



APOLLO TRAINING

STRUCTURES AND MECHANICAL
SUBSYSTEMS

COURSE NUMBER A-5125

13 JANUARY 1969 FOR TRAINING PURPOSES ONLY

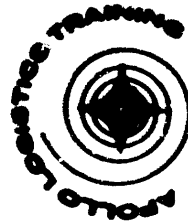
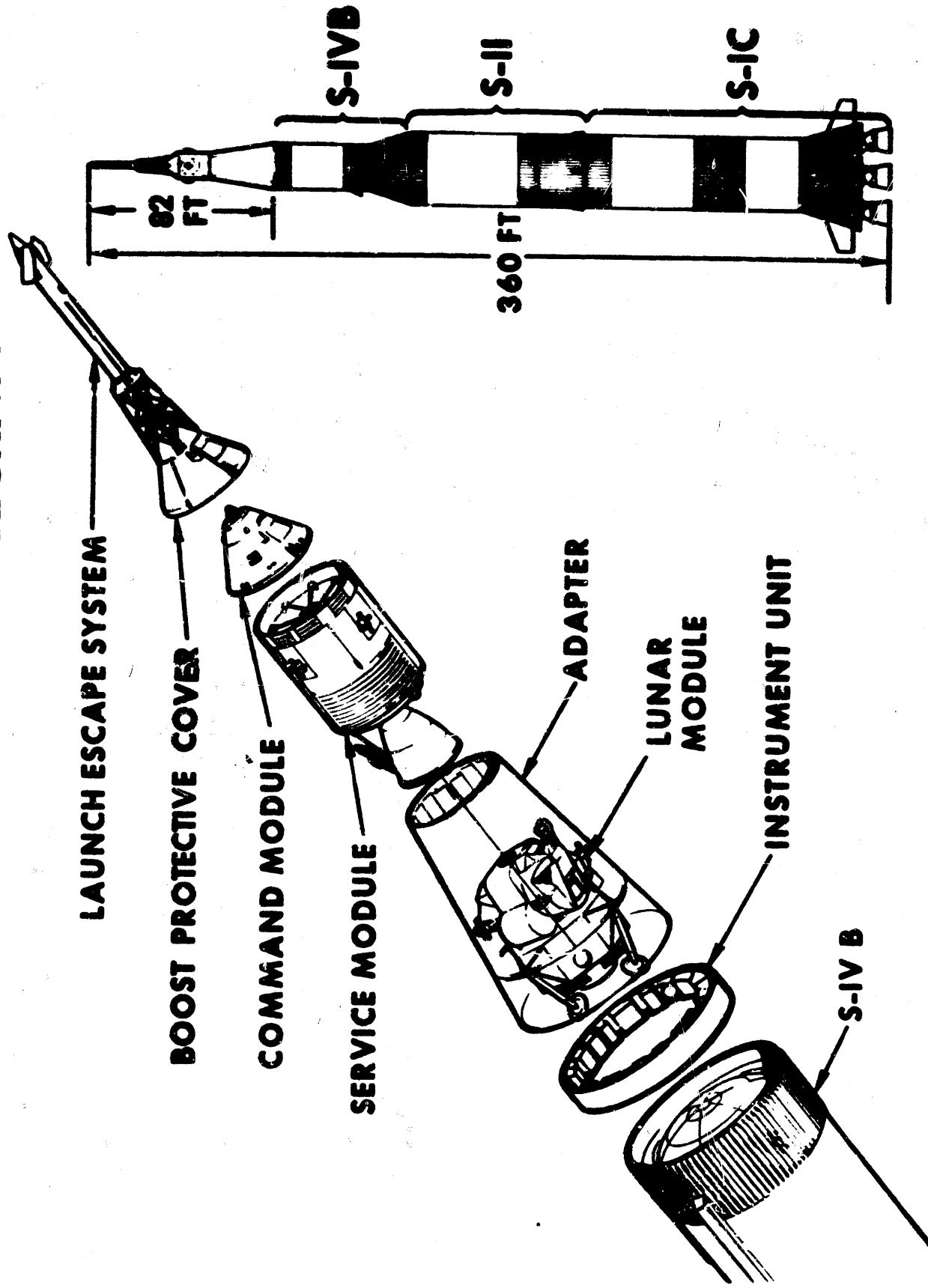


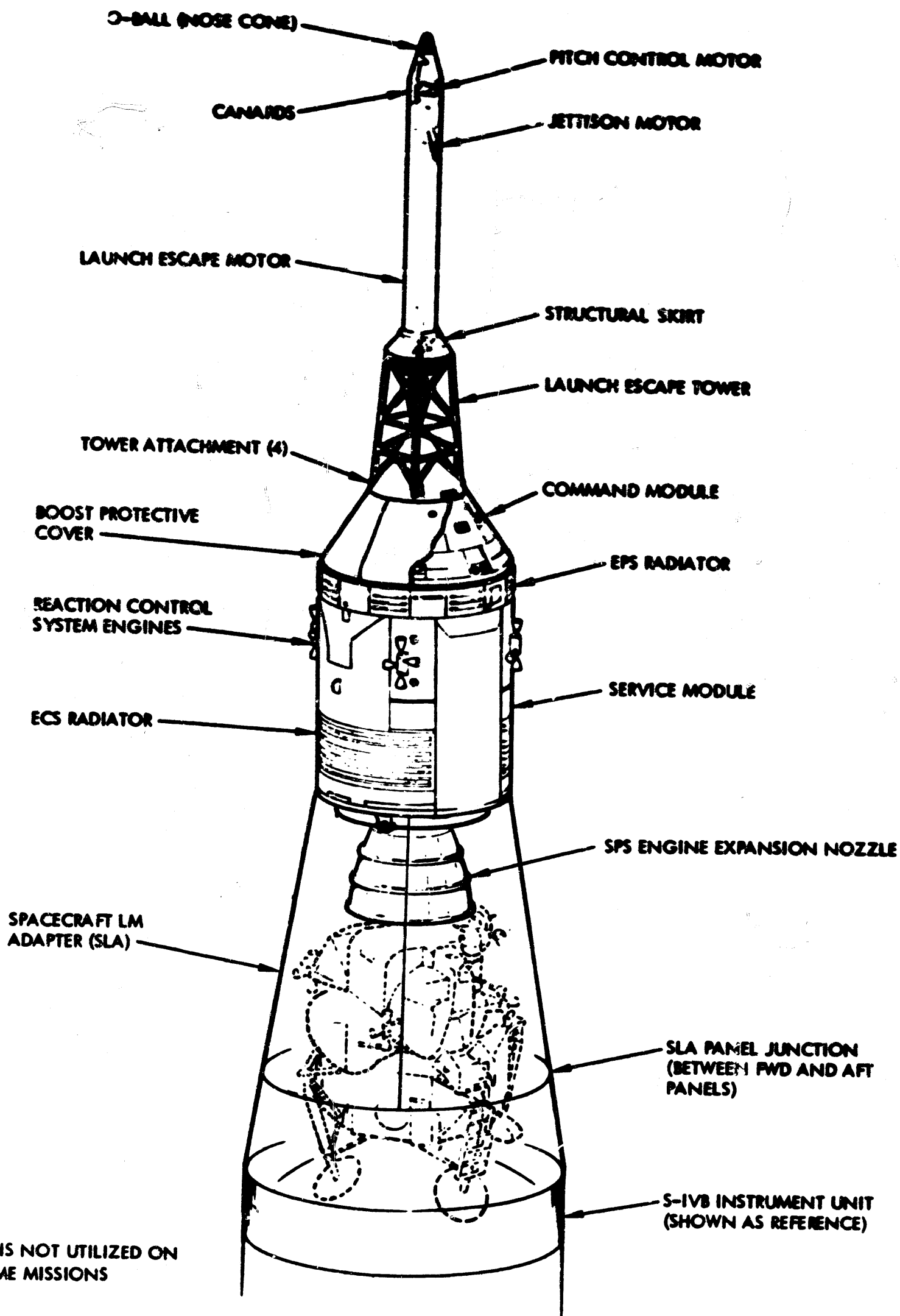
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APOLLO SPACECRAFT

S36A/P84509A

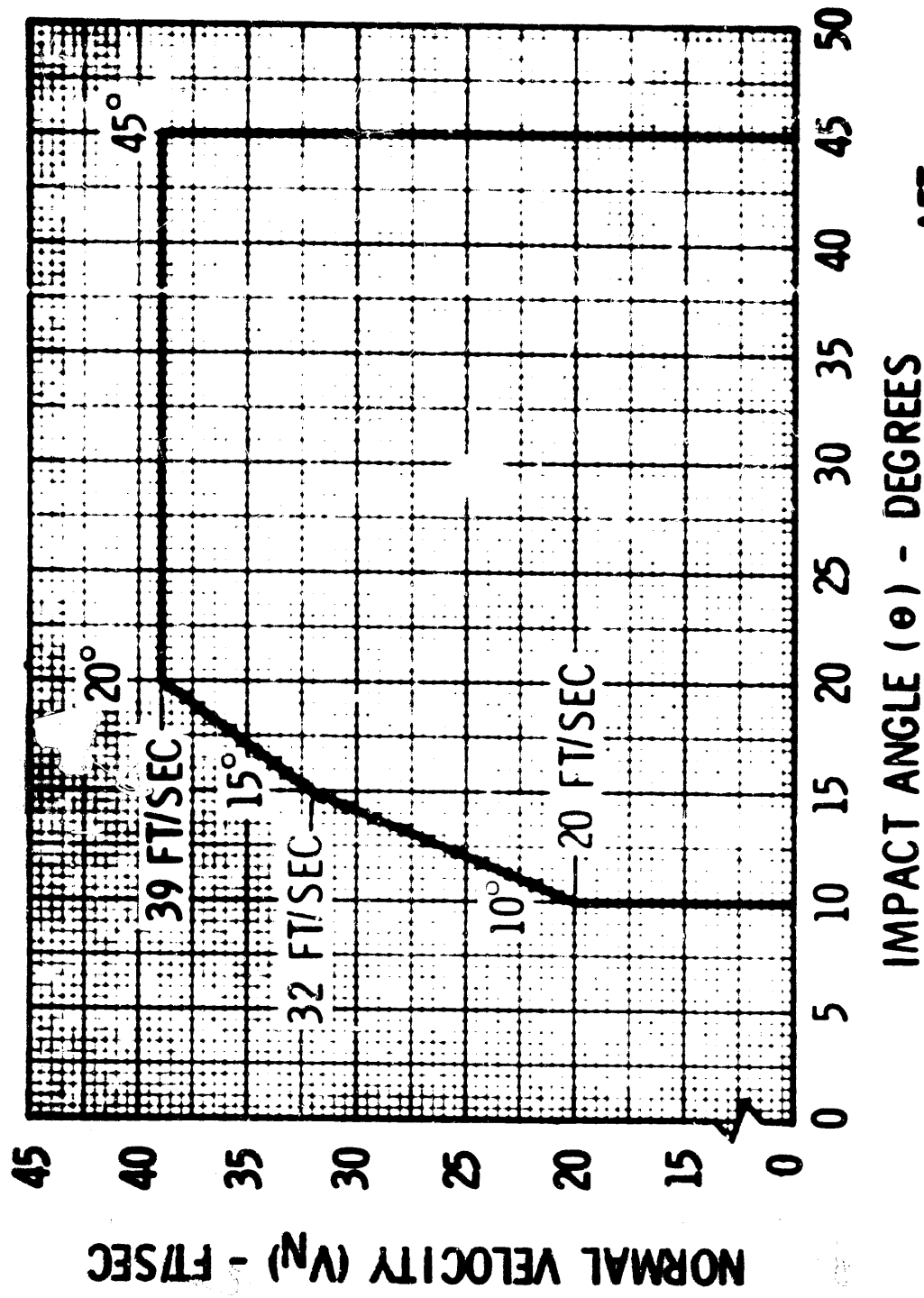




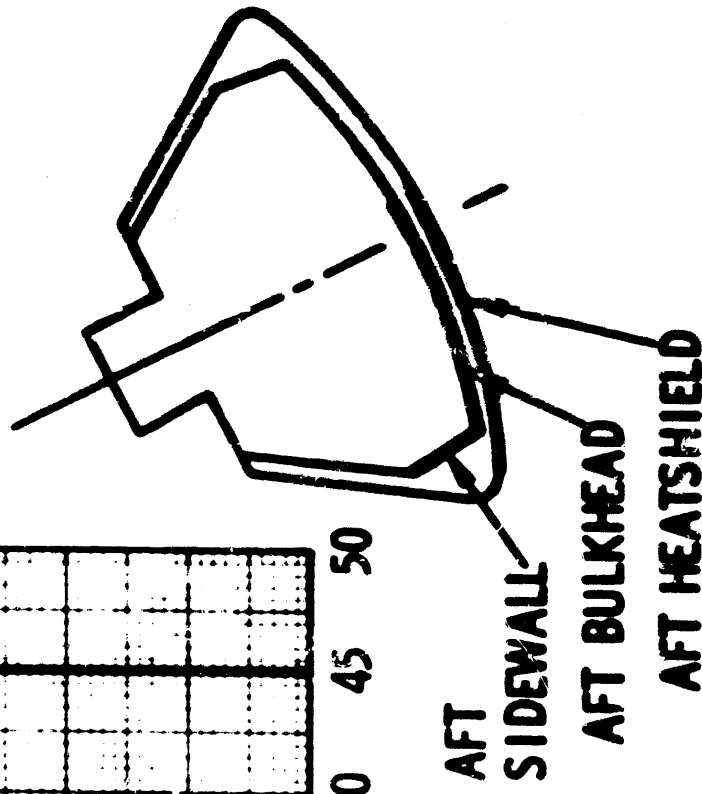
SM-2A-1273

APOLLO CM WATER IMPACT CRITERIA

(BLOCK II)



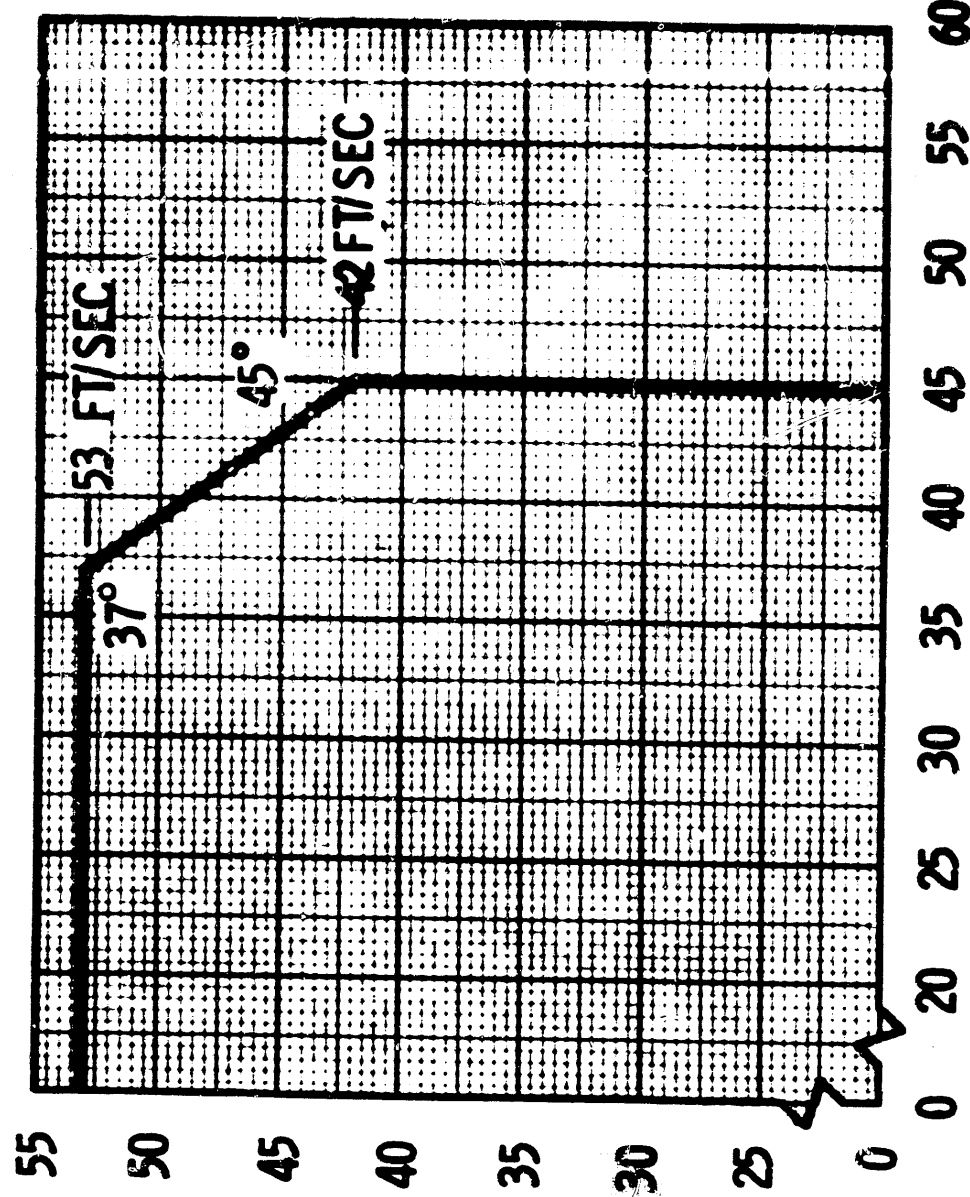
AFT SECTION
VN VS θ
SC-012 & SU.



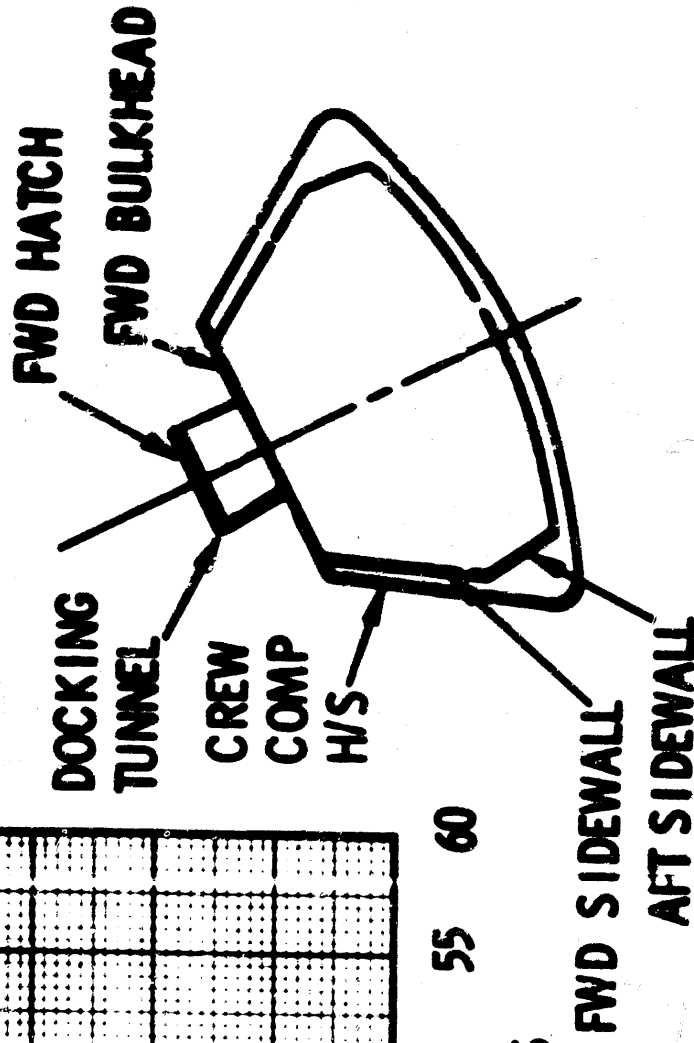
APOLLO CM WATER IMPACT CRITERIA

(BLOCK II)

TANGENTIAL - VELOCITY (V_T) - FT/SEC

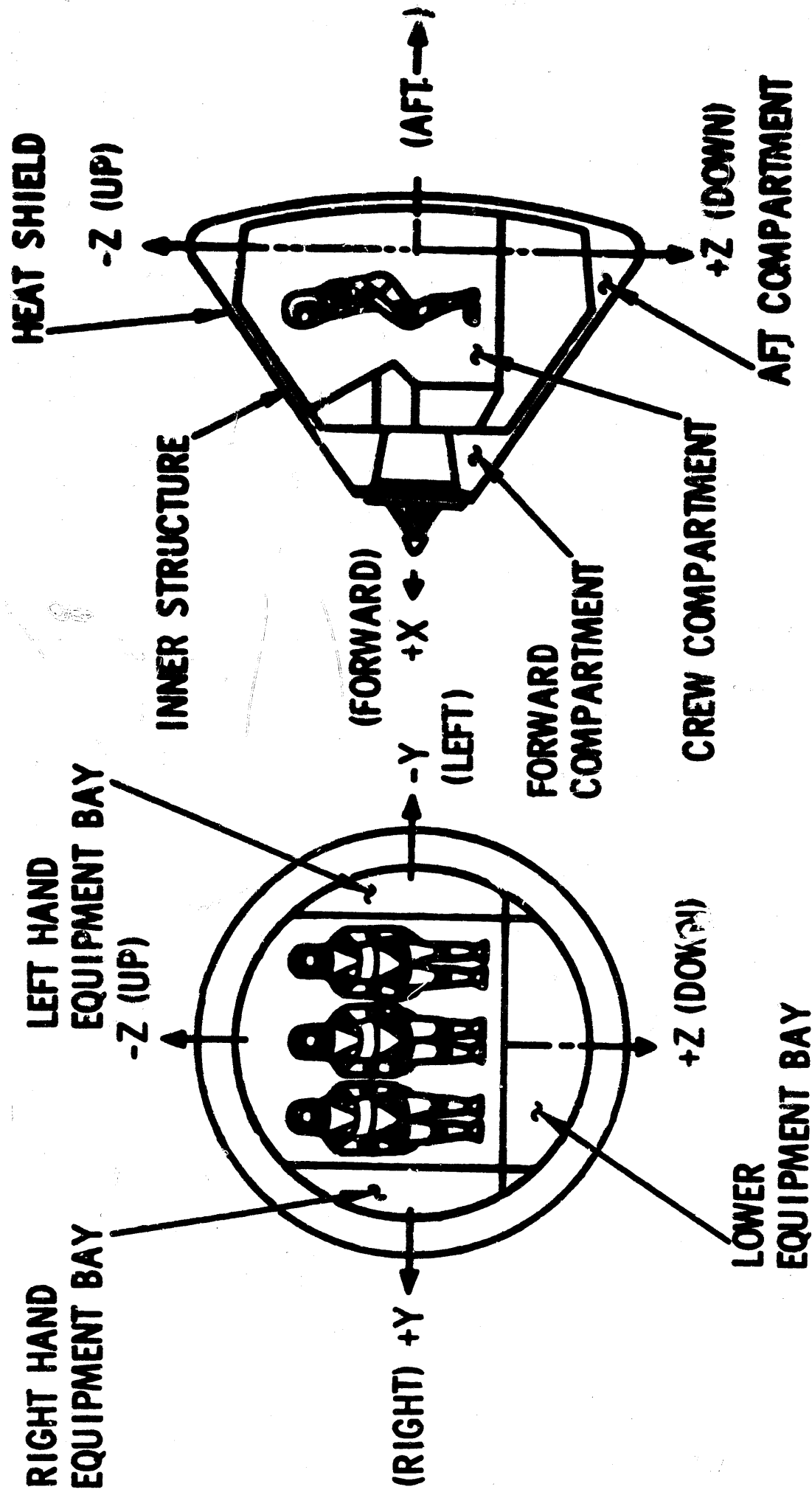


SIDE & FWD
SECTION - (V_T) VS •



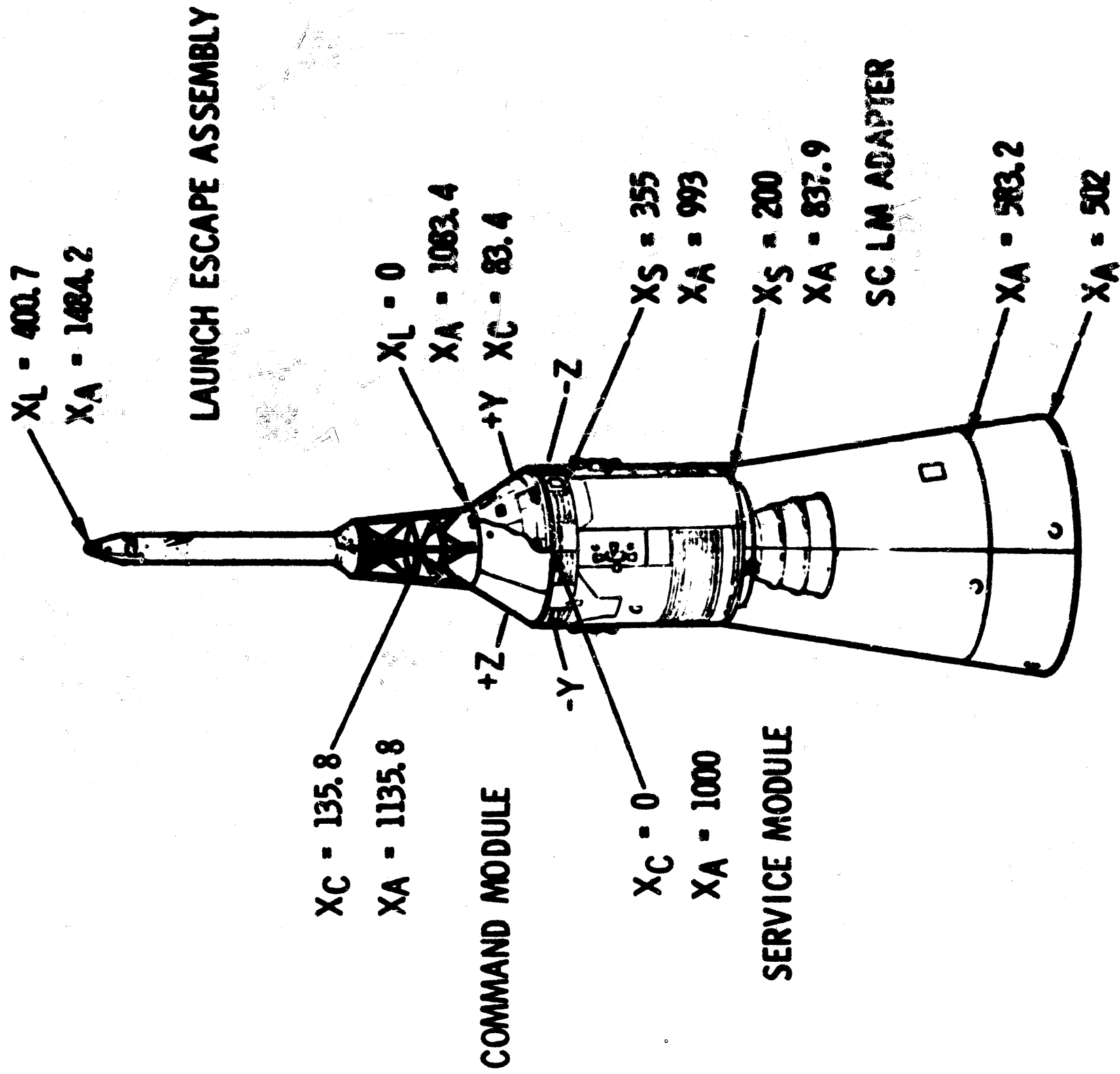
COMMAND MODULE COMPARTMENT ORIENTATION

BLOCK II

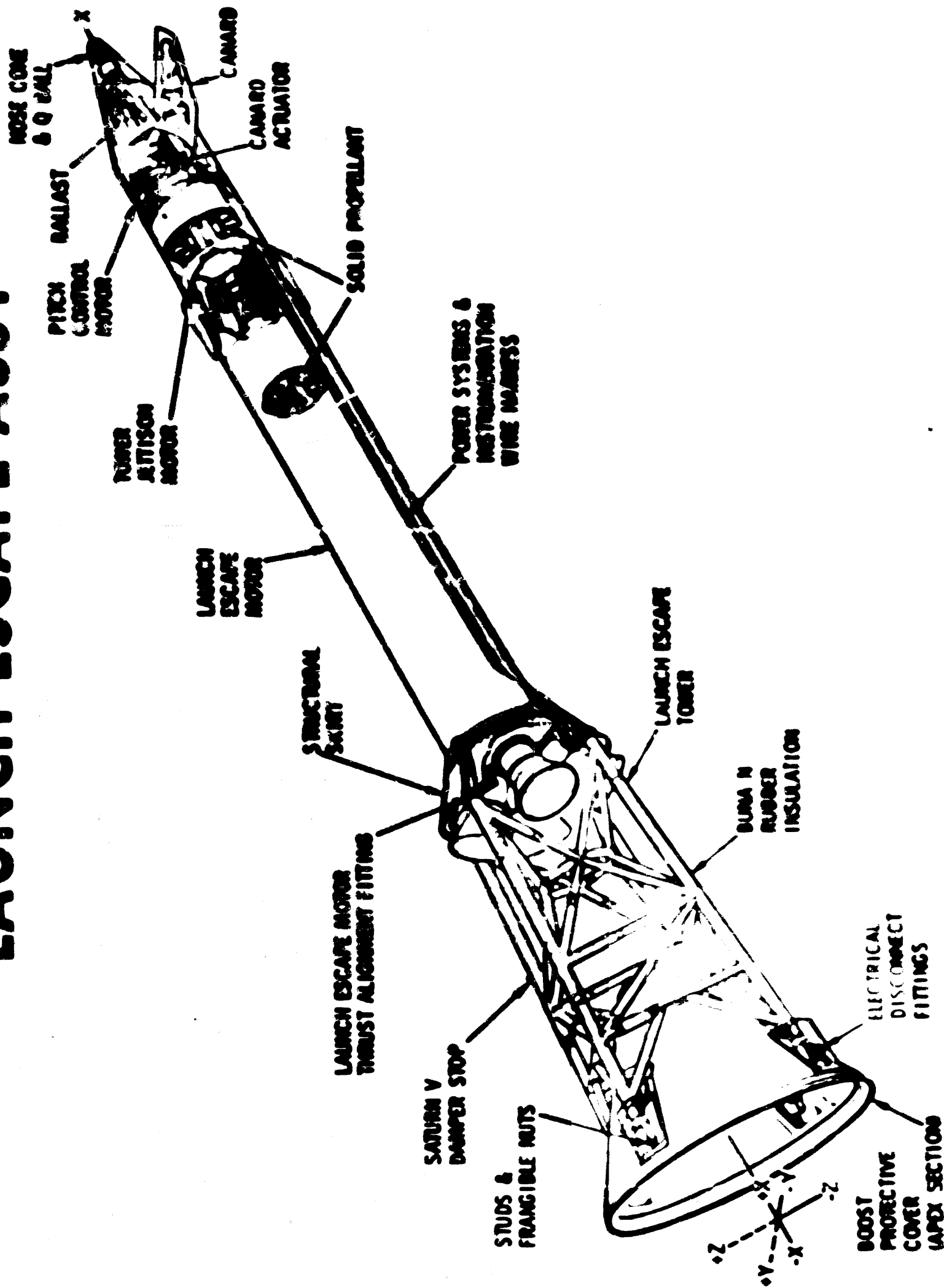


APOLLO INTEGRATED STATION & CSM AXIS

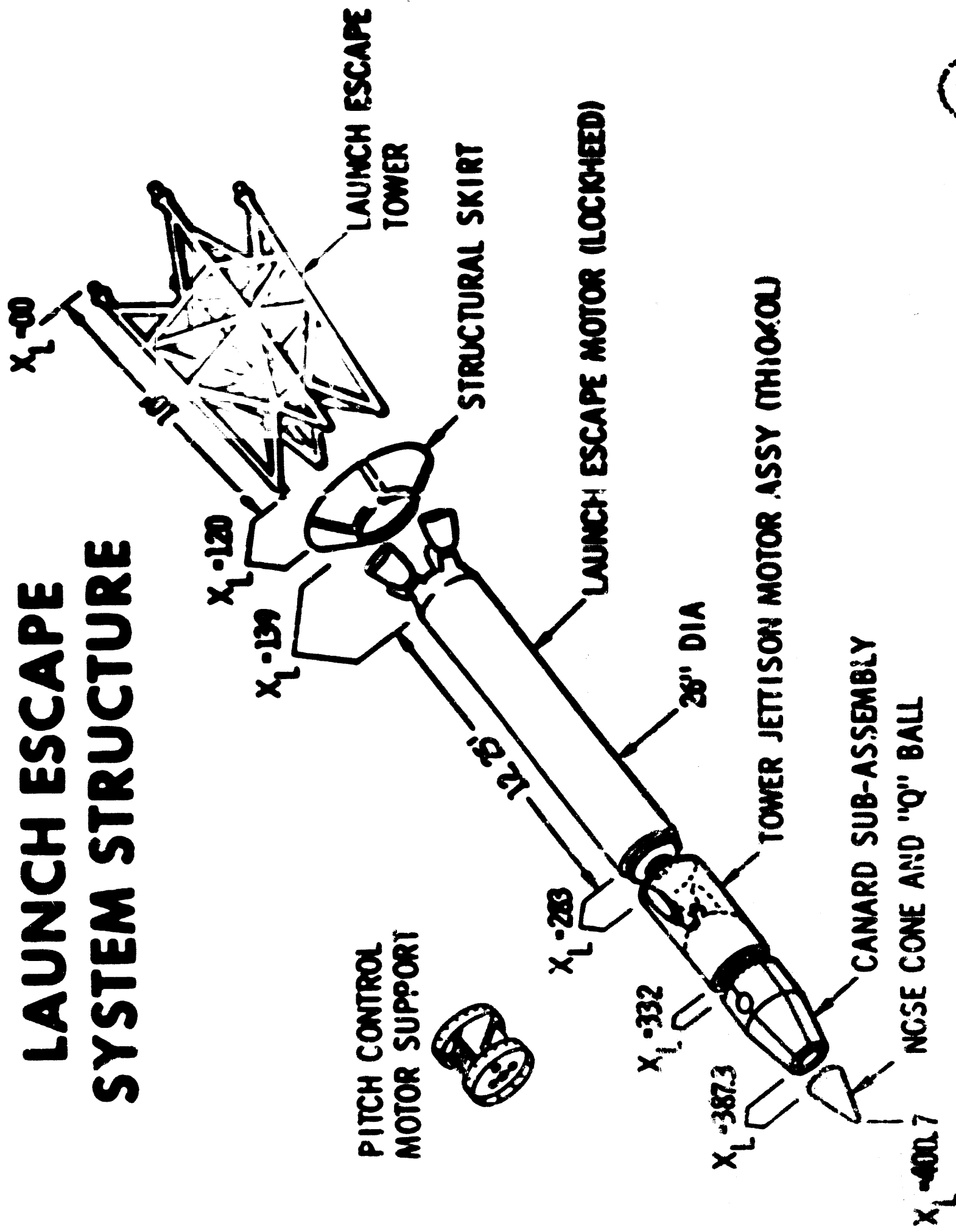
BLOCK II



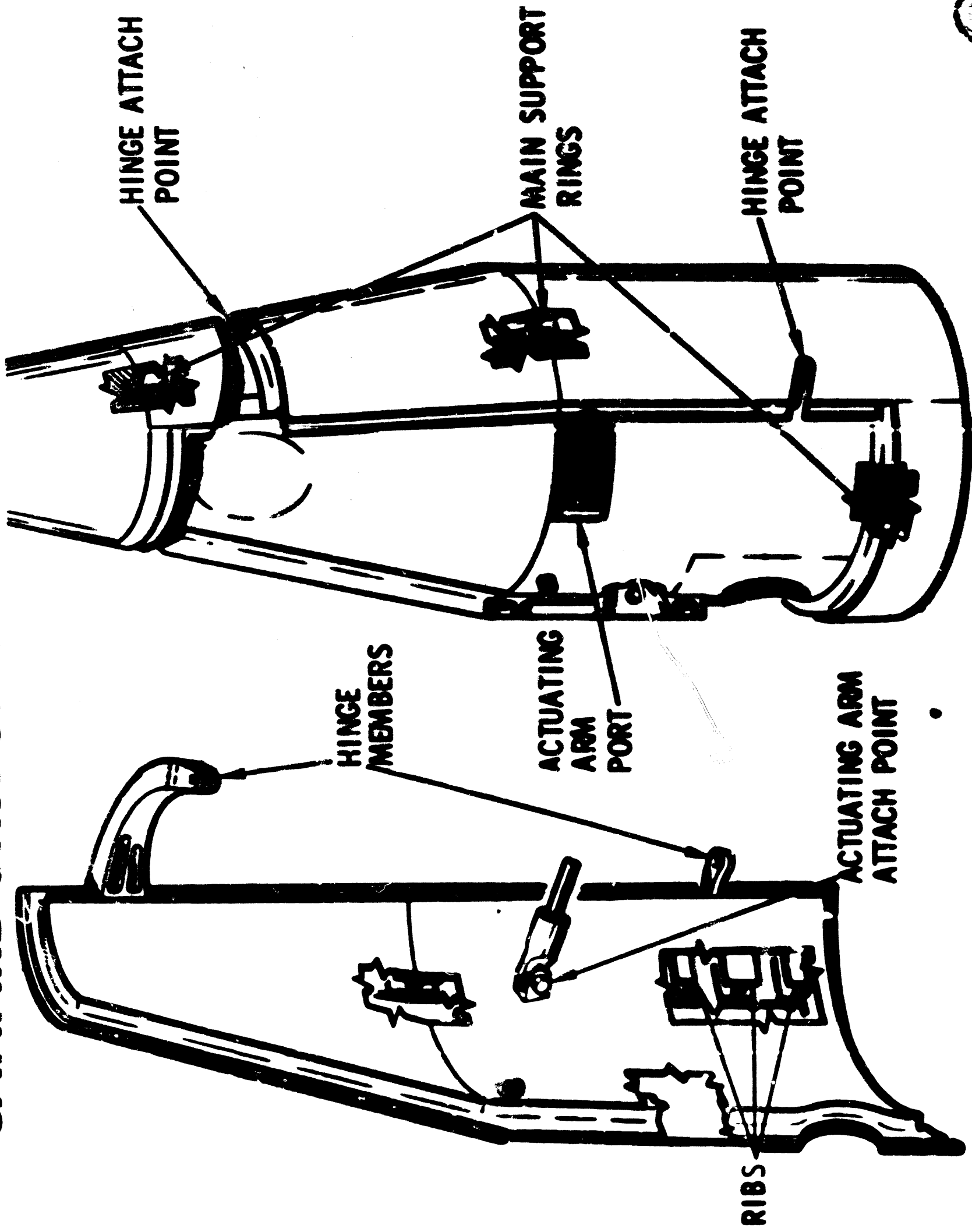
LAUNCH ESCAPE ASSY



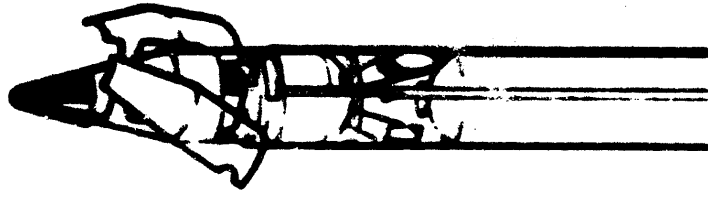
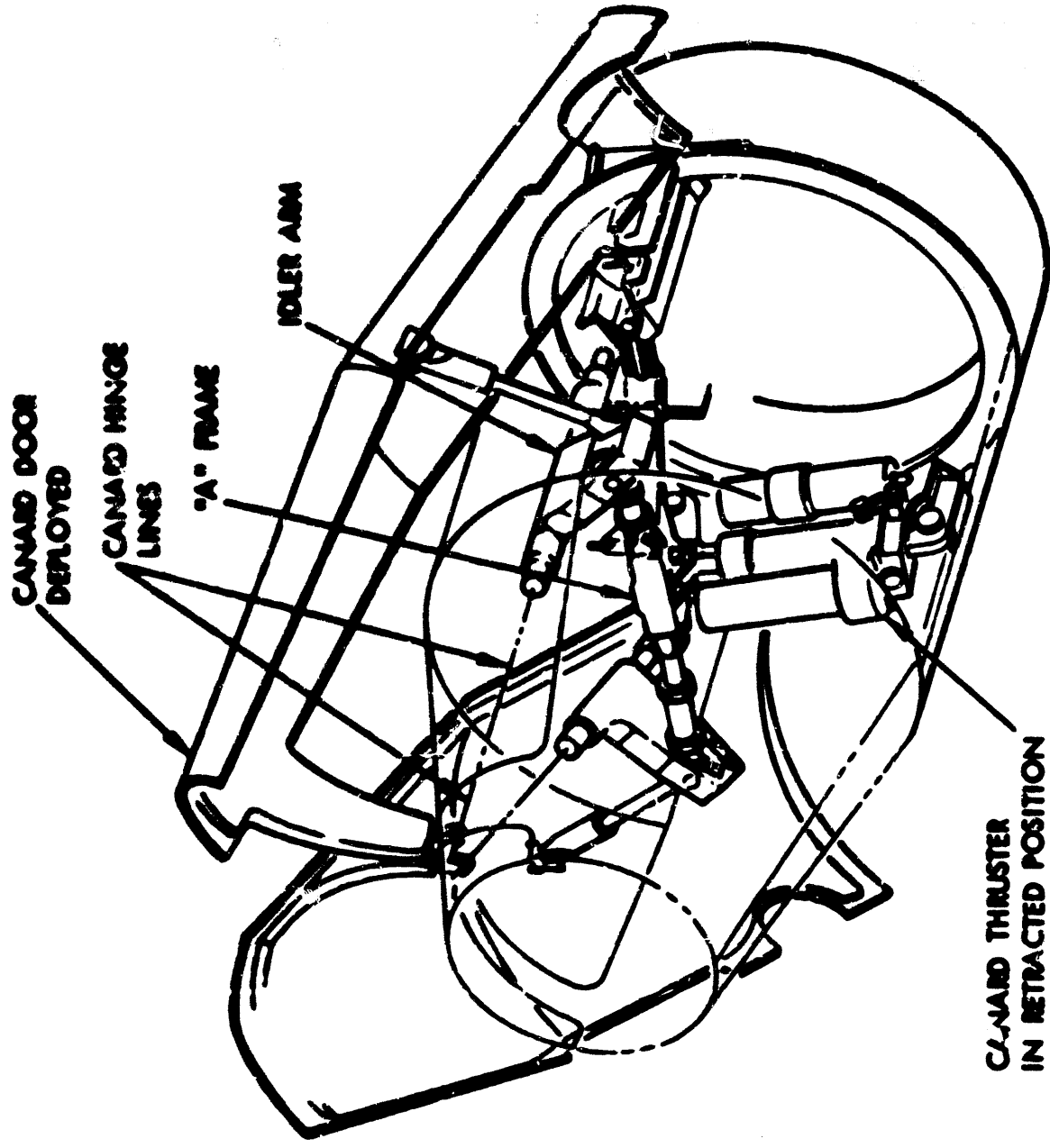
LAUNCH ESCAPE SYSTEM STRUCTURE

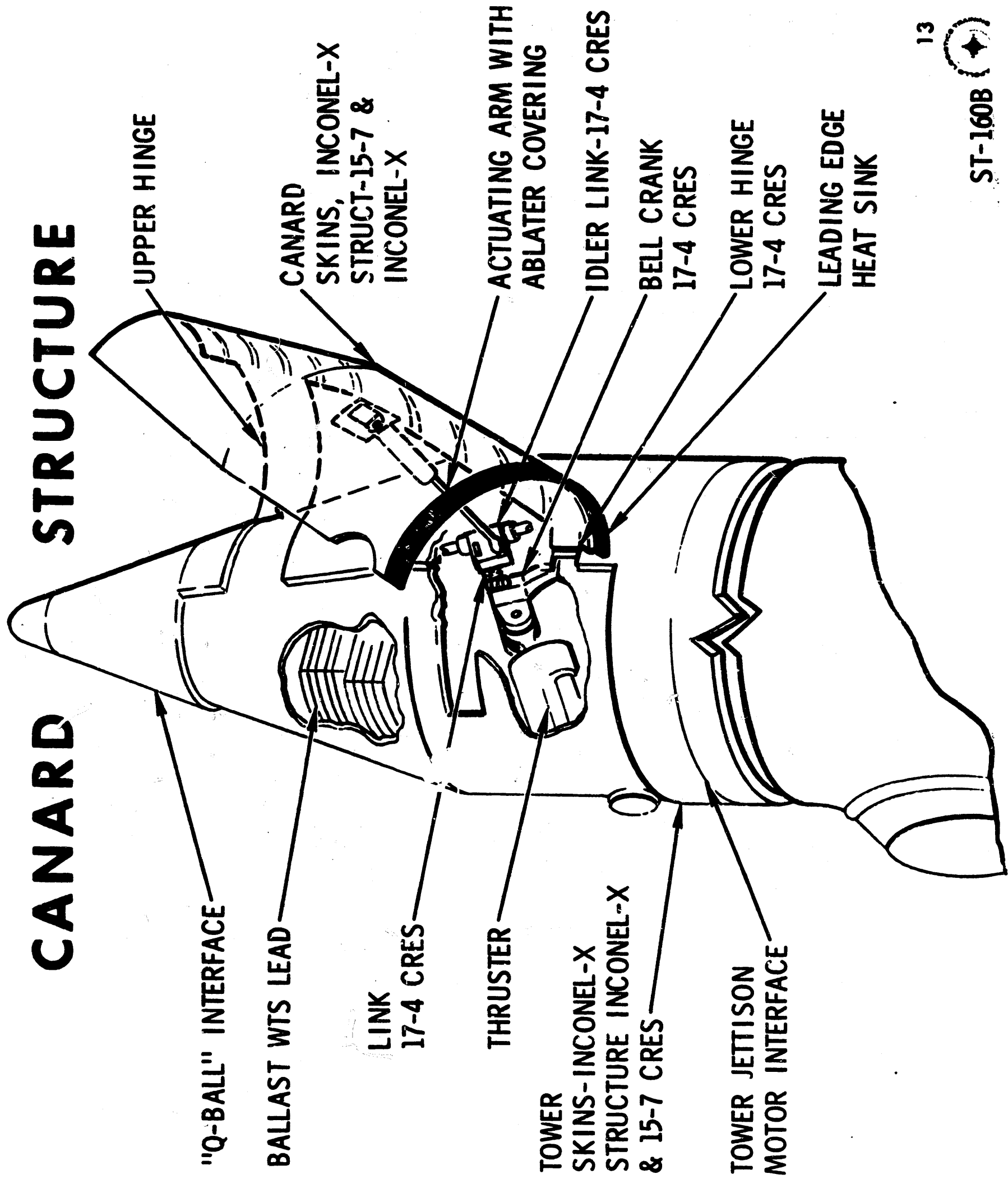


CANARD STRUCTURAL CONFIGURATION



CANARD THRUST & LINKAGE ASSEMBLIES





CANARD

STRUCTURE

"Q-BALL" INTERFACE

BALLAST WTS LEAD

LINK
17-4 CRES

THRUSTER

TOWER
SKINS-INCONEL-X
STRUCTURE INCONEL-X
& 15-7 CRES

TOWER JETTISON
MOTOR INTERFACE

UPPER HINGE

CANARD
SKINS, INCONEL-X
STRUCT-15-7 &
INCONEL-X

ACTUATING ARM WITH
ABLATER COVERING

IDLER LINK-17-4 CRES

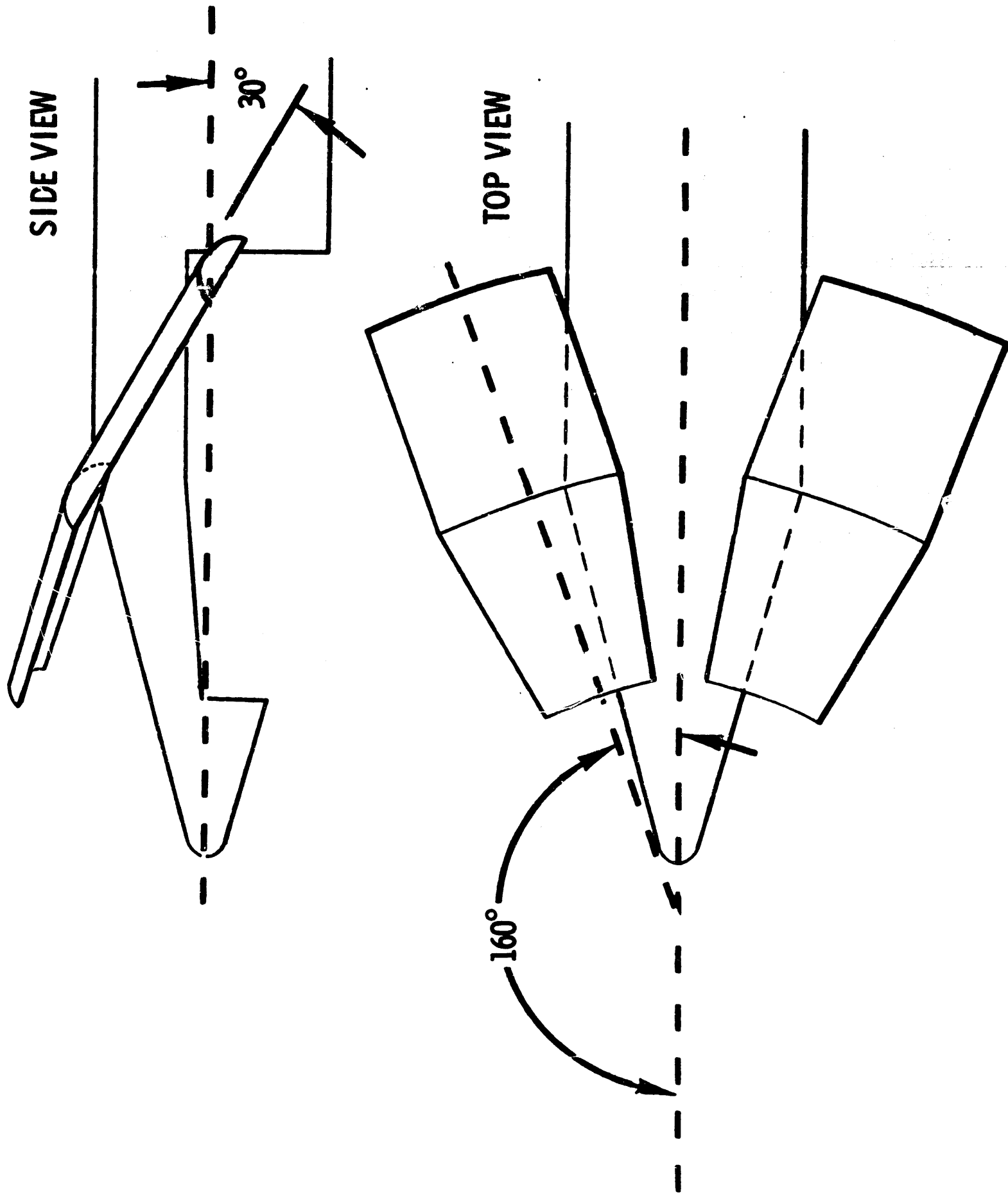
BELL CRANK
17-4 CRES

LOWER HINGE
17-4 CRES

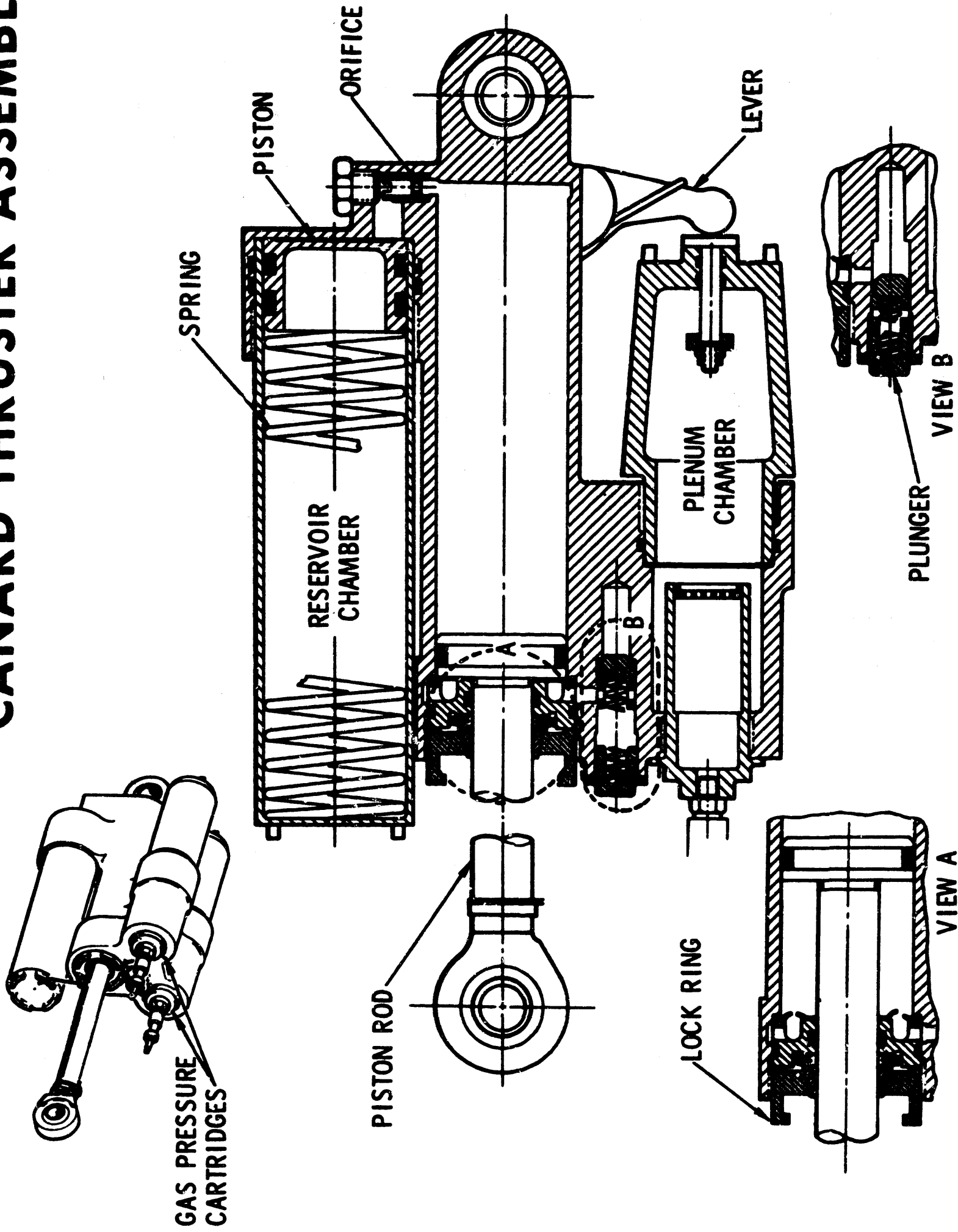
LEADING EDGE
HEAT SINK



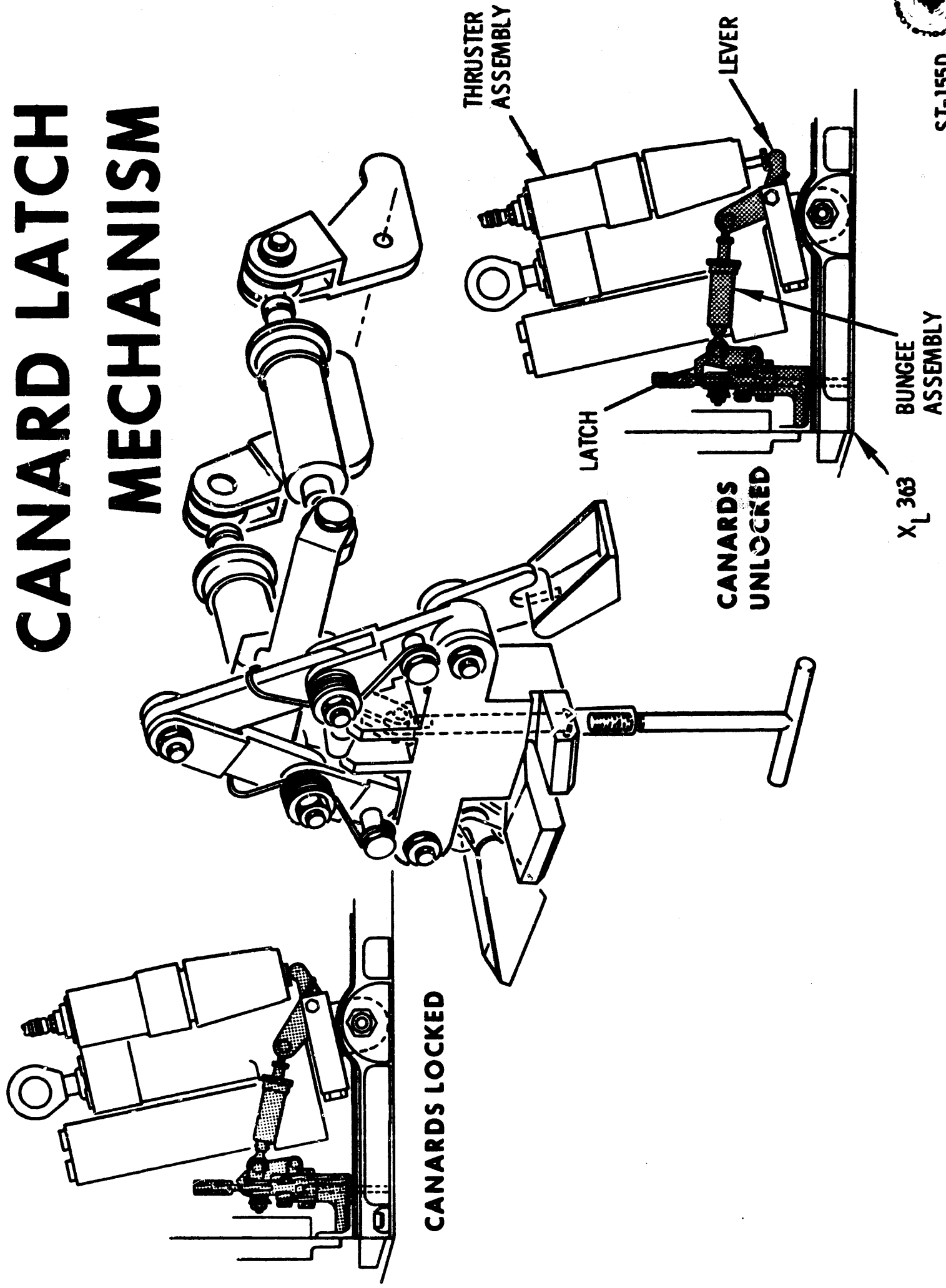
CANARD SURFACES FULLY DEPLOYED



CANARD THRUSTER ASSEMBLY



CANARD LATCH MECHANISM



ST-155D

LET STRUCTURE AND INSULATION

FIGURE A

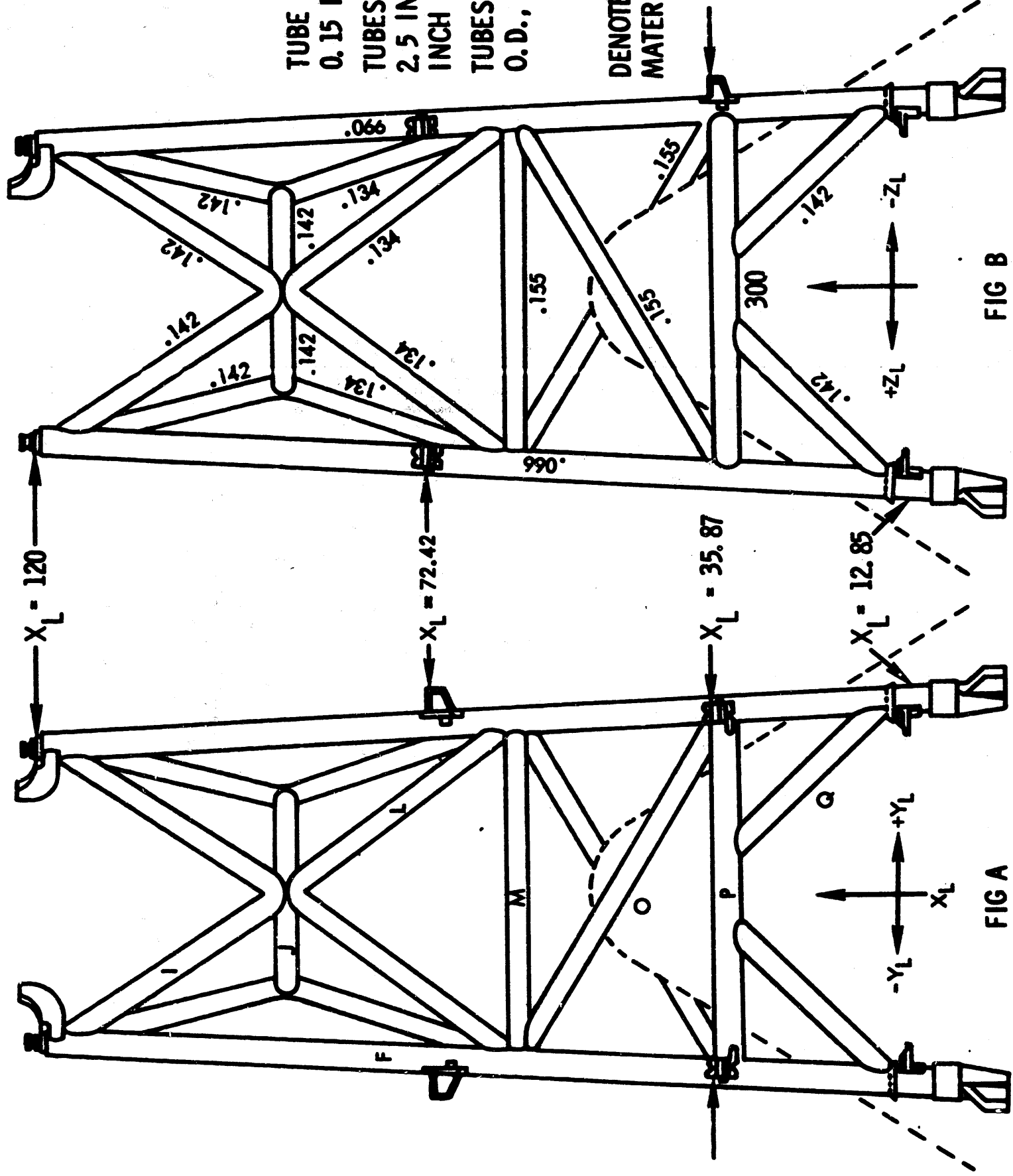
**TUBE J-2.5 INCH O.D.,
0.15 INCH WALL**

**TUBES I, L, M, O, Q -
2.5 INCH O.D., 0.05
INCH WALL**

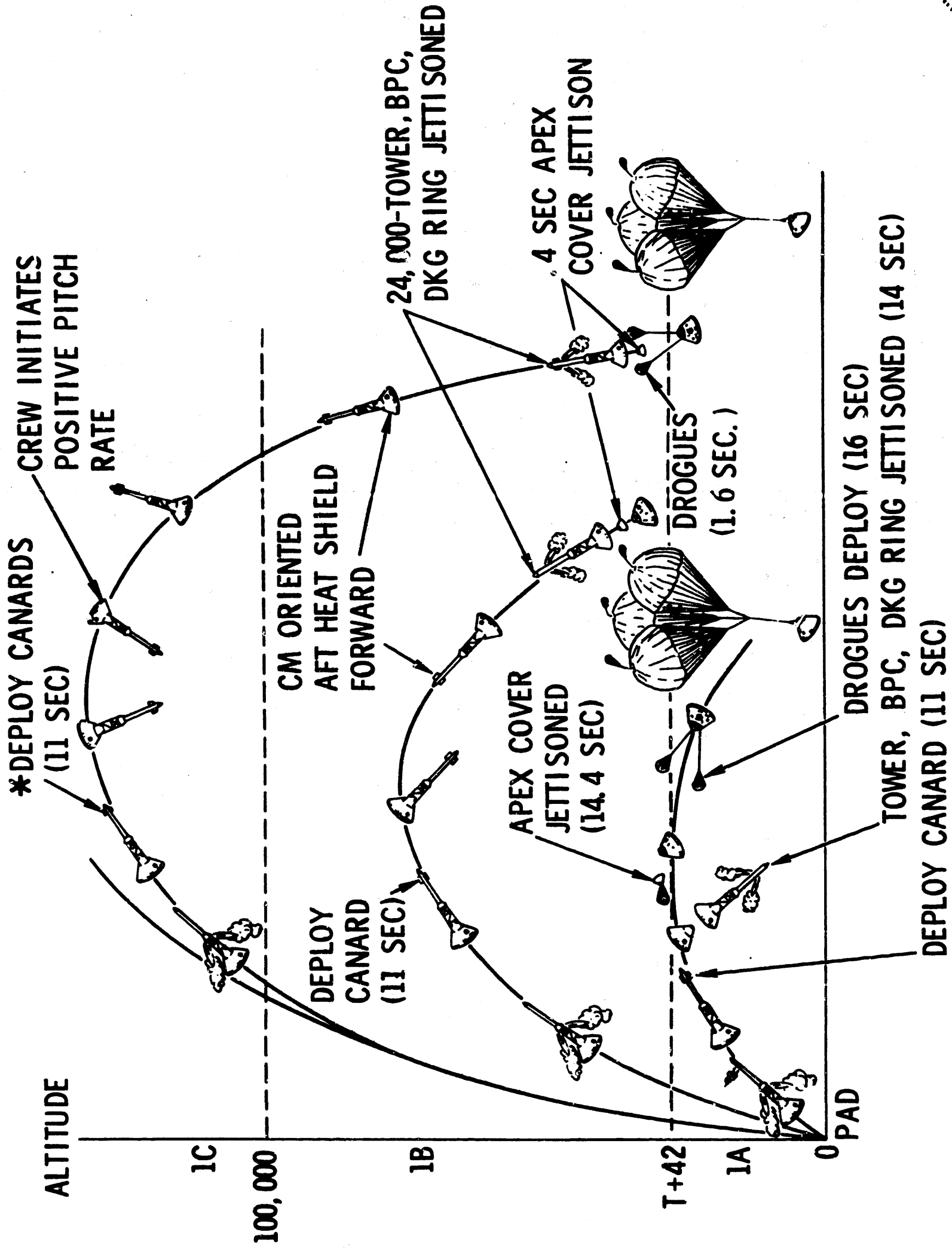
**TUBES F, P - 3.5 INCH
O.D., 0.125 INCH WALL**

FIGURE B

**DENOTES ABLATIVE
MATERIAL THICKNESSES**



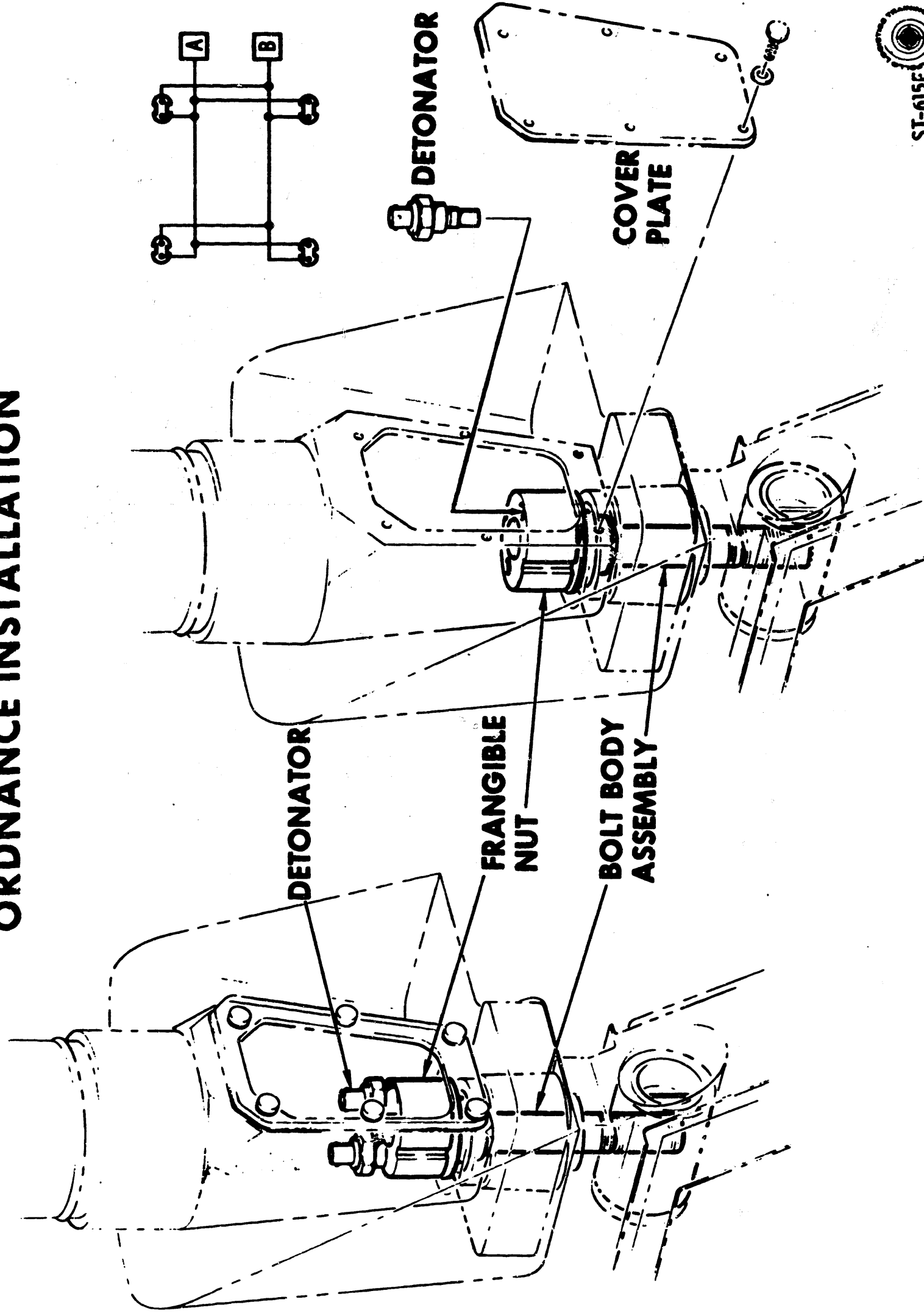
LAUNCH ESCAPE VEHICLE OPERATION



*RETAINING TOWER IS OPTIONAL

TOWER SEPARATION MECHANISM

ORDNANCE INSTALLATION



LAUNCH ESCAPE SUBSYSTEM

FRANGIBLE NUT INSTALLATION

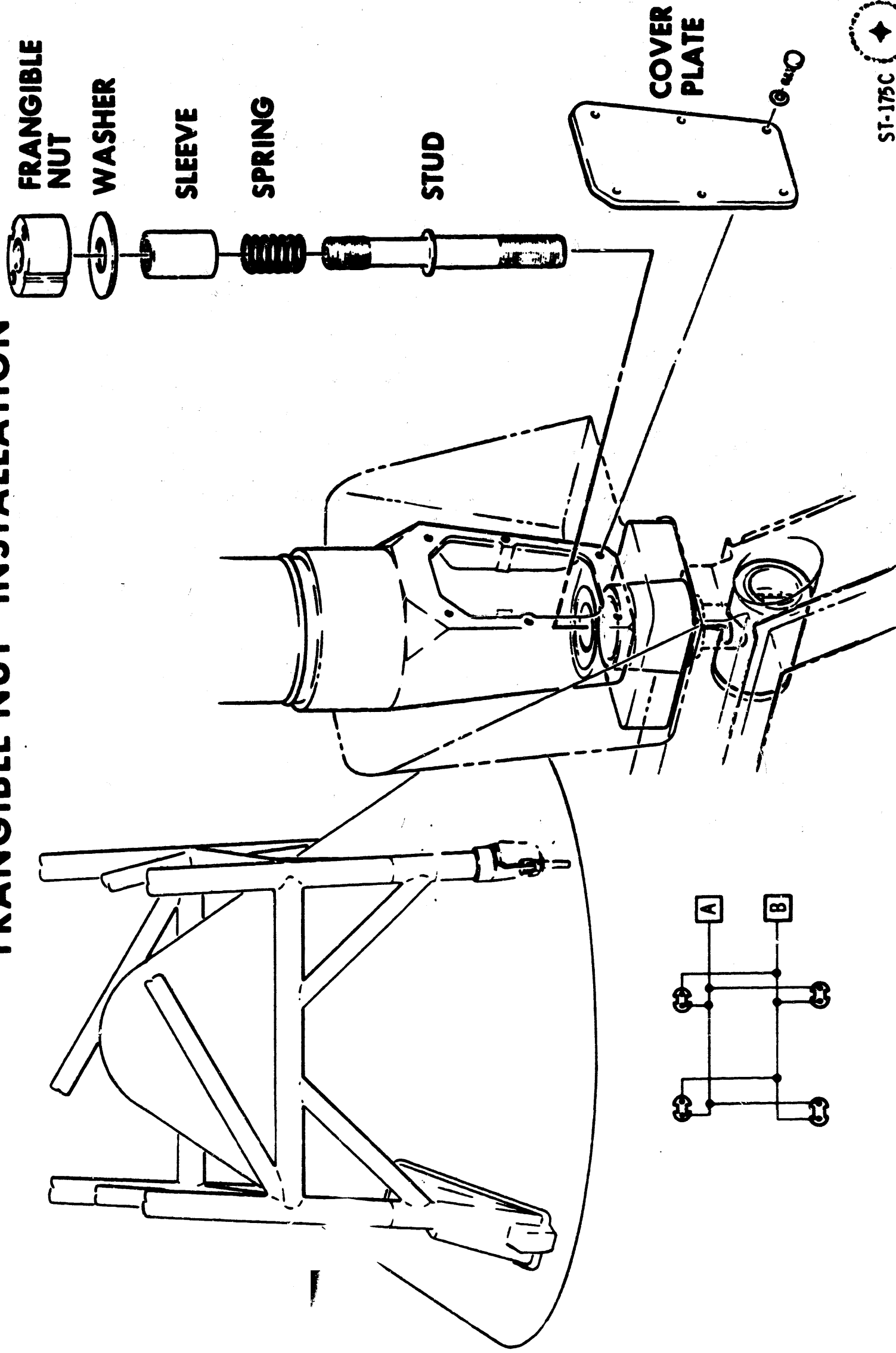
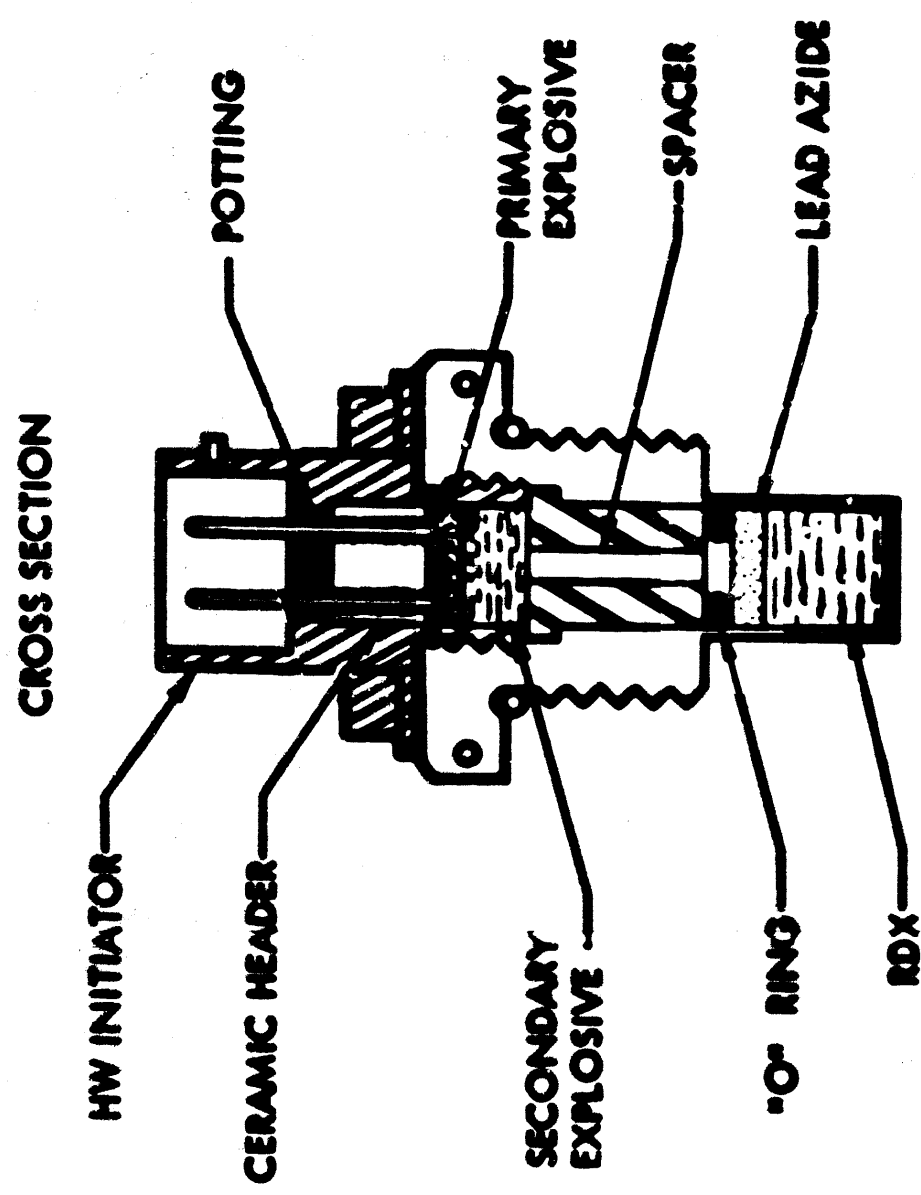
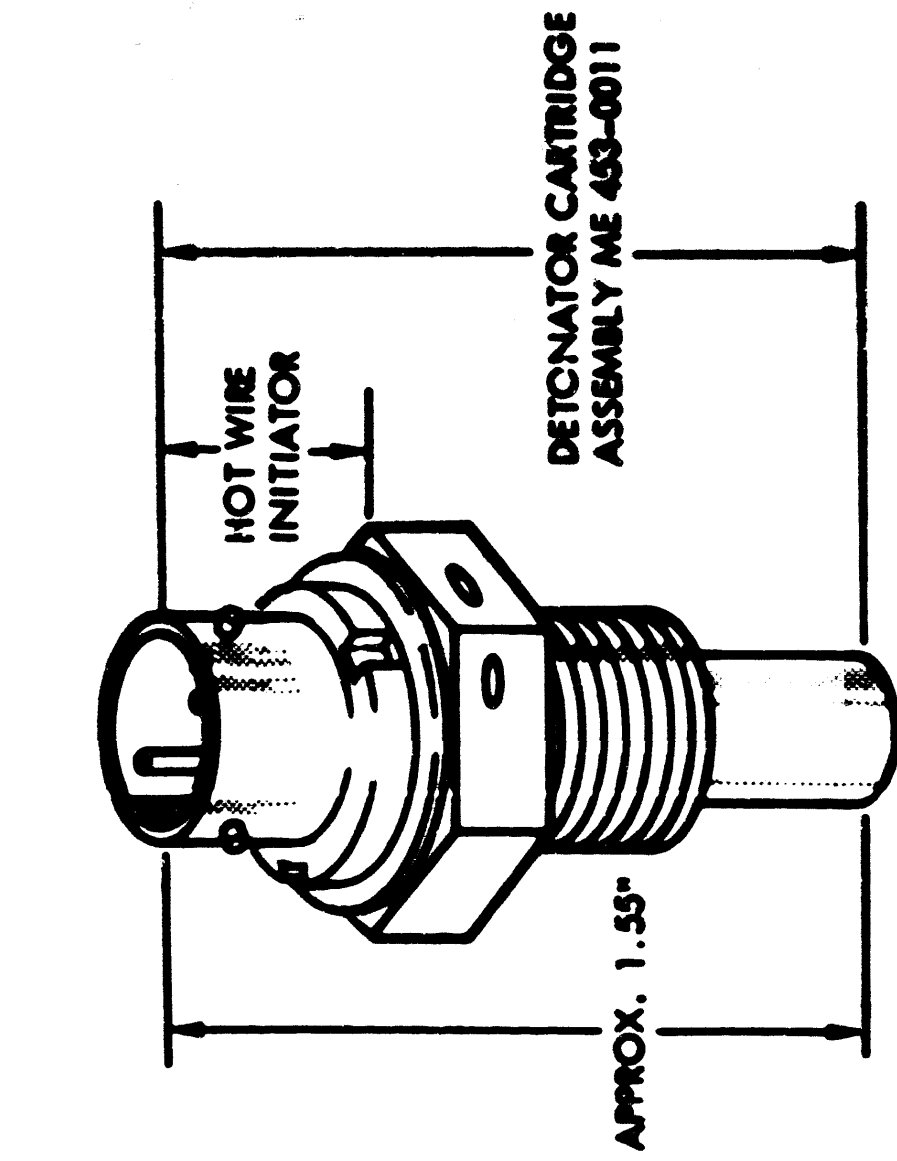
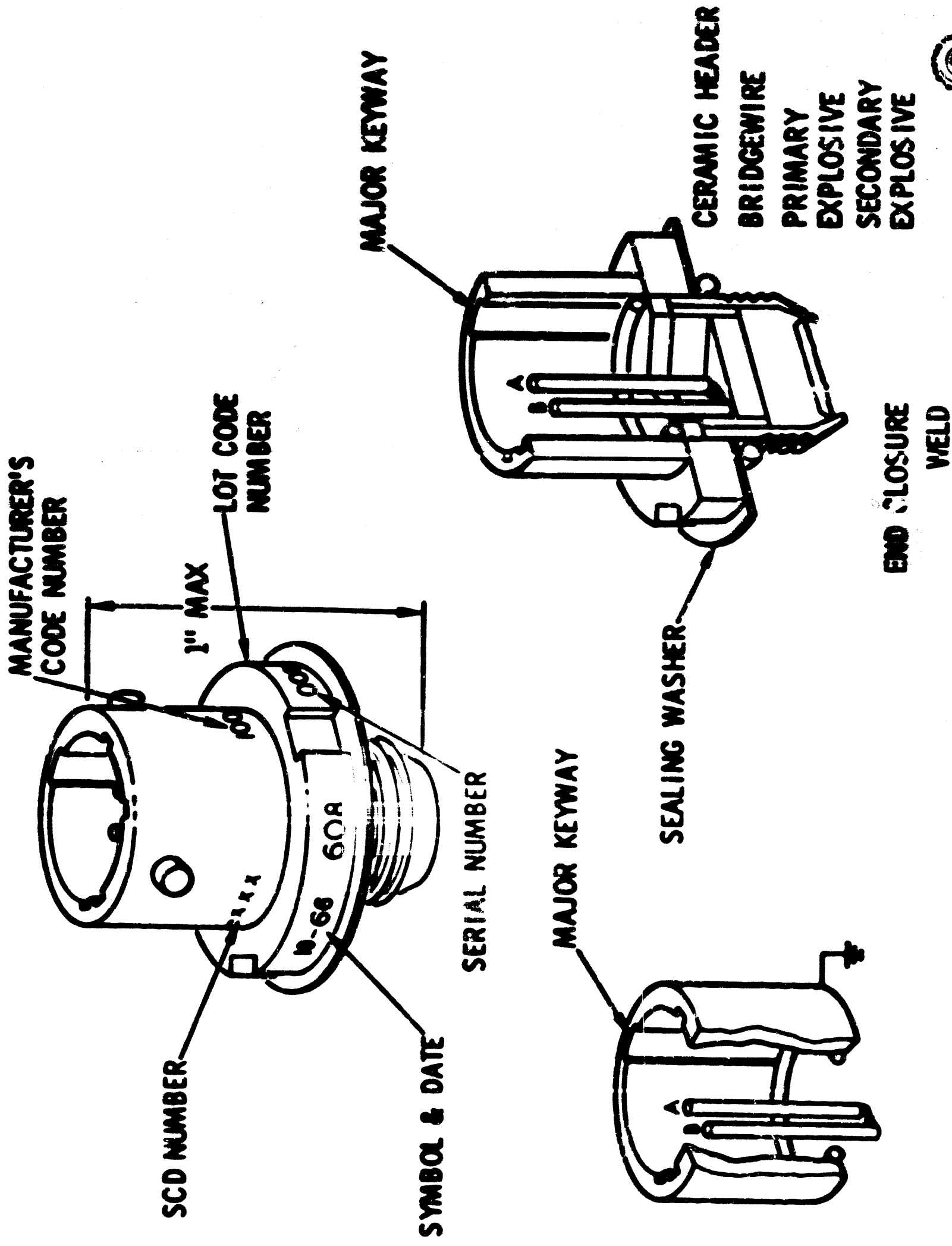


FIGURE 2-13

DETONATOR CARTRIDGE ASSEMBLY

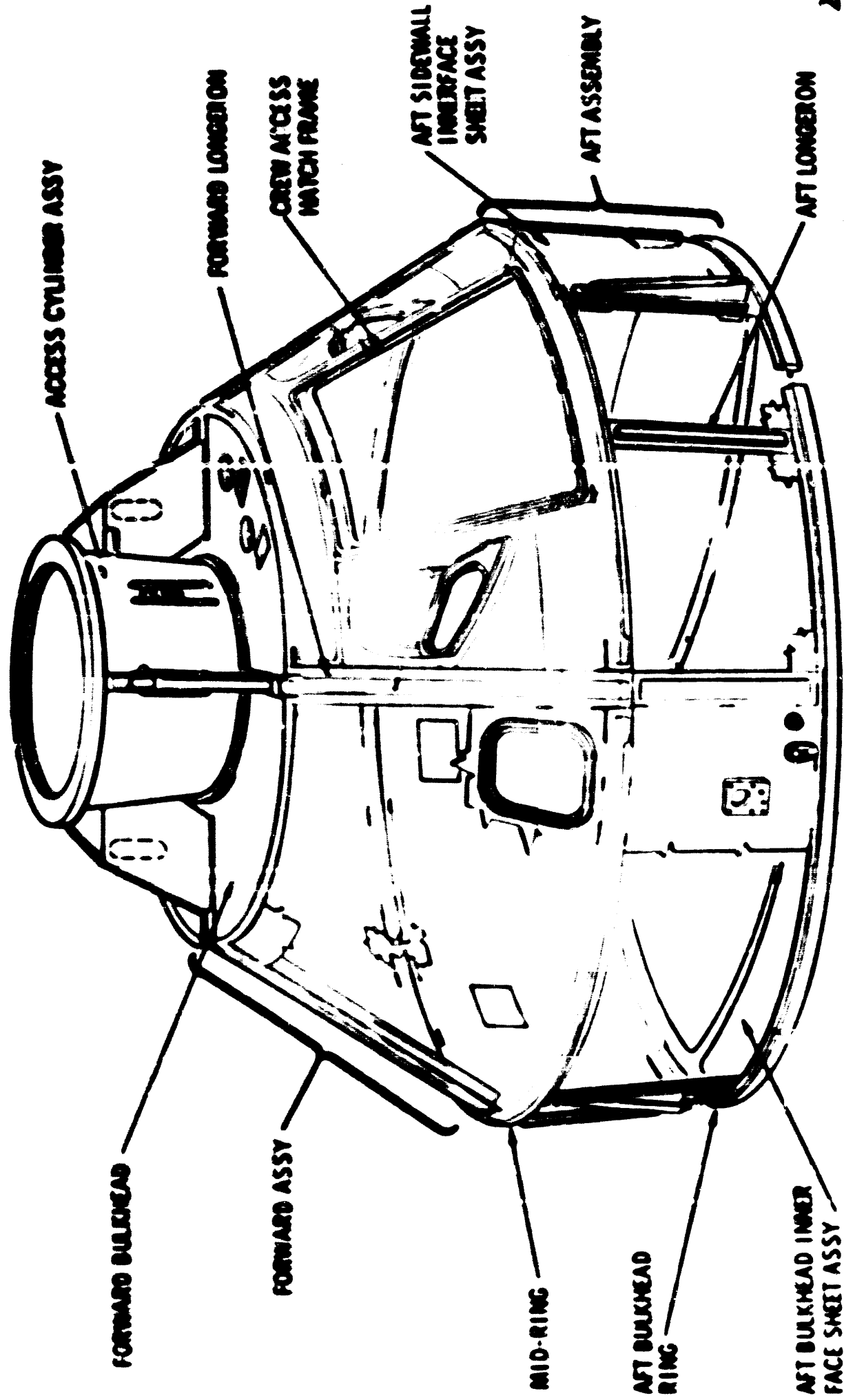


ELECTRICAL HOTWIRE INITIATOR

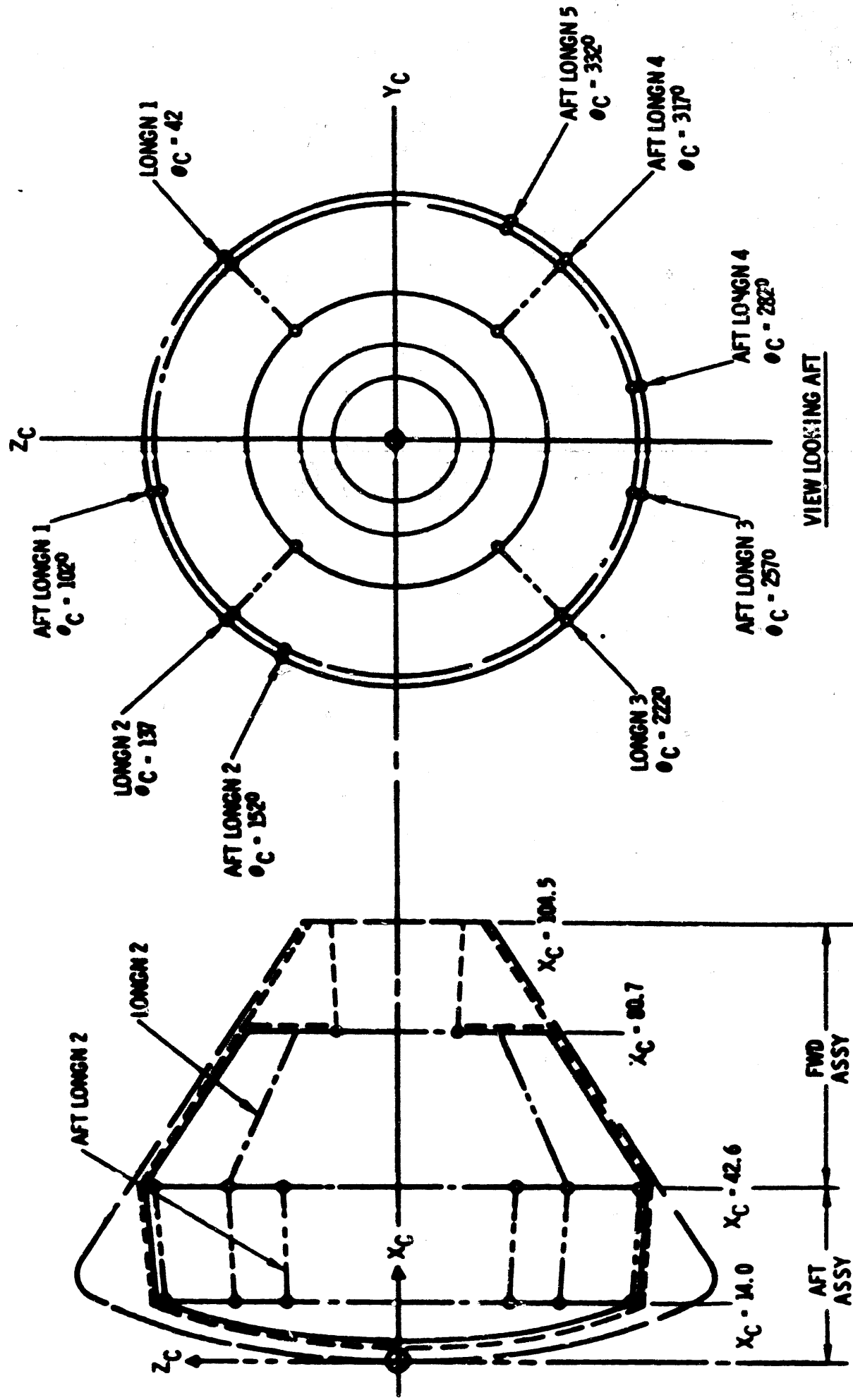


INNER STRUCTURE

INNER SHELL (BLOCK 14)



INNER STRUCTURE SUPPORT LONGERONS



SIDE VIEW

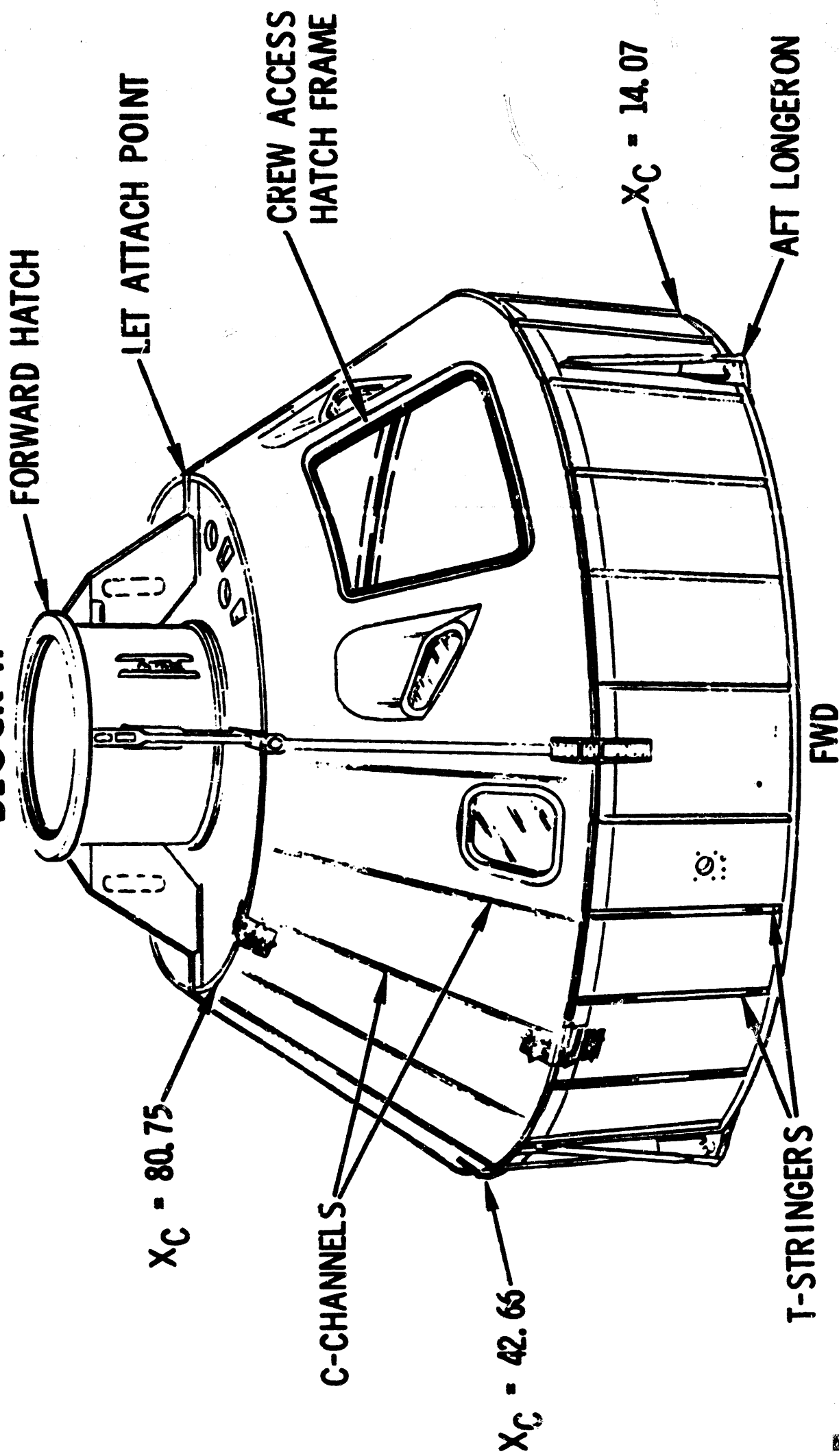
VIEW LOOKING AFT

NOTE: ANGLES SHOWN ARE APPROXIMATE

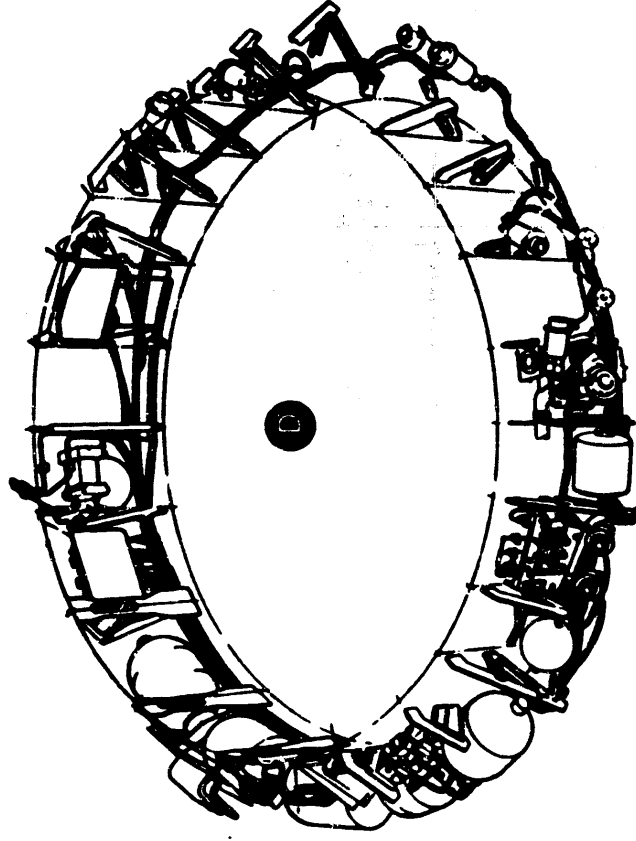
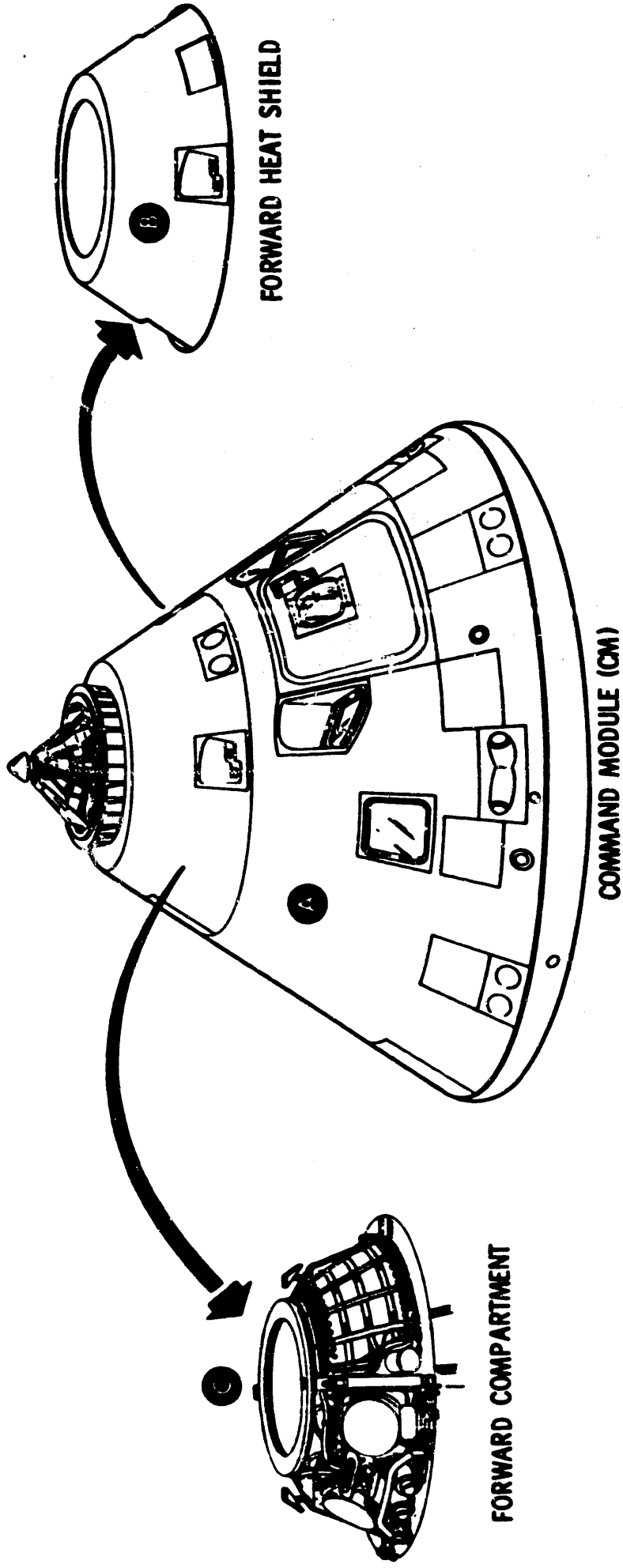


CM INNER STRUCTURE

BLOCK II



CM EXTERNAL COMPARTMENTS



JUL 68

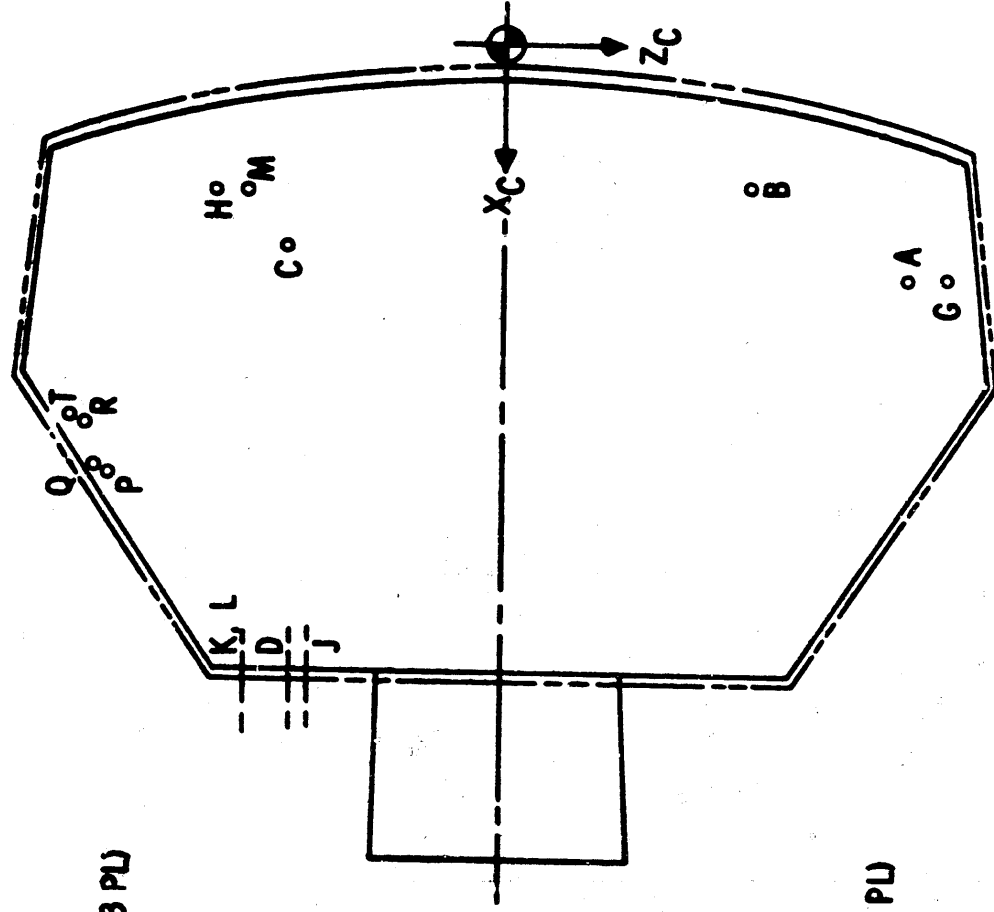
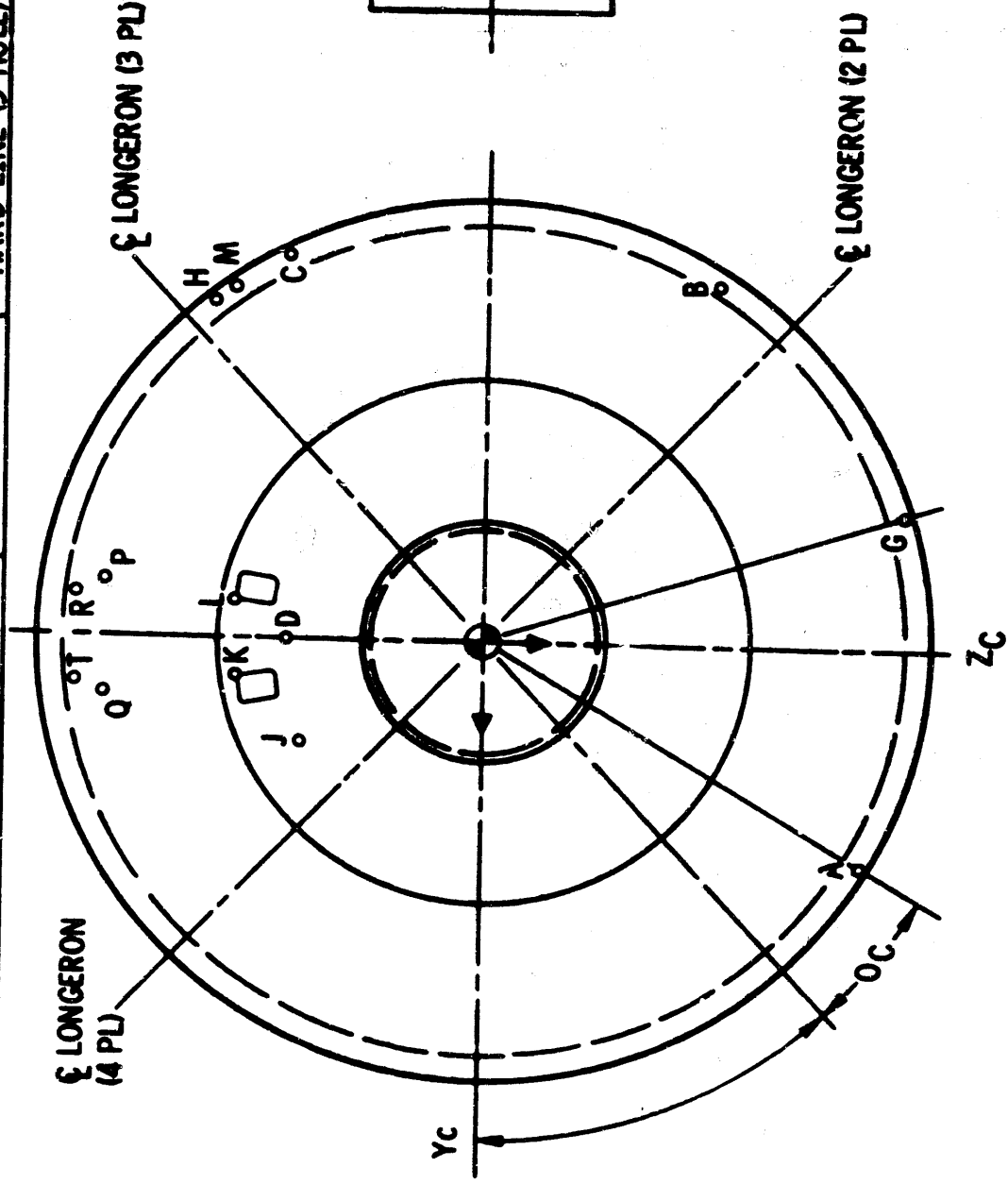
ST-266



INNER STRUCTURE PENETRATION DIAGRAM & COORDINATES

PT	Xc	Yc	Zc	Oc	NOMENCLATURE
A	30.9000	28.7200	51.0939	60°39'34.40"	ELECT UMBILICAL
B	18.6856	-48.8943	30.4243	148°06'29.44"	HARD LINE (3 HOLE)
C	26.0000	-51.5856	-26.9500	207°35'02.46"	HARD LINE (8 HOLE)
R	57.0005	-9.2244	-49.6092	259°28'	PURGE PRESS TEST
T	51.9600	9.6122	-52.8055	280°19'	CREW HATCH MECH
G	30.9000	-16.4500	56.2568	-106°17'57.89"	ELECT UMBILICAL
H	19.2500	-45.0084	-36.0000	218°39'16.62"	HARD LINE (1 HOLE)
Q	58.7200	11.3140	-48.0486	283°15'	BOOST COVER RELEASE
P	60.5000	-10.1506	-47.1474	257°51'	DUMP VALVE
M	18.3300		-31.4600		HARD LINE (3 HOLE)

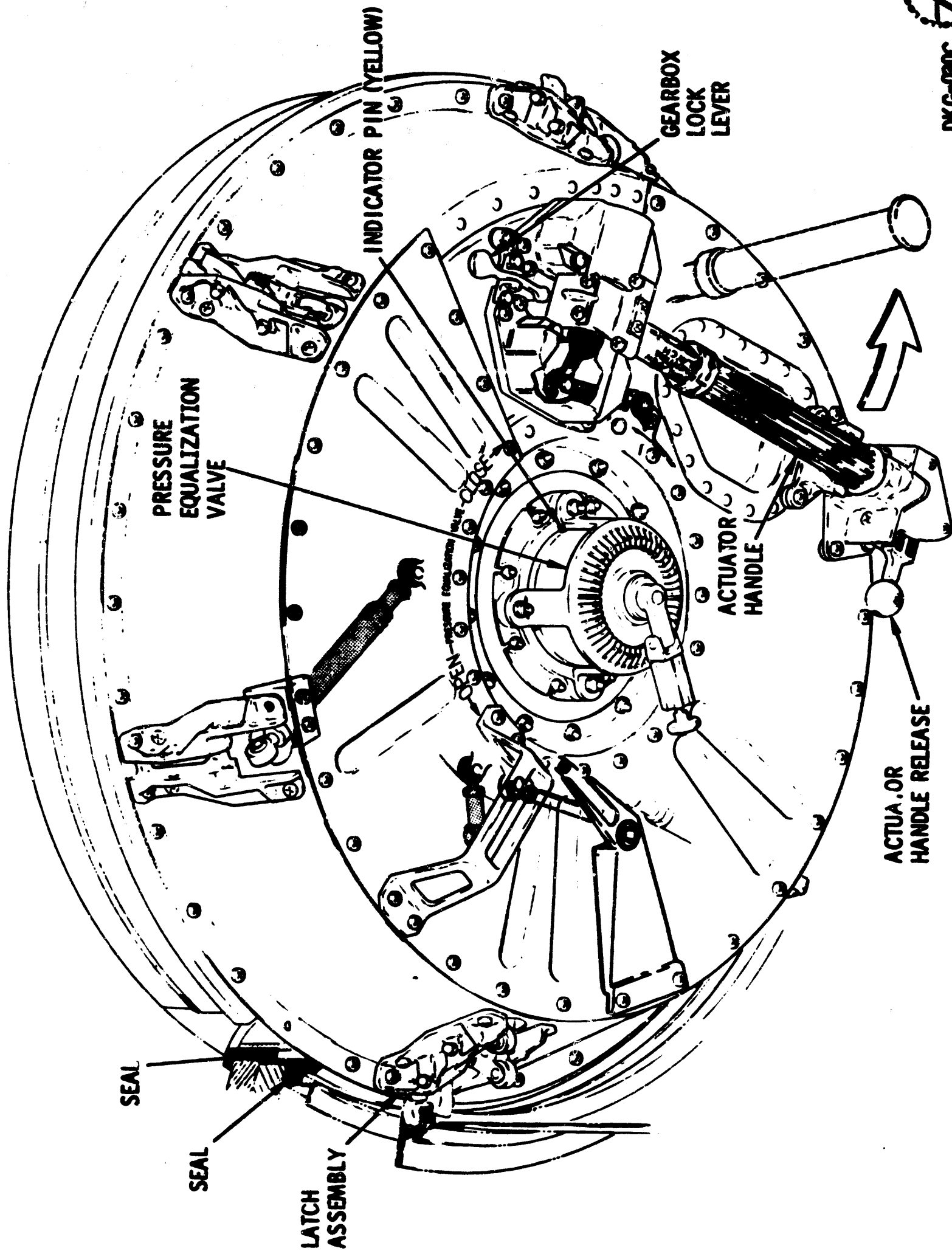
FWD BULKHEAD PENETRATION				
PT	Yc	Zc	NOMENCLATURE	
K	5.1000	-32.3505	ELECT PLUG	
L	-5.1000	-32.3505	ELECT COAX - ECS	
D	0	-25.8000	P/UECS	
J	13.7000	-24.5000	P/UECS	



VIEW LOOKING AFT

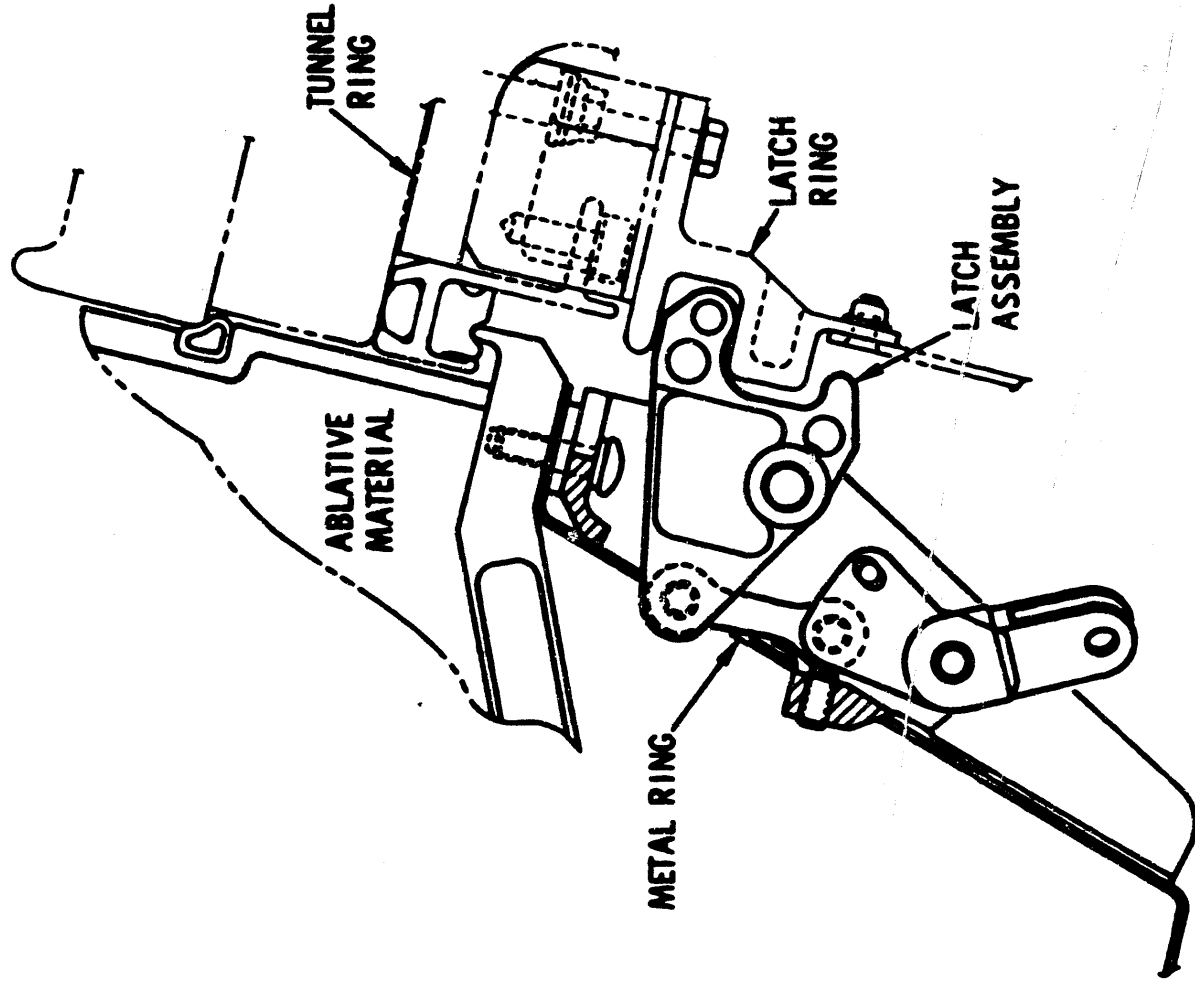
SIDE VIEW

COMBINED TUNNEL HATCH

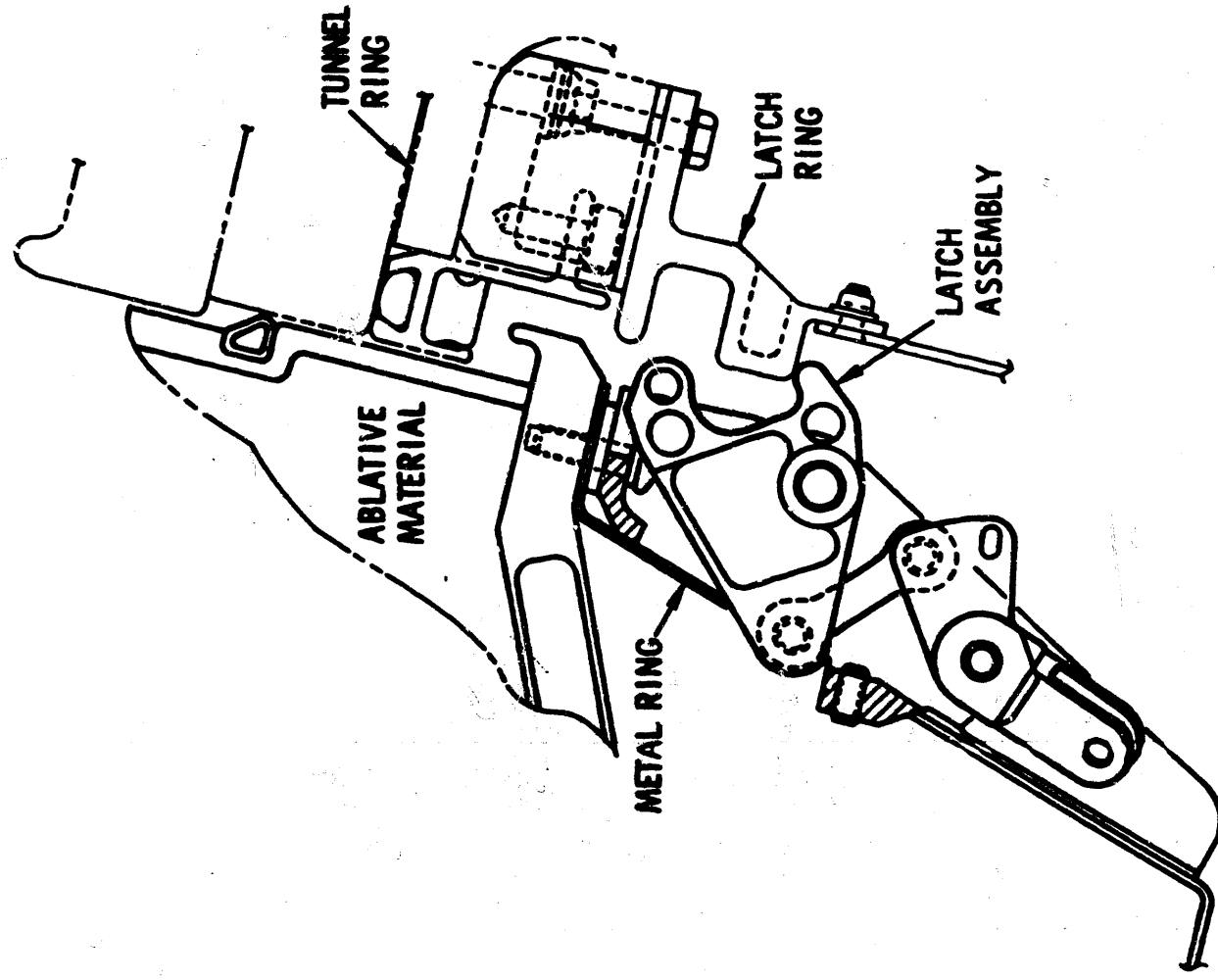


DKG-030C

COMBINED TUNNEL HATCH MECHANISM

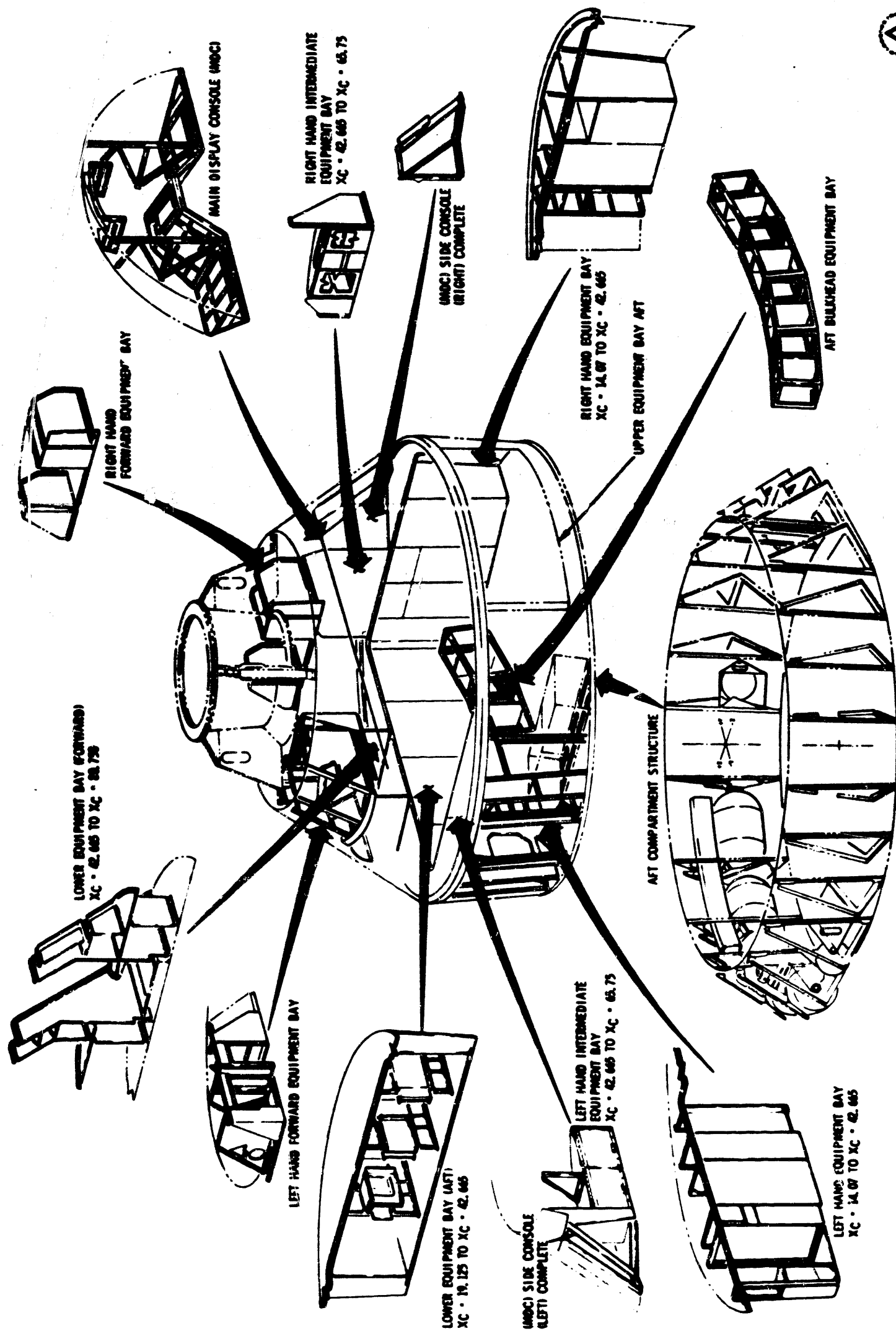


VIEW LATCHED



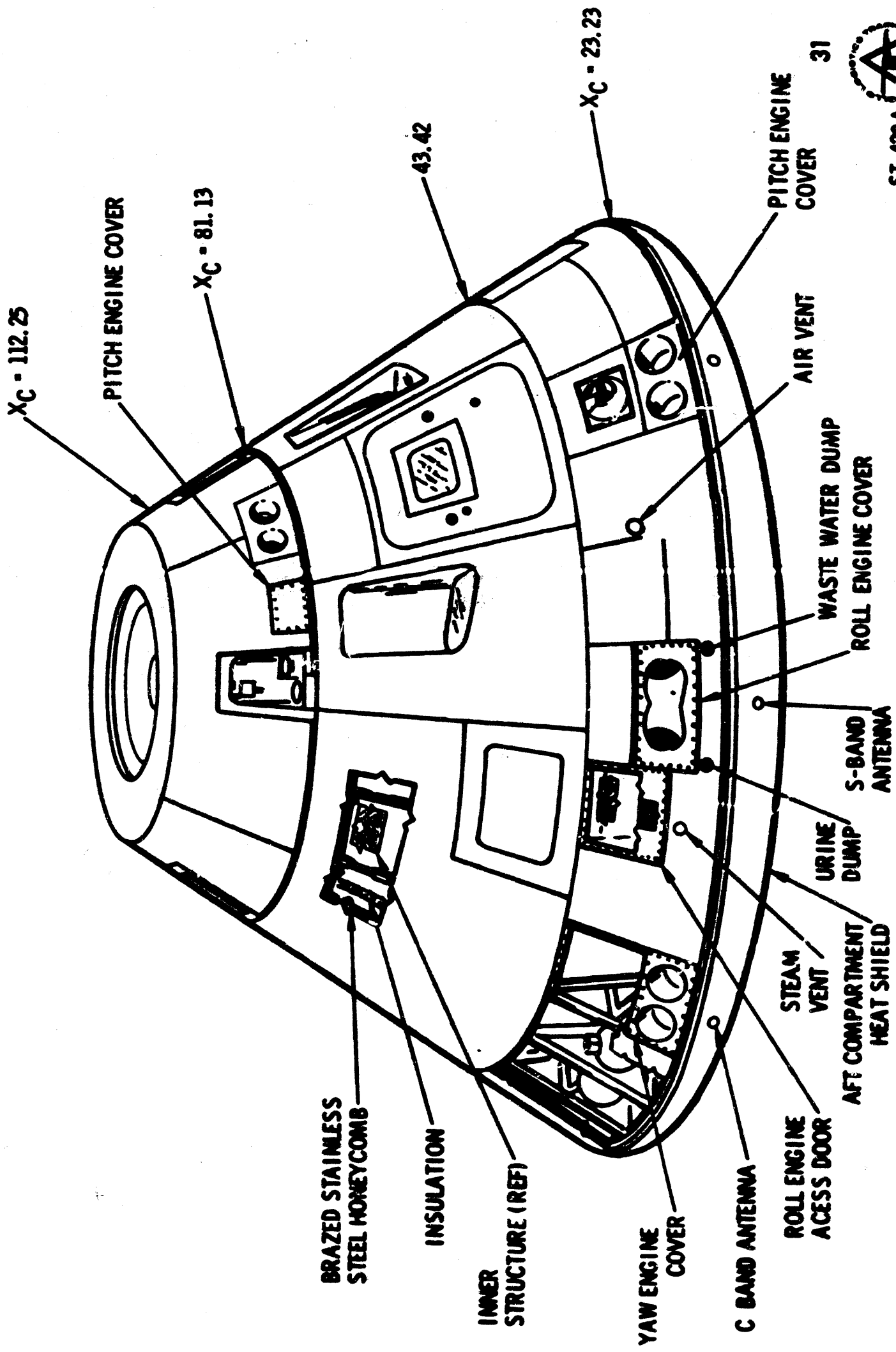
VIEW UNLATCHED

SECONDARY & EQUIPMENT SUPPORT STRUCTURE

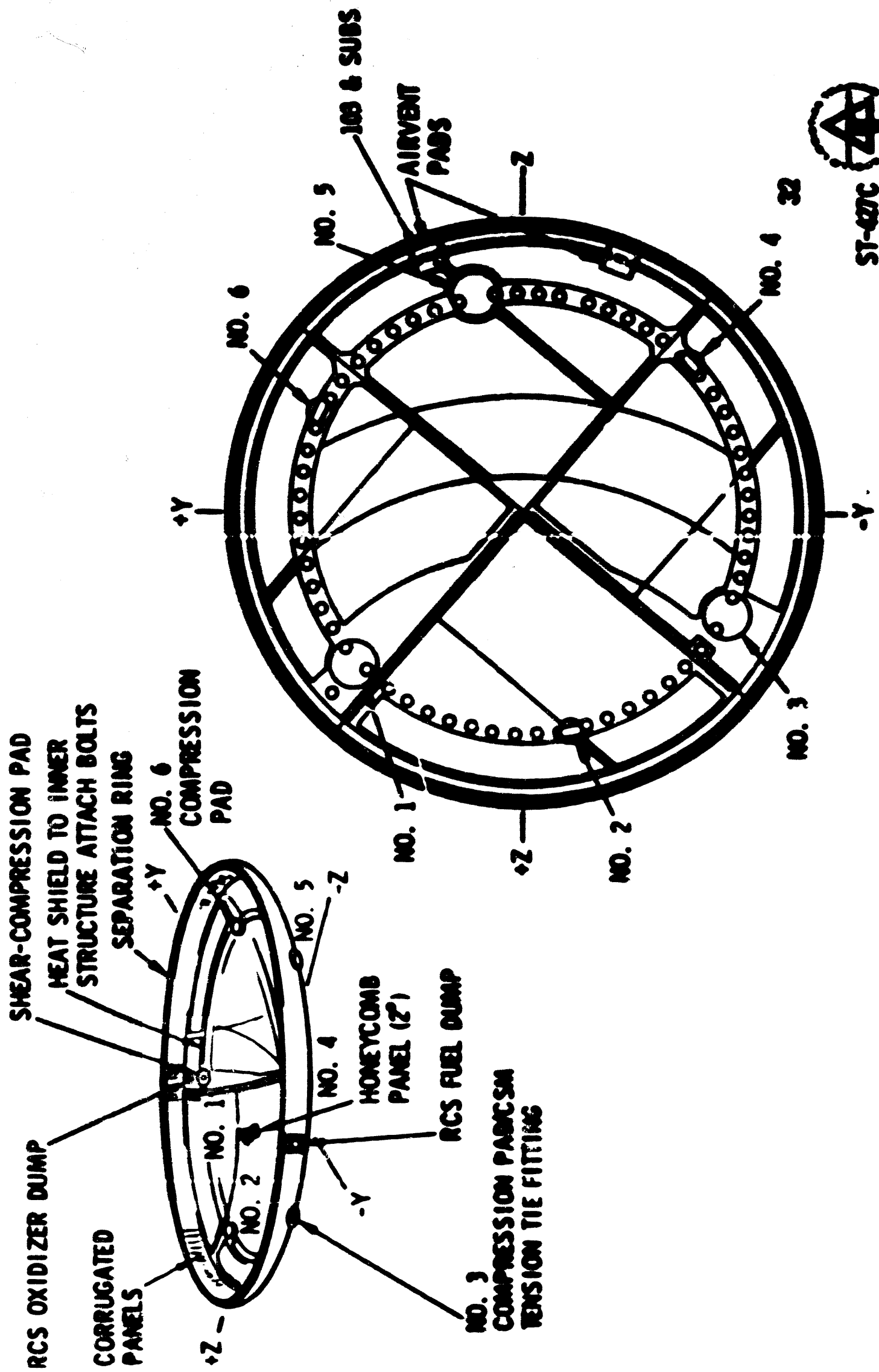


CM HEAT SHIELD COMPONENTS

(BLOCK II)

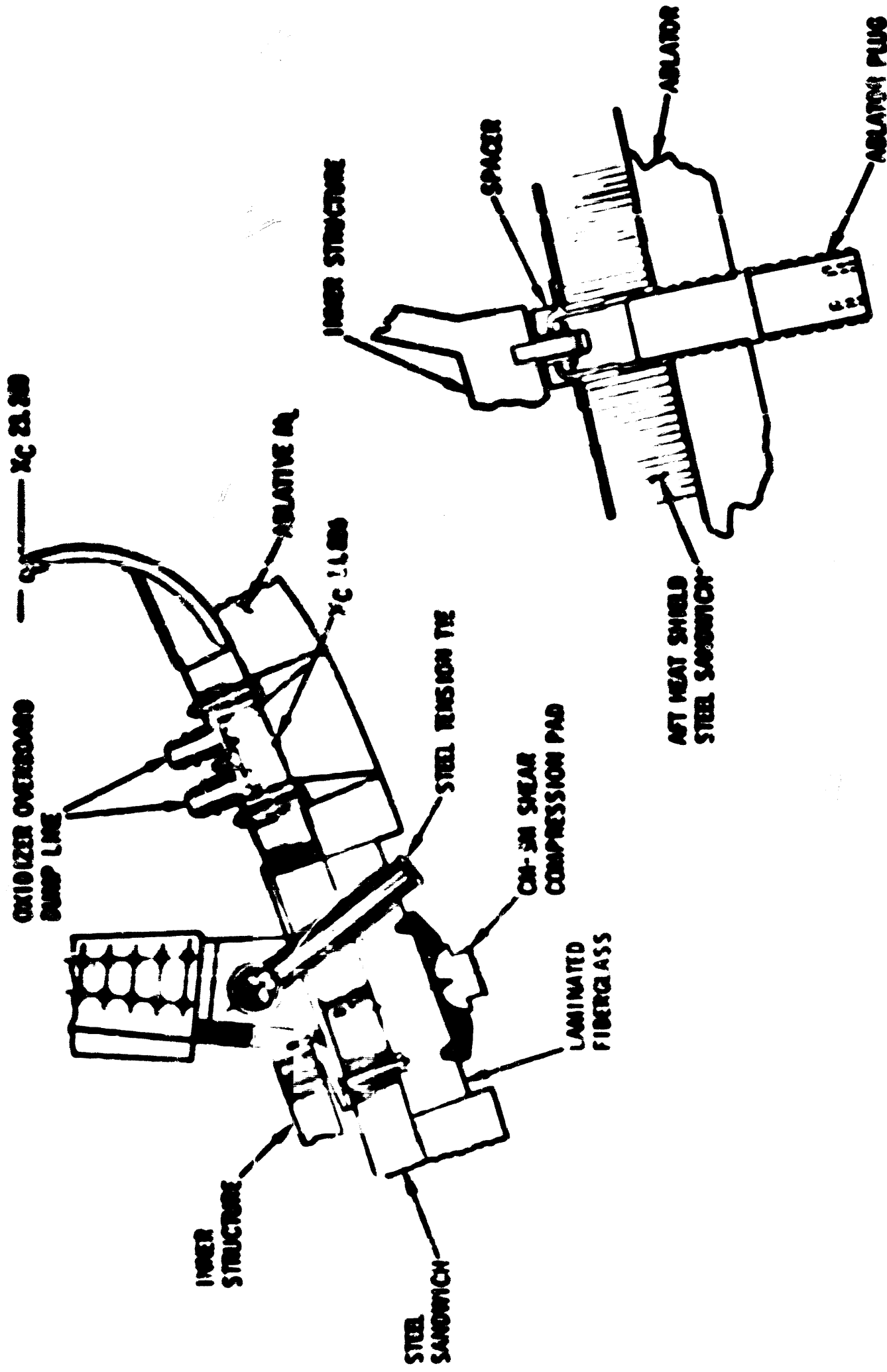


AFT HEAT SHIELD BLOCK II

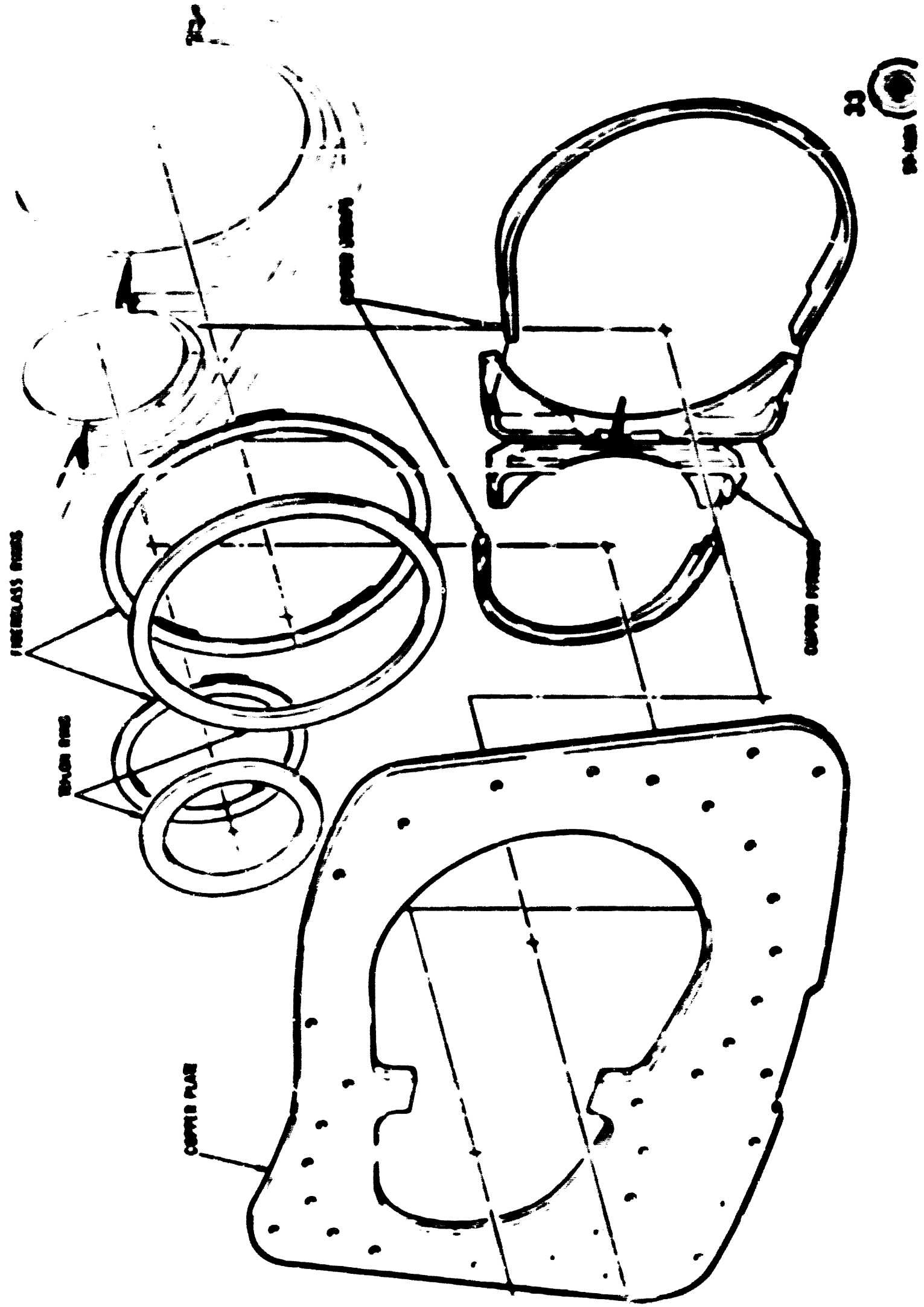


ST-027C (A)

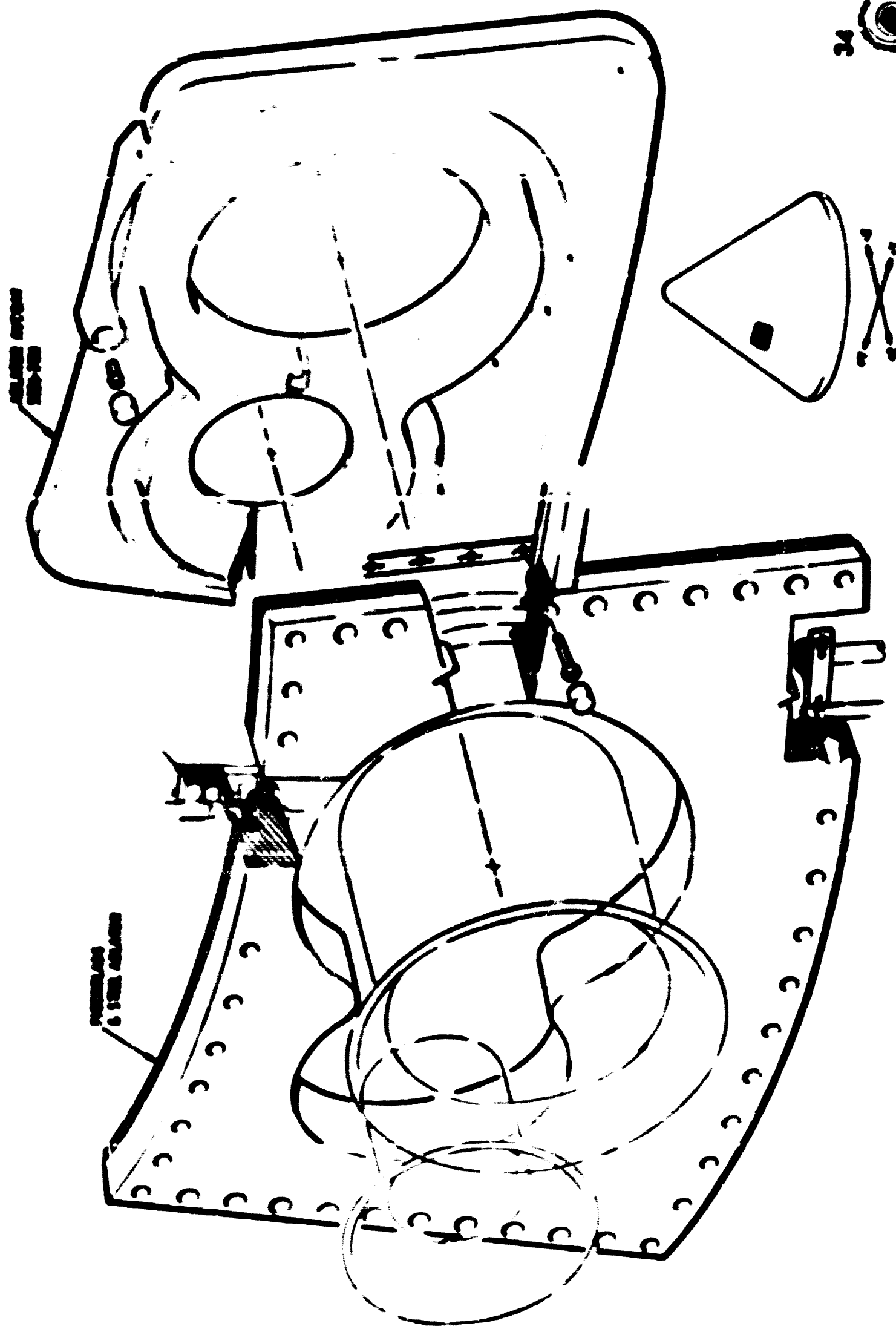
AFT HEAT SHIELD PENETRATIONS



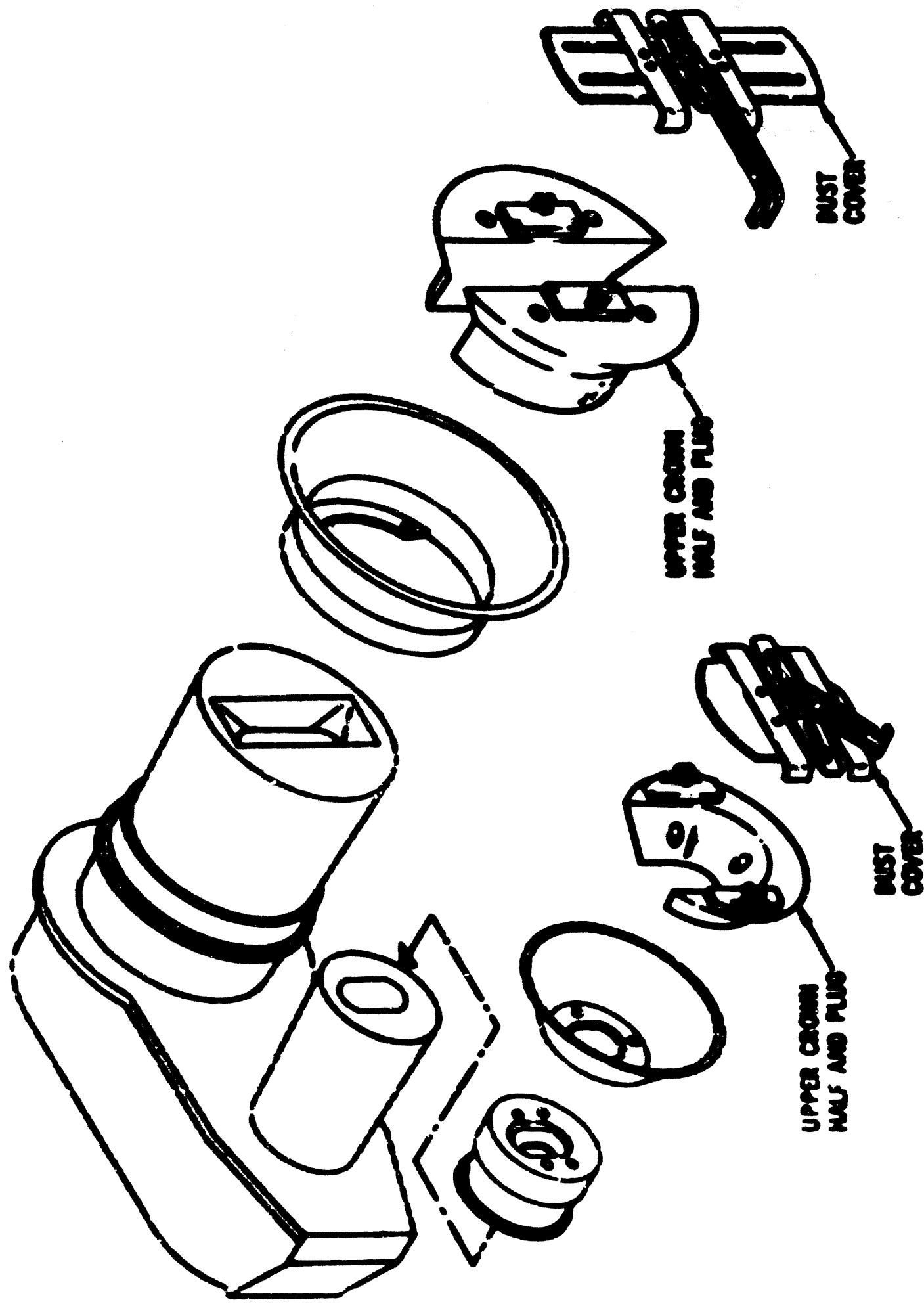
ASTRO SEXTANT HEATSINK INSTALLATION



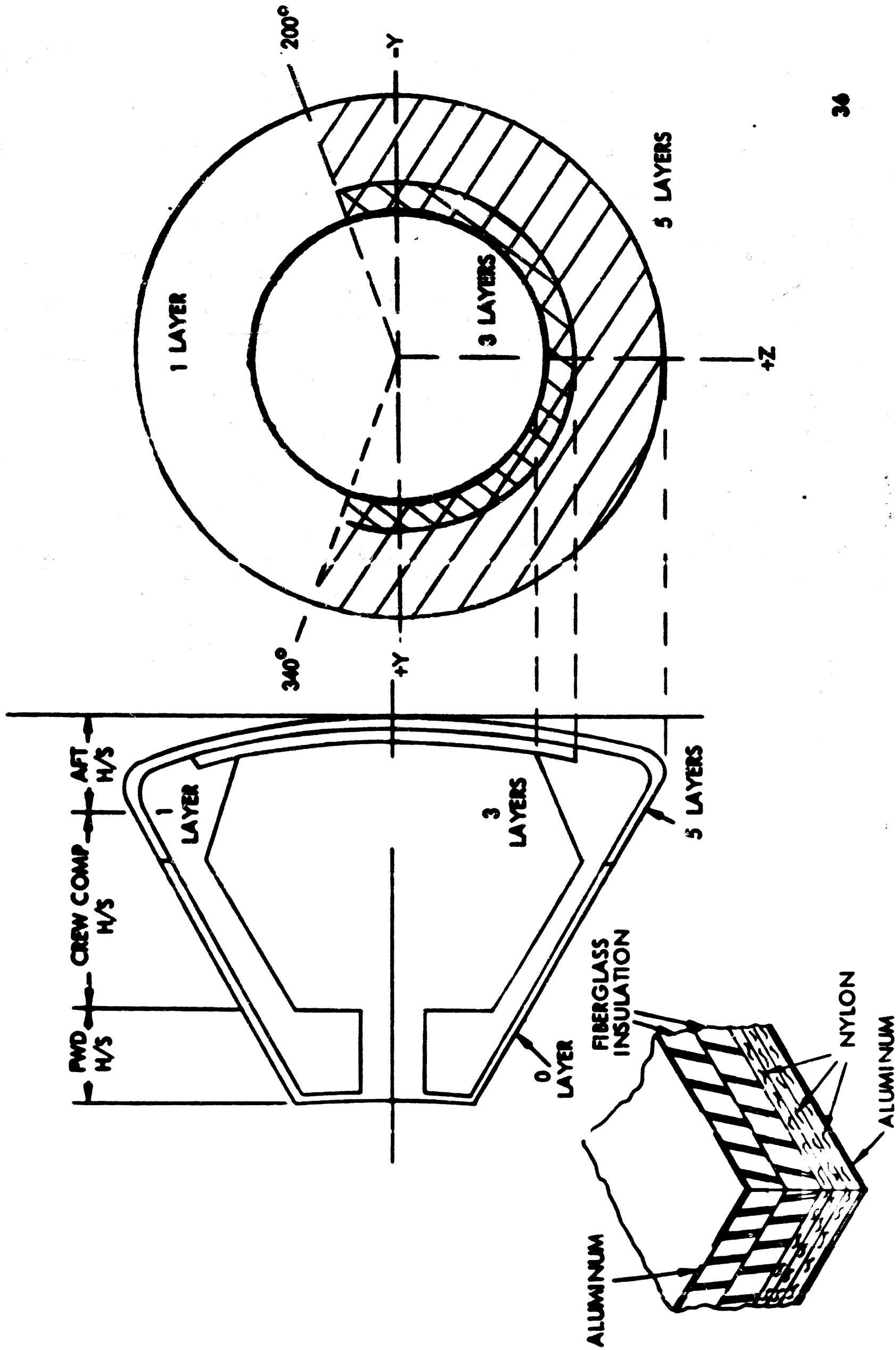
ASTRO SEXTANT ABLATOR INSTALLATION



OPTICS EJECTABLE DUST COVERS

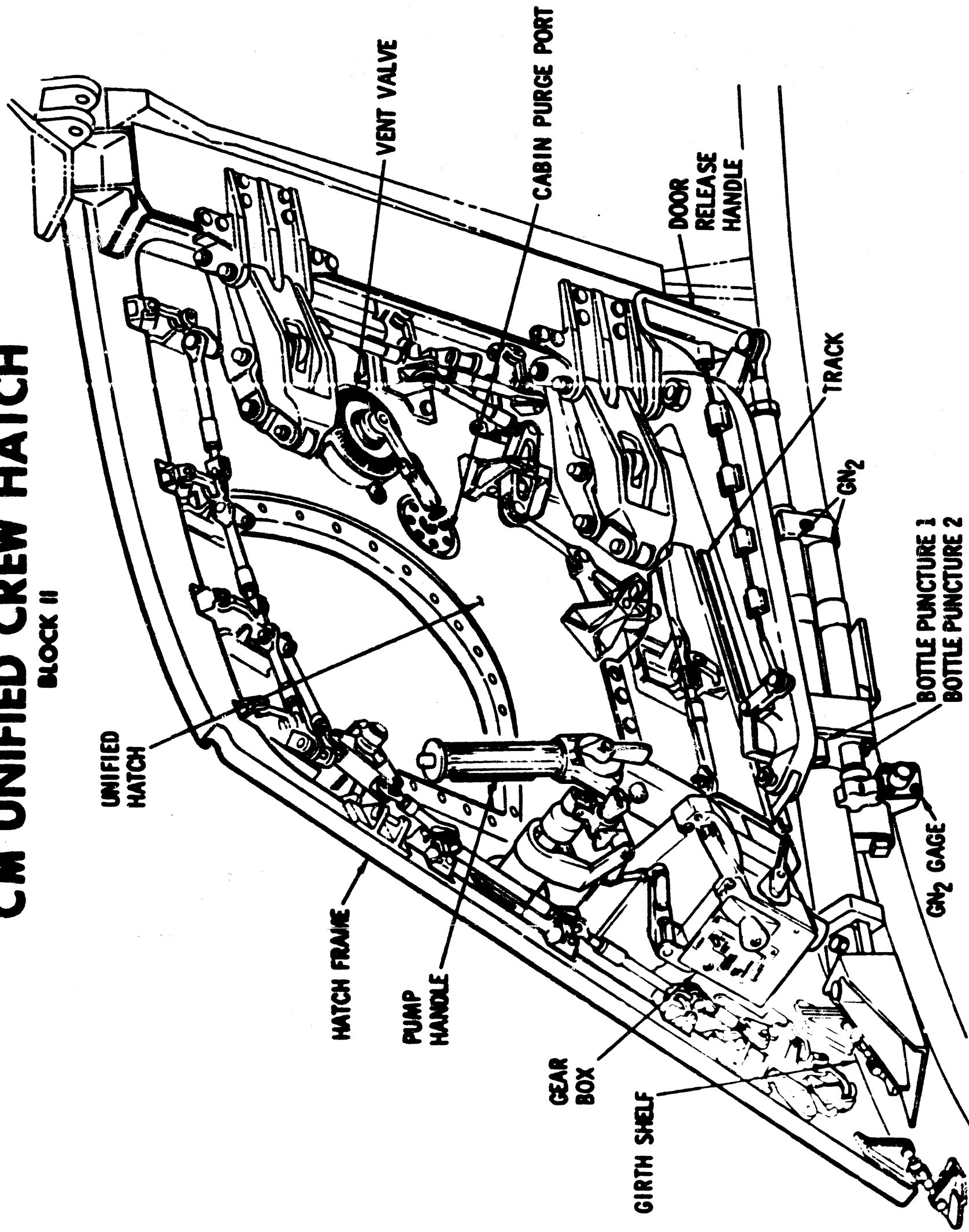


CM INSULATION

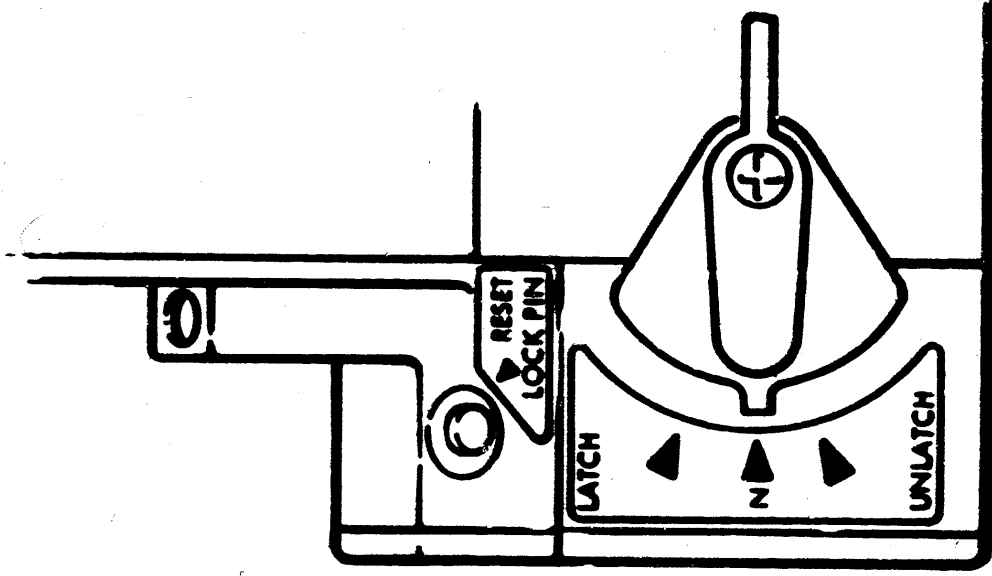
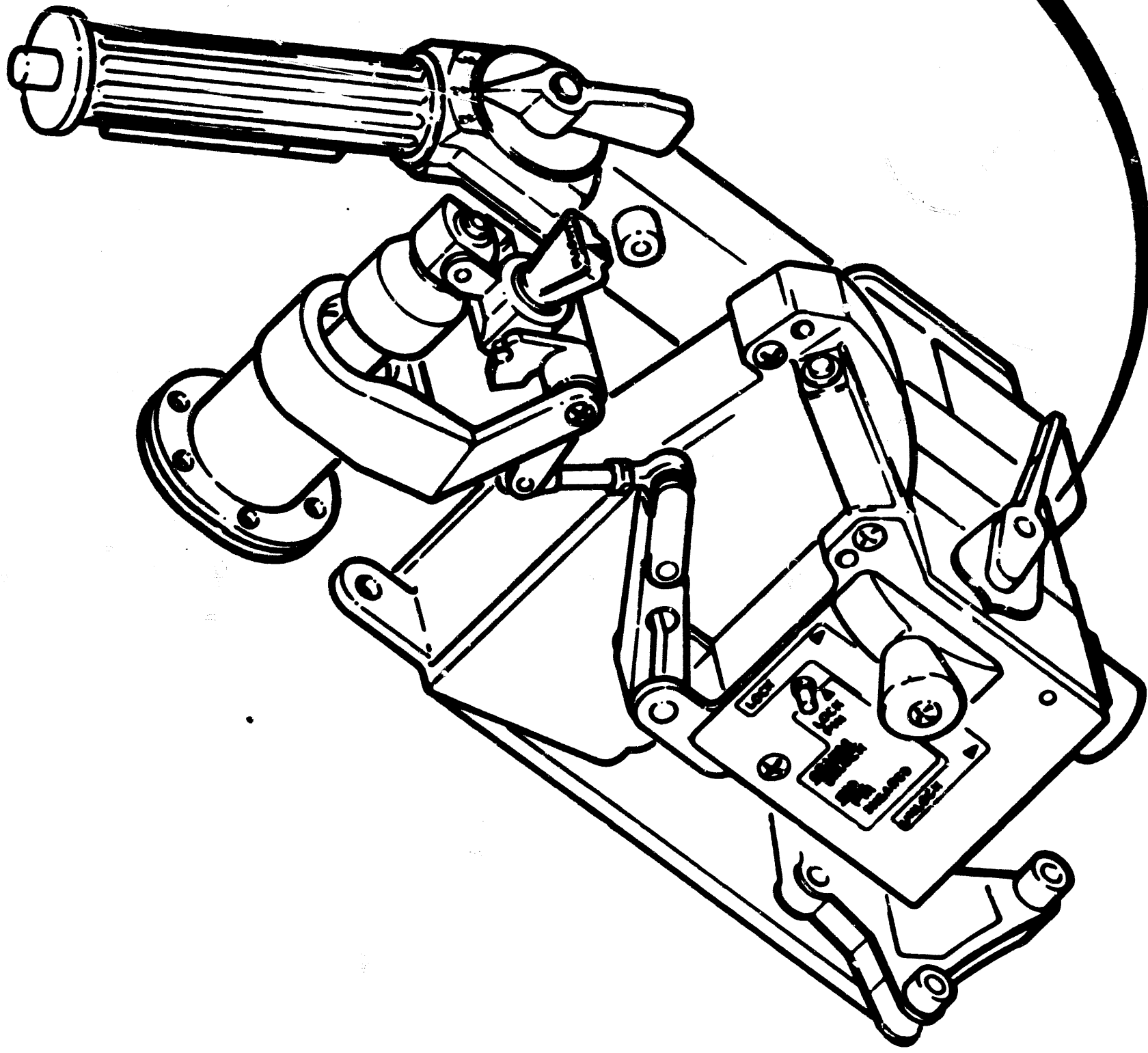


CM UNIFIED CREW HATCH

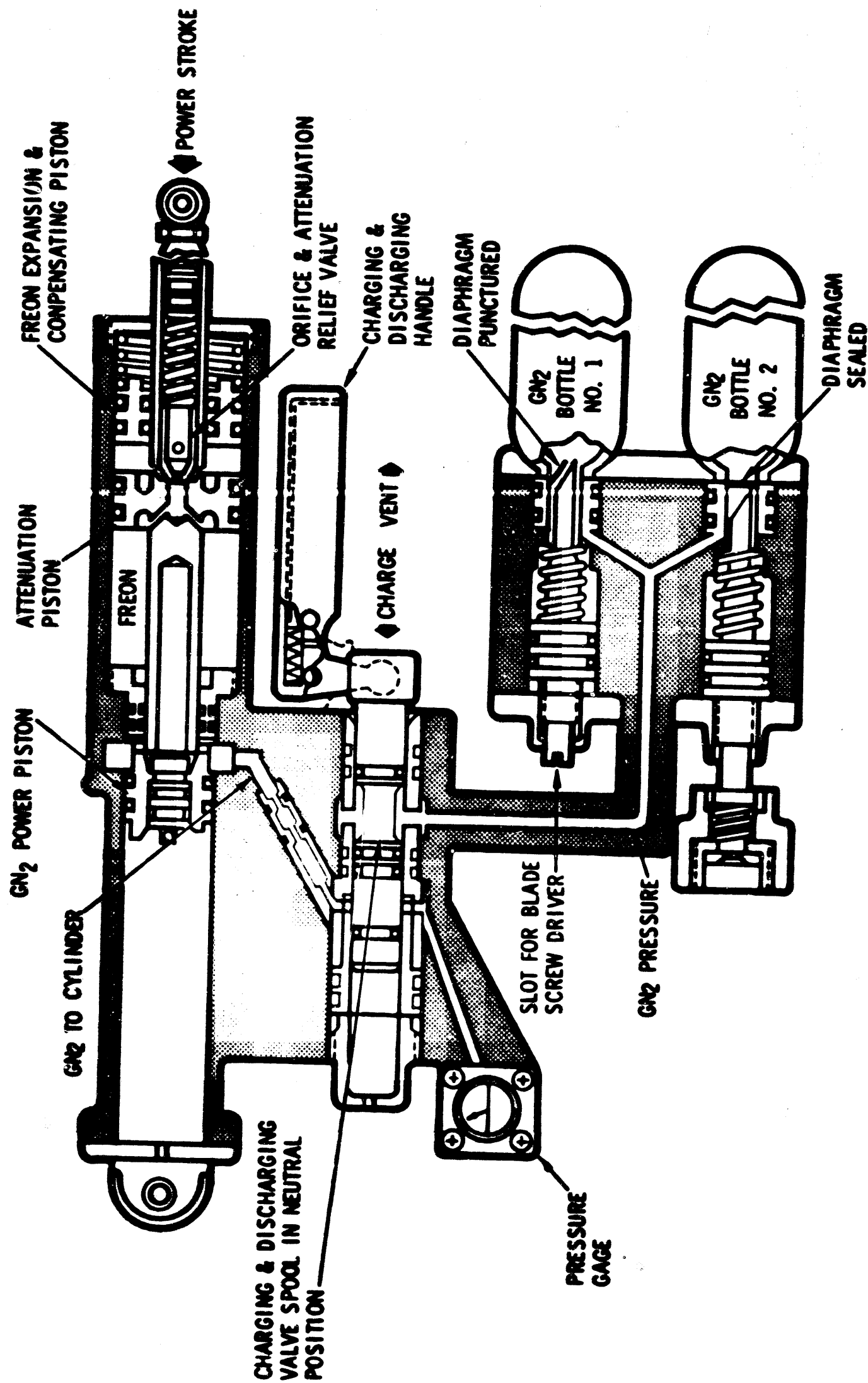
BLOCK II



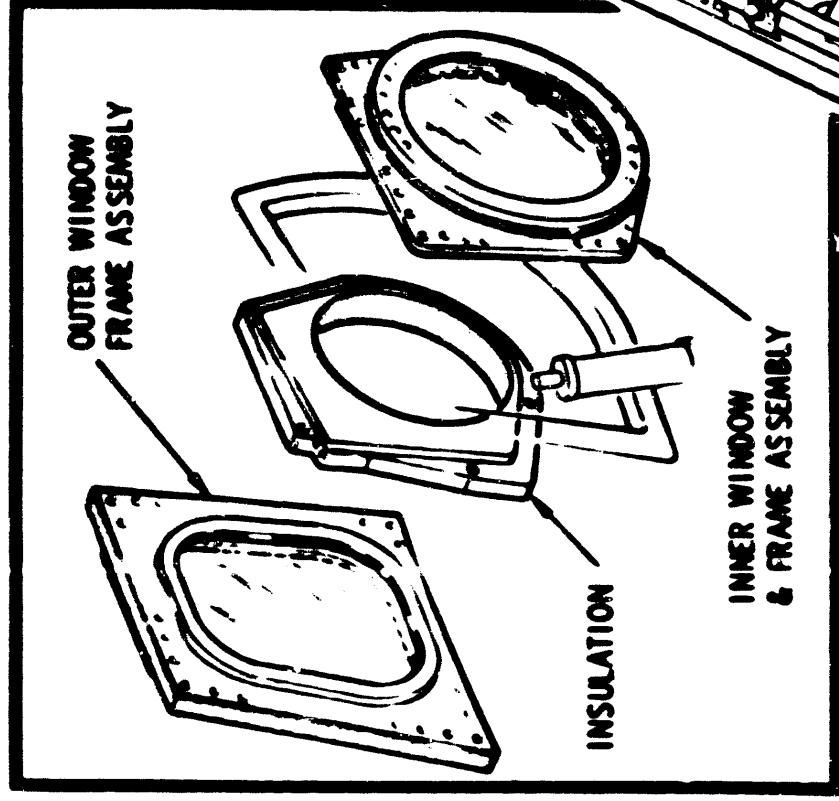
UNIFIED HATCH GEAR BOX



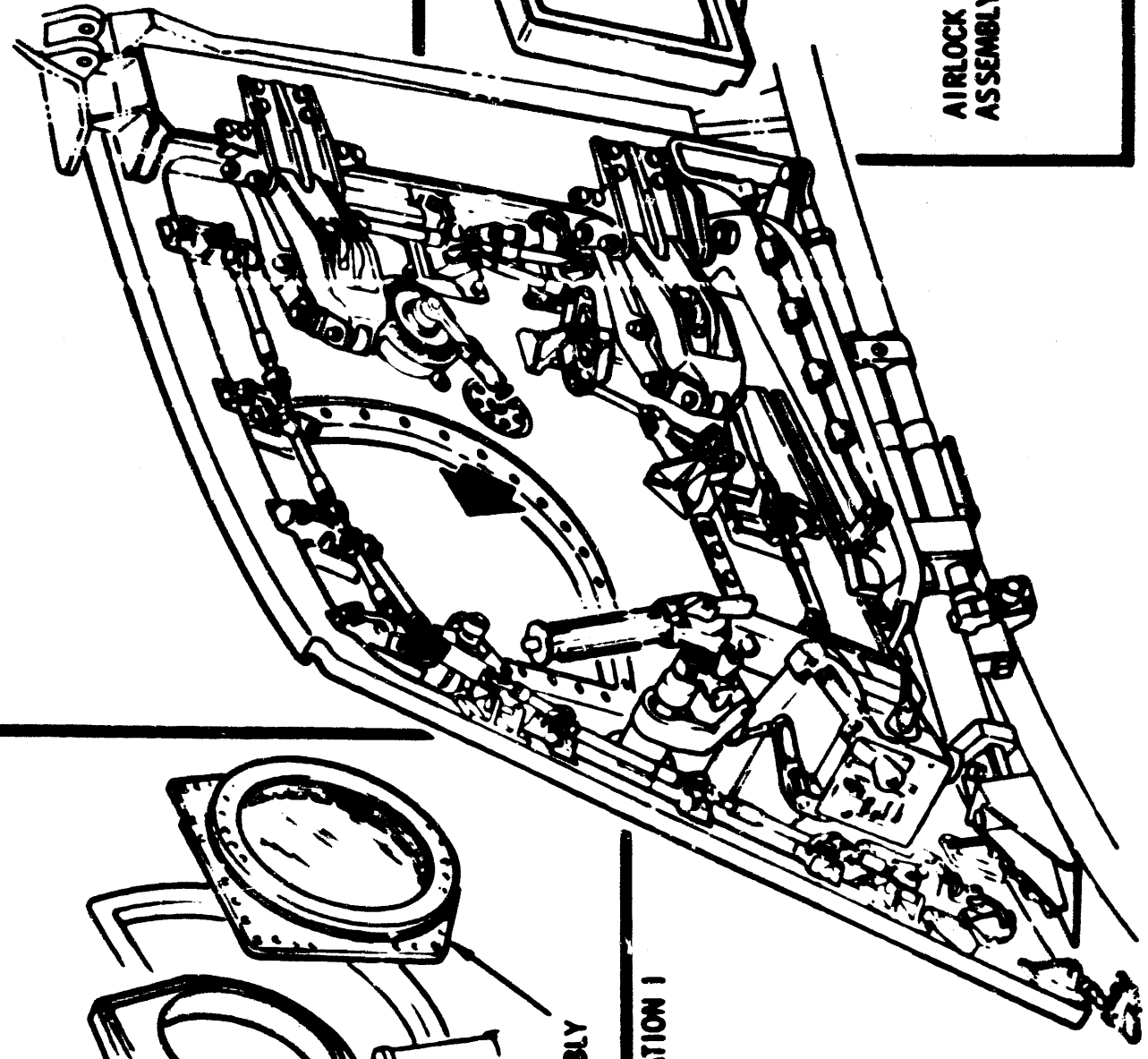
GN₂ COUNTER-BALANCE SCHEMATIC



HATCH WINDOW & AIRLOCK INTERFACE

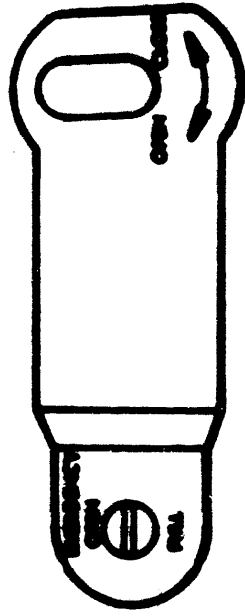
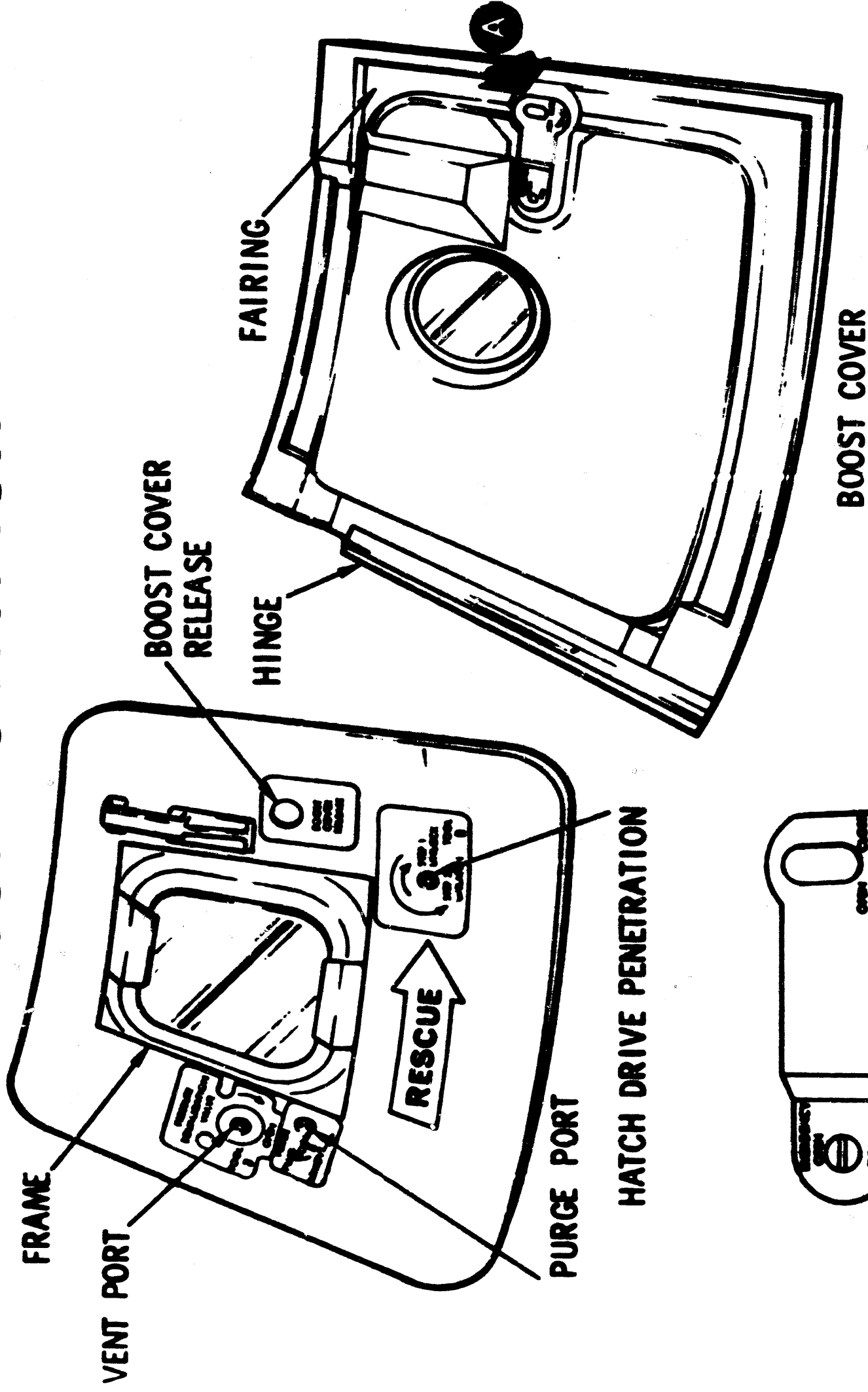


CONFIGURATION I



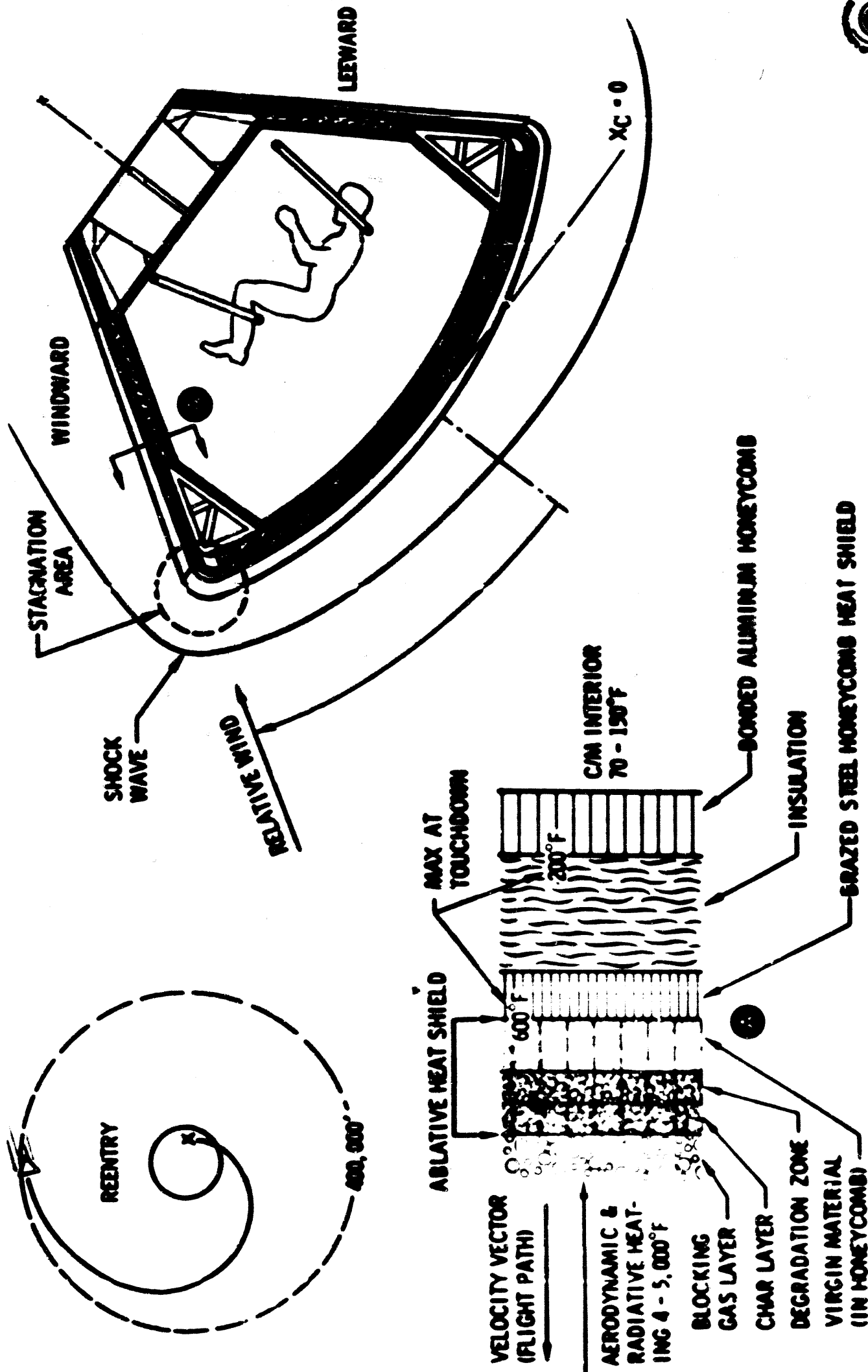
CONFIGURATION II

UNIFIED HATCH & BOOST COVER CONFIGURATION



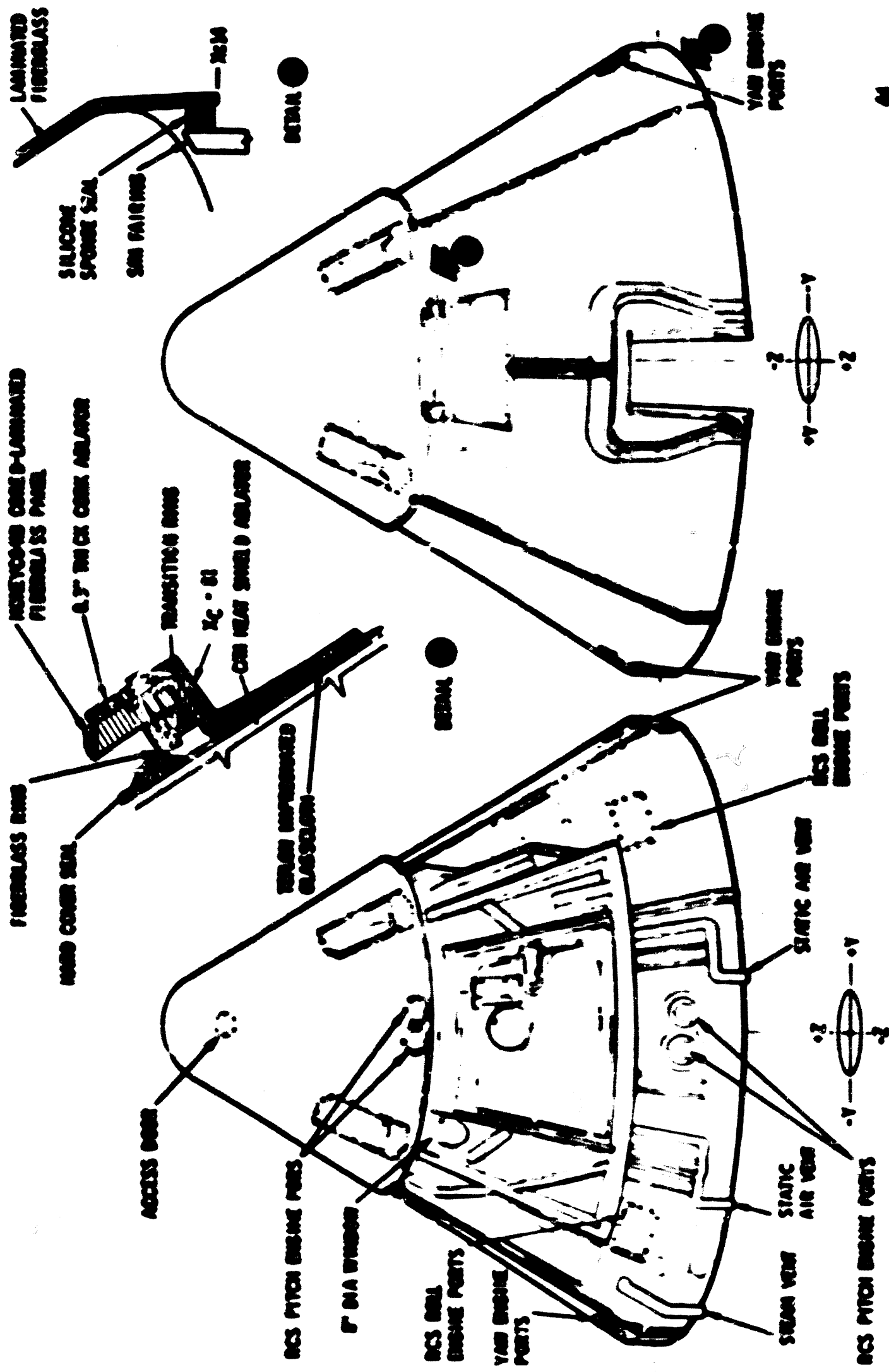
ST-504 A

ABLATIVE MATERIAL MECHANICS & CONFIGURATION (BLOCK II)

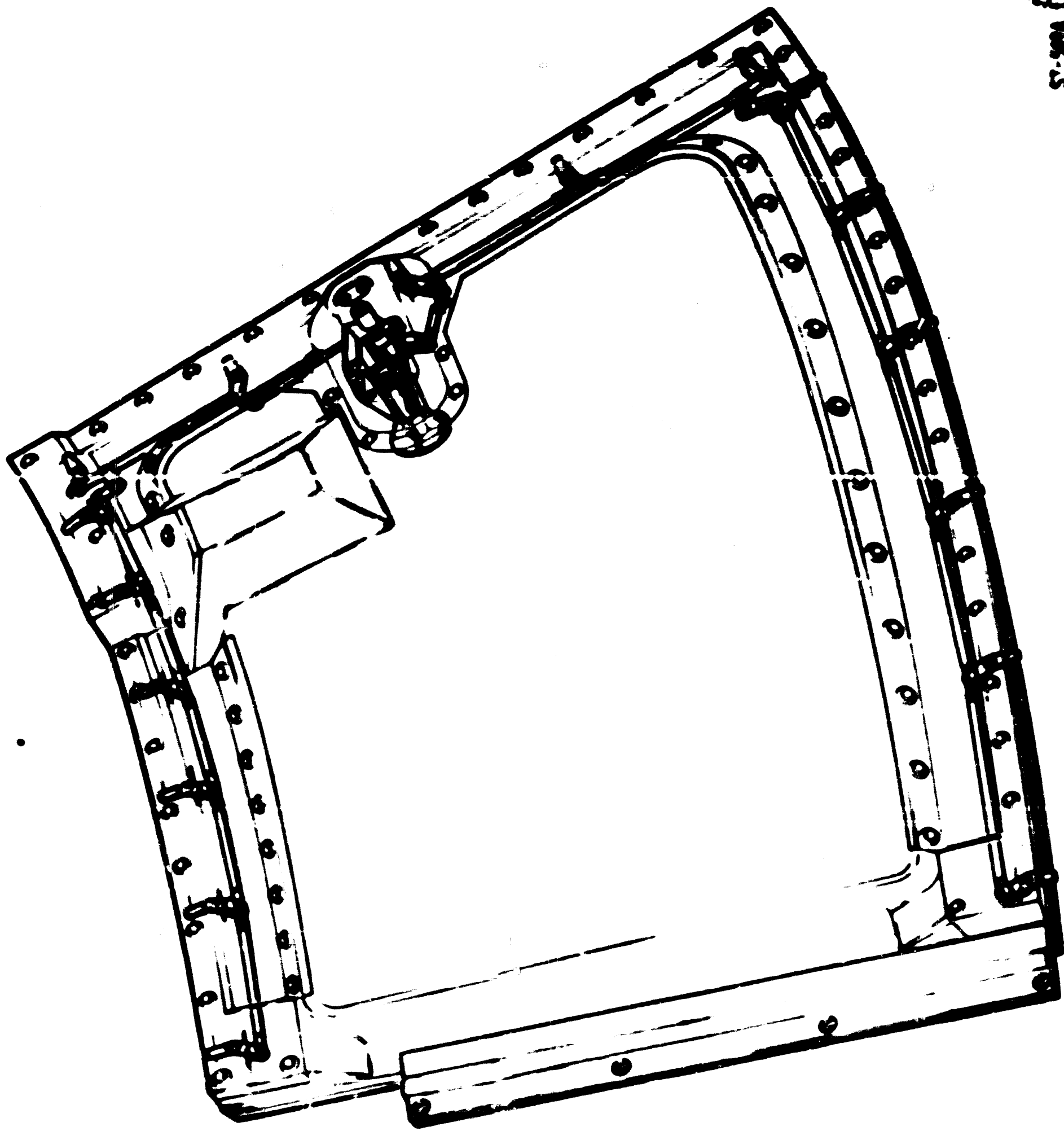


BOOST PROTECTIVE COVER

WORLD OF

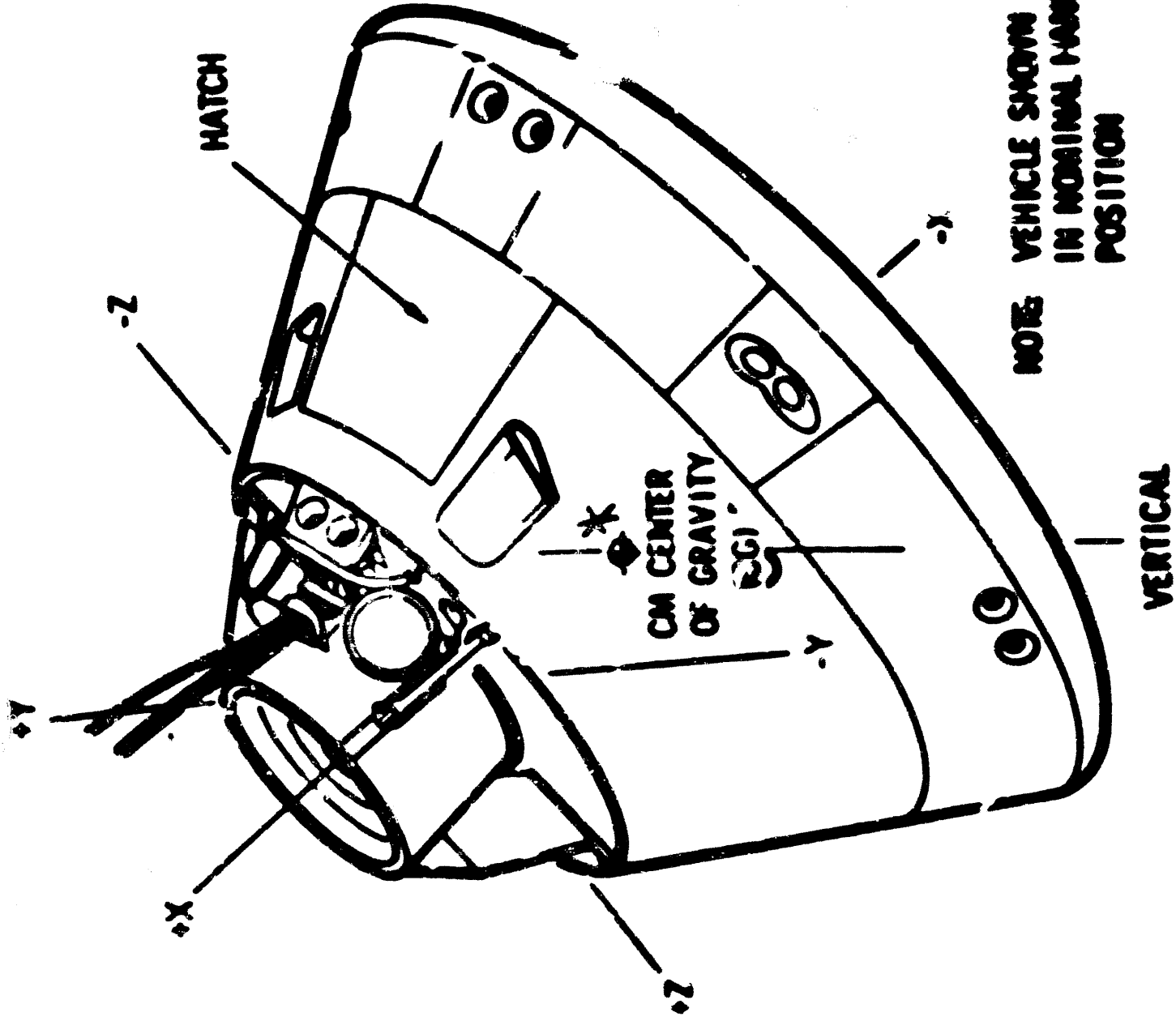


BOOST COVER CREW HATCH



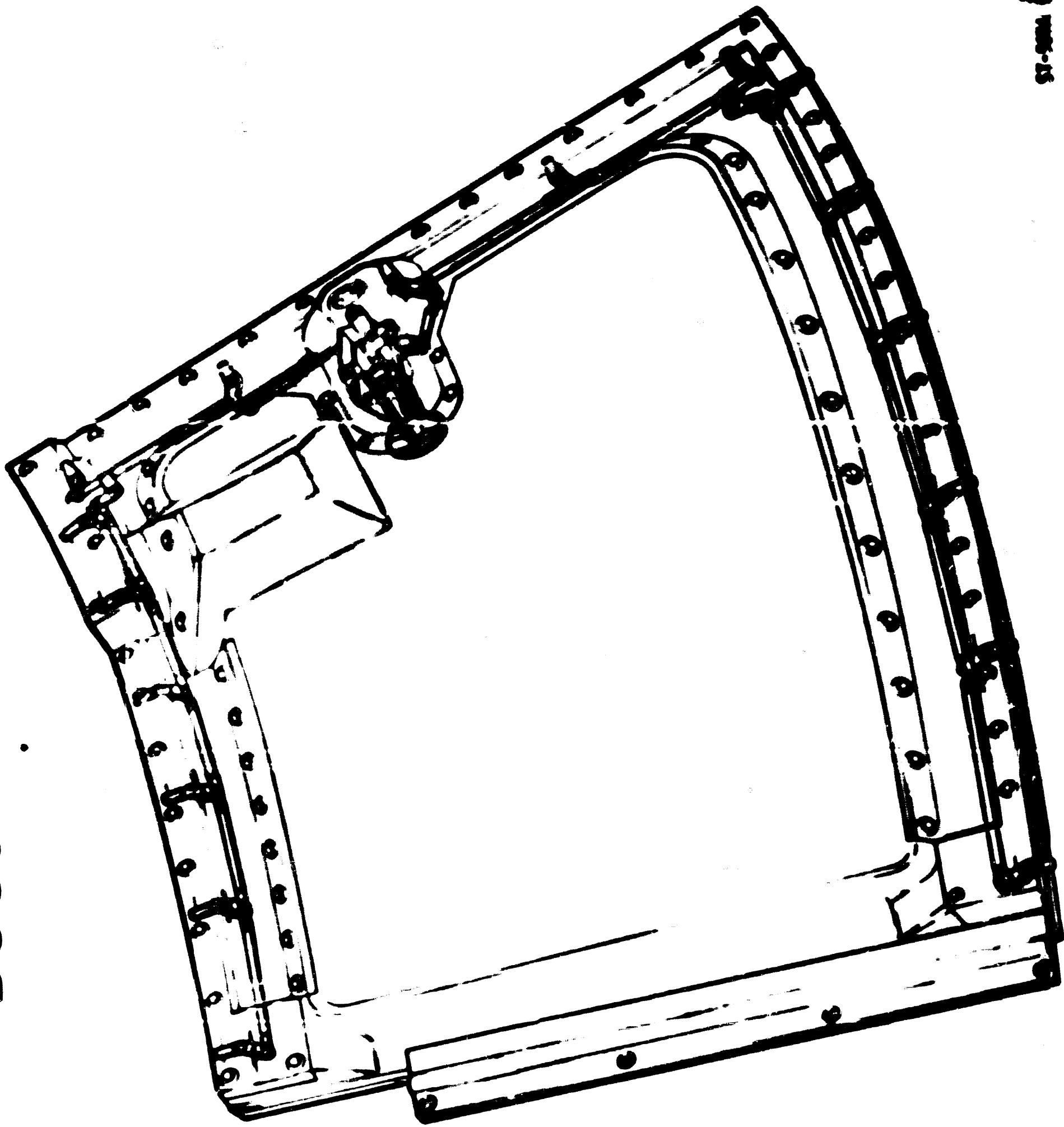
IMPACT ANGLE (TYPICAL)

Block II



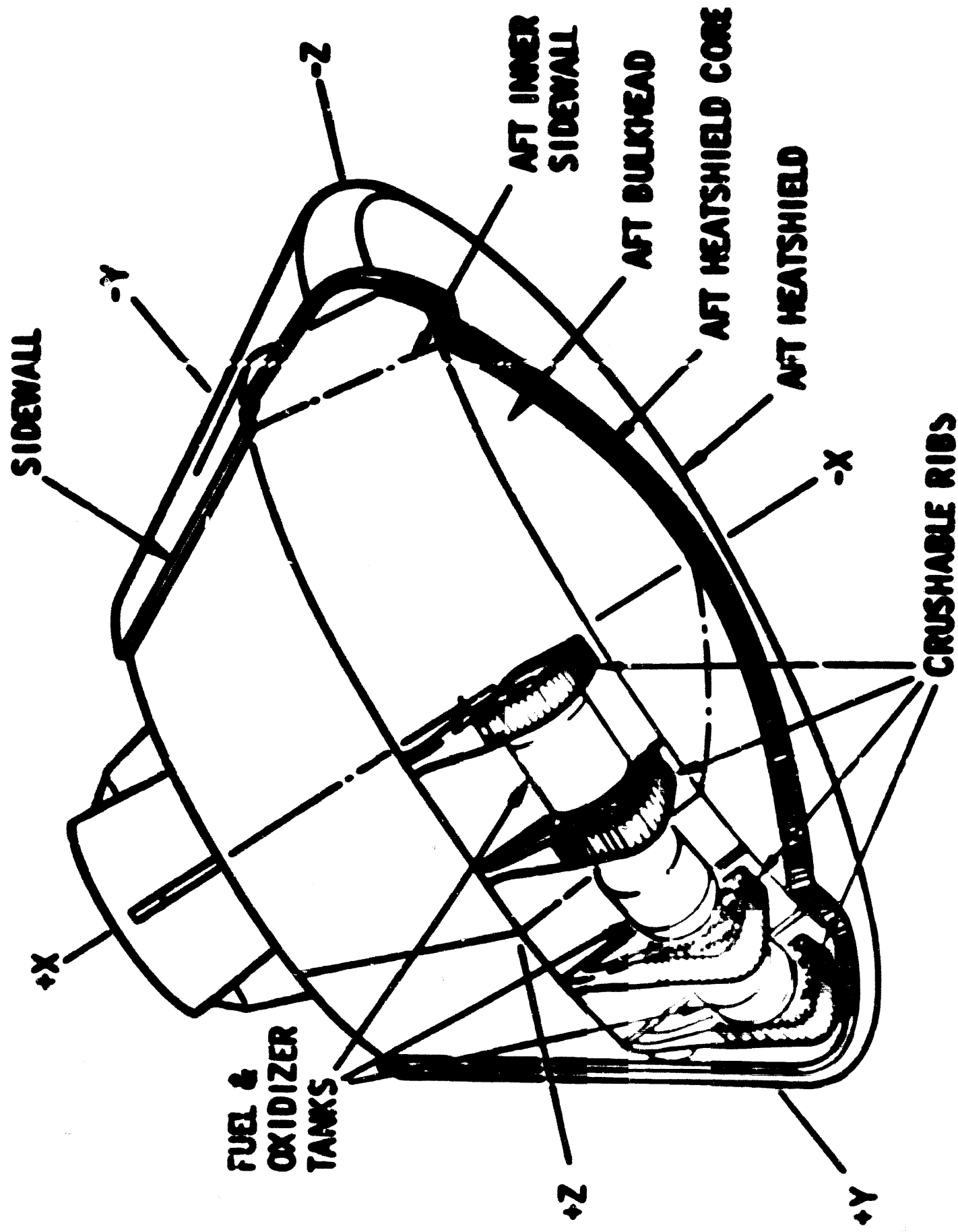
NOTE: VEHICLE SHOWN
IN NOMINAL HANG
POSITION

BOOST COVER CREW HATCH

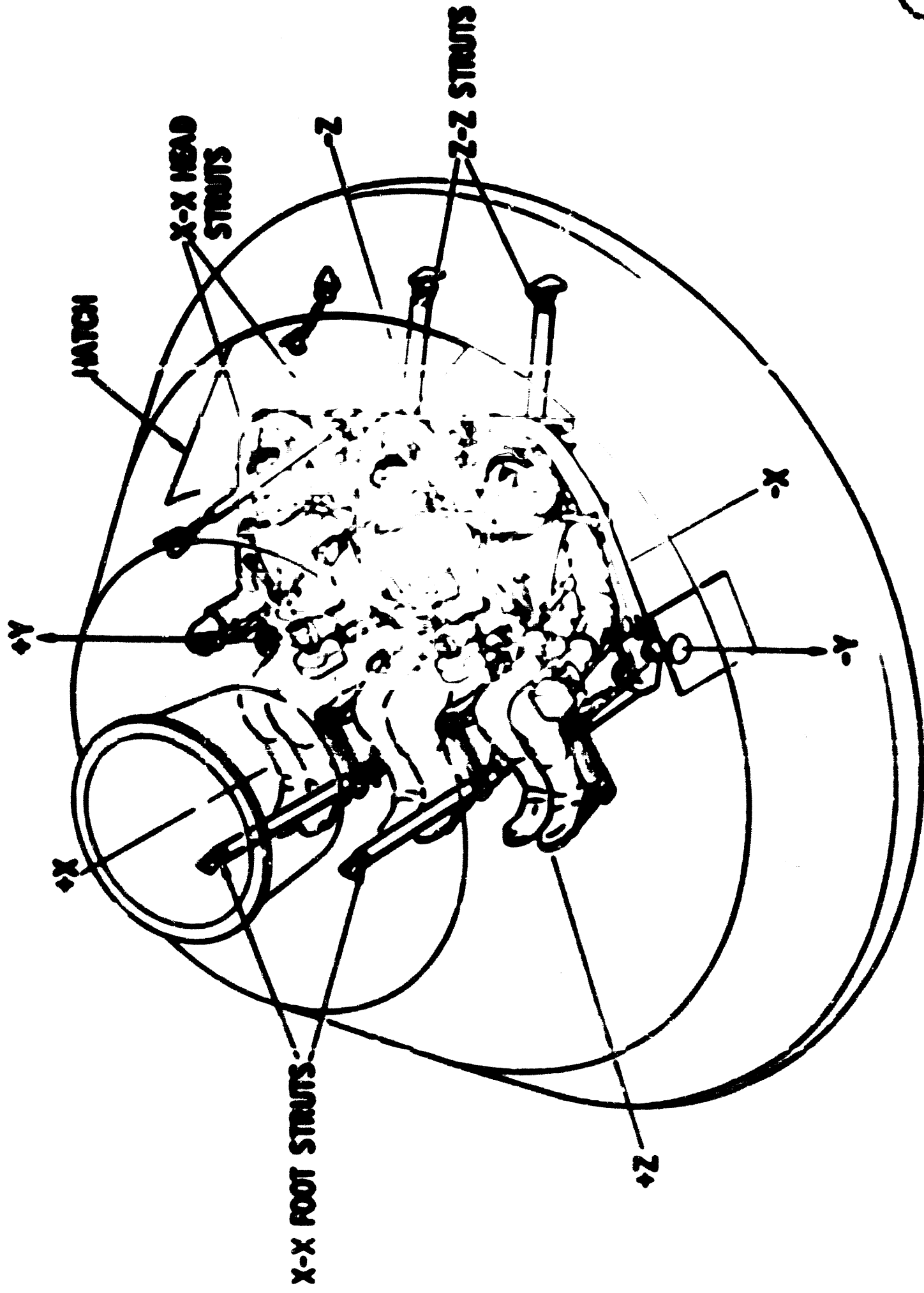


EXTERNAL ATTENUATION SYSTEM

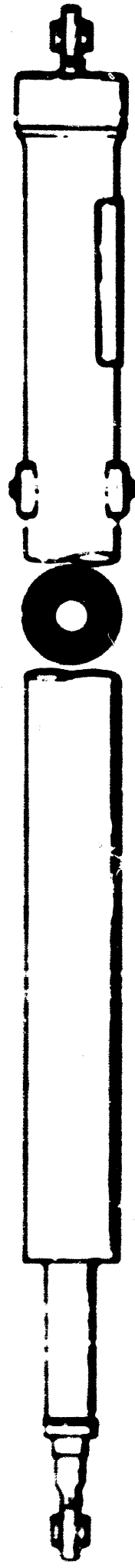
BLOCK II



INTERNAL ATTENUATION SYSTEM

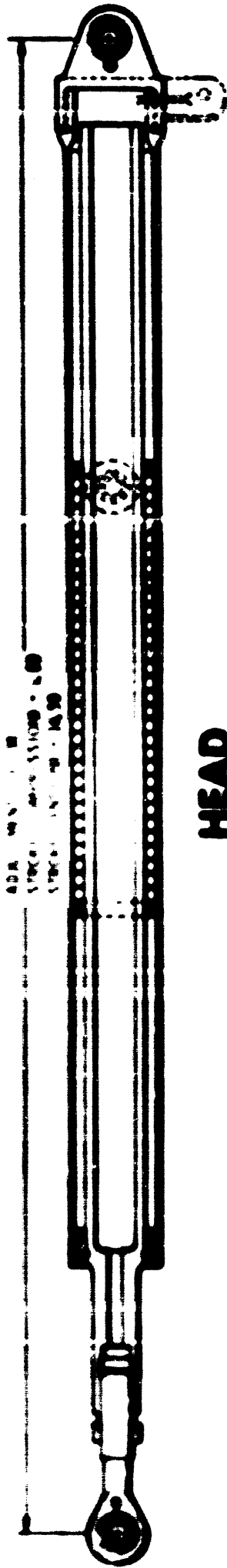


X-X STRUT

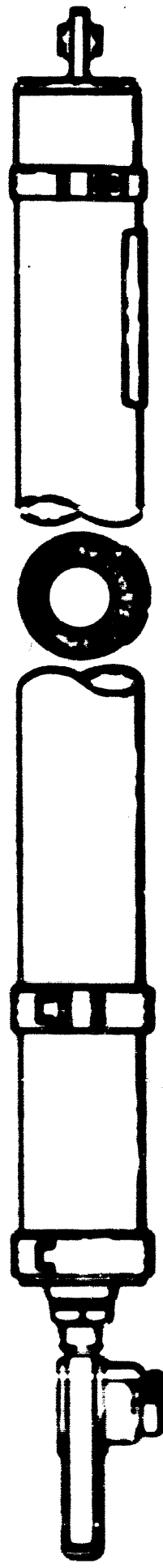


MEASUREMENT INFORMATION (IN)

WELD TO 1/4" DIA. x 1/4" DIA.
 DIA. 1/4" DIA. x 1/4" DIA.
 STRUT LENGTH 1.00
 STRUT WEIGHT 1.00

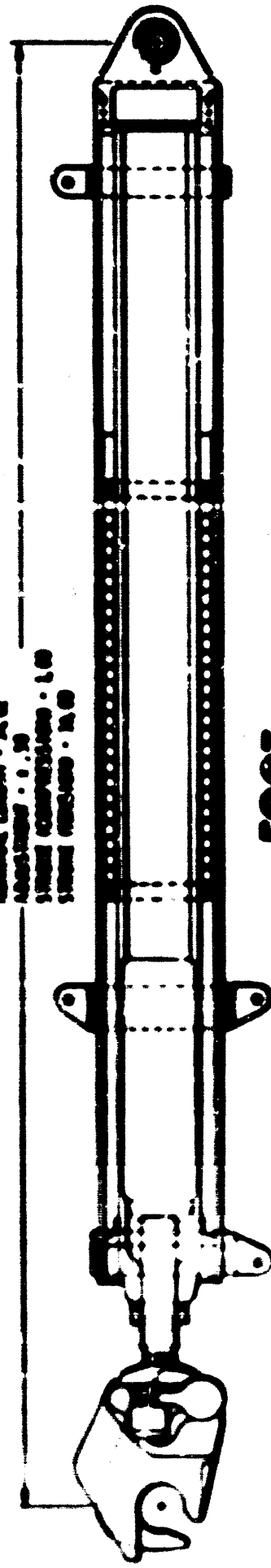


HEAD



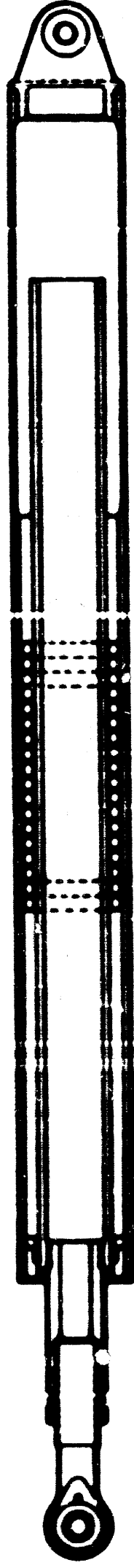
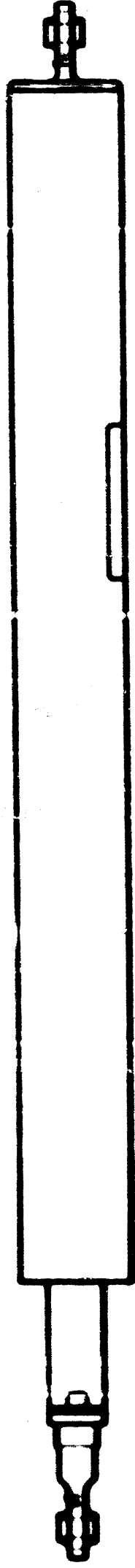
MEASUREMENT INFORMATION (IN)

WELD TO 1/4" DIA. x 1/4" DIA.
 DIA. 1/4" DIA. x 1/4" DIA.
 STRUT LENGTH 1.00
 STRUT WEIGHT 1.00



FOOT

Z-Z STRUT



ENGINEERING INFORMATION (ENR)

NOMINAL LENGTH • 21.00

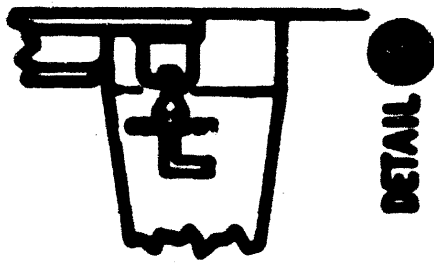
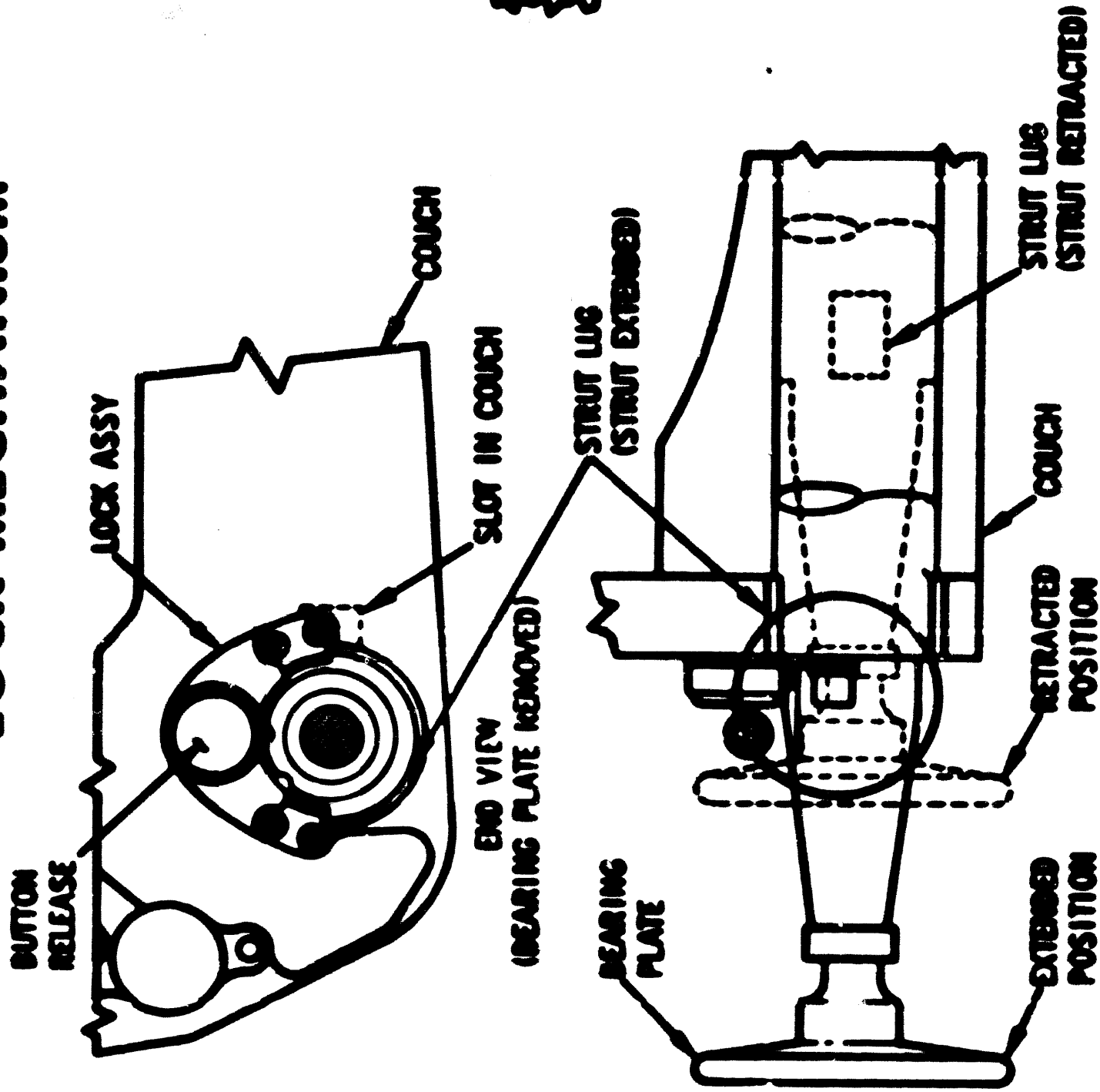
ADJUSTMENT • ±.50

STROKE (COMPRESSION) • 3.00

STROKE (TENSION) • 21.50

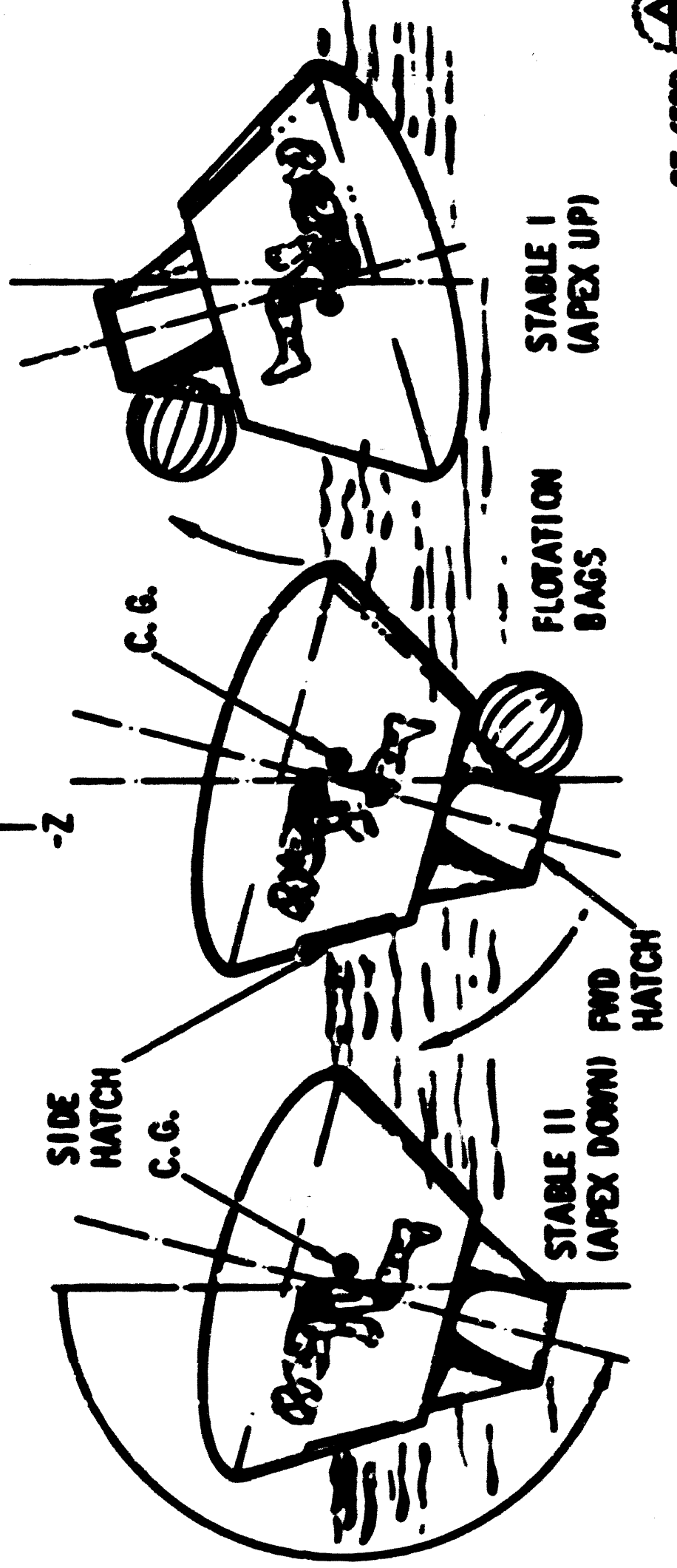
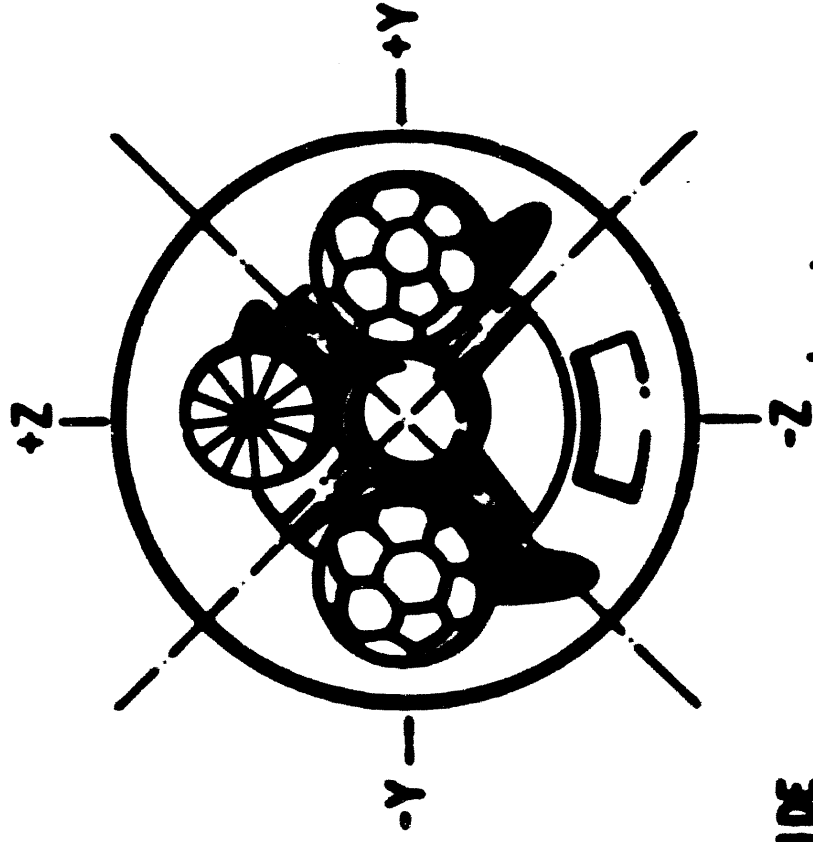


Y-Y STRUT LOCK MECHANISM



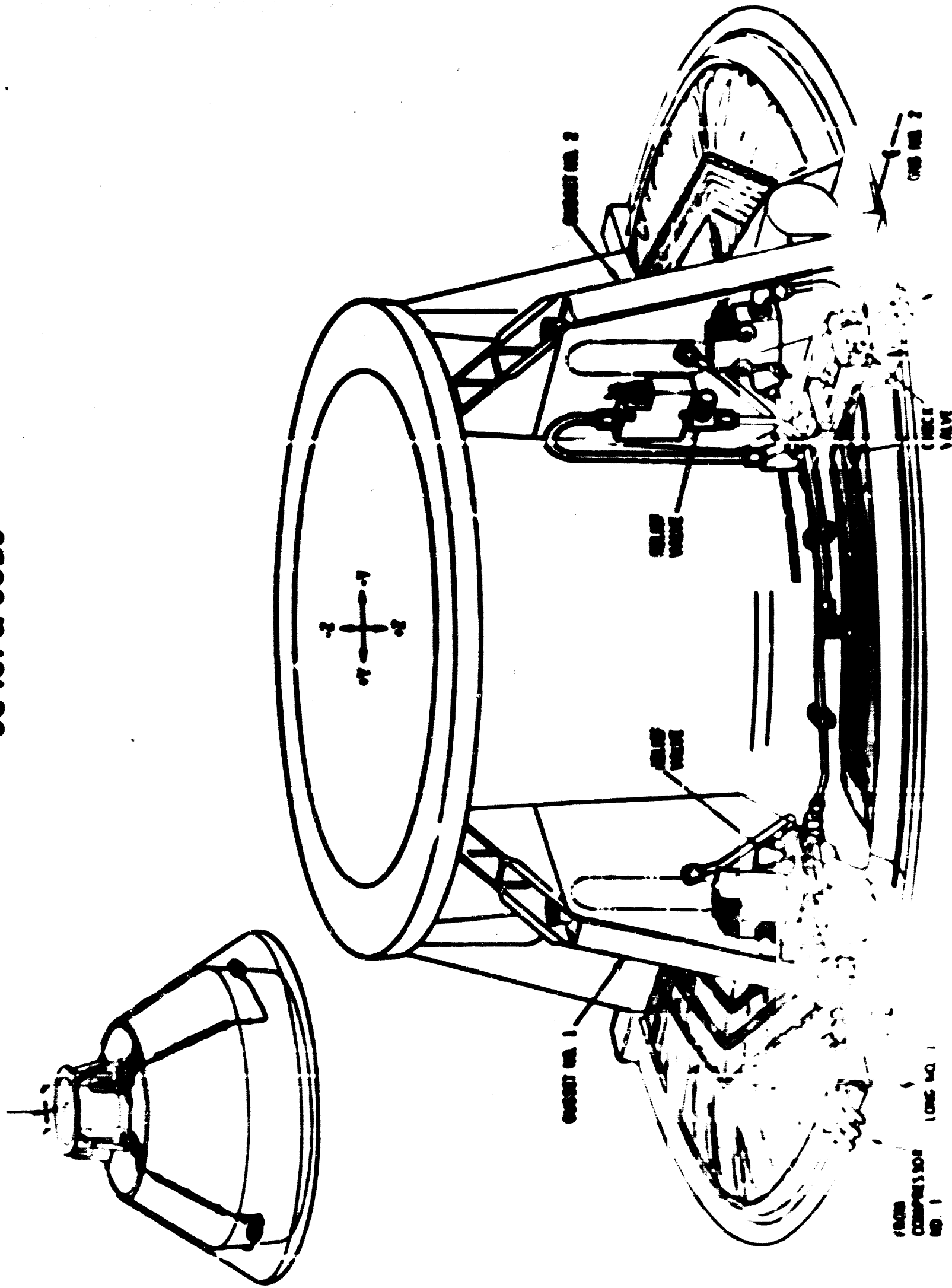
UPRIGHTING SYSTEM

3 BAG SYSTEM

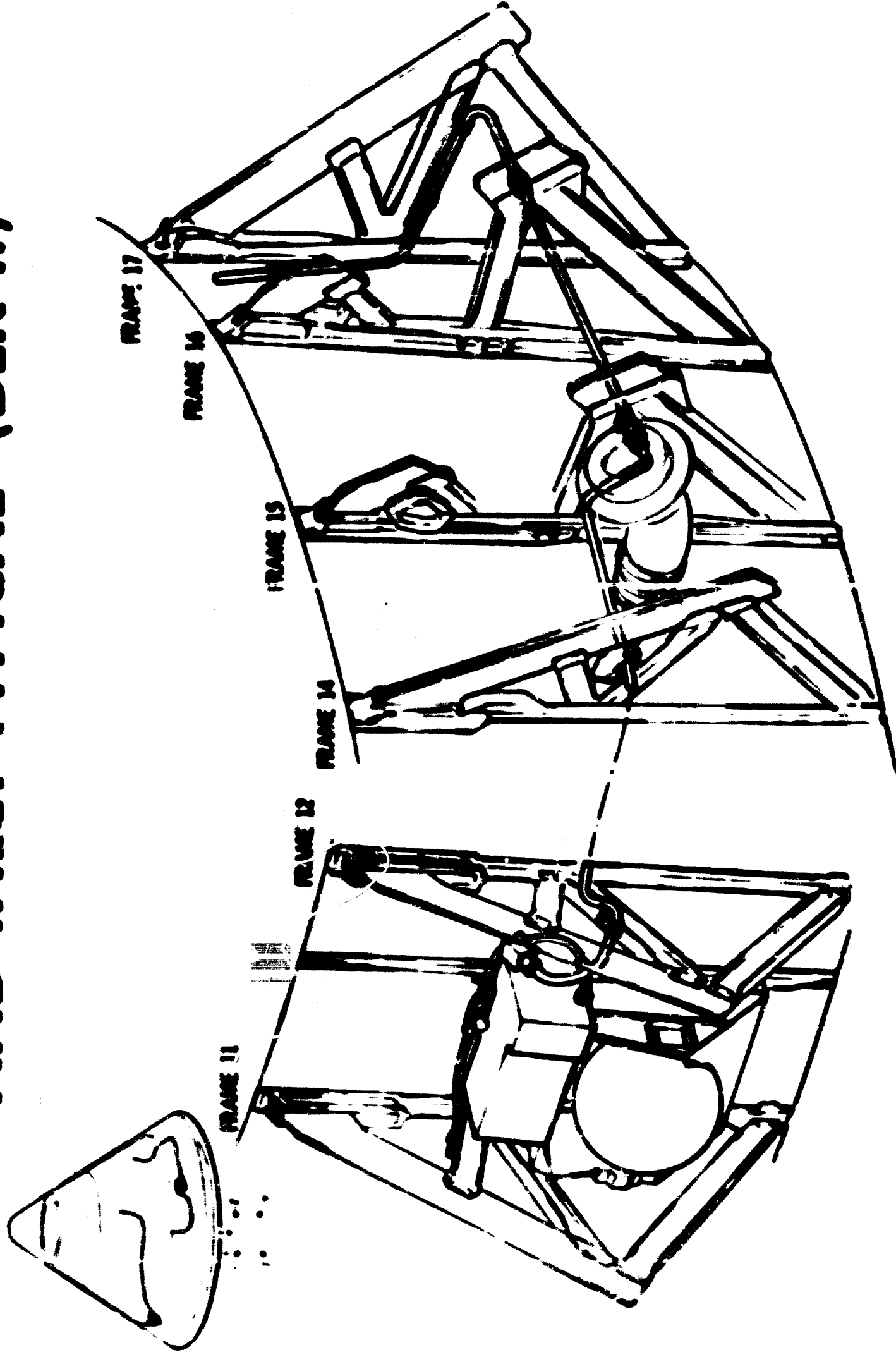


UPRIGHTING SYSTEM

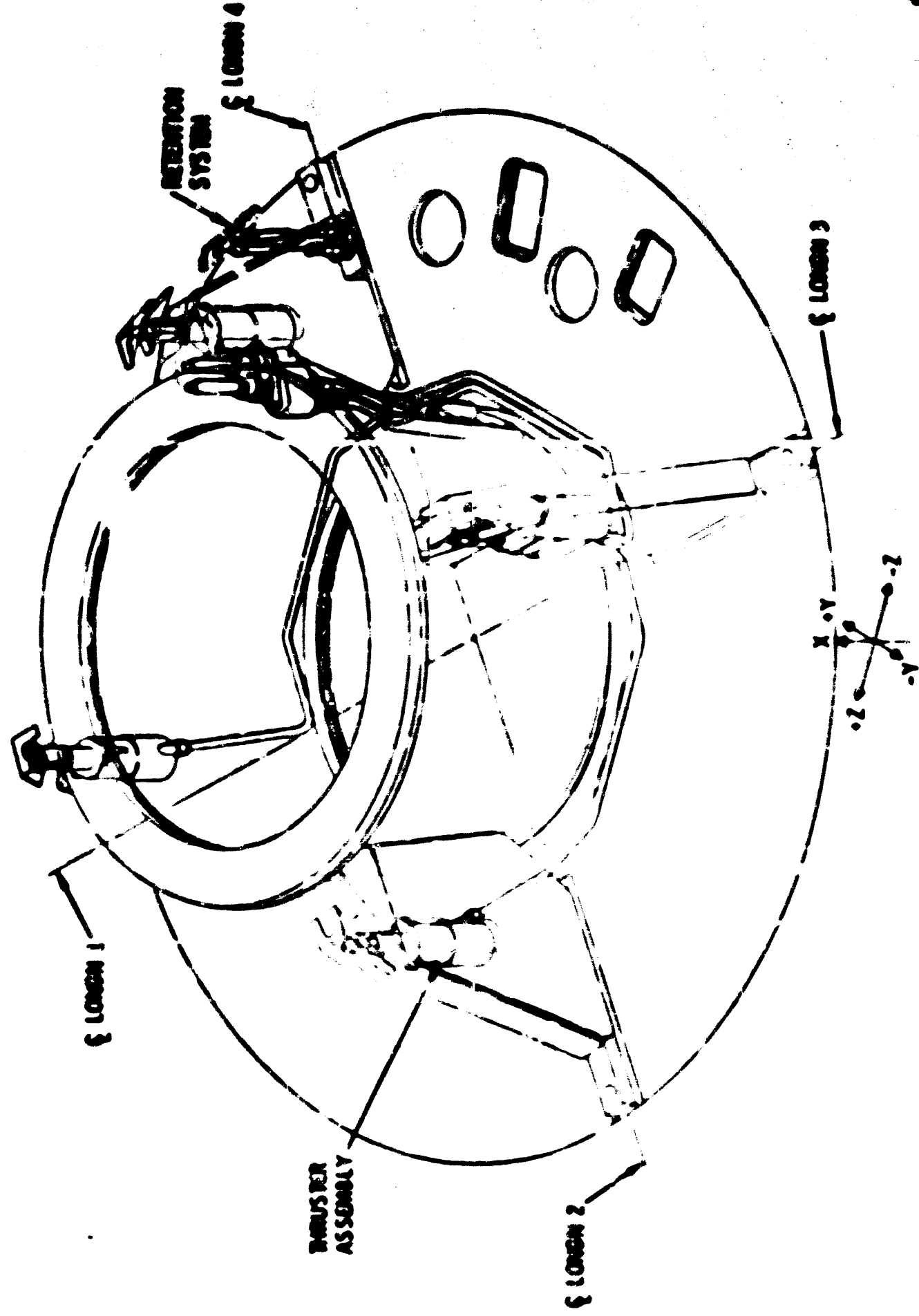
SC 101 & SUBS



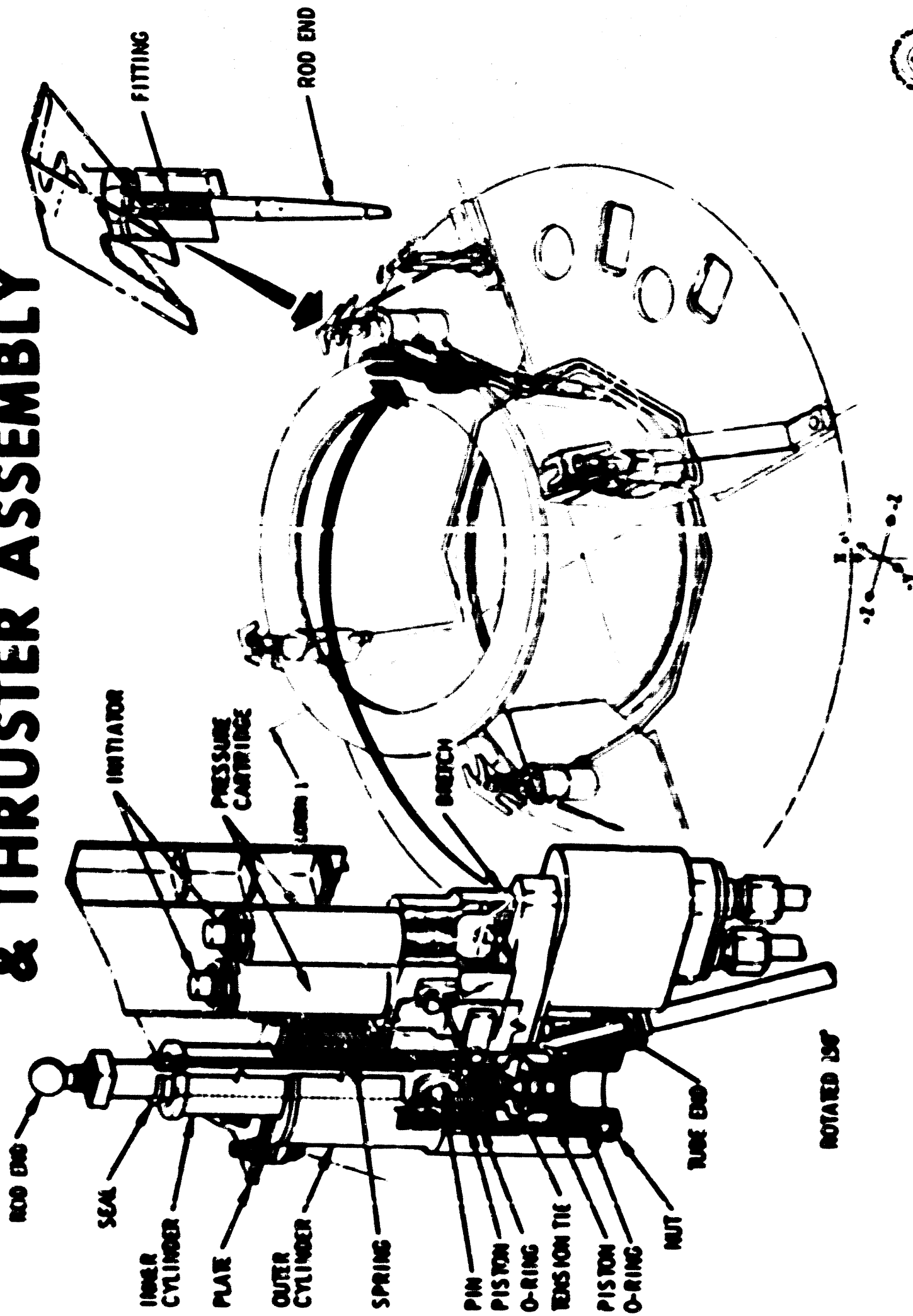
UPRIGHTING SYSTEM COMPRESSOR AND INLET TYPICAL (BLK II)



FORWARD HEAT SHIELD SEPARATION & RETENTION SYSTEM (BLOCK II)

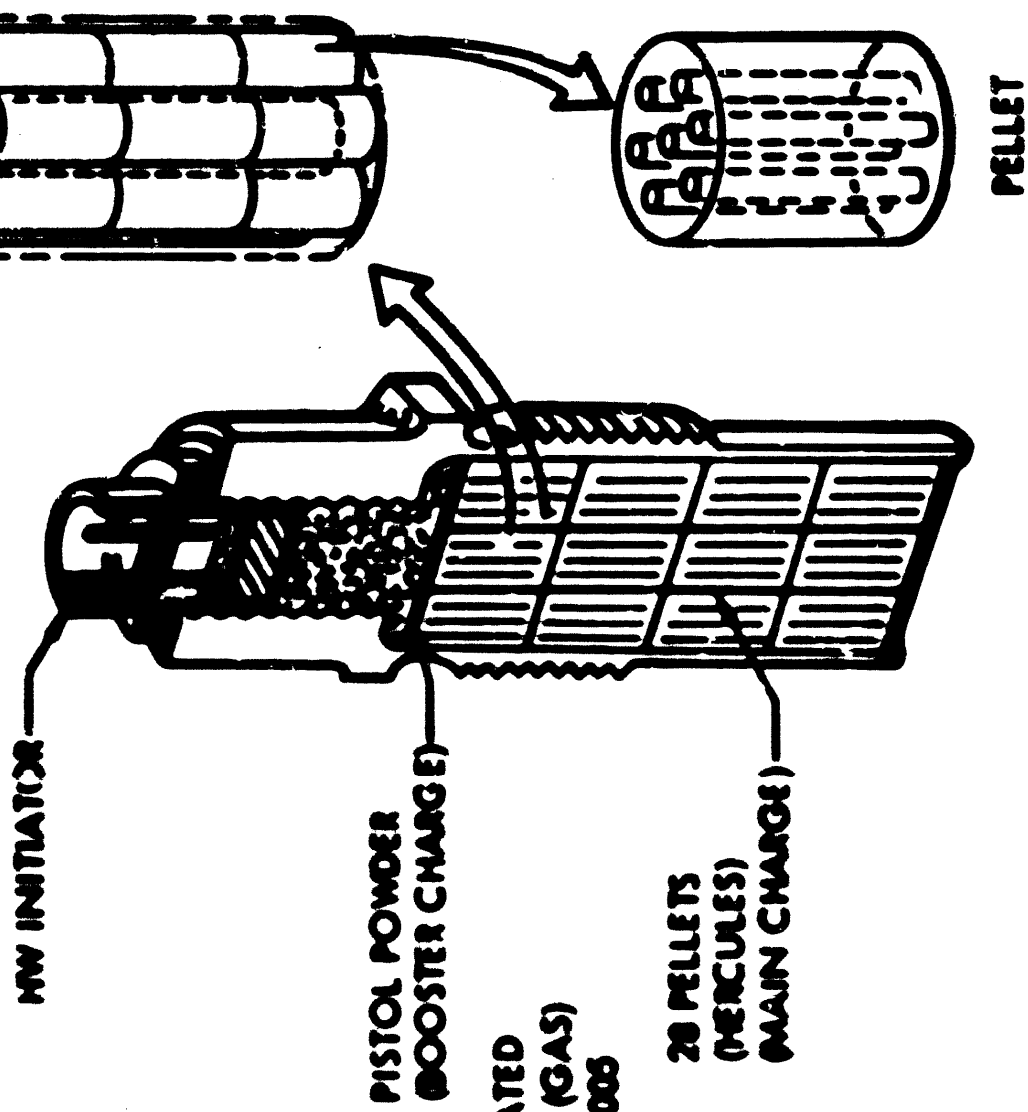
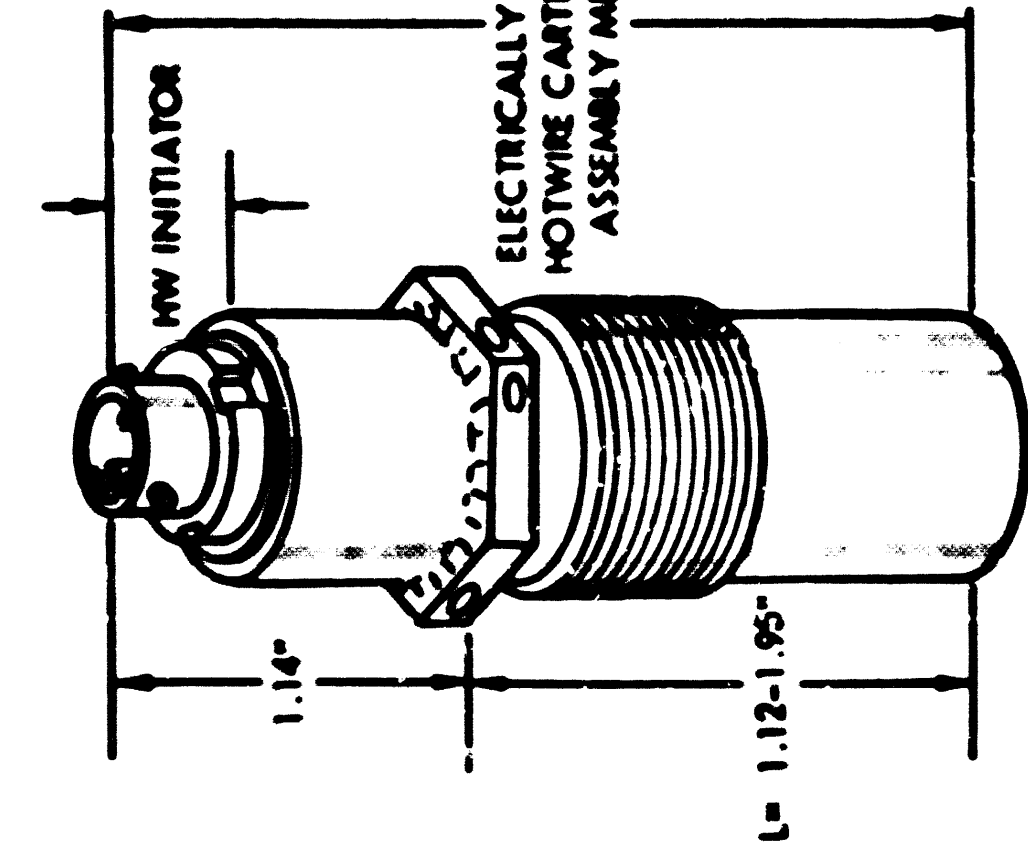


FORWARD HEATSHIELD ATTACHMENT & THRUSTER ASSEMBLY

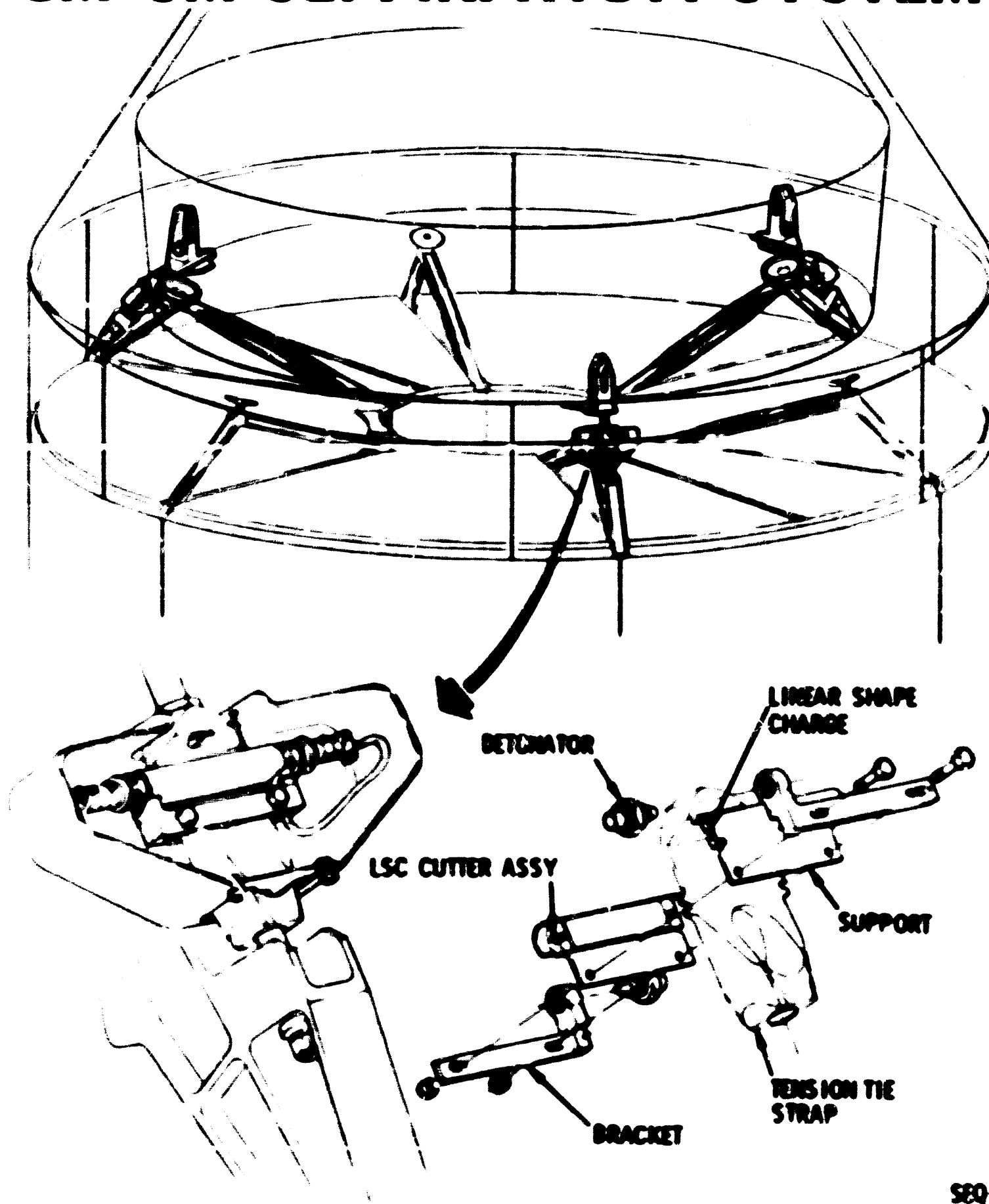


HOTWIRE PRESSURE CARTRIDGE ASSEMBLY

ELECTRICALLY INITIATED

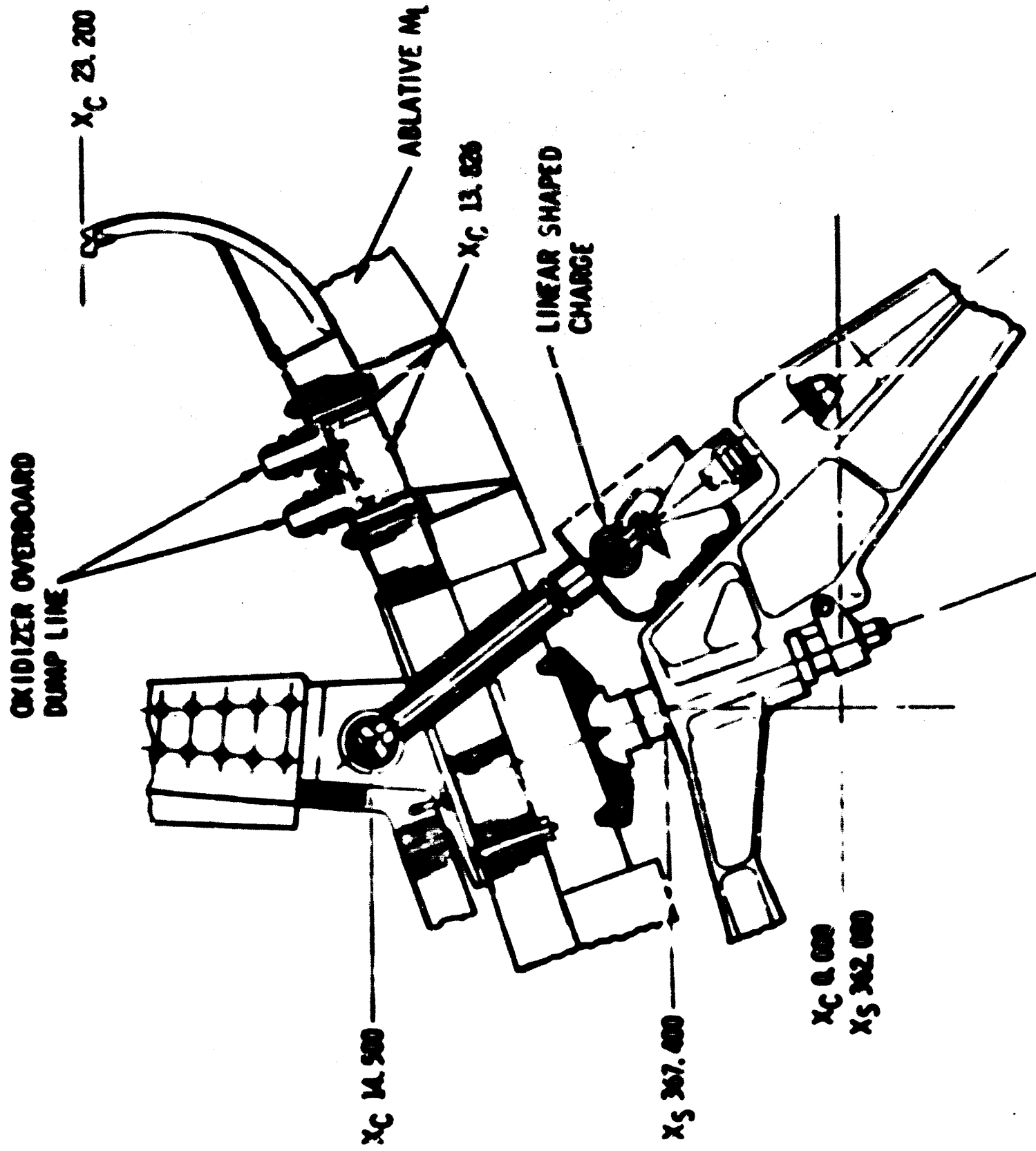


CM-SM SEPARATION SYSTEM

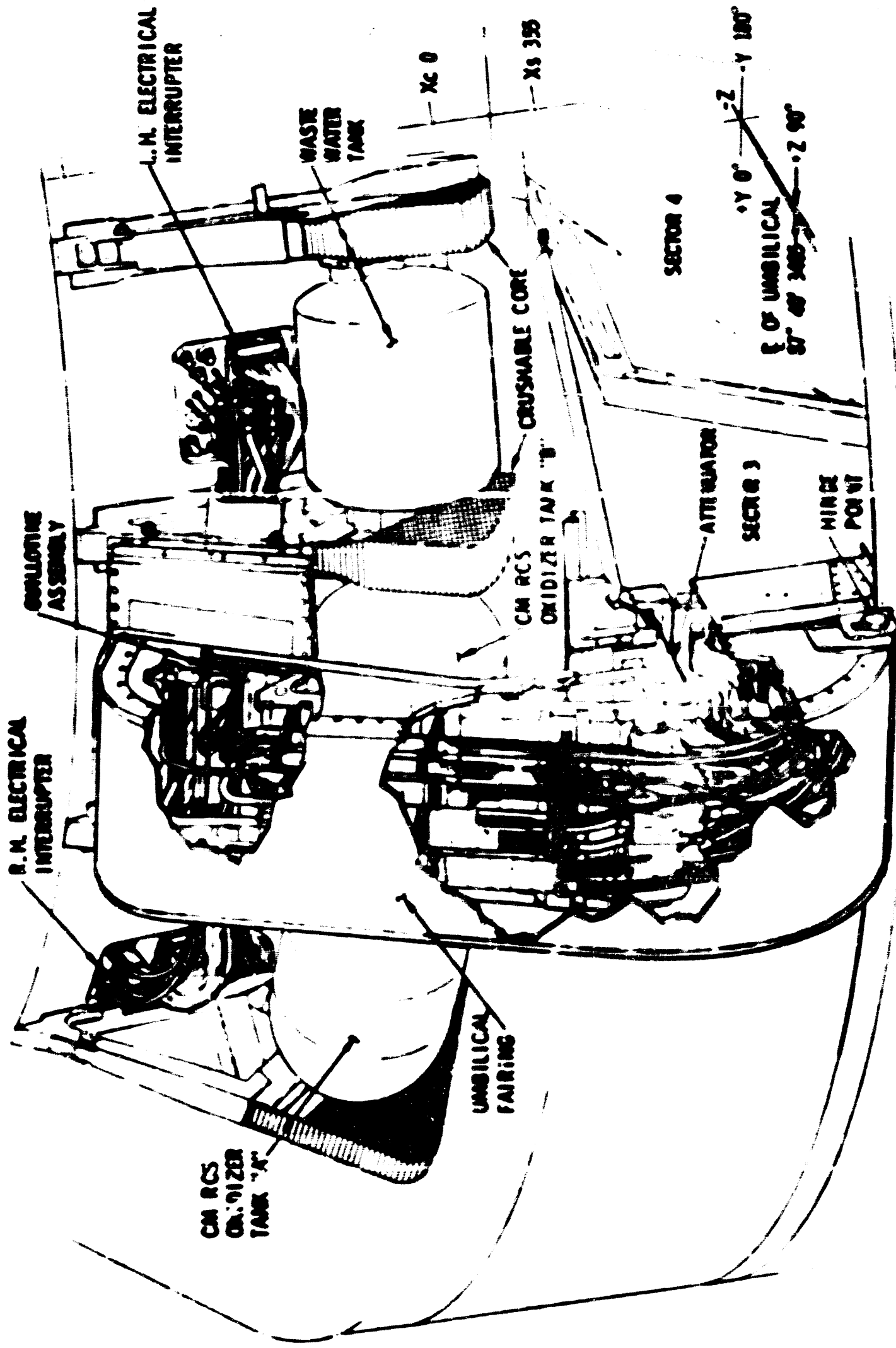


SEQ-523 

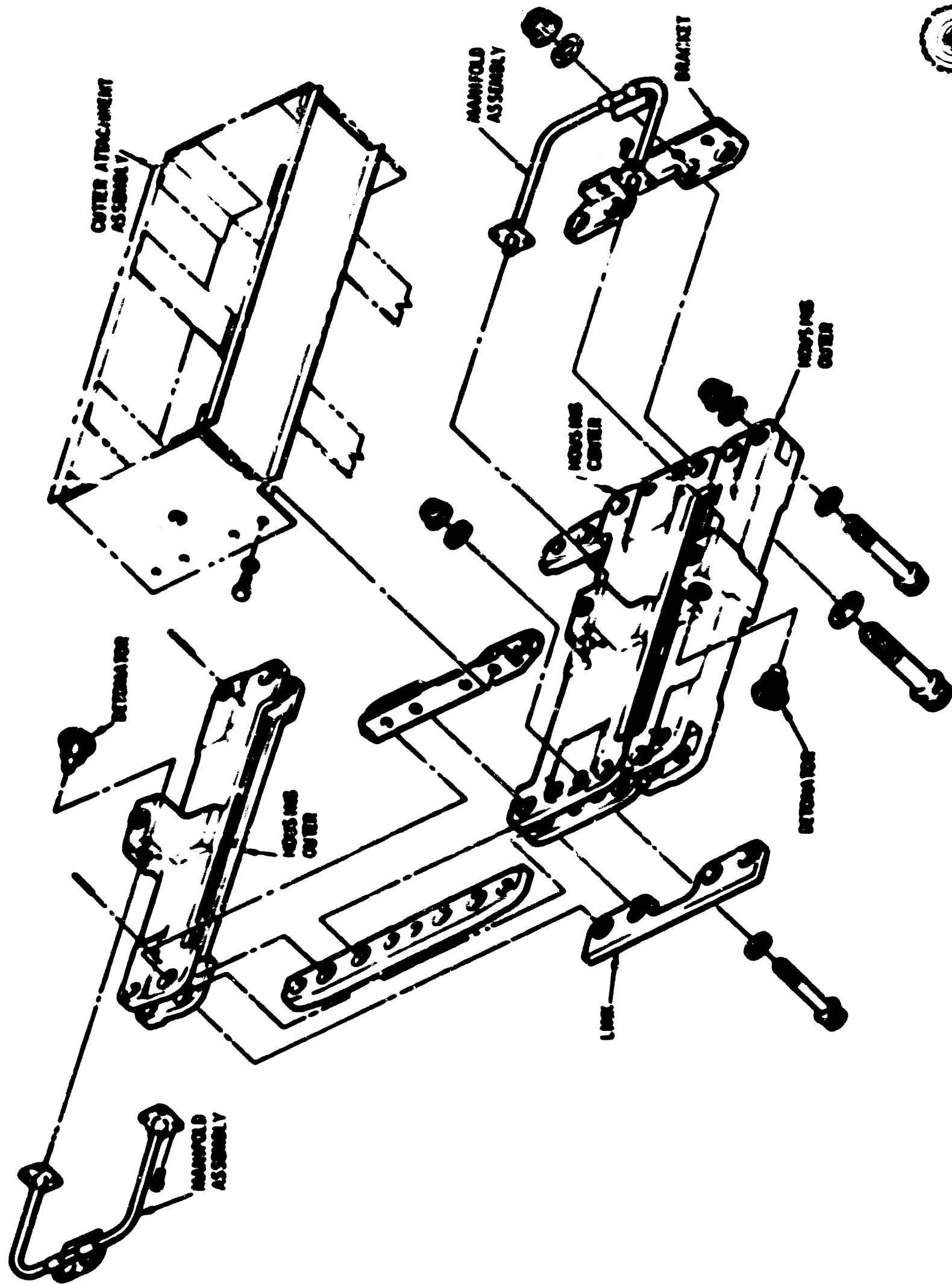
AFT TENSION TIE NO. 1



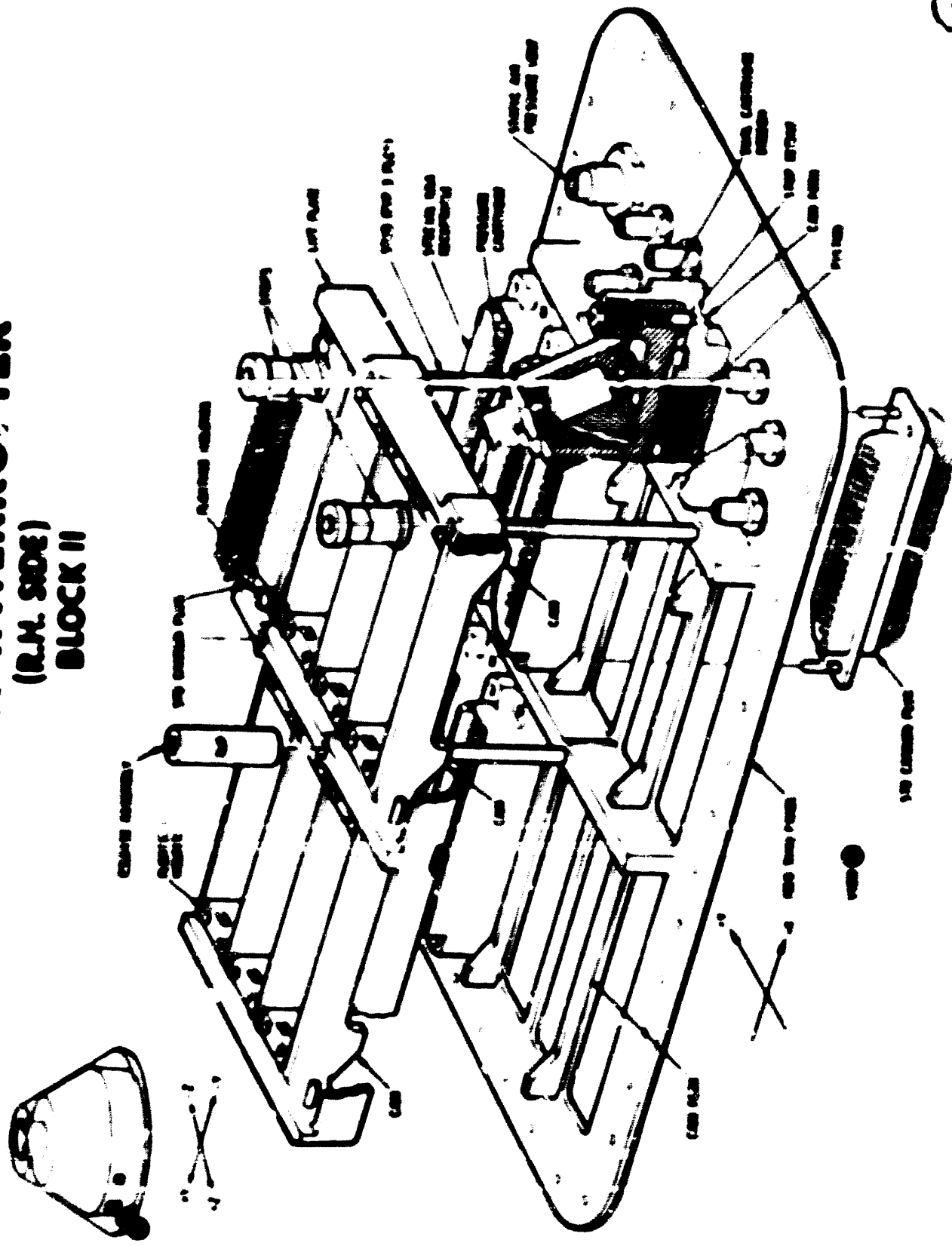
COMMAND MODULE TO SERVICE MODULE UMBILICAL ASSEMBLY



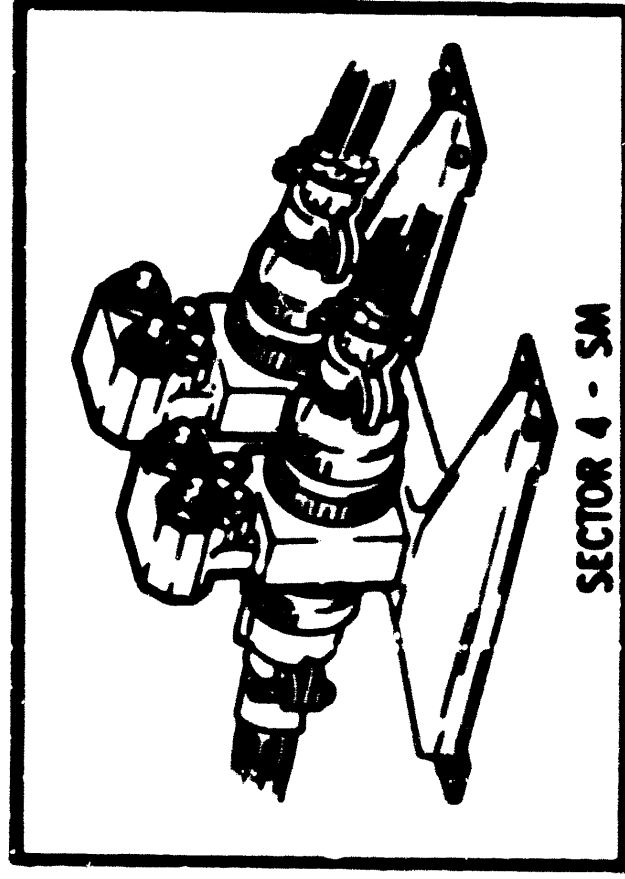
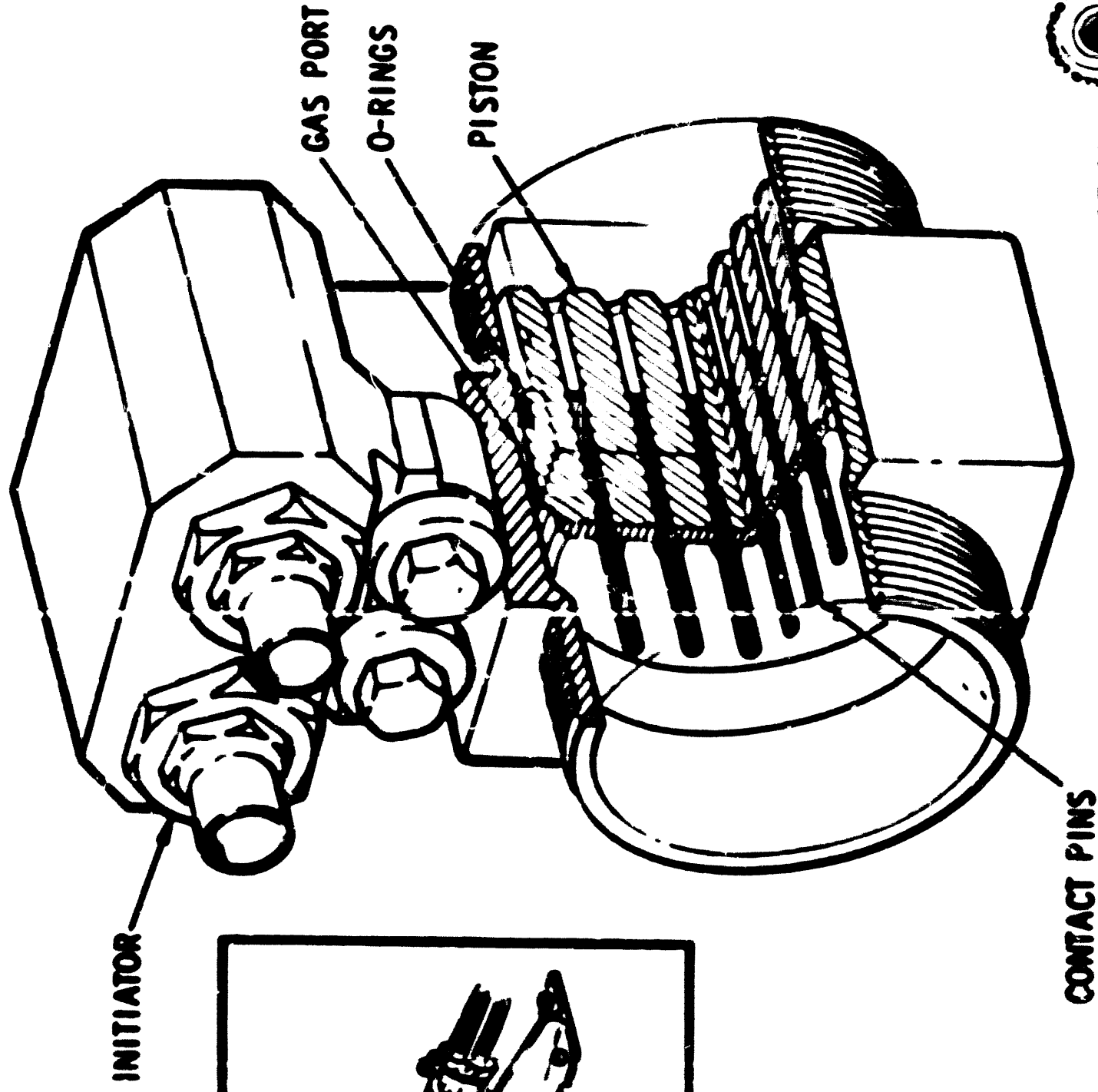
GUILLOTINE SUB-ASSEMBLY



CIRCUIT INTERRUPTER **(R.H. SIDE)** **BLOCK II**



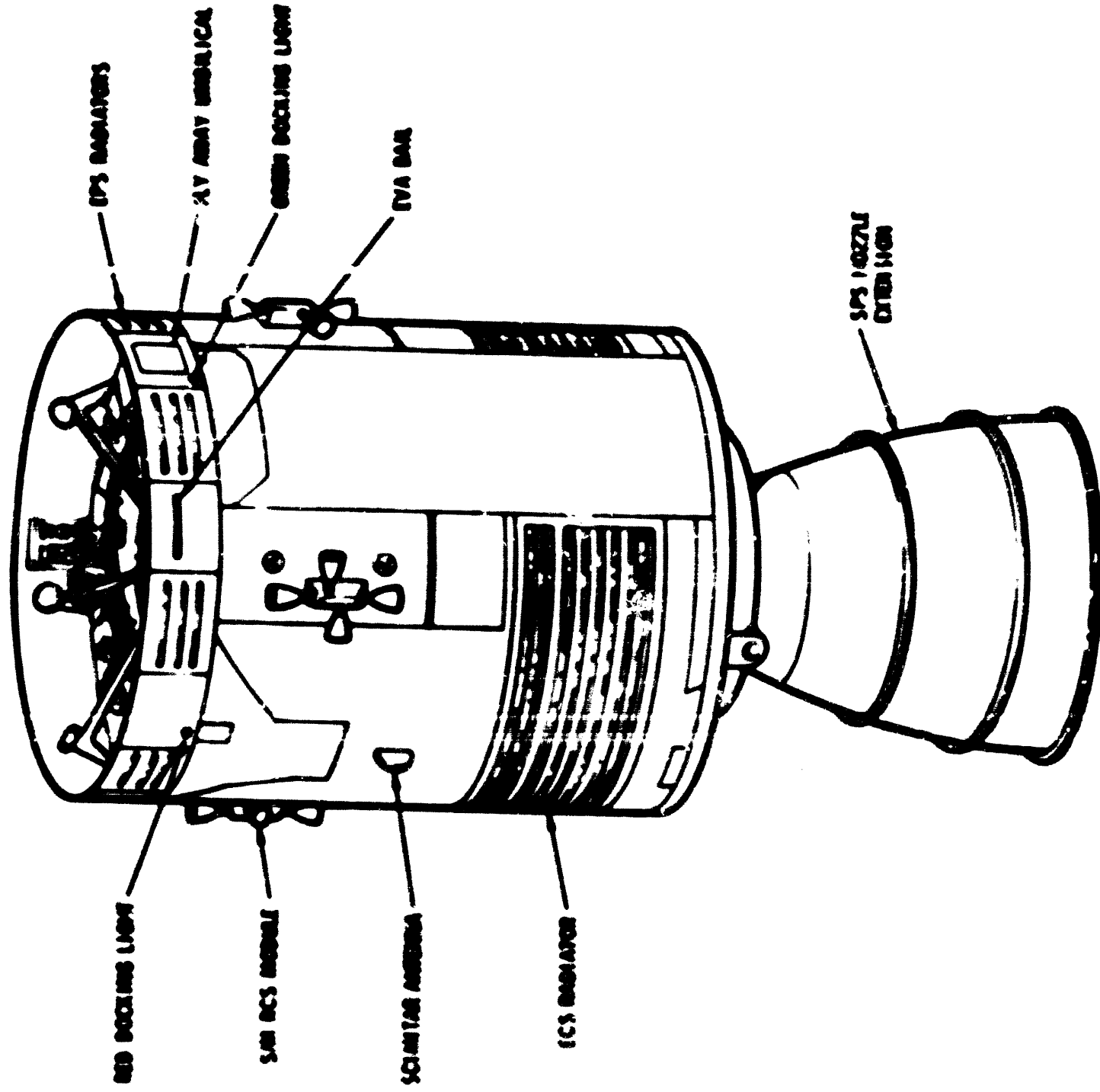
ELECTRICAL CIRCUIT INTERRUPTERS



ST-9000E

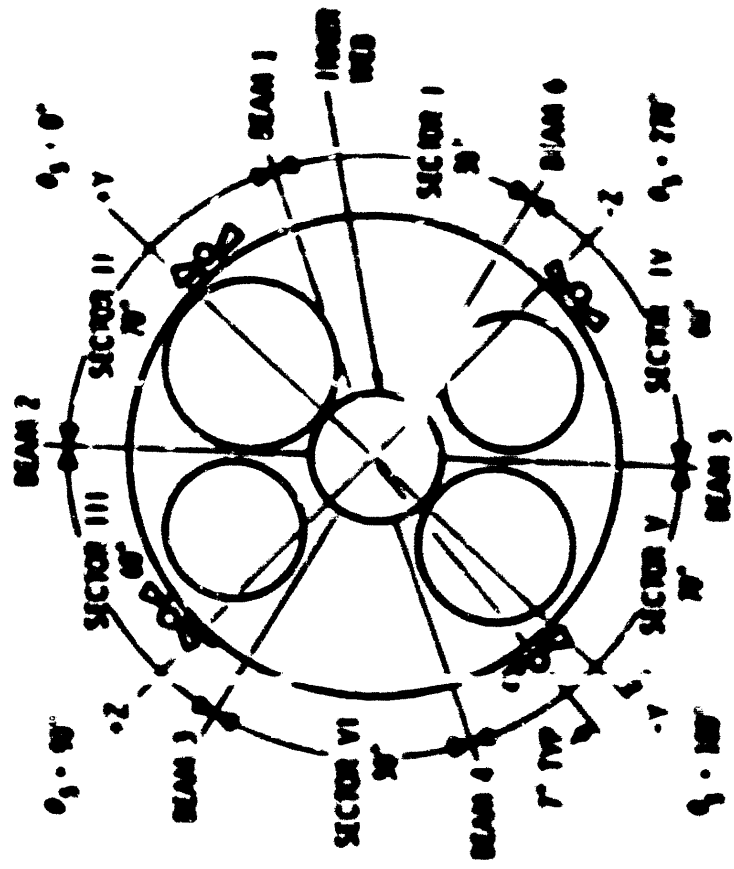
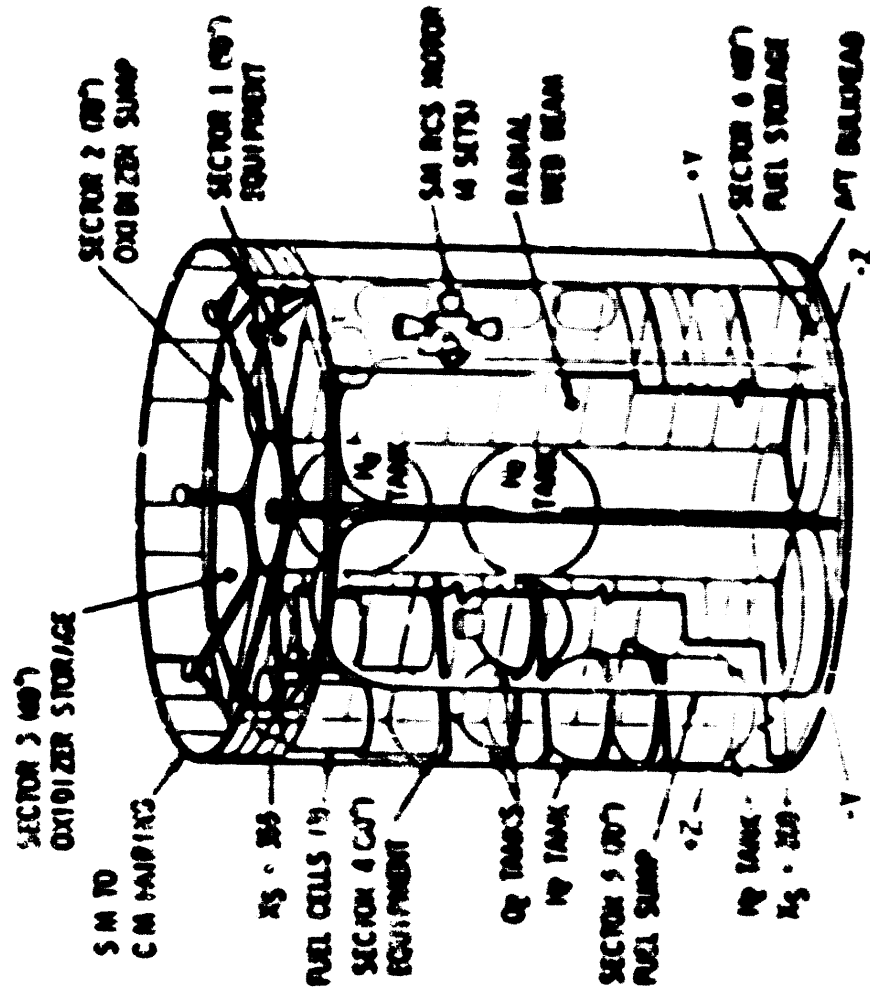
SERVICE MODULE

Block II

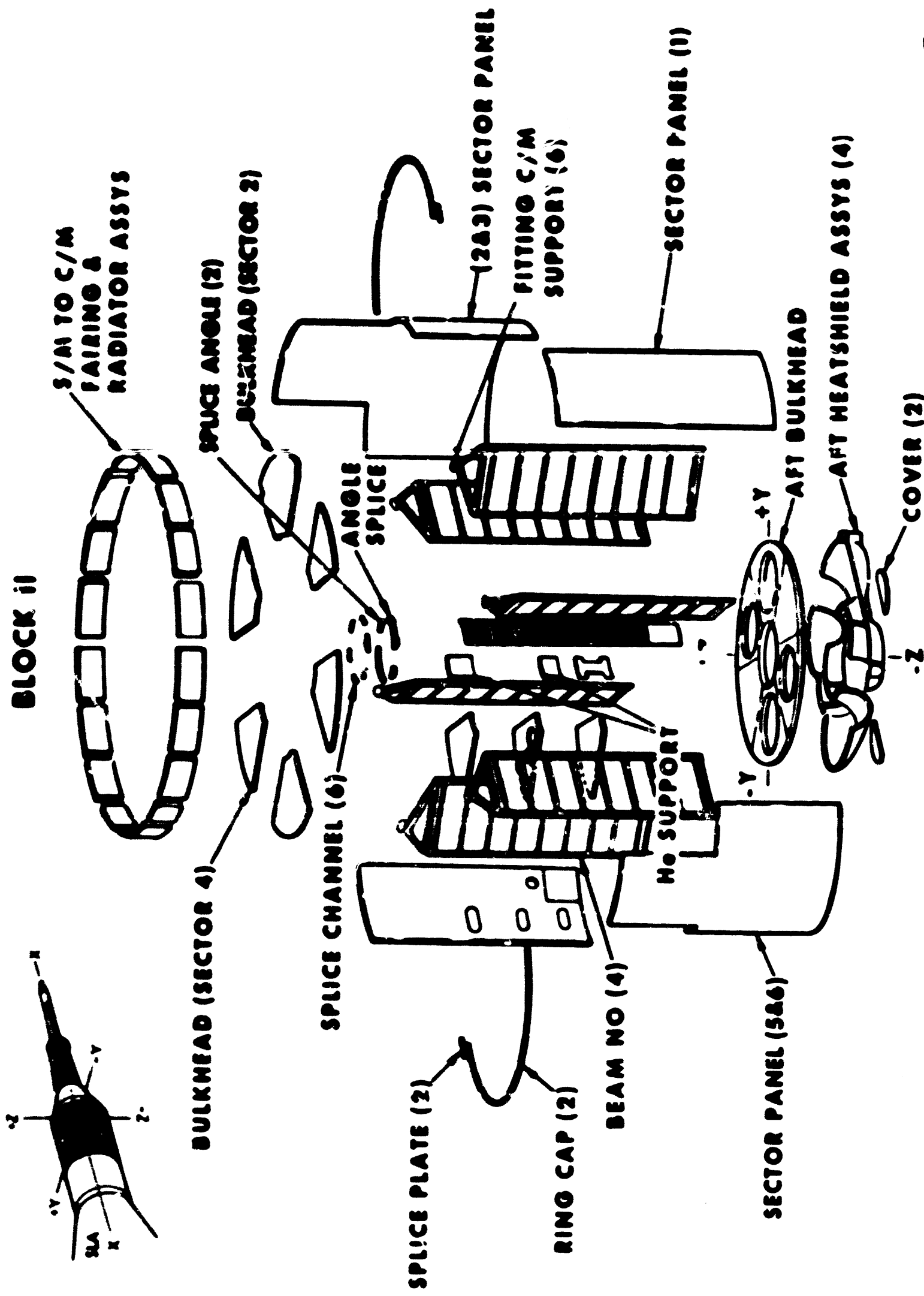


APOLLO SM GENERAL CONFIGURATION

BLOCK II

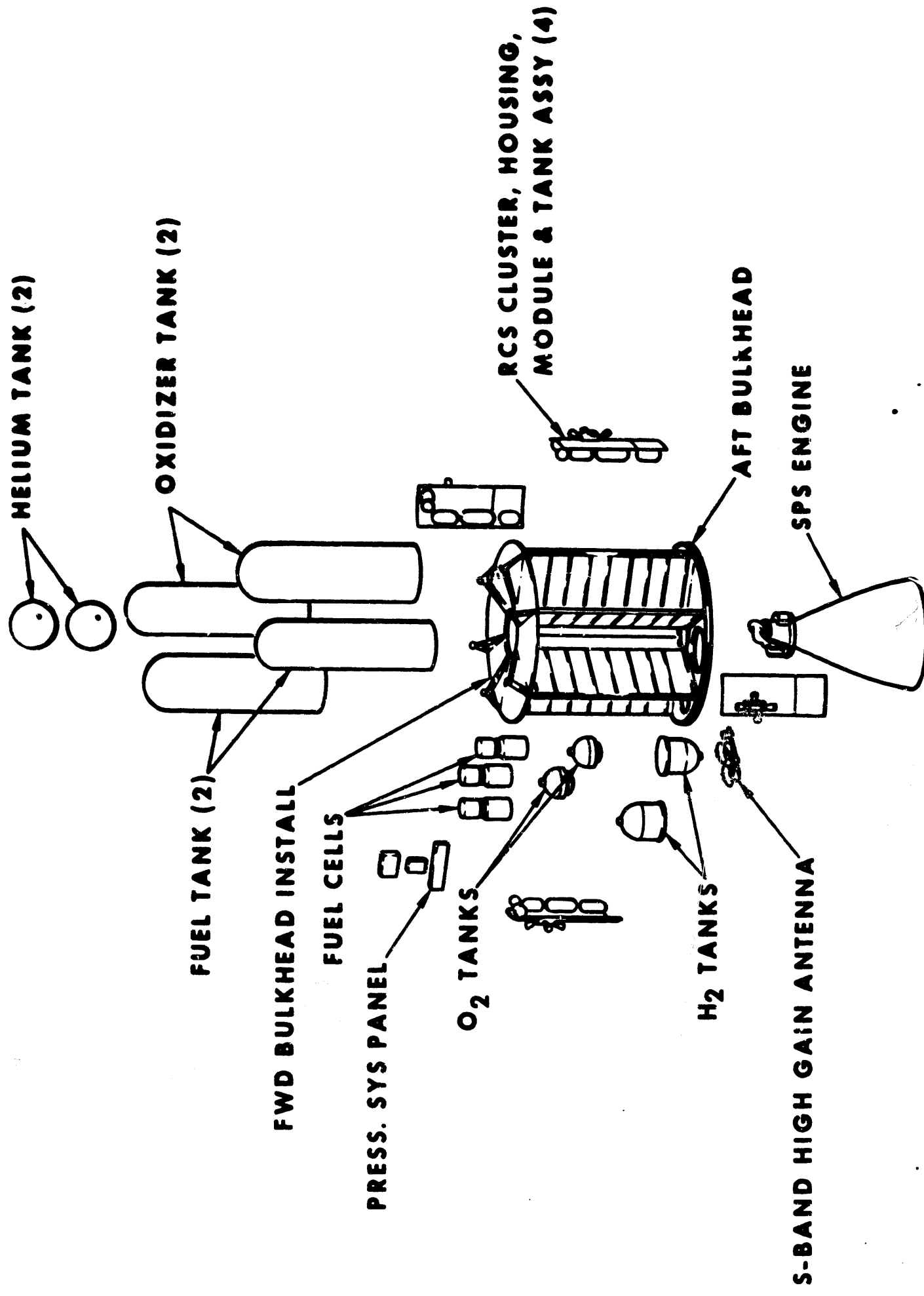


APOLLO SM STRUCTURE BREAKDOWN



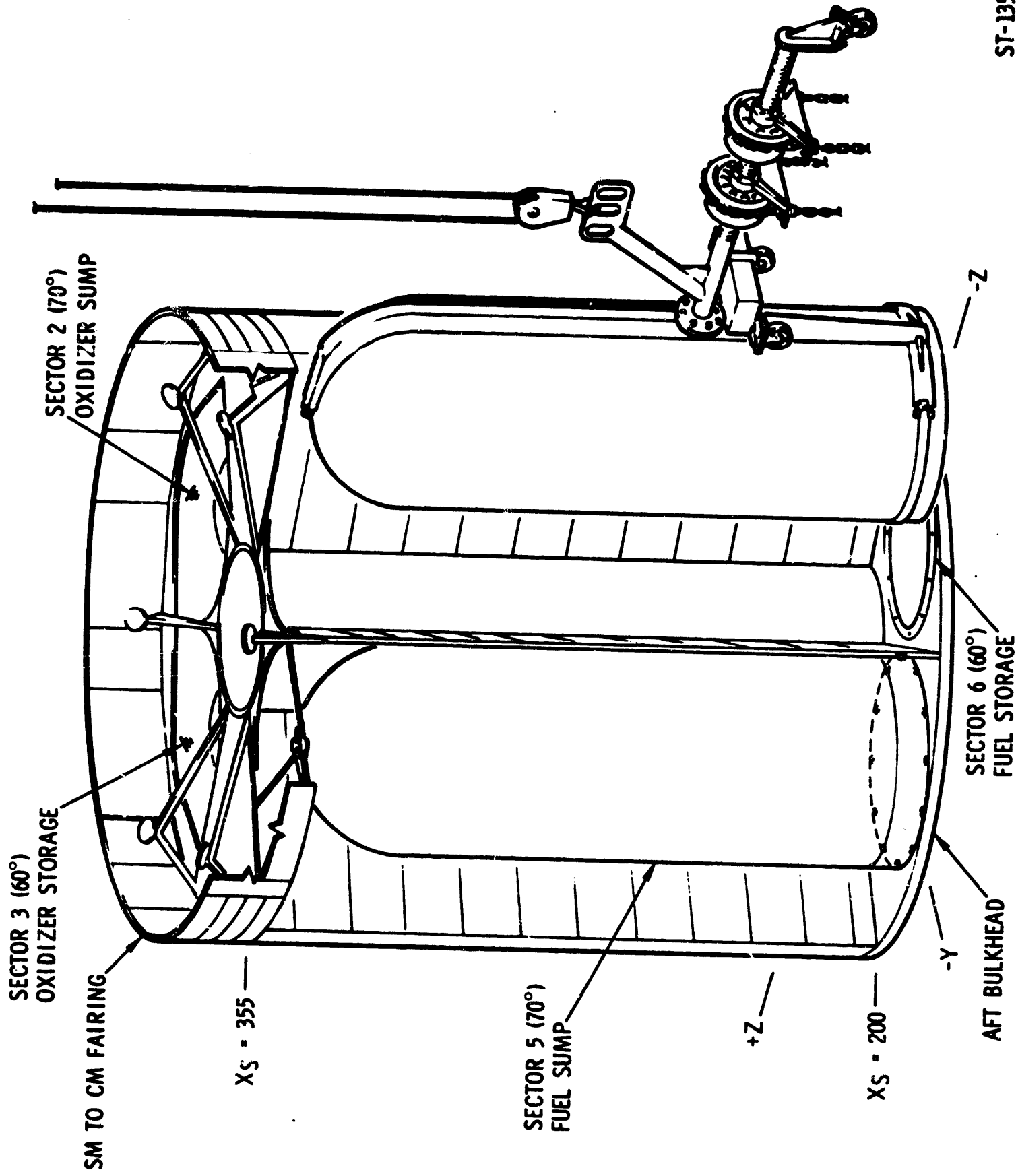
APOLLO SM SYSTEMS EQUIPMENT

BLOCK II



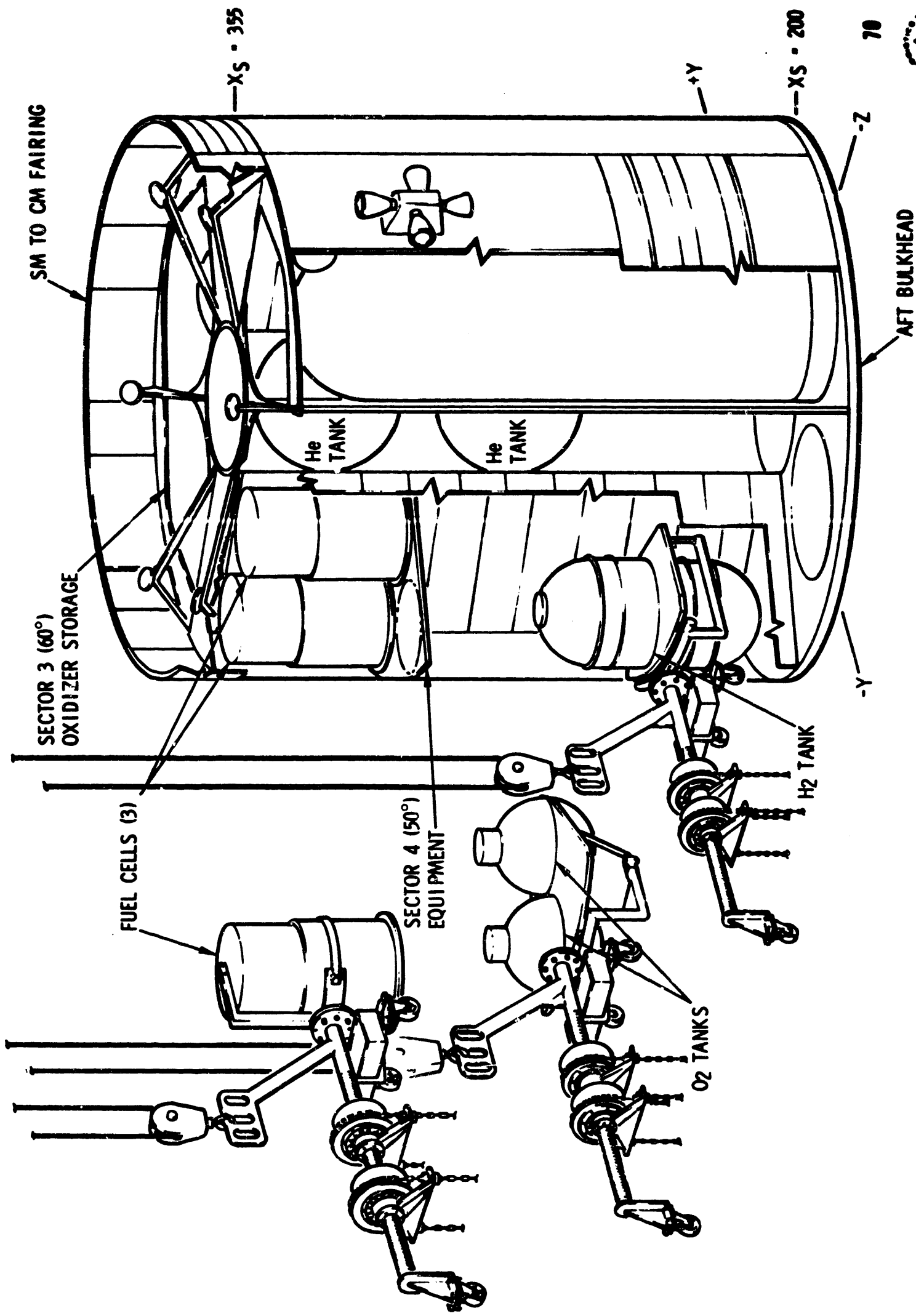
SM SPS TANK INSTALLATION

ILLUSTRATION FOR REF



ST-1350

SM SECTOR 4 TANK INSTALLATION

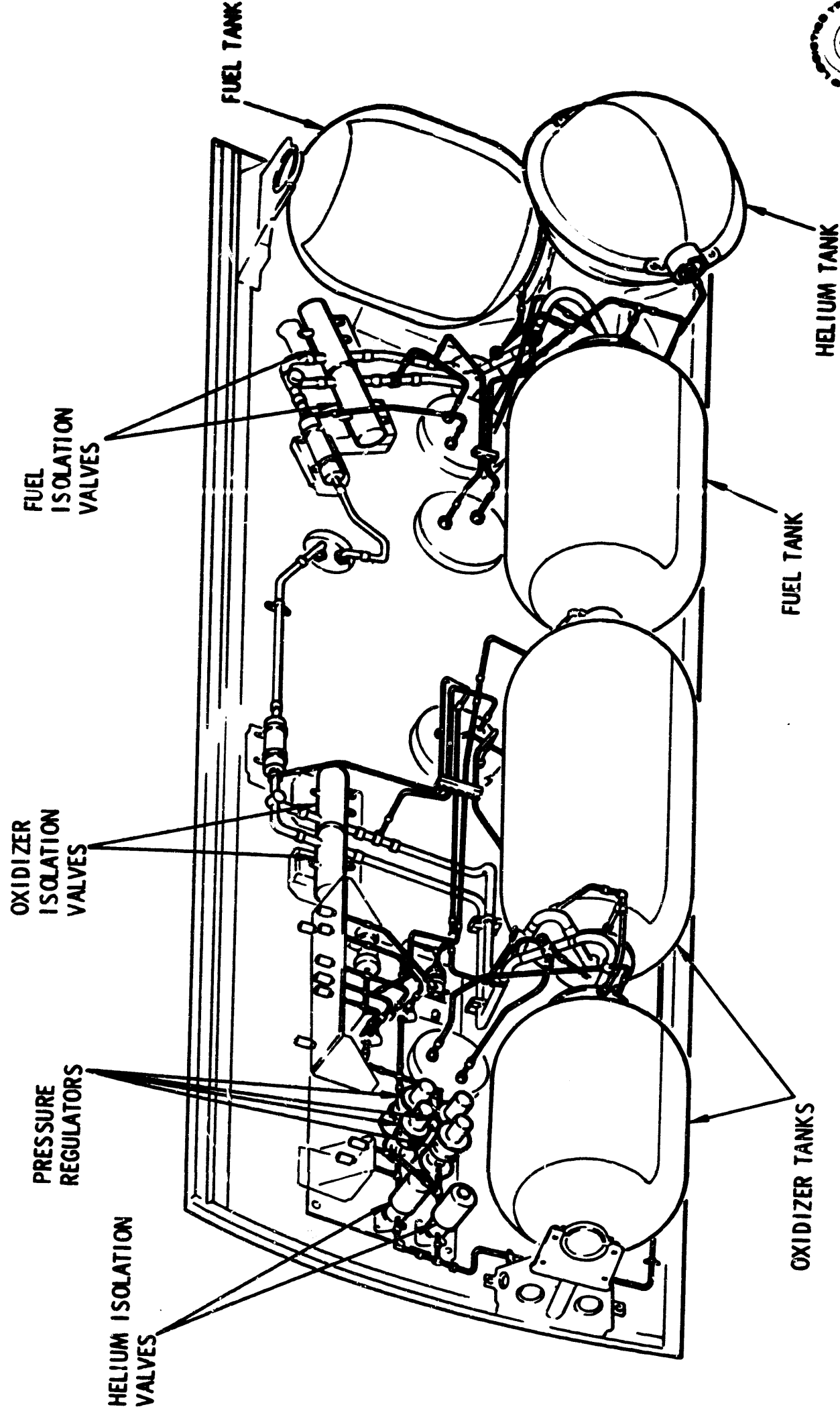


ST-1355

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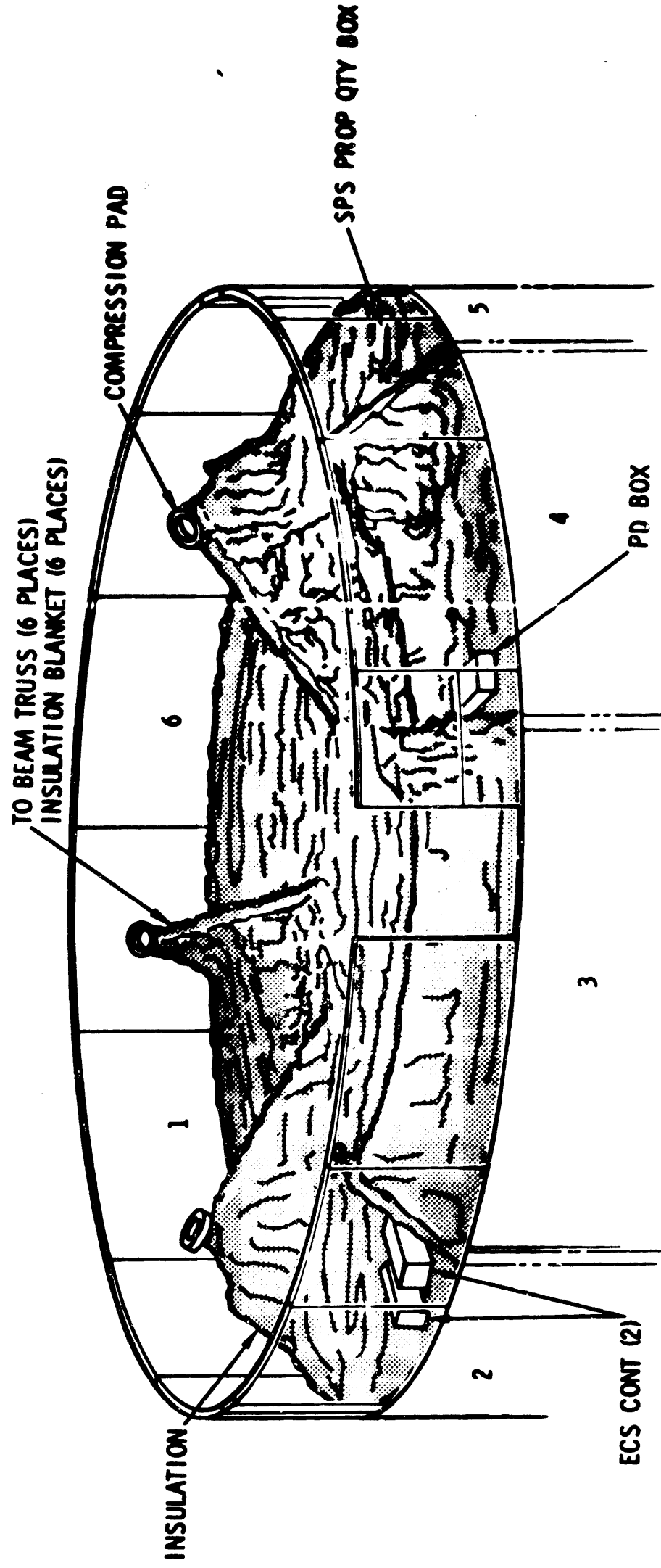
REACTION CONTROL SYSTEM MODULAR PACKAGE

BLOCK II



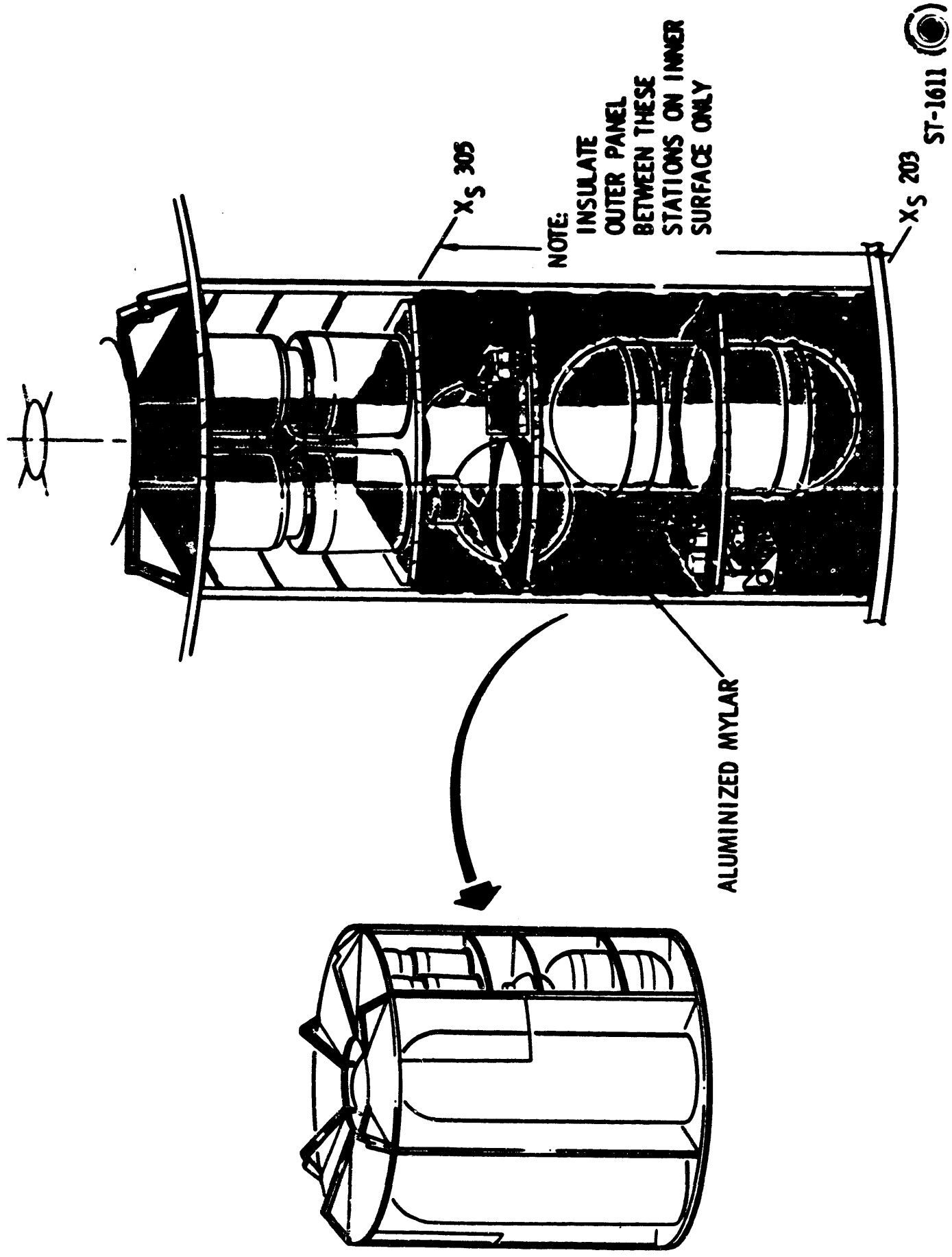
FORWARD BULKHEAD INSULATION

BLOCK II

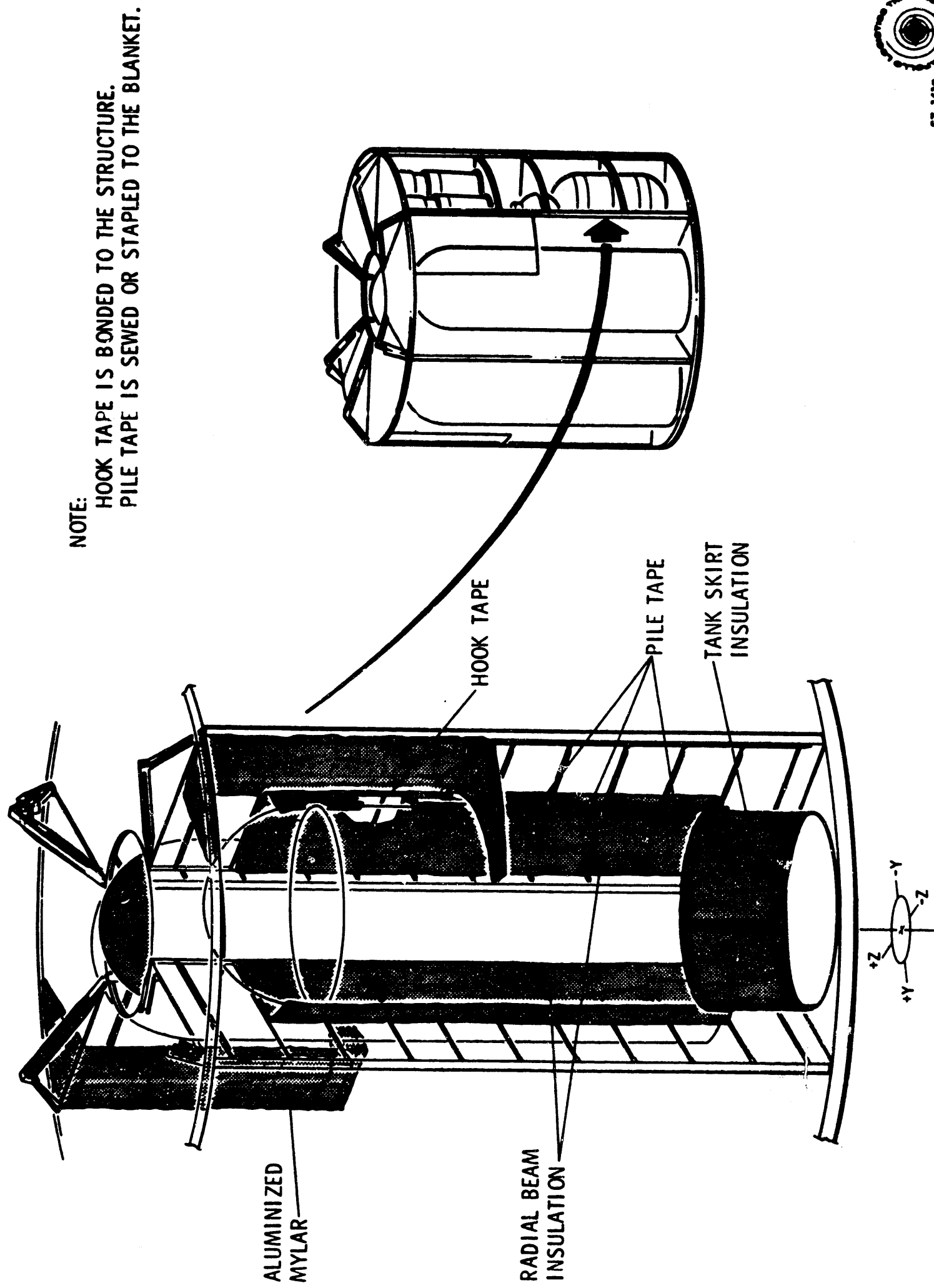


SERVICE MODULE

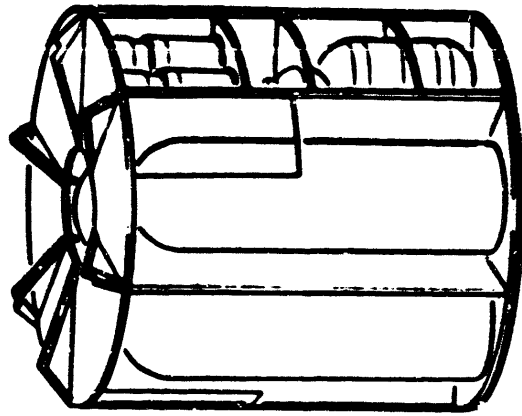
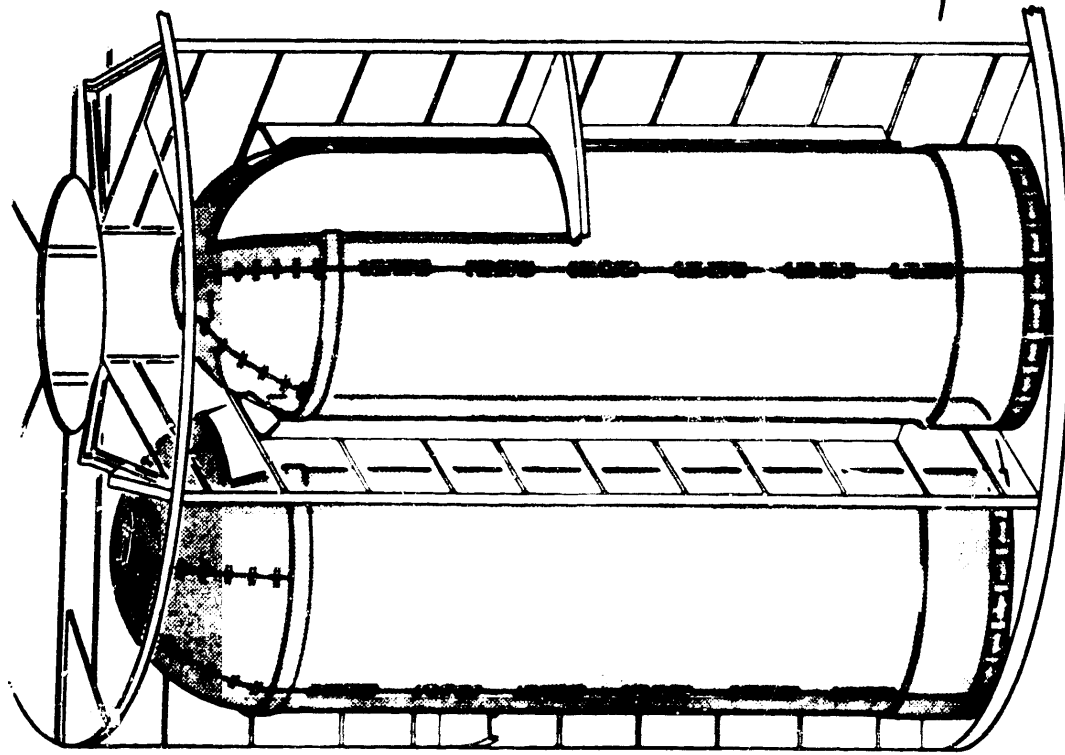
SM INSULATION TYPICAL FOR SECTOR IV



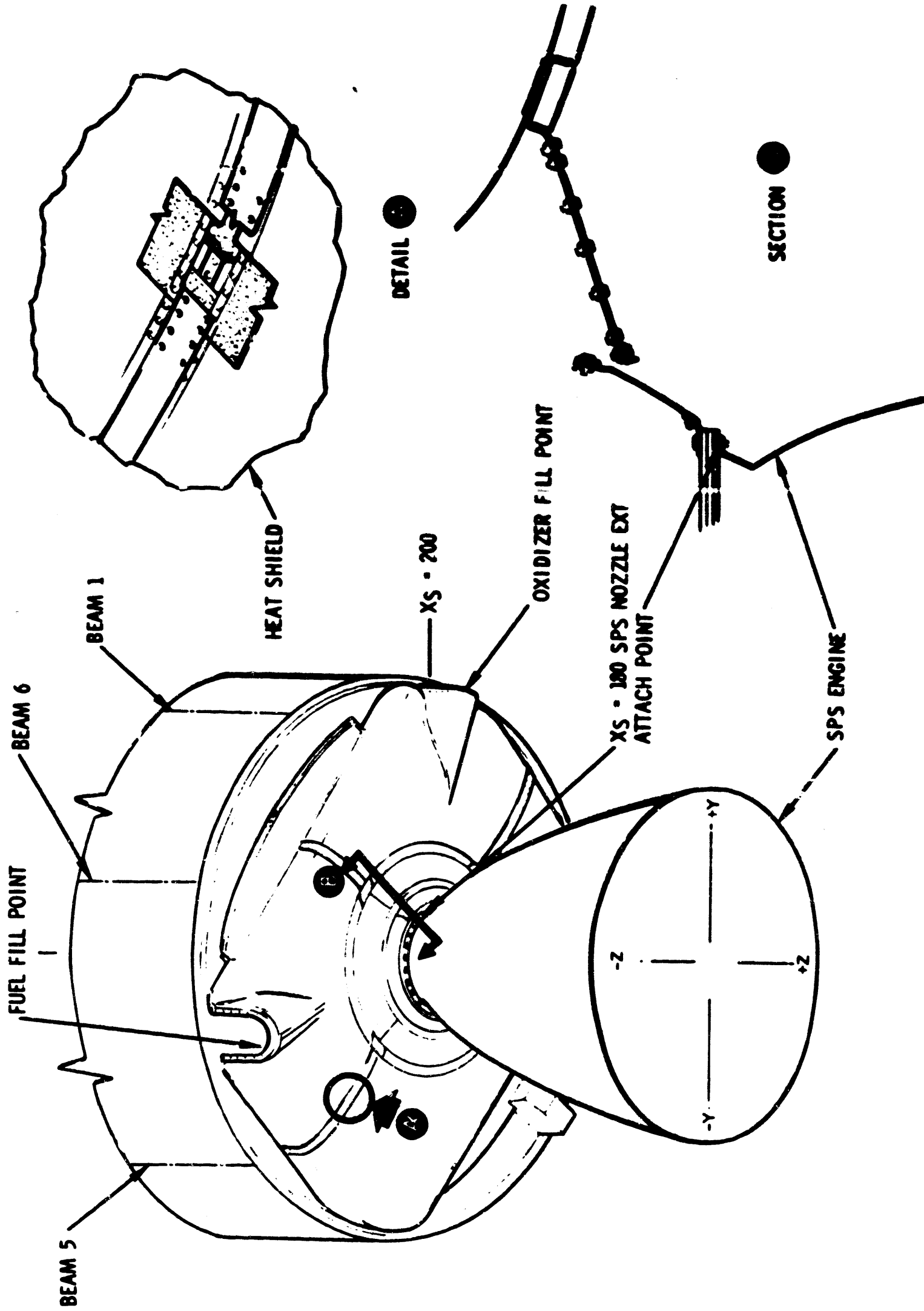
SM INSULATION TYPICAL FOR SECTORS II, III, V, & VI



SM TANK INSULATION

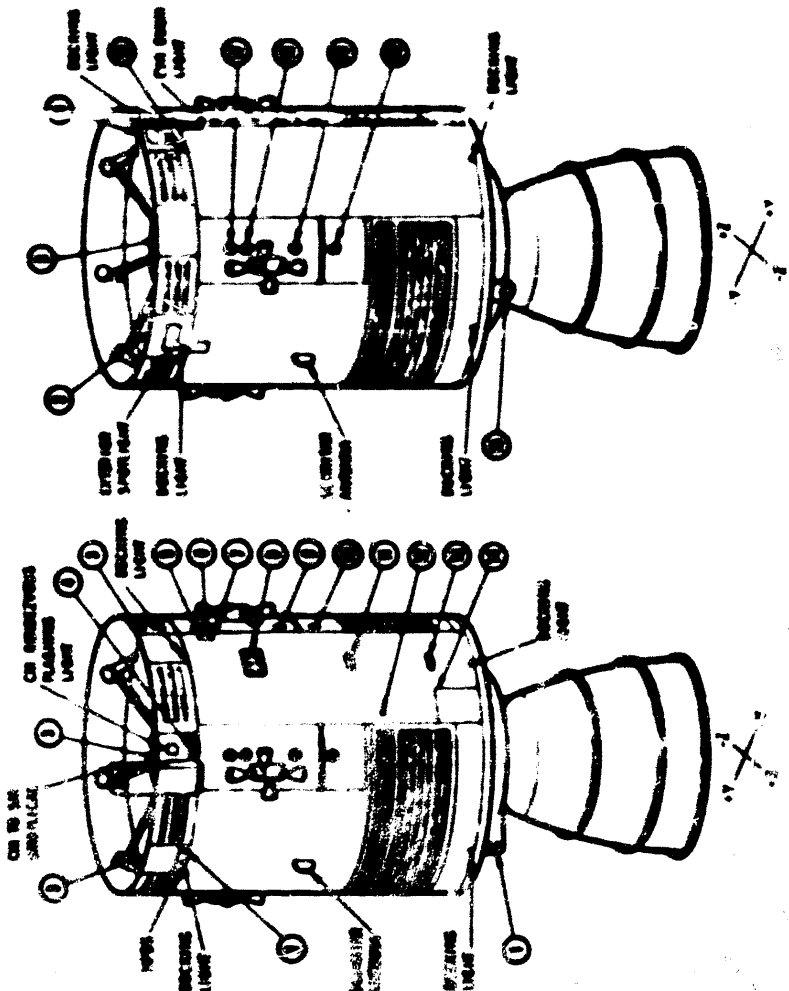


SM SPS NOZZLE AND HEAT SHIELD



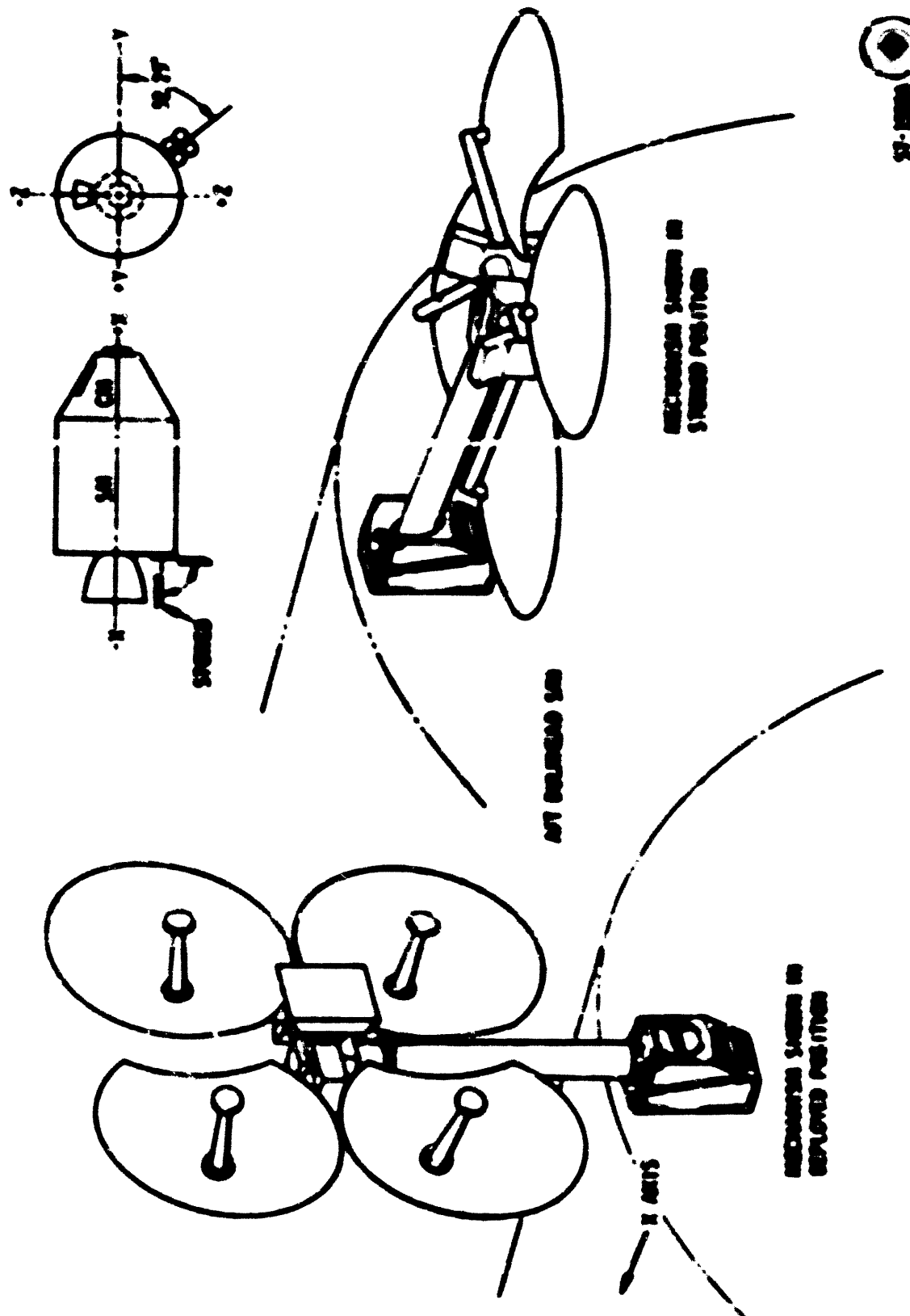
SM ACCESS AND SERVICING POINTS

Access Point	Access Point	Access Point	Access Point	Access Point
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6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50
51	52	53	54	55
56	57	58	59	60
61	62	63	64	65
66	67	68	69	70
71	72	73	74	75
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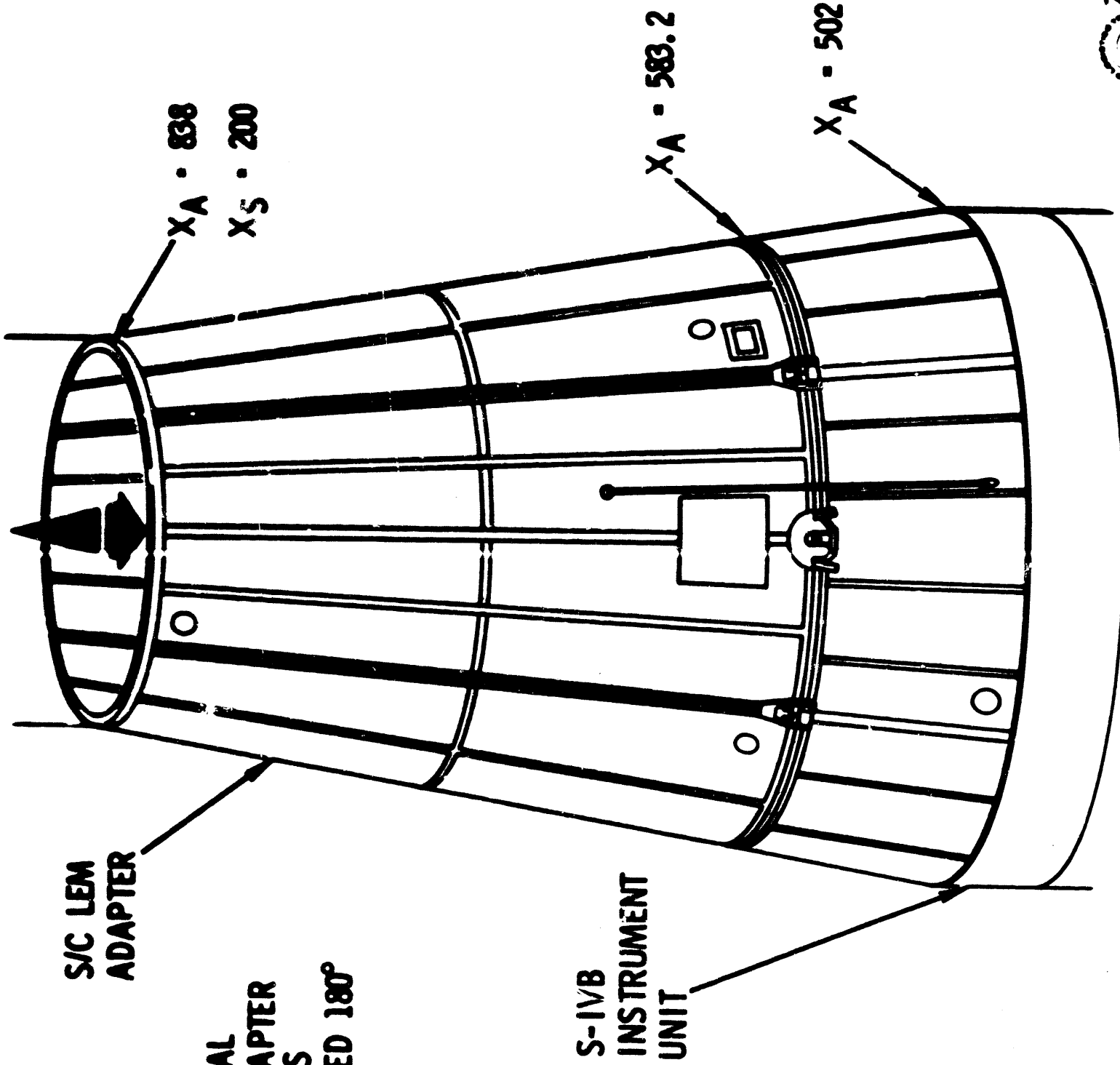
Access Point	Access Point	Access Point	Access Point	Access Point
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96	97	98	99	100

HIGH GAIN ANTENNA

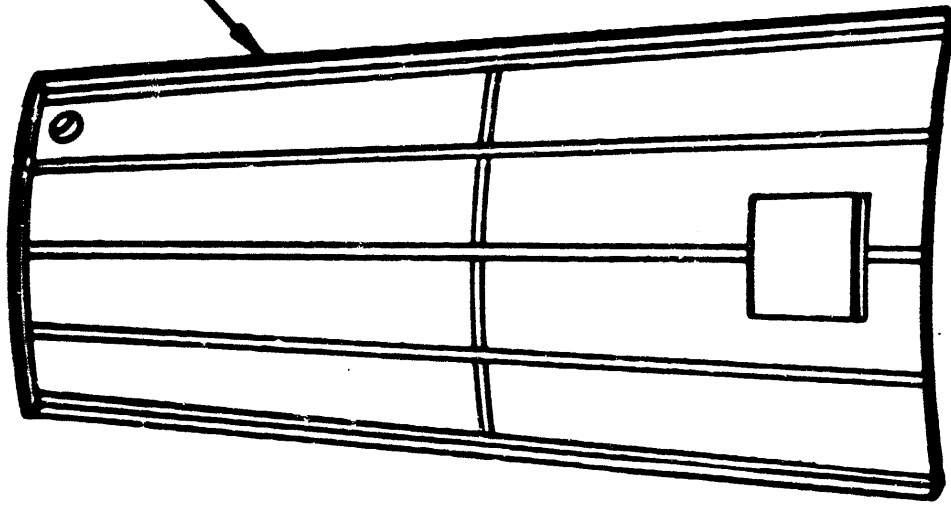


SPACECRAFT LEM ADAPTER

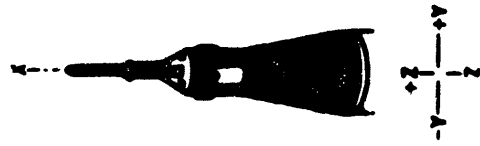
VIEW A



TYPICAL
OF ADAPTER
PANELS
ROTATED 180°

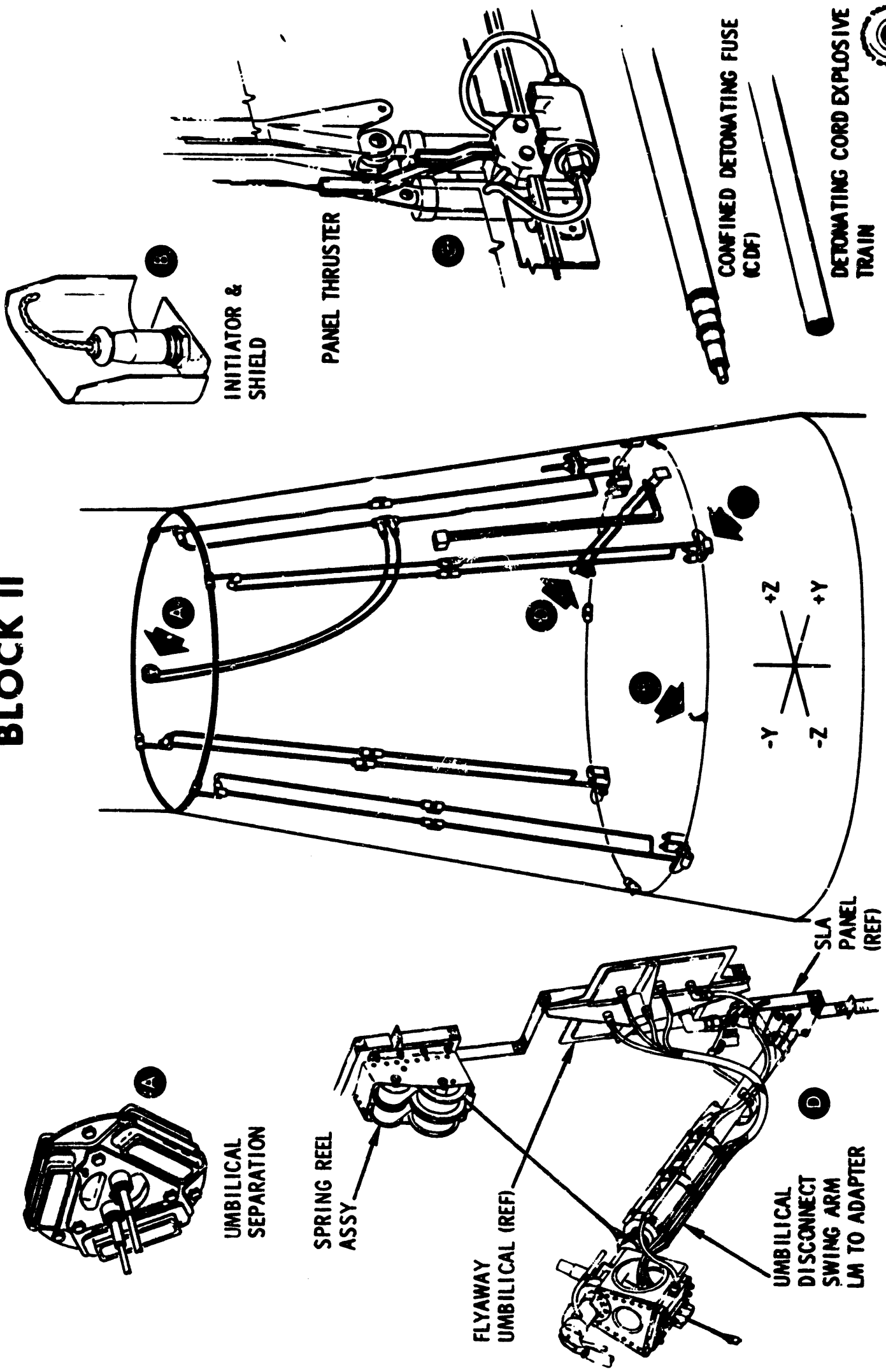


VIEW A

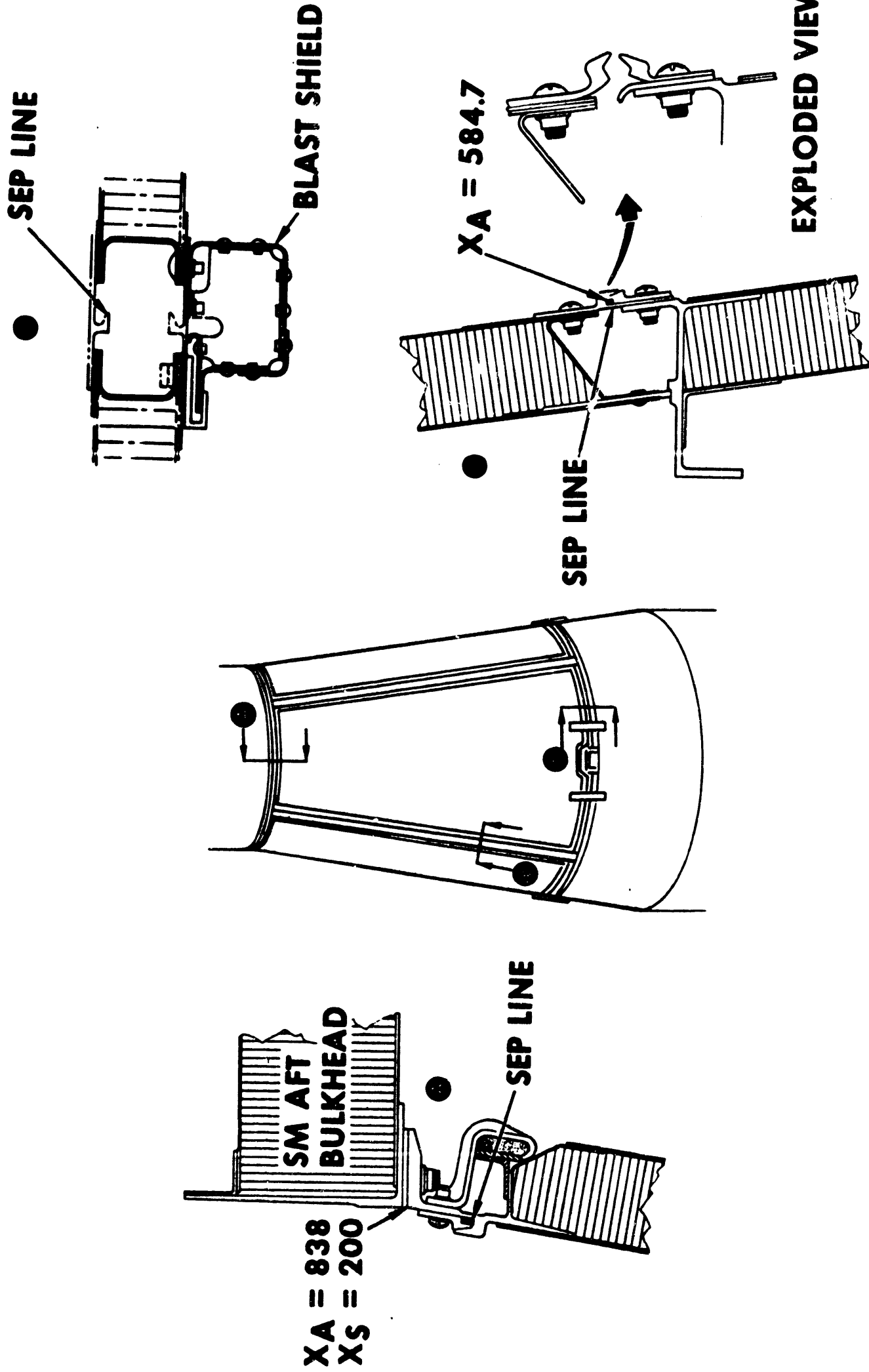


ADAPTER SEPARATION SYSTEM

BLOCK II

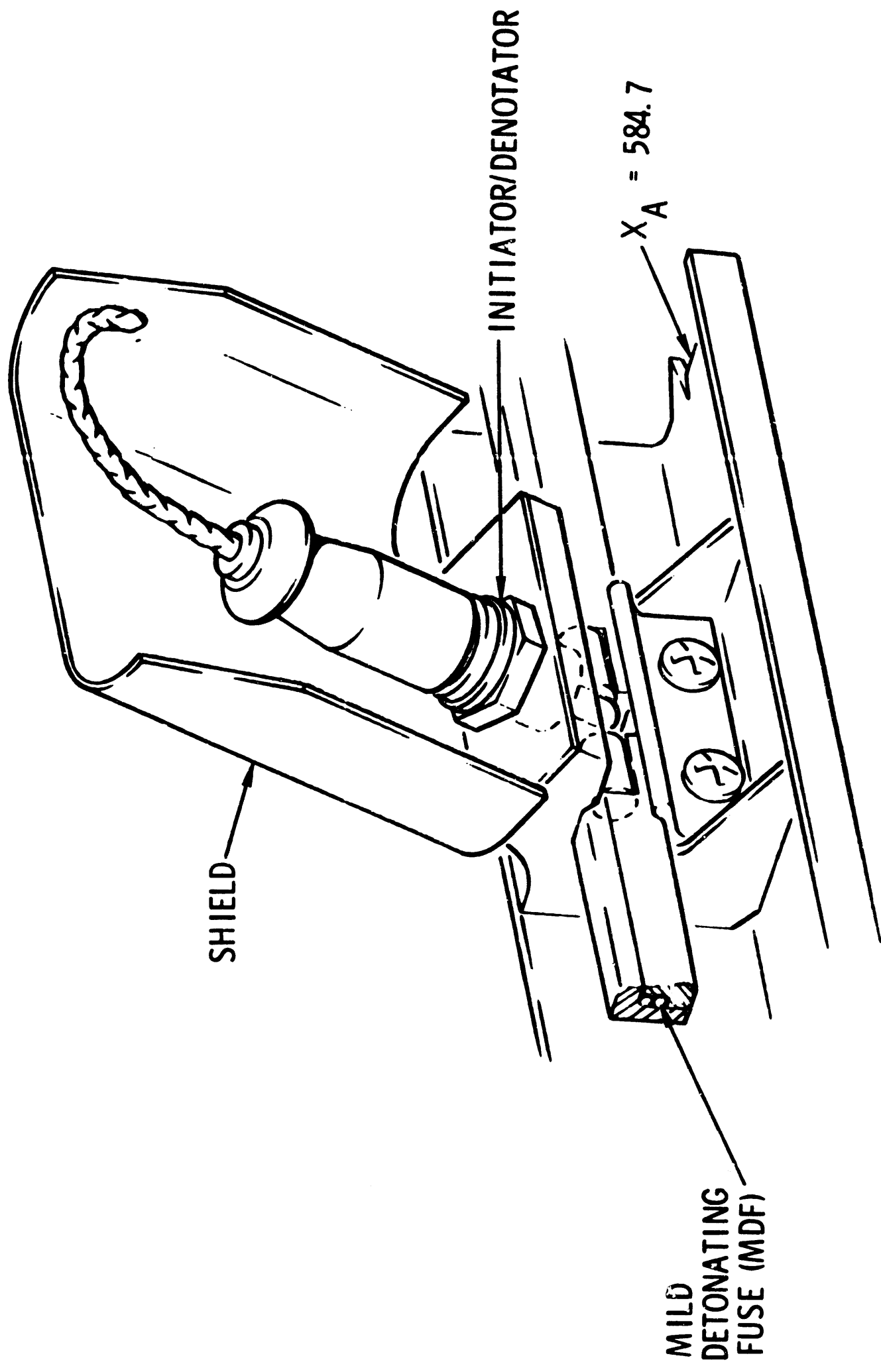


ADAPTER PANEL SEPARATION LINE

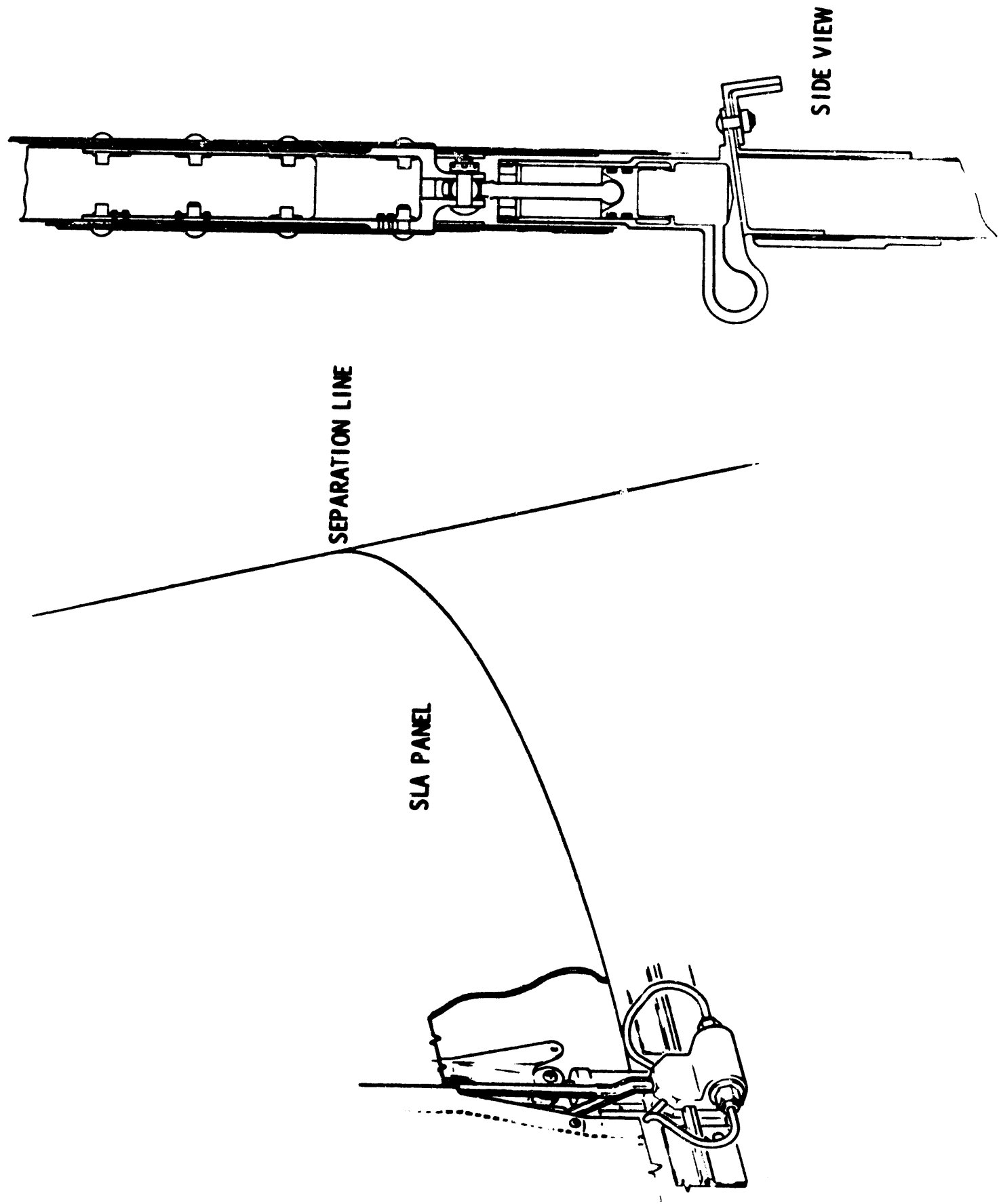


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SLA INITIATOR AND SHIELD

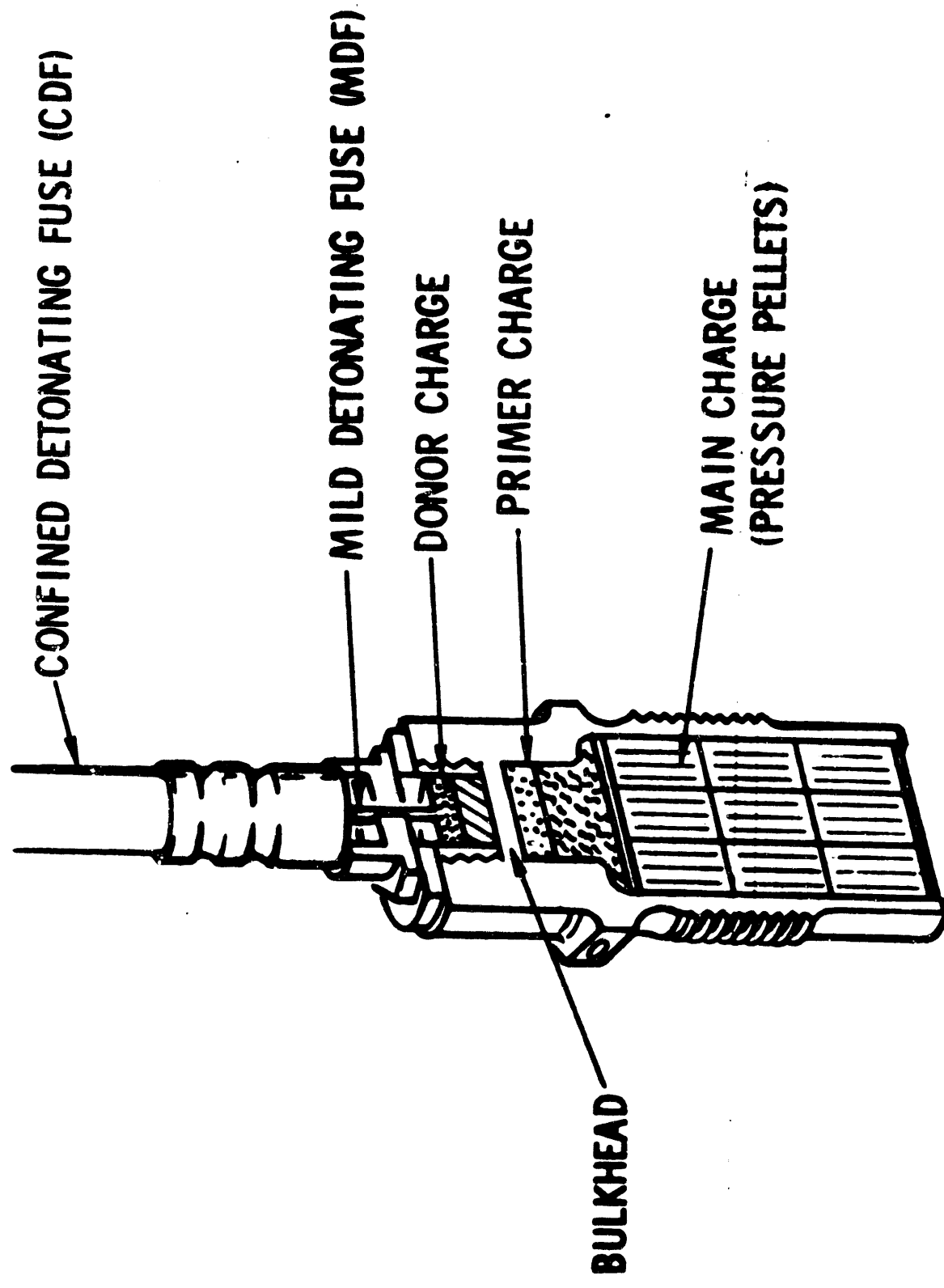


SLA THRUSTER LAYOUT

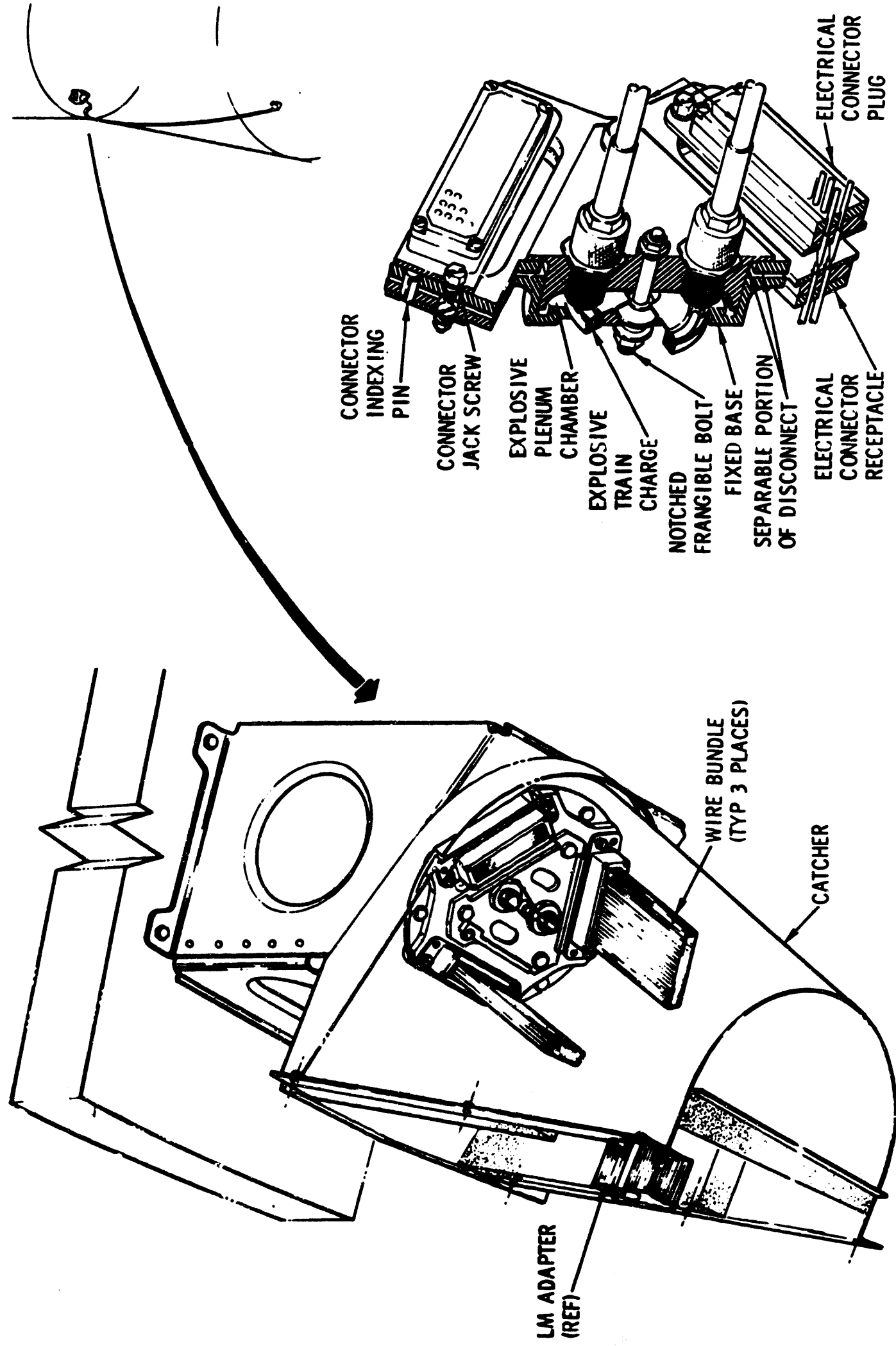


THROUGH-BULKHEAD PRESSURE CARTRIDGE

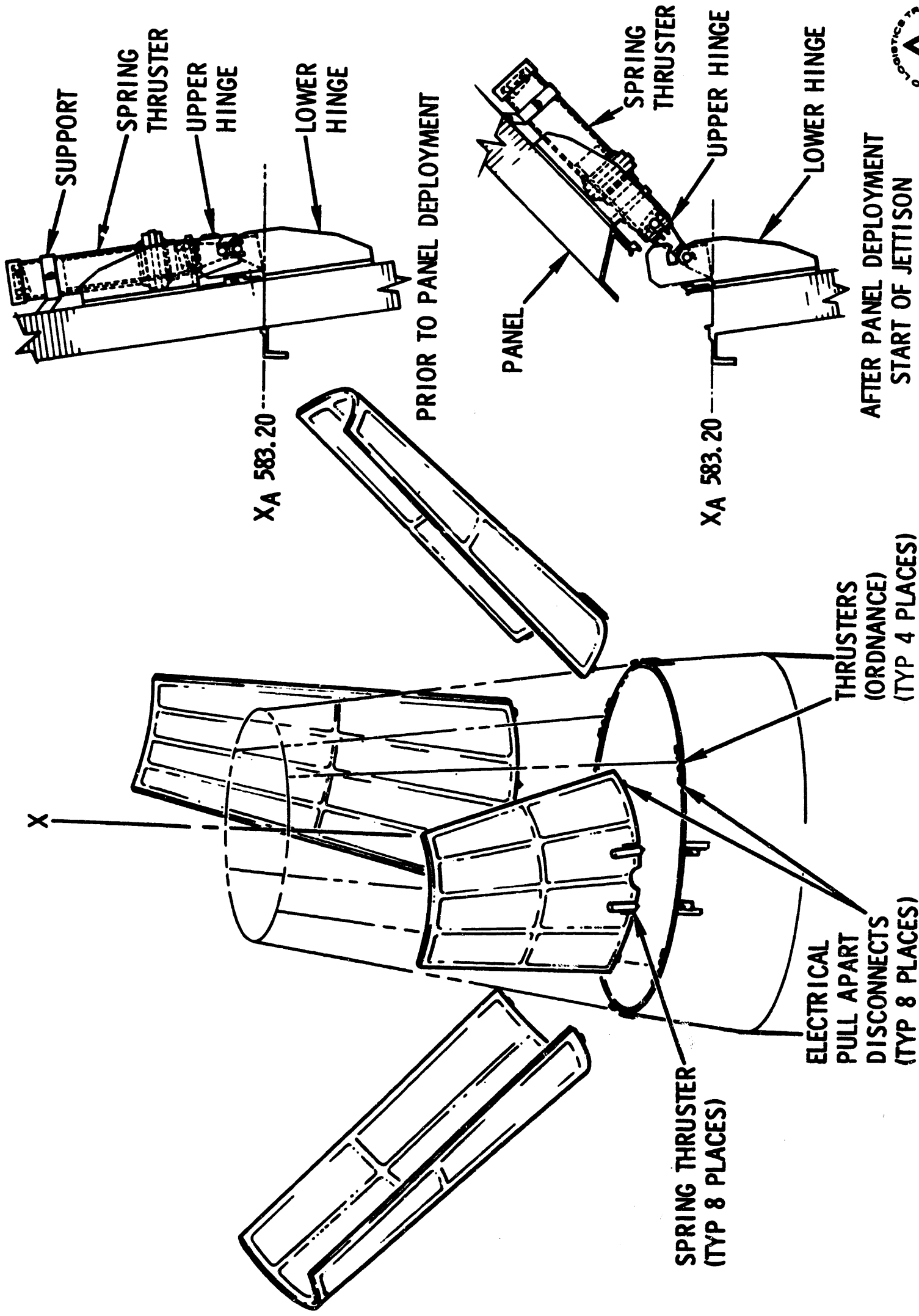
TYPICAL



SM TO ADAPTER UMBILICAL SEPARATION



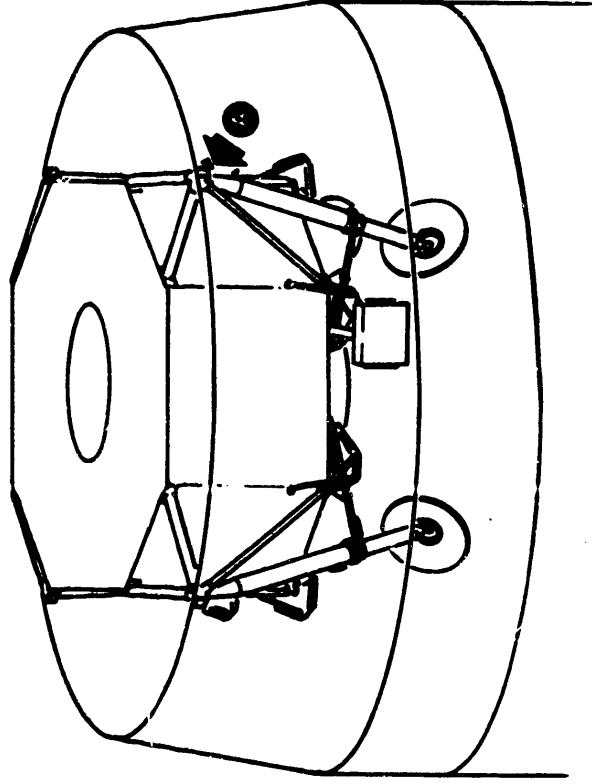
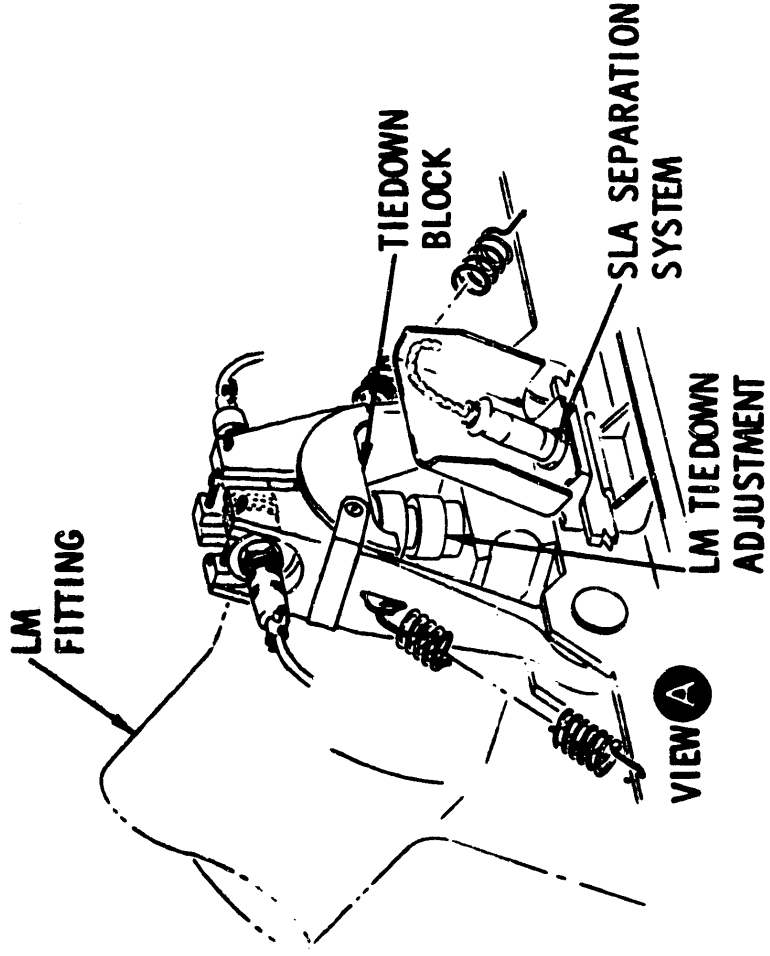
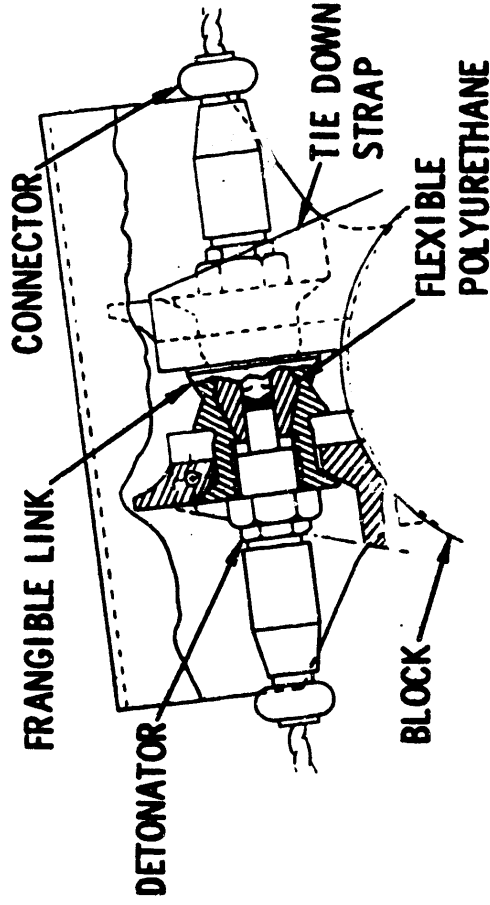
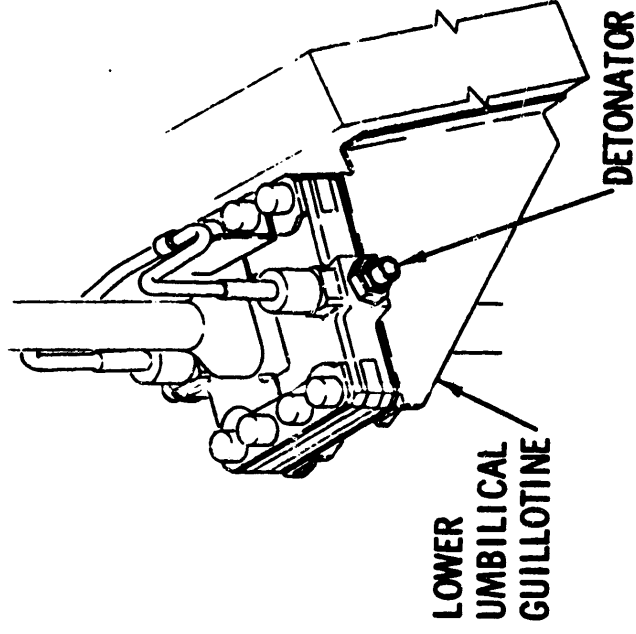
SLA PANEL JETTISON SYSTEM



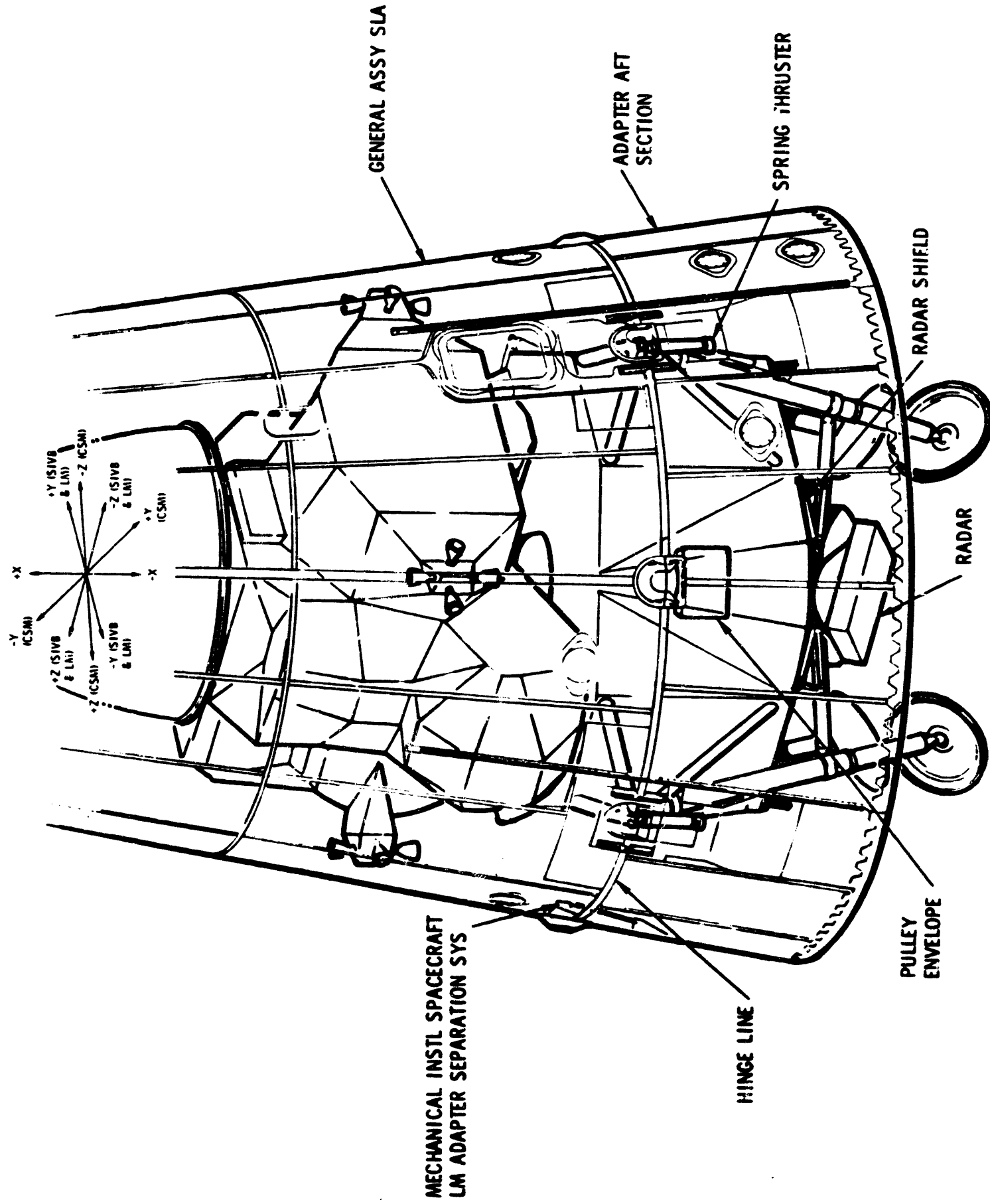
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LM SEPARATION SYSTEM

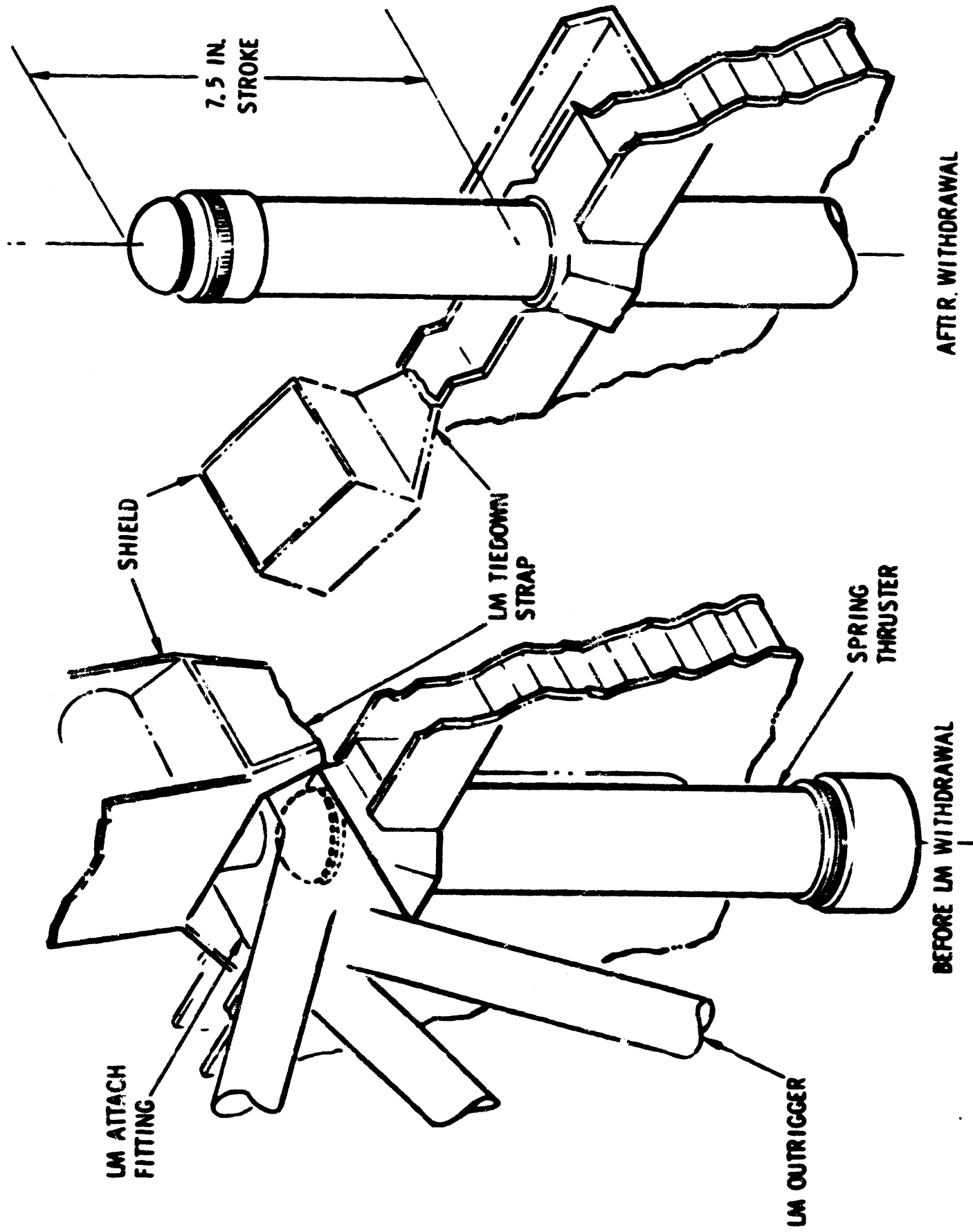
BLOCK II



LM-SLA INSTALLATION



LM WITHDRAWAL SYSTEM



LIST OF ABBREVIATIONS

BPC	-	BOOST PROTECTIVE COVER
CDP	-	CONFINED DETONATING FUSE
CG	-	CENTER OF GRAVITY
CM	-	COMMAND MODULE
CSM	-	COMMAND SERVICE MODULE
EC	-	ENVIRONMENTAL CONTROL SYSTEM
ELS	-	EARTH LANDING SUBSYSTEM
EPS	-	ELECTRICAL POWER SUBSYSTEM
FC	-	FUEL CELL
FHS	-	FORWARD HEAT SHIELD
FLSC	-	FLEXIBLE LINEAR SHAPED CHARGE
LEA	-	LAUNCH ESCAPE ASSEMBLY
LEB	-	LOWER EQUIPMENT BAY
LES	-	LAUNCH ESCAPE SUBSYSTEM
LET	-	LAUNCH ESCAPE TOWER
LHEB	-	LEFT HAND EQUIPMENT BAY
LM	-	LUNAR MODULE
LSC	-	LINEAR SHAPED CHARGE
LV	-	LAUNCH VEHICLE
MAXQ	-	MAXIMUM DYNAMIC PRESSURE
MDC	-	MAIN DISPLAY CONSOLE
MDF	-	MILD DETONATING FUSE
ML	-	MOLD LINE
RCS	-	REACTION CONTROL SUBSYSTEM
SC	-	SPACECRAFT
SCT	-	SCANNING TELESCOPE (G&N)
SECS	-	SEQUENTIAL EVENTS CONTROL SUBSYSTEM
SLA	-	SPACECRAFT LM ADAPTER
SM	-	SERVICE MODULE
SPS	-	SERVICE PROPULSION SUBSYSTEM
SXT	-	SECTANT (G&N)

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