep.

09 23 15 11 CC Roger. And I gather that ALFMED must be a pretty effective shield. I didn't hear Ken saying anything.

09 23 15 21 CDR He wasn't supposed to use it.

09 23 15 25 LMP We already did that on the outbound leg.

09 23 15 27 CC Oh, okay.

09 23 15 32 LMP He was doing something, but it was all audible.

09 23 17 11 CMP Hank, what was the jet you wanted to have me turn off?

09 23 17 14 CC Roger. Bravo 1, so it won't fire in the SIM bay. If you used Bravo 2 and Delta 1 for roll, you'll be okay just to leave that configuration and maneuver on to the next attitude.

09 23 17 36 CMP You want to use Bravo 2 and Delta 1. Is that affirmative?

09 23 17 41 CC That's affirmative.

09 23 18 02 CMP Okay, Hank. They - that's not the jet configuration they gave us this morning because I did have the SIM bay jets - No, I'll have to look up those jets I had this morning, but Bravo 1 was one of the ones I had turned on.

09 23 18 23 CC Roger. We understand that, Ken. The reason is that when we stop the PTC the - we're - in the configuration you had, you'd probably use - you'd have to use Bravo 1 to stop it, and it would fire into the SIM bay. It probably never fired during the PTC.

09 23 18 45 CMP Okay.

09 23 21 42 CMP Hank, this one you want to do is a normal PTC? Or do you want to use this one as a - as the enabled-jet version.

09 23 21 53 CC Roger, Ken. We'd like to do it in that same procedure that - that Tony read to you this morning. And, for the next one at about 275:50, we'll go back to the regular procedures.

09 23 22 07 CMP Okay. And you want to use the same jets that Tony read me this morning?

09 23 22 10 CC Roger. And those, I guess, should be the ones you have enabled now.

09 23 22 20 CMP Except I got - this morning I had all B/D ROLLs enabled.

09 23 22 26 CC Okay, we'd like to start up in single jet, which is what you have now.

09 23 22 38 CMP Okay. I'll use the jet configuration I have now, then.

09 23 22 42 CC Roger. And, I guess - did Tony read you the change that we wanted the 2-degree dead band?

09 23 22 49 CMP Yes, sir.

09 23 22 50 CC Okay.

09 23 22 52 CMP And how about the rate? Now, he read me 0.3 this morning, and normally we do 0.42. I take it 0.3 is what you're really after.

09 23 23 03 CC Let me doublecheck that one.

09 23 23 15 CC Okay, 0.3 is the correct rate.

09 23 23 20 CMP Okay.

09 23 23 34 CC And, Ken, when we get to attitude, we'd just like to hold that before you start the P20, so we can dump the tape recorder.

09 23 23 42 CMP Okay.

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09 23 27 19 CC Ken, we need to get the high gain, and I guess we need you to do a MANUAL ROLL about 30 degrees left.

09 23 27 29 CMP Okay.

09 23 27 41 CC And, in regard to the urine dump coming up, the doctors think they see a correlation between the urine dump times and the dump port temperature. So, just to see if this really works, and if it does work, we may be able to get rid of all of this recording stuff. We'd like for you to identify which bags you are dumping and give us a mark at start and the end of the dump.

09 23 28 10 CMP Run that by one more time, please?

09 23 28 13 CDR Looks like you guys don't understand the problem, do you? I can't believe that. We all dumped the urine into the same bag.

09 23 28 24 CC Okay, give us a start and stop.

09 23 28 26 CDR We been stowing - yeah, but, Hank, we're all dumping into the same big white bag and then that gets dumped over to the side. Is that what you want? A total volume from all three of us?

09 23 29 17 CDR Did you get my last, Henry?

09 23 29 20 CC Roger. They still would like to know the start and stop times.

09 23 29 27 CMP (Laughter) Be our guest.

09 23 29 29 CDR What do you - start and stop of what? You know, we let this thing purge, line out, and then we let it sit there until we're sure everything's all cleaned out - afterwards, to make sure we don't plug things up. I guess we can tell you when we do each step, but we don't really know when those bags are empty.

09 23 29 44 CC Well, that would be my guess, also, but can you guess at it? Okay, if you can't, forget it.

09 23 29 55 CDR Okay.

09 23 30 24 CDR Okay, Henry. Here's what we've been doing with the urine.

09 23 30 50 CDR Is this attitude okay for you, Hank?

09 23 30 56 CC Roger.

09 23 31 03 CC John, could you repeat what you said. INCO cut the antenna off about the time you started?

09 23 31 25 CDR Houston, is this attitude okay for the high gain?
... - -

09 23 31 27 CC That's affirmative. It's a good attitude.

09 23 31 32 CDR Okay, now. Let me tell you what we've been doing with this stuff. We've been using the Gemini [?] bags and then dumping it into a big white bag. And it's all in there now, all mixed together, and nobody knows whose is whom's. And - and, furthermore, we don't know when we dump that big white bag when - We know when we start to do it, but we don't know whenever it finishes. Because you can't see the inside of the bag. You just don't have a feel for that. So, what you just do is you just let it run until you think you ought to quit and look and see if you've got particles on the outside. And even after you quit, there's still particles on the outside.

09 23 32 13 CC Roger. Copy, John. Why don't we forget about that?

09 23 32 21 CDR Okay. I would be glad to do it, if I thought it would give you any data. But I can't see how it'll give you anything you could use.

09 23 32 30 CC Okay, John. What we're trying to do is find some way to make the procedures a little cleaner on - on Apollo 17. So they think they can get some useful data out of this, and if you can just give us a mark when you start, maybe they, from the temperature curves, can tell just about when it ends. They got a - they're trying to get a calibration on how the temperature of the port changes during the dump.

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09 23 33 01 CDR Yeah, but - are you sure that, for example, that we don't have at least thousands of chamber dumps that'll tell you the same thing?

09 23 33 22 CC Okay. They said the chamber data is what got them looking at the possibility of doing this.

09 23 33 29 CDR Okay, Hank, I'll tell you what we'll do. We'll give you mark when we start and a mark when we stop.

09 23 33 36 CC Thank you.

09 23 35 44 CDR Purge line heater, Houston - on, Houston.

09 23 35 48 CC Roger; copy.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

09 23 41 03 CC 16, Houston. When you get ready to dump the waste water, we'd like to dump to 49 percent. That'll leave us enough for the Skylab contamination.

09 23 41 22 CMP Okay, dump to 49 percent.

09 23 41 41 CC 16, Houston. We can go ahead and start spinning up, but first we've got to load the VERB 49 with a current roll attitude and PRO going to attitude and then start the spinup. And for the spinup, we'd like to use Delta 2 in addition to the jets you now have configured so we can get a couple of spinups, and then turn Delta 2 back off.

09 23 42 07 CMP Okay, we add Delta 2 for the start and then turn it off.

09 23 42 11 CC That's affirmative.

09 23 52 59 CC Ken, I guess you've figured out the reason we got caught there is we can't load the NOUN 79 in option 2.

09 23 53 10 CMP Yeah, I just figured that out, Hank. Is what I did there to fix it okay?

09 23 53 21 CC Okay, you restarted it after going to ACCEL COMMAND, is that right?

09 23 53 28 CMP Yeah, I restarted it, then didn't mean to stop it, just kind of kept it going. Is that attitude looking all right or - I don't have any way of reading out where the dead band is centered now. Would you like for me to just stop and start all over again?

09 23 53 42 CC Okay, we'll take a look at it.

09 23 54 04 CC Okay, the - the center's only about a half a degree off from where we wanted it. So that's good.

09 23 54 16 CMP Okay; thank you, Hank.

10 00 02 04 CC 16, Houston. We show you 55 percent on the waste tank. I'll give you a call at 50.

10 00 02 13 CDR We're watching it, Henry.

10 00 02 16 CC Okay.

10 00 02 18 CDR That ain't good enough from past experience, is what you're saying?

10 00 02 22 CC I'm not saying that at all, John; just thought I would help if I could.

10 00 02 26 CDR Okay. You are, Hank. I'm just teasing.

10 00 02 50 CDR Looks like 49 to us.

10 00 02 53 CC Roger. We show about 50, now.

10 00 03 03 CC MARK; 50 percent.

10 00 03 11 CDR Okay, she's shut down.

10 00 06 30 CDR Hank, we're gonna start, and we're gonna give you something in a little bag first, and I'll give a mark when we start it and when we stop it and when I see particles start to slow down, and then we'll go emptying the bigger bag.

10 00 06 43 CC Roger; copy.

10 00 06 46 CDR Okay, stand by.

10 00 06 47 CDR MARK. It's started.

10 00 06 58 CDR Okay, the bag's empty and I don't see anything out the side, yet. It's started out the side, now. Okay, we're leaving the bag on purge.

10 00 07 14 CC Roger.

10 00 07 36 CDR Okay, the particles are starting to slow down, but they spurt every now and then. Man, there's a big blast.

10 00 08 13 CC Ken, do you have an estimate of the quantity in the little bag?

10 00 08 22 CDR No, there's no way to get that (laughter).

10 00 08 25 CMP You're supposed to give us that.

10 00 08 26 CDR That's what you're doing. You're supposed to tell us that (laughter).

10 00 08 30 CMP It's whatever 5 psi does through a 1/20,000 hole that's modified by ice.

10 00 08 38 CC Roger (laughter).

10 00 08 48 CDR Okay, we've got the bag off. We're getting ready to start another one, and most of the particles have stopped.

10 00 09 23 CDR Okay, we're running another bag.

10 00 09 53 CDR Okay, that bag's empty.

10 00 09 56 CC Roger.

10 00 10 41 CDR There's another bag started.

10 00 10 45 CC Roger.

10 00 10 58 CDR That one is empty -

10 00 10 59 CDR MARK.

10 00 12 56 CMP Okay, we're starting on our big bag.

10 00 12 59 CC Roger.

10 00 13 06 CDR And it's dumping now.

10 00 13 07 CMP Okay.

10 00 14 30 CMP Well, it looks like our big bag is empty somewhere in here.

10 00 14 36 CC Roger. Copy, Ken.

10 00 15 46 CDR You know, Houston, we think one of the problems you're gonna have with this kind of a - a measuring thing is how - how clogged up your filters are. Like we don't think it's dumping as much right now as it was when it started because we think the filter's getting clogged.

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10 00 16 07 CC That's a good point, John.

10 00 16 29 CC We also see that if we're gonna do sequential dumping, we're gonna have to wait between the dumps, you know, to allow the nozzle - the temperature to stabilize.

10 00 16 40 CDR That's affirmative.

10 00 17 15 CDR We're gonna turn the dump valve off and change filters.

10 00 17 22 CC Roger.

10 00 18 10 CDR Okay, we started on another bag.

10 00 18 26 CDR Bag's empty.

10 00 23 51 CDR Okay, Houston, we got an ISS light and a 37777.

10 00 23 59 CC Roger. ... understand. Stand by.

10 00 24 03 CDR Okay, the eight ball didn't move. That's the ICDU fail light is what it is.

10 00 24 12 CC Okay, just stand by. We're looking at it.

10 00 24 20 CDR Okay, the NOUN 20s all look pretty good - -

10 00 24 22 CMP ... a - -

10 00 24 23 CDR Yeah, ... is okay.

10 00 24 41 CDR Okay, no switches were being touched at the time.

10 00 24 58 CC Okay, John. We saw the same thing you did and everything looks good; we're talking it over now.

10 00 25 10 CDR Need a program alarm reset.

10 00 25 14 CC Roger.

10 00 25 25 CDR ICDU fail transient, huh?

10 00 28 41 CC Apollo 16, Houston. We'd like for you to go through mal procedure G&N, number 6 on page 28.

10 00 28 56 CMP Okay, stand by.

10 00 33 27 CMP Okay, Hank, when we go into number 6 procedure, we come down, and the logical answer out of block 2 is that the - you can reset the program lights and the ISS light goes off all on its own. It's only on for a very short period of time. And that says that it's a transient condition and stops. I - guess we could take a look at going down through the "no" path and try block 6, but I'd like to have some concurrence on that before we do it.

10 00 34 02 CC We concur - like for you to go to block 6.

10 00 34 10 CMP You had some bad comm there; I understand you want us to go to block 6.

10 00 34 12 CC That is affirmative.

10 00 34 16 CMP Okay.

10 00 34 33 CMP Okay. Before we started on that, we've decided to take a look at 1620 and it seems to be counting in all three axes. And they agree with what's on the FDAI. We're gonna start into block 40 now. And I'm going on the VOX so I can talk and read at the same time.

10 00 34 58 CC Roger, Ken. Before you do this, would you check yaw real carefully. We're showing about a degree difference between the ISS att and the ICDUs.

10 00 35 09 CMP Say again, Hank. You - you were blocked out right in the middle.

10 00 35 11 CC Roger. Could you check the yaw axis real closely; we're showing about a degree difference down here. The other two axes look pretty good.

10 00 35 21 CMP I - I repeat, the FDAI and the NOUN 20s look like they're in as close agreement as I can read. You can't tell a degree on the FDAI down here anyway.

10 00 35 32 CC Roger.

10 00 35 33 CMP There's that much dispersion in the instrumentation. You know that. Okay; can we proceed?

10 00 35 45 CC Proceed.

10 00 35 50 CMP Okay, we did. And it's counting again, and it's gone back to the same numbers - well, it just blanked again. Let's see here; maybe I was premature. That's where it zeroed. Yeah, it's still showing about the same numbers, Hank. The biggest change was in the - no they're all - they're all ball park, within readability, from one reading to the other.

10 00 36 36 CC Roger.

10 00 36 38 CMP Okay. So out of that, I come up with a "yes" answer, and I'm going - looking at block 12.

10 00 37 23 CMP I guess in order to do this block 12, I have to be in CMC CONTROL, is that not correct?

10 00 37 32 CC Stand by. SCS should be okay, Ken.

10 00 37 45 CMP Okay. I had no displacement; I did a VERB 43 ENTER, and I loaded R-1, 2, and 3 - and I got no needle displacement. Is another ENTER required or something?

10 00 38 06 CC Stand by.

10 00 38 24 CC Ken, we'd like for you to repeat the procedure, starting with the VERB 43, and do it very slowly so we can watch it down here.

10 00 38 33 CMP Okay; there's VERB 43 - ENTER, plus 00250 ENTER, plus 00333 ENTER, plus 00333 ENTER, and the needles pulsed out and right back to zero.

10 00 39 12 CC Roger. Copy. The needles did jiggle, but they went back to zero.

10 00 39 23 CMP That's correct.

10 00 40 05 CC 16, Houston. Stand by a little bit, and we'll digest this a while.

10 00 44 11 CC Apollo 16, Houston. The computer looks good to us, and we're checking now to make sure that there's nothing left out in mal procedures.

10 00 44 20 CMP Okay. Would you like for me to try them in the -
in CMC CONTROL, and I'll go to ACCEL COMMAND so we
won't get any attitudes?

10 00 44 35 CC Okay, Ken; give it a go.

10 00 45 17 CMP Same thing, Hank, as soon as I hit ENTER, they
pulse out, and it looks like they go to where they
belong, and then as soon as it comes back, it just
goes out and comes right back.

10 00 45 28 CC Roger. Copy.

10 00 47 51 CMP Hank, looks like one other thing that would check
the D to A's would be - how about if I load a -
just a NOUN 22 of all zeros, and then call up the
VERB 62?

10 00 48 12 CC Ken, we'd like to have you just stand by, just a
minute, here, and - while we smoke this over.

10 00 48 20 CMP Okay.

10 00 55 55 CC Apollo 16, Houston.

10 00 55 58 CMP Go ahead.

10 00 55 59 CC Roger. What we'd like to do, Ken, is call up
VERB 48. And on NOUN 46, set the first digit,
digit A, to 0 to kill the DAP; do a VERB 46 ENTER;
and then we want to go back to block 12 and start
with a VERB 43. The boys in the backroom here
think that the procedure won't work if the DAP
is running even though we're in SCS.

10 00 56 28 CMP Okay. I have done this in the simulator, and it
didn't work there, but we'll try this in just ...
Okay. You want to set the - you to kill the DAP
as number 1 step.

10 00 56 43 CC That's affirmative.

10 00 56 50 CMP Okay, then you want to go back and go through
step 12.

10 00 56 56 CC That's affirmative, Ken.

10 00 56 58 CMP Okay. That's in work.

10 00 57 28 CMP Okay. I have to do a VERB 46 on this now. That was one of the no-no's we had the other night. Is that okay?

10 00 57 38 CC That's okay now. That was just to protect the EMP.

10 00 57 43 CMP Okay, just ... the EMP. Thank you.

10 00 58 15 CMP Okay. And now that's working like a champ.

10 00 58 18 CDR Yeah, it works just like it's supposed to, now.

10 00 58 19 CC Roger. Somebody just got the same results over in the CMS, I understand.

10 00 58 27 CMP Okay. Very good.

10 00 59 12 CC Ken, we'd like for you to activate the DAP again on a VERB 48, and 1 in digit A, and then a VERB 46.

10 00 59 44 CMP Hank, we'd like to - I'd like to run a P52 here and see - see what kind of torquing angles we get. That would tell us whether or not we really had any kind of - of a hangup in the A to D section. As short as it was, we couldn't have gotten very far off in attitude.

10 01 00 06 CC Roger. We don't think it moved.

10 01 00 10 CMP Say again. We were in PTC at the time, so there was bound to be some rates going at the time.

10 01 00 22 CC 16, Houston. Our SIM bay's gonna get too cold, if we don't change attitudes. We'd like for you to roll to 280 degrees and then do the P52.

10 01 00 34 CMP Okay. I'll roll to 280.

10 01 04 31 CDR Houston, we just wanted you to know that the heart rates that you're seeing or not seeing are due to the exercise period - not the ISS light.

10 01 04 36 CC Roger. We copy.

10 01 04 38 CDR Although, that could be a factor.

10 01 04 40 CC The Surgeon, I think, had come to the conclusion you must be exercising.

10 01 05 02 CDR He just doesn't know what an ISS light will do to a boy.

10 01 06 20 CC John, the Surgeon says your heart rate hit a peak of 114 during the exercise period.

10 01 06 28 CDR I've timed it myself. I only got up to 100. Better check his gear.

10 01 06 35 CC Roger. (Laughter)

10 01 08 55 CC Ken, our pitch has got off a little bit. We need about a 120 degrees in pitch also.

10 01 09 03 CMP Is that for thermal reasons, Hank?

10 01 09 04 CC That's affirmative.

10 01 10 03 CC Ken, you want to keep an eye on your roll?

10 01 10 09 CMP Well, how about telling me what attitude you precisely would like.

10 01 10 15 CC 280, 120, and 040.

10 01 10 21 CMP Okay. I can do that.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

10 01 19 10 CMP Okay, Houston; there are the angles. It does look like that middle gimbal is - might be a little large, but it's - it was late last night when we had the last alignment, so that may be - that may be nominal.

10 01 19 20 CC Roger. We agree it has been quite a few hours since the last P52.

10 01 19 44 CC Clear the torque, Ken.

10 01 23 02 CC Ken, the SIM Bay's warmed up and - it looks like we give the computer and the software a clean bill of health. And we're suspecting we might of had a - a transient or something in the CDUs, so G&C would like to maneuver back to about the attitude where we had this thing and sweep out plus or minus 5 degrees in each axis one at a time and see if we can get another glitch. Now, we're trying to search those low-order bits because we think that's where the problem occurred. The attitude is 182.5, 130.7, 039.7, and we'd like for you to stay in SCS.

10 01 23 55 CMP Can you tell me why you want to stay in SCS, please?

10 01 24 05 CC Just to be conservative, Ken.

10 01 24 17 CMP Okay, that's just - All right.

10 01 35 41 CC And, Ken, when you get to the attitude, we'd like to sweep this 5-degree band there with a very low rate, say maybe using MINIMUM IMPULSE.

10 01 36 02 CDR You guys wouldn't want to consider the very conservative approach of just avoiding this 5-degree area on the 8-ball, would you?

10 01 36 15 CC Well, we don't want to do that yet.

10 01 36 19 CDR Okay.

10 01 38 06 CMP You want a sweep of one axis at a time? Is that what you're talking about, Hank? Say like from -125 to 135 in the - in the pitch?

10 01 38 18 CC That's affirmative.

10 01 38 21 CMP I see.

10 01 39 22 CMP Okay, Hank, do you have any preferred axis first? We'll take yaw first.

10 01 39 32 CC Okay.

10 01 41 41 CMP Okay, Hank, is 5 degrees sufficient to cover all your bits?

10 01 41 52 CC They're checking. That'll do it, Ken. Five degrees will cover the low-order bits.

10 01 42 05 CMP Okay. Going back the other way with yaw.

10 01 47 38 CC Ken, we'd like to do roll next - for the next axis.

10 01 47 44 CMP Oh, very well.

10 01 59 05 CMP Okay, Hank, what do I do at the end of this little sweep?

10 01 59 13 CC Okay. We didn't get it, did we?

10 01 59 22 CMP No, sir. Sure didn't.

10 01 59 35 CC Stand by a second, Ken.

10 02 00 21 CC Okay, Ken. Here's the plan. The G&C gives a hardware clean bill of health. So, I - they're going to smoke over the data now and look at why we got that little transient in there. In the meantime, it looks like we're safe to proceed with the Flight Plan. We'd like to pick it up at 267 - go into this Sco X-1 attitude. And, since we're real fat on RCS fuel, we'd like to do the maneuvers between these different attitudes today where we're getting data in different - different attitude at a faster rate, a half degree per second. And if that's all right with you, then, we'll get the X-ray on now which is called for in the Flight Plan and then start maneuver into the Sco X attitude and I guess we can use CMC for that.

10 02 01 09 CMP Okay, I'll - I concur with using the CMC and do you have any feel for midcourse ??

10 02 01 27 CC I'll get an answer on that, Ken. Right now, it's looking like about 3 feet per second, Ken.

10 02 01 37 CMP Okay. I can - think we can cover that.

10 02 06 49 CC Apollo 16, OMNI Charlie.

10 02 07 17 CC Apollo 16, COMMAND RESET, and OMNI Charlie.

10 02 11 43 CMP Houston, 16.. How do you read?

10 02 11 50 CC Say again, 16.

10 02 11 54 CMP Thought I'd just send y'all - got you back on the OMNI - or correction, HIGH GAIN now, Hank. Say how do you read?

10 02 12 00 CC Okay. Read you 5 by 5 and we got HIGH BIT RATE and locked up, looks like.

10 02 18 05 CC Ken, if you got a minute. I've got a little procedure here we want to try. Another little troubleshoot, if you're free.

10 02 18 14 CDR Just a minute. We'll get him back on comm.

10 02 18 44 CMP Hello, Henry.

10 02 18 46 CC Hello, there. We got something we'd like to try here, and its purpose is to determine whether or not the time delay on the CDU fail detection circuitry is so short that - apparently normal CDU movements can trigger the alarm. Now the normal time delay is 2 to 10 seconds. And we got a procedure here we'd like for you to run and time - time this thing, and see if that might be our culprit.

10 02 19 20 CMP Okay. Read it to me.

10 02 19 22 CC Okay. We'd like for you to go the SCS control, MIN, LOW, and uncage BMAG so we can hold this attitude pretty close. Then we'll do a VERB 25 NOUN 7 ENTER, 12 ENTER, 20 ENTER, 1 ENTER, and when you ENTER on the 1, we want you to start your stopwatch, and as accurately as possible, get the time from the ENTER until you get to ISS warning light. And after you get -

10 02 20 04 CMP Okay. So this channel 12 is gonna - is setting the bit that is the ISS warning bit that comes from the hardware, and the computer is the thing that does the timing. Is that correct?

10 02 20 15 CC What that's doing is zeroing the CDUs. And that - that guarantees you a fail. Okay, and as - as soon as you get the accurate time on that, we'll do a - a VERB 40 ENTER, and wait 10 seconds for the CDUs to recover.

10 02 20 45 CMP Okay. I'll do that, and then I'll call the steps out as I go through it.

10 02 20 49 CC Roger. And be advised that the CMC DAP is inoperative between the time you set the bit and the time you do the VERB 40.

10 02 21 00 CMP Also for 10 seconds thereafter.

10 02 21 03 CC Roger.

10 02 21 13 CMP Okay, we're in SCS. DEADBAND MIN, the RATE's LOW, limit cycles on, we've got the BMAGs uncaged. You're watching this too, John?

10 02 21 31 CC Okay, we're looking down here.

10 02 21 36 CMP All set. There's VERB 25 NOUN 7 ENTER, 12 ENTER, 20 ENTER, 1 - Is it NOUN? I am ENTER, RESET. Okay. Here we go; 5, 4, 3, 2, ENTER. I got 5 seconds.

10 02 22 12 CC Roger. That's a normal indication. That eliminates that as a possible source, so you can go ahead and do your VERB 40 and recover and go back to CMC control.

10 02 22 48 CMP Okay, back in CMC.

10 02 22 58 CC And, Ken, we're ready to get the ALPHA PARTICLE X-RAY COVER, OPEN.

10 02 23 34 CMP It was already open, Hank.

10 02 23 37 CC Roger. Copy.

10 02 23 38 CMP I think he wants to verify that.

10 02 24 05 CC Apollo 16, Houston. Like to get a check on the battery compartment.

10 02 24 14 CDR 2.7.

10 02 24 17 CC Roger. 2.7.

10 02 24 20 CDR Make it 2.65.

10 02 24 26 CC Roger.

10 02 36 05 CC Apollo 16, Houston. We need the X-RAY OFF for 2 seconds and then back ON.

10 02 26 19 CC The purpose of that, Ken, is to set the logic. Looks like it isn't set properly.

10 02 36 26 CMP Okay. You have it.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

10 02 51 16 CC Apollo 16, Houston. Since we just did a P52 a few minutes back, we'll scrub the one that's scheduled at 268 hours prior to the TV.

10 02 51 28 LMP Okay, Henry; thank you. We're setting the TV up now.

10 02 51 34 CC Roger.

10 02 52 17 CDR Okay, Hank; this attitude will be satisfactory for the - yeah, it'll be satisfactory for the TV also. Right?

10 02 52 27 CC Affirmative.

10 02 52 30 CDR Okay; fine.

10 02 59 27 LMP Houston, 16.

10 02 59 30 CC Go ahead.

10 02 59 34 LMP Hank, can we go S-BAND AUX TV to check - get this camera set and focused?

10 02 59 45 CC We need about 12 more minutes.

10 02 59 50 LMP Okay; we'll wait. We'll hold off. We got plenty of time.

10 03 06 47 LMP Houston, 16.

10 03 06 50 CC Go ahead.

10 03 06 53 LMP What - what's our velocity - inertial velocity and - and distance out right now?

10 03 07 03 CC Okay. You're 5516 feet per second and 108,880.

10 03 07 14 CMP Thank you, Henry! That was the nicest thing you could say.

10 03 07 23 CDR I'll split it with you.

10 03 10 39 CC 16, Houston. You can check out the TV now.

10 03 10 45 LMP Okay. Thank you.

10 03 16 08 CDR Okay; Houston, we got the gear all checked out ready to go whenever you are.

10 03 16 14 CC Roger. Roger. We've got just under 8 minutes to go.

10 03 19 17 LMP Hey, Hank, do you have a list of questions? Are you going to be reading the questions up?

10 03 19 24 CC That's affirmative.

10 03 19 30 LMP Okay; thank you.

10 03 24 24 CC Apollo 16, Houston. We're about ready to go here. You want to try to bring up the TV?

10 03 24 31 CDR Okay; it's in work.

10 03 24 57 CC Okay. We've got a picture now.

10 03 25 03 LMP Super! How does it look?

10 03 25 07 CC Looks pretty good.

10 03 25 08 CDR How does everything look to you?

10 03 25 18 CC Other than the fact you're looking pretty woolly now, that's not bad.

10 03 25 25 LMP Keeps you warm.

10 03 25 30 CC Apollo 16, the questions in this press conference have been prepared by newsmen covering the flight here at the Manned Spacecraft Center. I'm going to read them to you exactly as worded by the newsmen and in a priority specified by them. Question number 1 for John Young: A couple of times you were on hot mike and didn't know it, but how could a nice Florida boy like you say what you did about citrus fruit?

10 03 26 03 CDR That's a very good question. Wait'll you drink it day and night for 2 weeks, and - and let me know what you think. And for lunch, too.

10 03 26 15 CC Question number 2 - -

10 03 26 16 CDR I - I have an orange grove - I have an orange grove down in Florida, too, so I do like citrus, but citrus drinks are something else.

10 03 26 32 CC Question 2: When the CSM circularization burn could not be performed on schedule, did you think you wouldn't be able to land on the Moon?

10 03 26 47 CDR I thought - we all had serious doubts about whether we're going to be able to do it or not. Right?

10 03 26 56 CC Question number 3 in three parts. Were you surprised at the rocks and other formations at the Cayley site?

10 03 27 10 LMP I think we were. The - the original impression had been mostly volcanics to look for, and I don't think we found the - the highest percentage of volcanics as we had originally anticipated. So the rocks that we found were unique, that we had never seen before in any of the lunar samples, we feel, and so it was a surprise.

10 03 27 39 CC Do you think your geological training properly prepared you to describe them?

10 03 27 50 CDR I think so, under the circumstances. You see, most of the rocks are - were dust covered apparently by the - by the two impacts, North Ray and South Ray. It had just thrown a big blanket of dust out across there, and we saw very few rocks that were clean un - until we cut into them. And you don't want to take too much time to stop and whack off a piece of rock, because it's pretty hard to do in a pressure suit. So we were just describing them more by shape and softness and friability and things like that. And that really doesn't take a lot of training, but I think we've had adequate training to do this kind of a job.

10 03 28 40 CC Did you see anything specifically volcanic?

10 03 28 50 LMP As far as craters go, Hank, we think we saw two that had the shape we called endogenic that had the shape of very subdued old cinder cones or

something of that nature. They were - In other words, they were - look more like, well, sink holes, really, with the surrounding topography. They had no rim on them; and, to us, it looked like it might have been a source for some - volcanic activity way, way back.

- 10 03 29 27 CC Question 4: Several times at North Ray you mentioned, "Don't get too close to the edge." Did you think that if you had fallen in, you wouldn't have been able to get out?
- 10 03 29 39 CDR That's affirmative.
- 10 03 29 43 LMP You bet.
- 10 03 29 44 CDR If we had fallen in, we would not have been able to get out. That's correct.
- 10 03 29 50 CC Question 5: The heat flow experiment you broke was successfully fixed in simulation, although it was complicated and took a great deal of time. Do you think you should have tried to fix it or do what you did?
- 10 03 30 07 CDR I don't think we're qualified to make that decision. It was made by people on the ground that are far more qualified to do that sort of thing than we are. If - if we had been told to do that, we would have certainly done it.
- 10 03 30 23 CC Would you like to have been informed of the successful sinta - simulation and the trade-off factors involved?
- 10 03 30 31 CDR I - I still don't think that that's our decision-making process up there on the surface.
- 10 03 30 40 CC Question 6: You've had a lot of equipment trouble during this mission. Is there a common thread running through all these problems for which you could suggest an explanation?
- 10 03 30 56 CMP Yeah. I think space flight's kind of complicated. You got a lot of sophisticated equipment here that you're trying to get all working at one time. I think that's what we built a redundancy in for, and it seems to be paying off quite well.

- 10 03 31 12 CDR Yeah. I don't - I don't think there's any relation between any of these failures, one to another. I - I don't think there's any common thread. I agree with Ken. It's very complicated gear. It has to run for long periods of time, and you've got to expect some times that it won't run, and you got to know how to fix it, and that's why they send us on these trips.
- 10 03 31 37 CC Question 7 for Ken: Your observations of the landing site. Did you see the lunar module or the Rover, and did you see any differences between Cayley and Descartes?
- 10 03 31 51 CMP Okay. That's two distinct questions. First thing, did I see it? We never pointed the sextant at the landing site according to the Flight Plan because of the alterations we had. And there were two occasions, once when I thought I caught a glint of light, which I could not recognize as the LM but which came from the location where I think the LM probably was sitting. And that was very close to the position on my map that you folks read up to me. And once, as Rover was starting up on Stone Mountain, I just happened to be looking as they went by, and I think you were on the shift, Hank, and told me that they were hitting Stone Mountain, and I looked over there, and about that time I got another little flash of light, which is about all, with the 10-power optics we have, that - that I think you could expect to see. At no time could you see something you could identify.
- 10 03 32 46 CC The second part of that question was: Did you see any differences between Cayley and Descartes?
- 10 03 32 54 CMP Yes, I think there's a distinctly different morphology involved in these two units. Our preflight training is a little different in impression than what I think I saw; and, again, we have, like I say, a 10-power resolution. I think the - the real answer of what this material is, is going to lay in analyzing the data postflight. We have some good film records, and I think the - When you put that together with the rocks we picked up, we'll have a pretty powerful story that'll explain a lot of things we don't know now. But I think that there

are sections of material we called Descartes, particularly the material that makes up Stone and Smoky, and that stuff runs all the way south down to the old Descartes Crater for which the region is named. And that does look texturally entirely different from the Cayley formation.

10 03 33 46 CC

Question number 8, again for Ken: What were your impressions of the back side of the Moon, and were there any surprises?

10 03 33 57 CMP

Well, the impression of the back side is something I tried to collect from the time we got there until the time we left. And I'm still mulling that over in my mind. I've got a lot of transcripts we're going to have to read before I can psych it all out. But, in general, the impression I have is that the material on the back side, when you look at it on as small a detail as I could look, looks to me like it's very much like the material we find on the front side surrounding most of the big craters. The thing that looks different is that the back side is devoid of these large basins. We don't have the large mares; there's very little mare. In fact, on the back side the only mare we saw was really post-TEI, when we could look back and see a big area. But our groundtrack didn't pass over any mare in the daylight, so it took a while to psych that out. But I think that was a major difference was the absence of these large basins. And, on the back side, did we see surprises? Well, we went up looking for - with a suspicion that we might find material similiar to the Descartes formation located in several areas on the back side, and, indeed, I think we did. I think we saw an awful lot. I think we saw a lot that looks exactly like the Cayley. I think the things that I saw that were - Probably the most surprising thing was the - On the side of a crater called Guyot, which is just to the north and a little west of King Crater - which is right about the eastern limb of the Moon when you look at it from the Earth - we saw a big hole, I'll call it a crater, in the side of this - of the wall of this crater, and it appeared that there was material oozing out. And on our last couple of revs, we passed almost directly overhead, and it looked like

it was filled with a pool of material, and then this material had run down the side. And that's a formation typical of things you see like in Hawaii, something I have not seen anywhere else on the Moon, nor have I seen a picture of it.

- 10 03 36 03 CC Question number 9 for John and Charlie: At the tag end of EVA-3, you appeared to be having a high-jump competition. Who won, and how high do you think you jumped?
- 10 03 36 19 CDR No, we weren't having a competition. We were just showing you some of the things you could do with a 360-pound mass that only weighs 60 pounds, even slowed down, if you will, by the pressure suit. And I don't think anybody won. We were just demonstrating what you can do with the suit.
- 10 03 36 44 CC Question 10 - -
- 10 03 36 45 CDR I don't have any idea how we - how high we jumped. You'll have to look at the TV. Maybe - maybe a foot or 2 feet.
- 10 03 36 56 LMP It was too high for me.
- 10 03 37 02 CC Question 10: Could you - -
- 10 03 37 04 LMP Still have a picture, Hank?
- 10 03 37 05 CC - - Explain the circumstances surrounding the failure of the lunar module ascent stage to deorbit?
- 10 03 37 16 LMP I think that has to be worked out when we've looked at all the data - on the ground and discuss it with the flight controllers. At the present time, I have no idea.
- 10 03 37 29 CDR No, I don't either.
- 10 03 37 34 CC Question 11: To what extent - -
- 10 03 37 36 CMP Hank, could you verify that you still have a picture? We've lost our monitor, and just like to make sure there's nothing wrong with the camera.

10 03 37 45 CC We have a good picture. Question 11: To what extent did fatigue affect your performance? For example, do you feel that you would have been capable of a full 7-hour EVA-3, lift-off, and LM jettison all in the same day?

10 03 38 09 CDR I think that'd been pushing it a little.

10 03 38 12 CC Question 12, for each of you - -

10 03 38 16 CDR We could probably - we could probably have done it, but I think that'd really been pushing it.

10 03 38 25 CC Question 12 for each of you: What do you hope to tell your grandchildren as your most memorable moment of your trip to the Moon?

10 03 38 40 LMP Well, I'll start with that one, Hank. I have two impressions. The first is the dazzling beauty of Descartes - the surface. It was just one of the most awe-inspiring sights I've ever seen. And secondly, on the EVA, when you look away from the Earth - or the Moon - it's just the utter blackness of space. It really is black out there.

10 03 39 12 CDR Time number 53 you said that.

10 03 39 22 CMP Well, I guess I'm next then. I - I thought of - I knew someone would ask that question, and I've been asking that question, too. And I don't think I can put an impression. There's so many that we've crammed in in the last 12 days. And it seems like each one comes on top of the other one, and the immediate response that you come up with is "That's the most fantastic thing I've ever seen." In - in a lot of respects, it really is. There - there have been so many events and so many sights that, in my case, I'm going to have to sit and think about this one for a long time before I could ever pick out one, and then I'm not sure I'll ever be able to say that there was a unique thing, or a most memorable event. The whole thing has been a - just one series of very impressive, and I hate to use the word, but I don't know anything else except to say, "It's fantastic."

- 10 03 40 11 CDR I think Ken's got the answer. I think we've seen as much in - in 10 days as most people see in 10 lifetimes. And we certainly have enjoyed it.
- 10 03 40 26 CC Question 13: From an astronaut's point of view, would you discuss the possible operation - operational difficulties, besides language, to be overcome in the proposed joint U.S.-U.S.S.R. manned space flight? And would you have any suggestions to make?
- 10 03 40 47 CDR From an astronaut's point of view, I'd - I would not feel qualified to discuss it, other than to say that if language is a problem, I'll be glad to learn Russian. I think Charlie and Ken feel the same way.
- 10 03 41 06 CC Question 14: Did the potassium in your diet affect the taste of the food, and did it cause any other problems?
- 10 03 41 20 CDR That's a very good question, and I - I'm not sure we're qualified to - to say. We'll have to get back and talk to everybody. I - I don't think it - I didn't notice it being in there as far as taste was concerned. And I don't think anybody else did.
- 10 03 41 41 LMP Yeah. This is one of those things where you have to wait and take a look at - in our postflight medicals and see what they come up with as our body potassium level, because that's really the part that they're trying to work on, and I'm afraid the guys on the ground have a lot more data than we have on our physical condition, other than the fact that we know that we feel good.
- 10 03 41 59 CDR Yeah, I think - I think we've been very fortunate to do as much of the mission as we have, considering - considering how much we got slowed there. And I don't know whether potassium had anything to do with it or not, but if it did, I'm sure grateful that we were taking it.
- 10 03 42 22 CC Question 15 for John: What did you mean when you said, "Morale went up a couple of hundred percent after the successful TEI." Was it low?

10 03 42 41 CDR Yes, that's a - No, not particularly. It's just - It would sure be low if you didn't get off the TEI burn, I can tell you that.

10 03 43 00 CC Question 16 for each of you: Based on your experience, do you have any recommendations right now for the crew of Apollo 17?

10 03 43 15 CDR Yeah, I recommend they enjoy it as much as we did. I'm sure they will, because, I tell you, we really have - we really have had a lot of sights to see. I'll admit that, in a lot of cases, we worked hard, and - and I suppose the people on the ground were able to tell that. But we got all the support in the world from the - MCC-Houston. I - I mean, I could tell, from every decision that came up from the ground, that there had been a lot of work put into it, and all around the country that there were a lot of wheels turning and people working late hours and solving these problems. And I'm just really happy that Ken, Charlie, and myself got to do this. And I think it's a wonderful experience.

10 03 44 06 CC That was the last question, John. We thank you very much, and thank you for the kind comments.

10 03 44 15 CDR Well, let me just say one thing, Hank, and that is - Mr. Descartes said it. He said, "There's nothing so far removed from us as to be beyond our reach, or so hidden that we cannot discover it." And you all know Descartes was a French mathematician and philosopher for whom the region was named. And I guess, really, the story of our mission so far is we've been out testing his theory. My personal assessment of where we are right now, as soon as we get the rocks back in the LRL, we'll be making headway toward proving he was right.

10 03 45 00 CC Good show, John.

10 03 45 04 LMP Okay. Hank, as the LEB sinks slowly into the distance, we'll say goodbye.

10 03 45 41 LMP Houston, 16.

10 03 45 43 CC Go ahead.

10 03 45 45 LMP Okay. Hank, you want S-BAND AUX back to SCI?

10 03 45 50 CC Affirmative.

10 03 45 55 LMP Okay; you got it.

10 03 46 02 CC Nice job there, guys.

10 03 46 07 CDR Thank you, sir.

10 03 46 45 CC Apollo 16, if you'll give us ACCEPT, we'll give you a new state vector.

10 03 46 52 CDR Roger.

10 03 48 38 CC Apollo 16, looks like we're getting some stratification in the H₂ tanks. Would you take the H₂ fans on for a minute and then back off again?

10 03 49 05 CC The computer's yours, 16.

10 03 49 15 LMP Okay, Hank; and we've got the fans on.

10 03 49 18 CC Okay. Thank you, Charlie.

10 03 50 25 LMP Okay; your fans are off.

10 03 50 27 CC Okay; the tanks look good now.

10 03 59 18 CC Apollo 16, Houston.

10 03 59 22 CMP Go ahead.

10 03 59 23 CC Roger. I got a sort of an outline of our plans here for the rest of the day. You might want to jot these down on your scratch pad, Ken, and then you can operate on the Flight Plan.

10 03 59 35 LMP Okay; Stand by.

10 04 00 36 CMP Okay. Hank, why don't you go ahead?

10 04 00 40 CC Okay. In absence of any thermal problems, this Sco X-1 we're in now is going to run until 270:30.

10 04 00 52 CMP Understand; 270:30.

10 04 00 55 CC Roger. And at the termination - or at 270:30, we want you to immediately maneuver to the Skylab attitude, Skylab contamination, and, as soon as you get in attitude, do the photo sequence B - Skylab contamination photo sequence B - and Skylab dump sequence. And do those as quickly as possible. And, in the dump sequence, number 3, it now reads "Do it 30 minutes after sequence 1." Make that "15 minutes after sequence 1."

10 04 01 36 CMP Okay; we'll stay with Sco X-1 until 270:30. Then we'll go to Skylab photo sequence B, and we'll press right through that and the dump sequences. And we'll do dump sequence number 3 at 15 minutes instead of 30 minutes, and we're ready to press on.

10 04 01 54 CC Okay. Then, after that, maneuver immediately to attitude of NOUN 20 per roll, 128, 042; and we want to do the ecliptic AUX PTC with a minus 0.3 rate and a 2-degree dead band. And that's what we started at 264 hours when we got the glitch.

10 04 02 27 CMP Okay. You want the - the completion of the dump sequences; you want to go to NOUN 20 roll, 128 pitch, 042 in yaw, which will start the ecliptic AUX PTC mode. We'll use 2-degree dead band and minus 0.3 of a degree per second rates.

10 04 02 45 CC Roger. And it doesn't say how long we're going to - -

10 04 02 49 CMP I can use the thruster configuration I have now.

10 04 02 52 CC That's affirmative. Use the same con - thruster configuration we had before, and when we finish that sequence - and I'll get you a time on that a little later how long we do that - we're going to go to the ecliptic AUX PTC for the Cyg X-1 photos. And that'll be - at 273:15, we want to do that.

10 04 03 17 CMP Okay. Hank, I didn't follow that. I thought we were in the ecliptic AUX PTC at - for this earlier maneuver. So - say again what happens at 273:15.

10 04 03 27 CC At 273:15 - Excuse me; I may have - I read it to you wrong, Ken. We want to go to the Cyg X-1 point per the Flight Plan.

10 04 03 41 CMP Okay; at 273:15, you'd like to go to the Cyg X-1 per the Flight Plan.

10 04 03 46 CC Roger. And we want to continue with the 0.5 - degree per second rates in these maneuvers to try to make up as much time as possible until we get back on the Flight Plan at 273:15. And, if we have any thermal problems, just to read you in on what we're thinking, we'll scrub the Skylab contamination first, and the ecliptic AUX second, as required.

10 04 04 13 CMP Okay. When you say Skylab contamination, you talking about both the dump and the sequence B, or just - are you referring to sequence B?

10 04 04 23 CC It'll be the whole works, if we have a thermal problem.

10 04 04 30 CMP Okay.

10 04 04 33 CC And that's our plan, Ken. Is there any question on that?

10 04 04 39 CMP No; I think I understand what you want to do.

10 04 04 41 CC Okay.

10 04 05 25 CC Charlie, we've got a couple of very special guests here would like to see your biomed, and they guarantee they'll be able to understand it.

10 04 05 41 LMP Boy, you got me, Hank. It'll be 15 minutes before I can get it up.

10 04 05 48 CC Roger. Understand.

10 04 05 51 LMP Oh, I know who you're talking about. Good. Thank you.

10 04 05 56 CC You're a little slow at that, Charlie.

10 04 06 00 LMP Yeah, it took me a while there. Thank you. Tell them "Hi."

10 04 06 22 CC Are you going to do it, Charlie?

10 04 06 26 LMP Say again?

10 04 06 28 CC Are you going to do it?

10 04 06 31 LMP Yeah, I can get some sensors on.

10 04 06 33 CC Okay.

10 04 06 46 CDR Well, while we're waiting in the meantime, I can guarantee you old Charlie's alive and well.

10 04 06 54 CC Roger. By the way, you guys did a - did a great job here on that show.

10 04 07 03 CDR Thank you, Hank. You - you asked pretty mean questions, I'll tell you that.

10 04 08 59 CC John, the truth is the backup crew wrote those questions. And I got your midcourse 7 pad and entry pad.

10 04 09 09 CDR Roger; wait a second.

10 04 09 21 CMP And, Hank, we just completed our EMS check, and it works like a champ.

10 04 09 25 CC Outstanding.

10 04 09 40 CDR Okay. Go ahead for midcourse 7.

10 04 09 43 CC Roger. MCC-7, RCS/G&N; 27318; NOUN 33: 287:22:56.28; NOUN 81, minus 0003.1, all zips, minus four balls 1; 102, 126, 040; H_A is NA, plus 0021.7; 0003.1, 0:07, 0003.1; sextant star 13, 312.7, 33.7; boresight star NA; minus 007.1, minus 156.17; range to go, 1045.9, 36276; 290:23:59; Sirius and Rigel: 219, 166, 313. Four jets, plus-X. Comments: EMS not biased for drift; PTC REFSMMAT.

10 04 12 12 CDR Okay. MCC-7, RCS/G&N; 27318; hours, 187:22:56. 28 [sic]; minus 0003.1, all balls, minus 0000.1; 102, 126, 040; H_A is NA, H_P is 21.7; DELTA- V_T is 3.1; burn time, 7 seconds; DELTA- V_C is 3.1; sextant star 13, plus 312.7, plus 33.7; not applicable on the boresight; latitude, minus 007.1; longitude, minus 156.17; 1045.9, plus 36276; 290:23:59. Sirius

and Rigel are set stars; 219; 166; 313. Four jets,
plus-X. EMS not biased for drift and the PTC
REFSMMAT.

10 04 12 22 CC Roger, John. And would you reread the NOUN 33?
10 04 13 28 CDR 287:22:56.28.
10 04 13 32 CC Roger. Good readback.
10 04 14 56 CDR Okay; you want to give me the entry pad?

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

10 04 15 03 CC Okay. MIDPAC; 000, 153, 000; 290:06:32, 267; minus 00.71, minus 156.17; 06.9; 36196, 6.50; 1045.9, 36276; 290:23:32; 00:27; NOUN 69 is NA; 04.00, 02:02; 00:16, 03:32, 07:44; sextant star 25, 151.6, 26.2; boresight NA; lift vector UP. Comments: use nonexit EMS pattern. RET for 90 K is 6 plus 05; RET for the mains, 8 plus 30; RET landing, 13 plus 22. Constant-G entry, roll right. Moonset at 290:20:26. EMS entry reverse bank at 20 000 foot per second. Okay. These entry angles assume the crew has done the procedure to obtain the entry REFSMMAT. And that's at the bottom of G&C Checklist 4-18. And you must realign the platform to the entry REFSMMAT, or you'll go into gimbal lock during P67.

10 04 17 59 CDR Okay. Say again the page that's on?

10 04 18 02 CC G/4-18.

10 04 18 11 CDR And it also assumes MCC-7?

10 04 18 19 CC I'm sorry, John. Somebody said something to me. What was your question?

10 04 18 22 CDR It assumes MCC-7, right?

10 04 18 28 CC That is affirmative.

10 04 18 50 CDR Okay. The MIDPAC area; roll, zero; pitch, 153; yaw, zero; GET horizon check 290:06:32, pitch 267; latitude, minus 00.71; longitude, minus 156.17; 6.9, maxs Gs; 36196, minus 006.50; plus 1045.9 plus 36276; 290:23:32; 27 seconds; D zero, 4.00; V_{circ}, 2:02; 0:16, 3:32, 07:44; 25, 151.6, 26.2; lift vectors UP. Comments: nonexit EMS pattern. RET 90 K, 6 plus 05; RET MAINS, 8 plus 30; RET landing, 13,22. Constant-G entry, roll right. Moonset, 290:20:26. EMS entry reverse bank at 20 K feet per second. And this assumes the crew procedure to get the entry REFSMMAT on page G/4-18.

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10 04 20 25 LMP And also assume MCC-7.
10 04 20 27 CC Roger. And you must have the entry REFSMMAT, or you'll go into gimbal lock.
10 04 20 31 CDR Okay. We got the picture.
10 04 20 37 LMP And Hank. I'm up on biomed and no - arrhythmias - don't count.
10 04 20 53 CC They say everything looks fine.

(NO COMM FOR 35 MINUTES)

10 04 55 02 CC 16; Houston. We'd like the GAMMA RAY SHEILD, on now, please. And during the next few hours, we'll be calling in real time all the GAMMA RAY SHIELD calls and the GAINSTEP calls.
10 04 55 19 CDR Okay, Don. Thank you.
10 04 55 23 CC Roger.
10 04 55 24 CMP Good afternoon, Donald.
10 04 55 26 CC How are you doing?

(NO COMM FOR 49 MINUTES)

10 05 44 07 CMP Don, we're on our way to the Skylab contamination attitude. Is that okay?
10 05 44 10 CC That's affirmative.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

10 06 09 57 CC 16, Houston. When you get into this maneuver to the second attitude, we'd like to go MAPPING CAMERA door, OPEN, and a GAINSTEP up four steps. And then Stu's got some words for you here on the use of EMP 509 for entry.

10 06 10 17 CMP Okay. Stand by.

10 06 10 48 CMP Okay, you've got the MAPPING CAMERA door OPEN, and you've got the GAINSTEP up four steps.

10 06 10 54 CC Roger. Copy.

10 06 11 23 CMP Okay. We're on our way. How about giving first a couple of philosophy words on 509, and then, if there's something for us to copy, we'll come back and catch it later with our books.

10 06 11 35 CC Okay, Ken. I think we'll not copy anything at this time or make any changes to the Entry Checklist. I would just like to give you a few words on it, let you mull it over. If you have any questions, and then tomorrow morning we'll - we'll make the - the changes. Basically, we're recommending the use of 509 during entry. And, of course, the TVC relay that we've chased around will not be activated during entry. However, all the time there's - there's been this doubt that we can say, specifically, that's the relay. We think it's a high-probability source, however, in lieu of today, in particular. We - we're not sure that - we - we can't rule out that some other EMI might - might glitch that CDU. They've taken a good look - and - look at the wiring in the CDU, and, as it turns out, the 90-degree bit in CDU Z is the most sensitive to being set by EMI. And this bit is wired differently that - than the other bit. So, to preclude going into coarse align, we - we'd like to use 509 for entry. And, of course, this doesn't prevent any glitches, but it does prevent you from locking up the platform with the - with the coarse-align routine. What this is going to - -

10 06 13 13 CMP ... - -

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- 10 06 13 14 CC - - what this is - Go ahead, Ken.
- 10 06 13 19 CMP I was thinking about the things that happened today. We didn't have to do anything. It didn't lock up anything, and it didn't look like even zeroing the CDUs had any effect on it.
- 10 06 13 32 CC We agree - we agree to that - -
- 10 06 13 33 CMP ... with 509, if we have a glitch, what would - what would you anticipate would be the proper thing to see and the proper response?
- 10 06 13 42 CC Okay, now. As we've said before, the only thing 509 will do for you is to prevent the CMC from going into the coarse-align routine. If you, indeed, get a glitch, you're going to have the CDU indicating a wrong attitude. This would be reflected, most probably, in your NOUN 20s, and you could expect the spacecraft, if you're under CMC control, to try to chase off after this NOUN 20. And, if it is the 90-degree bit, you would - the 509 would keep you from going into a coarse align. So, if the spacecraft moves, you would not lose your attitude reference, and you could do a VERB 40, zero the CDUs, and be back in business again. That - that's the only - the only thing that we have to offer on the thing is to try to prevent this coarse align, if you get the 90-degree glitch. Now, if you get a glitch in roll - you could get a glitch in roll or pitch. And, under CMC control, it would see this as a - as a erroneous NOUN 20 and do whatever is appropriate. If you're in attitude hold, it's going to try to - try to chase it.
- 10 06 15 16 CMP Okay.
- 10 06 15 17 CC Okay. And, as I said, let's don't make any changes to the checklist. Let's massage this overnight. But, basically, what you're going to do is continue to use SCS control for your P52s, and then we'll - As we start into our entry program, we'll make one entry as we go into P61, and then 509 protection will be in once average g and P61 comes back up. And then, as you activate the entry DAP, this is going to kill 509, because it - it resets the DAP registers. So after you enter the entry DAP, you're going to have to do your VERB 21 NOUN 46 and put - put

your three back in R-1 of NOUN 46. The procedures look pretty straightforward, Ken. There's - like I say, these two spots where you need to make these entries, they look real straightforward, and it's the same numbers that - that you've been using. And once you have put 509 back in after activation of entry DAP, then it will be in throughout the rest of the entry.

10 06 16 48 CMP Okay. Sounds like you guys have been working again.

10 06 16 52 CC Well, this is (laughter). You know what, this is really chasing a - chasing a spook bit here, but I guess we're probably getting a lot of experts on - on CDUs, and it looks like the - the 509 is - is the way to go. And the question you might have is - well, why didn't we do 509 during the - during the rendezvous if that's what we're concerned about? And there I just didn't want any glitches, and I did want to keep the gimbal lock protection in. Now, something maybe we haven't discussed with you, that if 509 is in and you truly go through your 90 or 270 yaw, you will, most probably, damage the IMU. And you hear the words, "you'll break it," you'll hear the words, "you'll render it unreliable," so forth. So as long as 509 is in, you do not have your true gimbal lock protection because the CMC will never go to coarse align. And I didn't feel it was worth doing that - taking any sort of chance on the platform until we've got down to the entry point, but, once we're here, it's sort of superfluous. If - if you - if you go there, you've lost your reference anyway, no matter what you've done to the - done to the platform, but you should be aware that you have lost this protection.

10 06 18 20 CMP Okay. Sounds real good, Stu. Thank you, sir.

10 06 18 23 CDR Yeah. Good work, Stu. Thank you.

10 06 18 27 CC Okay. And, if you don't have anymore questions on this, I'll - I'll get off the loop, and we will have these specific changes to the Entry Checklist for you tomorrow.

10 06 18 40 CMP Okay. Don't stay up all night.

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10 06 18 42 CC No sweat. Don't you either. We'll see you.

10 06 20 55 CC 16, your rates look good.

10 06 21 05 CDR Roger. The pictures are being snapped.

10 06 43 18 CC 16, would it help you if we called you to advise you when your rates are sufficiently damped in these different Skylabs.

10 06 45 20 CMP Don, did you call us?

10 06 45 23 CC Yeah, we just wanted to know if we could help you by advising you when your rates are damped, so you wouldn't have to wait for them.

10 06 45 33 CMP No, we - we're having to restart the sequence, but we'll get it this time, and we'll be pressing on.

10 06 45 37 CC Roger.

10 06 48 48 CDR Houston, when we started the Skylab dump contamination, it didn't - it dumped a little out the side hatch and then it must have flashed - froze - or something, because it stopped immediately. And so Ken is now removing the screw to see if it's - to see if it's still flowing.

10 06 49 11 CC Roger. We copy that.

10 06 49 20 CDR Okay. It's not flowing right now.

10 06 49 21 CC Roger. Understand.

10 06 49 31 CDR The heater had been on about - about 10 minutes before we started.

10 06 49 43 CC I'm not sure what you mean by it "had been on about 10 minutes before you started." You mean the dump had started?

10 06 49 50 CDR Yeah, before we started dumping.

10 06 49 53 CC Okay. The bag had been on before you started dumping.

10 06 49 57 CDR No, not the bag, the heater.

10 06 50 00 CC Okay.

10 06 50 19 CDR Okay. It's flowing again.

10 06 50 20 CC Roger. Understand.

10 06 50 30 CC And, John, I guess using that heater's about the only thing we know to do. If that doesn't work, we don't have an answer for you.

10 06 52 47 CDR It's working fine now, Don.

10 06 52 49 CC Okay. Thank you.

10 07 14 33 CC 16, Houston. Since we're going into PTC pretty quick, there are about four things we need to get done.

10 07 14 45 CMP What are they?

10 07 14 47 CC Okay. We need to close the door on the MAPPING CAMERA/LASER ALTIMETER and on the X-RAY ALPHA PARTICLE, and we need to make about a 1-minute water dump. We need to dump 5 percent. And we need to get the GAINSTEP up four steps.

10 07 15 24 CMP Don, we have another 4 minutes before we take our last sequence of photos here, and you don't want to take a water dump until we get through with that, do you?

10 07 15 36 CC Negative. You can hold off until after the photos.

10 07 15 41 CMP And we've got the GAINSTEP set, and we've closed the doors.

10 07 15 45 CC Roger.

10 07 16 43 CMP Okay, Don. You said something about PTC. We show we're going to the - this Cygnus X-1 attitude next.

10 07 17 03 CMP That's really not what you were supposed to do, though, here. You want us to go to this - -

10 07 17 07 CC Roger.

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10 07 17 09 CMP We want to go to this auxiliary ecliptic first.
10 07 17 12 CC That's affirmative.
10 07 17 13 CMP Is that correct?
10 07 17 14 CC That's affirmative.
10 07 17 15 CMP Okay.
10 07 22 41 CMP Okay, Don. We're ready for a dump.
10 07 22 45 CC Okay. Go ahead.
10 07 22 50 CMP You want us to dump 5 percent. Is that correct?
10 07 22 52 CC That's affirmative. It should run about 1 minute.
10 07 22 57 CMP Okay. We were reading 62 percent when we started.
You want us to go to 52?
10 07 23 06 CC 57, Ken.
10 07 23 10 CMP Okay.
10 07 24 01 CMP Don, I think we're through with the water dump.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

10 07 24 07 CC Okay. It looks good from here. And 16, we'd like to get into a roll as soon as we can because we're running kind of close to the limit on some of the tips.

10 07 26 15 CMP Jet configuration okay, Don?

10 07 26 19 CC That's affirmative.

10 07 26 24 CMP You don't want us to bring D-2 on for the spinup?

10 07 26 30 CC Roger. Bring a couple on for the roll.

10 07 27 43 CC Let's go PITCH minus 40 and YAW 90 on the HIGH GAIN, please.

(NO COMM FOR 23 MINUTES)

10 07 50 55 CC 16, we got about 10 items here to talk about. Most of them are real short. We can either try to get to them now, or we can wait a while.

10 07 51 10 CDR We'd like to wait a while. We're in the midst of our reentry stowage.

10 07 51 16 CC Okay. One of the items here has to do with reentry - with entry stowage. We'd just like to verify, or have you tell us about any changes that you're making relative to the normal stowage, that is, in accordance with page 2-17.

10 07 51 34 CDR That's where we're working on right now, and we'll be - certainly gonna do that, Pete.

10 07 51 40 CC Okay.

10 07 53 49 LMP Okay.

10 08 00 56 LMP Houston, 16.

10 08 00 58 CC Go ahead 16.

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10 08 01 01 LMP Pete, we're busy with this entry stowage. Could you keep us on the Flight Plan if something comes up.

10 08 01 06 CC Okay. Will do.

10 08 01 08 LMP Thank you.

10 08 12 18 CC 16, we're having some thermal problems in the SIM bay. We'd like to stop the roll at 274 degrees, and get the Sun on the SIM bay.

10 08 12 33 CDR Roger. Stop the roll at 274 degrees, and get the Sun on the SIM bay.

10 08 12 37 CC That's affirmative. Thank you.

10 08 16 44 CDR Okay. You've got 274 about there, Pete.

10 08 16 49 CC Okay, John. Thank you.

10 08 40 27 CC 16, we think we may have stratification in H₂ tanks 1 and 2. Would you give us about 1 minute on the fans?

10 08 40 35 CDR Roger. H₂ tanks 1 and 2, 1 minute on the fans.

10 08 44 55 CC 16, we noticed the cabin pressure drop about a tenth and the O₂ flow go up a little bit. Are you doing something that might have caused that?

10 08 45 09 LMP Negative. Sure not.

10 08 45 14 CC Okay. And also we have a maneuver for you. We'd like you to do the VERB 49 maneuver to the X-ray pointing thermal attitude cyg X-1. It's at 273:15 in your Flight Plan, but I'll read you the angles, if you want.

10 08 45 31 CDR Appreciate it.

10 08 45 33 CC Okay. It's 278, 295, and 310. And the HIGH-GAIN angles are PITCH 11 and YAW 330.

10 08 45 56 CDR Roger. PITCH 11; YAW 330; attitude 278, 295, and 310.

10 08 46 05 CC That's affirmative.

10 08 46 07 CDR Okay. We're going there now.

10 08 46 09 CC Okay. And we're watching the cabin pressure. It's steady again now.

10 08 46 20 LMP Okay, Pete. It looks about like where it's been to us. We think it's been hanging a little bit below 5.

10 08 46 30 CC Yeah. That's affirmative, and EECOM says that could be the cabin regs making up that's causing what he's seeing.

10 08 46 39 LMP Okay.

10 08 50 07 CDR Okay, Houston. You want us to dump the OPS again? We would like to finally stow it, and we can dump it now if you want.

10 08 50 15 CC Okay. We would like to use the OPS to get the cabin up to 5.6, and then leave it in bleed flow through the sleep period.

10 08 50 26 LMP Okay.

10 08 50 53 CDR That bleed flow means leaving the hose in the port and leave it on, right?

10 08 51 00 CC Stand by a minute, John. I'll check.

10 08 51 42 CC 16, we need you to check that dump in the hatch where you just made the Skylab dump from. We're still showing a little high on the O₂ flow.

10 08 51 58 LMP Flow just went to 0.2 here, Pete.

10 08 52 02 CC Yeah. Roger. EECOM's just calling it. We're seeing it drop off here now.

10 08 52 19 CC Okay. On the OPS configuration, we wanted the OPS connector locked in the stowage plate, and turn the OPS ACTUATOR to ON. That's after you dump the cabin up.

10 08 52 38 CDR Okay. That's what we'll do.

10 08 54 19 CC 16, on the HIGH GAIN, I think the angles we called up are wrong. Let's go PITCH 55, YAW 323.

10 08 54 42 CDR Okay. We're at the Sco X-1 attitude, as you know.

10 08 54 46 CC Roger. And go WIDE on the HIGH GAIN.

10 08 55 04 LMP Pete, it doesn't seem to be acquiring in REACQ. I stepped it through.

10 08 55 14 CC Okay. And Charlie, did you copy to try 55 degrees on pitch and 323 on yaw? And the first set of angles we called up were not correct.

10 08 55 24 LMP Okay. My mistake.

10 08 55 49 CC No, Charlie. That was our mistake. The first set of angles we called up were wrong.

10 08 55 56 LMP Okay. 55 and 323.

10 08 55 58 CC Affirmative.

10 08 56 18 CDR Okay, Houston. We got it turned on. It's got about 200 pounds in it; it's just barely making any noise.

10 08 56 25 CC Roger.

10 08 57 02 CC And 16, would you give us GAMMA RAY SHIELD OFF, please?

10 08 57 07 LMP Okay.

10 08 57 24 CC Okay.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

10 08 59 03 CC 16, with the OPS flow, we're still looking at an O₂ flow that is higher than normal. And we'd like you to take a look at the nozzle on the hatch window there and make sure that - on the hatch there and make sure that it's secured.

10 08 59 50 LMP Okay, Pete. We'll reinstall it. I got the cover hand - tight as I can get it, and we'll take the cover off and reinstall the nozzle.

10 08 59 59 CC Okay, Charlie.

10 09 03 24 CC Okay, Charlie. Looks like the O₂ flow is down to about what we'd expect now.

10 09 03 31 LMP Okay, Pete. We're cleaning off the suit return hoses and the inlet to the suits circuit.

10 09 03 48 CC Roger.

10 09 05 47 CC 16, would you verify the H₂ tanks 1 and 2 FANS OFF, please?

10 09 05 54 LMP That's affirmative.

10 09 05 56 CC Okay. Thank you.

10 09 11 35 CC 16, we need the X-RAY OFF for 2 seconds and then back ON. We're trying to keep it out of the attenuate mode for the next few minutes here.

10 09 11 45 CDR Roger. You have it, Houston.

10 09 11 52 CC Thank you.

10 09 19 40 CC 16, would you verify that the X-RAY/ALPHA COVER is OPEN?

10 09 19 50 LMP We got it closed.

10 09 19 54 CC Okay. Would you open it, please?

10 09 19 56 LMP It's open now, Pete.

10 09 19 58 CC Roger. Thank you.

10 09 27 19 CC 16, we're asking for some stuff that's at 273:50 in the Flight Plan. We need a report on the command module RCS injector valve temps.

10 09 27 47 CMP Okay. It's in work.

10 09 27 49 CC Okay. Do you want me to give you a callout on the systems test meter positions or not?

10 09 27 55 CDR No, we can figure that out, probably.

10 09 28 13 LMP Pete, 5 Charlie is 4.3; 5 Delta is 4.6; 6 Alpha is 4.2; 6 Bravo is 4.4; 6 Charlie is greater than 5; and 6 Delta is 4.4.

10 09 28 44 CC Roger. Copy. And also, we'd like to remind you of a LiOH canister change, 23 in the Bravo and stow 21 in A-5.

10 09 28 58 LMP Okay.

10 09 30 50 CC 16, we need the GAMMA RAY, SHIELD, ON.

10 09 30 59 LMP Okay. You have it.

10 09 31 02 CC Roger. Thank you. And, Charlie, you let us know when you get the LiOH canister changed.

10 09 31 12 LMP Being done right now.

10 09 31 14 CC Roger. And 16, we've got a new attitude for you. The angles are 164, 134, 035. HIGH GAIN angles, pitch minus 23, yaw 101.

10 09 31 41 CMP We got it, Pete. Thank you.

10 09 31 50 LMP Okay. The LiOH canister's changed.

10 09 31 53 CC Roger. Copy.

10 09 39 16 CC Okay, 16. Let's try to bring the high gain up.

10 09 57 30 CC And 16, I'm still sitting here with about 6 items, a couple of which require readings. Most of them just require a little talking. Anytime you can get to it - well, let's get started on it.

10 09 57 42 LMP Okay. Just as soon as we get Ken on comm.

10 09 57 45 CC Roger.

10 10 01 03 CMP Hello, Houston.

10 10 01 05 CC Go ahead, 16.

10 10 01 08 CMP Understand you have a few words.

10 10 01 10 CC Roger. First of all, I guess we wanted to check with you on any changes to entry stowage, and particularly the LiOH canisters, to check that they are stowed according to the entry stowage list.

10 10 01 26 CMP LiOH canisters are stowed according to the entry stowage list, and the entry stowage is essentially complete except for the items that we need to work out tomorrow. And, of course, tying down the suit under the right-hand seat.

10 10 01 46 CC Roger.

10 10 01 48 CMP Okay. There's a couple of things that we couldn't stow as per nominal. They are the fecal bag and the goodie bag. And we intend to tie those down in the LEB. The goodie bag is the LM Data File.

10 10 02 07 CC Roger. Understand LM data file and the fecal bag are gonna be tied down in the LEB.

10 10 02 12 CMP That's affirmative. And we know we can tie those down enough to withstand any kind of reentry you might even help L over D. I don't - You know how much the LM Flight Data File weighs? Less the Contingency Checklist and the Timeline Book. And that's a total - mostly the total weight of that bag.

10 10 02 31 CC Roger. Okay. We - we also need the battery compartment reading one more time before you go to bed tonight. And I guess if you want to, we could get that out of the way now.

10 10 02 49 CMP 2.75.

10 10 02 50 CC Understand, 2.75.

10 10 02 55 CMP That's affirmative.

10 10 03 09 CC Okay. And, Charlie, we want you on the biomed tonight. And it looks like we're gonna have to reverse the top two sensor wires, because apparently - either you got them hooked up backwards, or we're getting the signal turned around somewhere in the transmission.

10 10 03 32 CC Charlie, that's - we want to reverse - -

10 10 03 34 LMP Yeah, is the lon - The long one's the ground, isn't it?

10 10 03 39 CC Negative. Stand by just a minute.

10 10 03 55 CC Okay, Charlie. The long one goes to the sternum, and the branching one goes off to the right.

10 10 04 11 LMP Well, I got them on like I been wearing them all week.

10 10 04 20 CC Roger.

10 10 04 31 CC Okay. And the surgeons wanted you to know they appreciated your status - the good status report you gave them this morning. And they hope you can find time to give them a good one again tomorrow morning.

10 10 05 10 CC Okay. We got one other item. We just want to make sure that we don't get any uncoupled attitude control after 277 hours GET. That's to ensure that we get precise tracking for at least 10 hours prior to midcourse 7.

10 10 05 31 CMP Okay. I'm as interested in that as you are.

10 10 05 34 CC Roger.

10 10 05 51 CC Okay. And I guess we've got some news items here for you. And I think that'll wrap it up.

10 10 06 01 CDR Okay. Go ahead.

10 10 06 04 CC

Okay. I guess the biggest news was that President Nixon went on national television tonight to discuss the military situation in Vietnam. He said efforts toward Vietnamization of the war were proving effective. And he announced additional U.S. troop withdrawals of 20 000 men by July the first. At the same time, the President characterized the current North Vietnamese advances into South Vietnam as an open invasion. And he said U.S. air and naval forces will continue to attack military targets in North Vietnam to assure the safety of remaining U.S. forces in South Vietnam and to prevent a military takeover of South Vietnam by the North. The President also said U.S. negotiators would return to the Paris peace talks, as he put it, "To get on with the constructive business of obtaining peace." "The first order of business," he said, "will be to get the North Vietnamese to stop their invasion and to secure the release of Americans being held prisoner." And we got an item here on Apollo 16. The headline says, "Space-ship Speeds Up, Zeros in on Earth." Apollo 16 picked up speed today from the gravitational embrace of Earth as scientists awaited the delivery of samples that may rewrite the history of the Moon. Astronauts John Young, Charles Duke, and Thomas Mattingly II, were due to enter the atmosphere of Earth Thursday afternoon at 24 000 miles per hour. Apollo 16 is returning 240 pounds of Moon samples. But the flight's lunar legacy consists of more than just rocks. Mattingly spent an hour walking in space Tuesday to retrieve two holders containing the exposed film of powerful mapping and panoramic cameras. With only one mission remaining in the Apollo Program, the cameras' pictures, taken from lunar orbit, are expected to provide much knowledge about areas of the Moon that man will not visit for a long time. And a little - little bit on the Democratic campaign here. "Muskie dealt 1-2 blow by McGovern in Massachusetts and HHH in Pennsylvania. Senator George McGovern, triumphant in Massachusetts, and Senator Hubert H. Humphery, the Pennsylvania victor, joined head-on political battle today after dealing a 1-2 blow to the Presidential campaign of Senator Edmund Muskie. Muskie finished a far-back second in Massachusetts, and managed only a virtual third-place tie with McGovern and Wallace in Pennsylvania where he

concentrated his campaign. Alabama Governor George C. Wallace got 21 percent with 97 percent of the precincts tallied in Pennsylvania, after staging a 1-day campaign. Massachusetts gave Wallace 8 percent of the vote in partial returns, just ahead of Humphrey. Next Tuesday McGovern and Humphrey confront each other, Muskie, and Senator Henry M. Jackson of Washington in Ohio battle for 153 convention delegates." A couple of items on - on the reentry area. The USS Ticonderoga, the primary recovery ship for Apollo 16, has arrived at the new splashdown site, 1500 miles south of Honolulu. The forecast for Thursday splash was unlimited visibility with temperatures in the 80s. Seas are expected to be 1 to 3 feet with swells to 5 feet. And the weather here in Houston is low tonight in the low 60s, high Thursday in the low 80s, and the weather's been clear to partly cloudy today. And the Houston Astros did it again. They won their eighth consecutive baseball victory last night, a hard-fought 5 to 4 verdict over the Chicago Cubs. The win kept Houston in a tie with Los Angeles for first place in the National League West. And let's see, I guess we'll close - -

- 10 10 09 57 LMP - - Go get 'em. It's a big "Atta boy" for the Astros.
- 10 10 10 01 CC Roger.
- 10 10 10 15 CC And we got one last item here, which is entitled "Slick Trick by an Eager Beaver" from Flint, Michigan. Dedication to duty is fine, say Flint city officials, but the man who turned several miles of city streets into an ice rink carried that concept too far. He had been told to use the city water truck to wash the streets Tuesday morning. He did. Dutifully ignoring the 3 degrees below freezing temperature. His trail was clearly marked by irate drivers trying to navigate their dented cars over the glassy surface. Officials said salt crews were dispatched, but the Sun came out and melted the problem before they did.
- 10 10 11 06 LMP Thanks a lot, Pete.

10 10 11 08 CC You bet.

10 10 11 09 CDR Yeah. That's the way - that's the way the Rover drives. Like it's on ice.

10 10 11 14 CC Roger.

10 10 11 25 CMP We appreciate that good news, Pete.

10 10 11 28 CC Roger.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

10 10 45 30 CMP Hey, Don.

10 10 45 33 CC Go ahead.

10 10 45 37 CMP What would you folks think about my going to whatever attitude I'm going to do PTC in tonight and get it all damped and ready to set up?

10 10 45 45 CC Stand by a minute.

10 10 45 48 CMP Okay.

10 10 46 25 CC Okay, Ken. You can go ahead.

10 10 46 32 CMP Okay; and that's a PITCH of 43 and YAW of 335. Is that affirm?

10 10 46 38 CC That's affirmative.

10 10 46 41 CMP Okay, sir. And this PTC will be a normal PTC with no engines enable. Correct?

10 10 46 50 CC I believe that's right, Ken. Stand by 1.

10 10 46 59 LMP Houston, 16.

10 10 47 01 CC Go ahead.

10 10 47 03 LMP Okay; it looks like we've got a H₂ tank 1 that's a little above the green line - about 270. Oh that's - Excuse me; that's the one with the sen - bad sensor. Excuse me.

10 10 47 17 CC Roger.

10 10 47 28 CC And, Ken, that is a normal PTC.

10 10 47 32 CMP Thank you, sir.

10 10 47 49 CC Okay, Ken. And in connection with that, we want to verify that the PITCH is minus 40, YAW is 90 on the HIGH GAIN.

10 10 47 59 CMP That's verified.

10 10 48 02 CC And - -

10 10 48 03 LMP And, Pete, I was ready to sack out. Did y'all come to any conclusion about this biomed?

10 10 48 13 CC Charlie, you can leave it just like it is.

10 10 48 16 LMP Thank you.

10 10 48 18 CC And one other item we need, I guess, is a read-out on battery C and pyro batteries A and B voltage. This will be the last chance we'll get to look at them.

10 10 48 29 LMP Okay; stand by. BATTERY C is 36 and 1/2. The PYRO BATS are both 36 and 1/2.

10 10 48 40 CC Roger; copy. Thank you.

10 10 49 15 CC Okay. And, Ken, we need an E-MOD, and we're ready to call it a night.

10 10 49 22 CMP Okay. I guess - I guess I could do that while we're doing the maneuver.

10 10 59 28 CMP Don, I've got one more question for you.

10 10 59 31 CC Okay; go ahead.

10 10 59 36 CMP When it comes time to change REFSMMATs, to go to the entry REFSMMAT tomorrow, I've been thinking about our - our funnies that we've seen with the CDUs, and when we were looking at that one this afternoon, it in - in some ways hinted that maybe we - maybe we didn't have all that D to A and A to D stuff working the way it ought to. Would there be any advantage of - Maybe someone could think about it tonight, maybe they already are - but is there any advantage to doing a pulse torque to change REFSMMATs tomorrow instead of by the usual procedure of using the coarse align.

10 11 00 25 CC Okay. I understand what you're asking. Stand by just a minute. Okay. Ken, we'll work on that and get back to you first thing in the morning with it.

10 11 00 42 CMP Okay. I don't have any strong druthers. I just - I was thinking over the things we might be going through and kind of wondered if that might be prudent if I avoided that loop. But if everybody's happy with it, it's certainly a lot easier to coarse align.

10 11 00 57 CC Okay. We'll take a good close look at it tonight and let you know in the morning first thing.

10 11 01 02 CMP Okay. Thank you.

10 11 01 06 CC Roger.

10 11 06 54 CMP Don, we'll be off comm for about 3 or 4 minutes.

10 11 06 58 CC Roger. Understand.

10 11 16 45 CMP Okay. Don, I'm back up.

10 11 16 50 CC Okay, Ken.

10 11 16 53 CMP Do the rates look reasonable for PTC?

10 11 16 55 CC Roger. The rates look real good. You can go ahead.

10 11 16 59 CMP Okay. We'll see what happens.

10 11 27 29 CMP Don, we're about ready to sign off. Is there anything else that you'd like to do tonight? Anything we have out of configuration that you're aware of?

10 11 27 37 CC I don't think so, Ken, but stand by 1 minute. Okay. Ken, we're all squared away. Get a good sleep. We'll see you in the morning.

10 11 27 50 CMP Okay. Thank you very much. Good night.

10 11 27 53 CC Night.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

REST PERIOD -- NO COMMUNICATIONS

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

10 19 15 18 CC Good morning, Apollo 16.

10 19 15 44 CC Good morning, good morning up there.

10 19 15 53 CDR Good morning, good morning down there.

10 19 16 15 CC Well, we see on this biomed that old Charlie woke up. He was really sawing away there.

10 19 16 28 CDR Charlie was sawing away on his biomed?

10 19 16 30 CC Sure was.

10 19 16 33 CDR I wouldn't be surprised. That's probably why it doesn't work. Termites do the same thing.

10 19 20 00 CC Apollo 16, Houston. Would you switch your HIGH GAIN to MEDIUM?

10 19 20 14 CDR Yeah, MEDIUM on the HIGH GAIN.

10 19 20 17 CC Okay.

10 19 33 45 CC Apollo 16, Houston.

10 19 33 51 CDR Go ahead. Over.

10 19 33 52 CC Okay. We've only got one minor change to your Flight Plan. Some high gain angles for a P52 at 285:48 when you want them.

10 19 34 13 CDR Okay. Go ahead.

10 19 34 14 CC Okay. PITCH, minus 28; YAW, 96. And Stu will be in in a little while to talk about changes to your Entry Checklist. But that should do it for the Flight Plan. All your systems looked nominal through the night. We don't know about the mid-course 7 yet. Right now, you're in the corridor and it looks - it looks pretty good - like maybe you won't have to do one. If you did one, it wouldn't be any more than a foot and a half.

10 19 34 48 CDR Understand.

10 19 34 54 CC You're just slightly shallow. Give you a little softer ride.

10 19 35 17 CC And could you go WIDE on the HIGH GAIN, please?

10 19 35 29 CDR HIGH GAIN, WIDE.

10 19 35 31 CC Thank you.

10 19 36 02 CC 16, Houston.

10 19 36 07 CDR Go ahead. Over.

10 19 36 08 CC Hey, John. This is Gold Flight. We're going to be handing over down here shortly and our last shift with you - We wanted to let you know that we really commend you for a job well done and be looking forward to seeing you when you get back to Houston.

10 19 36 24 CDR Okay, Gold Flight. I tell you, we certainly enjoyed you, particularly on that descent. That was something else, wasn't it?

10 19 36 31 CC It was a pretty long day. I'm sure it was for you. It sure was for us.

10 19 36 36 CDR Yeah, you bet.

10 19 36 44 IMP Gerry, thanks for everything. We'll be seeing you when we get back.

10 19 36 47 CC Okay, Charlie.

10 19 36 59 CC Incidentally, I talked to Lee yesterday, and he sends you all a "Very well done."

10 19 37 08 CDR Thank you.

10 19 39 35 CMP Tony, you still there?

10 19 39 37 CC Yeah. Go ahead.

10 19 39 40 CMP Would you have your friend on the left take a look at my biomed?

10 19 39 45 CC Okay. He says you look healthy.

10 19 39 56 CMP Okay. Thank you.

10 19 40 19 CC Incidentally, I think Lee's comments really mean you passed the course. I hope so anyway.

10 19 40 40 LMP If we didn't, we'd like to go back and try again.

10 19 40 44 CC That would be a good deal, wouldn't it?

10 19 40 47 CDR Yeah, maybe you can fix that up for us so we can go back and try it again.

10 19 40 55 LMP There's another 400 or 500 pounds up there, Tony, we'd like to bring you.

10 19 41 05 CDR We didn't make Lee's ton a year, but we're working on it.

10 19 41 10 CC (Laughter) Yeah, if you don't get a - get a ton - Lee's going to be disappointed. No, I don't think so. I think he's pretty happy.

10 19 51 02 CDR Okay, Houston. With the crew status report.

10 19 51 07 CC Go ahead.

10 19 51 08 CDR Okay. For the Commander, A1 is still stowed, A3 is 7 hours, A4 is none, A5 is 1725 - -

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

10 19 51 45 CC John, we lost comm there about the CDR's A-5. If you can do that one again, please.

10 19 51 52 CDR Okay. A-5: 17, 25, and 16; A-6 is: 1 is 8, 2 is 4, 3 is 6, 4 is 5, and 5 is 8. All those - all those quantities are in ounces.

10 19 52 13 CC Okay.

10 19 52 22 CDR CMP. B-1, 15072; B-3, 6 hours; B-4, none - B-2 is 40 and 50. B-6: 1 is 5 ounces; 2 is 6 ounces; 3, 5 ounces; 4, 5 ounces.

10 19 52 58 CC Okay.

10 19 52 59 CDR On the LMP: C-1, 21180; C-3, 7 hours; C-4, none; C-5, 18, 25, 15; C-6: 5 ounces - number 1 is 5 ounces, number 2 is 7 ounces.

10 19 53 28 CC Okay. We copy that.

10 19 53 39 CDR Okay, back to the - to the chow. Yesterday, we were working on day 11 food, and we - For the CDR, meal A, scratch the coffee with K; meal B, scratch the rye bread, change the tuna spread to 2/3, and change the - change the tuna spread from tuna spread to ham salad, and change the cocoa with K to citrus beverage with K.

10 19 54 28 CC Okay.

10 19 54 31 CDR And on meal C, scratch the romaine soup and the pecans, and add 1/2 tuna salad.

10 19 54 46 CC Okay.

10 19 54 54 CDR On the CMP: for breakfast, scratch the grits; meal B, scratch the grapefruit bar and the graham crackers; meal C, substitute ham for beef steak, scratch the chicken and rice, scratch the pecans, scratch the grape drink, add orange-pineapple drink, gingerbread.

10 19 55 53 CDR And also an orange-grapefruit drink.

10 19 56 01 CC Okay.

10 19 56 19 CDR And on the LMP: for breakfast, scratch the bacon squares from meal A; meal B, scratch the lobster bisque, and the rye - and the rye bread. Wait a second here, somebody's got a little disagreement on what we ate here. It's not, incidentally, the first time that that's happened.

10 19 57 17 CC We'd like you to get started toward that galactic anticenterpoint attitude, whatever that is.

10 19 57 59 CDR Okay, we're going that way.

10 19 58 00 CC Okay.

10 19 58 18 CDR Okay, let's start over on meal B for the LMP.

10 19 58 23 CC All right.

10 19 58 24 CDR I've been correc - I've been corrected here. Do not scratch the lobster bisque. And substitute for tuna spread, ham spread. And do not scratch the rye bread. Scratch the cherry fruit bar, and the citrus beverage with K, and substitute the cocoa with K.

10 19 58 57 CC Okay.

10 19 58 58 CDR On meal C, scratch the beef steak, scratch the fruitcake and the pecans, and add tuna salad, 3/4 of a tin.

10 19 59 16 CC Okay, got it.

10 19 59 22 CDR Okay, and the injector valve temps are looking as follows: 5C, 4.5; 5D, 4.6; 6A, 4.1; 6B, 4.4; 6C, 4.9; 6D, 4.4. Which means no heatup.

10 19 59 51 CC Okay, copy that.

10 20 02 06 CC Apollo 16, we'd like AUTO on the HIGH GAIN.

10 20 02 15 CDR You have it.

10 20 02 40 CC Hey, fellows. Hank's here, and have a good ride in. We'll see you in a couple of days.

10 20 02 47 CDR Okay. Thank you much, Tony.

10 20 02 50 CC You betcha.

10 20 02 53 CMP We'll see you, and we enjoyed working with you, Tony.

10 20 02 57 CC Thank you.

(NO COMM FOR 23 MINUTES)

10 20 25 46 CMP Okay. We just got her again.

10 20 25 52 CC Roger. Copy.

10 20 26 30 CMP And, Houston; this time we've got the ISS light on and it's remaining on.

10 20 26 34 CC Roger. Copy, Ken.

10 20 27 08 CMP Program alarm was resettable, as you probably noticed.

10 20 27 13 CC Roger. And you - But you still have the light, is that affirmative?

10 20 27 17 CMP That's affirmative.

10 20 27 18 CDR Affirmative.

10 20 28 13 CMP Okay, Houston, could we proceed through malfunction number 6 here?

10 20 28 24 CC They're debating that, Ken. Just a second.

10 20 28 28 CMP Okay. The NOUN 20s check with the FDAI very closely.

10 20 28 41 CC Okay. Ken, why don't you press on through that malfunction 6 there on page 28; and remember, if you get down to box 12, you have to kill the DAP.

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10 20 28 53 CMP Okay.

10 20 29 24 CC Do you have any questions on killing the DAP, Ken?

10 20 29 28 CMP No, sir.

10 20 29 50 CMP Okay, that time when I went to do a VERB 40, just about the time it should have run its time out and blanked the DSKY, we got another program alarm, and a - shows 3777 again.

10 20 30 06 CC Roger, ... that.

10 20 30 47 CC Do you still have the ISS light, Ken?

10 20 30 51 CMP That's affirmative.

10 20 32 13 CC 16, Houston. We'd like to proceed with the malfunction procedure.

10 20 32 19 CMP Okay. Would you like to do block 6 again?

10 20 32 31 CC Stand by, Ken. They're looking at it. There's speculation we've got a - the fail bit set and stuck there.

10 20 33 17 CC Okay, Ken. Let's proceed with block 6 and go on down to 12, and - but I think we're gonna see the same thing all over again, but let's try it.

10 20 33 26 CMP You say skip block 6?

10 20 33 28 CC Negative. Let's do back - block 6 again.

10 20 33 33 CMP Okay.

10 20 33 51 CMP Same thing, Hank.

10 20 33 53 CC Okay, understand.

10 20 34 35 CMP Okay, Hank. I'm not sure how to answer block 6. I'll go to block 12 if you like.

10 20 34 41 CC Stand by a minute, Ken.

10 20 35 28 CC Okay, Ken. We can see that input channel bit, and it's set, and it's staying set, so we think there's no need to proceed any further.

10 20 35 38 CMP Okay. Do you have any way of isolating whether it's - the bit is set or whether it's receiving continuous input?

10 20 35 47 CC Okay. Everybody's looking at that now. We're trying to psych out what's going wrong here.

10 20 35 53 CMP Okay. Thank you, sir.

10 20 40 47 CC 16, Houston. It appears to us that the input channel bit just cleared. Did you do anything?

10 20 40 54 CMP No, sir. And the ISS light is out.

10 20 41 45 CDR Let me tell you what the only thing we can think of that might have happened. Charlie's down in the LEB, and tool E, it sounded like, got knocked against the panel down there, if you can believe that.

10 20 42 03 CC Tool E hit the panel and the light went away?

10 20 42 07 CDR That, we can't say that for sure. That's the only action that - that I can think of that was going on at the time.

10 20 42 16 CC Roger.

10 20 42 17 CDR And I'm not even sure that was. I just heard a clank.

10 20 44 04 CC Apollo 16, Houston. We would like to get on with the activity at 285:30 regarding the SIM bay. However, we would like to leave the GAMMA RAY SHIELD on. We don't want to take it OFF.

10 20 44 19 CMP Okay.

10 20 50 11 CC Ken, looks like the gamma ray boom is not gonna come in any further; we've seen it stalled. But it is safe for - with a safe position. You can go ahead and turn the BOOM switch to OFF. And for planning purposes, we are gonna do a mid-course 7, and it's about 1-1/2 feet per second.

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10 20 50 28 CMP Okay, thank you.

10 20 50 29 CDR Okay.

10 20 50 30 CMP We'll turn the GAMMA RAY BOOM to OFF.

10 20 51 36 CMP Hank, do you folks want us to go ahead and try the 52?

10 20 51 48 CC Roger, Ken. We'd like to do the P52, and since the problem's cleared up, I imagine you can use the VERB 49 maneuver.

10 20 51 56 CMP We'll certainly give that a try. Hank, do we have the entry REFSMMAT plugged in yet?

10 20 52 18 CC Stand by.

10 20 52 40 CC If you'll give us ACCEPT, we'll pump your loads up to you.

10 20 52 47 CMP Okay, you have it.

10 20 53 03 CC We're sending you a state vector, a target load, and a REFSMMAT.

10 20 55 20 CC Apollo 16, Houston. I have your MCC-7 pad.

10 20 56 02 CDR Okay, go ahead, Hank.

10 20 56 03 CC Roger. MCC-7, RCS/G&N; 27276; NOUN 48 is NA; NOUN 33, 287:23:00.26; minus 0001.4, plus all zips, plus four balls 1; 180, 310, 000; H_A is NA, plus 0021.7; 0001.4, 0:04, 0001.4; sextant star 13, 312.7, 33.7; boresight star NA; NOUN 61, minus 00.71, minus 156.18; 1045.8, 36276; 290:23:59. Sirius and Rigel; 279, 045, 014. Four jets. Remarks: EMS not bias for drift. HIGH GAIN angles, PITCH, minus 85; YAW, 119. End of pad, and the computer is yours.

10 20 58 17 CDR Okay. MCC-7, RCS/G&N; 27276; NOUN 48 not applicable; 287:23:000.26 [sic]; minus three balls 1.4, plus all balls, plus 0000.1; 180, 310, 000; H_A is not applicable, 21.7; DELTA-V_T 1.4, burn time 4 seconds, DELTA-V_C 1.4; 13 sextant star, 312.7, 33.7; latitude

minus 7.1, longitude minus 156.18; 1045.8, 36276;
290:23:59. Sirius and Rigel; 279, 045, and 014.
Four jets, plus-X. EMS not bias for drift. PITCH
on HIGH GAIN, minus 85; YAW, 119 - minus 119.

10 20 59 40 CC That's a good readback, John, except the NOUN 61,
the latitude is 0.71, minus 0.71.

10 20 59 58 CDR Okay, 0.71.

10 21 00 20 CC OMNI Charlie, Apollo 16.

10 21 00 28 CDR You have Charlie.

10 21 01 03 CC Apollo 16, Houston. We're clear to turn the
DATA SYSTEM OFF down on panel 230.

10 21 01 09 CMP Okay.

10 21 01 24 CMP Hank, did you copy my question about post-torque
versus coarse align for the REFSMMAT change?

10 21 01 30 CC Negative, Ken. But I'll check it.

10 21 01 31 CMP Okay. That's in light of these funnies. I'd hate
to have it - end up losing all track of what it's
doing.

10 21 01 40 CC Roger.

10 21 02 01 CC OMNI Delta.

10 21 02 17 CMP OMNI Delta.

10 21 02 21 CC Roger.

10 21 02 33 CC Apollo 16, Houston. Normal procedures on the
P52 coarse align.

10 21 02 39 CMP Okay. Thank you, sir.

10 21 04 50 CC Apollo 16, OMNI Alfa.

10 21 09 17 CC Apollo 16, Houston. Have a entry pad for you.

10 21 09 23 CMP Okay. Just a second, Henry.

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10 21 11 11 CC Apollo 16, are you clear to torque?

10 21 14 34 CC Clear to torque. And, 16; we're still standing by with that entry pad.

10 21 14 44 CDR Okay.

10 21 15 13 CC And, 16; after we get this pad up, Stu is gonna have some words for you about the checklist change.

10 21 15 26 CDR Okay. Go ahead with the pad.

10 21 15 30 CC Okay, MIDPAC; 000, 153, 000; 290:06:32, 267; minus 00.71, minus 156.18; 06.9; 36196, 6.50; 1045.8, 36276; 290:23:32; 00:27; NOUN 69 is NA; 4.00, 02:02; 00:16, 03:33, 07:43; sextant star 25, 151.5, 26.2; boresight NA; lift vector UP. Use nonexit EMS pattern; RET for 90K, 06:06; RET mains, 08:29; RET landing, 13:21; constant-g entry, roll right; moonset, 290:20:26; EMS entry, reverse bank angle at 20,000 feet per second.

10 21 18 02 CDR Okay, MIDPAC; roll 0, pitch 153, yaw 0; 290:06:32, 267; minus 00.71, minus 156.18; 0.69 - 06.9; plus 36196, minus 006.5; plus 1045.8, plus 36276; 290:23:32; 00:27; NA on NOUN 69; D_0 4.00, V_{CIRC} time 2:02; 00:16, 03:33, 07:43; 25, 151.5, 26.2; NA; lift vector UP. Nonexit EMS pattern; RET 90K, 06 plus 06; main 08 plus 29; landing 13 plus 21; constant-g entry, roll right; moonset, 290:20:26; EMS entry, reverse bank at 20K feet per second.

10 21 19 32 CC Good readback, John.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

10 21 24 25 CC 16, Houston.

10 21 24 29 CMP Good morning, Stuart.

10 21 24 30 CC Oh, jolly good, there. I - I've got a couple or three changes to your checklist and your cue card, if you want to fish those out.

10 21 24 41 CMP Okay, got the cue card and an Entry Checklist.

10 21 24 45 CC Okay, let's go to the Entry Checklist, page E/1-2.

10 21 24 53 CMP Okay, E/1-2. You're starting early in the book.

10 21 24 54 CC Oh, Roger. Okay, let's go down here to the - the end of the logic sequence check.

10 21 25 06 CMP Okay.

10 21 25 07 CC Right after we've opened the SECS circuit breakers there, we want to write in "Battery compartment pressure check - SYSTEMS TEST, 7-A. If off-scale high, open vent valve through entry."

10 21 25 41 CMP Okay, battery compartment pressure check - that's meter 7-A. If off-scale high, open through entry - and, just for your information, right now it's about 2.9.

10 21 25 53 CC Okay; copy. Okay, and then at the bottom of that page, after the P52, put in - I'm sorry - let's do it before the P52. Add "Start EMP 509." And this is just an arbitrary point that we've - that we've picked, Ken. We're getting close enough now that we think we ought to have 509 running. We would prefer you to go ahead and do the P52 in SCS, as you have been doing. But let's just have 509 running before you go into that P52.

10 21 26 38 CMP Okay, that's fair.

10 21 26 40 CC Okay, let's go over to 1-3 and - -

10 21 26 44 CMP All right.

10 21 26 45 CC Down under the boresight - this is the standard bit - delete your "VERB 41 NOUN 91," and add "VERB 16 NOUN 91 ENTER; use MANUAL OPTICS."

10 21 26 59 CMP Okay, MANUAL on the boresight.

10 21 27 01 CC Okay. And now, after you drive the OPTICS to 90 degrees, we want to delete the OPTICS power, off. And we want to verify OPTICS SPEED, LO. And we're going to leave the OPTICS power on and, here in the mysterious world of glitches, this is going to minimize the probability. So we're gonna come in with it on, and we'll put the SPEED to LO just to hold down the drift.

10 21 27 36 CMP Okay, after the 90-degree shaft, why, we'll - delete OPTICS power off and verify that the SPEED is LO.

10 21 27 45 CC Okay, now let's go to 2-2. Thank you. I need to be looking at this instead of that.

10 21 27 53 CMP Okay, 2-2.

10 21 27 57 CC Okay. Now, after we get down to - after the P61 entry prep and prior to entering P61, we want to add - and the - what we're doing here, Ken, is we're resetting the average-g flag, which we set in 509. And if we do not do this step - now this is a - a pretty critical step - if we do not reset that average-g flag, P61 will not call average g. So our procedure here before we go into P61 is a VERB 25 NOUN 7 ENTER, 75 ENTER, 1 ENTER, ENTER. And if for some reason P61 would not call up average g, your fastest and most obvious cue is that lack of the comp cycle before NOUN 61 comes up. If you don't reset this, your NOUN 61 comes up immediately, but - with 509 running, we've got to get this step in or we'll not pick up our average g.

10 21 29 15 CMP Okay. That's a good one to know.

10 21 29 17 CC Roger. And how about just reading that step back to me there.

10 21 29 21 CMP Okay. Before calling P61, I'm going to reset the average-g flag with a VERB 25 NOUN 7, 75 ENTER, 1 ENTER, and 0 ENTER. And I'll do that prior to calling P61.

10 21 29 33 CC Okay. Jolly good. And let's go over to 2-4.

10 21 29 40 CMP Okay. On 2-4.

10 21 29 42 CC Okay. And what we're doing here now is, after you have PRO and you activate the ENTRY DAP, at that time, your NOUN 46 first digit is dropped to a zero. To reactivate EMP 509, after the flashing 06 61 comes up, let's insert in there a VERB 21 NOUN 46 ENTER, 30000 ENTER. And, of course, all we're doing here is putting the 3 back in NOUN 46 and this was dropped, as I say, when you went into the ENTRY DAP.

10 21 30 26 CMP Okay. The - you want to do that after - line 13, or before that?

10 21 30 32 CC Okay. After line 13, in between the flashing 06 61 and before the PRO.

10 21 30 53 CMP Okay. Stu, after flashing 61 and before PROCEEDing on that, we'll do a VERB 21 NOUN 46, 30000 ENTER.

10 21 31 06 CC Roger. You'll do a VERB 21 NOUN 46 ENTER, 30000 ENTER.

10 21 31 11 CMP That's right.

10 21 31 13 CC Okay. And you got the picture of why we're having to do that?

10 21 31 18 CMP Yes, sir.

10 21 31 19 CC Okay. Now the - now, if you'll pick up your cue card, we'll change it to the same things that we've just gone over in the checklist here.

10 21 31 30 CMP Okay.

10 21 31 33 CC Okay. Prior to your P61, add VERB 25 NOUN 7 ENTER, 75 ENTER, 1 ENTER, 0 ENTER.

10 21 31 52 CMP Okay. I'll reset that flag before P61.

10 21 31 57 CC Okay. And, back down here in your P62 box, same thing we just talked about. Prior to the PRO, after the 06 61, add VERB 21 NOUN 46 ENTER, 30000 ENTER.

10 21 32 19 CMP Okay. Got that.

10 21 32 25 CC Okay. And - got a - a change here to your Systems Checklist - and this is just changing to reflect the increased pressure in the battery compartment. If you'd like to change that, it's page S/1-2, under step 3.

10 21 33 23 CMP Okay.

10 21 33 25 CC Okay. Down - toward the bottom of the page, about three lines up, we've got a comment in there. "If greater than 1.5, BATTERY VENT valve, VENT." We want to change that 1.5 to 3.4.

10 21 33 55 CMP Okay. We change that to 3.4.

10 21 33 58 CC Okay. It's a pretty innocuous change. And the one - the line right above that, too - "SYSTEMS TEST 7-A, battery compartment pressure less than 1.5," change that to 3.4, also.

10 21 34 09 CMP Okay.

10 21 34 10 CC Okay. Those are the changes, Ken. And - we're working up a - a list here. It'll be pretty straightforward. I don't want to give them to you now. We're massaging them - of the cues that will indicate to you - the CDU glitches just prior to and during the entry phase. And I'd like to talk to you about that in a little bit when we get all squared away.

10 21 34 38 CMP Okay. Thank you.

10 21 34 40 CC Roger. Oh, I'd like to also add here, Ken, and - Of course, as you well know, we - in this mysterious glitch solutions, we gotta shotgun it, and we're trying to find the areas that are a prime candidate for glitch in the CDU. And one of these is during your GDC align procedure, when you have your ATT SET switch to ATT SET and you either switch in to or out of IMU on the SOURCE. What you're doing here is loading up the CDU's, and they feel that this is a prime candidate for a glitch. So, our words of wisdom are to minimize the number of times that you use this switch, and I guess after your GDC align in the normal checklist, we'd kind of like to see you not cycle that SOURCE switch to IMU with your ATT SET switch in ATT SET. I guess you could still check your GDC versus NOUN 20s if you wanted to, but I did want you to be aware of this particular switch combination as - as loading up the CDU. And this is where we have the probability of glitches.

10 21 36 07 CMP Okay, thank you.

10 21 36 09 CC And just - -

10 21 36 10 CDR As you know, we've - we've only aligned the GDC IMU a thousand times, and I don't think that's had anything to do with the glitch we've had so far.

10 21 36 30 CC Yeah, we realize that, John. The problem is - we don't know what - what's causing the glitch. We just, at this time, can't say.

10 21 36 31 CDR That's true, but I'm saying that - Oh, never mind.

10 21 46 39 CMP Houston, 16.

10 21 46 44 CC Go ahead.

10 21 46 47 CMP You folks have any objections if we pump up the cabin to about 5.7 now so we can have full packages and have a little pad on the cabin pressure? The regs are running a little low.

10 21 47 04 CC Okay. Go ahead, Ken.

10 21 47 09 CMP Thank you.

10 21 58 01 CC Ken, it all looks good down here. We don't think you need the VERB 40.

10 21 58 07 CMP Okay. I agree. Sure gets your attention, though.

10 21 58 13 CC Roger.

10 21 58 26 CC Wait a couple hours, Ken, and it'll even get your attention faster. And when all of you've got a chance to listen, I've got a couple of words on the - on the CDU transient fuse [?].

10 21 58 43 CMP Okay. Why don't you wait a few minutes. We're still cleaning up a little stowage here.

10 21 58 48 CC Okay.

(NO COMM FOR 15 MINUTES)

10 22 13 11 CDR Well, here we go again.

10 22 13 13 CC Roger. We see it.

10 22 13 47 CDR Okay, Houston. I got it out that time by kicking the panel. Sounds to me like switch - it sounds to me like some kind of contamination in the - in the switch.

10 22 14 00 CC Where - -

10 22 14 01 CDR In the relay or whatever.

10 22 14 03 CC Where did you kick, John?

10 22 14 07 CDR I kicked right - I put my - I - when it went out, I was kicking right over the NOUN 99 codes, and just below that - I think it was - -

10 22 14 19 CMP ... LEB and the - -

10 22 14 20 CDR Yeah, I think I was - -

10 22 14 21 CMP - - optics panel.

10 22 14 22 CDR - - kicking on the region of the - What's just below there, the PSA with the modules in it?

10 22 14 29 CC All right. Maybe there was something to that tool E hitting it awhile ago.

10 22 14 34 CDR Could have been. Or maybe it just went out.

10 22 27 38 CC Apollo 16, Houston. We'd like to verify the S-BAND AUX TV switch, OFF.

10 22 27 48 CDR You want it -

10 22 28 01 CDR Okay, it's verified OFF now.

10 22 28 03 CC Okay, thank you.

10 22 32 29 CC Apollo 16, Houston. You're GO for midcourse 7.

10 22 32 34 CDR Roger. GO for 7.

10 22 36 25 CC Apollo 16, I request your KEY RELEASE.

10 22 36 29 CMP It'll - clear up at average g.

10 22 37 34 CDR Okay, burn's complete. Residuals, plus 0.1, minus 0, plus 1 or plus - Yeah.

10 22 37 43 CC Roger; copy.

10 22 39 04 CMP Okay. I'm maneuvering to the UV photo attitude.

10 22 39 09 CC Roger.

10 22 42 24 CC Apollo 16, OMNI Delta.

10 22 45 45 CC 16, Houston.

10 22 45 48 CMP Hello there.

10 22 45 50 CC Roger. Just a little info. We're gonna be - we'll give you a call, but we'll be bringing the batteries on at EI minus 45, about 15 minutes early, just so we'll have a little extra time to take a look at them.

10 22 46 07 CMP Okay.

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10 22 51 06 CMP Houston, we've got the UV camera all set up. And it looks like we're pointing at the Earth. How about if we go ahead and take this - UV sequence now, instead of waiting until 55.

10 22 51 19 CC Stand by.

10 22 52 05 CC Ken, you can go ahead with the photos.

10 22 52 09 CMP Okay. Thank you.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

10 22 54 34 CMP Houston, we're going around the closeout panels and we're down here around 382 and - are you happy with the mixing valve position or are you going to want to change it before we close it out?

10 22 54 47 CC I'll get you an answer on that, Ken.

10 22 54 58 CC Looks like a good setting, Ken.

10 22 55 02 CMP Okay, we're going to close out the panel.

(NO COMM FOR 15 MINUTES)

10 23 10 31 CMP Houston, you're gonna give us another entry pad after you work this midcourse for a while, aren't you?

10 23 10 39 CC That's affirmative. Be about another hour and 20 minutes.

10 23 10 43 CMP Okay.

10 23 10 54 CC And, for planning purposes, we're gonna be bringing - like to bring the batteries on a little earlier. But we'll give you a cue on that. We just want to look at them since we had this venting problem.

10 23 11 06 CMP Roger. Old battery vent is up to almost 3 now - 2.99.

10 23 11 17 CC Roger.

10 23 15 46 CDR Hank, we got the Earth out of window 5. It's a very thin crescent and the subsolar point is - spectacularly bright.

10 23 15 59 CC Sounds great.

10 23 16 01 CDR It looks great, I'll tell you.

10 23 16 10 CC We show you a little - well, about 20,700 miles out now and about 13,400 feet per second.

10 23 16 21 CDR Starting to haul it in.

10 23 16 53 CMP Houston, 16's ready for the logic check, whenever you are.

10 23 17 07 CC Stand by, Ken. We're getting a checkpoint here.

10 23 17 13 CMP Okay.

10 23 17 44 CC Okay, 16. Go ahead with the logic check.

10 23 18 14 CMP Okay. The LOGIC's coming on. Number 1, on; number 2 - that's - two LOGICs are on.

10 23 18 23 CC Roger. You're GO for PYRO ARM, as required.

10 23 18 31 CMP Thank you, sir.

10 23 18 43 CMP Okay. Let's do that check, again.

10 23 18 49 CC I understand you'd like to repeat?

10 23 18 52 CMP Yes, please. Okay, now - the SECS/LOGIC is coming on now.

10 23 19 12 CC It still looks good, 16.

10 23 19 15 CMP Okay. Thank you. Thank you, now.

10 23 19 53 CC Apollo 16, Houston. We saw a C&W about the time you started the logic check. Were you testing the lights, or did you really get a warning there?

10 23 20 03 CMP He was doing a light test.

10 23 20 05 CC Roger. Copy.

10 23 20 18 CDR Okay, Houston. The battery compartment is reading about 3. So, according to the rules, we do not go to vent.

10 23 20 31 CC Roger. That's - we concur.

10 23 21 48 CMP Okay, Houston. We have EMP 509 loaded.

10 23 21 53 CC Roger. Copy.

10 23 22 01 CMP And we're going to hold onto P52 until we get down to the nominal time.

10 23 22 05 CC Roger.

10 23 26 37 CC Apollo 16, Houston.

10 23 26 41 CMP Go ahead. Over.

10 23 26 44 CC Okay. I don't know how you're coming along in your time line there. I would like to make a couple of comments if you've got time to listen. I don't think you want to copy anything at this point.

10 23 26 56 CMP Okay. Looks like we're between - just before doing the P52. Go ahead, Stu.

10 23 27 04 CC Okay. This deals with the - our favorite problem, of course, the - your ISS warning. And, right now, you people are doing all the right things and we're wanting to do those same procedures right through - right through entry when, of course, when ISS comes on, I'm sure you're going to go to SPACECRAFT CONTROL, which you've been doing and you've been checking that alarm code. And we're saying that, if you have that 3 triple 7, to ignore it. Whe - it's - whether it needs it or not, just to keep the procedure straightforward, we - after you - while you're still in SCS, do a VERB 40 ENTER and wait your 10 seconds and go back to CMC. So, this means that we're saying - we'll come all the way in CMC with that 3 triple 7 alarm showing. If you do get a - if you do have a CDU failure, why, you will see it in your - in your bank angle - your - which is just your normal procedures there where you're looking at your commanded DSKY angle versus what the spacecraft is doing. Also, if you have got a glitch in the CDU, such as we got on the way out, and it's not the 90-degree bit - of course, if the 90-degree bit is set, you'll have the gimbal lock telling you that. And it's again the same old bit, SCS, VERB 40, wait 10 seconds, back to CMC. You can get some glitches, of course, in the CDUs that are not the 90-degree bit. I mean, there's a possibility of it. And, just some words on that - if - if the - if it's a low angle bit set, I say less than 30 degrees, you - it really does not affect your target point. I mean, we're talking in the order of being very close to nominal, within a mile or so. If - if the bit set is large enough for you to see it, comparing the - I mean if the bit set is gonna

affect your splashdown point by any appreciable amount, you'll see it comparing your commanded angle versus where the spacecraft is going. So, that's your clue. And, if you see this and it's not looking right, we want you to go to SCS, do a VERB 40, and back to CMC to see if that solves the problem.

10 23 30 02 CMP

Okay. That all sounds reasonable.

10 23 30 05 CC

Okay. And I guess the - I guess this - about the only thing I'm saying, Ken, - that's any appreciable difference is this VERB 40 bit. I'm not used to doing that during the entry and I'd like to emphasize that if you're not - if it's looking funny and you're not sure, well, go ahead and do it. And, of course, as you well know, the needles will zero and the DAP will be off for 10 seconds, and you'll be back in business. There's one other point, and I'll admit this is - this stretching pretty - pretty thin, but we're trying to cover all the angles. If it's prior to P64, where you're going along - Of course, if you're in CMC control and you get a glitch, why you'll get the response from the DAP. If you're going along in SCS control and you get a glitch, why, your needles will go out. Now, you may have your pitch needle already pegged. So there's - here again, we might have a glitch in that pitch needle - in the pitch CDU and not know it. So, just one other recommendation is if your pitch needle doesn't come off the peg the way you like it, why, let's try a VERB 40 before we would say the - the G&N is not doing correctly.

10 23 31 25 CMP

Okay.

10 23 31 39 CC

And I guess that about takes care of it, Ken, John, unless you got any - Charlie, unless you got any questions. It'd probably be John punching up the - the alarm there and, if you do get the 3777, why, let's reset it and press ahead. And, of course, any of the other triple-7 alarms are - are valid. And - but, of course, it's the same old monitoring bit. You're going to see how she goes.

10 23 32 14 CMP

Okay, Stu. I think that's all pretty well understood. Thank you very much.

10 23 32 18 CC Roger.

10 23 32 20 CDR Yes, Stu. We appreciate it.

10 23 32 22 CC Okay.

10 23 32 23 CDR You've got to spend a lot of time learning about CDUs, I expect, huh?

10 23 32 27 CC Hey, that's a favorite topic of discussion, now. CDUs and how do they glitch.

10 23 32 47 CMP Houston, 16. Are we going to get another entry pad?

10 23 32 52 CC That's affirmative. About an hour from now.

10 23 33 50 CC Apollo 16. Our first batch of tracking data shows you right in the groove, and we're gonna get another hours' worth of data and then give you your final pad.

10 23 34 01 CDR Roger.

10 23 37 02 CMP Okay, Houston, the EMS checks in STANDBY. Its pattern checked out okay.

10 23 37 19 CC Roger. Copy.

(NO COMM FOR 25 MINUTES)

11 00 02 58 LMP Houston, we're gonna maneuver to the entry attitude.

11 00 03 05 CC Roger.

11 00 03 06 CDR Do you happen to have two stars to recommend to us? We got a 405 here.

11 00 03 11 CC Roger; we saw it, and FAO's working on it.

11 00 03 39 CC Ken, your current attitude is good for stars 15 and 21.

11 00 03 43 CMP Thank you very much. Roger.

11 00 03 44 CDR Roger.

11 00 05 57 CMP Boy, that's a good platform, isn't it?

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11 00 06 00 CC That's a beauty.

11 00 06 05 CMP Okay, when you have the numbers, we'll torque.

11 00 06 07 CC Cleared to torque.

11 00 07 20 CDR Okay. We're going to the horizon attitude check, Houston.

11 00 07 25 CC Roger. Copy.

11 00 11 13 CC Apollo 16, OMNI Charlie.

11 00 11 17 CDR Roger; you have it.

11 00 11 23 CC Roger.

11 00 16 30 LMP Okay, Hank. We're into the checklist down to standing by for the pri - glycol loop evap - evaporator activations.

11 00 16 39 CC Roger. Copy, Charlie.

11 00 23 39 LMP Houston, the evaporators are up.

11 00 23 41 CC Roger; copy.

END OF TAPE

APOLLO 16 AIR-TO-GROUND VOICE TRANSCRIPTION

11 00 24 03 LMP Hank, is - Are we okay with the TEMP IN valve in MANUAL? With this setting?

11 00 24 12 CC That's affirmative.

11 00 24 15 LMP Okay.

11 00 31 03 CC If you'll give ACCEPT, we'll send you a state vector and a Z PIPA bias update.

11 00 31 12 LMP Okay, you have it.

11 00 34 47 CC Apollo 16, the computer's yours. And I've got your recovery information. The weather's good; 2000-foot scattered, 10 miles, wind's out of the east at 10 knots, 3-foot wave heights. Your recovery ship is Ticonderoga, and the aircraft is Recovery.

11 00 35 07 CDR Roger; understand. Thank you much.

11 00 37 08 LMP Houston, the pyro battery check is okay.

11 00 37 13 CC Roger; copy.

11 00 39 00 CDR Houston, we're ready for the VHF check. Over.

11 00 39 06 CC Roger, John. We're going to have to wait a few minutes here to be - until we get in a little closer.

11 00 39 12 CDR Okay. We're going to do the command module RCS activation, if that's okay.

11 00 39 19 CC Stand by 1.

11 00 39 23 CC Okay; go ahead.

11 00 39 25 CDR Roger.

11 00 39 34 CDR Okay; here comes the LOGIC, ON, Houston.

11 00 39 39 CC Roger.

11 00 40 00 CC Stand by, John. It will be a minute before we get data.

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11 00 40 20 CC 16, Houston. Would you take the LOGICs, OFF, please, and then back ON again?

11 00 40 24 CDR Okay; they're going OFF, and back ON. They're OFF now. They're ON now; 1 is, 2 is.

11 00 40 37 CC Apollo 16, you're GO for PYRO ARM.

11 00 40 41 CDR Roger. Okay; PYRO ARM A is armed, and B is armed.

11 00 40 56 CC Looks good.

11 00 41 00 CDR Okay, we're pressurizing her now, Houston.

11 00 41 24 CC 16, looks good down here.

11 00 41 29 CDR There you go.

11 00 44 07 CC Apollo 16, Houston. If you'll bring up your VHF, SIMPLEX A, we'll do a voice check with you about 5 minutes after we configure the ground.

11 00 44 19 LMP It's up, Henry.

11 00 44 20 CC Okay.

11 00 45 46 CC Apollo 16, Houston. I have your final entry pad.

11 00 45 51 LMP Go ahead, Hank.

11 00 45 53 CC Roger. MIDPAC 000, 153, 000; 290:06:31, 267; minus 00.71, minus 156.18; 07.1; 36196, 6.54; 1051.0, 36276; 290:23:31; 05g, 00:27; NOUN 69, NA; D₀, 4.00, 02:00; 00:16, 03:31, 07:46; boresight sextant stars, NA; lift vector, up; and there's only one change in the comments, Charlie. The RET for 90K - do you want me to read all those?

11 00 47 19 LMP Just give me the RET.

11 00 47 20 CC Okay, RET 90K is 6:08.

11 00 47 27 LMP Okay, the range is the same?

11 00 47 28 CC Roger. The other times and the other comments remain the same.

11 00 47 35 LMP Okay, with the readback, Hank. MIDPAC; 000, 153, 000; 290:06:31, 267; minus 00.71, minus 156.18; 07.1; 36196, 6.54; 1051.0, 36276; 290:23:31; 00:27; NOUN 69 is NA; 4.00, 02:00; 00:16, 03:31, 07:46; sextant and boresight are NA; lift vector is up. All the comments are the same except RET 90K is 6 plus 08 over.

11 00 48 27 CC Good readback, John.

11 00 52 45 CC Apollo 16, Houston. We'd like to get the MAIN BUS TIES on a little early, as we talked about.

11 00 52 52 CDR Okay.

11 00 53 08 LMP Okay, they're on, Henry.

11 00 53 10 CC Roger; thank you. They look good.

11 00 54 21 CC Apollo 16, Houston. Like to verify that you have the LEFT VHF ANTENNA.

11 00 54 29 LMP Negative; we had the RIGHT; we're on LEFT ANTENNA now.

11 00 54 32 CC Roger.

11 00 55 03 CC Apollo 16, Houston on VHF. How do you read?

11 00 55 07 CDR Loud and clear, Hank.

11 00 55 13 CC Roger; reading you loud but a little noise.

11 00 55 53 CDR Okay; we're checking out the command module thrusters now.

11 00 55 57 CC Roger. We're ready to go, John.

11 00 56 06 CDR Okay.

11 00 57 34 CC RCS looks good down here, 16.

11 00 57 40 CDR Okay, we can verify that we had all engines.

11 01 05 12 CC Apollo 16, Houston. We gonna have to give you another Z PIPA bias and we'd like for you not to go into P61 until we get that in.

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11 01 05 25 CDR Okay.

11 01 05 32 CDR We're in - do you want us to go to ACCEPT now?

11 01 05 40 CC Negative.

11 01 07 09 CC Apollo 16, Houston. If you'll give us ACCEPT, we'll send up that Z PIPA bias.

11 01 07 14 CDR You have it.

11 01 07 20 CC It appears that that PIPA's responding to temperature changes, is what the problem is, John.

11 01 07 28 CDR Okay.

11 01 08 37 CC Apollo 16, the computer's yours.

11 01 08 42 CDR Okay, going to BLOCK.

11 01 10 23 CDR Houston, have you got the PIPA incorporated?

11 01 10 27 CC That's affirmative.

11 01 10 30 CDR Okay, we're going to BLOCK.

11 01 11 46 LMP Okay, Hank; your VHF is off. I'm turning off the fuel pumps now.

11 01 11 51 CC Roger.

11 01 13 07 CDR Okay; we have knocked down the average g flag.

11 01 13 13 CC Roger.

11 01 17 38 CC You're looking good coming up on sep.

11 01 21 08 CDR Okay; we're a minute and a half to CM/SM sep.

11 01 21 11 CC Roger; copy.

11 01 22 42 LMP Separation, Houston.

11 01 22 44 CC Roger.

11 01 22 54 CC Everything looks good from down here, 16.

11 01 24 39 CDR Okay, Houston, we have the - we have the bit 3 set
 in the 21 46.

11 01 24 49 CC Roger; and you're looking good.

11 01 25 58 CDR Okay, we got P64 up and she's looking good - 63, I
 mean.

11 01 26 05 CC Roger. P63.

11 01 29 08 LMP Houston, 16 - on another antenna.

11 01 29 22 CC Apollo 16, Houston. We're reading you.

11 01 29 27 LMP Looks like your up-link's a little weak, Hank;
 we're down - we're getting a lot of scratchiness.

11 01 29 32 CC Roger; we're hearing the same thing.

11 01 29 46 CC Roger, 16. We're coming through ARIA now.

11 01 29 52 LMP Okay; you sounded pretty good then.

11 01 30 35 CC And, Apollo 16, Houston. We do not have telemetry.

11 01 30 41 LMP Okay; we're looking good, Hank.

11 01 30 45 CC Roger.

11 01 33 26 CC Got data back and you're looking good.

11 01 33 31 CDR Roger.

11 01 36 24 CC Apollo 16, Houston. You're still looking good.

11 01 36 26 CDR Roger.

11 01 41 32 CC Apollo 16, Houston.

11 01 41 35 CDR Roger. Loud and clear.

11 01 41 38 CC Roger. How's it going?

11 01 42 01 CC Apollo 16, Houston. We're getting a little data now
 and everything looks good.

11 01 46 04 CC Apollo 16, Houston. We've got you on TV.

11 01 46 24 P-1 Photo has visual contact.

11 01 46 26 R-1 Recovery has visual.

11 01 46 28 P-1 Roger.

11 01 46 52 CDR Recovery, this is Apollo 16.

11 01 46 56 R-1 Apollo 16, this is Recovery. Welcome back; go ahead.

11 01 47 01 CDR Roger. We're showing ... 166.2 ... and ...

11 01 47 19 R-1 This is Recovery. Roger. What is your condition? Over.

11 01 47 23 CDR Outstanding.

11 01 47 26 ELS Tico, ELS. ELS has a visual.

11 01 47 30 TIC Roger.

11 01 47 44 S-1 And Swim's got a visual.

11 01 47 46 TIC Roger.

11 01 47 52 R-1 Tico, this is Recovery. Did you receive the Apollo 16 report? All three chutes are fine? They are looking good -

11 01 48 01 TIC Ticonderoga. Roger. Ticonderoga did copy.

11 01 48 53 P-1 Tico, this is Photo. All main chutes are deployed. There is no sway on the module - it's coming down, straight down.

11 01 49 00 TIC Roger.

11 01 49 32 CDR Houston, we're passing to - through 2800 now. And we are - have the helicopters out the windows.

11 01 50 31 ELS Tico, this is ELS. We have the two drogue chutes in sight. And they are just south of the command module.

11 01 50 40 TIC Roger.

11 01 50 41 ELS Up about 3000 feet higher.
11 01 50 50 TIC Roger.
11 01 50 56 CDR Okay. The purge burn has been accomplished.
11 01 51 07 CDR Splashdown.
11 01 51 08 LMP Splash.
11 01 51 14 R-1 The command module is stable II, stable II. All three main chutes are in the water.

END OF TRANSCRIPTION