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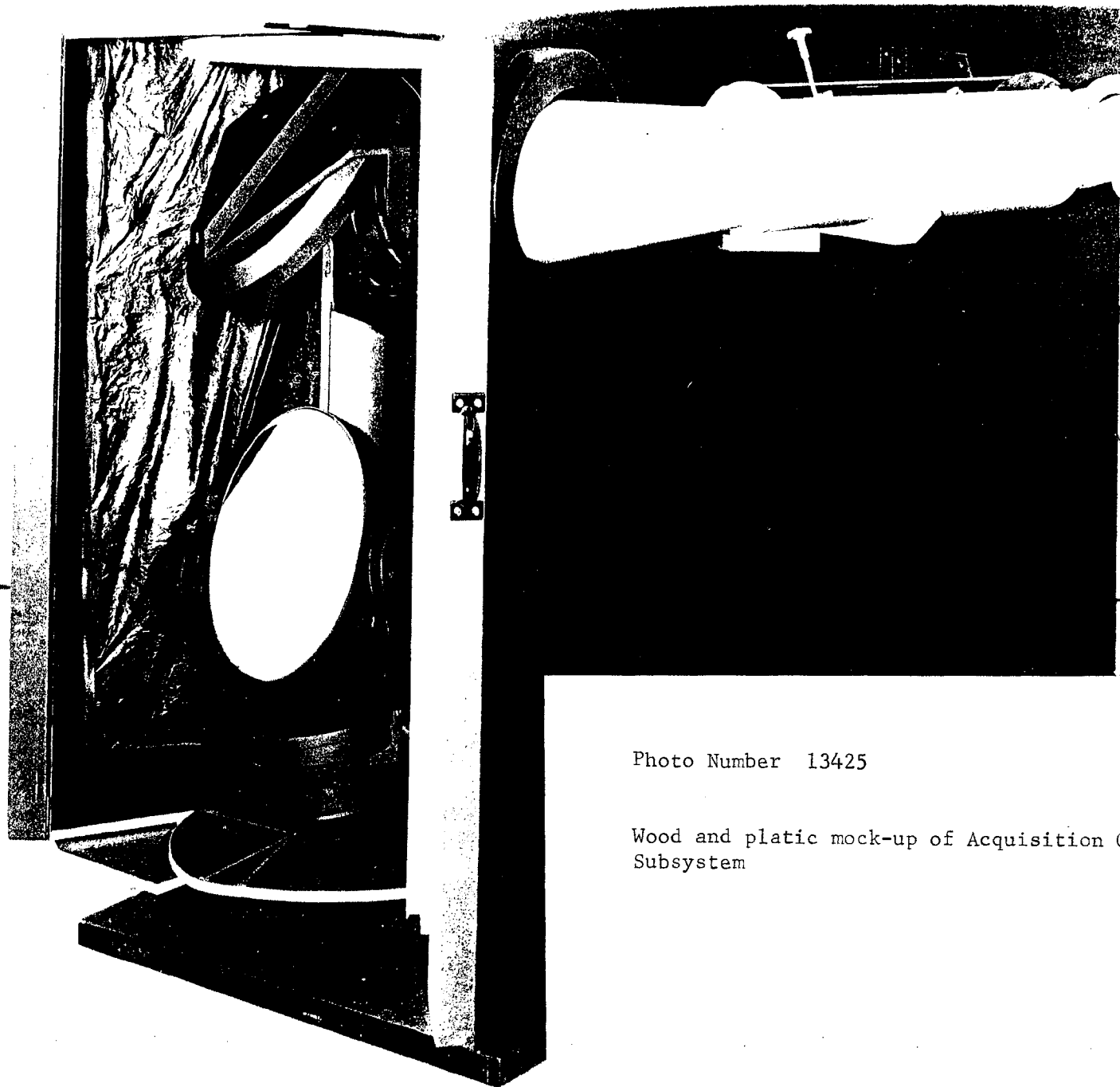
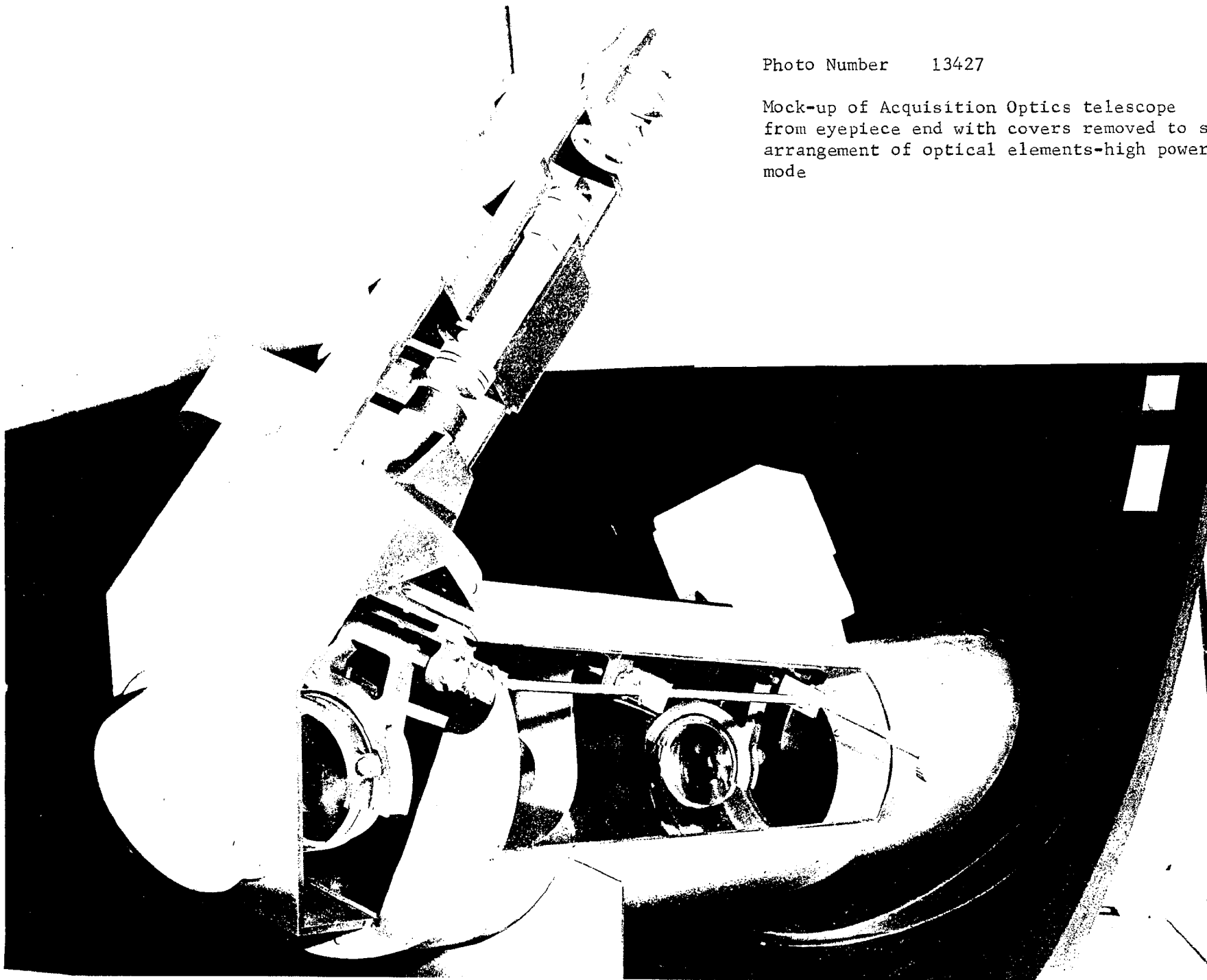


Photo Number 13425

Wood and plastic mock-up of Acquisition Optics
Subsystem

Photo Number 13427

Mock-up of Acquisition Optics telescope
from eyepiece end with covers removed to show
arrangement of optical elements-high power
mode



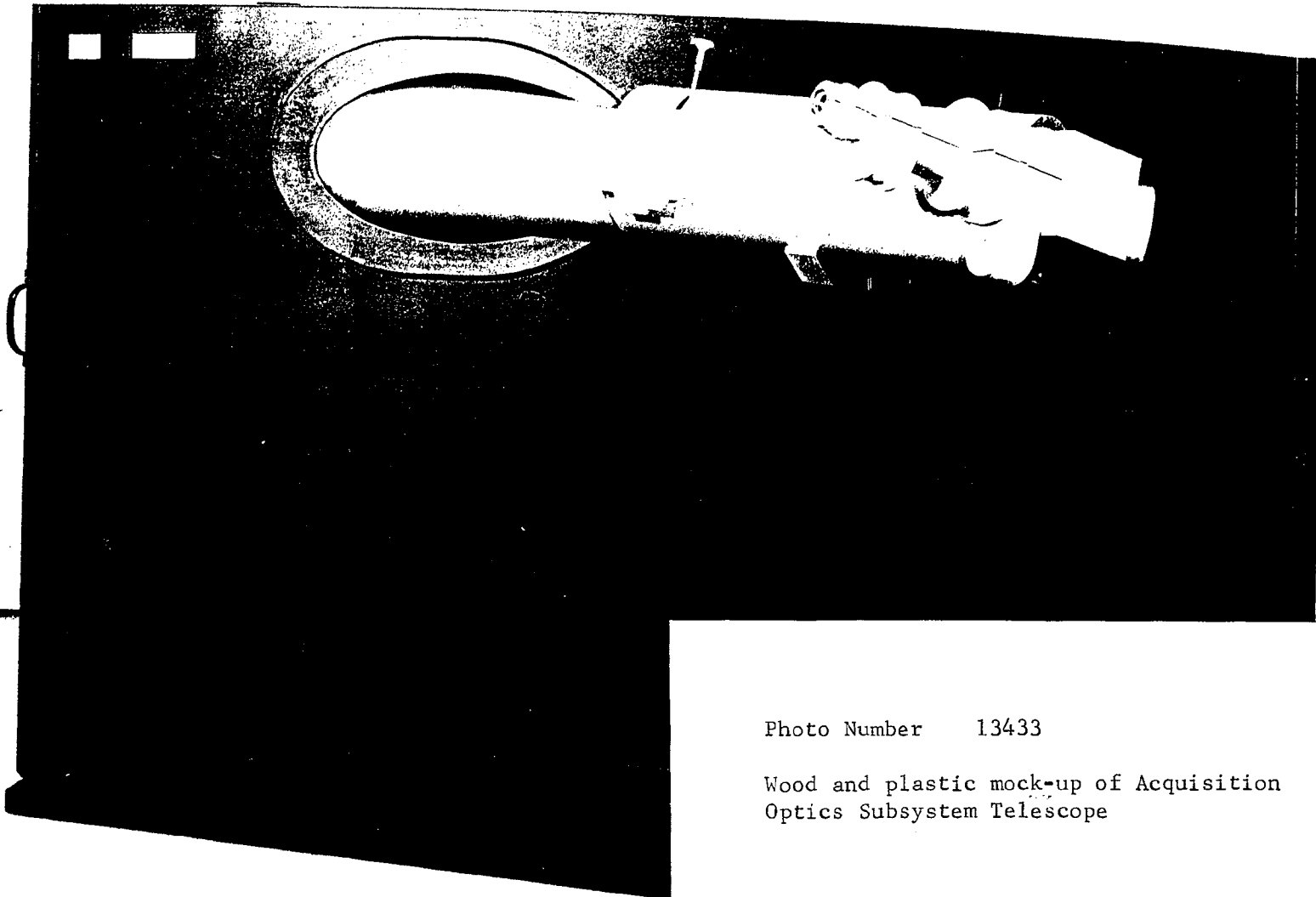


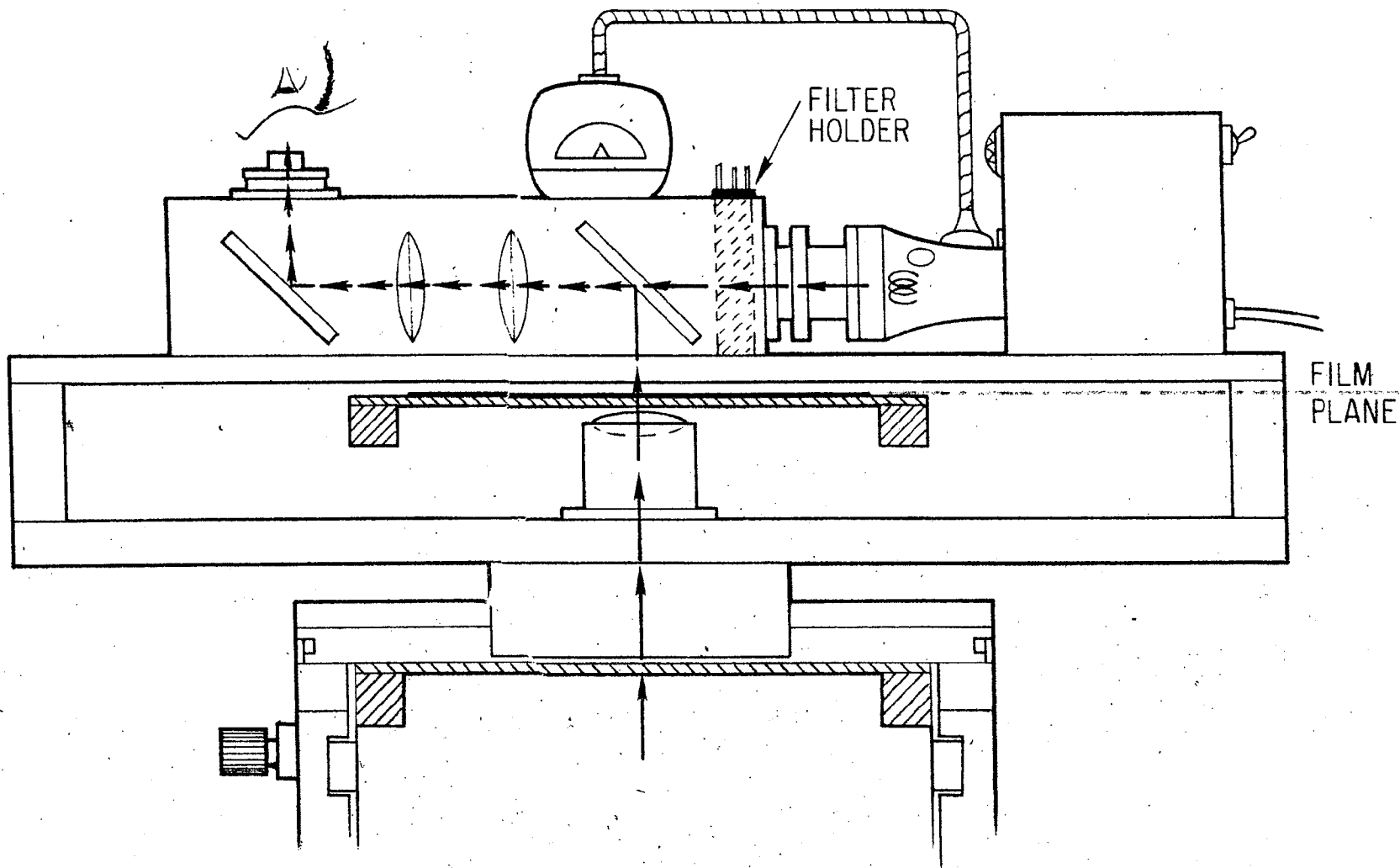
Photo Number 13433

Wood and plastic mock-up of Acquisition
Optics Subsystem Telescope

~~SECRET~~
SPECIAL HANDLING

32

TRACKING TELESCOPE SIMULATOR

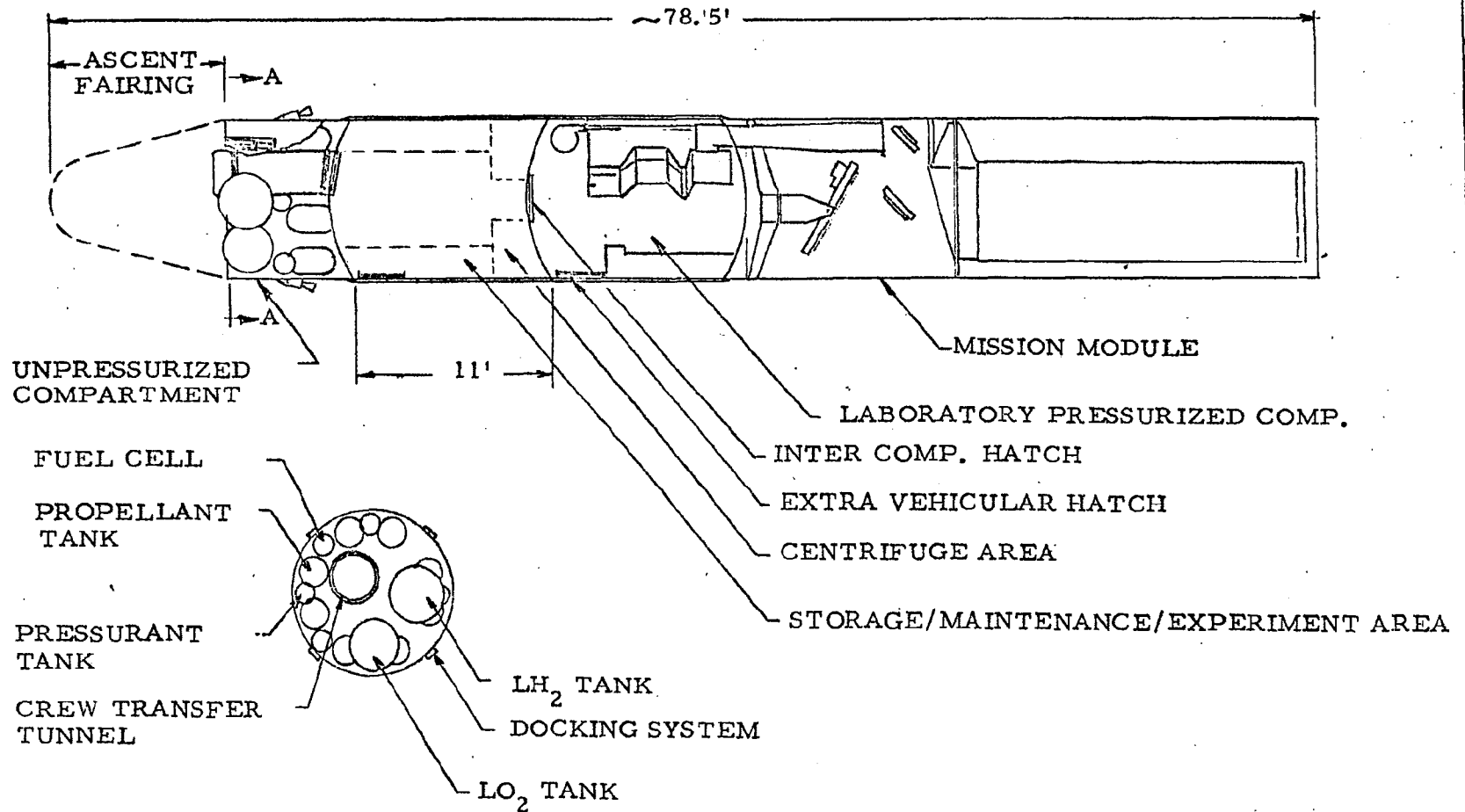


SPECIAL HANDLING
~~SECRET~~

"D" ~~SECRET~~ SPECIAL HANDLING

FIGURE 1

RENDEZVOUS INITIAL VEHICLE CONFIGURATION
(DUAL COMPARTMENT LABORATORY)

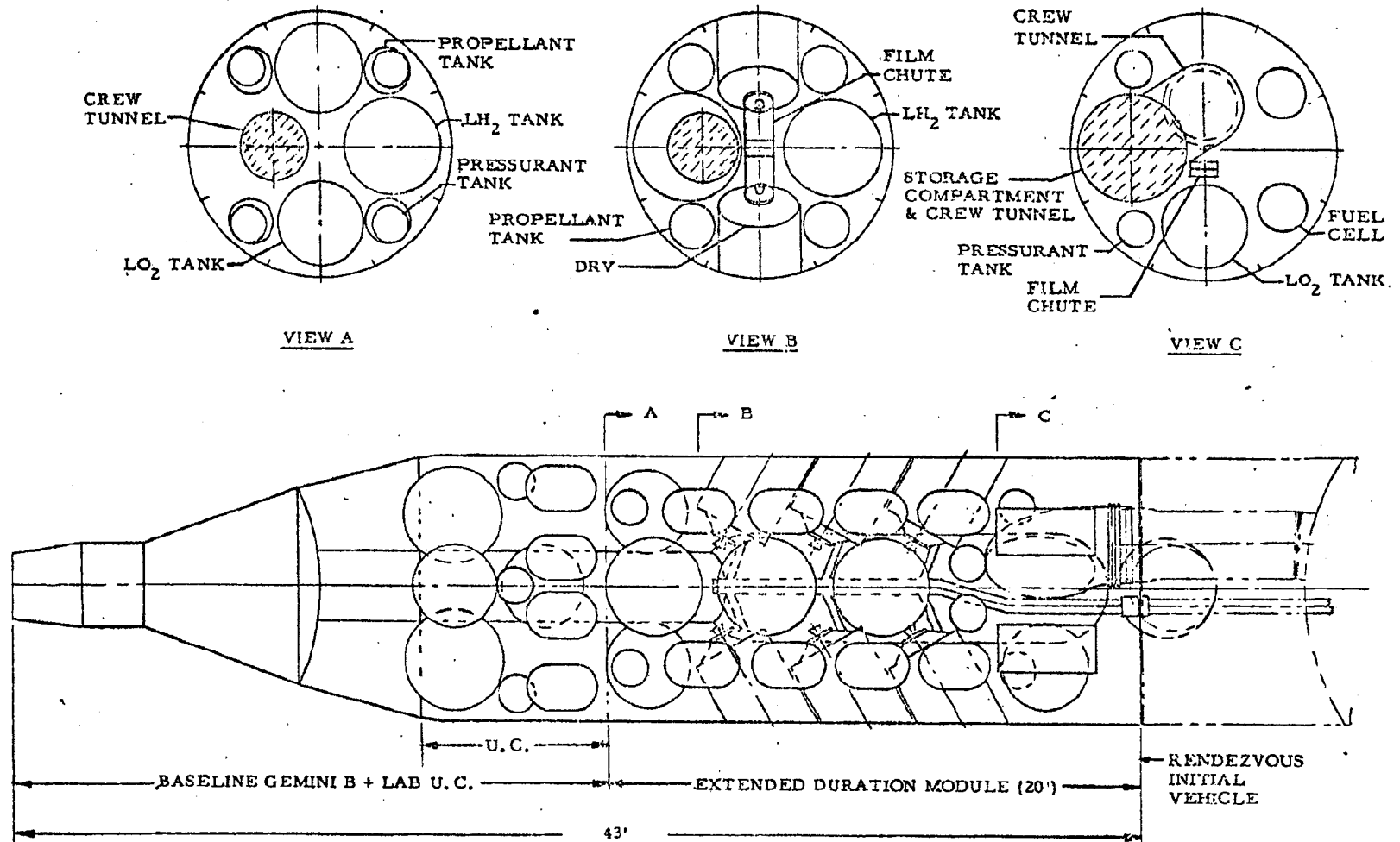


"D" ~~SECRET~~ SPECIAL HANDLING

~~"D" SECRET SPECIAL HANDLING~~

FIGURE 2

RENDEZVOUS/RESUPPLY VEHICLE - "VERTICAL" DRV ARRANGEMENT



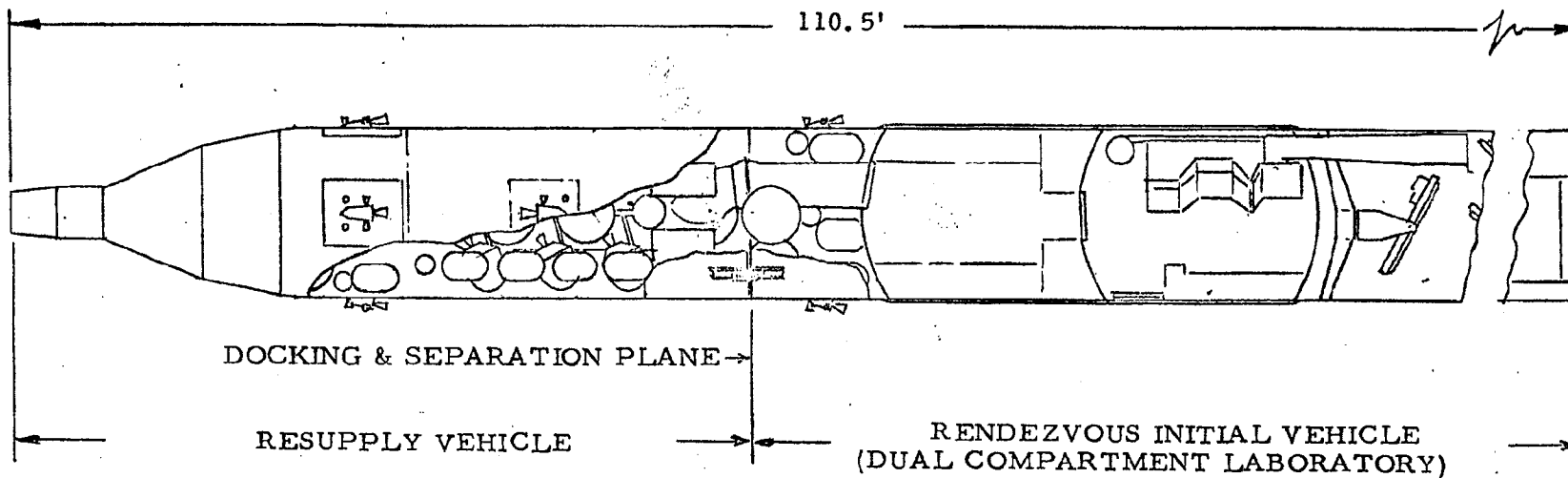
~~"D" SECRET SPECIAL HANDLING~~

~~"D" SECRET SPECIAL HANDLING~~

FIGURE 3

RENDEZVOUS ORBITING VEHICLE FUNCTIONS

(NOMINAL 60 DAY RESUPPLY CYCLE)



RRV FUNCTIONS

- CREW TRANSPORT VEHICLE
- ACTS PROPULSION
- PRIME POWER SYSTEM
- LIFE SUPPORT EXPENDABLES
- DATA RETURN SYSTEM
- SUBSYSTEM SPARES/REPLACEMENTS

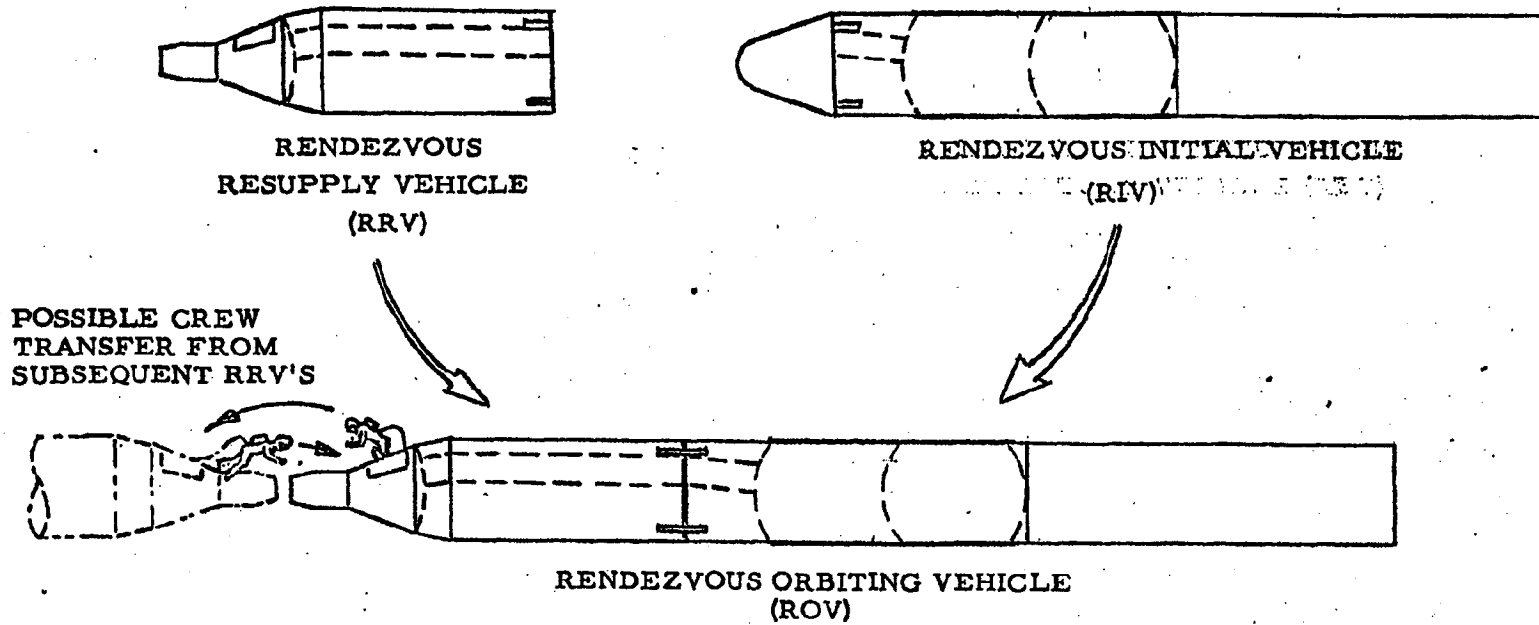
RIV FUNCTIONS

- LIFE SUPPORT SYSTEM
- ATTITUDE CONTROL REFERENCE/ELECTRONICS
- COMMUNICATIONS AND DATA HANDLING
- ENVIRONMENTAL CONTROL
- HRO SYSTEM

~~"D" SECRET SPECIAL HANDLING~~

FIGURE 6
2 MAN DUAL COMPARTMENT LABORATORY CONFIGURATION

(COMBINED MISSION)



RRV FUNCTIONS

- CREW TRANSPORT VEHICLE
- ACTS PROPULSION
- PRIME POWER
- LIFE SUPPORT EXPENDABLES
- DATA RETURN SYSTEM
- SUBSYSTEM SPARES/REPLACEMENTS

RIV FUNCTIONS

- LIFE SUPPORT SYSTEM
- ATTITUDE CONTROL REF. ELECTRONICS
- COMMUNICATIONS AND DATA HANDLING
- ENVIRONMENTAL CONTROL
- PERFORMANCE DATA

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SPECIAL HANDLING

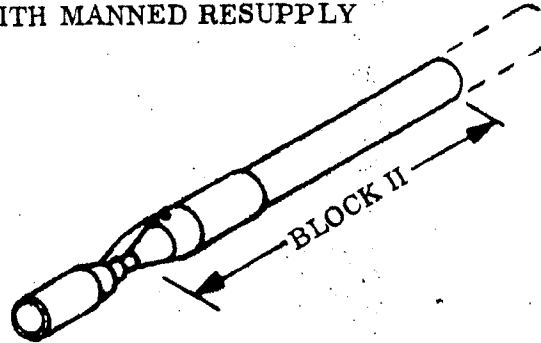
SECRET
SPECIAL HANDLING

HANDLE VIA BYEMAN SYSTEM ONLY

~~SECRET/DORIAN~~

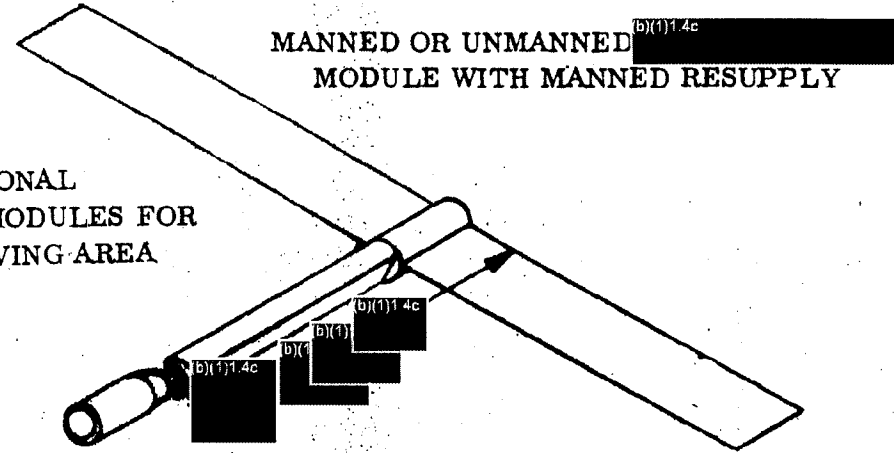
OPTIONS FOR RECON MISSION MODULES

MANNED OR UNMANNED
DORIAN MISSION MODULE
WITH MANNED RESUPPLY

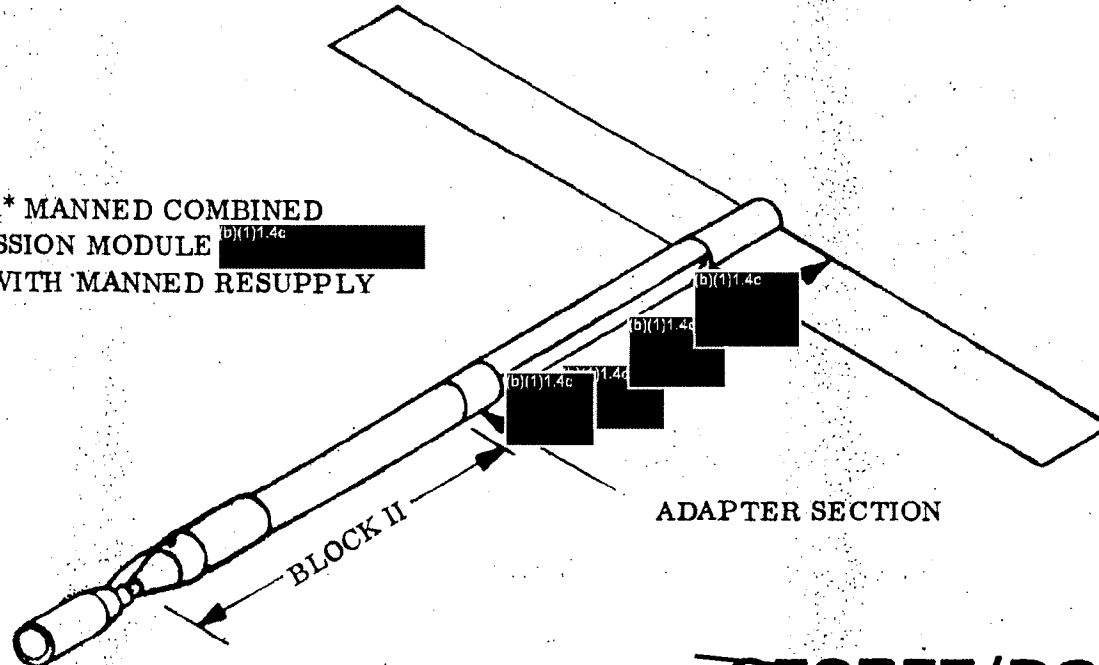


OPTIONAL
RESUPPLY MODULES FOR
ADDED LIVING AREA

MANNED OR UNMANNED
MODULE WITH MANNED RESUPPLY



* MANNED COMBINED
MISSION MODULE
WITH MANNED RESUPPLY



ADAPTER SECTION

*CAN ADD NUCLEAR POWER MODULE OR OPTICAL SEARCH MODULE

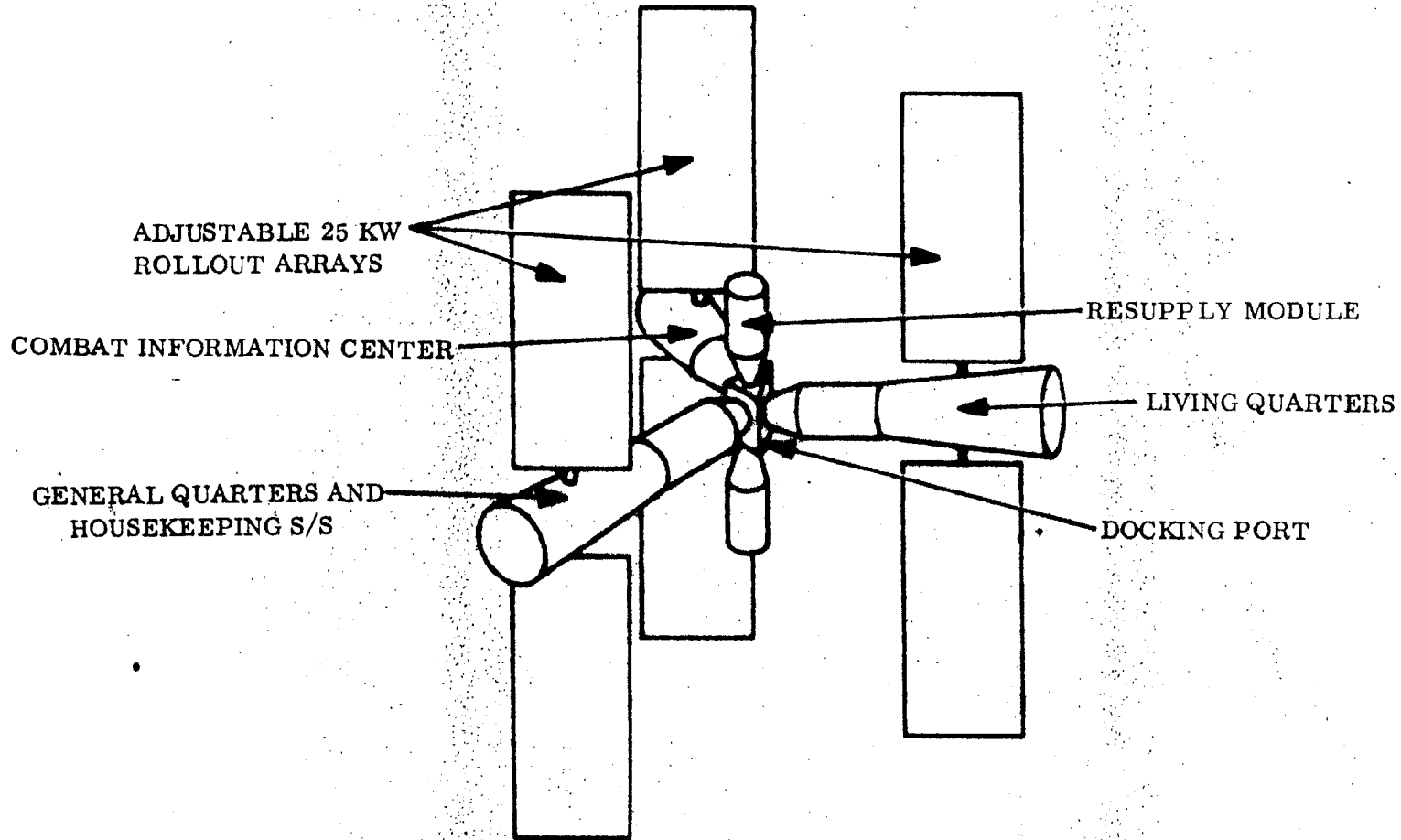
~~SECRET/DORIAN~~

HANDLE VIA BYEMAN SYSTEM ONLY

HANDLE VIA BYEMAN SYSTEM ONLY

~~SECRET/DORIAN~~

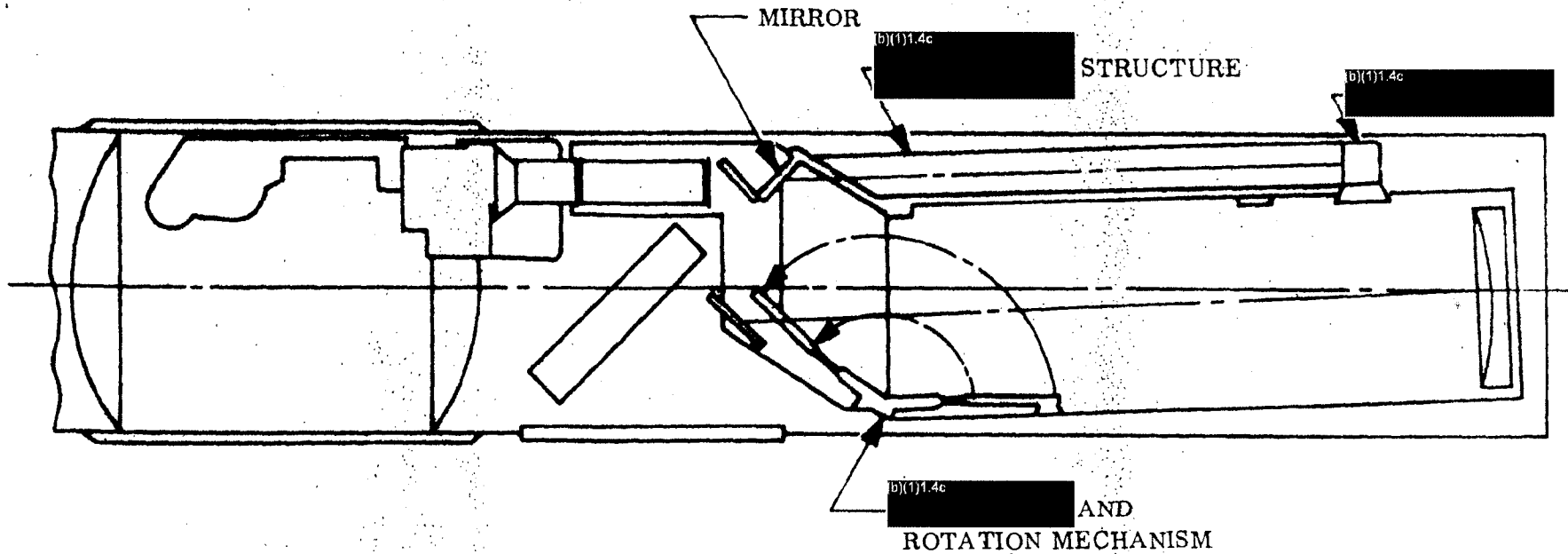
SYNCHRONOUS ALTITUDE
COMMAND POST



~~SECRET/DORIAN~~
HANDLE VIA BYEMAN SYSTEM ONLY

HANDLE VIA BYEMAN SYSTEM ONLY

~~SECRET/DORIAN~~



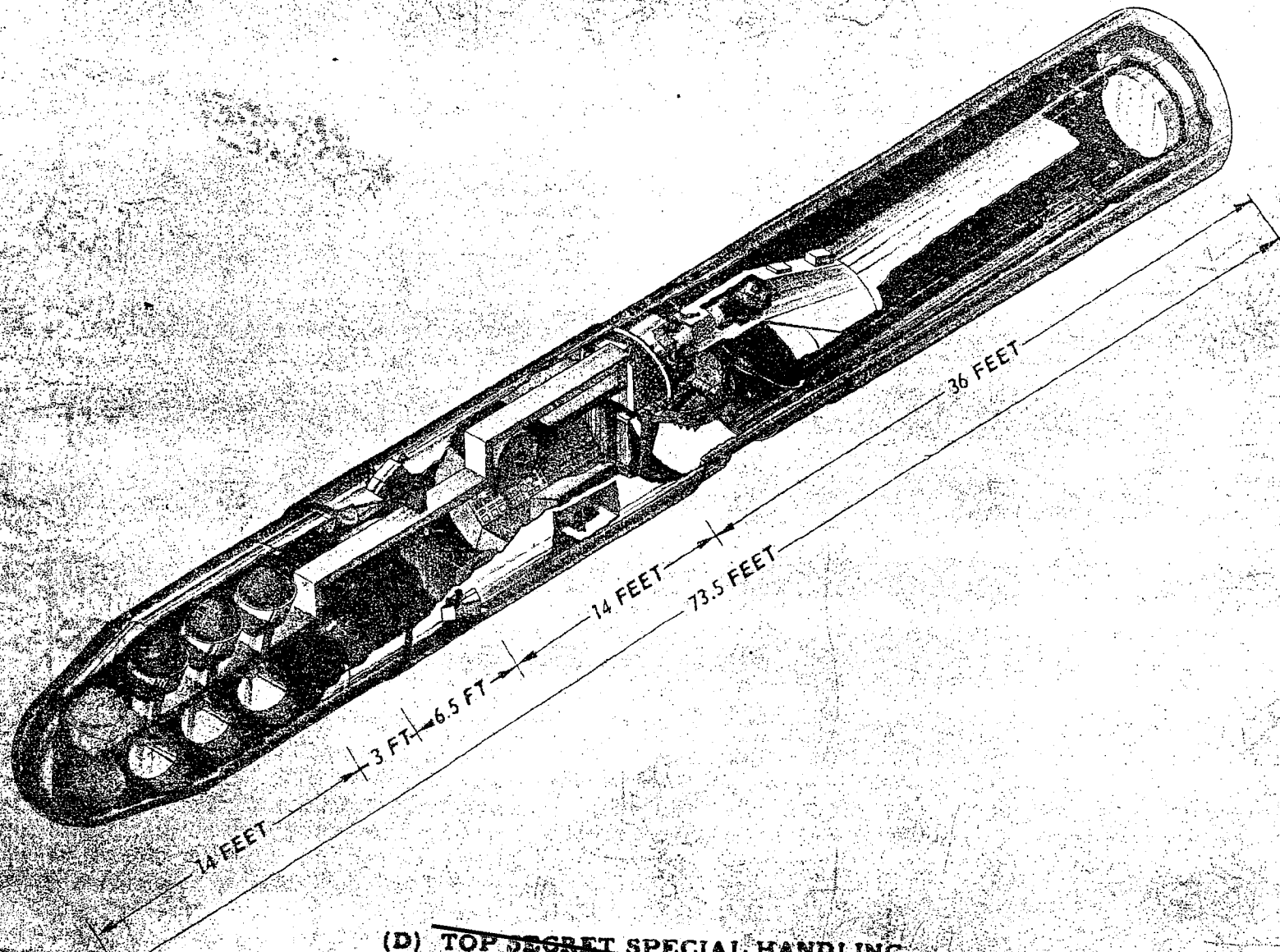
- (b)(1)1.4c
- (b)(1)1.4c

MOL (b)(1)1.4c MODIFICATION

~~SECRET/DORIAN~~
HANDLE VIA BYEMAN SYSTEM ONLY

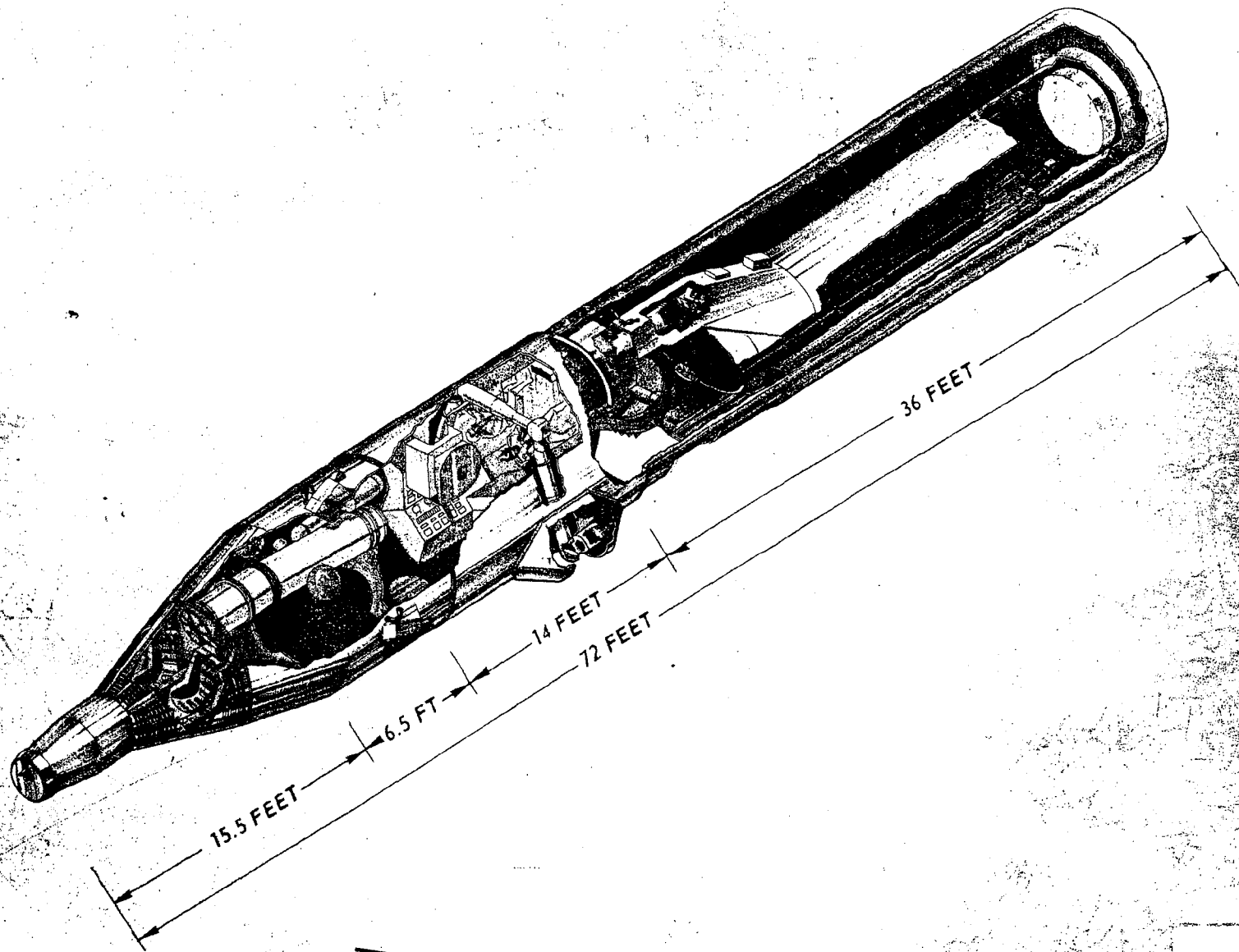
(D) TOP SECRET SPECIAL HANDLING

BASELINE MOL UNMANNED MODE



(D) TOP SECRET SPECIAL HANDLING

(D) ~~TOP SECRET~~ SPECIAL HANDLING
BASELINE MOL MANNED MODE

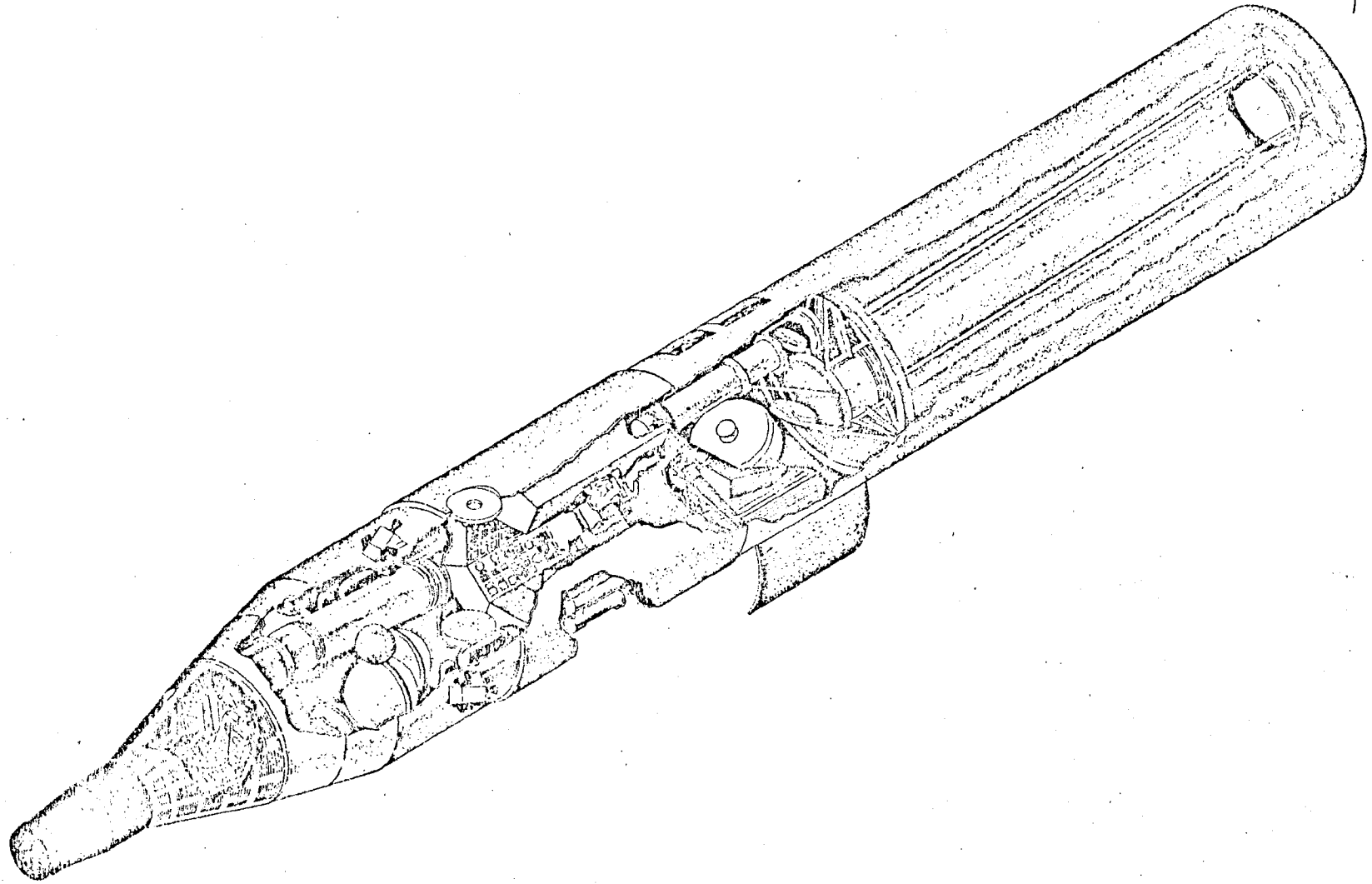


(D) ~~TOP SECRET~~ SPECIAL HANDLING

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473

~~SECRET SPECIAL HANDLING~~

~~SECRET~~
WHS-154
pg 3

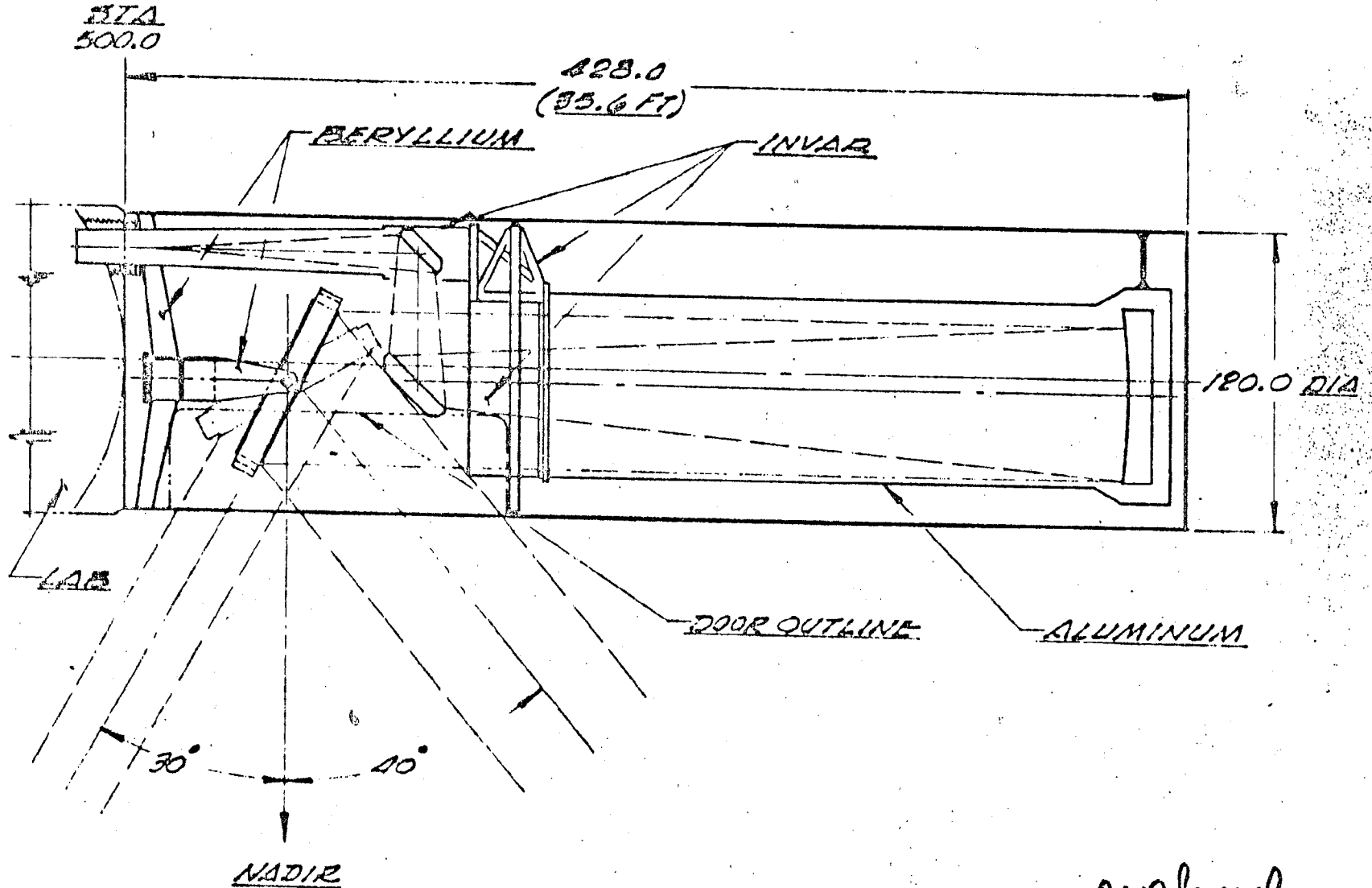


~~SECRET SPECIAL HANDLING~~

~~SECRET/SPECIAL HANDLING~~

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p94

MISSION MODULE



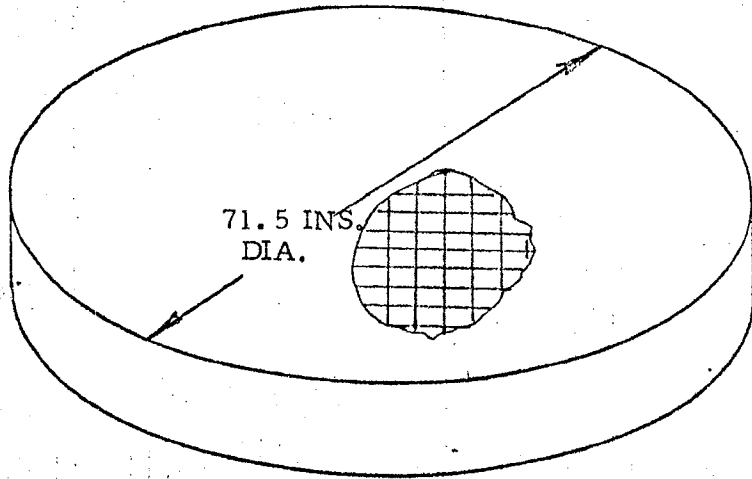
replaced
w/ color chart

~~SECRET/SPECIAL HANDLING~~

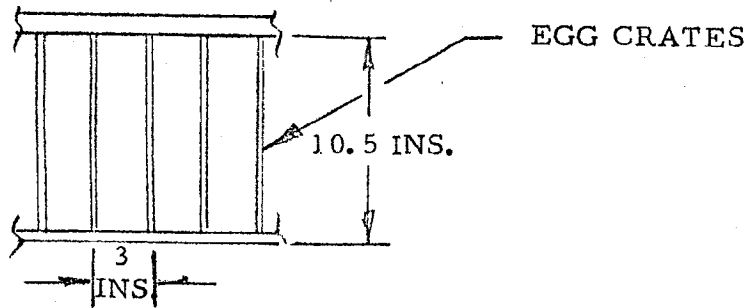
~~SECRET~~ - SPECIAL HANDLING

WHS-184
p9.6

MIRROR TECHNOLOGY



- PRIMARY AND TRACKING MIRRORS
- "EGG-CRATE" CONSTRUCTION
- MATERIAL - FUSED SILICA
- WEIGHT - 1020 LBS. EACH
- THICKNESS -
 - FACE PLATE 0.9 INS.
 - BACK PLATE 0.5 INS.
 - CORE 0.22 INS.
- OPTICAL TOLERANCE -
1/10 WAVE LENGTH



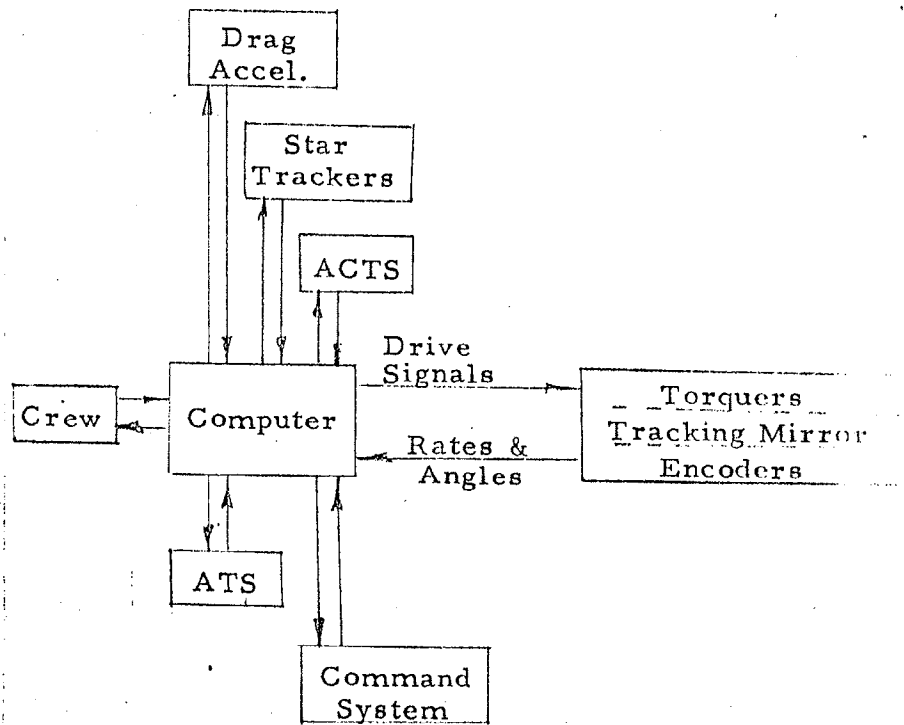
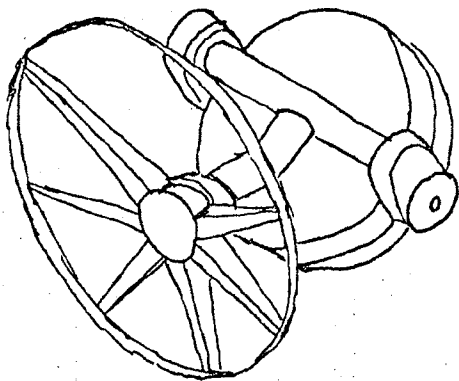
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ST-1059

~~SECRET~~ SPECIAL HANDLING

WJHS-184
p47

TRACKING MIRROR GIMBAL SYSTEM



ACTS - ATTITUDE CONTROL/TRANSLATION SYSTEM

ATS - ACQUISITION & TRACKING SCOPE

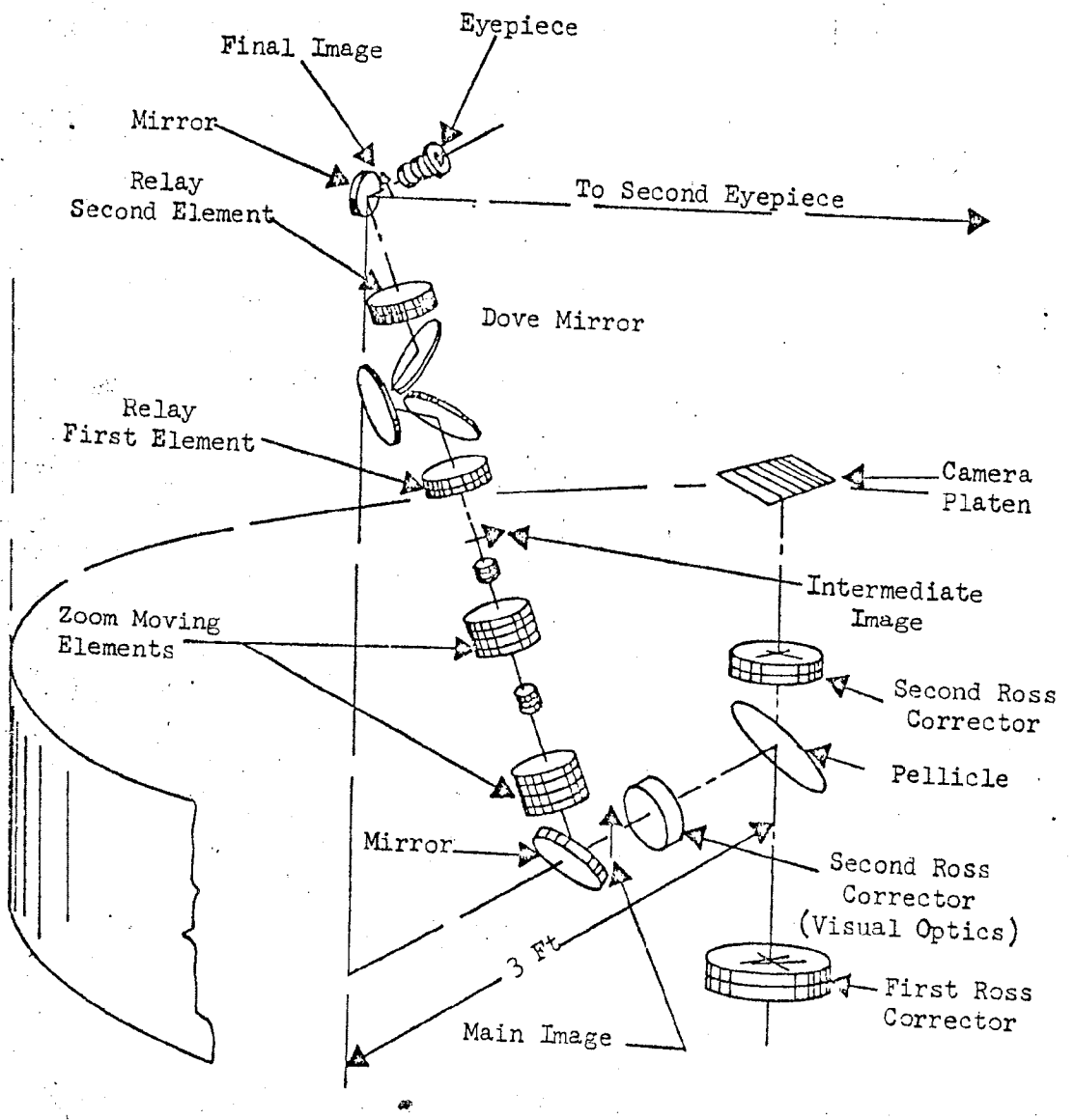
BLOCK DIAGRAM

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~~SECRET - SPECIAL HANDLING~~

WHS-184
pg 8

DIRECT VIEWING AND TRACKING SYSTEM



CHARACTERISTICS

FIELD OF VIEW - 40°

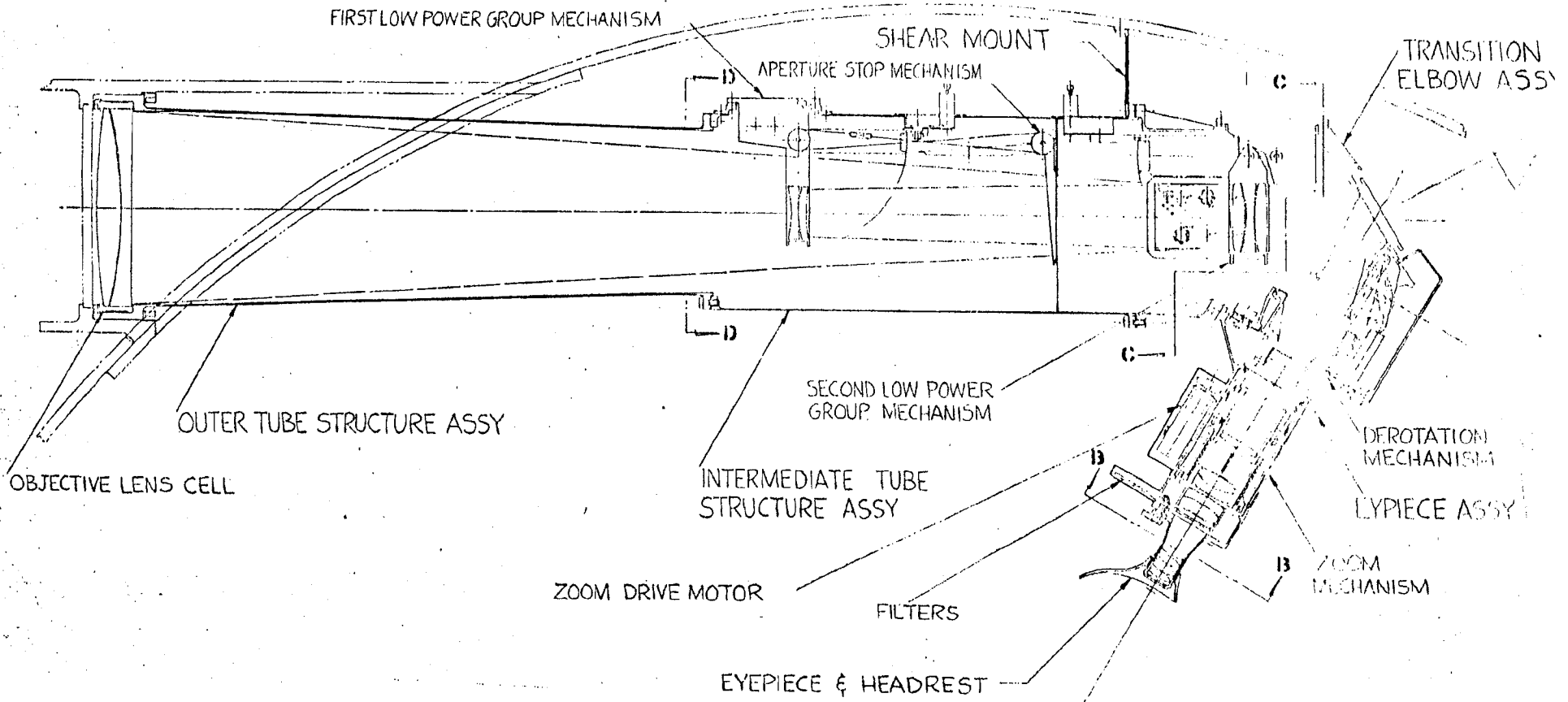
ZOOM RANGE - 100X to 1000X

GROUND RESOLUTION - 4'

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WHY-184
p99

ACQUISITION AND TRACKING SCOPE



CHARACTERISTICS:

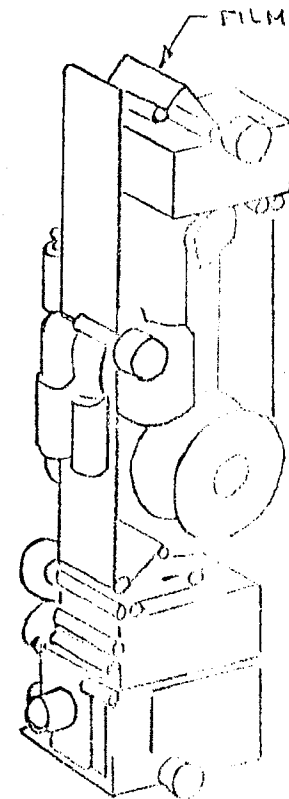
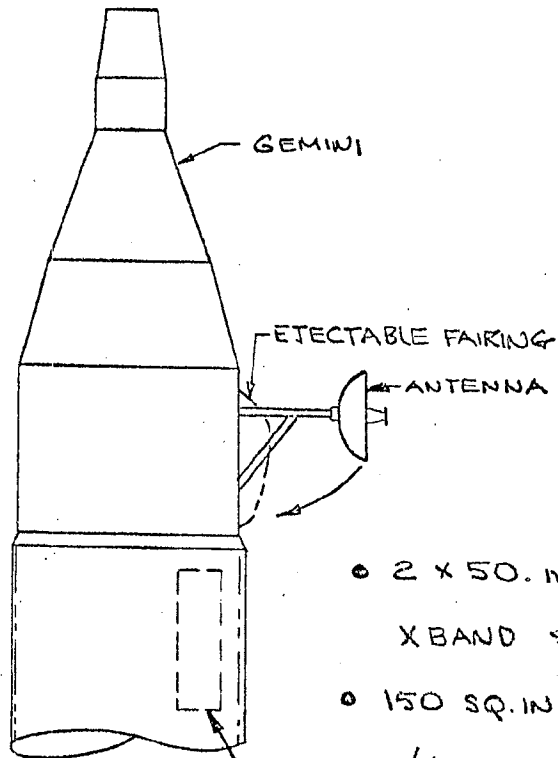
APERTURE 8" - 10"
ZOOM RANGE 60X - 120X
FOV 15X - 4°
120X - 0.5°

MAX. GROUND RESOLUTION ~ 3'
WEIGHT ~ 500 LB
PEAK POWER ~ 500W

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pg 10

WIDE BAND READOUT



- 2 x 50. mhz VIDEO CHANNELS
- X BAND STEERABLE ANTENNA - 3 FT. DISH
- 150 SQ. IN. / MIN. FILM READOUT
(6 IN. SCAN WIDTH)
- SINGLE ZI GROUND STATION
- WEIGHT ≈ 500 LBS
- PEAK POWER ~ 630 W

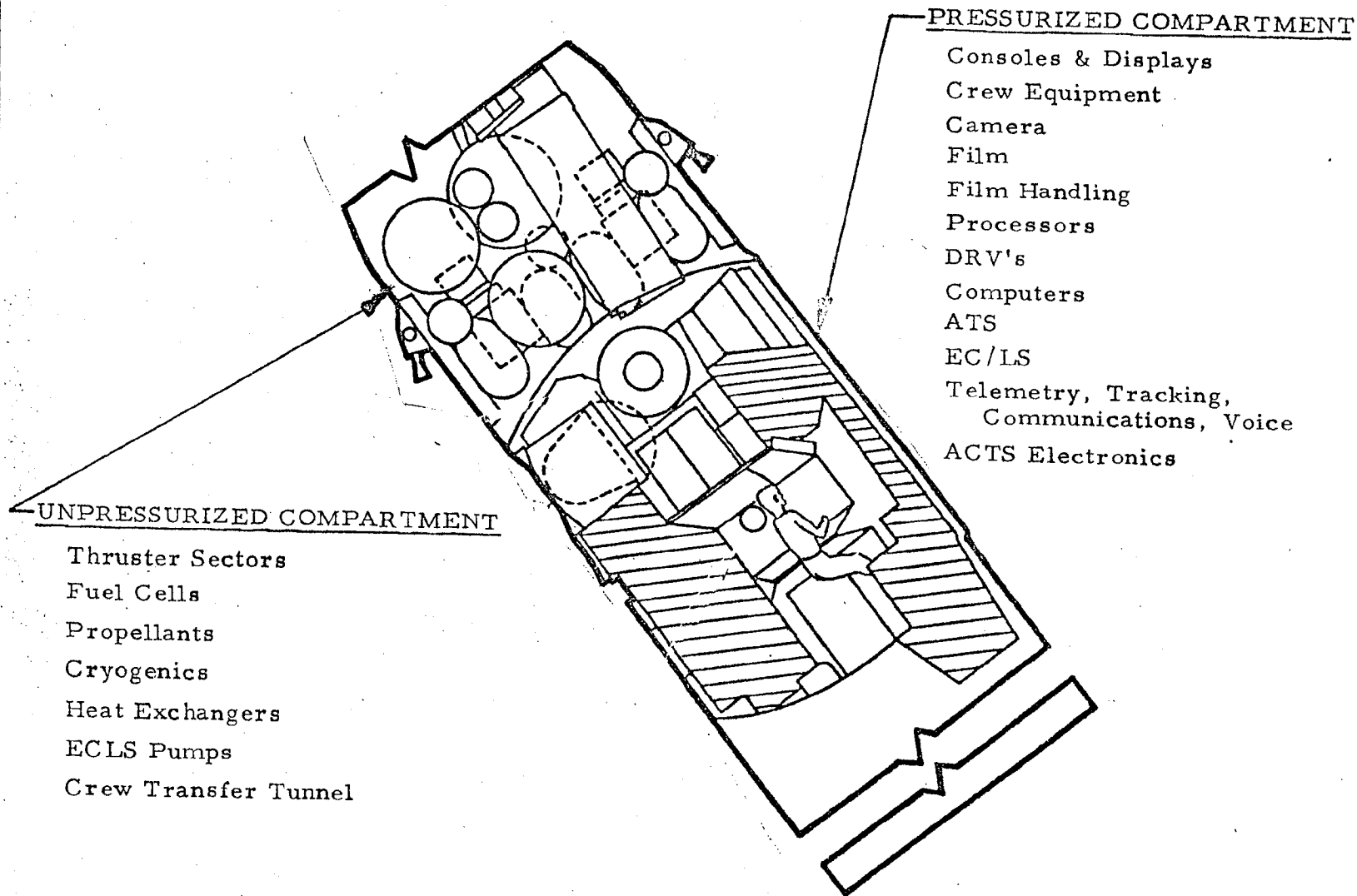
WIDE BAND ANALOG
READOUT

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~~SECRET~~ SPECIAL HANDLING

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pg 12

LABORATORY VEHICLE ARRANGEMENT



~~SECRET~~ SPECIAL HANDLING

WHS-184
p9 13

REF-65 Y21479-RTH

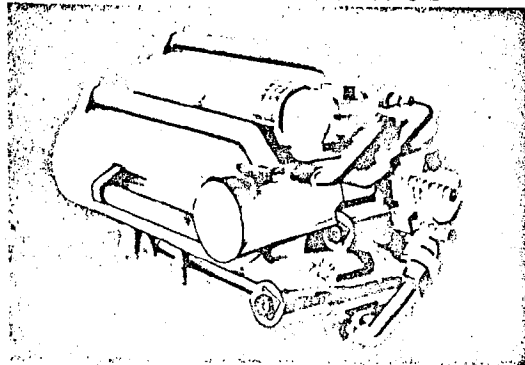


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ENVIRONMENTAL CONTROL AND LIFE SUPPORT BASELINE LABORATORY VEHICLE

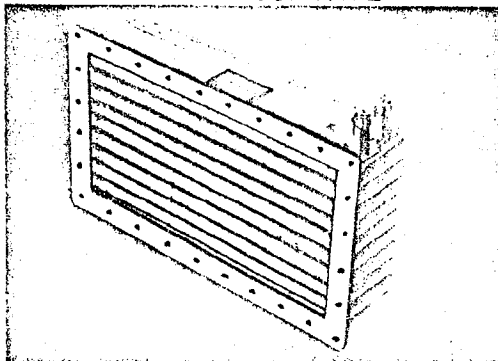


ATMOSPHERE CONTROL



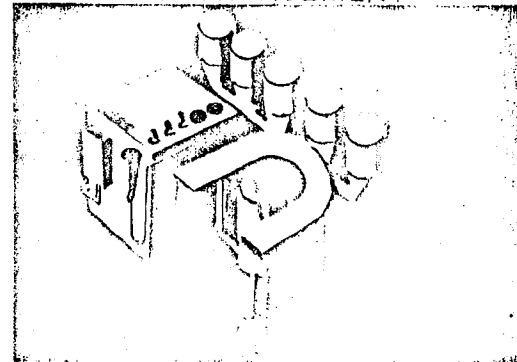
- DUAL GAS ATMOSPHERE, O₂ BACK-UP
- 5 PSIA O₂/He, "SHIRTSLEEVE"
- SUPERCRITICAL O₂ STORAGE
- MOLECULAR SIEVE FOR CO₂ CONTROL
- 5 MINUTE COMPARTMENT REPRESSURIZATION
- OPEN SUIT LOOP FOR EMERGENCY

THERMAL CONTROL



- HEAT EXCHANGERS & COOLPLATES
- INNER WALL HEATING
- SPACE RADIATOR

WASTE MANAGEMENT



- COLLECT METABOLIC WASTES
- PROCESS & STORE WASTE MATTER
- VACUUM DEBRIS COLLECTION

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DECLASSIFIED AFTER 10 YEARS
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AEROSPACE CORPORATION



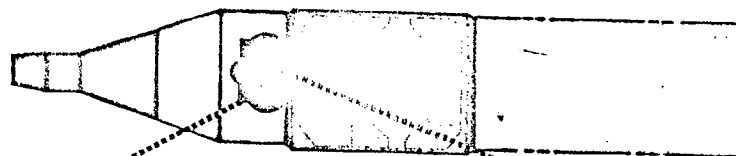
WHS-184
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REF-65- Y21481-R-11

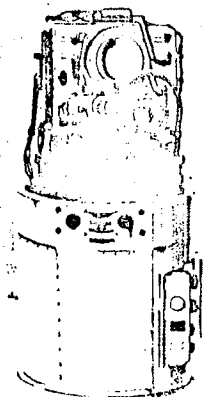
MOL

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ELECTRICAL POWER SYSTEM BASELINE LAB VEHICLE



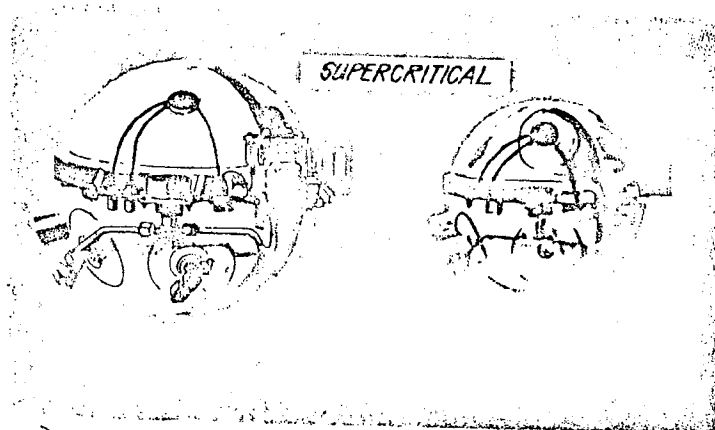
FUEL CELL



APOLLO TYPE

- ① THREE 1,000 HR. FUEL CELL MODULES
- ② 2.0 KW AVERAGE POWER
- ③ 4.5 KW PEAK POWER

CRYOGENIC STORAGE



- ④ TWO H₂ AND TWO O₂ TANKS
- ⑤ 30 DAY CAPACITY

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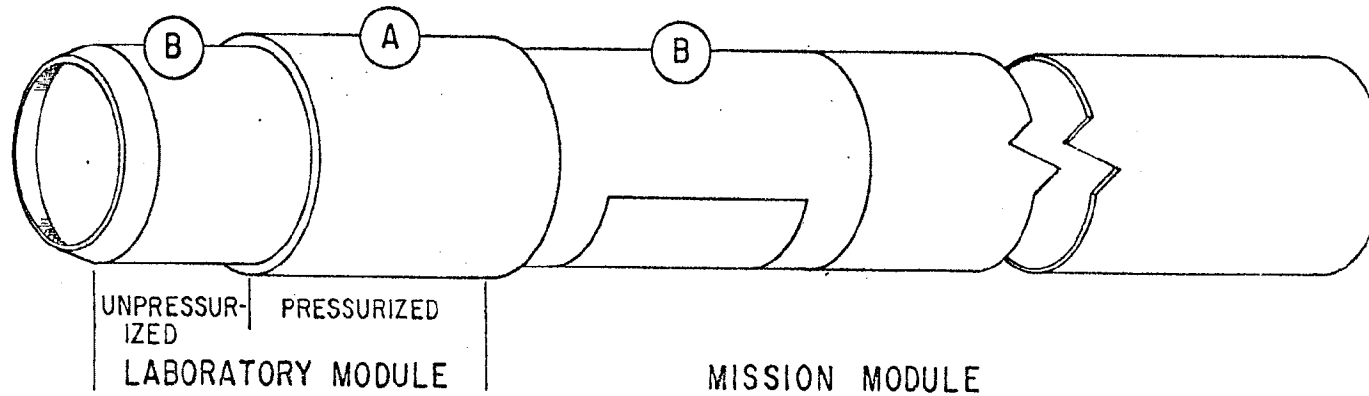
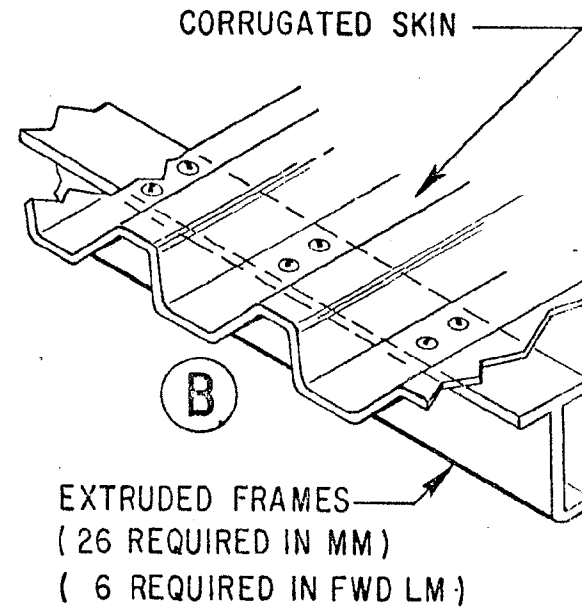
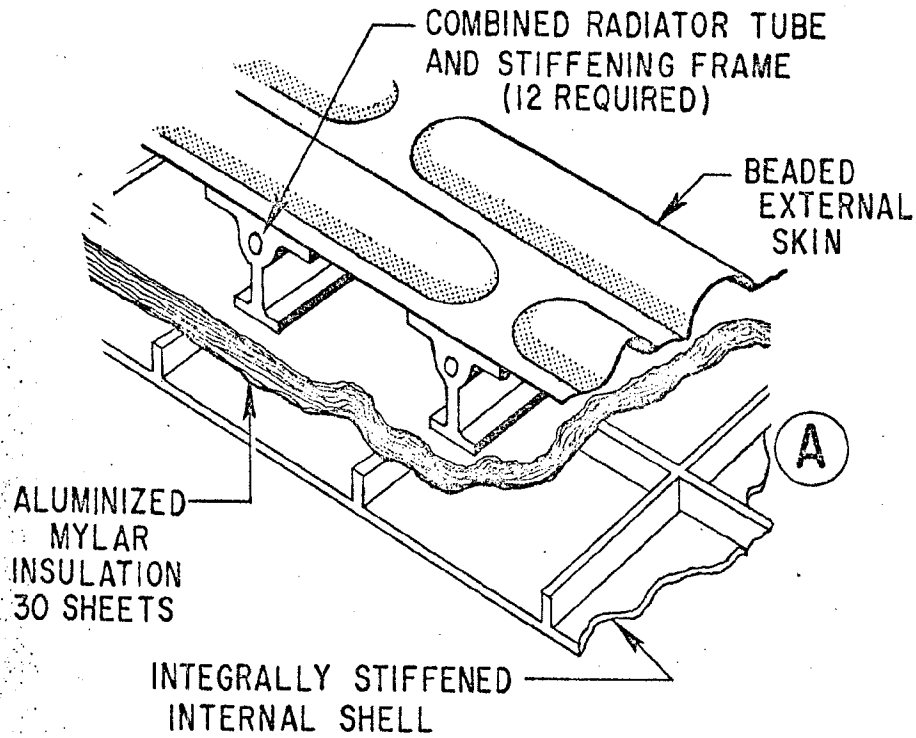
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EXCEPTED AFTER 12 YEARS
DOD DIR 5700.10

AEROSPACE CORPORATION



STRUCTURAL ARRANGEMENT

WHS-184
p9 15



WHS-184
Pg 16

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MOD

~~SECRET~~

REF ID: A65000-0174025

COMMUNICATIONS / DATA HANDLING

BASELINE LAB VEHICLE



SGLS

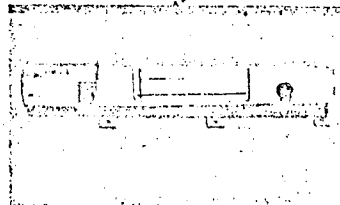
- TRACKING - R, R, A
- TELEMETRY

REAL TIME - 64 KBPS
STORED - 1024 KBPS

- COMMAND - 1 KBPS

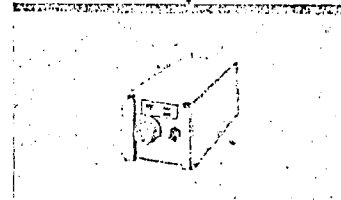
REAL-TIME
STORED DATA

- VOICE - DUPLEX



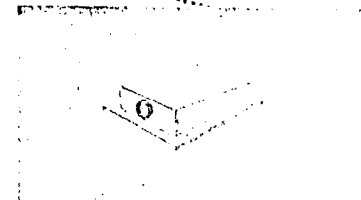
WIDEBAND DATA

- 20 MBPS



BACK-UP TELEMETRY

- STATUS DATA



BACK-UP COMMAND

- 1 KBPS

SECURITY

CONDITION / MULTIPLEX / RECORD
MONITOR / ALARM
TIMING

TELEPRINTER

DISPLAYS

THIS DOCUMENT CONTAINS INFORMATION RELATING TO NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18 U.S.C. SECTION 793 AND THE PROHIBITIONS ON THE DISCLOSURE OF ALL CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON AS Prescribed by Law

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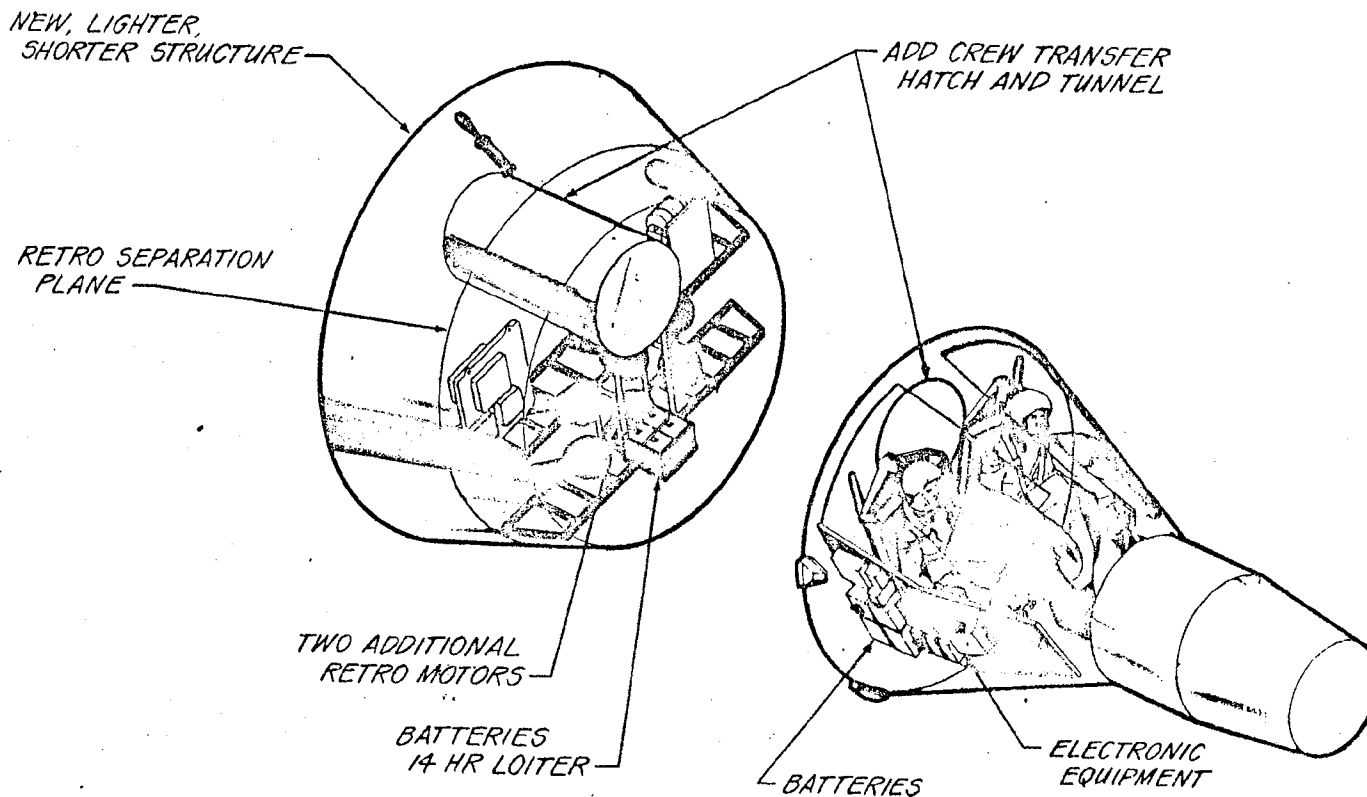


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pg 17

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MOL

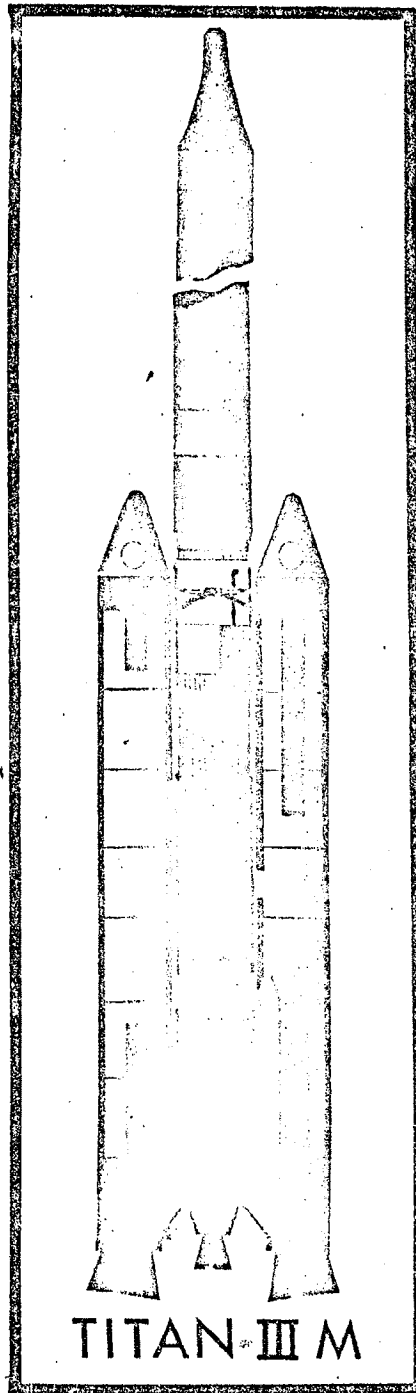
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W145-184
Pg 18

TITAN IIIM DESCRIPTION

MAJOR FEATURES

- PERFORMANCE
32,800 LBS @ 80°-80/130 N. MI.
- TOTAL THRUST AT LIFTOFF - 3 MILLION POUNDS
- 7 - SEGMENT SOLIDS
- CORE - 2 STAGES
NO TRANSTAGE
STAGE 1 ENGINES - 15:1 NOZZLE EXPANSION RATIO
- REDUNDANT FLIGHT CONTROL SYSTEM
- BOOSTER INERTIAL GUIDANCE SYSTEM DURING ASCENT
(BIGS)
- GEMINI INERTIAL GUIDANCE SYSTEM BACKUP
(GIGS)

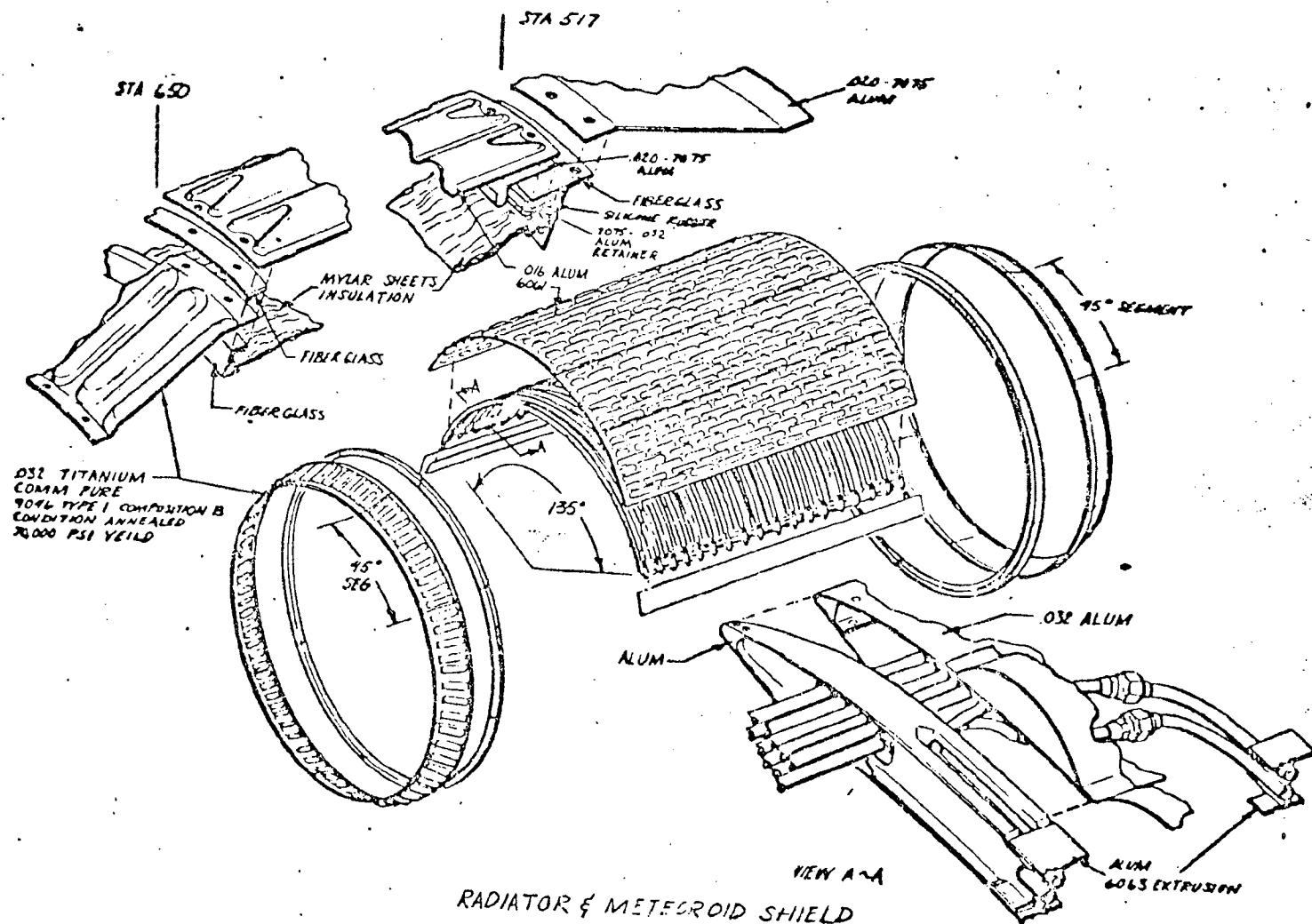
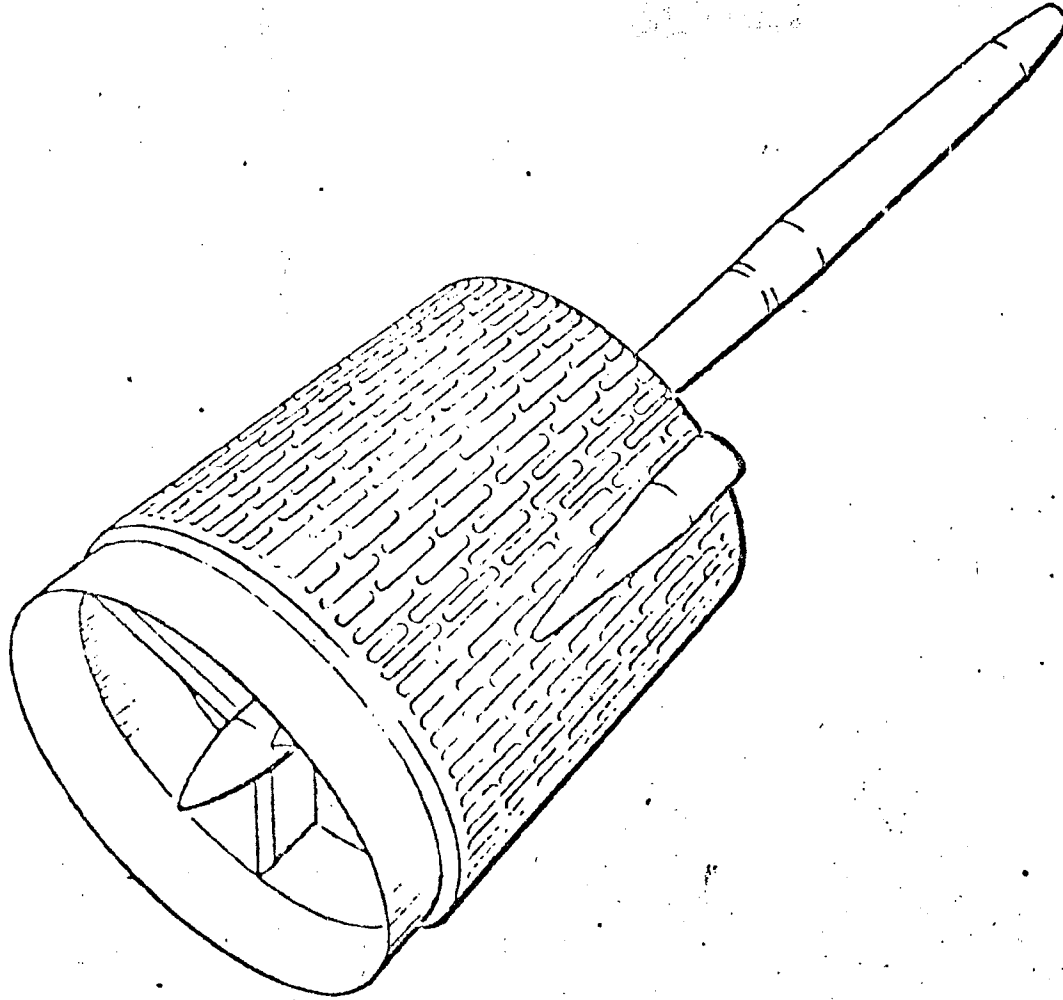


Figure 1

2-20



1A35 FLUTTER TEST SPECIMEN

Figure 2

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Systems Applications Office
4-2-66

WHS-005

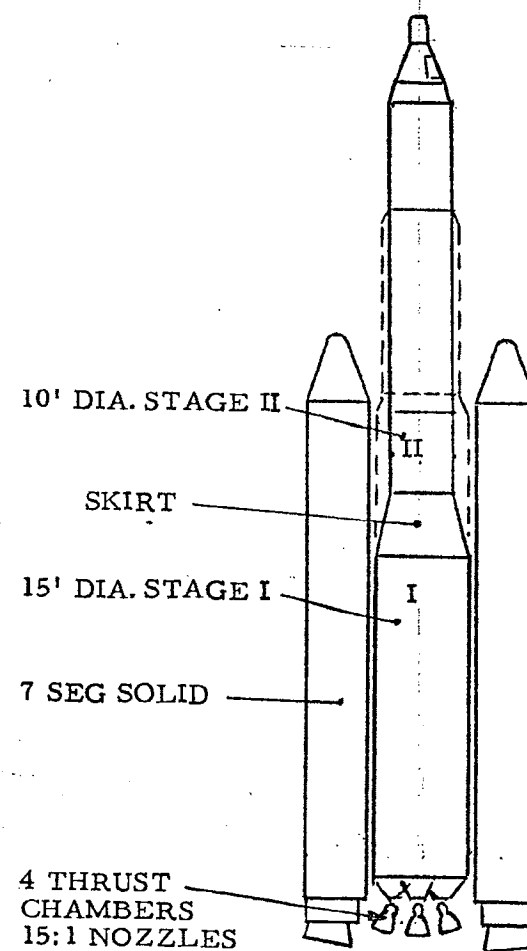


LARGE CORE TITAN III

- ⊙ PAYLOADS (i = 80°; 80/130 ORBIT)
 - .. LDC 1/7 SEG. --44,000 LBS.
 - .. LDC 1 & 2/7 SEG. --50,000 LBS.

- ⊙ THIC (U) DEVELOPMENT PROVIDES
 - .. 15:1 NOZZLES
 - .. 7 SEGMENT SOLIDS

- ⊙ LDC 1 CHANGES
 - .. STRUCTURES
 - .. PROPULSION SYSTEM
 - .. CONTROL SYSTEM



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~~SECRET~~

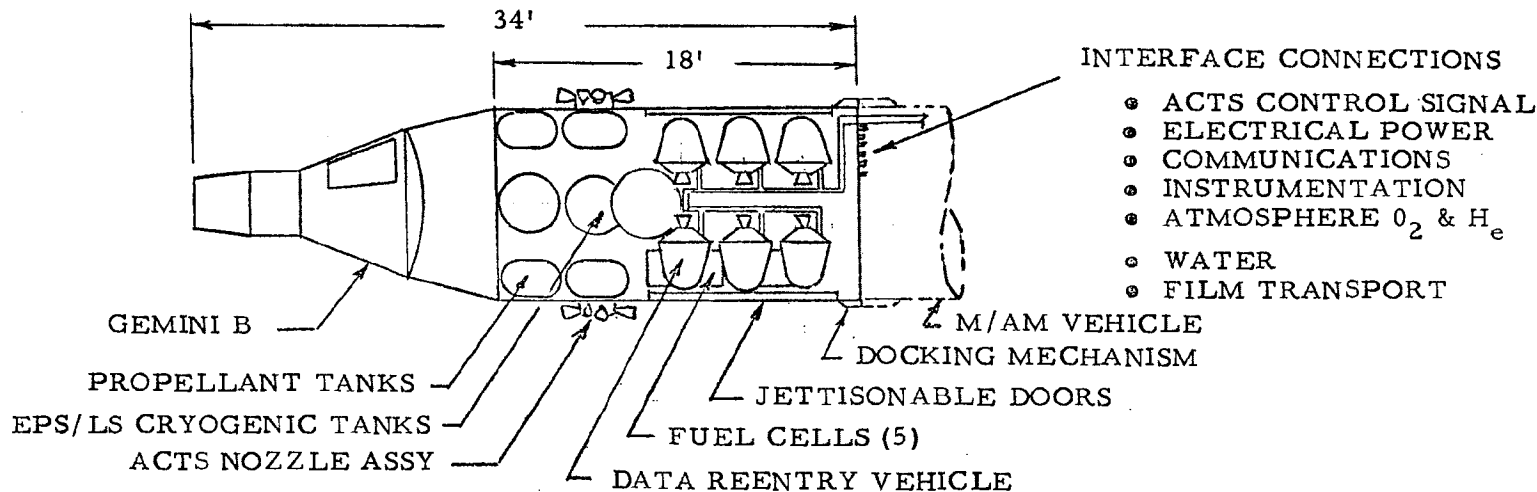
SPECIAL HANDLING

WHS-005

12

~~SECRET~~ - SPECIAL HANDLING

RESUPPLY VEHICLE DESCRIPTION
(TYPICAL 60 DAY DESIGN)



EST. WT. = 28.4K

FUNCTIONS DOCKED

RESUPPLY VEHICLE

- ATTITUDE CONTROL (ACTS PROPULSION)
- PRIME POWER SYSTEM
- LIFE SUPPORT EXPENDABLES
- DATA SYSTEM

M/AM VEHICLE

- LIFE SUPPORT SYSTEM
- ATTITUDE CONTROL ELECTRONICS
- COMMUNICATIONS & DATA HANDLING
- ENVIRONMENTAL CONTROL

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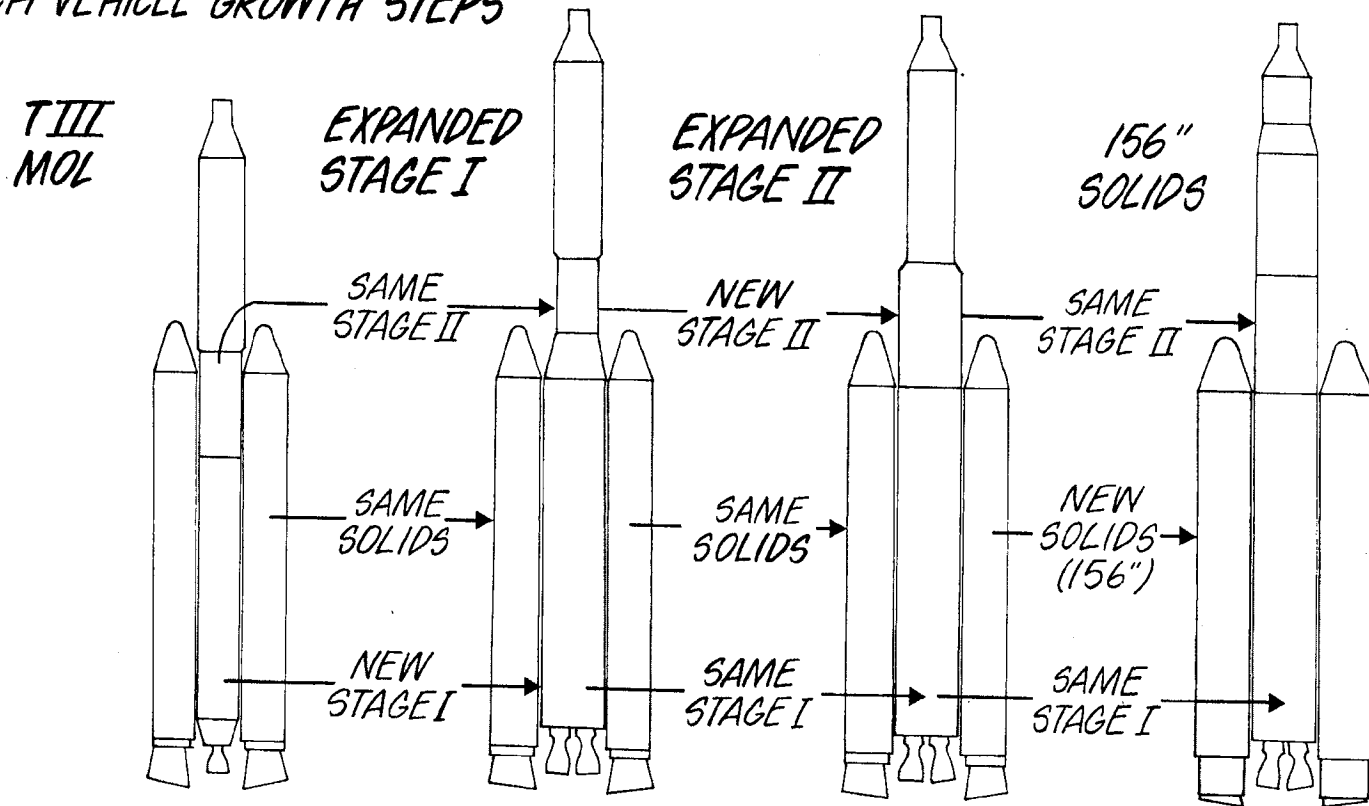
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WHS-005

AD 65 XXXX 00140 R11
MAR 21 1966

~~SECRET~~ SPECIAL HANDLING MOL PERFORMANCE IMPROVEMENT PLAN

● LAUNCH VEHICLE GROWTH STEPS



T III
MOL

EXPANDED
STAGE I

EXPANDED
STAGE II

156"
SOLIDS

SAME
STAGE II

NEW
STAGE II

SAME
STAGE II

SAME
SOLIDS

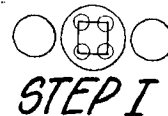
SAME
SOLIDS

NEW
SOLIDS
(156")

NEW
STAGE I

SAME
STAGE I

SAME
STAGE I



P/L (80° 80/130) 32,000

42^① - 44,000

45 - 50,000

62^① - 68,000

① NO EXTENDED STAGE I OR STAGE II BURN DURATION.

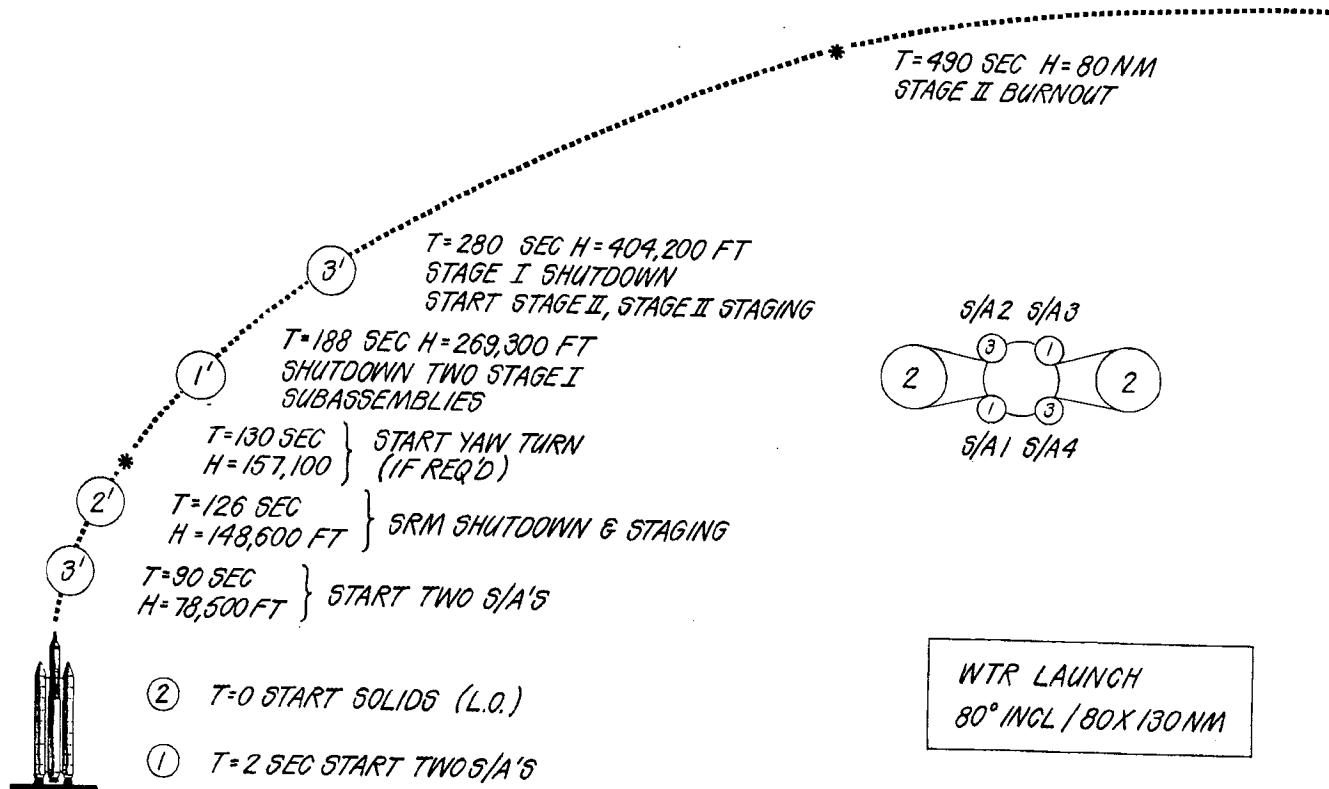
WHS-005

~~SECRET~~ SPECIAL HANDLING

AD 66 XXXX 00163
MAR251966

MOL PERFORMANCE IMPROVEMENT PLAN

● SEQUENCE OF EVENTS - STEP I CONFIGURATION (80°- 80/130 NM)



- ② T=0 START SOLIDS (L.O.)
- ① T=2 SEC START TWO S/A'S

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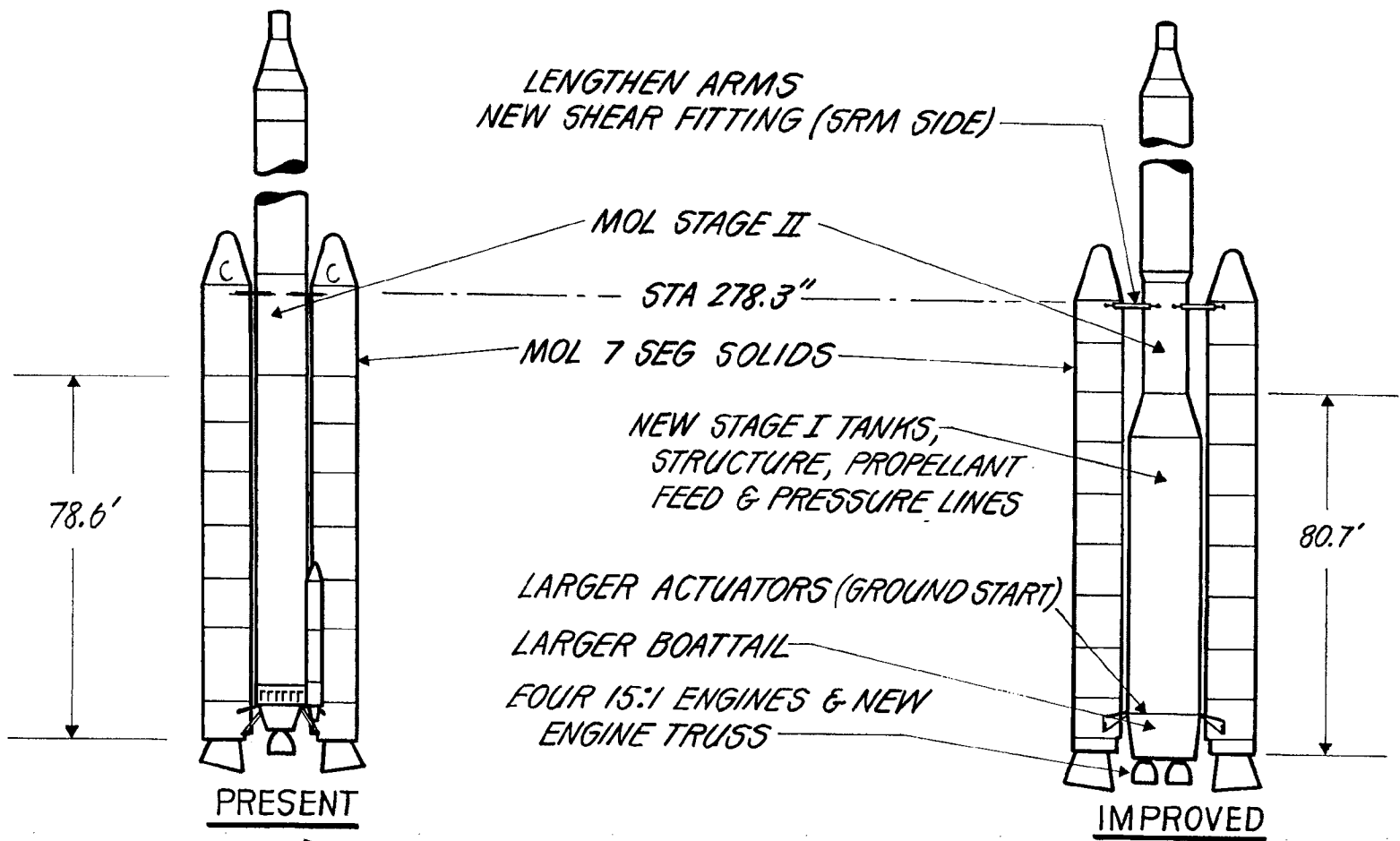
WHS-005

~~SECRET~~ SPECIAL HANDLING

AD 66 XXXX 00161
MAR 25 1966

MOL PERFORMANCE IMPROVEMENT PLAN

● VEHICLE CONFIGURATION



~~SECRET~~ SPECIAL HANDLING

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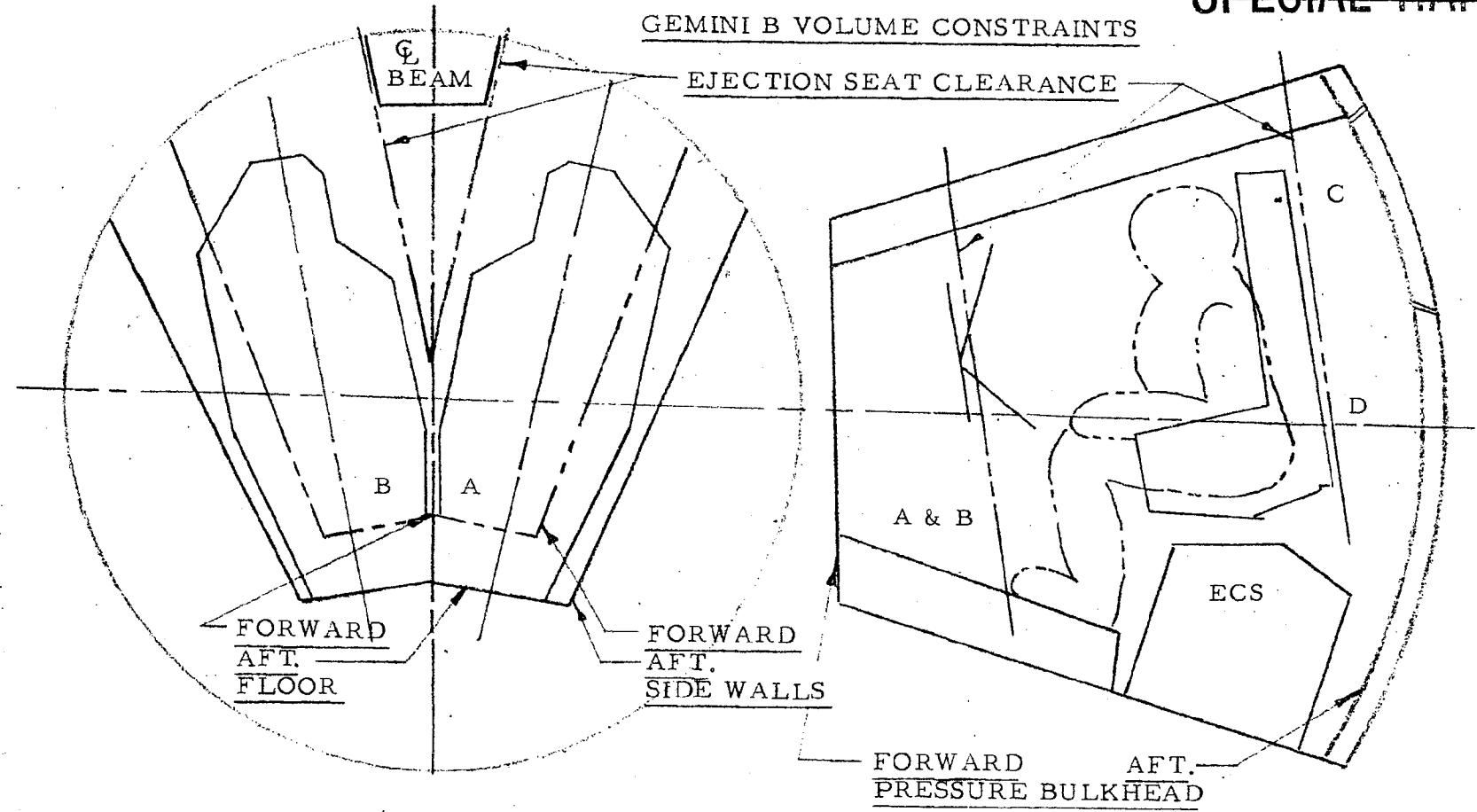
WHS-005

GEMINI B DATA RETURN CAPABILITY

~~SECRET~~

~~SPECIAL HANDLING~~

GEMINI B VOLUME CONSTRAINTS



~~SECRET~~

~~SPECIAL HANDLING~~

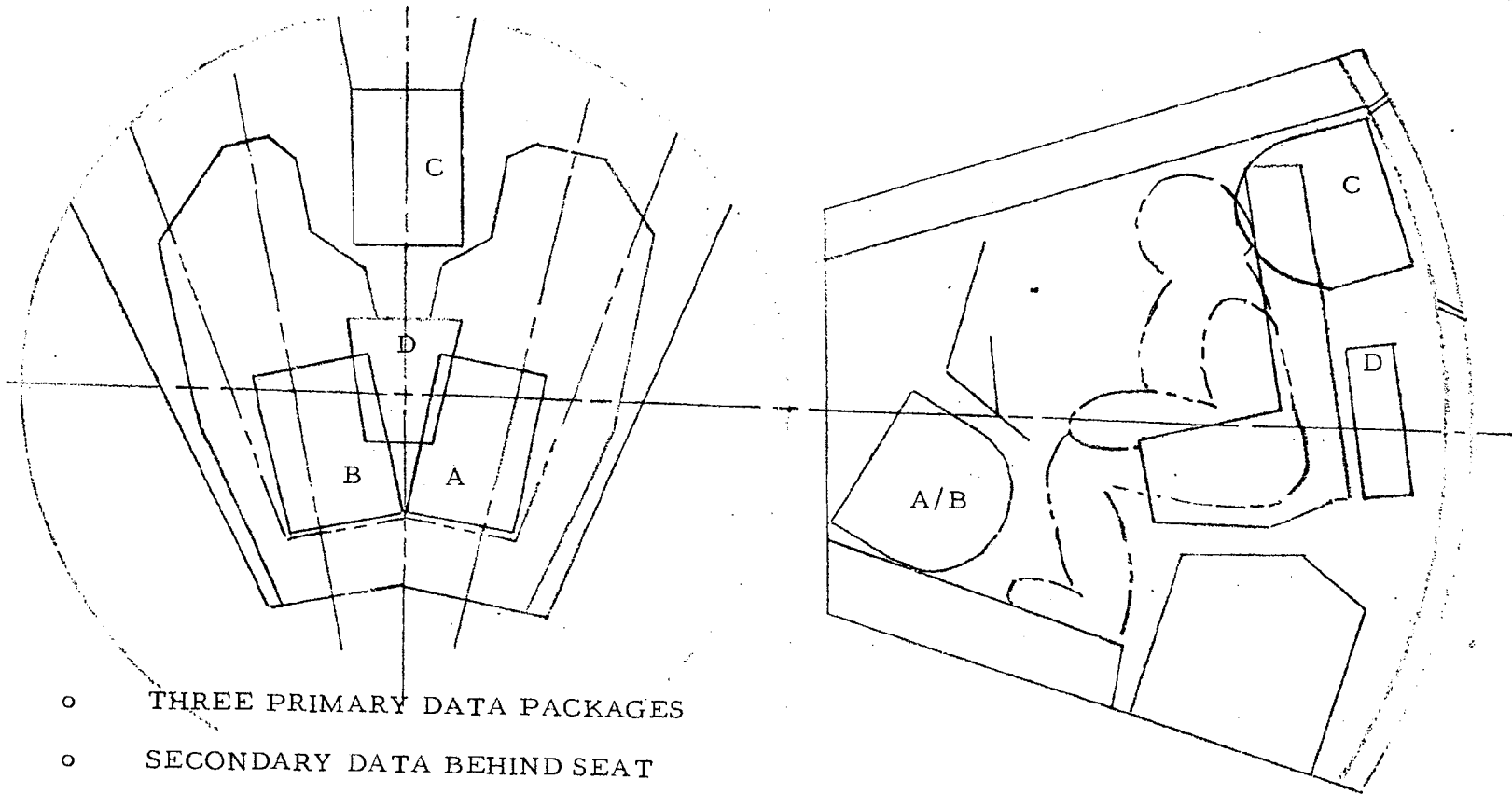
~~SECRET~~

GEMINI B DATA RETURN CAPABILITY

WHS-005

~~SECRET~~

SPECIAL HANDLING



- o THREE PRIMARY DATA PACKAGES
- o SECONDARY DATA BEHIND SEAT

~~SECRET~~

SPECIAL HANDLING

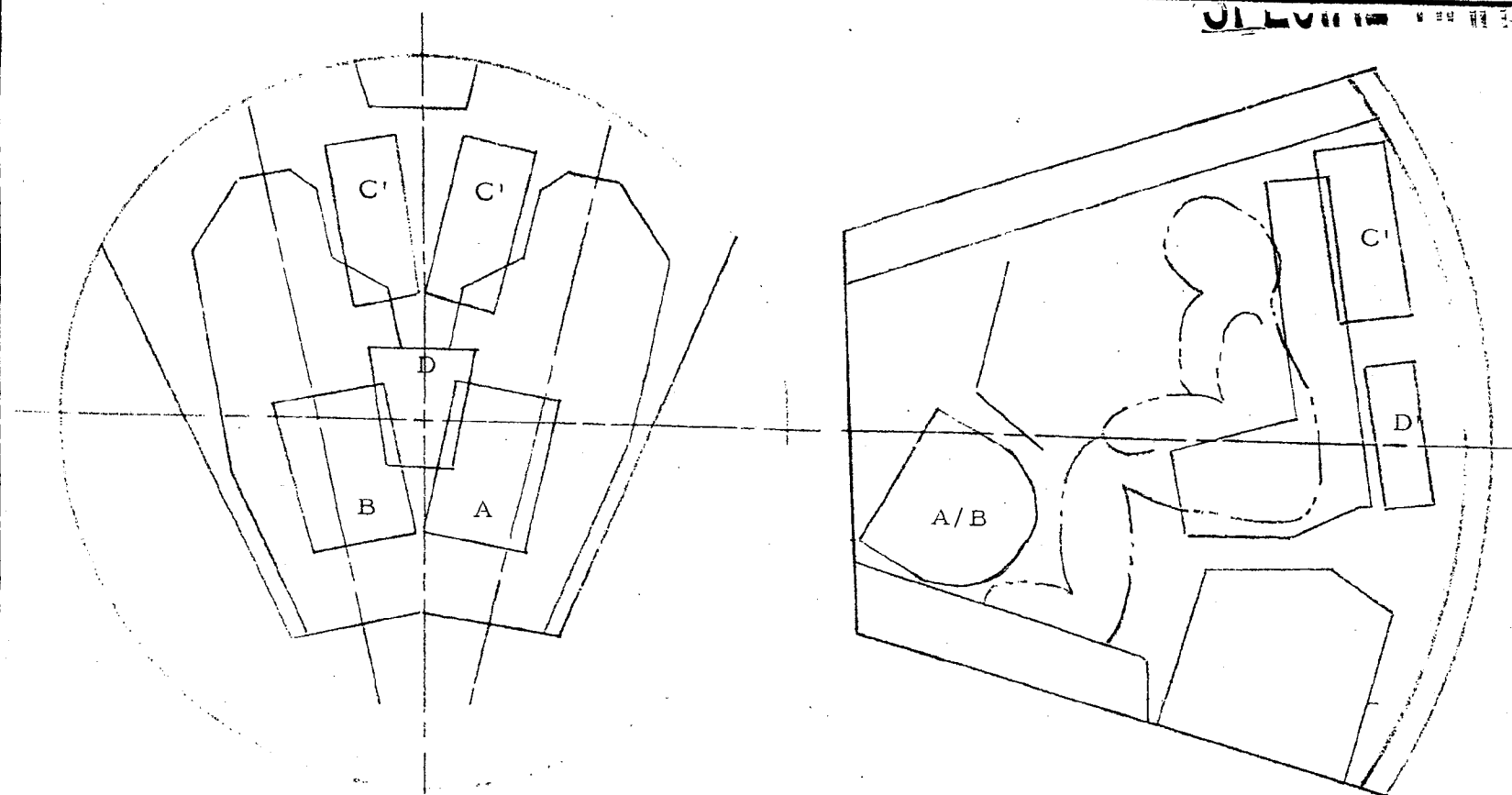
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GEMINI B DATA RETURN CAPABILITY

WHS-005

~~SECRET~~

~~SECRET~~



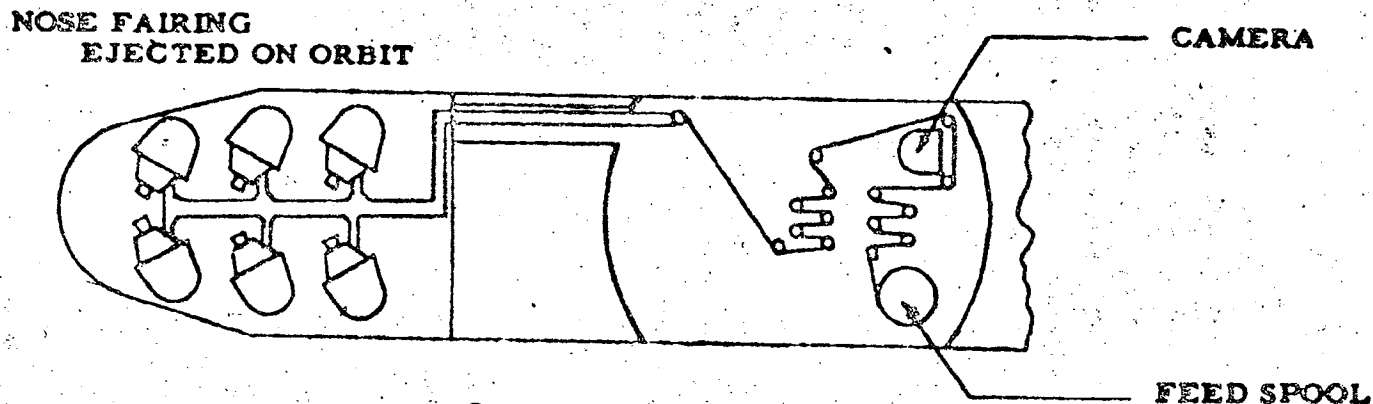
- o FOUR PACKAGES OF PRIMARY DATA
/ TWO PRIMARY SHAPES
/ TWO ALTERNATE SHAPES
- o SECONDARY DATA BEHIND SEAT

~~SECRET~~ SPECIAL HANDLING

WMS-005

~~SECRET~~ - SPECIAL HANDLING

FILM HANDLING AND RECOVERY APPROACH



REQUIREMENTS

24,000 FEET OF 9" FILM

6 RV's 33" DIAMETER (MODIFIED MARK 5) - 70 LBS FILM

STATUS

MECHANICAL ASPECTS OF FILM TRANSPORT SIMILAR TO PREVIOUS DESIGNS

~~SECRET~~ - SPECIAL HANDLING

~~SECRET~~ SPECIAL HANDLING

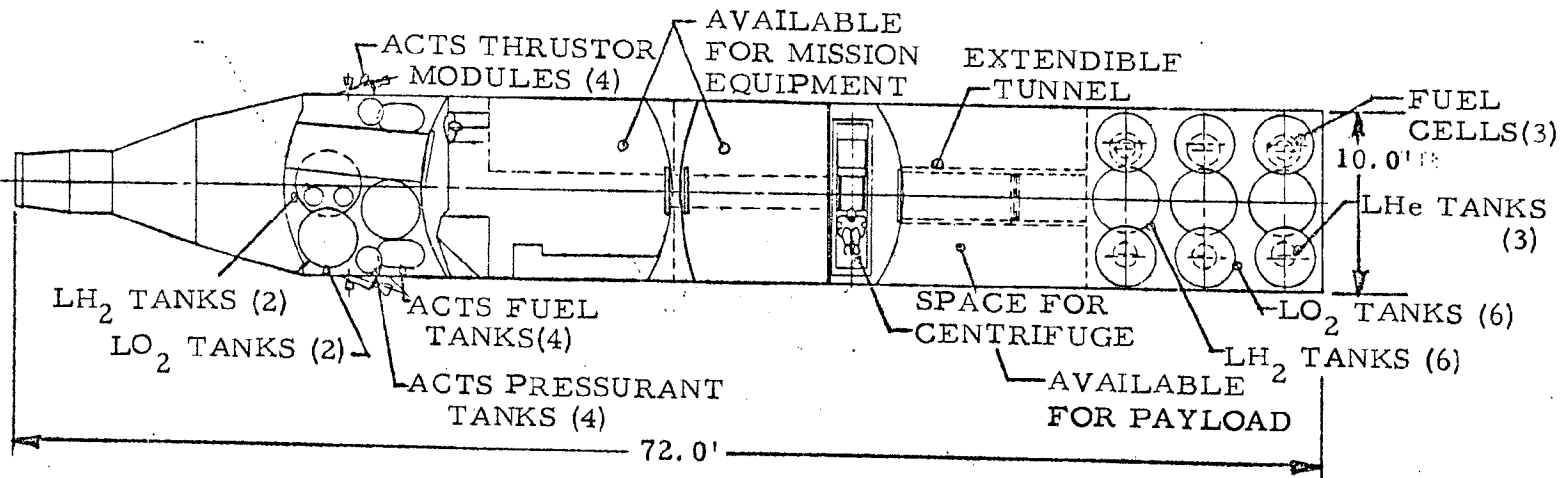
WHS-084
Page 3.

ETR

INTEGRAL LAUNCH DUAL COMPARTMENT LABORATORY

(CONFIGURATION AND PERFORMANCE)

o CONFIGURATION



o PERFORMANCE

TOTAL PRESSURIZED VOLUME (SHIRT SLEEVE ENVIRONMENT)	2,000 FT ³
AVAILABLE PRESSURIZED VOLUME FOR CREW	1,200 FT ³
AVAILABLE PRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	600 FT ³
AVAILABLE UNPRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	~ 700 FT ³
EXPERIMENT PAYLOAD CAPACITY (ETR, i = 28.5°, 180 N M CIR)	~ 5,500 LB
(WTR, i = 80°, 180 N M CIR)	~ 1,000 LB
ELECTRICAL POWER (AVERAGE)	1,650 WATTS*
MISSION DURATION	90 DAYS

*INCLUDES 200 WATTS FOR EXPERIMENTS

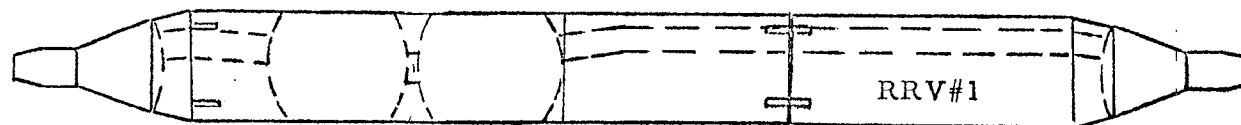
~~SECRET~~ SPECIAL HANDLING

~~SECRET~~ SPECIAL HANDLING
4 MAN DUAL COMPARTMENT LABORATORY

WHS-084
Page 6



- INITIAL LAUNCH CONFIGURATION (2 MAN OPS)



- FIRST RENDEZVOUS RESUPPLY (4 MAN OPS)



- ON-ORBIT CONFIGURATION (4 MAN OPS)

RRV FUNCTIONS

- ACTS PROPULSION
- PRIME ELECTRICAL POWER
- LIFE SUPPORT EXPENDABLES
- EXPERIMENTS
- SPARE EQUIPMENT

LABORATORY FUNCTIONS

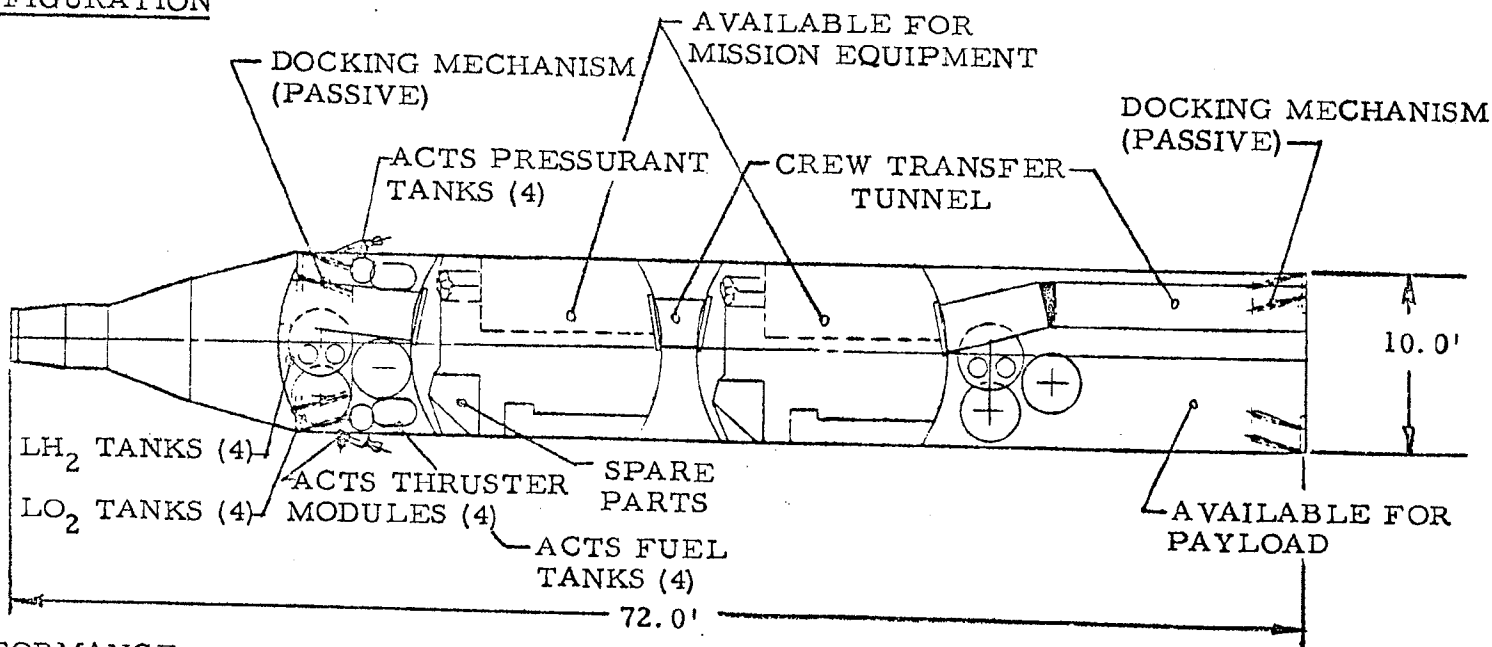
- LIFE SUPPORT/ENVIRONMENTAL CONTROL
- ACTS - REFERENCE
- COMMUNICATIONS/DATA
- BIO-MEDICAL EQUIPMENT
- EXPERIMENTS

~~SECRET~~ SPECIAL HANDLING

4 MAN DUAL COMPARTMENT LABORATORY

(CONFIGURATION AND PERFORMANCE)

o CONFIGURATION



o PERFORMANCE

TOTAL PRESSURIZED VOLUME (SHIRT SLEEVE ENVIRONMENT)	2,000 FT ³
AVAILABLE PRESSURIZED VOLUME FOR CREW	1,200 FT ³
AVAILABLE PRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	600 FT ³
AVAILABLE UNPRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	950 FT ³
EXPERIMENT PAYLOAD CAPACITY (WTR, $i = 80^\circ$, 180 N M CIR)	5,700 LBS
ELECTRICAL POWER (AVERAGE)	2,000 WATTS*
RESUPPLY CYCLE	60 DAYS

* 200 WATTS AVAILABLE FOR EXPERIMENTS

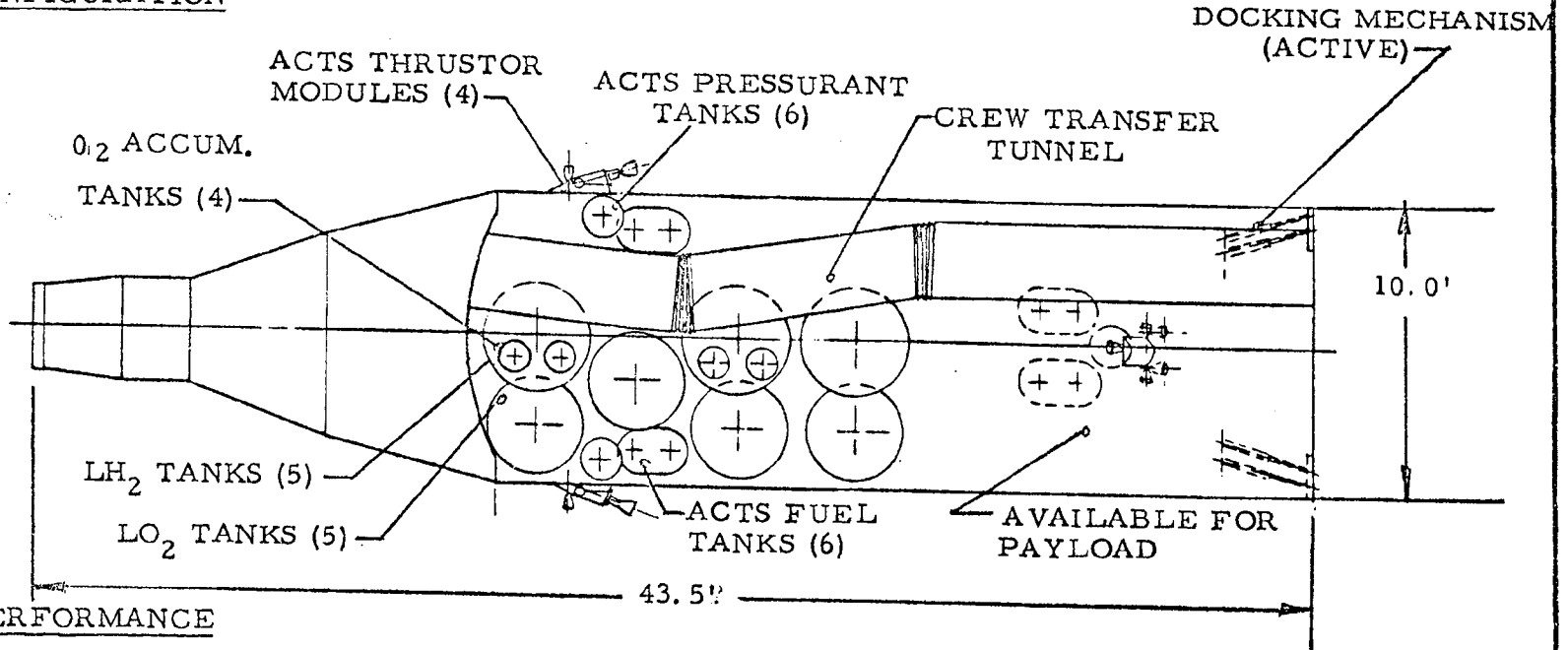
~~SECRET~~ SPECIAL HANDLING

~~SECRET~~ SPECIAL HANDLING

RENDEZVOUS RESUPPLY VEHICLE

(CONFIGURATION AND PERFORMANCE)

o CONFIGURATION



o PERFORMANCE

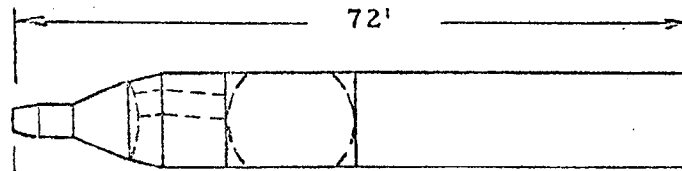
UNPRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	2,000 FT ³
EXPERIMENT PAYLOAD CAPACITY (WTR, i = 80°, 180° N M CIR)	10,000 LBS
ELECTRICAL POWER (AVERAGE)	2,000 WATTS*
RESUPPLY CYCLE (TO SUPPLY 4 MAN CREW)	60 DAYS

*200 WATTS AVAILABLE FOR EXPERIMENTS

~~SECRET~~ SPECIAL HANDLING

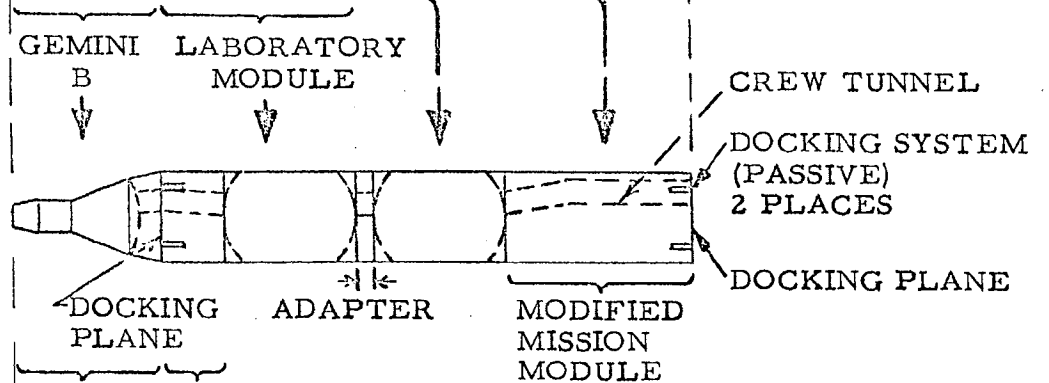
~~SECRET~~ SPECIAL HANDLING
UTILIZATION OF MOL HARDWARE FOR
4 MAN DUAL COMPARTMENT LABORATORY CONFIGURATION

○ MOL BASELINE VEHICLE



PRESS. COMPT. MISSION MODULE

○ RENDEZVOUS INITIAL VEHICLE (RIV)

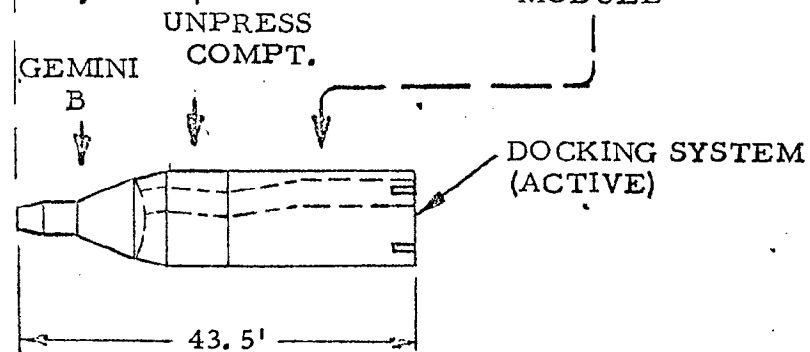


GEMINI B LABORATORY MODULE

CREW TUNNEL
DOCKING SYSTEM (PASSIVE) 2 PLACES
DOCKING PLANE

DOCKING PLANE ADAPTER MODIFIED MISSION MODULE

○ RENDEZVOUS RESUPPLY VEHICLE (RRV)



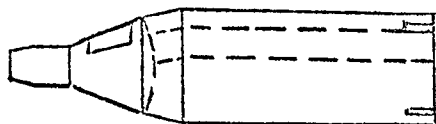
GEMINI B UNPRESS. COMPT.

DOCKING SYSTEM (ACTIVE)

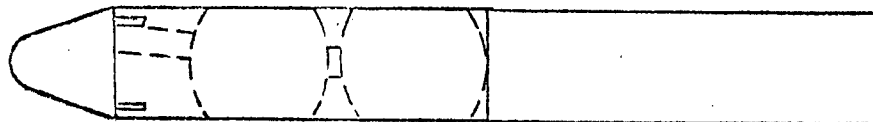
43.5'

2 MAN DUAL COMPARTMENT LABORATORY CONFIGURATION

(COMBINED MISSION)

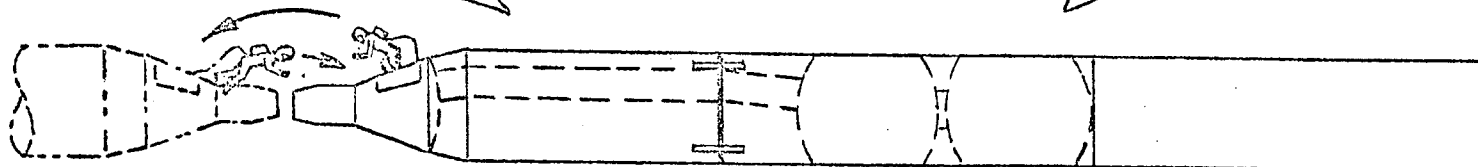


RENDEZVOUS
RESUPPLY VEHICLE
(RRV)



INITIAL LAUNCH RENDEZVOUS
LABORATORY VEHICLE (RIV)

POSSIBLE CREW
TRANSFER FROM
SUBSEQUENT RRV'S



RENDEZVOUS ORBITING VEHICLE
(ROV)

RRV FUNCTIONS

- ⊙ CREW TRANSPORT VEHICLE
- ⊙ ACTS PROPULSION
- ⊙ PRIME POWER
- ⊙ LIFE SUPPORT EXPENDABLES
- ⊙ DATA RETURN SYSTEM
- ⊙ SUBSYSTEM SPARES/REPLACEMENTS

RIV FUNCTIONS

- ⊙ LIFE SUPPORT SYSTEM
- ⊙ ATTITUDE CONTROL REF. ELECTRONICS
- ⊙ COMMUNICATIONS AND DATA HANDLING
- ⊙ ENVIRONMENTAL CONTROL
- ⊙ PERFORMANCE DATA

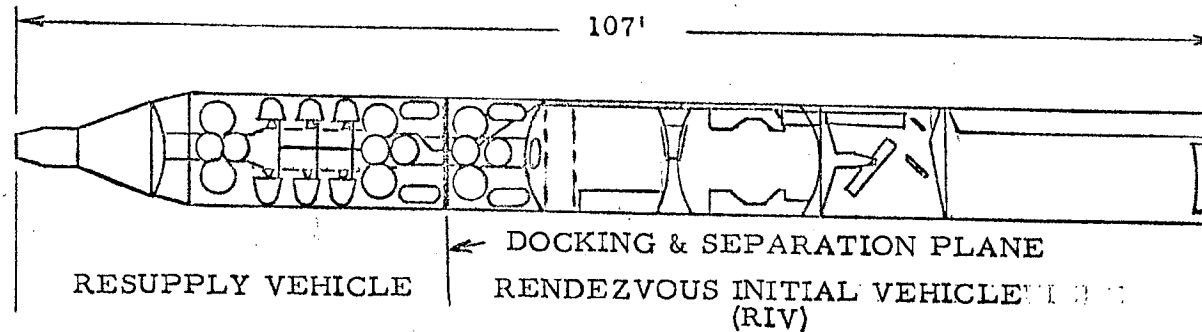
~~SECRET SPECIAL HANDLING~~

WHS-084

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2 MAN DUAL COMPARTMENT LABORATORY
CONFIGURATION AND PERFORMANCE SUMMARY
 (COMBINED MISSION)

● CONFIGURATION



● PERFORMANCE DATA

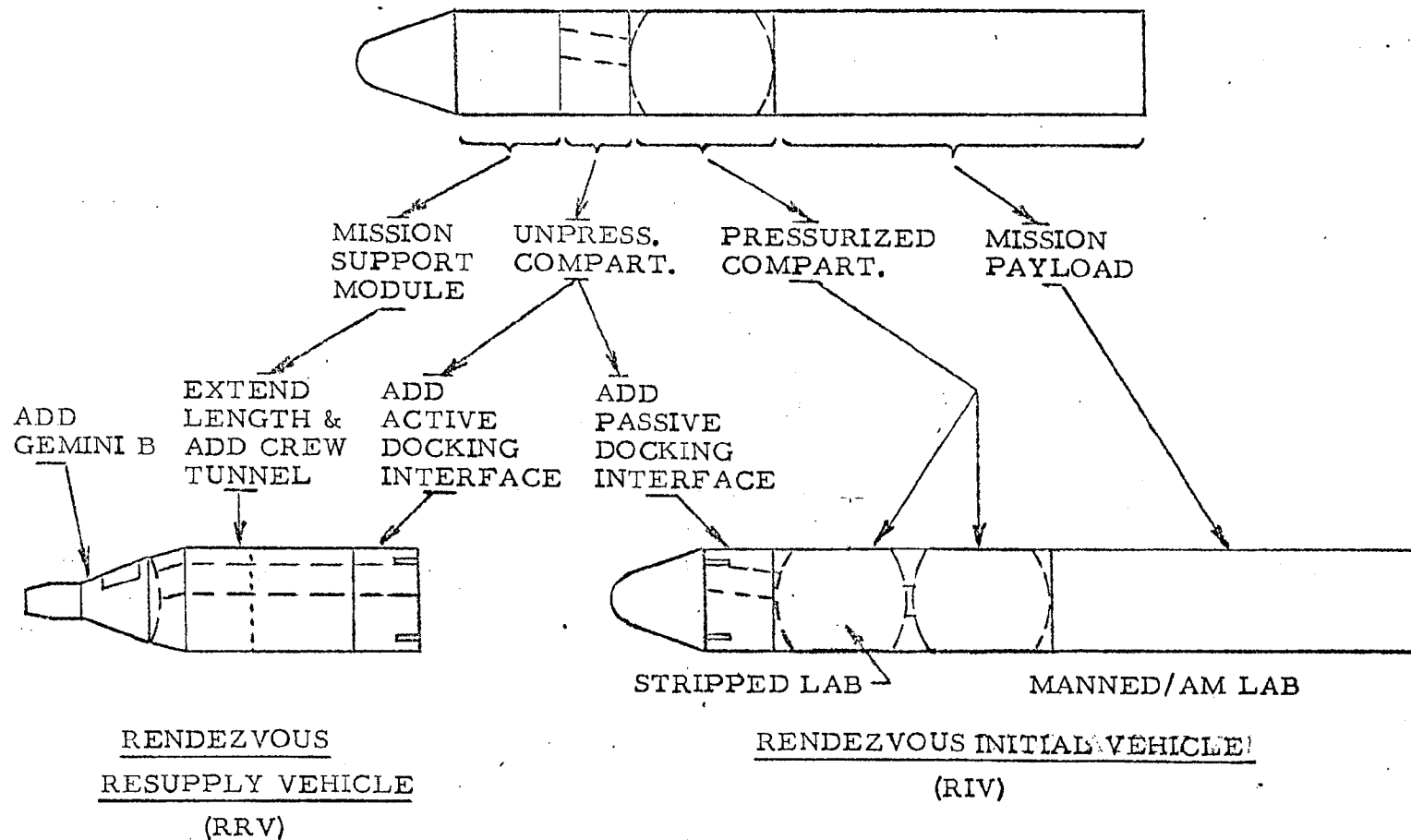
TOTAL PRESSURIZED VOLUME (SHIRT SLEEVE ENVIRONMENT)	2,060 FT ³
AVAILABLE PRESSURIZED VOLUME FOR CREW	1,200 FT ³
AVAILABLE PRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	210 FT ³
R. I. V. EXP. PAYLOAD CAPACITY ($i = 96.4^\circ$, 80/180 NM)	3,000 LBS
ELECTRICAL POWER (AVERAGE)	1,950 WATTS
RESUPPLY CYCLE	60 DAYS

~~SECRET SPECIAL HANDLING~~

13




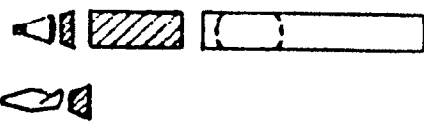



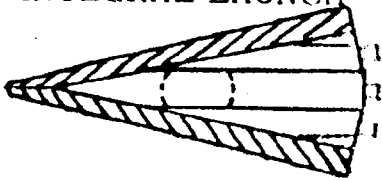
APPLICATION OF BASELINE COMPONENTS FOR 2 MAN
DUAL COMPARTMENT LABORATORY
(COMBINED MISSION)

AUTOMATIC MODE VEHICLE (AMV)



WHS-071-4

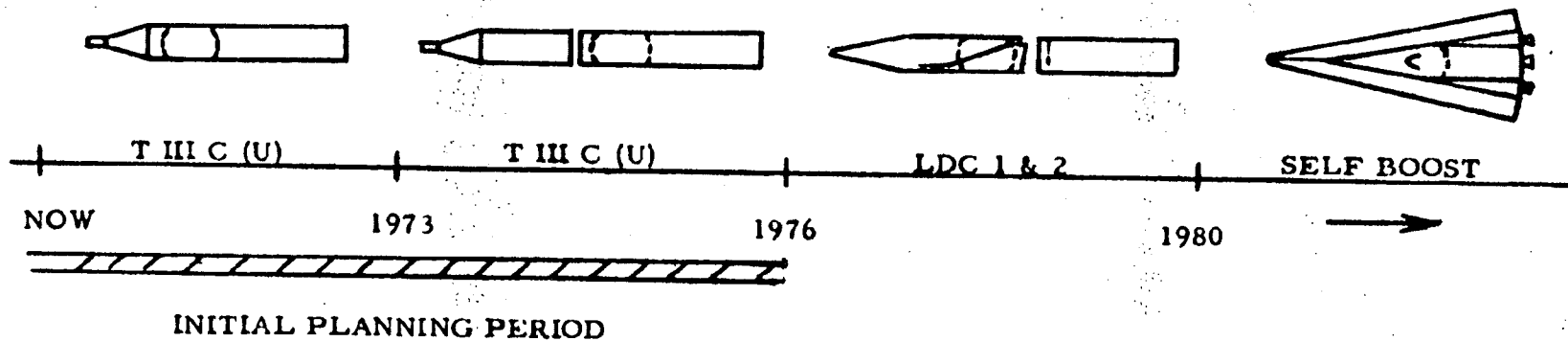
POTENTIAL VEHICLE SYSTEM CONCEPTS

<p>I</p> <p>INTEGRAL LAUNCH</p>  <p>Dispose all Segments each Mission.</p>	<p>II</p> <p>INTEGRAL LAUNCH</p>  <p>Retrieve/Reuse R. E. V. each Mission - Dispose all other Segments.</p>	<p>III</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Dispose R. E. V. + Supply Module (RRV) each Resupply Mission - Revisit/Reuse Orbiting Vehicle for ~ 1 year cycle.</p>	<p>IV</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Dispose Supply Module each Resupply Mission - Retrieve/Reuse R. E. V. - Revisit/Reuse Orbiting Vehicle for ~ 1 year cycle.</p>
<p>V</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Retrieve/Reuse R. E. V. + Supply Module (RRV) each Resupply Mission - Revisit/Reuse Orbiting Vehicle for ~ 1 year cycle.</p>	<p>VI</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Retrieve/Reuse Integrated R. E. V. + Supply Module + Lab - Revisit/Reuse Mission Module Lab ~ 1 year cycle</p>	<p>VII</p> <p>INTEGRAL LAUNCH</p>  <p>Retrieve/Reuse fully Integrated R. E. V. + Lab + Supply Module + Mission Module. Dispose conventional booster only.</p>	<p>VIII</p> <p>INTEGRAL LAUNCH</p>  <p>Retrieve/Reuse fully Integrated R. E. V. + Lab + Supply Module + Mission Module + Propulsion Sys. Dispose propellant tanks and pressurization system only.</p>

WHS-871-5

4

POSSIBLE MOL GROWTH PERSPECTIVE





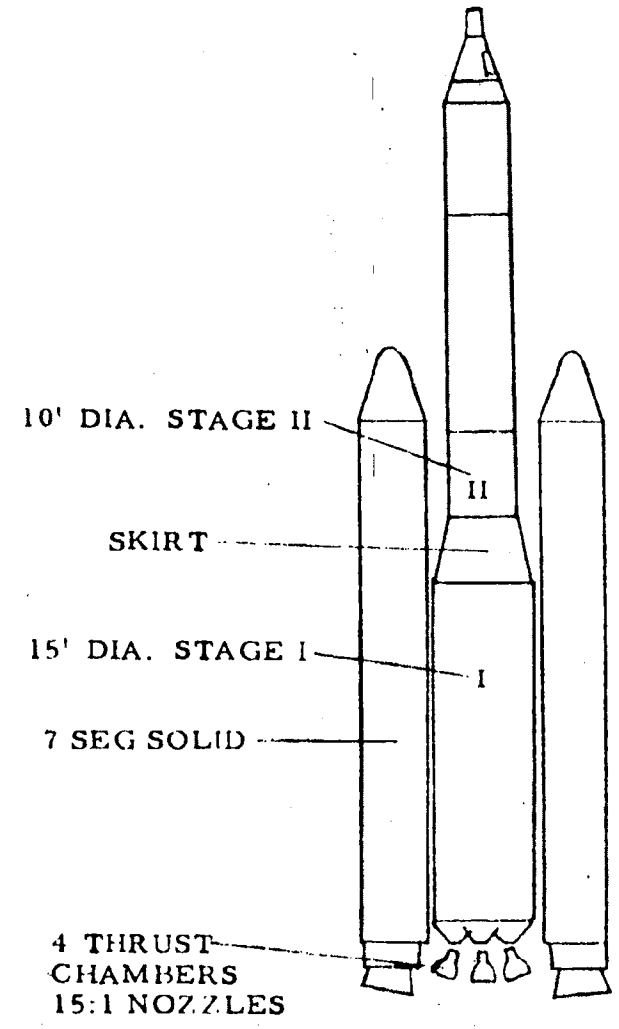
WHS-171-7

LARGE CORE TITAN III
STAGE I

- PAYLOADS ($i = 80^\circ$; 80/130 ORBIT)
 - .. LDC 1/7 SEG. --44,000 LBS.

- THIC (U) DEVELOPMENT PROVIDES
 - .. 15:1 NOZZLES
 - .. 7 SEGMENT SOLIDS

- LDC 1 CHANGES
 - .. STRUCTURES
 - .. PROPULSION SYSTEM
 - .. CONTROL SYSTEM



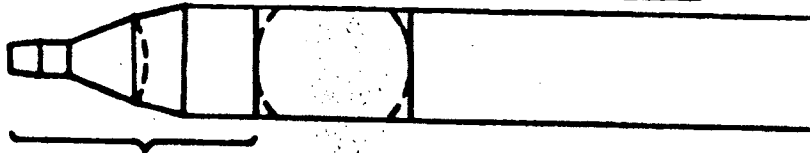
~~SECRET~~ SPECIAL HANDLING

WHS-871-8

10
7

RESUPPLY VEHICLE DERIVATION FROM MOL HARDWARE

BASELINE M/AM VEHICLE



GEMINI B
+
LABORATORY
UNPRESSURIZED
COMPARTMENT

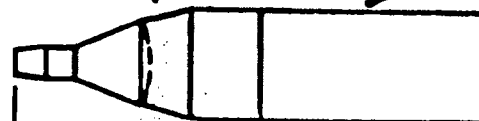
BASELINE AM VEHICLE



DRV &
FILM HANDLING
SYSTEM

+
BASELINE SUBSYSTEM
COMPONENTS

RENDEZVOUS RESUPPLY VEHICLE

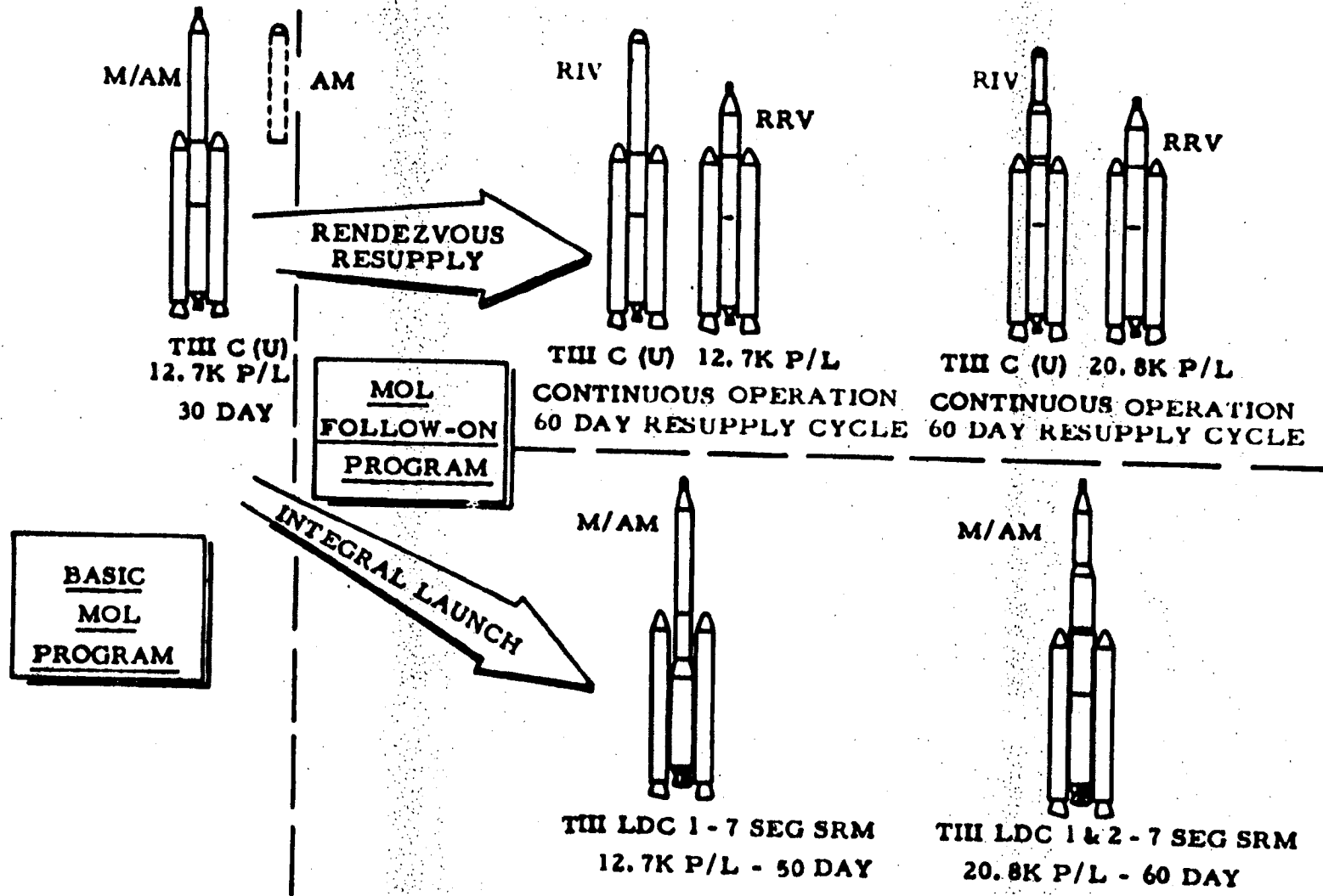


GEMINI B +
LAB U.C. | EXTENDED
DURATION
MODULE

~~SECRET~~ SPECIAL HANDLING

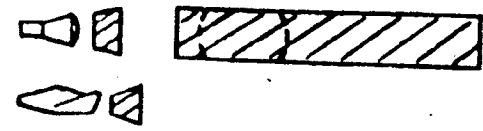
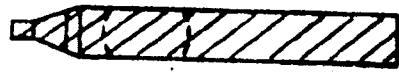
GROWTH AVENUES

WHS-671-9



WHS-171-20

EARLY INTEGRAL LAUNCH SYSTEMS



I DISPOSE AT MISSION TERMINATION
(INTEGRAL LAUNCH)

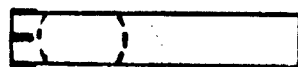
II RETRIEVE/REUSE REV
(INTEGRAL LAUNCH)

CONCEPT	I		II	
	GEMINI B (WATER LANDING)	GEMINI B (LAND LANDING)	LDC 1	LIFTING BODY (MEDIUM L/D)
REV TYPE	T III C (U)	T III C (U)	LDC 1	LDC 1
LAUNCH VEHICLE	31.0 K	31.0 K	42.0 K	42.0 K (i=90°)
LAUNCH WEIGHT (i=90°)	Baseline	Baseline	Baseline	Baseline
P/L TYPE	30 Days	15 Days	40 Days	30 Days
MISSION DURATION	Current Phase II	NASA Mod. Test	NASA Model Test	Model Tests & Studies
DEVELOP. STATUS:	Current Phase II	Current Phase II	Current Phase II	Current Phase II
REV	Current Phase II	Current Phase II	Current Phase II	Current Phase II
LM	Current Phase II	Current Phase II	Martin/UTC In-	Martin/UTC In-
MM	Current Phase II	Current Phase II	House Design	House Design
LV	Current Phase II	Current Phase II	House Design	House Design
DEVELOPMENT CYCLE	5 Yr	2 Yr	3 Yr	5 Yr
Δ NON RECURRING COST ABOVE BASELINE OPT. #6	0	130 M\$	190 M\$	450 M\$
RECURRING COST	78.2 M\$	79.7 M\$	87.2 M\$	99.2 M\$
INITIAL LAUNCH	--	77.2 M\$	84.7 M\$	87.2/78.2 M\$
REFURBISHED VEH. LAUNCH				(60%-30% Refurb.)

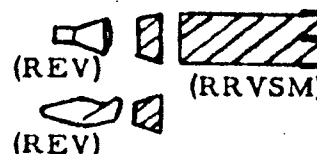
INITIAL RENDEZVOUS SYSTEM



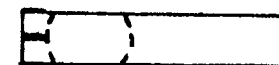
(RRV)



(RIV)



(RRVSM)



RIV

III REVISIT RIV - DISPOSE OF RRV EACH RESUPPLY CYCLE (RENDEZVOUS/RESUPPLY)

IV REVISIT RIV - DISPOSE OF RRV SUPPLY MODULE - RETRIEVE/REUSE REV (RENDEZVOUS/RESUPPLY)

CONCEPT	III		IV	
	GEMINI B (WATER LANDING)	GEMINI B (LAND LANDING)	LIFTING BODY (MEDIUM L/D)	
REV TYPE				
LAUNCH WEIGHT (i=96.4°)	30.0 K	30.0 K	30.0 K	41.4 K
LAUNCH VEHICLE TYPE	T III C (U)	T III C (U)	T III C (U)	LDC 1
P/L TYPE	Baseline	Baseline	Baseline	
MISSION DURATION	Cont. OPS - 1 yr Res. Cy. - 60 days	Cont. OPS - 1 yr. Res. Cy. - 53 days	Cont. OPS - 1 yr Res. Cy. - 45 days	Cont. OPS - 1 yr Res. Cy. - 90 days
DEVELOP. STATUS				
REV	Current Phase II	NASA Model Tests	Mod. Test & Studies	Mod. Test & Stud.
LM	Current Phase II	Current Phase II	Current Phase II	Current Phase II
MM	Current Phase II	Current Phase II	Current Phase II	Current Phase II
LV	Current Phase II	Current Phase II	Current Phase II	Martin/UTC In-House Design
DEVELOP. CYCLE	3 yr	3 yr	5 yr	5 yr
ΔNRC ABOVE OPT #6	203 M\$	323 M\$	603 M\$	673 M\$
RC				
RIV	66.2 M\$	66.2 M\$*	66.2 M\$	71.7 M\$
RRV (NEW REV)	43.8 M\$	45.3 M\$	59.3 M\$	69.8 M\$
RRV (REFURB REV)*	--	42.8 M\$	47.3/38.3 M\$	57.8/48.8 M\$

*Cost based on 60%/30% Refurbishment

WHS-171-22

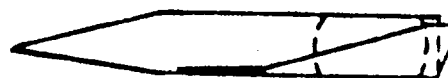
LIFTING BODY RE-ENTRY VEHICLE
RENDEZVOUS SYSTEM



RRV



RIV



RRV (MMM)



RIV (MM)

V REVISIT RIV
RETRIEVE/REUSE RRV
(RENDEZVOUS/RESUPPLY)

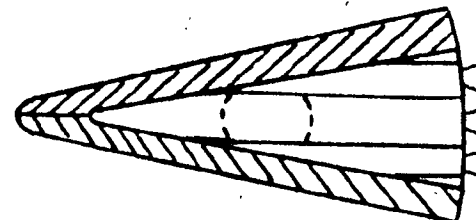
VI REVISIT MM
RETRIEVE/REUSE MMM
(RENDEZVOUS/RESUPPLY)

CONCEPT	V	VI
LAUNCH VEHICLE TYPE	LDC 1	LDC 1 & 2
LAUNCH WEIGHT (i=96.4°)	41.4 K	47.0 K
P/L TYPE	Baseline	Baseline
MISSION DURATION	Continuous to 1 Yr - 60 Day Resupply Cycle	Continuous to 1 Yr - 50 Day Resupply Cycle
DEVELOPMENT STATUS	Technology Studies Current Phase II Current Phase II Martin/UTC In-house Design	Technology Studies Components in Phase II Components in Phase II Preliminary Studies
DEVELOP. CYCLE	7 Yr.	7 Yr.
ΔNRC ABOVE OPT. #6(ROM)	770 M\$	1,170 M\$
RC		
RIV	71.7 M\$	58.0 M\$
RRV (NEW)	71.0 M\$	93.0 M\$
RRV (REFURB)*	51.0/36.0 M\$	67.0/46.0 M\$

*Based on 60%/30% Refurbishment Cost

WHS-171-23

ADVANCED INTEGRAL LAUNCH SYSTEM



VII RETRIEVE/REUSE COMPLETE M. O. V.
(INTEGRAL LAUNCH)

VIII RETRIEVE/REUSE COMPLETE
M. O. V.
(INTEGRAL LAUNCH)

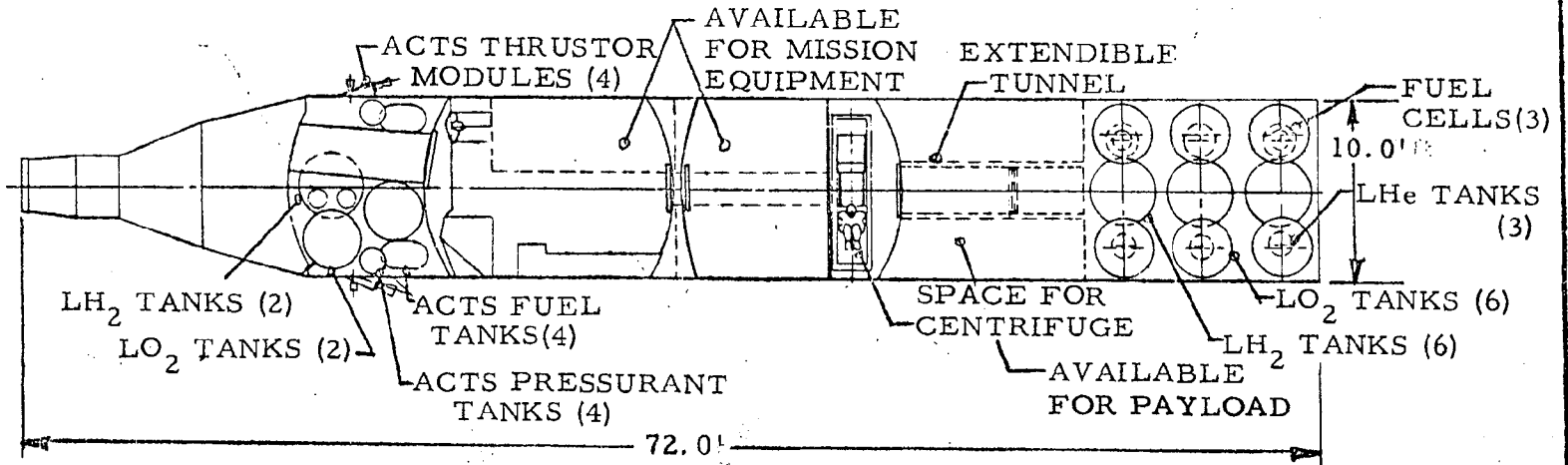
CONCEPT	VII	VIII
LAUNCH VEHICLE TYPE	LDC 1 & 2+156" SRM	Strap-On Tankage
LAUNCH WEIGHT	62 K	~70 K
MISSION DURATION	60 Day	60 + Day
DEVELOPMENT STATUS	Vehicle/Technology Studies Major Subsystems - Phase II	Proposed by Industry
DEVELOPMENT CYCLE	8 Year	10/12 Year
Δ NRC ABOVE OPTION #6	1,230 M\$	1,500 to 2,000 M\$
RECURRING COSTS		
INITIAL	133 M\$	200 M\$
REFURB.	93/63 M\$ (60%-30% Refurbish.)	30 M\$ (~10% Refurbish.)

~~SECRET~~ SPECIAL HANDLING
 ETR

INTEGRAL LAUNCH DUAL COMPARTMENT LABORATORY

(CONFIGURATION AND PERFORMANCE)

o CONFIGURATION



o PERFORMANCE

TOTAL PRESSURIZED VOLUME (SHIRT SLEEVE ENVIRONMENT)	2,000 FT ³
AVAILABLE PRESSURIZED VOLUME FOR CREW	1,200 FT ³
AVAILABLE PRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	600 FT ³
AVAILABLE UNPRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	~ 700 FT ³
EXPERIMENT PAYLOAD CAPACITY (ETR, i = 28.5°, 180 N M CIR)	~ 5,500 LB
(WTR, i = 80°, 180 N M CIR)	~ 1,000 LB
ELECTRICAL POWER (AVERAGE)	1,650 WATTS*
MISSION DURATION	90 DAYS

*INCLUDES 200 WATTS FOR EXPERIMENTS

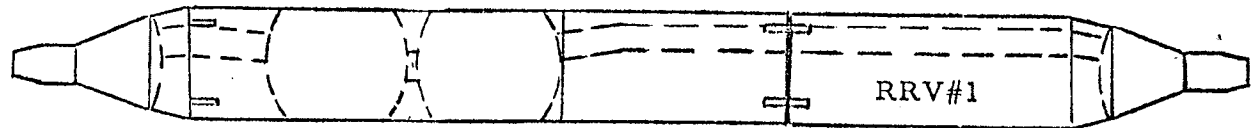
~~SECRET~~ SPECIAL HANDLING

~~SECRET~~ SPECIAL HANDLING
2 MAN DUAL COMPARTMENT LABORATORY

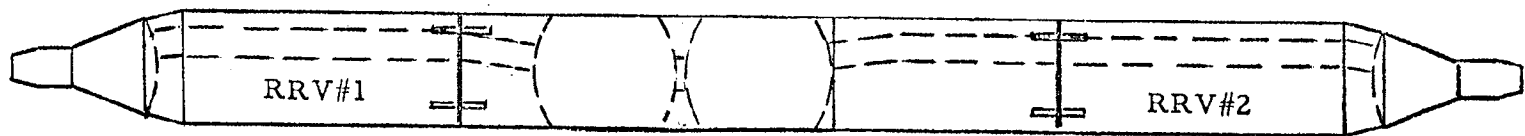
WHS-231
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- INITIAL LAUNCH CONFIGURATION (2 MAN OPS)



- FIRST RENDEZVOUS RESUPPLY (4 MAN OPS)



- ON-ORBIT CONFIGURATION (4 MAN OPS)

RRV FUNCTIONS

- ACTS PROPULSION
- PRIME ELECTRICAL POWER
- LIFE SUPPORT EXPENDABLES
- EXPERIMENTS
- SPARE EQUIPMENT

LABORATORY FUNCTIONS

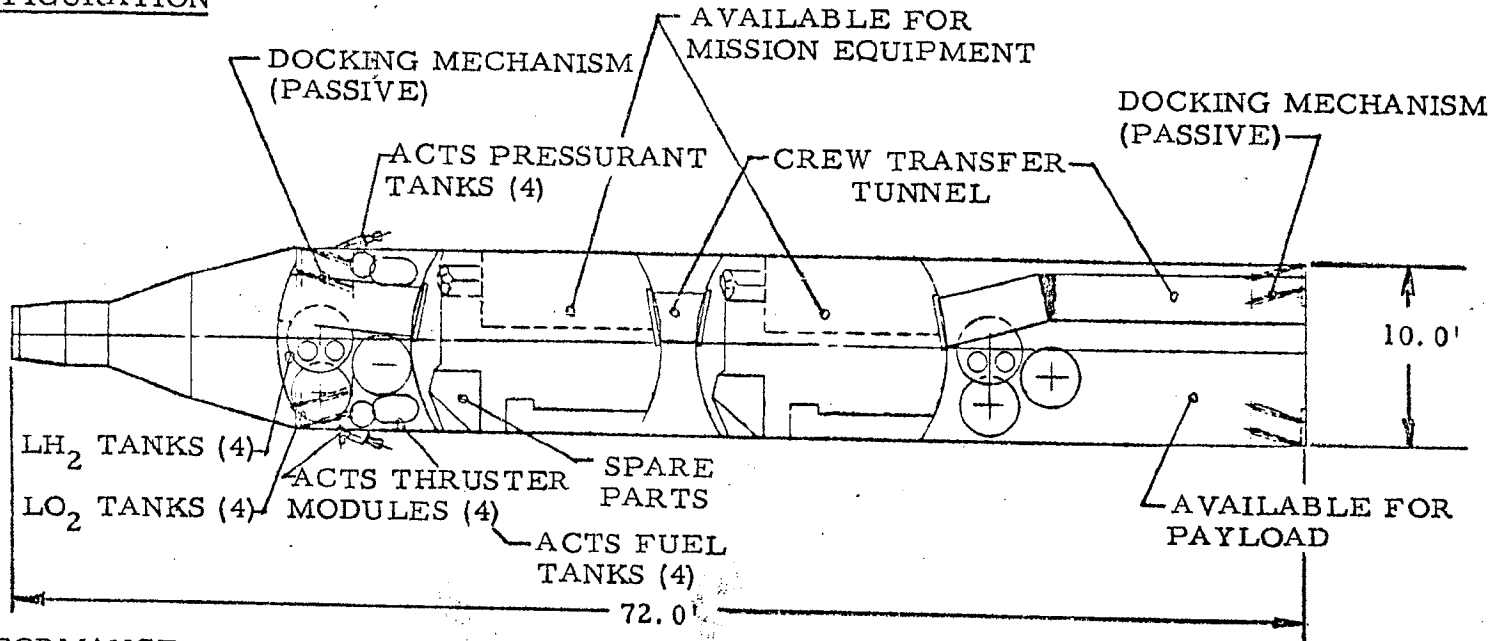
- LIFE SUPPORT/ENVIRONMENTAL CONTROL
- ACTS - REFERENCE
- COMMUNICATIONS/DATA
- BIO-MEDICAL EQUIPMENT
- EXPERIMENTS

~~SECRET~~ SPECIAL HANDLING

~~D SECRET~~ SPECIAL HANDLING
 4 MAN DUAL COMPARTMENT LABORATORY

(CONFIGURATION AND PERFORMANCE)

o CONFIGURATION



o PERFORMANCE

TOTAL PRESSURIZED VOLUME (SHIRT SLEEVE ENVIRONMENT)	2,000 FT ³
AVAILABLE PRESSURIZED VOLUME FOR CREW	1,200 FT ³
AVAILABLE PRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	600 FT ³
AVAILABLE UNPRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	950 FT ³
EXPERIMENT PAYLOAD CAPACITY (WTR, i = 80°, 180 N M CIR)	5,700 LBS
ELECTRICAL POWER (AVERAGE)	2,000 WATTS*
RESUPPLY CYCLE	60 DAYS

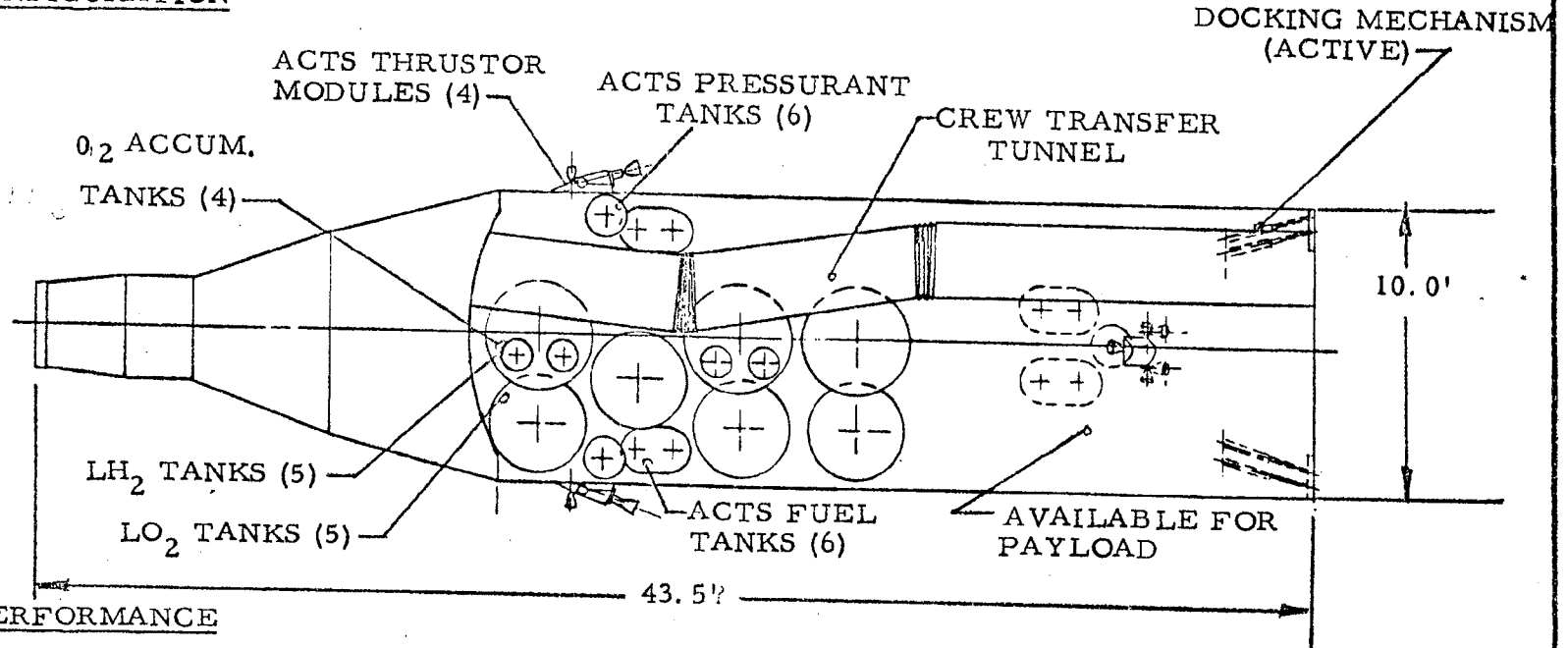
* 200 WATTS AVAILABLE FOR EXPERIMENTS

~~D SECRET~~ SPECIAL HANDLING
RENDEZVOUS RESUPPLY VEHICLE

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(CONFIGURATION AND PERFORMANCE)

o CONFIGURATION



o PERFORMANCE

UNPRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	2,000 FT ³
EXPERIMENT PAYLOAD CAPACITY (WTR, i = 80°, 180 N M CIR)	10,000 LBS
ELECTRICAL POWER (AVERAGE)	2,000 WATTS*
RESUPPLY CYCLE (TO SUPPLY 4 MAN CREW)	60 DAYS

*200 WATTS AVAILABLE FOR EXPERIMENTS

~~D SECRET~~ SPECIAL HANDLING

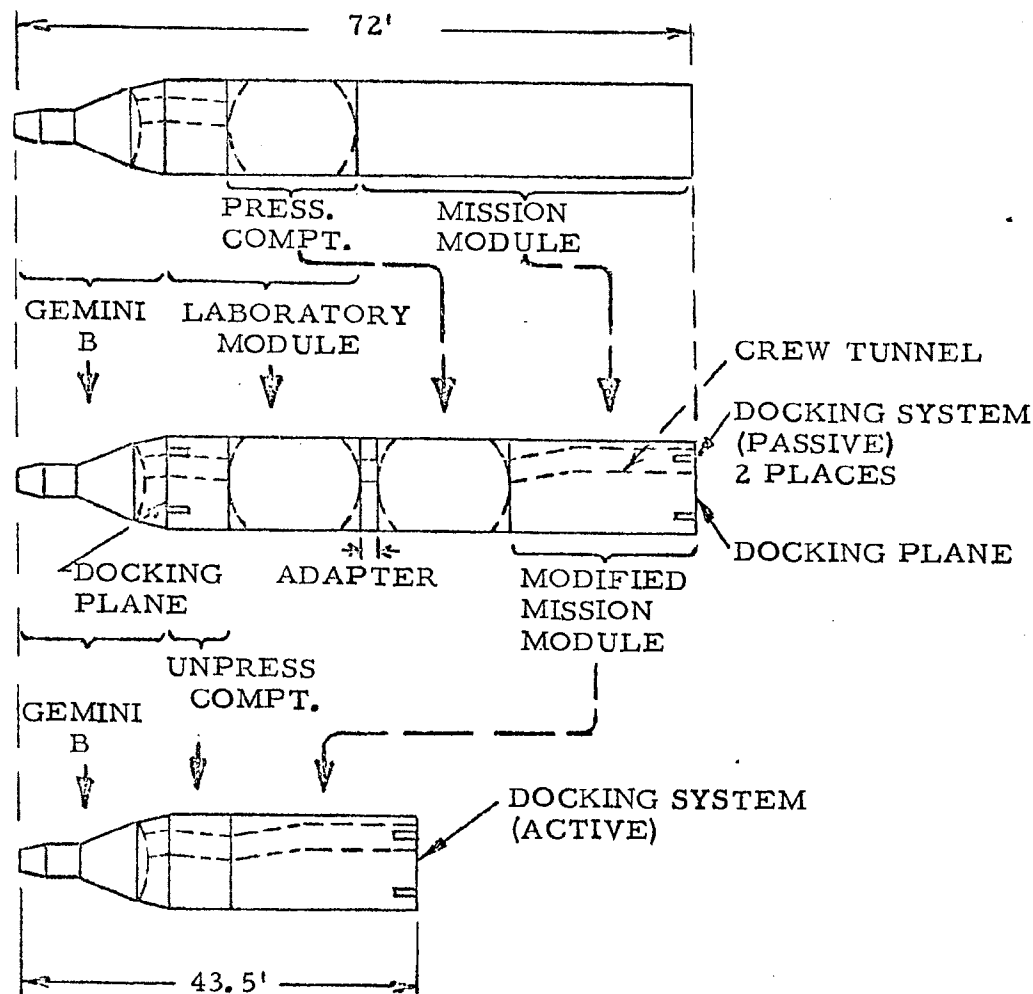
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UTILIZATION OF MOL HARDWARE FOR
4 MAN DUAL COMPARTMENT LABORATORY CONFIGURATION

○ MOL BASELINE VEHICLE

○ RENDEZVOUS INITIAL VEHICLE (RDV)

○ RENDEZVOUS RESUPPLY VEHICLE (RRV)

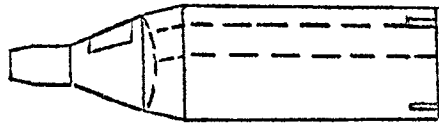


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2 MAN DUAL COMPARTMENT LABORATORY CONFIGURATION

(COMBINED MISSION)

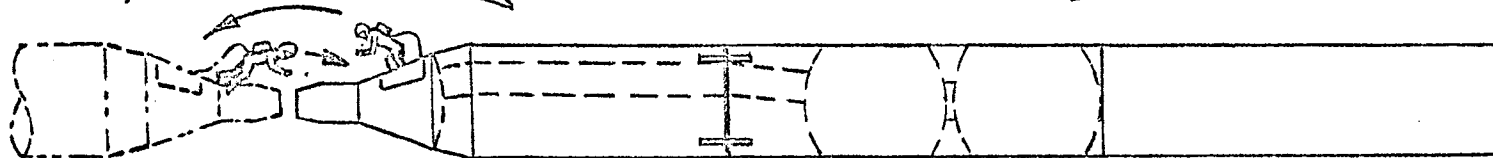


RENDEZVOUS
RESUPPLY VEHICLE
(RRV)



INITIAL LAUNCH RENDEZVOUS
LABORATORY VEHICLE (RIV)

POSSIBLE CREW
TRANSFER FROM
SUBSEQUENT RRV'S



RENDEZVOUS ORBITING VEHICLE
(ROV)

RRV FUNCTIONS

- CREW TRANSPORT VEHICLE
- ACTS PROPULSION
- PRIME POWER
- LIFE SUPPORT EXPENDABLES
- DATA RETURN SYSTEM
- SUBSYSTEM SPARES/REPLACEMENTS

RIV FUNCTIONS

- LIFE SUPPORT SYSTEM
- ATTITUDE CONTROL REF. ELECTRONICS
- COMMUNICATIONS AND DATA HANDLING
- ENVIRONMENTAL CONTROL
- PERFORMANCE DATA

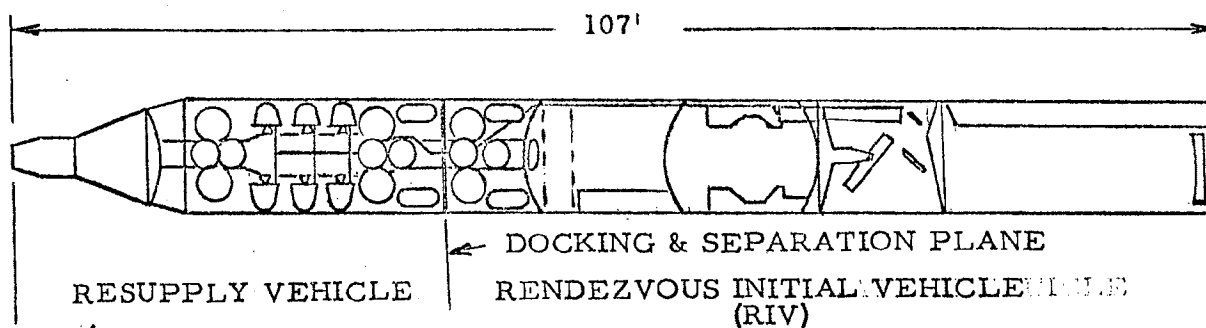
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2 MAN DUAL COMPARTMENT LABORATORY
CONFIGURATION AND PERFORMANCE SUMMARY
(COMBINED MISSION)

● CONFIGURATION



● PERFORMANCE DATA

TOTAL PRESSURIZED VOLUME (SHIRT SLEEVE ENVIRONMENT)	2,060 FT ³
AVAILABLE PRESSURIZED VOLUME FOR CREW	1,200 FT ³
AVAILABLE PRESSURIZED VOLUME FOR EXPERIMENT EQUIPMENT	210 FT ³
R.I.V. EXP. PAYLOAD CAPACITY ($i = 96.4^\circ$, 80/180 NM)	3,000 LBS
ELECTRICAL POWER (AVERAGE)	1,950 WATTS
RESUPPLY CYCLE	60 DAYS

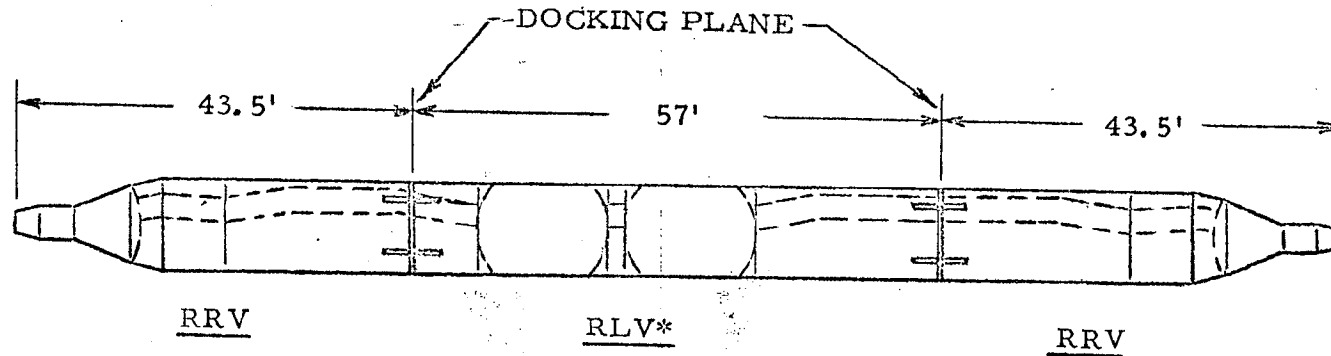
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FUNCTION DISTRIBUTION
ORBITING CONFIGURATION



RRV FUNCTIONS
(STORAGE END)

- o CREW TRANSPORT (STORAGE)

RLV FUNCTIONS

- o LIFE SUPPORT
- o ENVIRONMENTAL CONTROL
- o ACTS - REFERENCE
- o COMMUNICATIONS/DATA
- o BIO MED EQUIPMENT
- o EXPERIMENTS

RRV FUNCTIONS
(ACTIVE END)

- o CREW TRANSPORT
- o ACTS - PROPULSION
- o PRIME ELECTRICAL POWER
- o LIFE SUPPORT EXPENDABLES
- o DATA RETURN SYSTEM
- o EXPERIMENTS
- o SPARE EQUIPMENT

~~D SECRET~~

* RENDEZVOUS LABORATORY VEHICLE = R. O. V. LESS GEMINI B

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4 MAN - DUAL COMPARTMENT CONCEPT
POSSIBLE RENDEZVOUS/RESUPPLY OPERATIONS

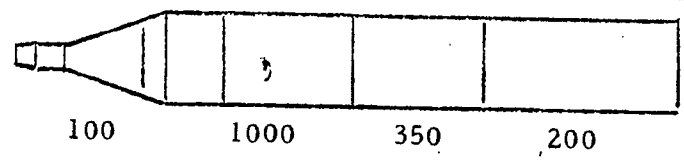
<u>TIME LINE</u> (DAY)	<u>FUNCTION</u>	<u>CREW</u>	<u>CONFIGURATION</u>
0-60	LAUNCH ROV & OPERATE	2	
60	LAUNCH RRV #1	2	
	RENDEZVOUS WITH ROV DOCK & OPERATE ROV SYSTEM	4	
120	LAUNCH RRV #2	2	
	RENDEZVOUS WITH ROV SEPARATE RRV #1 & STATION KEEP DOCK RRV #2 ON P/L COMPARTMENT SEPARATE GEMINI #1 & RETURN DOCK RRV #1 ON ROV/GEM I. F. OPERATE ROV SYSTEM	4	
180	LAUNCH RRV #3 & SUBS. (REPEAT RRV SEQUENCE)		SAME AS RRV #2 CONFIG.

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ESTIMATED ELECTRICAL POWER REQUIREMENTS

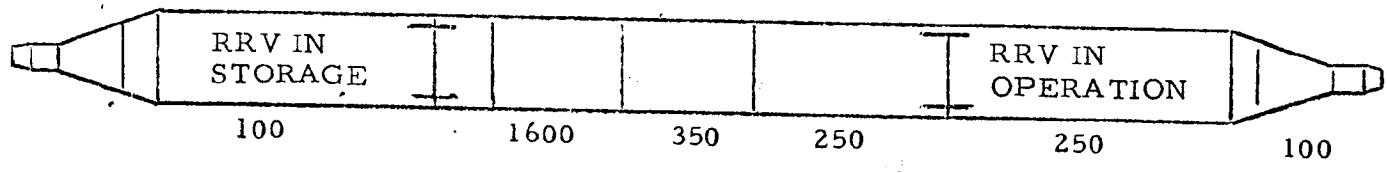
(WATTS)

- 2 MAN DUAL COMPARTMENT VEHICLE - INTEGRAL LAUNCH



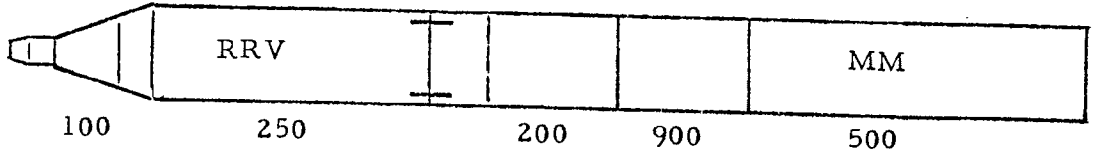
1650 WATTS

- 4 MAN DUAL COMPARTMENT VEHICLE - RENDEZVOUS (BIO TEST) -



2000 WATTS

- 2 MAN DUAL COMPARTMENT VEHICLE - RENDEZVOUS (COMBINED MISSION)



1950 WATTS

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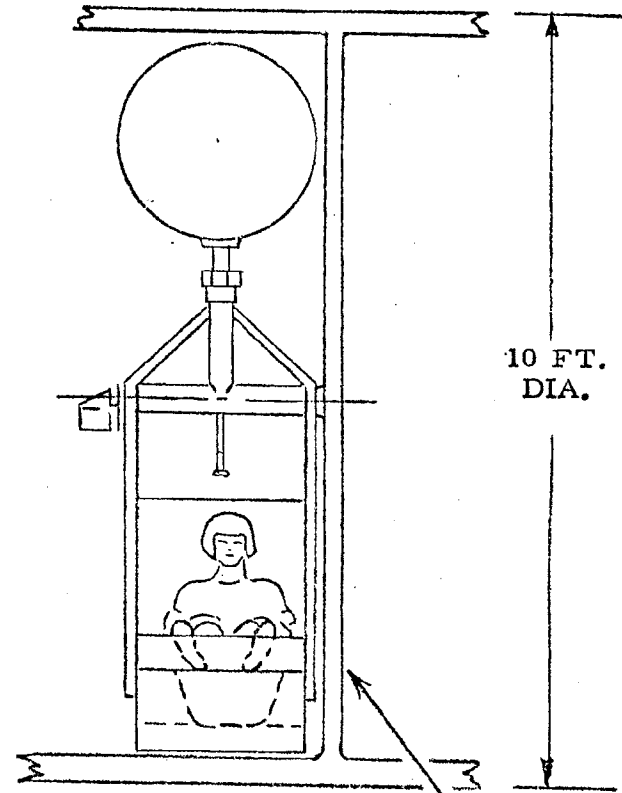
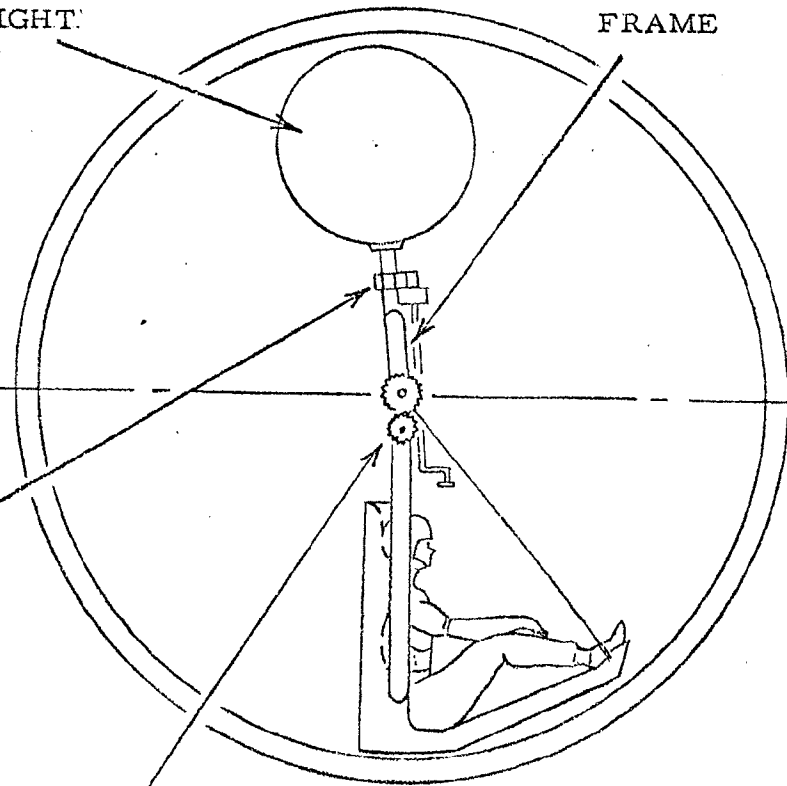
INTERNAL CENTRIFUGE CONCEPT

COUNTER WEIGHT
(BALLAST)

FRAME

BALANCING
MECHANISM

MOTOR DRIVE



SUPPORT STRUCTURE

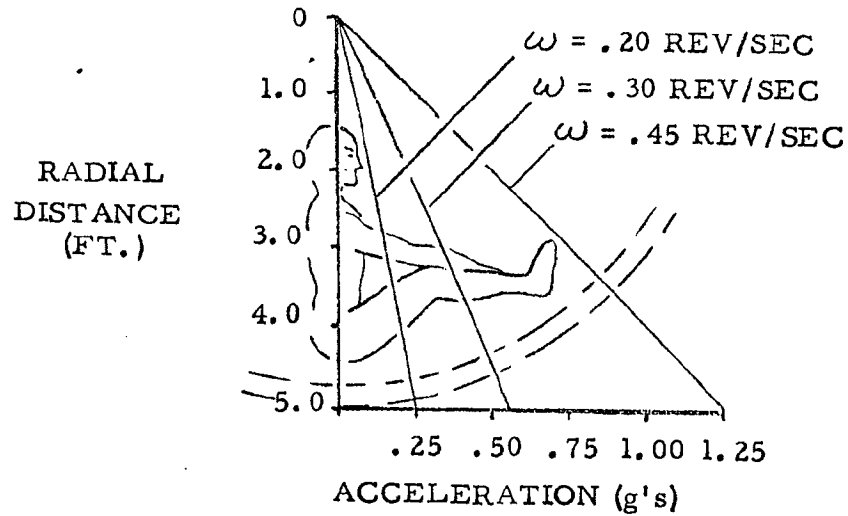
⊙ WEIGHT PENALTY = 400 LBS. PLUS ATTITUDE CONTROL REQUIREMENTS

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INTERNAL CENTRIFUGE
ACCELERATION & ATTITUDE CONTROL FUEL CONSUMPTION



● FUEL CONSUMPTION FOR SPIN
CYCLE DURATION - 600 SEC.




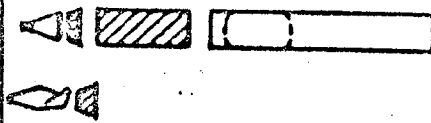


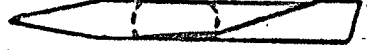
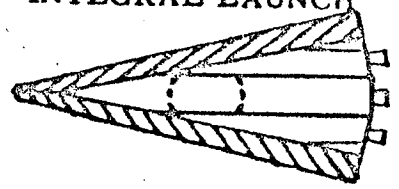
● SPIN/DESPIN	1.0
● GYRO COUPLING	0.3
TOTAL	<u>1.3 LBS.</u>

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POTENTIAL VEHICLE SYSTEM CONCEPTS

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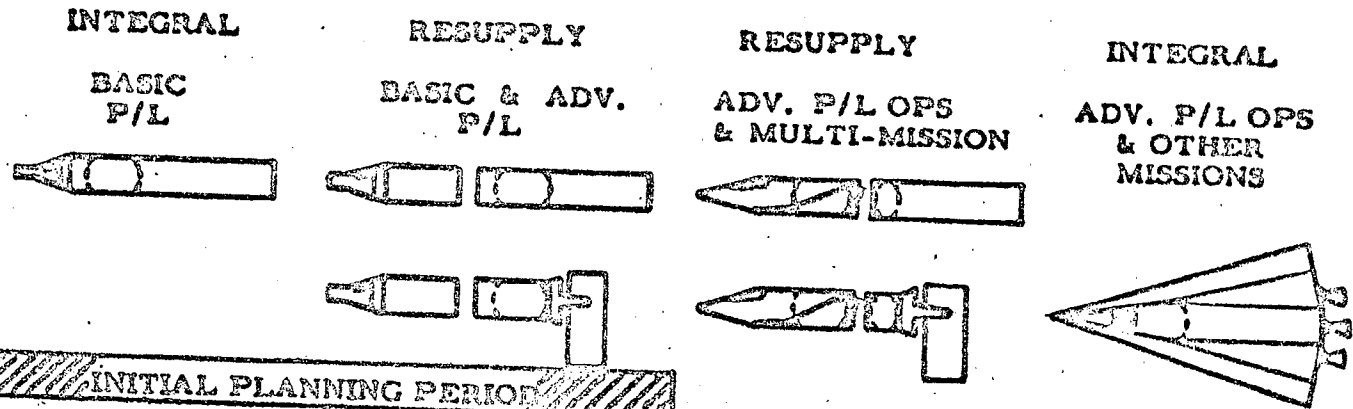
3.6

<p>I</p> <p>INTEGRAL LAUNCH</p>  <p>Dispose all Segments each Mission.</p>	<p>II</p> <p>INTEGRAL LAUNCH</p>  <p>Retrieve/Reuse R. E. V. each Mission - Dispose all other Segments.</p>	<p>III</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Dispose R. E. V. + Supply Module (RRV) each Resupply Mission - Revisit/Reuse Orbiting Vehicle for ~ 1 year cycle.</p>	<p>IV</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Dispose Supply Module each Resupply Mission - Retrieve/Reuse R. E. V. - Revisit/Reuse Orbiting Vehicle for ~ 1 year cycle.</p>
<p>V</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Retrieve/Reuse R. E. V. + Supply Module (RRV) each Resupply Mission - Revisit/Reuse Orbiting Vehicle for ~ 1 year cycle.</p>	<p>VI</p> <p>RENDEZVOUS/RESUPPLY</p>  <p>Retrieve/Reuse Integrated R. E. V. + Supply Module + Lab - Revisit/Reuse Mission Module Lab ~ 1 year cycle</p>	<p>VII</p> <p>INTEGRAL LAUNCH</p>  <p>Retrieve/Reuse fully Integrated R. E. V. + Lab + Supply Module + Mission Module. Dispose conventional booster only.</p>	<p>VIII</p> <p>INTEGRAL LAUNCH</p>  <p>Retrieve/Reuse fully Integrated R. E. V. + Lab + Supply Module + Mission Module + Propulsion Sys. Dispose propellant tanks and pressurization system only.</p>

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FOLLOW-ON SYSTEMS PERSPECTIVE



INITIAL PLANNING PERIOD

SYSTEM AVAILABILITY	1970	1973 - 1975	1978	POST 1980
R. E. V. TYPE	GEMINI B	GEMINI B	LIFTING BODY (MED L/D)	LIFTING BODY (HI L/D)
LAUNCH VEH.	T III M	T III M	LDC 1 & 2	STRAP-ON TANK-AGE
LAUNCH WEIGHT	31.0 K (i = 90°)	30.0 K (i = 96.4°)	47.0 K (i = 96.4°)	~ 70.0 K
P/L TYPE	BASELINE 4"	BASIC (4") & ADV (2")	ADV (2") & MULT.	ADV (2") & OTHER
MISSION DURATION	30 DAYS	CONT. OPS - 1 YR.	CONT. OPS - 1 YR.	60 + DAYS
DEV. 'MT STATUS		60 D. RESUPPLY (BASIC)	50 D. RESUPPLY	
R. E. VEHICLE	PHASE II	PHASE II	TECHNOLOGY STUDIES	PROPOSED BY INDUSTRY
LAB. MOD.	"	"	COMPONENTS IN Q II	
MISS. MOD.	"	"	PRELIMINARY STUDIES	
LAUNCH VEHICLE	"	"	PRELIMINARY STUDIES	
DEV'MT CYCLE	5 YR	3 YR (BASIC)	7 YR	10-12 YRS
△ NRC - (ROM)	0	275 M\$	1,200 M\$	2,000 M\$

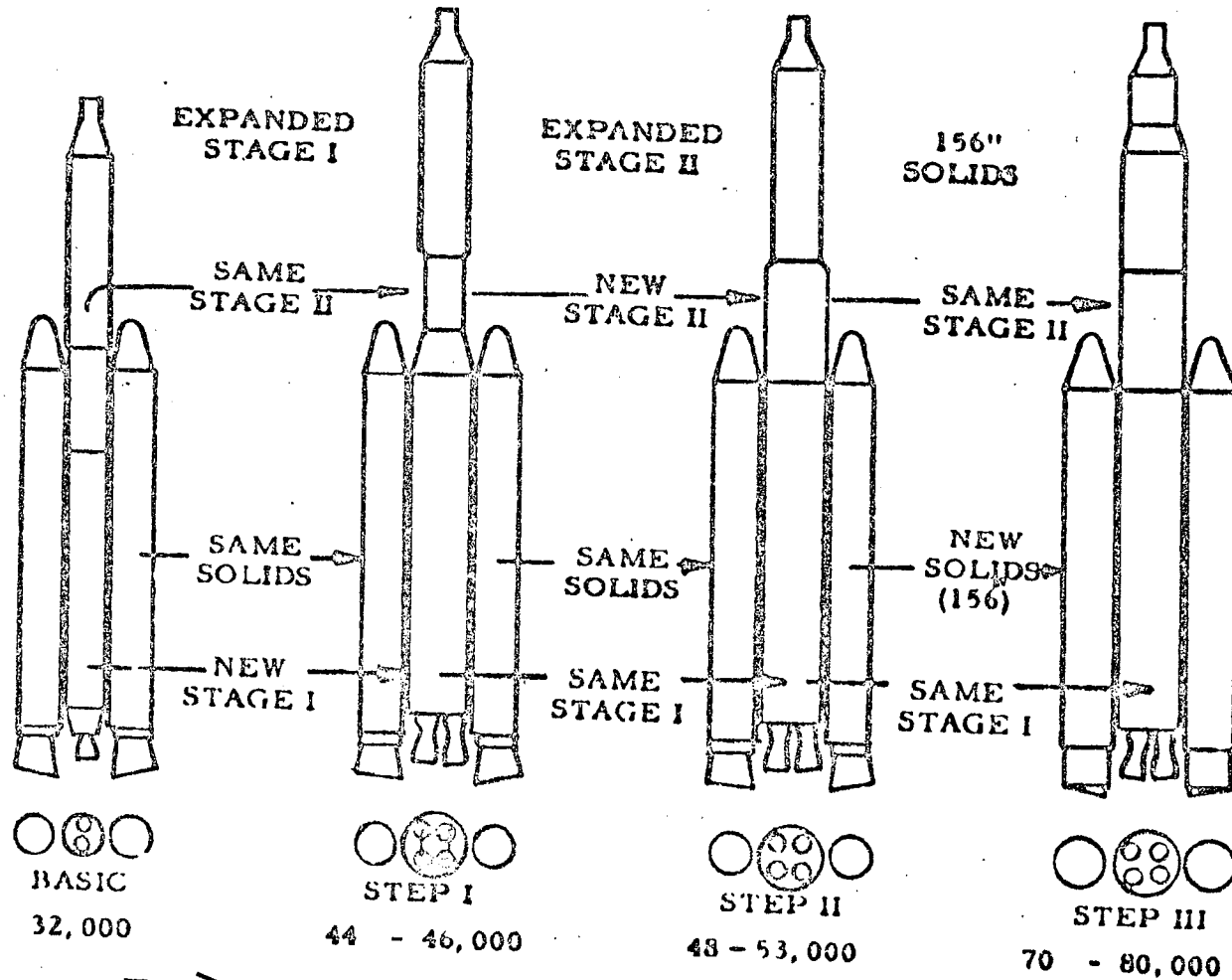
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POSSIBLE MOL LAUNCH VEHICLE EVOLUTION

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T-III
MOL



P/L (80°80/130)

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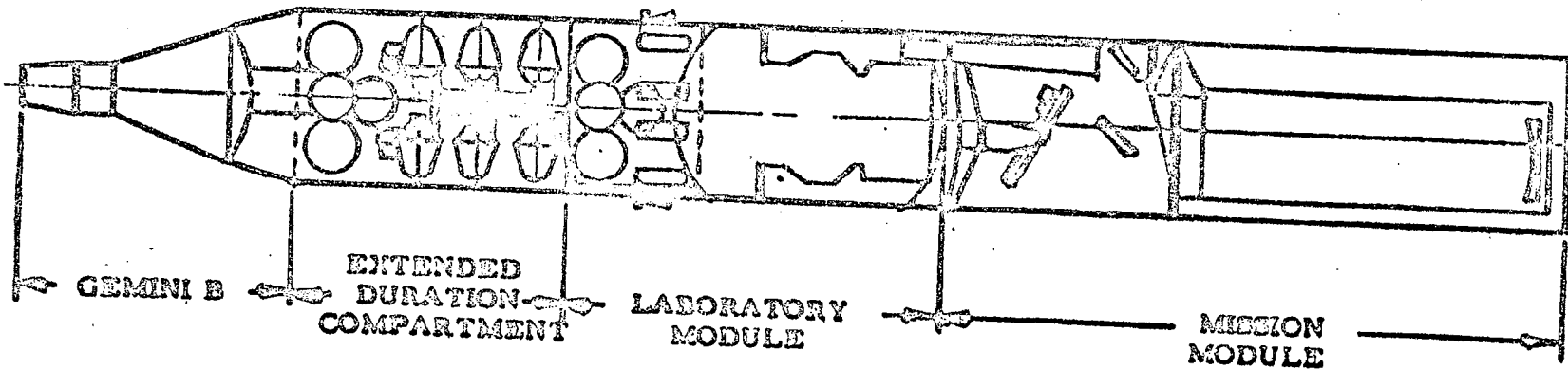
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EXTENDED DURATION INTEGRAL LAUNCH

ORBITING VEHICLE

(50 DAY MISSION DURATION)

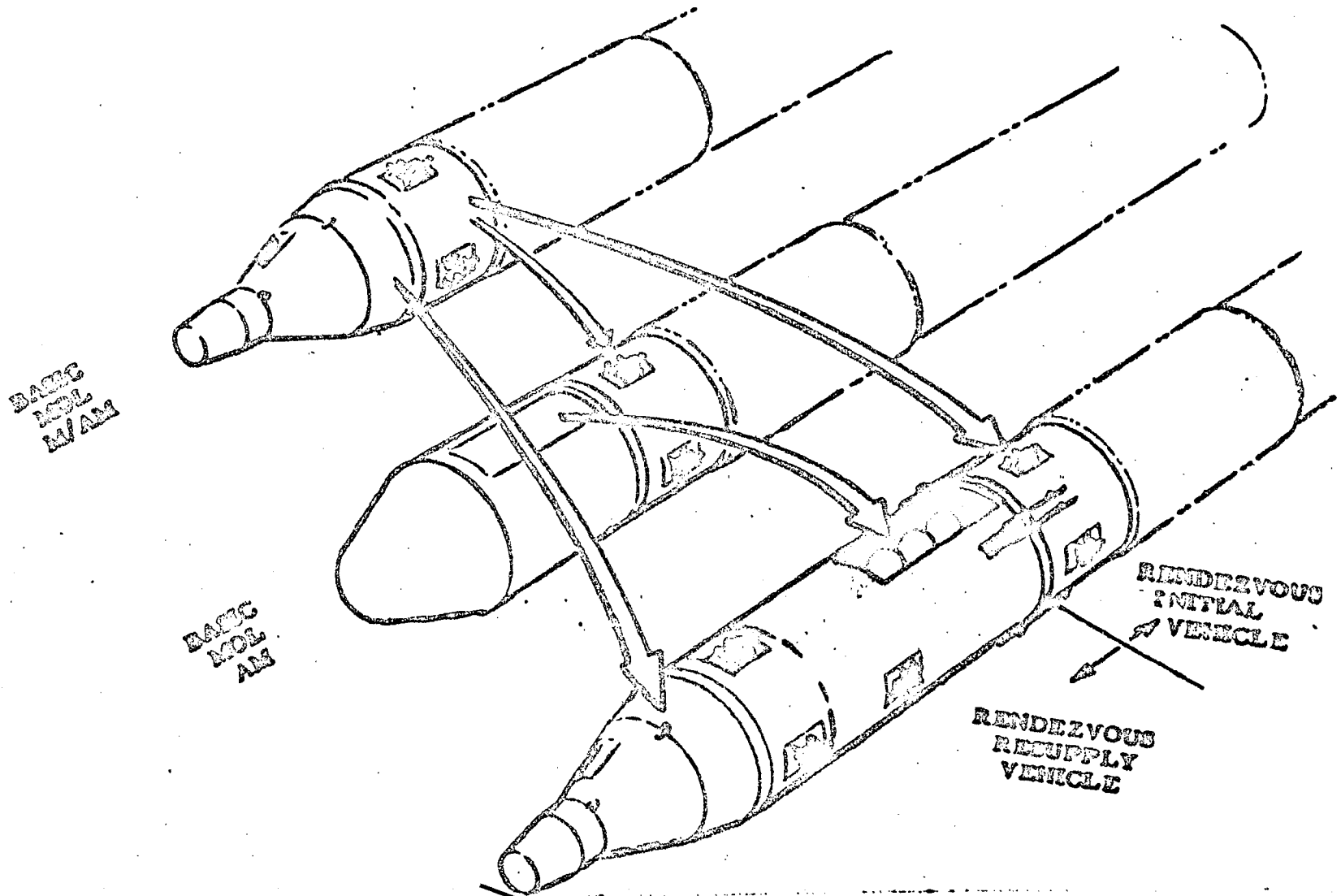
(LDC 1 BOOSTER)



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RESUPPLY SYSTEM CONCEPT

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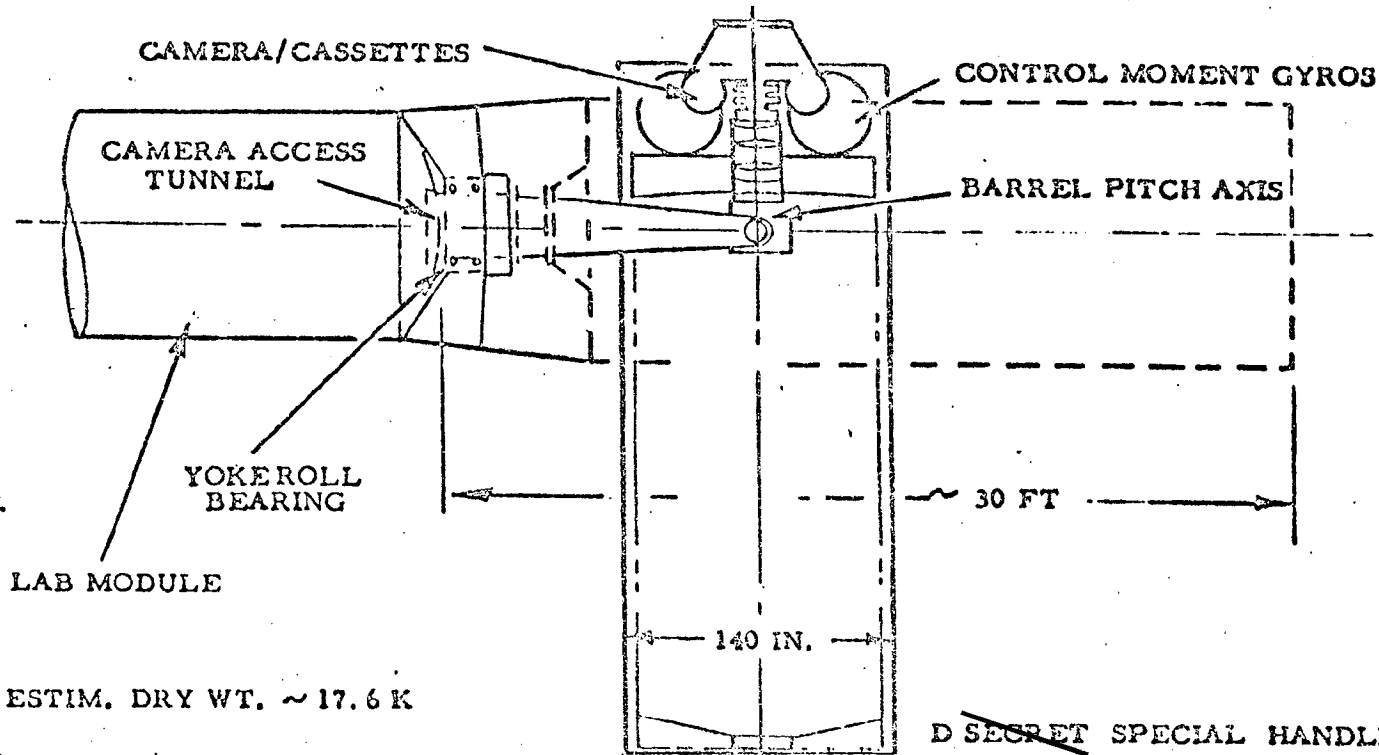
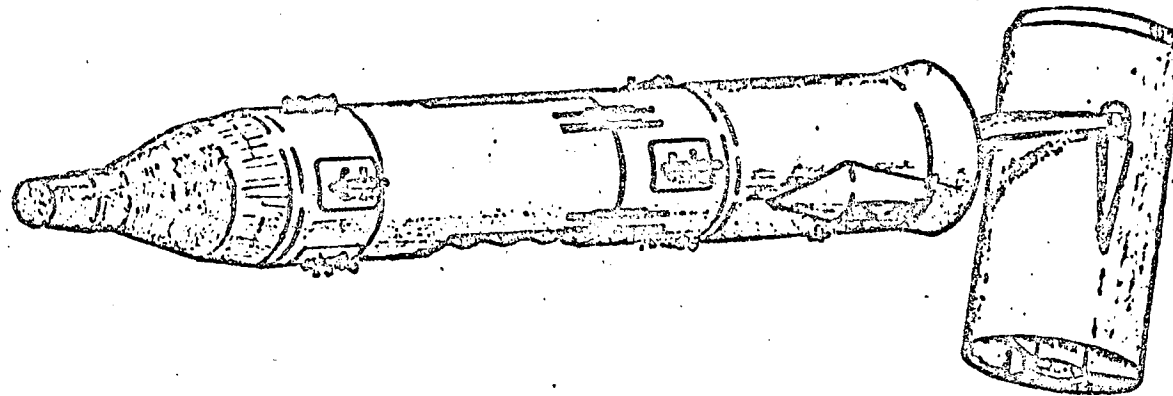


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POSSIBLE ADVANCED PAYLOAD CONFIGURATION

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ESTIM. DRY WT. ~ 17.6 K

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SELECTED EARLY FOLLOW-ON ALTERNATIVES

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BASIC
MOL
PROGRAM

○ INTEGRAL LAUNCH OPERATIONS

M/AM

EDAM

- THM M
- 4" RES. P/L
- 30 DAY

- THM M
- 4" RES. P/L
- 45 DAY

(BASELINE SYSTEMS)

(EXTENDED DURATION SYSTEMS)

M/AM AM

M/AM

M/AM

- THM LDC 1
- 4" RES. P/L
- 50 DAY

- THM LDC 1 & 2
- 2" RES. ADV. P/L
- 60 DAY

- THM M
- 4" RES. P/L
- 30 DAY

○ RENDEZVOUS/RESUPPLY OPERATIONS

RIV

RRV

RIV

RRV

- THM M
- 4" RES. P/L
- CONT. OPS
- 60 DAY RESUPPLY

- THM M
- 2" RES. ADV. P/L
- CONT. OPS.
- 50 DAY RESUPPLY

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STP

2364

13

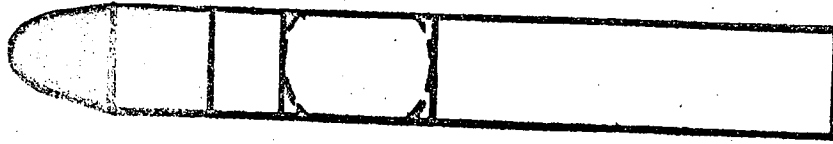
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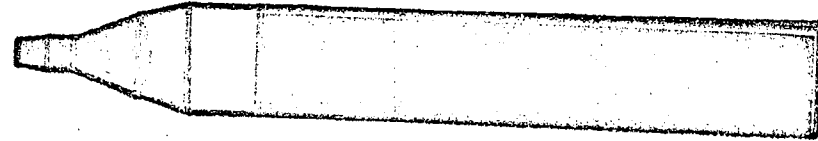
RESUPPLY SYSTEM DERIVATION FROM MOL HARDWARE

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BASELINE AM VEHICLE

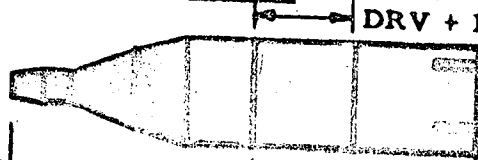


BASELINE M/AM VEHICLE



RENDEZVOUS RESUPPLY VEHICLE

(RRV)



DRV + FILM HANDLING SYSTEM

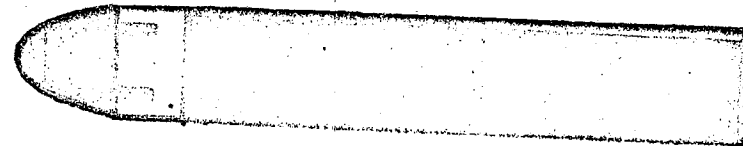
GEMINI B LABORATORY UNPRESSURIZED COMPARTMENT

EXTENDED DURATION MODULE

- ADD BASELINE SUBSYSTEM COMPONENTS
- ADD DOCKING SYSTEM AND INTERFACE

RENDEZVOUS INITIAL VEHICLE

(RIV)



- DELETE GEMINI B
- ADD EXTENDED DURATION PROVISIONS
- ADD DOCKING SYSTEM AND INTERFACE
- ADD ASCENT FAIRING

D

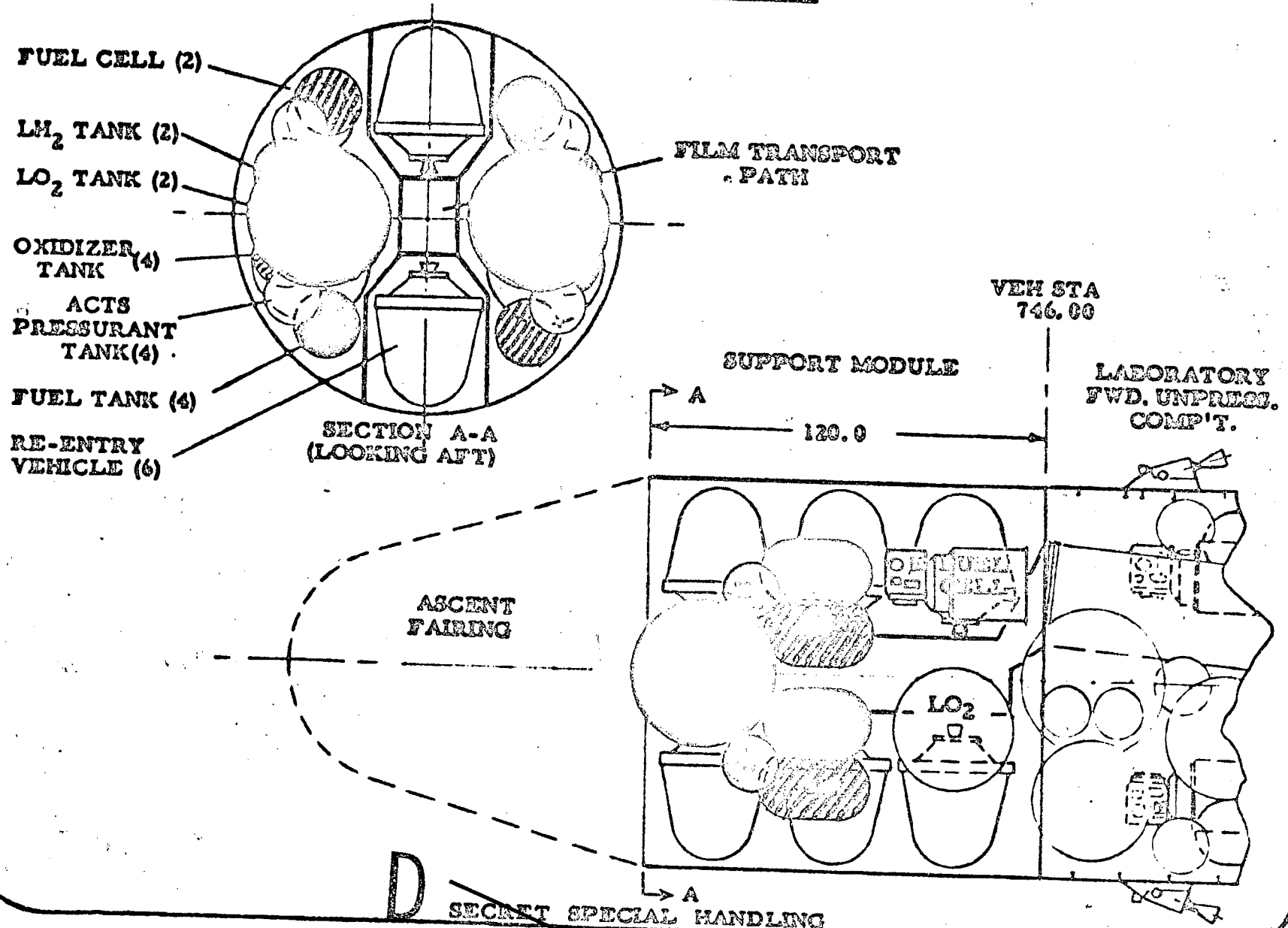
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65 DAY MISSION SUPPORT MODULE

INTERNAL ARRANGEMENT

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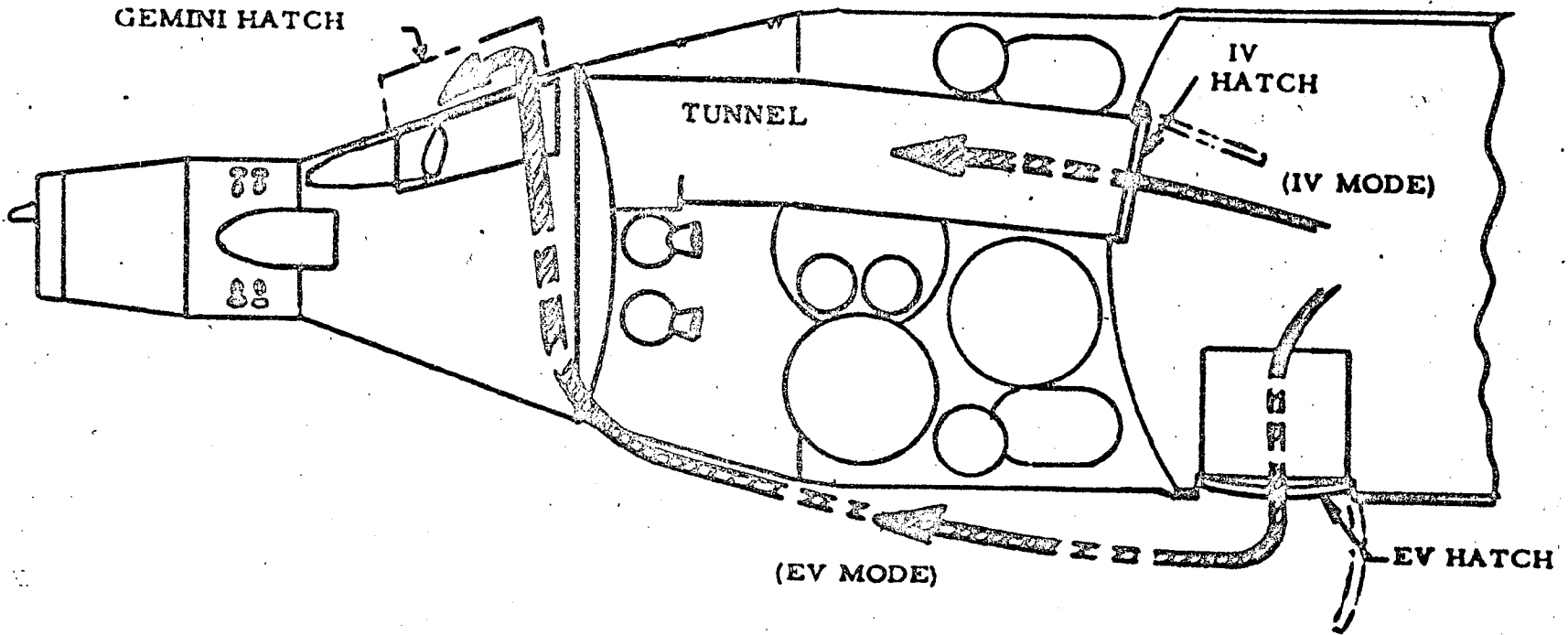
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ACCESS ROUTE PROBABILITIES

(LABORATORY TO GEMINI B)



INTRA-VEHICULAR MODE (IV)

EXTRA-VEHICULAR MODE (EV)

<u>EVENT</u>	<u>PROBABILITY*</u>
⊙ HATCH INOPERATIVE	3.0×10^{-6}
⊙ CRUSHED TUNNEL	$.3 \times 10^{-6}$

<u>EVENT</u>	<u>PROBABILITY*</u>
⊙ DRV TUBE HATCH INOPERATIVE	3.0×10^{-6}
⊙ PRESSURE SUIT ASSEMBLY INOPERATIVE	$.03 \times 10^{-6}$
⊙ GEMINI B HATCH INOPERATIVE (OPEN)	6×10^{-6}

* PROBABILITY OF OCCURRENCE FOR 30 DAY IN-ORBIT

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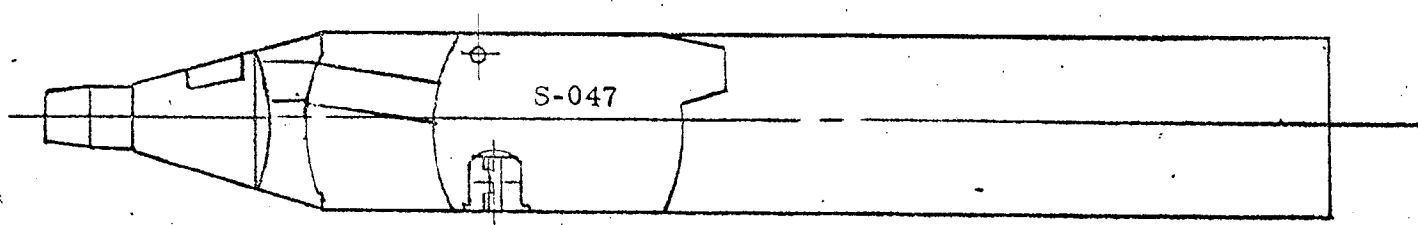
APPROVED FOR RELEASE 10 JUNE 2014

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MOL/NASA APPLICATIONS "A"
FLIGHTS 3, 4, AND 5 (MANNED)
(30 DAY DURATION)



- S-047 STELLAR REFRACTION EXPERIMENT
(158 LBS - 74 WATTS OPERATING POWER)
74
- ✓ MANUAL OPERATION FOR STAR ACQUISITION
- ✓ MINIMUM SUBSYSTEM IMPACT
- ✓ INSTALLATION REQUIREMENTS COMPATIBLE WITH
VEHICLE DESIGN FEATURES
- ✓ LESS THAN 1 KWH ELECTRICAL ENERGY PER MISSION
- ✓ LESS THAN 4 HOURS OF CREW TIME PER MISSION

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CLASSIFIED AT 3 YEAR INTERVALS;
DECLASSIFIED AFTER 12 YEARS,
DOD DIR 5200.10

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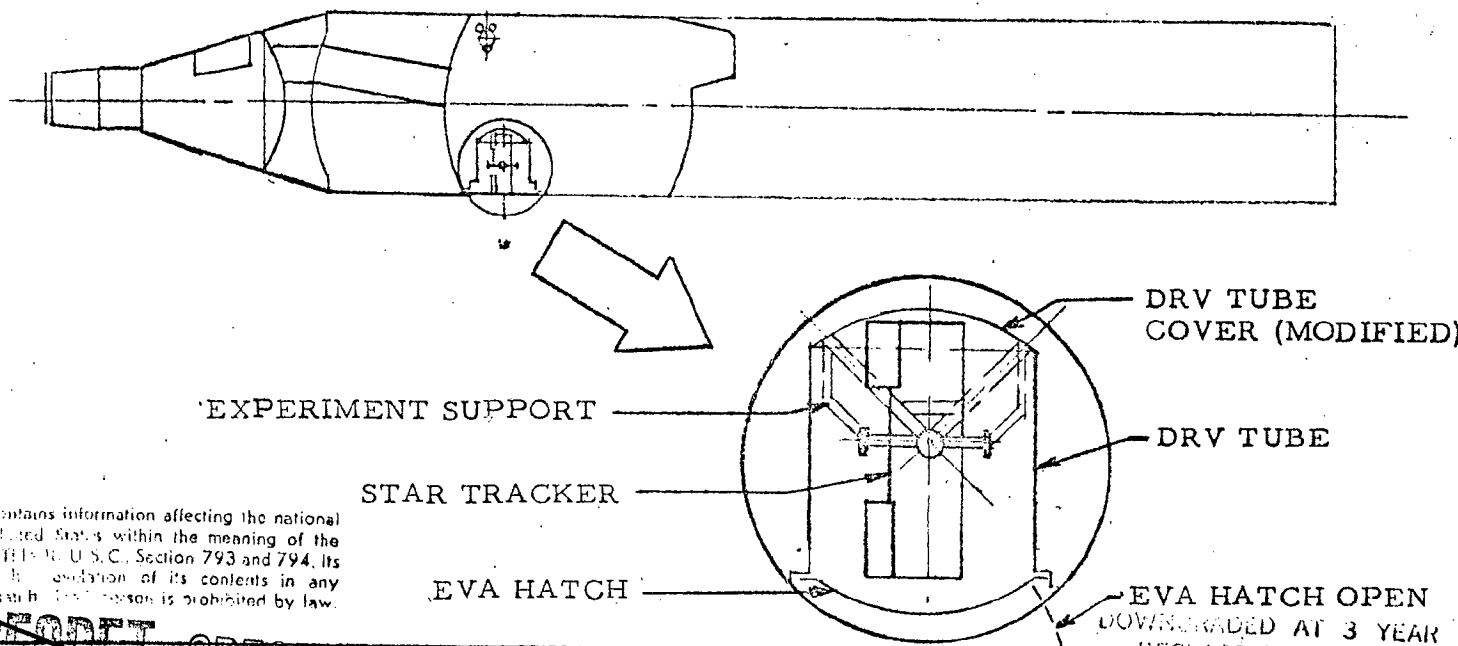
POSSIBLE S-047 EXPERIMENT INSTALLATION

(MOL FLIGHTS 3, 4, AND 5)

- S-047 WEIGHT (INSTALLED) 158 LBS
- S-047 VOLUME (STOWAGE) 4.5 CU. FT.
- S-047 ELECTRICAL ENERGY 9.5 KWH
- S-047 POWER PEAK 74 WATTS
- CREW TIME REQUIRED 20 HRS
- ACTS PROPELLANT REQUIRED 20 LBS

STOW IN SLEEP POSITION FOR LAUNCH

OPERATE FROM DRV TUBE



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EVA HATCH OPEN
DOWNGRADED AT 3 YEAR INTERVALS;
DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10

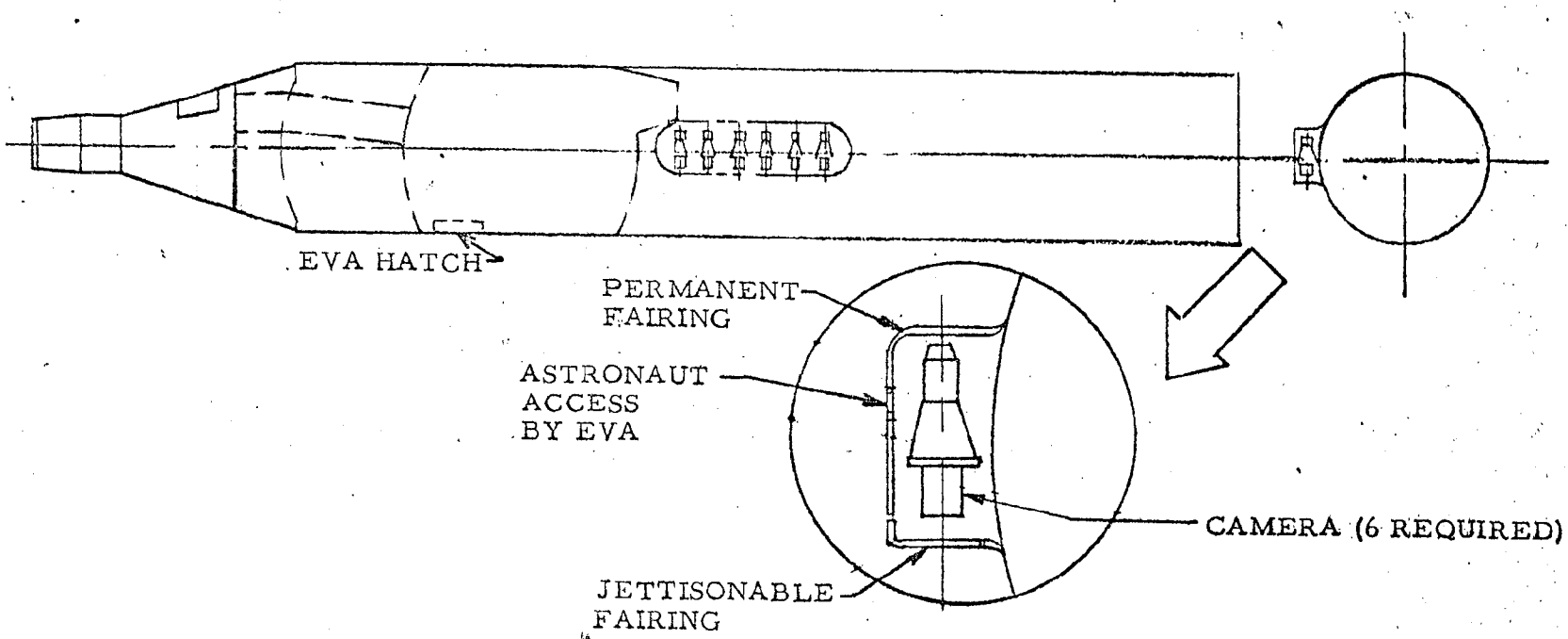
121

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POSSIBLE S-042 EXPERIMENT INSTALLATION

(MOL FLIGHTS 3, 4, AND 5)



- S-042 WEIGHT (INSTALLED) ~2000 LBS
- S-042 ELECTRICAL ENERGY 3.2 KWH
- S-042 POWER PEAK 945 WATTS
- EVA REQUIRED FOR EXPERIMENT SUPPORT ~1.5 HRS
- CREW EXPERIMENT OPERATING TIME 2 HRS
- DATA RETURN 200 LBS

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DOWNGRADED AT 5 YEAR INTERVALS;
 DECLASSIFIED AFTER 12 YEARS.
 DOD DIR 5200.10

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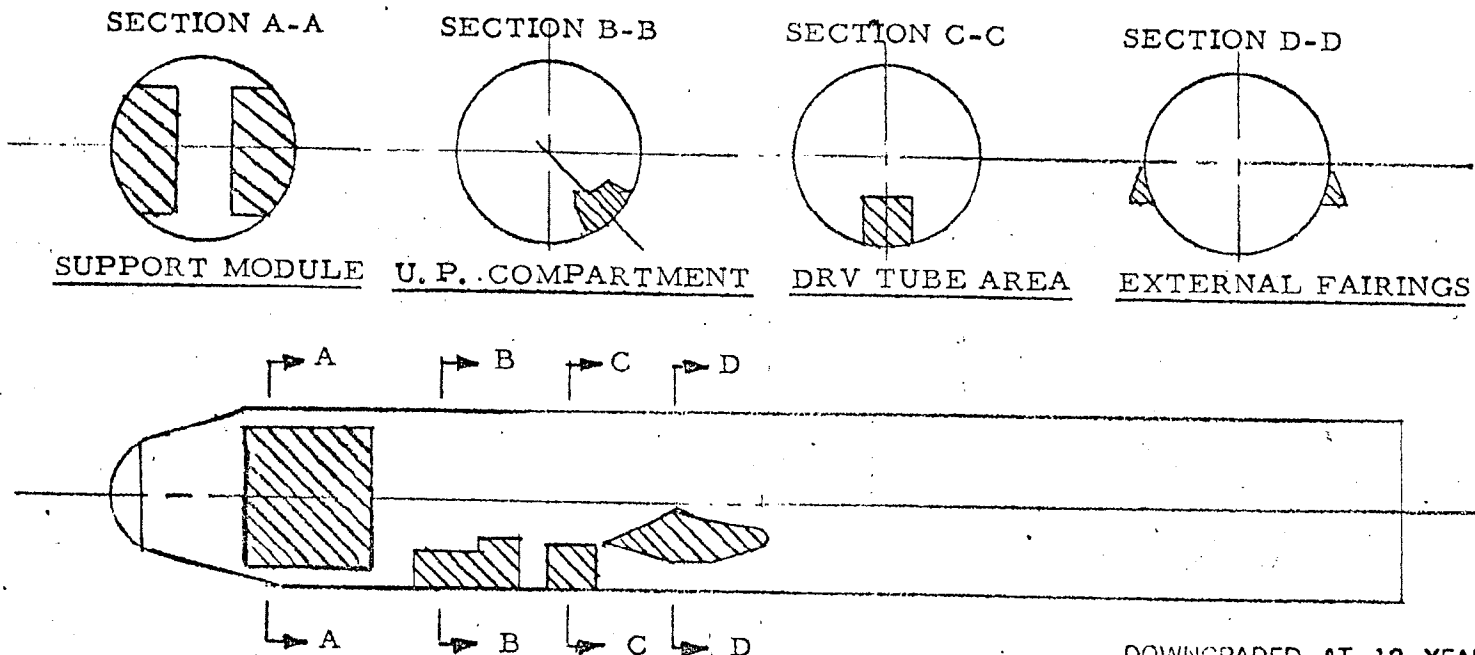
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SPECIAL HANDLING

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AVAILABLE VOLUME FOR EXPERIMENTS

(MOL FLIGHTS 6 AND 7)



o AVAILABLE VOLUME

SUPPORT MODULE	366 CU. FT.
U.P. COMPARTMENT	33 CU. FT.
DRV TUBE AREA	23 CU. FT.
EXTERNAL FAIRING (2)	36 CU. FT.

DOWNGRADED AT 12 YEAR
INTERVAL; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

SPECIAL ACCESS REQUIRED
CLASSIFIED SPACE PROGRAM

NUMBER 632a

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SPECIAL HANDLING

SPECIAL ACCESS REQUIRED
CLASSIFIED SPACE PROGRAM

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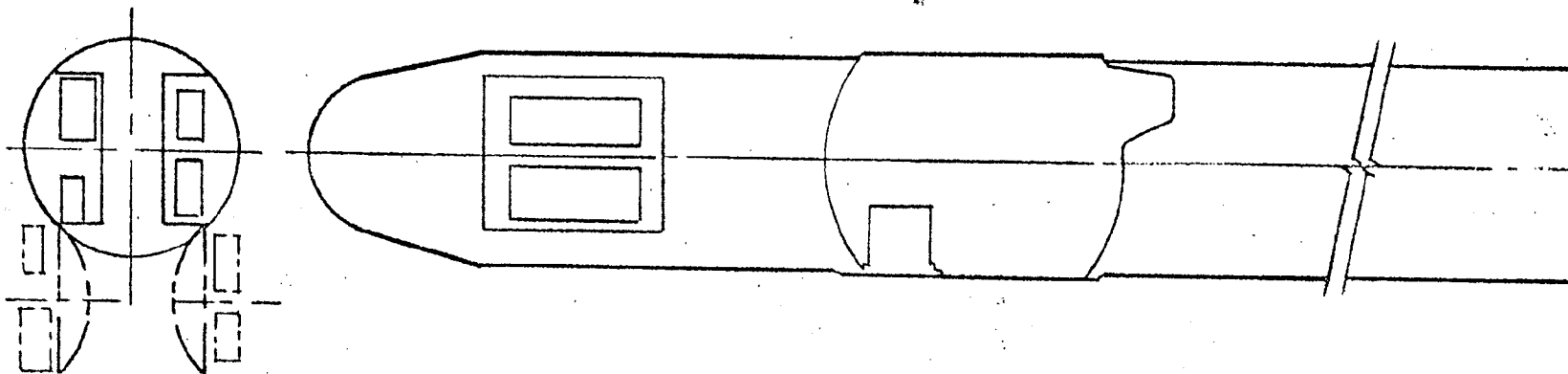
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NUMBER 632a

MOL/NASA APPLICATIONS "A"

FLIGHT 6 OR 7 (UNMANNED)

(30 DAY DURATION)



- CAPABILITY FOR ALL EXPERIMENTS EXCEPT S-042 AND S-047
- AMPLE VOLUME AVAILABLE IN SUPPORT MODULE FOR EXPERIMENT INSTALLATION
- ADEQUATE PAYLOAD MARGIN FOR EXPERIMENT WEIGHT REQUIREMENTS
- ADEQUATE POWER AVAILABLE FOR EXPERIMENT REQUIREMENTS
- SYSTEM IMPACT
 - ✓ SUPPORT MODULE DESIGN MODIFICATIONS
 - ✓ DATA MANAGEMENT SUBSYSTEM AUGMENTATION
 - ✓ ON-BOARD SOFTWARE REVISION
 - ✓ SYSTEM TEST FLOW/AGE REVISIONS

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DOWNGRADED AT 12 YEAR
 INTERVALS; NOT AUTOMATICALLY
 DECLASSIFIED. DOD DIR 5200.10

D ~~SECRET~~ **SPECIAL HANDLING**

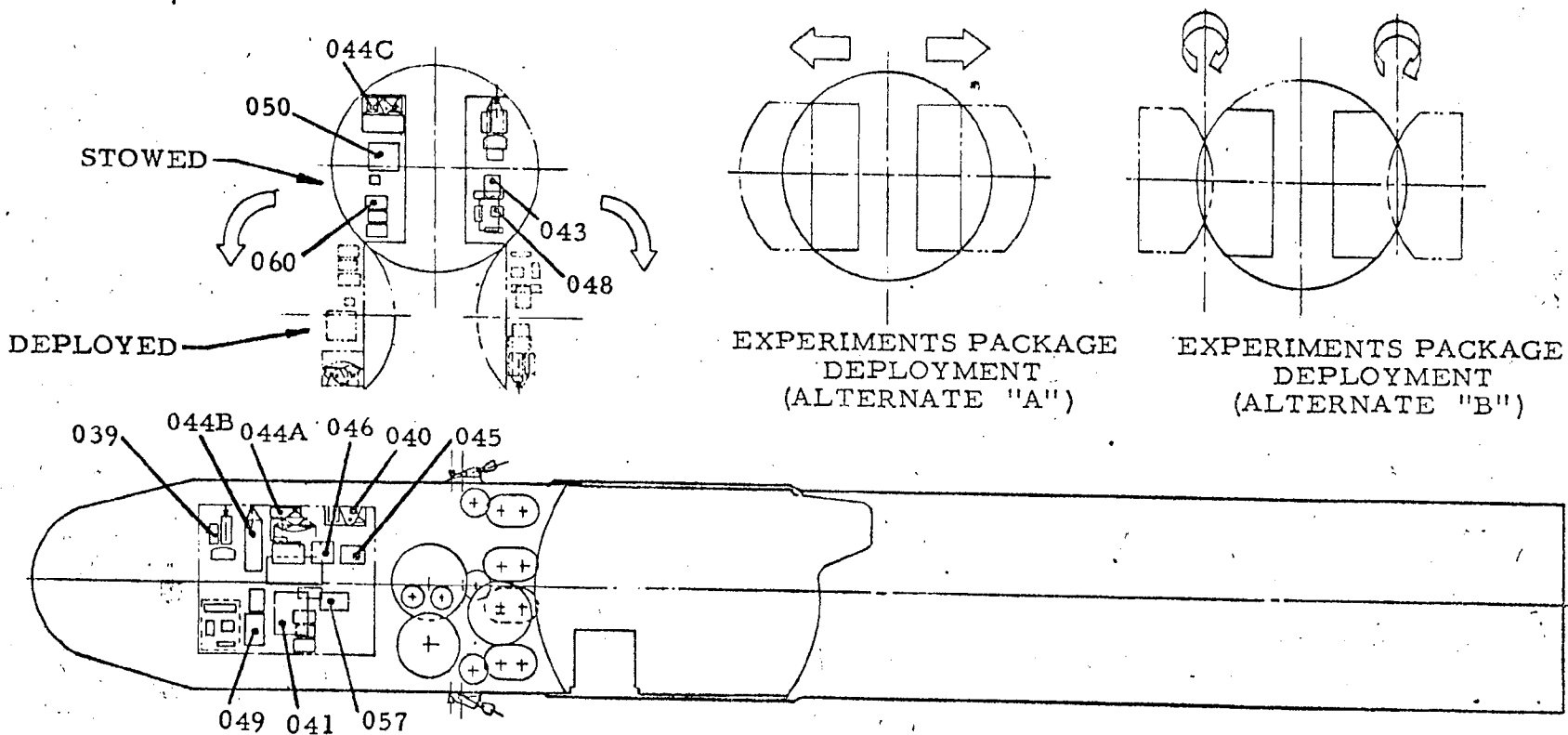
~~SECRET~~
SPECIAL ACCESS REQUIRED
CLASSIFIED SPACE PROGRAM

~~D SECRET~~ **SPECIAL HANDLING** WHS-311
Page 147

NUMBER 632a

PROPOSED CONFIGURATION

NASA APPLICATIONS "A" EXPERIMENTS ON FLIGHT 6 OR 7



MISSION DURATION	30 DAYS
AVAILABLE PAYLOAD MARGIN	7460 LBS
EXPERIMENTS PAYLOAD WEIGHT	1440 LBS

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~~D SECRET~~ **SPECIAL HANDLING**
DOWNGRADED AT 12 YEAR
INTERVALS, NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

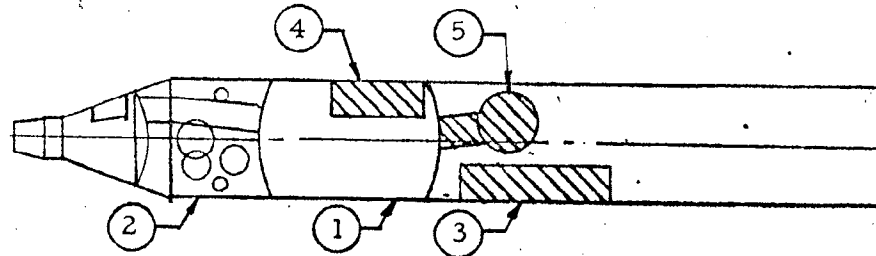
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D SECRET SPECIAL HANDLING
 MOL/NASA APPLICATIONS "A"

WHS-311
 Page 154

POSSIBLE SEPARATE VEHICLE APPLICATION CONCEPTS

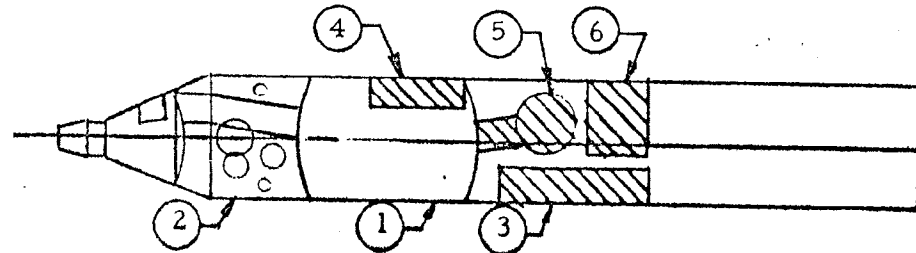
● CONCEPT A

1. BASELINE VEHICLE (LESS MISSION P/L EQUIP)
2. 30 DAY SYSTEMS QUAL
3. APP. "A" PACKAGE
4. BIO-TEST (P11 AND P12)
5. AIRLOCK



● CONCEPT B

1. BASELINE VEHICLE (LESS MISSION P/L EQUIP)
2. 30 DAY SYSTEMS QUAL
3. APP. "A" PACKAGE
4. BIO-TEST (P11 AND P12)
5. AIRLOCK
6. EXTENDED DURATION CAPABILITY (Δ 30 DAYS)
 - / ✓ ELECTRICAL POWER (CRYOGENIC TANKS AND FUEL CELLS)
 - / ✓ POWER CONDITIONING AND DISTRIBUTION
 - / ✓ EC/LS EXPENDABLES



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~~CONFIDENTIAL~~
D SECRET SPECIAL HANDLING

DOWNGRADE AT 3 YEAR INTERVALS;
 DECLASSIFIED AFTER 12 YEARS.
 GPO DIR 5200.10

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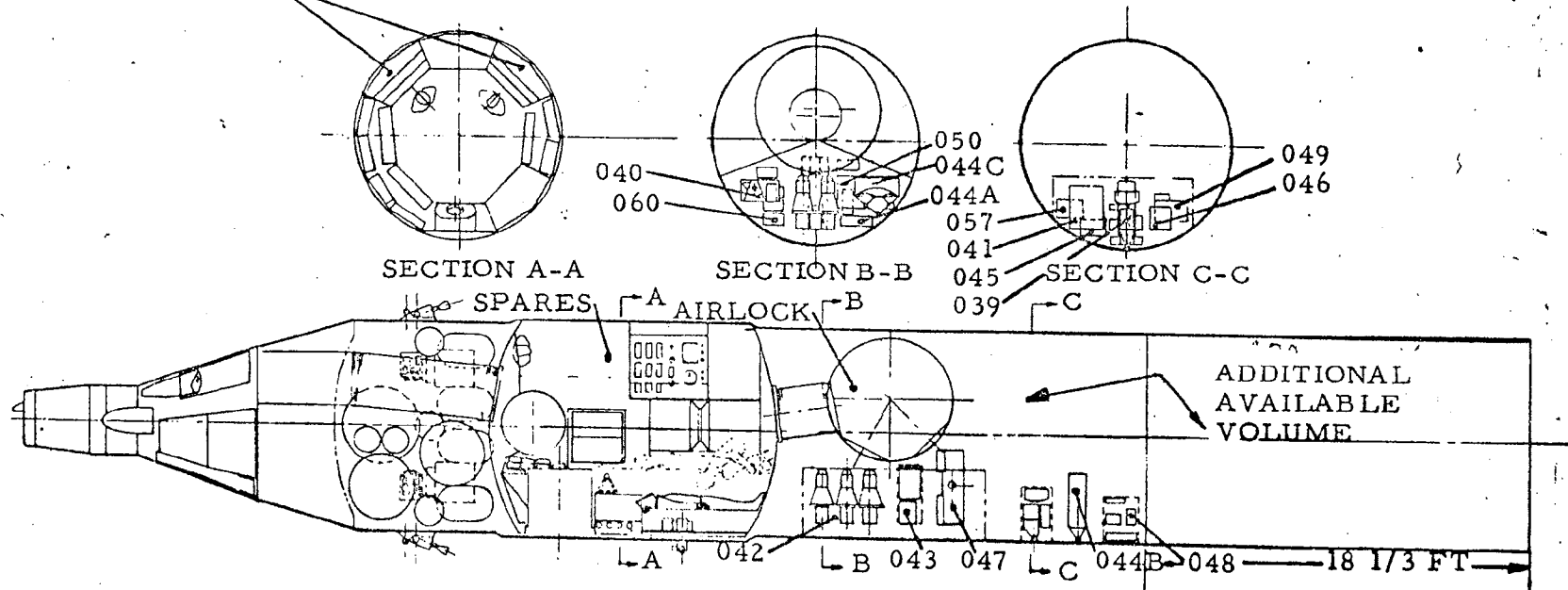
WHS-311
Page 155

B4

POSSIBLE SEPARATE VEHICLE APPLICATION - CONCEPT A

~~D~~ ~~SECRET~~ SPECIAL HANDLING

EXPERIMENTS P11 AND P12
(BIOMEDICAL AND PHYSIOLOGICAL
EVALUATION)



- MISSION DURATION
- PRESSURIZED VOLUME (INCLUDING AIRLOCK)
- EXPERIMENT PAYLOAD
- ADDITIONAL AVAILABLE VOLUME (UNPRESSURIZED)

30 DAY EXPENDABLES *per*
 1125 CU. FT.
 NASA APP. "A" + P11 + P12

~ 1700 CU. FT.
 DOWNGRADED AT 3 YEAR INTERVALS.
 DECLASSIFIED AFTER 12 YEARS.
 DOD DIR 5200.10

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~~D~~ ~~SECRET~~ SPECIAL HANDLING
~~CONFIDENTIAL~~

23

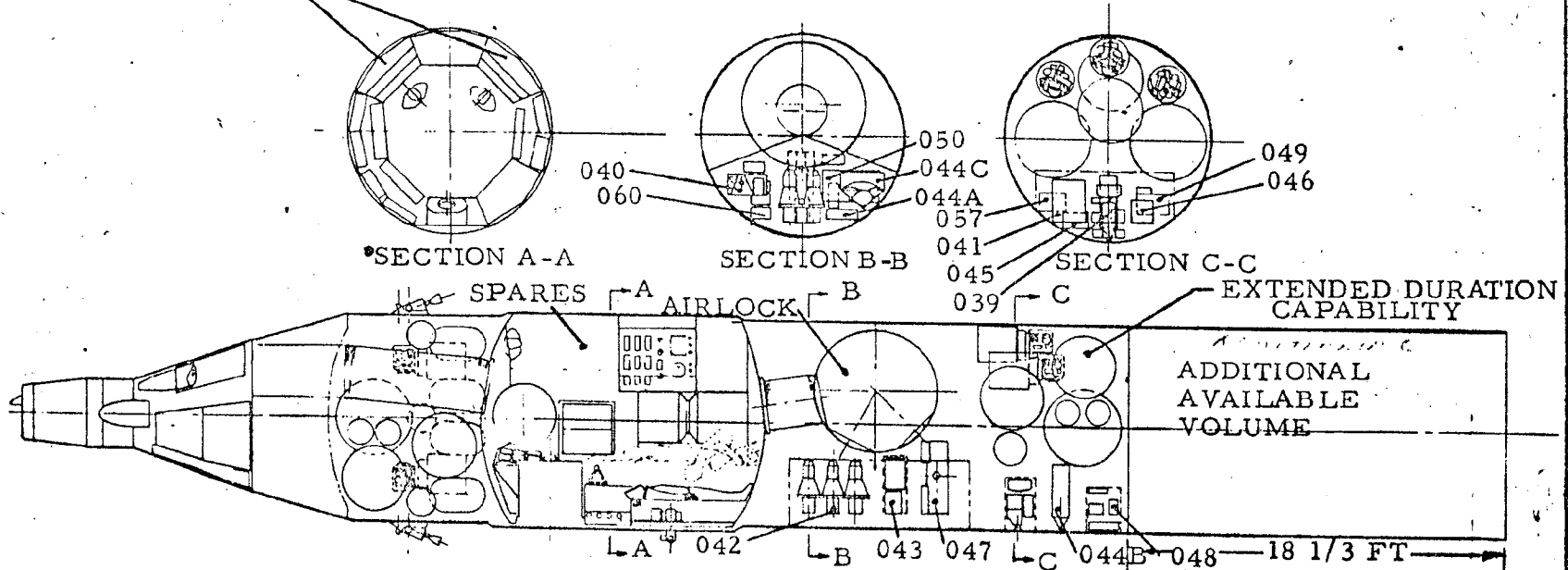
~~CONFIDENTIAL~~

WHS-311
Page 157

POSSIBLE SEPARATE VEHICLE APPLICATION - CONCEPT B

~~D SECRET~~ SPECIAL HANDLING

EXPERIMENTS P11 AND P12
(BIOMEDICAL AND PHYSIOLOGICAL
EVALUATION)



- MISSION DURATION
- PRESSURIZED VOLUME (INCLUDING AIRLOCK)
- EXPERIMENT PAYLOAD
- ADDITIONAL AVAILABLE VOLUME (UNPRESSURIZED)

60 DAY EXPENDABLES
1125 CU. FT.
NASA APP. "A" + P11 + P12
~ 1400 CU. FT.

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~~D SECRET~~ ~~CONFIDENTIAL~~ SPECIAL HANDLING

DECLASSIFIED AFTER 12 YEARS
DOD DIR 5200.10

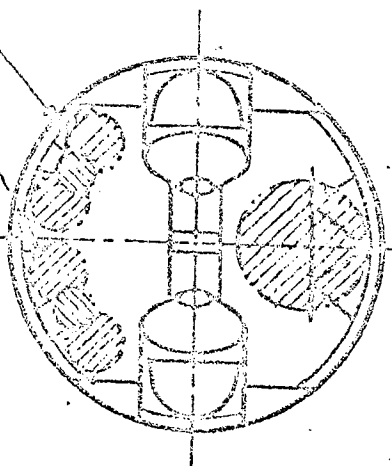
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SUPPORT MODULE

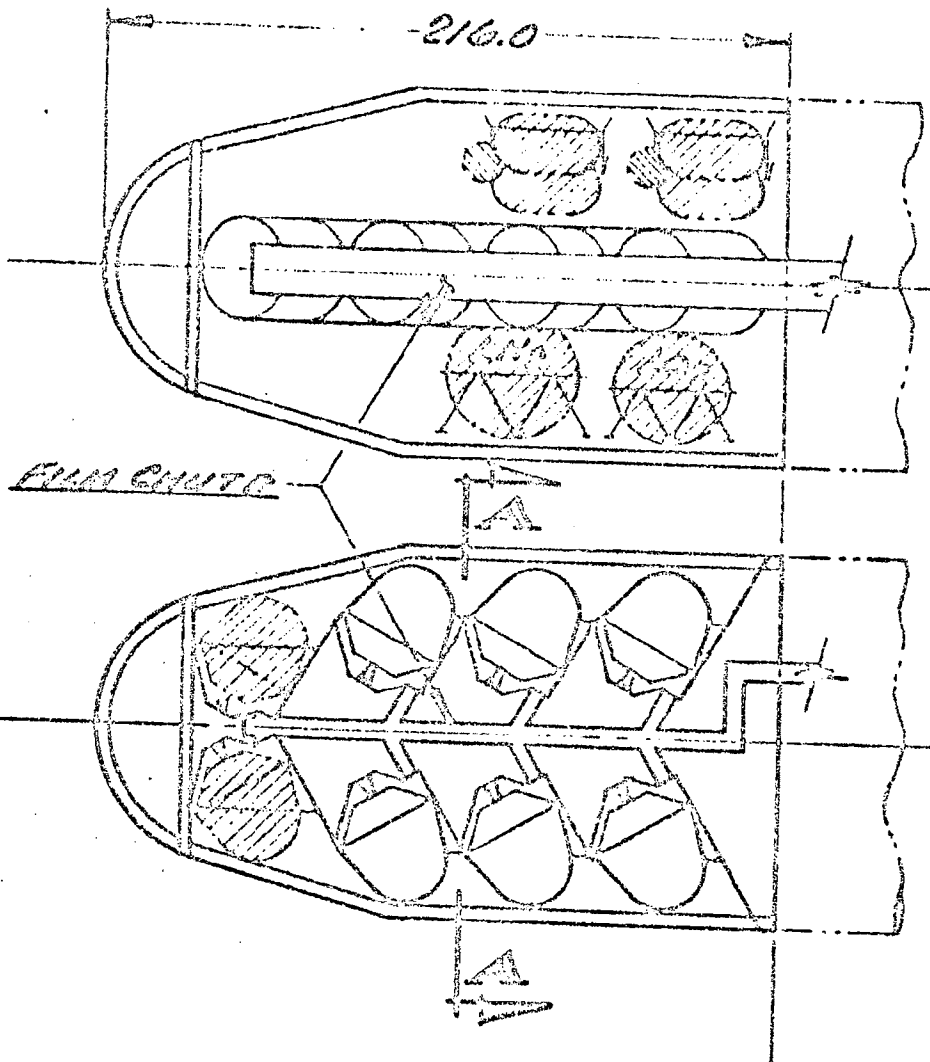
90 DAY - WITH 60 DAY



GROWTH CAPABILITY

ARTIC PROPELLANT



SECTION AA

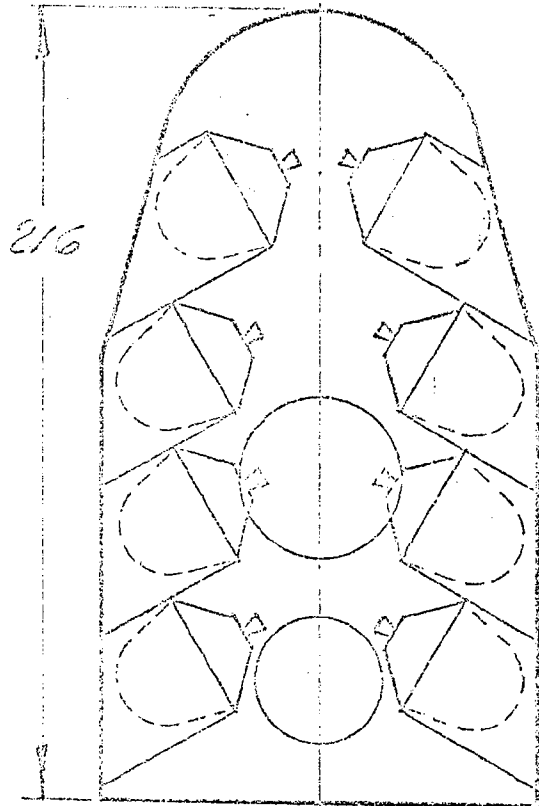


 SUPPORT MODULE
 IN CASE

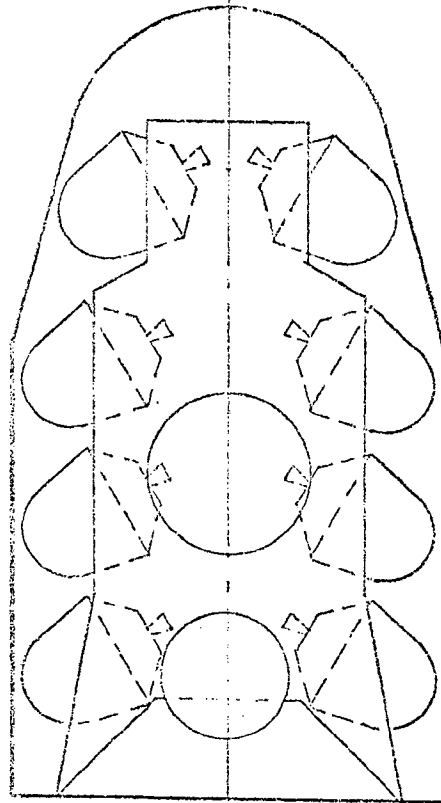
OTA 726.0

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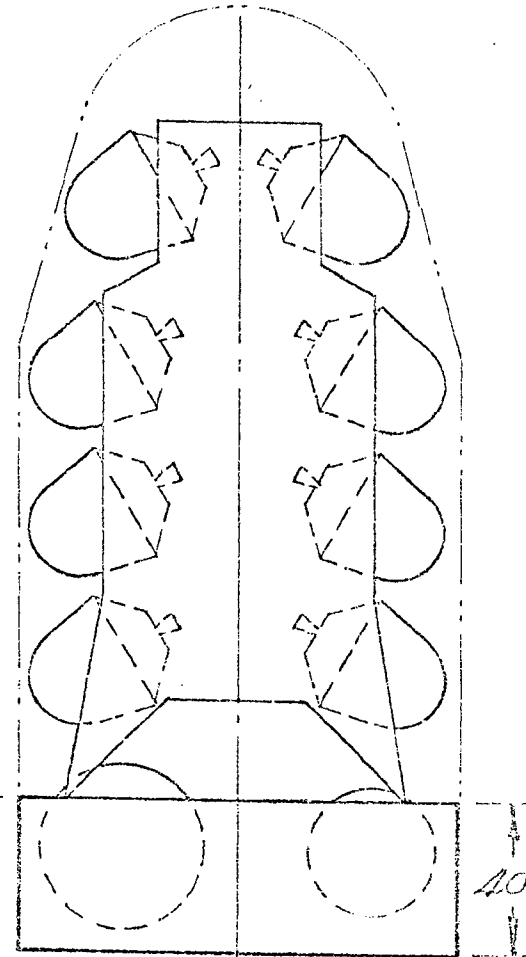
CONFIGURATIONS



CONCEPT A



CONCEPT B



CONCEPT C

○ INTEGRAL STRUCTURE

○ INDEPENDENT STRUCT

○ INTEGRAL RV TANK FAIRING STRUCT ○ INDEPENDENT RV STRUCT

○ DOOR MOUNTED ACTS & CRYS TANKS ○ DOOR MOUNTED ACTS & CRYS TANKS

○ REMOVABLE ACCESS DOORS ○ REMOVABLE ACCESS DOORS

○ EJECTABLE RV DOORS ○ EJECTABLE RV DOORS

○ MODULAR STRUCTURE

○ EJECTABLE FAIRING (WT SAVINGS)

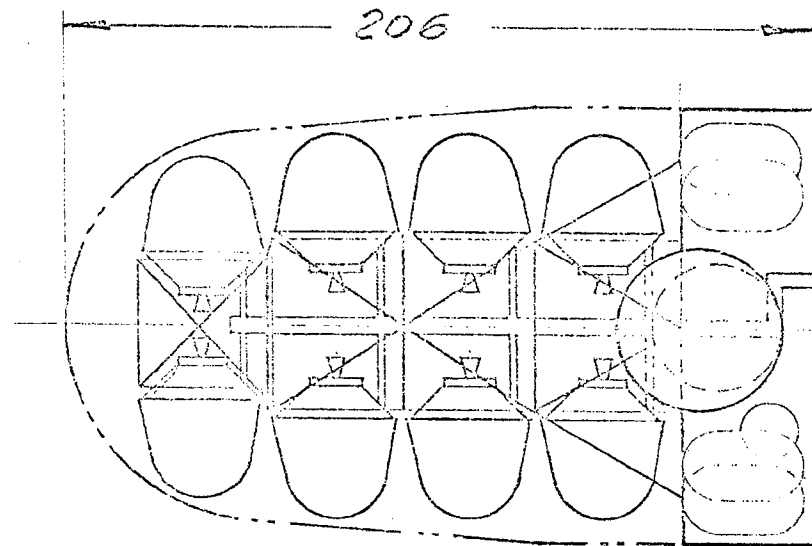
○ ACTS & CRYS TANKS IN MODULE

○ UNRETRACTED A/C ACCESSIBILITY

○ INDEPENDENT RV STRUCT

(D) ~~SECRET~~ SPECIAL HANDLING

CONCEPT C



◦ MODIFICATION

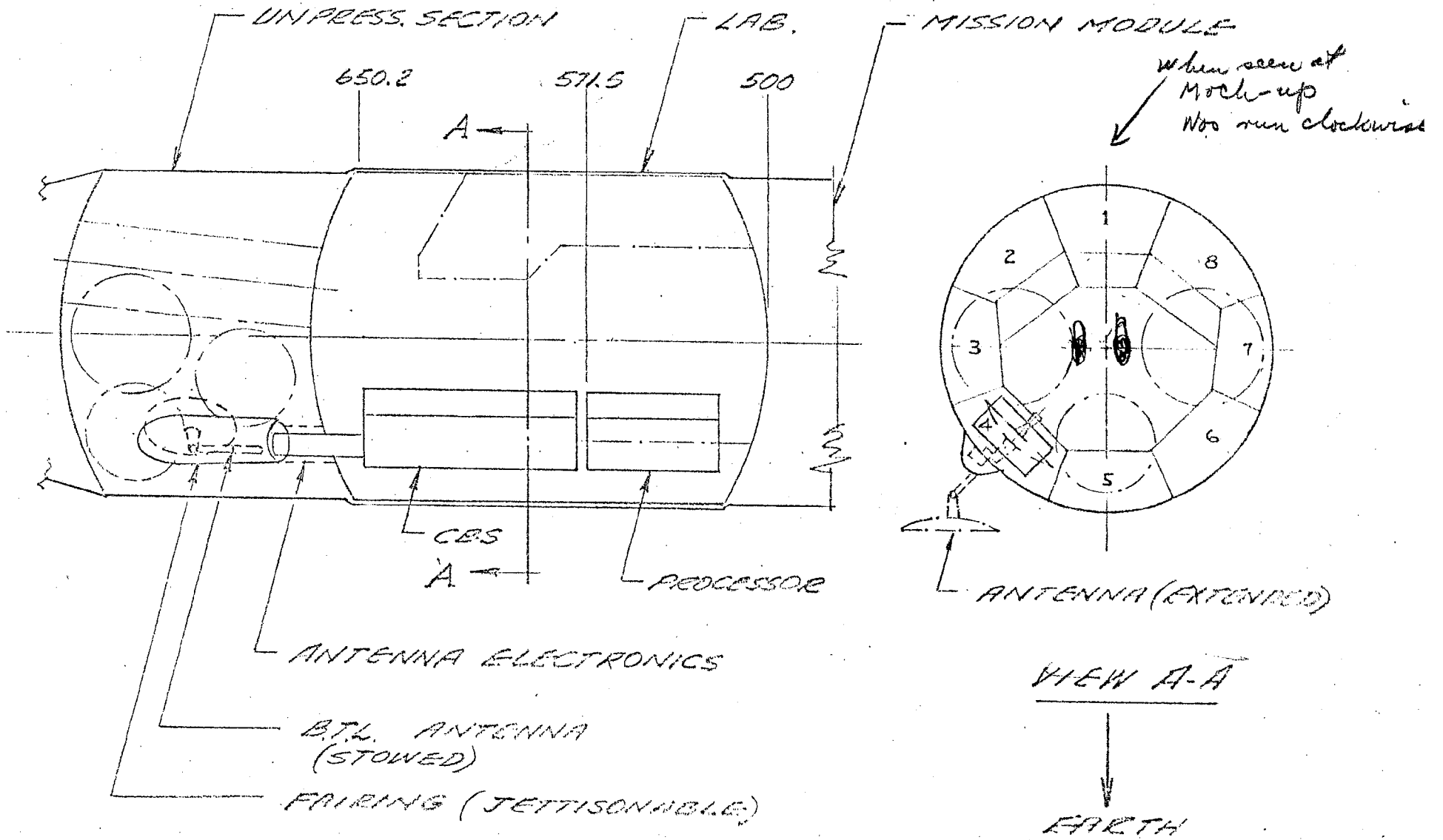
- STRAIGHT RV'S
- MODIFIED FAIRING SHAPE
- REDUCED FAIRING LENGTH

◦ MERITS

- WEIGHT SAVING - STAGED FAIRING
- CLEANEST INTERFACE
- EASES DEVELOPMENT & LIFE TESTING
- MAX ACCESSIBILITY: FACTORY & ON-PAD

(D) ~~SECRET~~ SPECIAL HANDLING

BTL WIDE-BAND SYSTEM



ACOUSTIC TEST FACILITY

WHS-180
p 9 11

27' x 38' x 50' I.DIMS.

AIR VENT
WITH SOUND
SUPPRESSION

END SIMULATOR

TUBE SUPPORT
TO PERMIT
VERTICAL
ADJUSTMENT

AIR STORAGE -
5000 CU. FT.

DOOR
15' x 45'

TEST
SPECIMEN

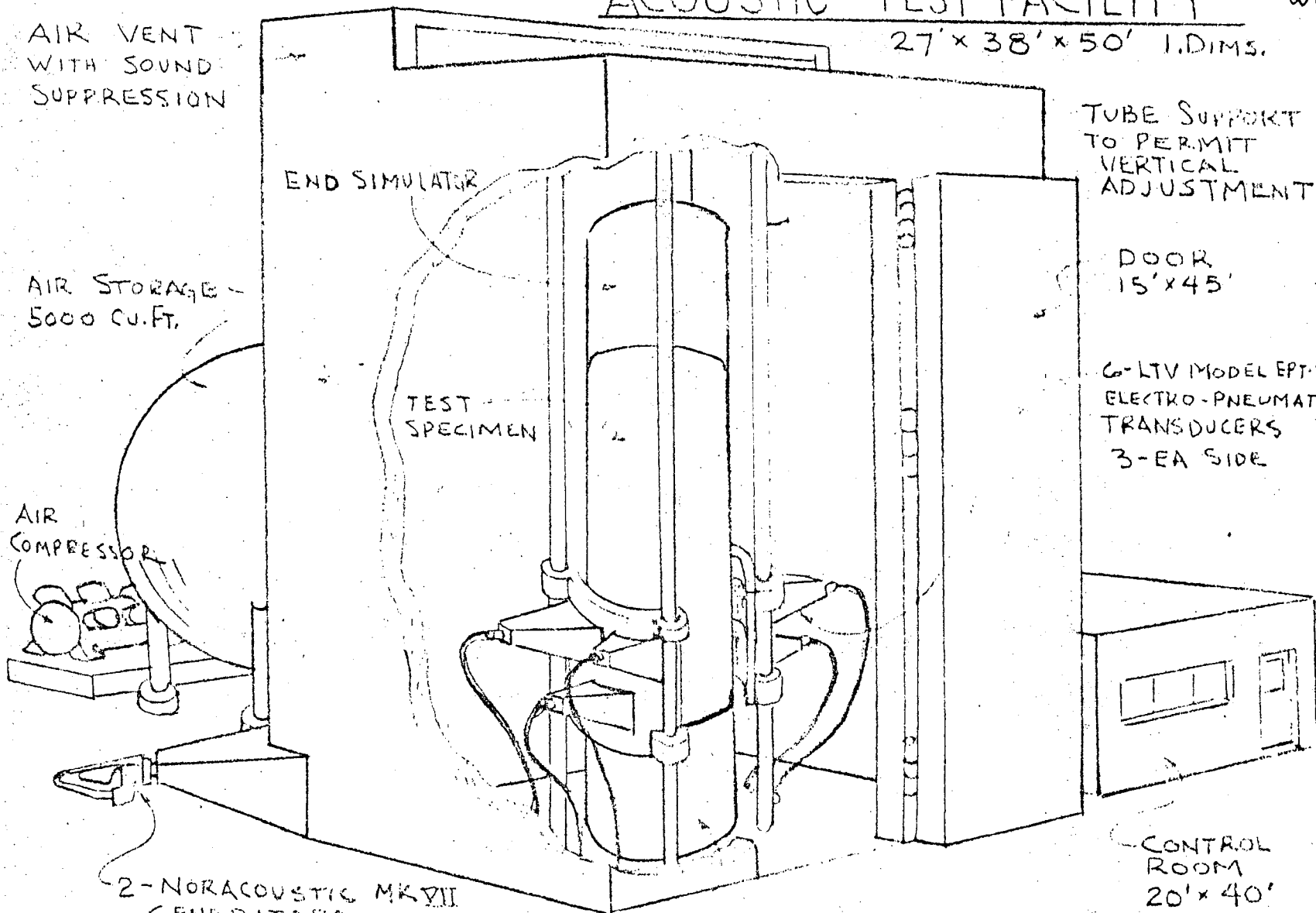
6- LTV MODEL EPT-200
ELECTRO-PNEUMATIC
TRANSDUCERS
3-EA SIDE

AIR
COMPRESSOR

2-NORACOUSTIC MKVII
GENERATORS
1 EACH REAR CORNER

CONTROL
ROOM
20' x 40'

END SIMULATOR

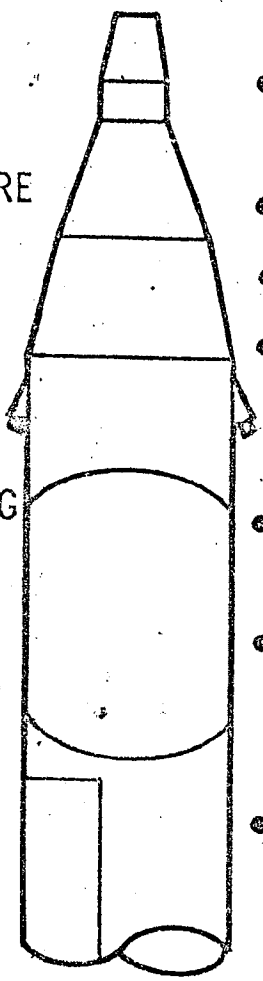


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MAJOR DIFFERENCES

MANNED

- GEMINI B
- 30 DAY MISSION
- 15,000 FRAMES
- 5 PSI ATMOSPHERE
- ONE-TIME DATA RETURN BY GEMINI B
- SHIP RECOVERY
- TARGET TRACKING AVAILABLE

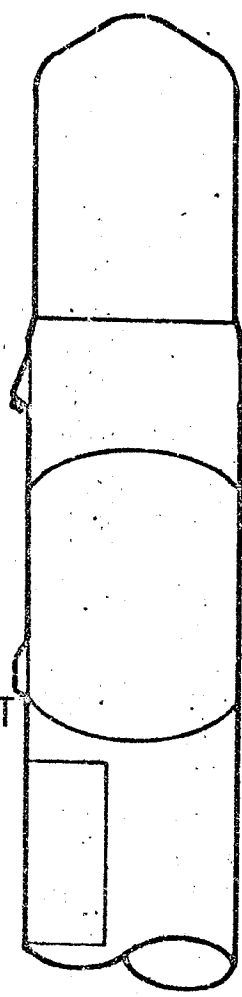


COMMONALITIES

- HIGH RESOLUTION PHOTO RECONNAISSANCE
- ORBIT: 80 X 186 NMI
- INCLINATION: 90°
- GROUND EQUIPMENT AND FACILITIES COMPATIBLE WITH BOTH SYSTEMS
- ONE LAUNCH EVERY FOUR MONTHS
- FACTORY FACILITIES AND FIXED EQUIPMENT SUPPORT BOTH SYSTEMS
- LAUNCH WITH TITIM

UNMANNED

- SUPPORT MODULE
- APPROXIMATELY 60 DAY MISSION
- 500 FRAMES PER DAY
- 2 PSI ATMOSPHERE
- SIX TIME DATA RETURN BY DRV
- AIR RECOVERY
- SPACE PRESERVED FOR 29,500 FRAMES OF TB FILM



HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

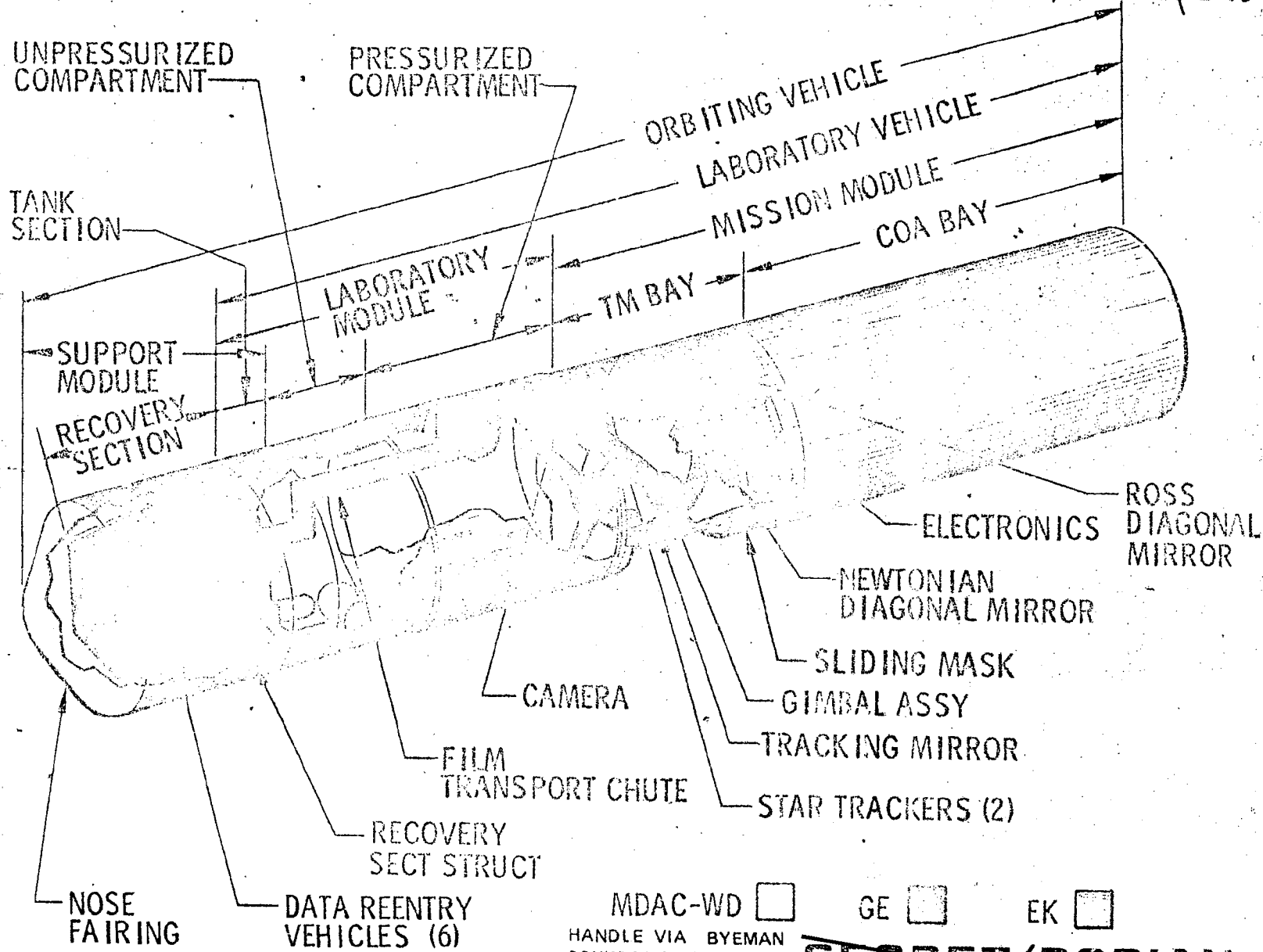
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BIF-77-ZB-7554
COPY 3.1

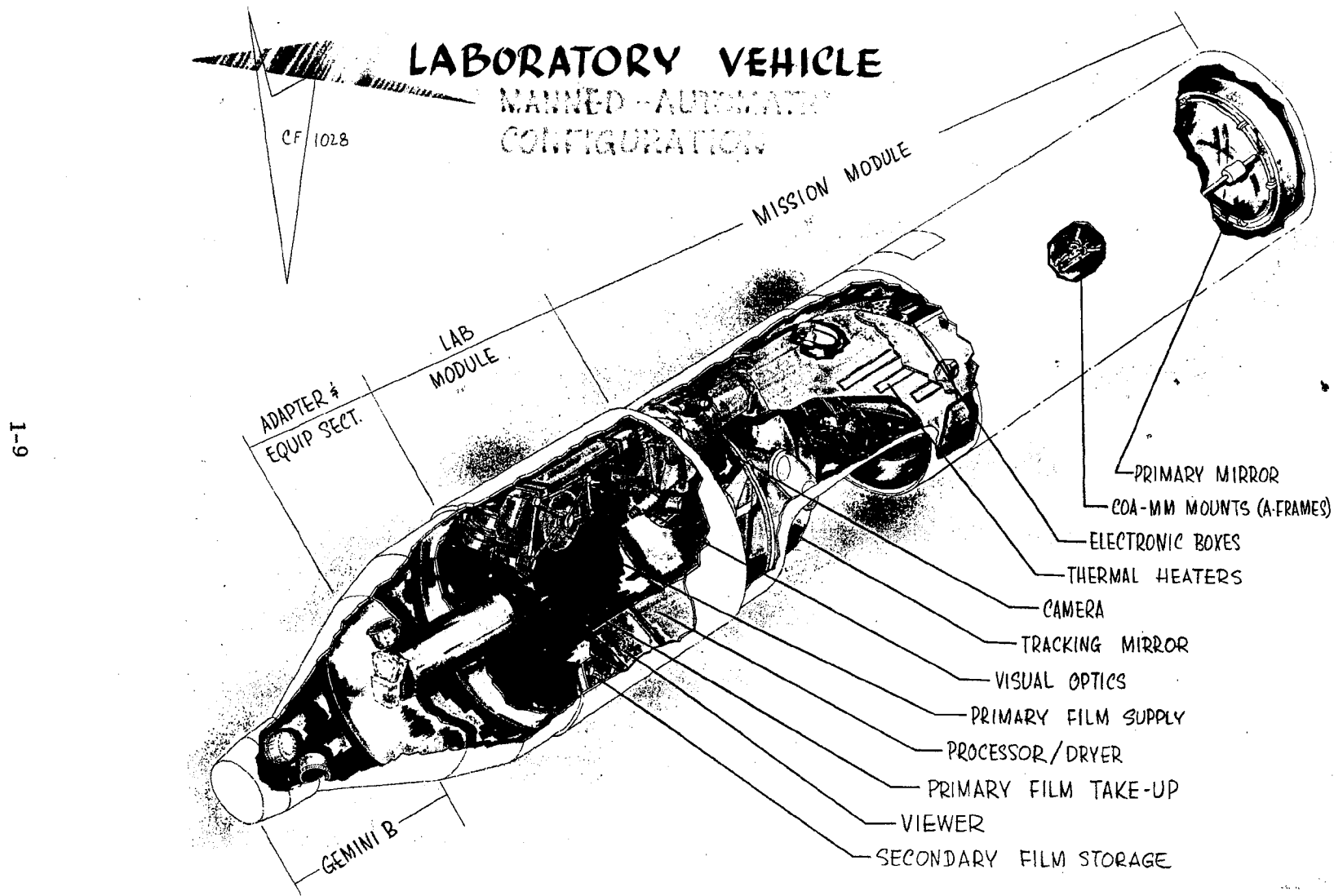
12-2-68

UNMANNED MODE SEGMENT RESPONSIBILITY



MDAC-WD GE EK
 HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

~~SECRET/DORIAN~~



1-9

Figure 1.2-1. Orbiting Vehicle M/A Mode

Handle via **BYEMAN**
Control System Only

II-1

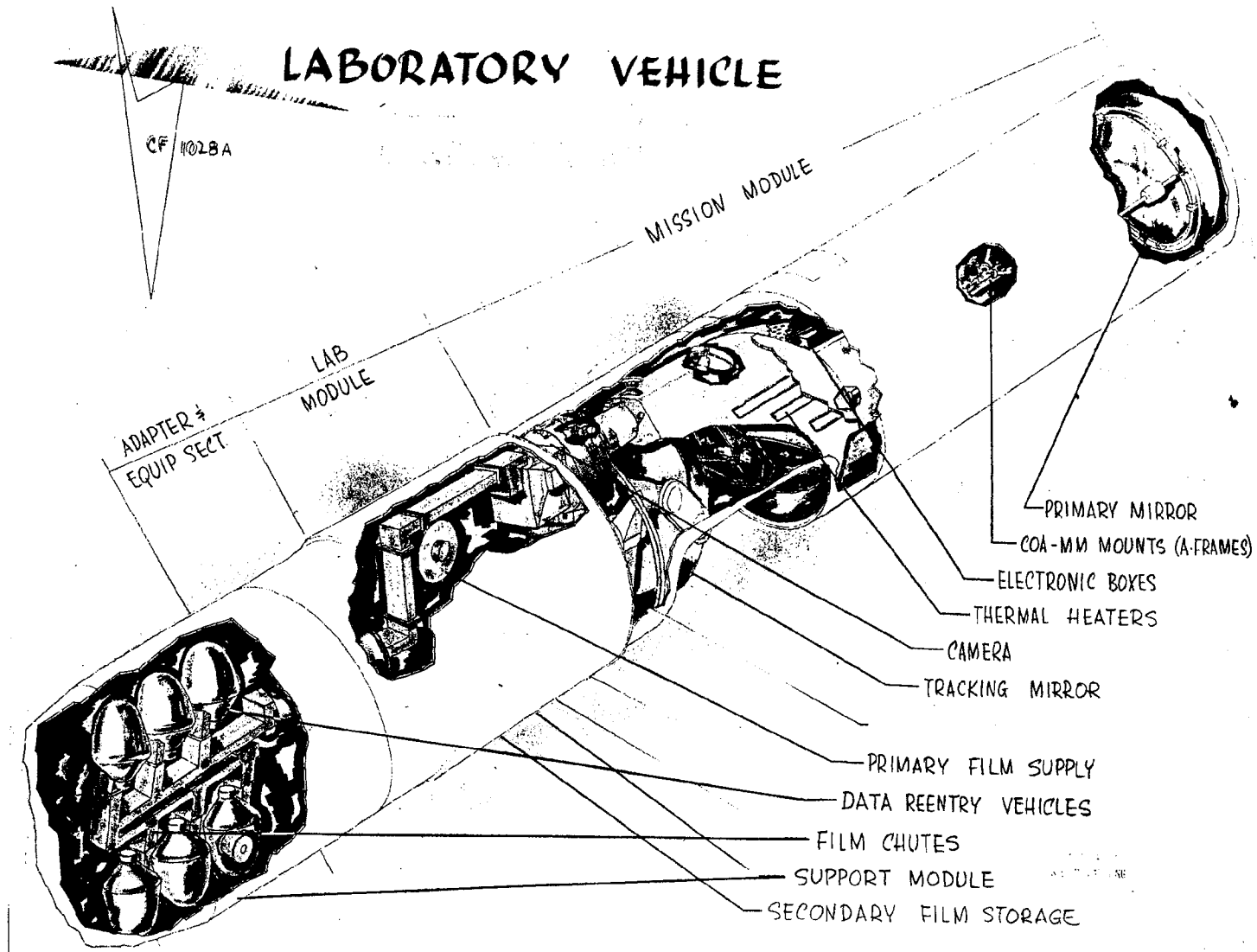


Figure 1.2-2. Orbiting Vehicle-Automatic Mode (Typical)

Handle via BYEMAN
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

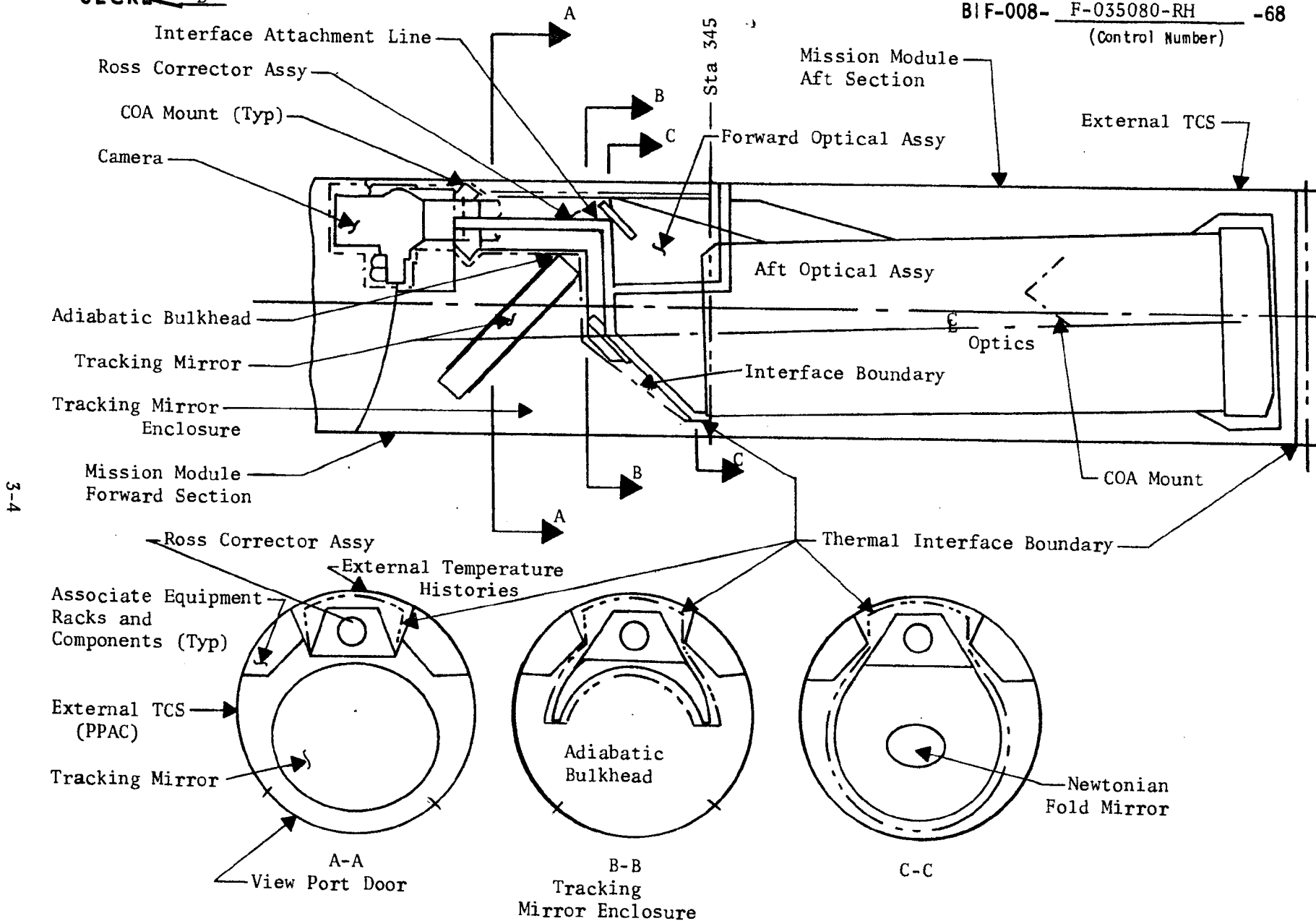


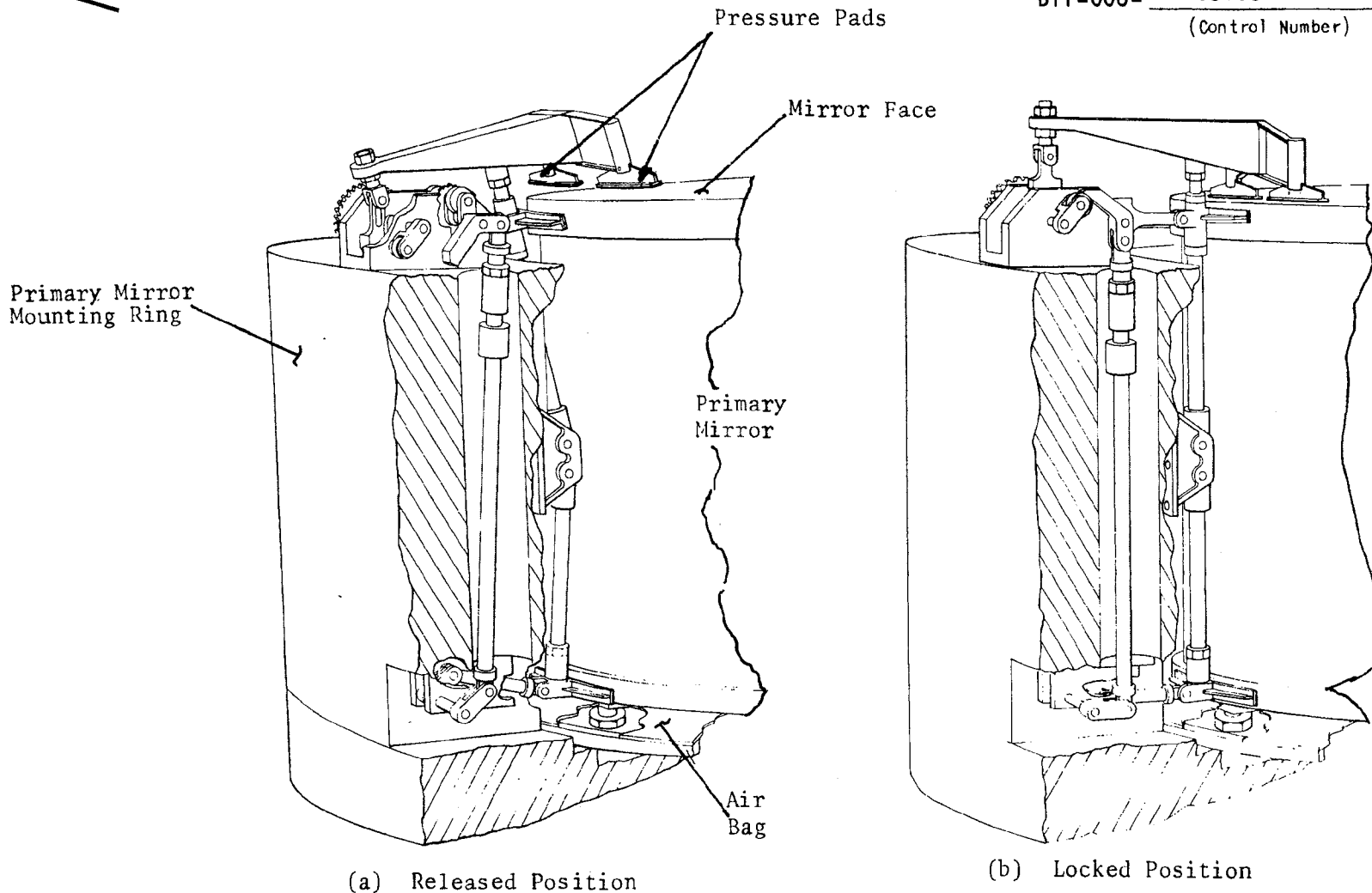
Figure 3.2-1. Mission Module Thermal Interface Boundaries

Handle via BYEMAN
Control System Only

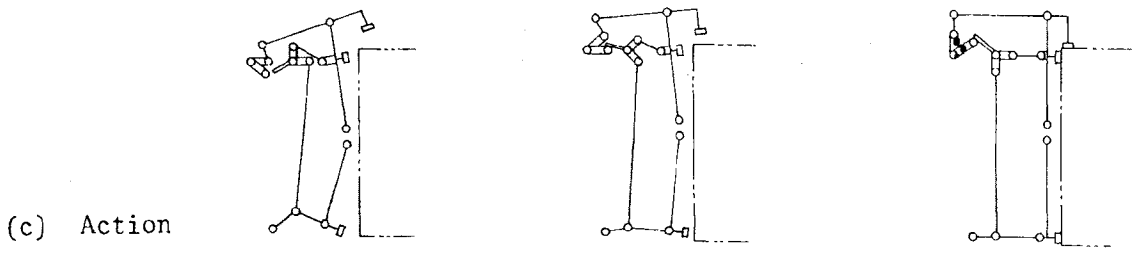
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B1F-008- F-035080-RH -68
(Control Number)



4-35



Handle via **BYEMAN**
Control System Only

Figure 4.1-12. Primary Mirror Launch Lock

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BIF-008- F-035080-RH -68
(Control Number)

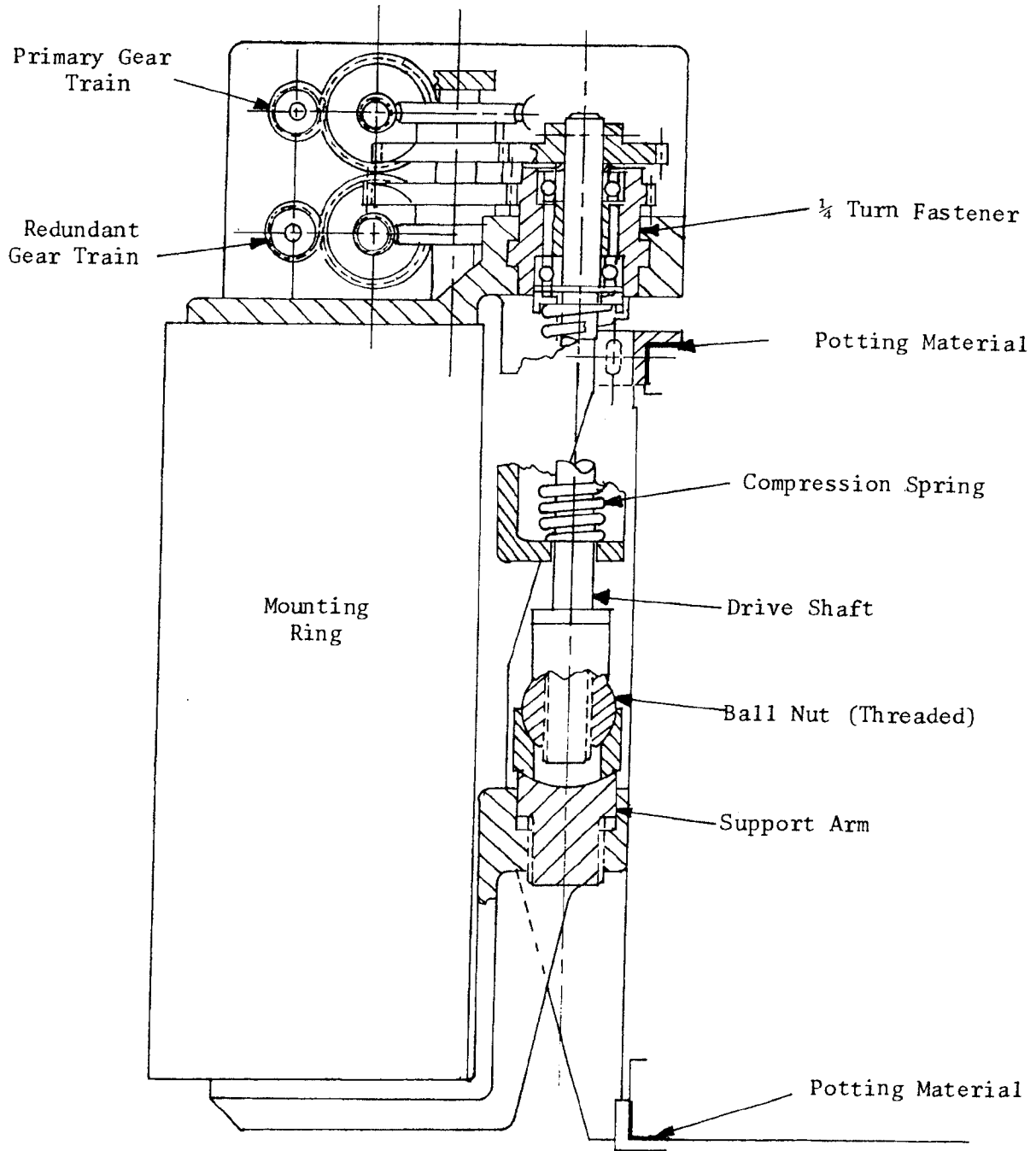


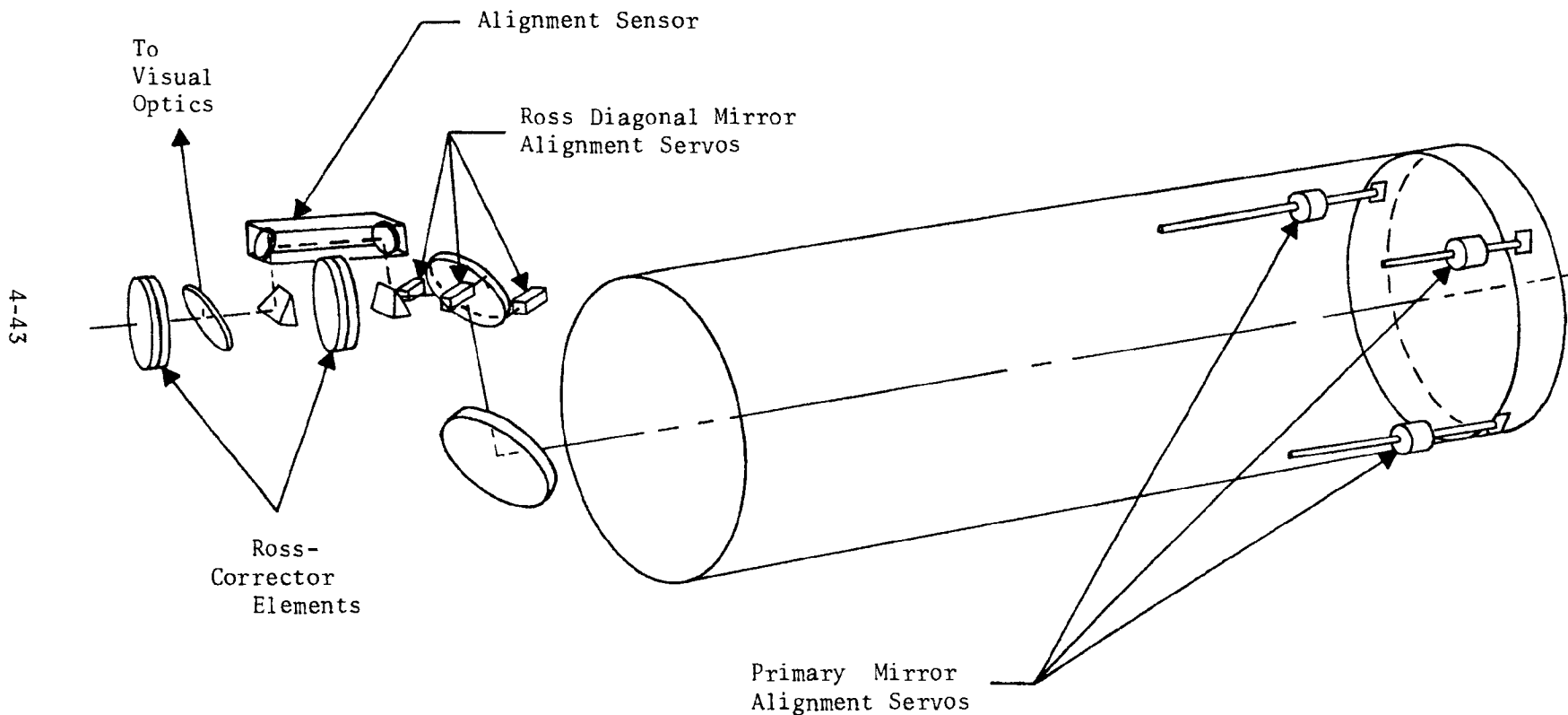
Figure 4.1-14. Lock-Set Design for Cer-Vit Mirrors

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Handle via BYEMAN
Control System Only

~~SECRET~~ D

B1 F-008- F-035080-RH -68
(Control Number)



4-43

Figure 4.1-16. Alignment Sensor and Servo Drive

Handle via BYEMAN
Control System Only

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~~SECRET~~ D

BI F-008- F-035080-RH -68
(Control Number)

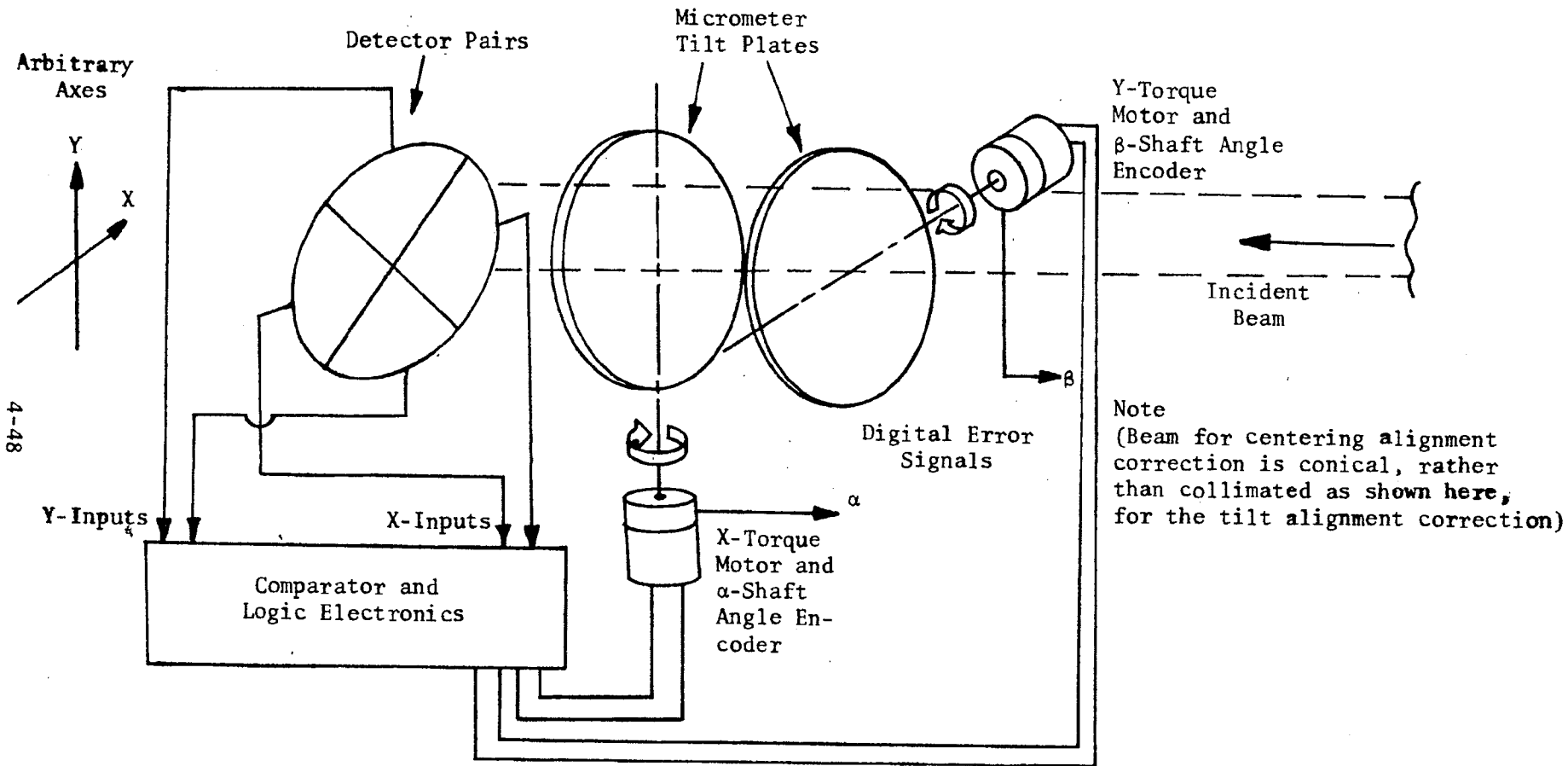


Figure 4.1-18. Schematic of Alignment Sensor Configuration

Handle via BYEMAN
Control System Only

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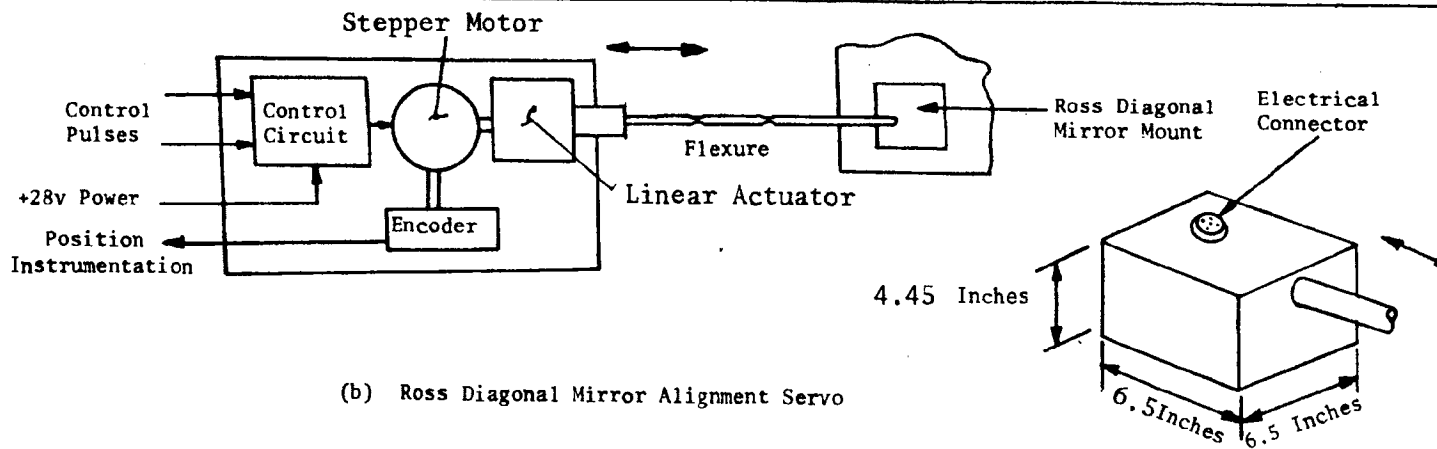
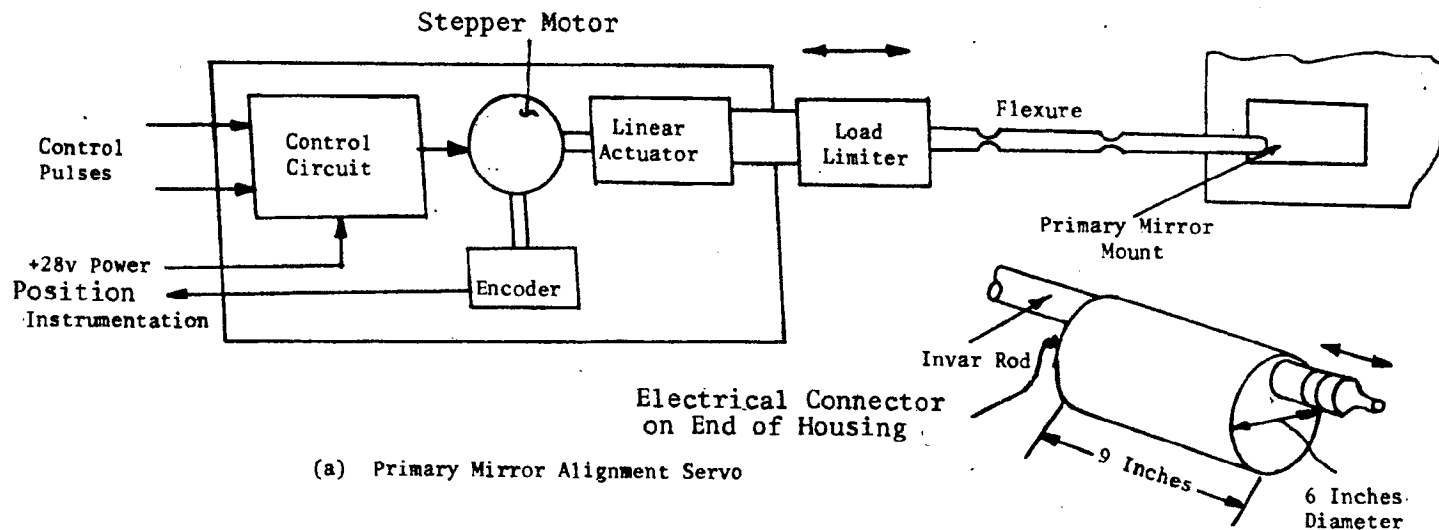


Figure 4.1-22. Alignment Servos

4-52

Handle via SYEMAN
Control System Only

4-56

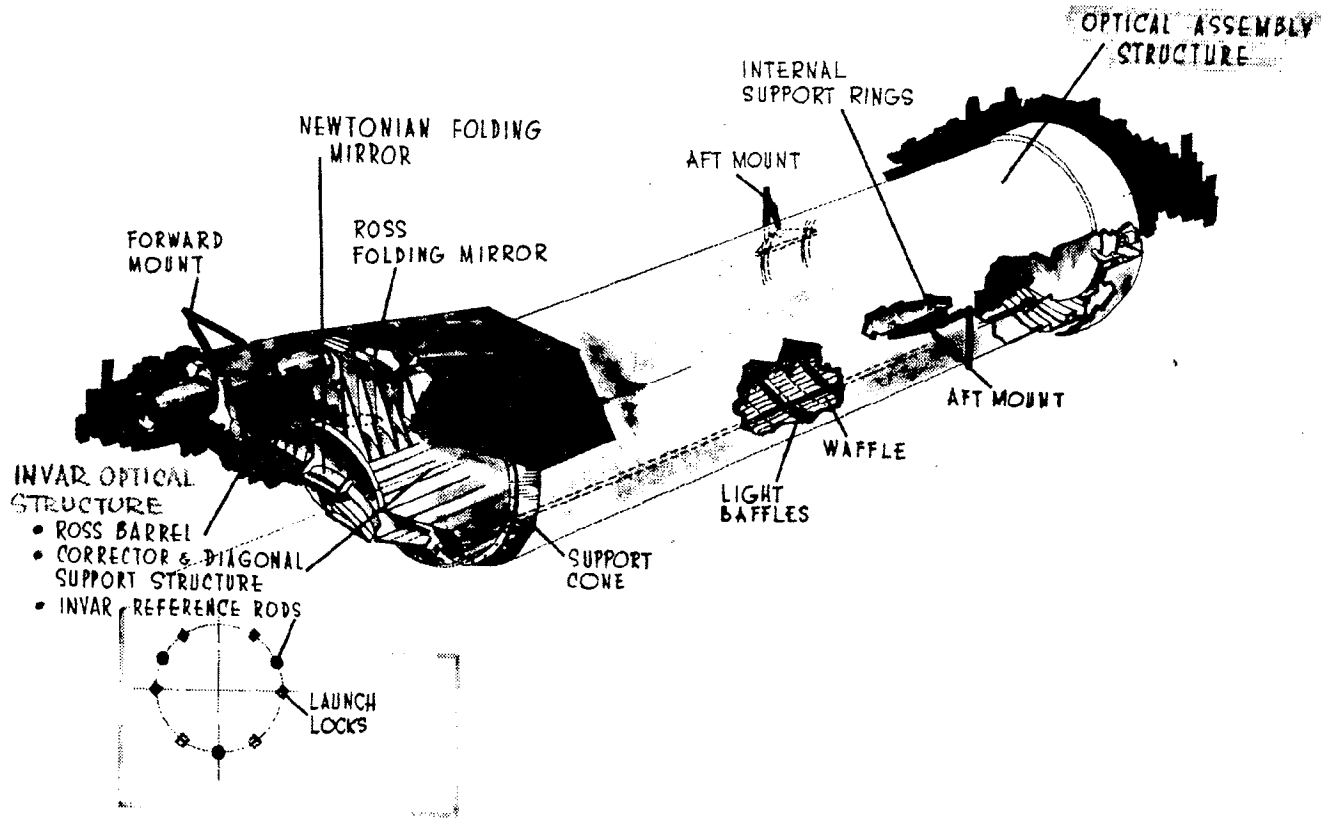
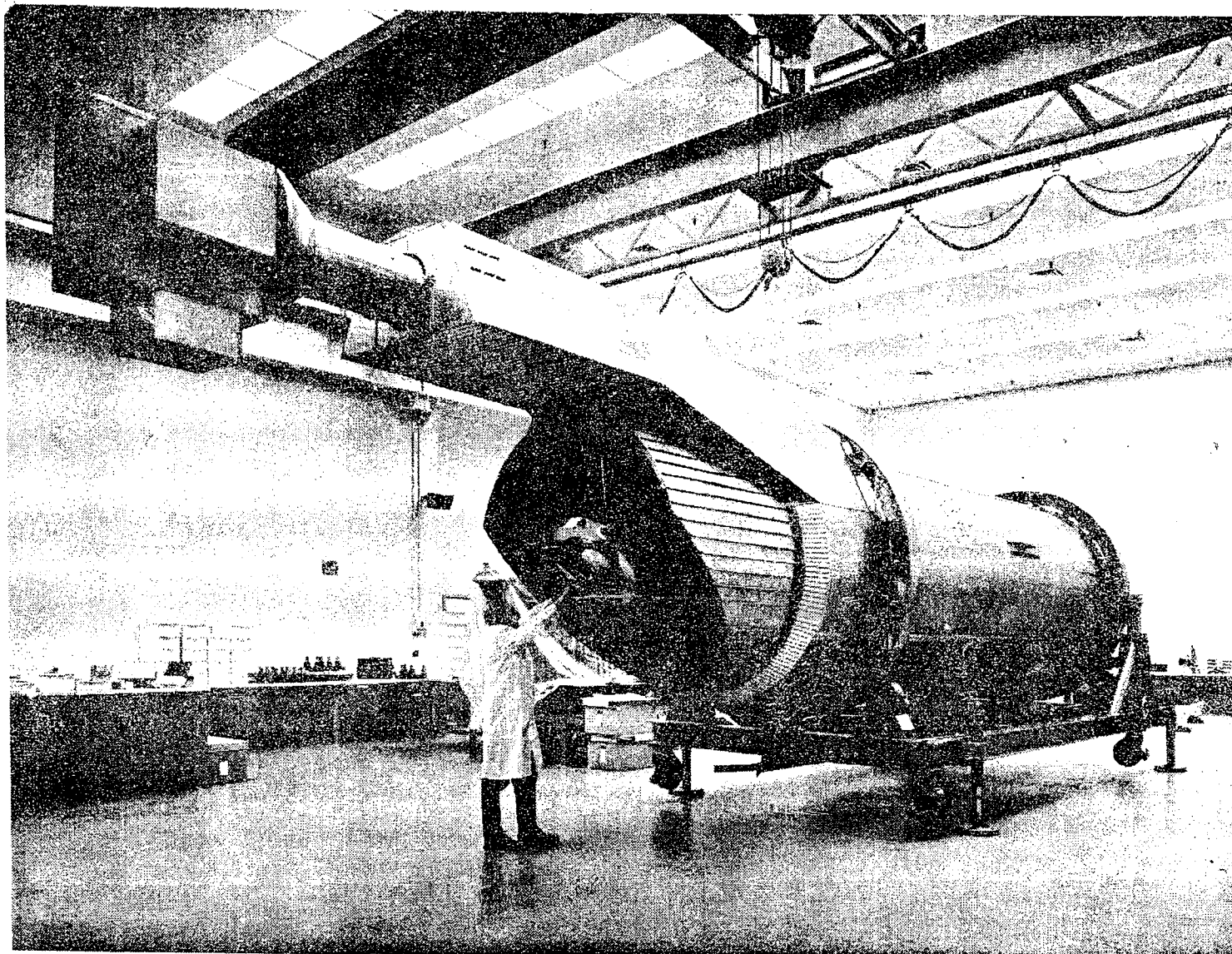


Figure 4.2-1. Optical Assembly Structure and Mounts

Handle via BYEMAN
Control System Only



4-57

Figure 4.2-2. Structural Development Model COA

Handle via BYEMAN
Control System Only

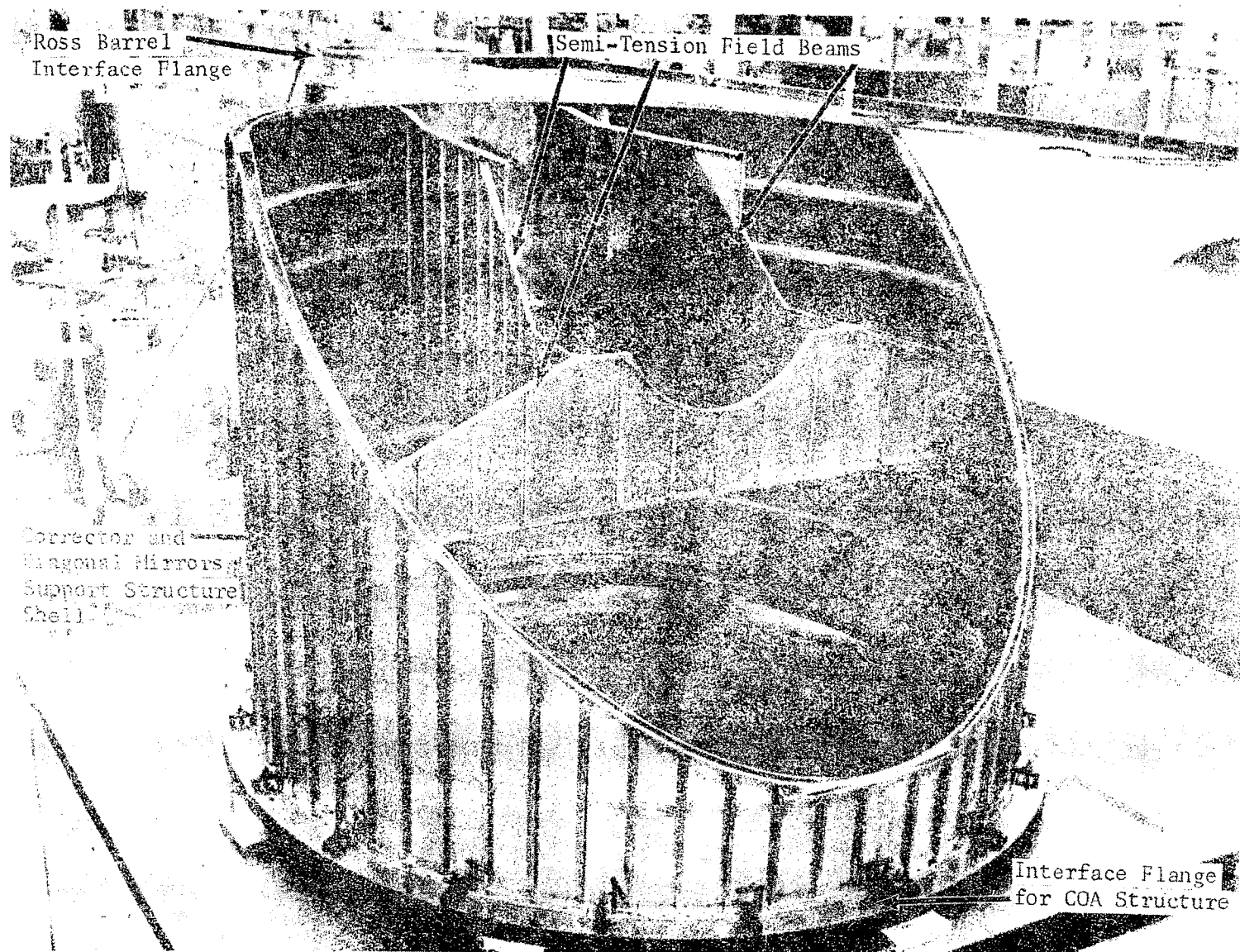


Figure 4.2-3. Corrector and Diagonal Mirrors Support Structure

Handle via BYEMAN
Control System Only

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BI F-008- F-035080-RH -68
(Control Number)

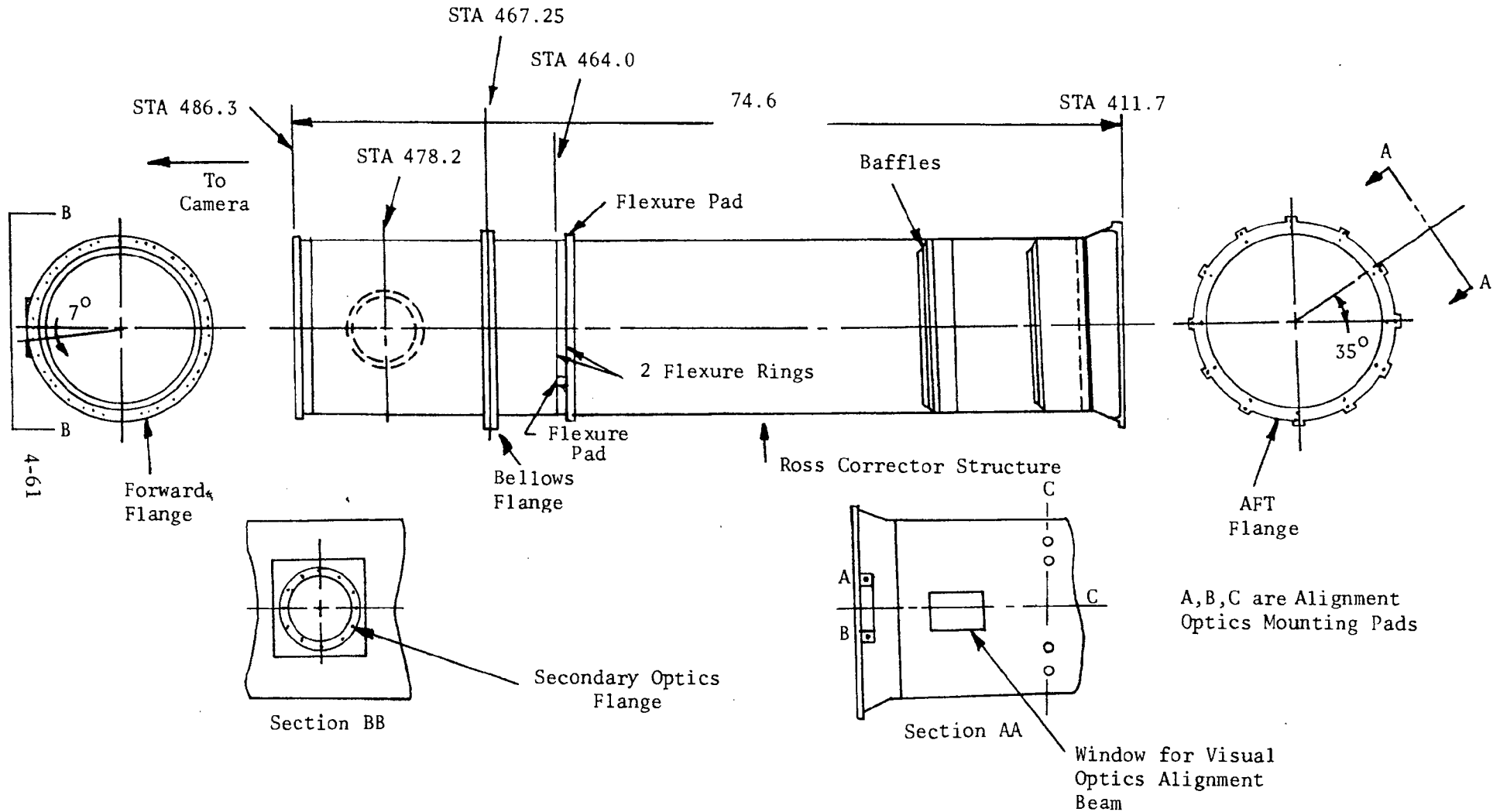
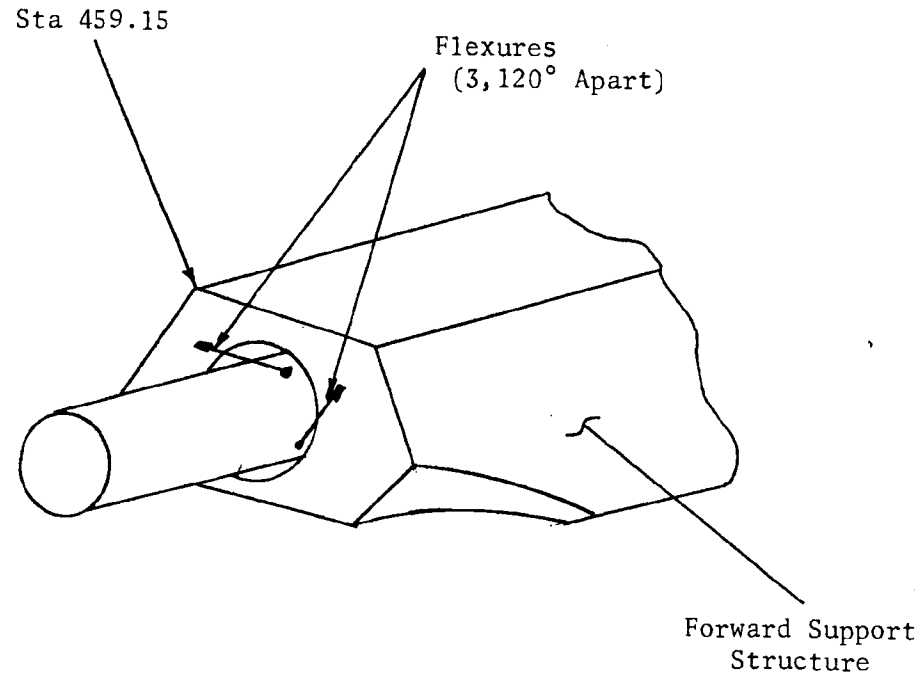


Figure 4.2-4. Ross Barrel Structure

Handle via **BYEMAN**
Control System Only

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4-62

Figure 4.2-5. Forward Support Structure

Handle via BYEMAN
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

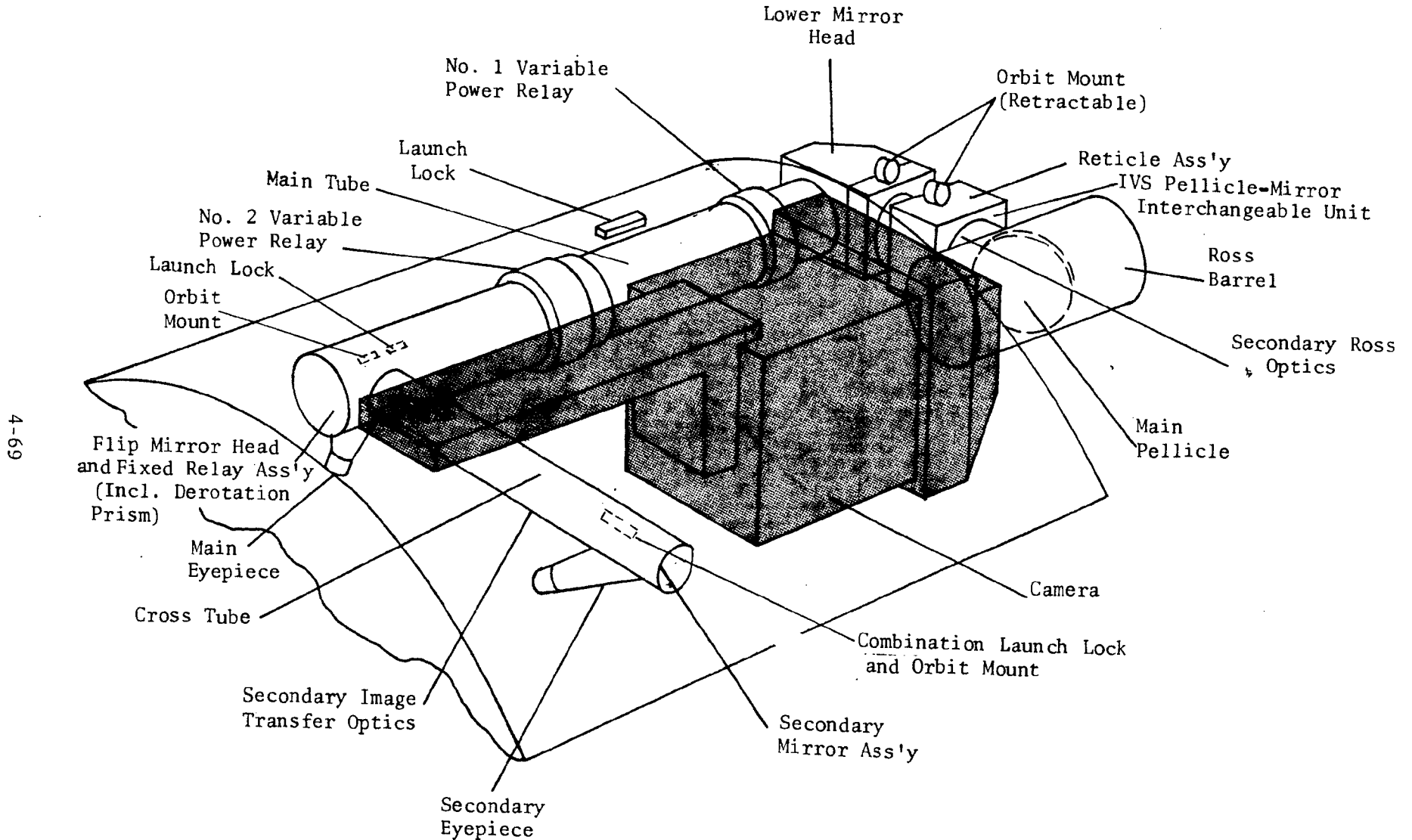


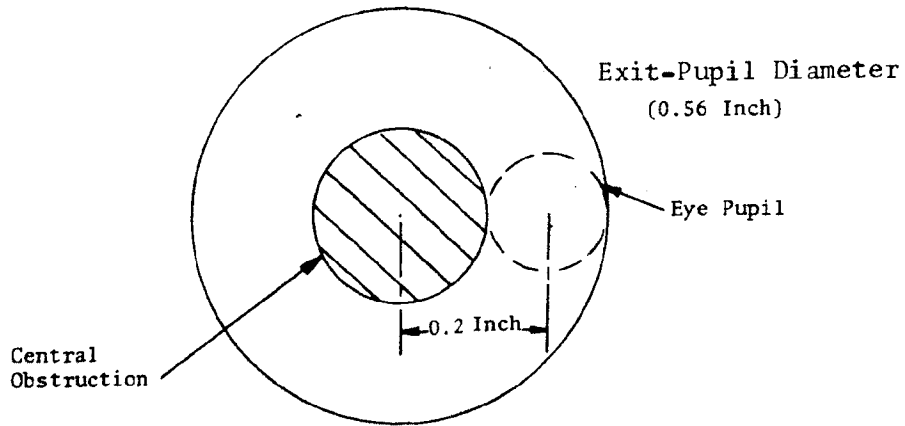
Figure 4.3-1. Schematic of Visual Optics Assembly

Handle via BYEMAN
Control System Only

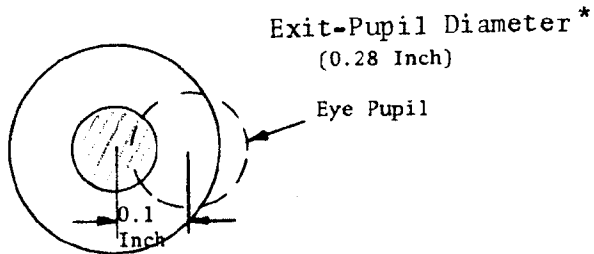
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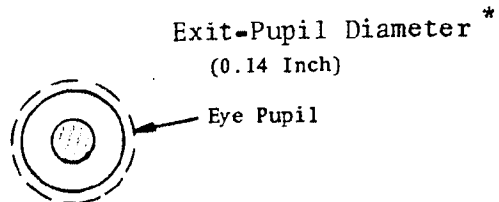
BIF-008- F-035080-RH -68
(Control Number)



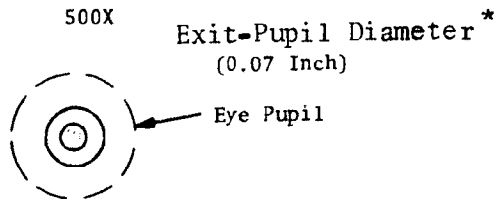
Magnification: 125X



250X



500X



1000X

* Primary mirror only; tracking mirror dimensions not included

Figure 4.3-6. Exit Pupil/Eye Pupil Relationships

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BIF-008- F-035080-RH -68
(Control Number)

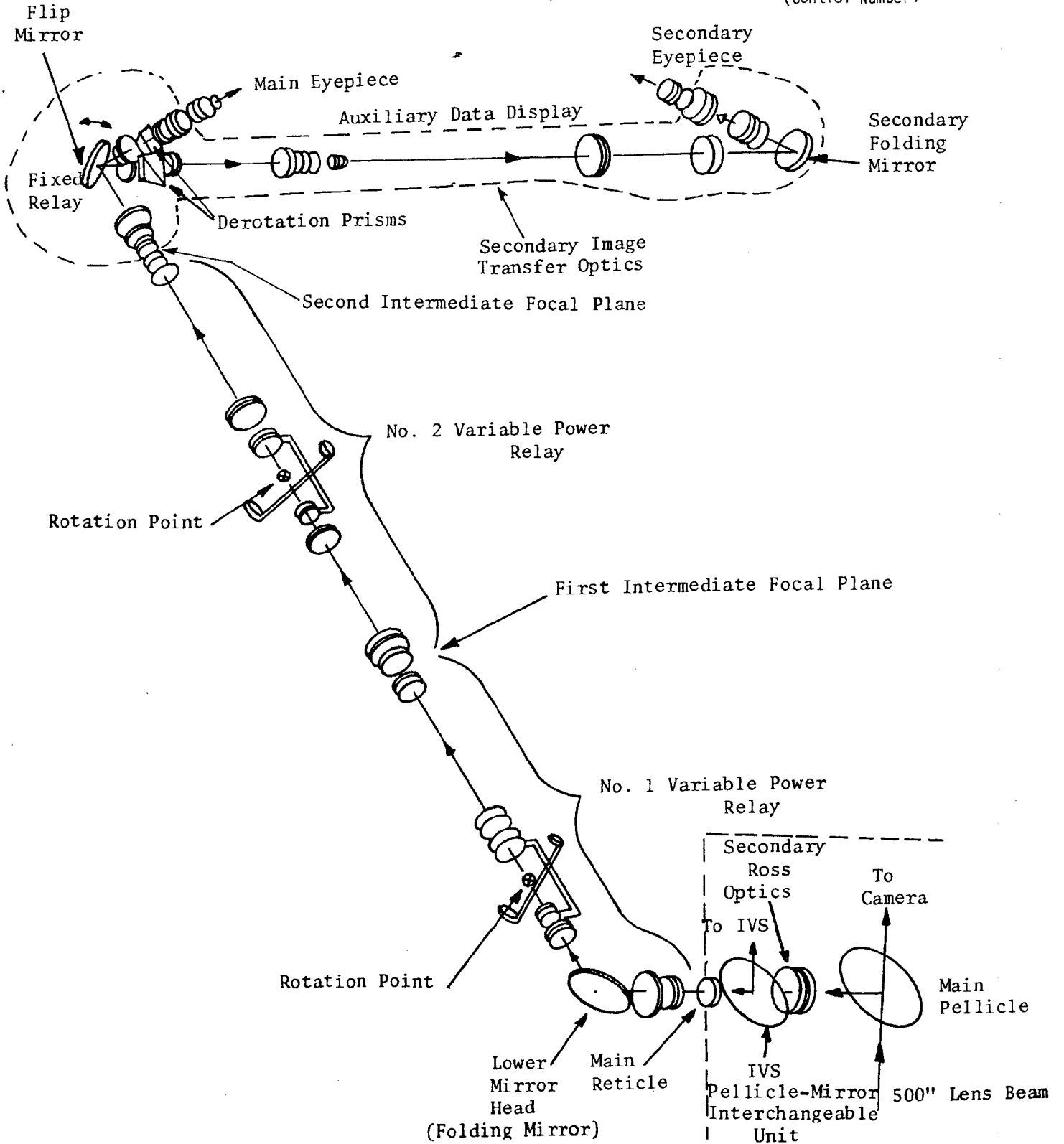


Figure 4.3-7. VO Optical Element Configuration

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Handle via **BYEMAN**
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(Control Number)

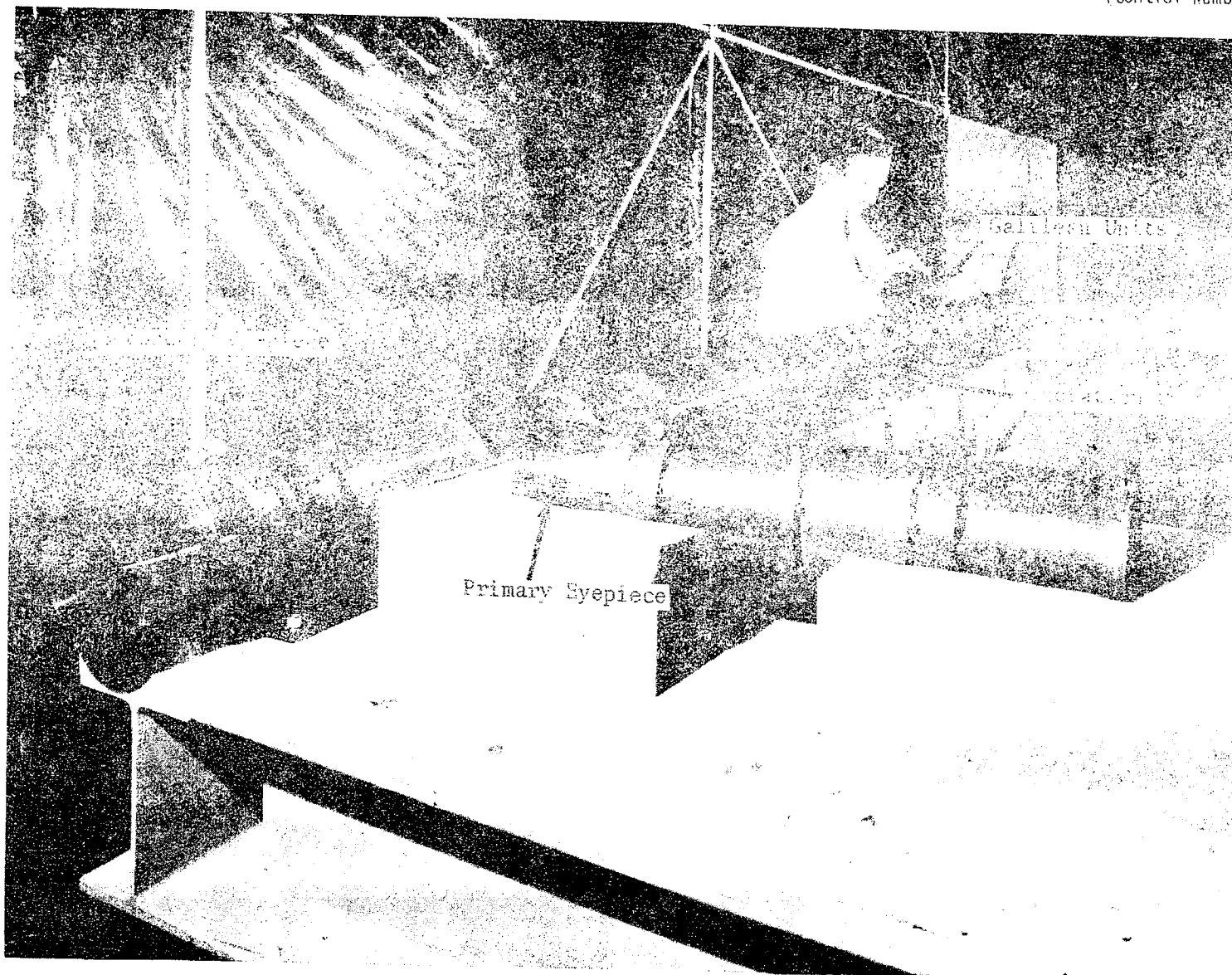


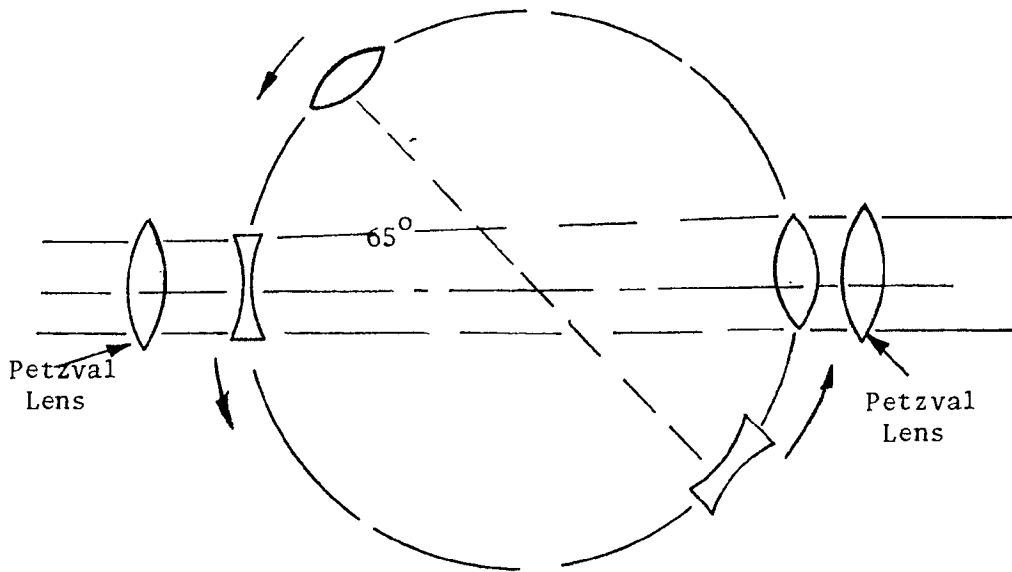
Figure 4.3-8. Formula Sample - Visual Optics Relay and Eyepieces

Handle via BYEMAN
Control System Only

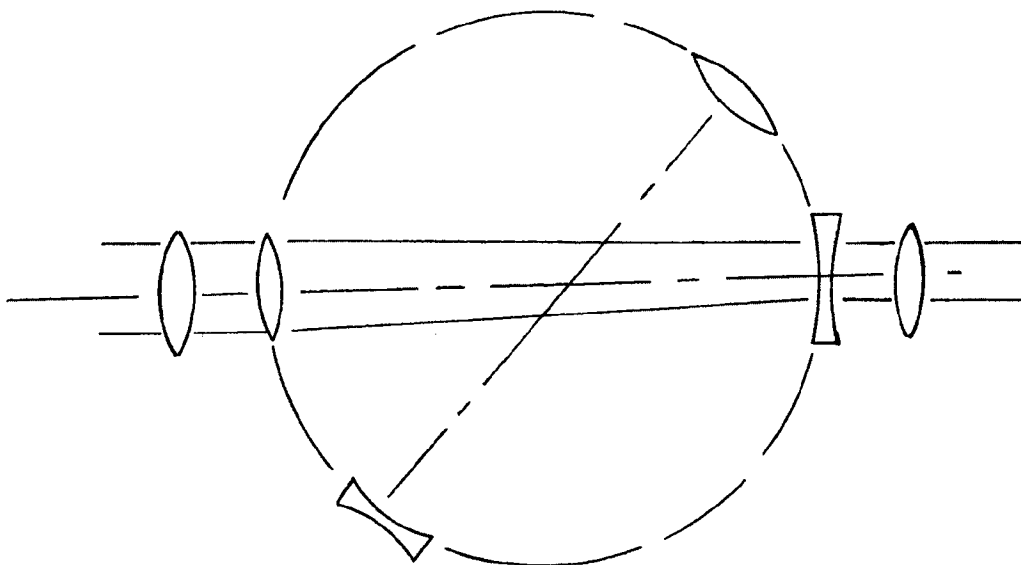
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BIF-008- F-035080-RH -68
(Control Number)



First Position



Second Position

Figure 4.3-9. Magnification Change Unit (Rotatable Galilean Telescope Pair) Mounted in Collimated Light Space of Variable Power Relays

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BIF-008- F-035080-RH -68
(Control Number)

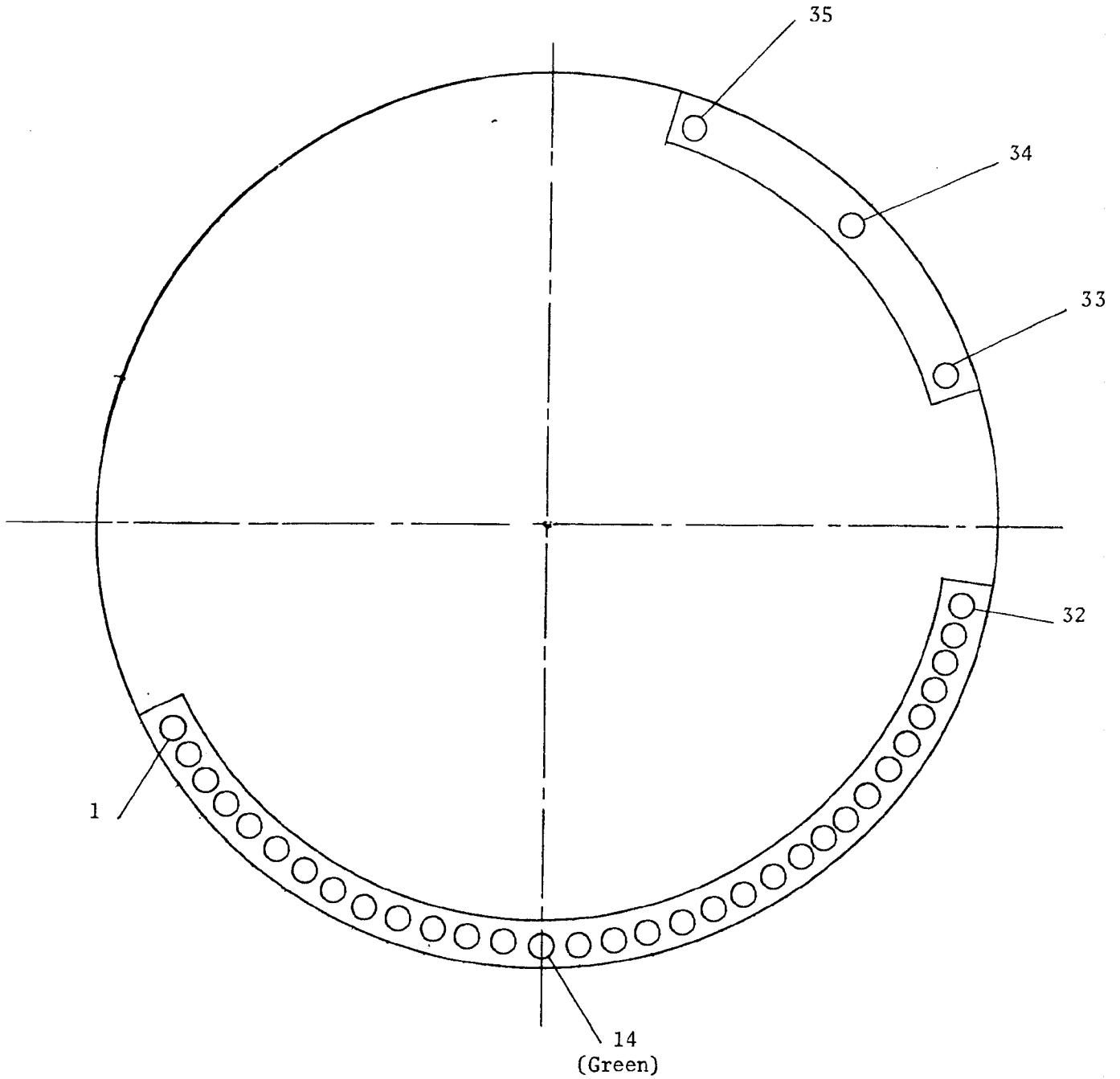


Figure 4.3-10. Auxiliary Data Display

~~4-87~~
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Handle via **BYEMAN**
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

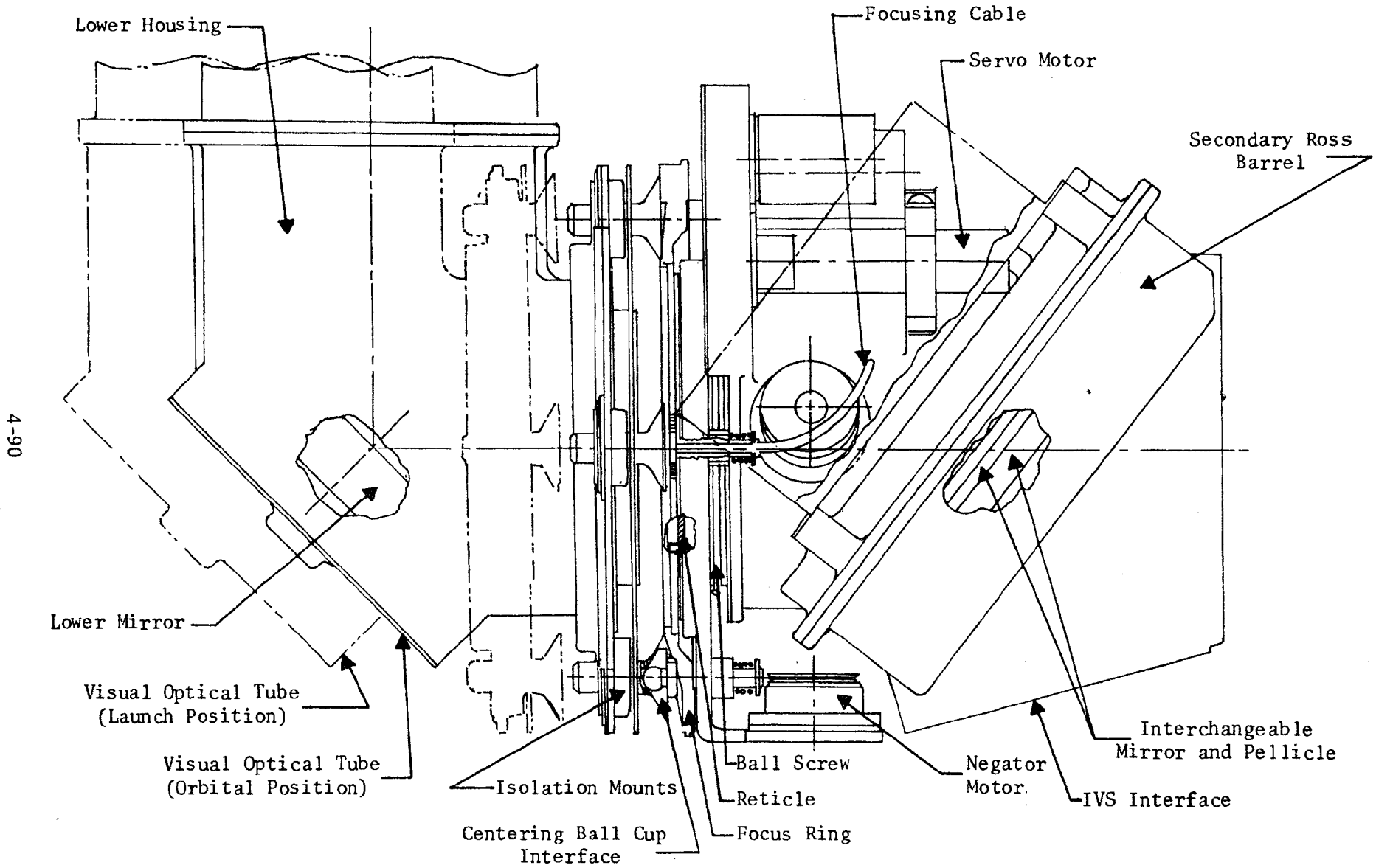


Figure 4.3-11. Retractable Interface Mount, VOA to Secondary Ross Barrel

Handle via **BYEMAN**
Control System Only

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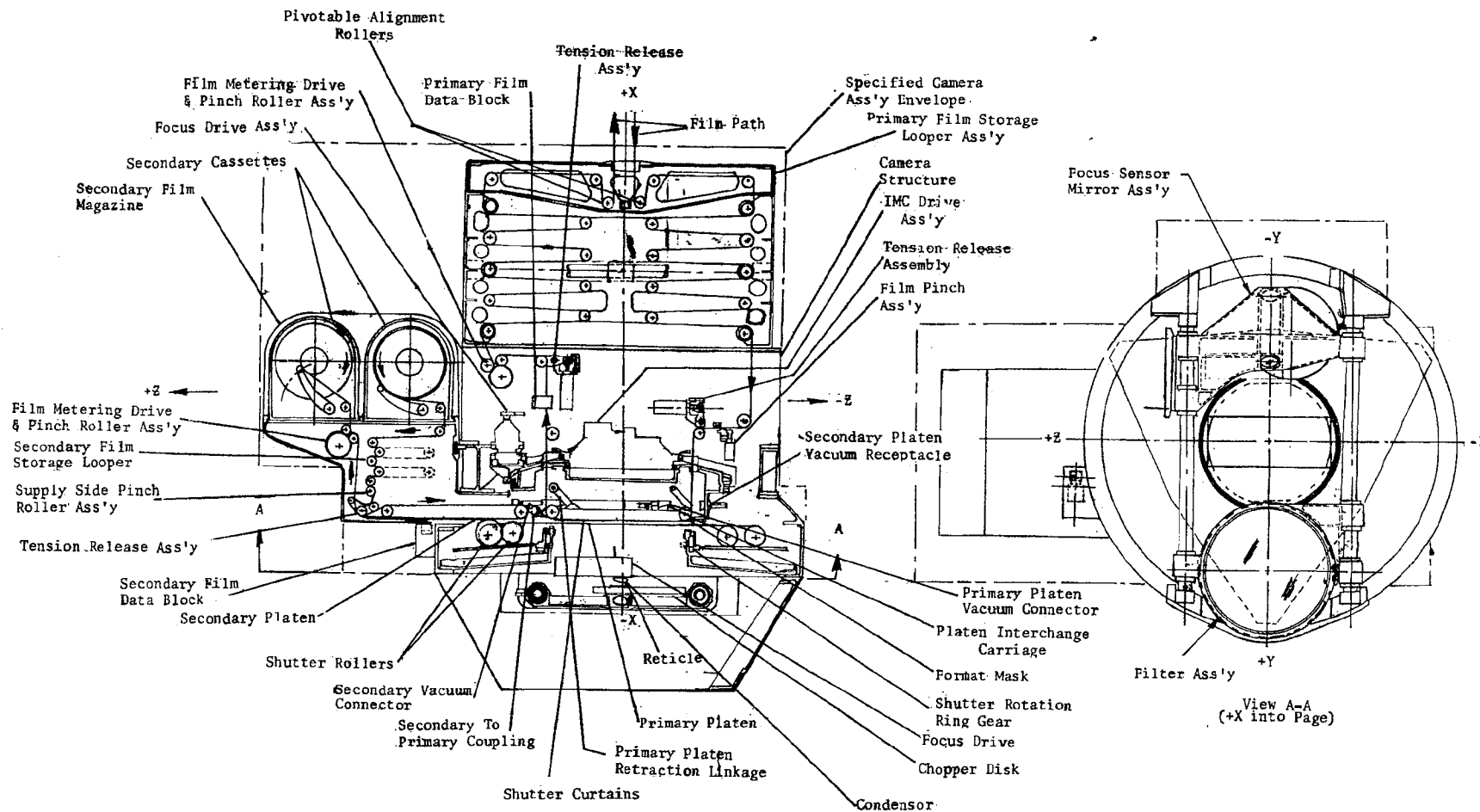


Figure 4.4-1. Camera Assembly

Handle via BYEMAN
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

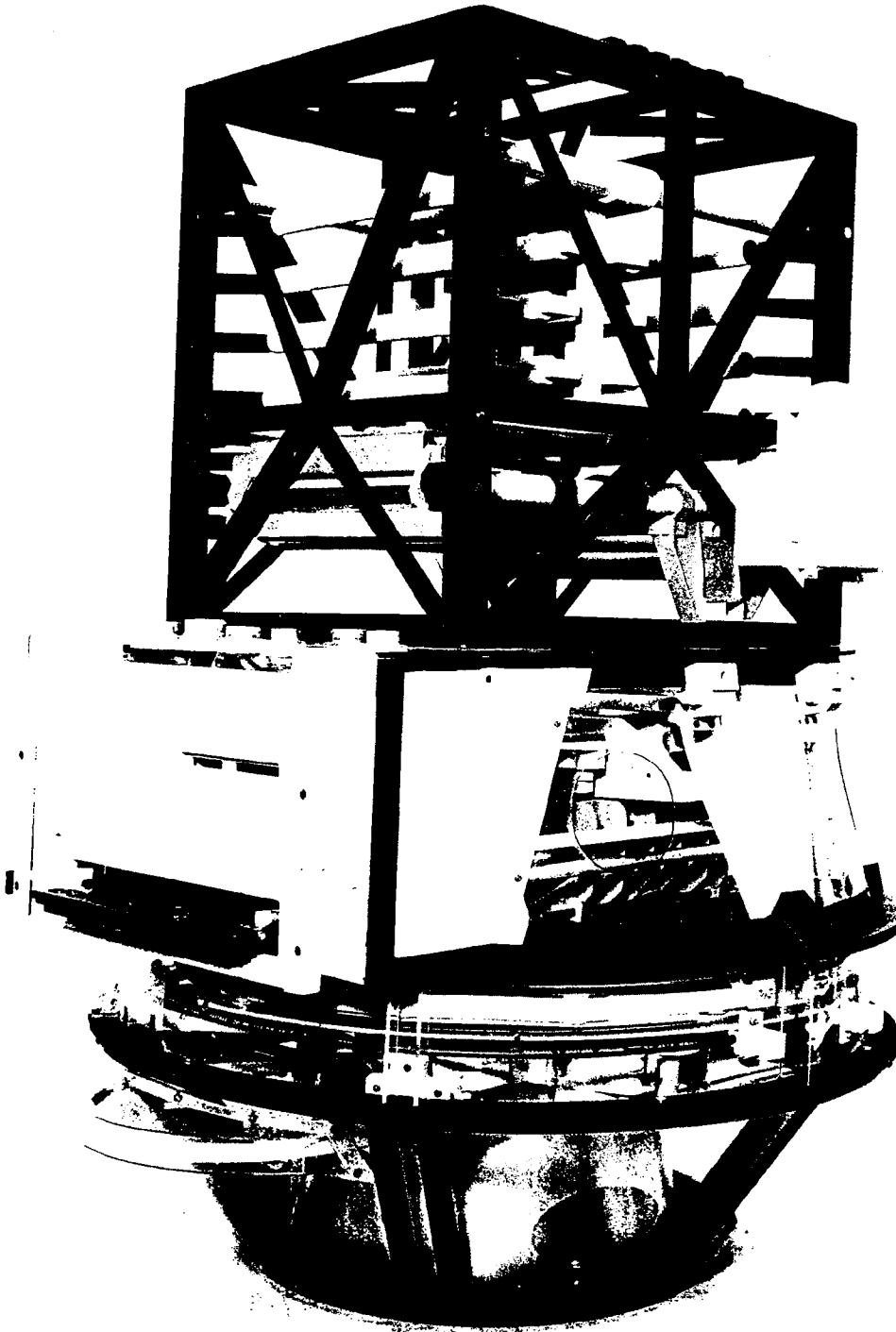


Figure 4.4-2. Camera Simulation Model

4-107

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Handle via BYEMAN
Control System Only

4-109

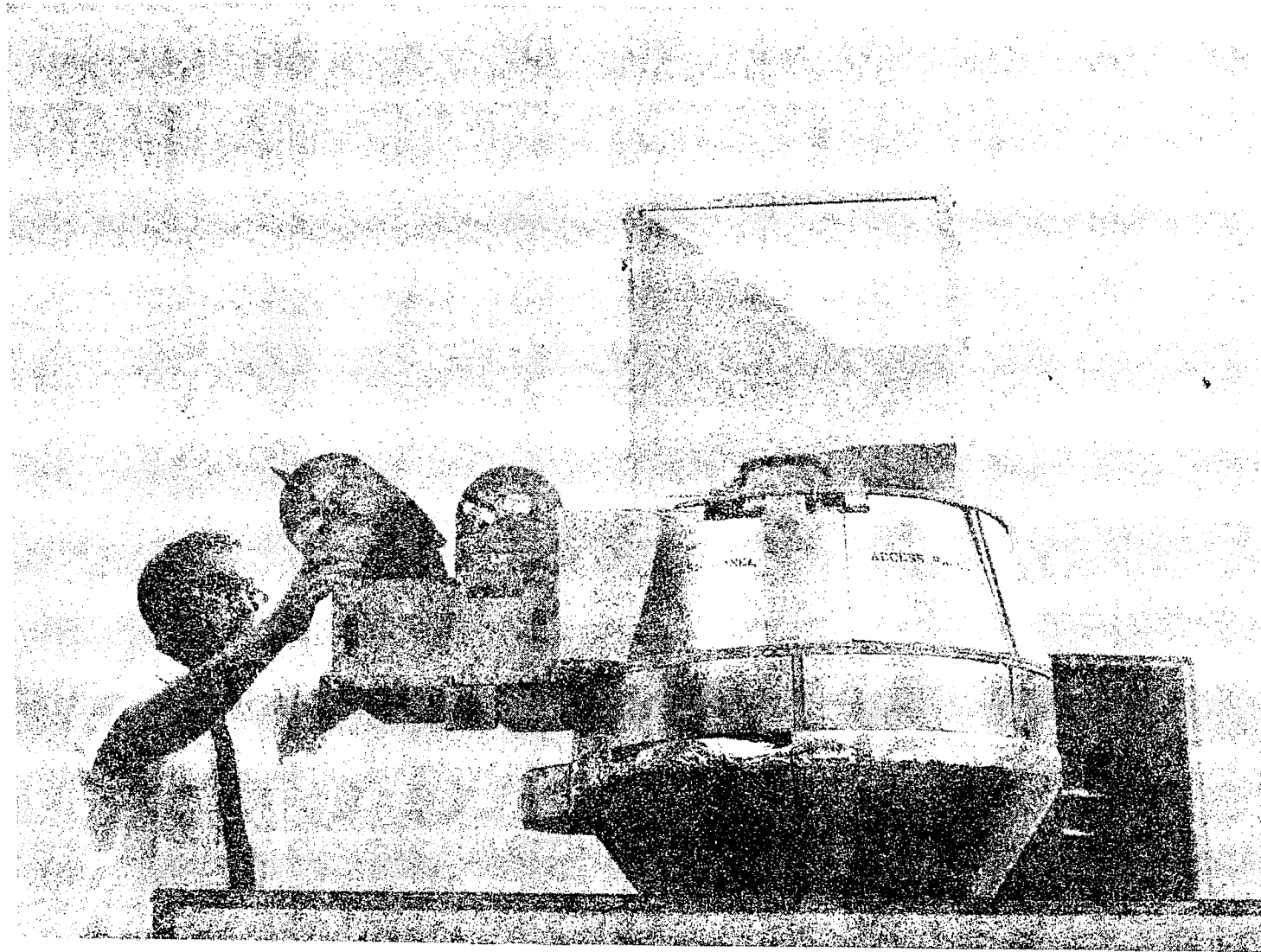


Figure 4.4-3. Camera Mock-up

Handle via BYEMAN
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

Legend

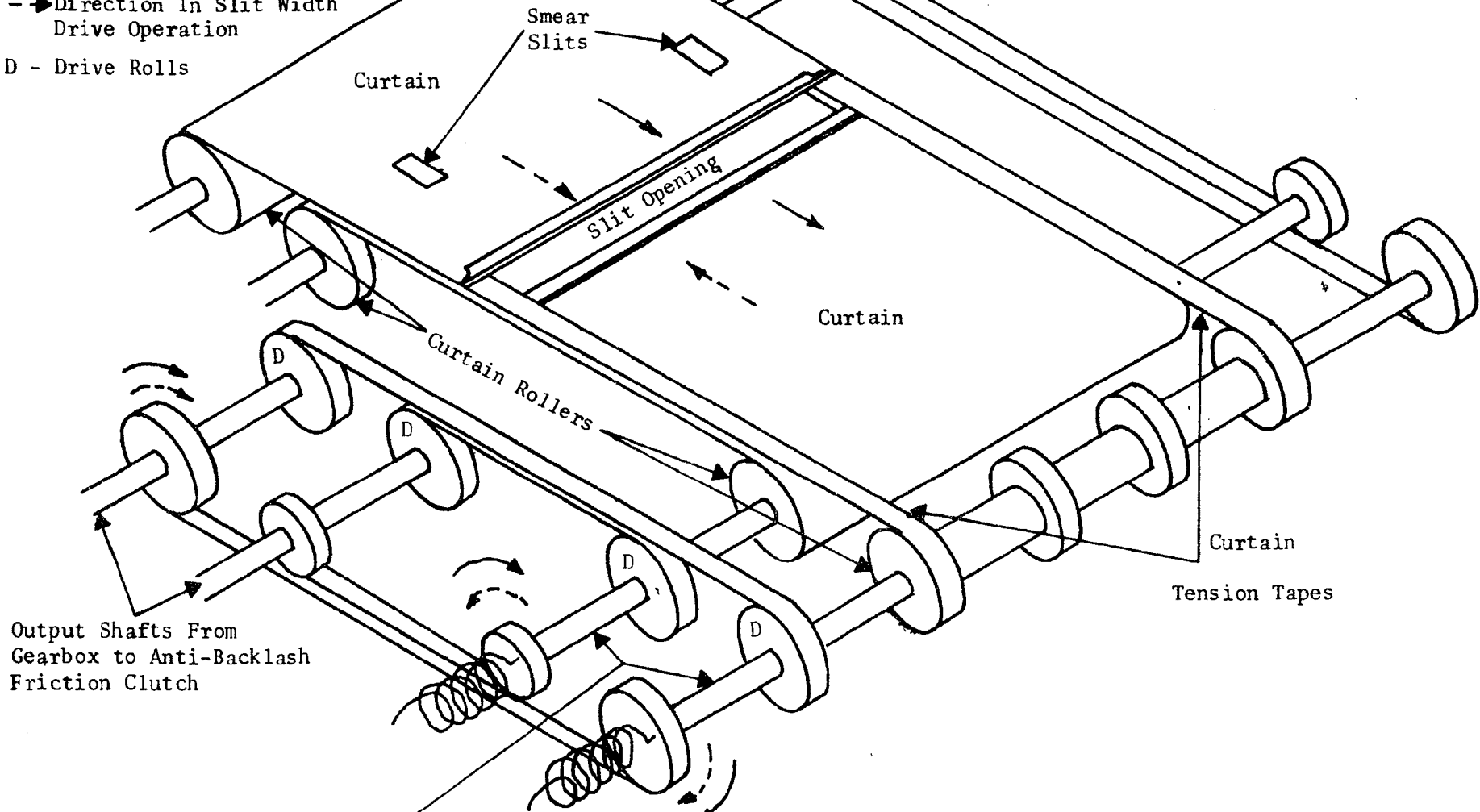
→ Direction In Curtain Drive Operation

- - -> Direction In Slit Width Drive Operation

D - Drive Rolls

Torsion Spring
For Tension On
Tapes and Curtains

4-113



Output Shafts From
Gearbox to Anti-Backlash
Friction Clutch

Input Shafts to
Curtain Carriage Figure 4.4-4. Shutter-Curtain Drive Tape System

Handle via BYEMAN
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

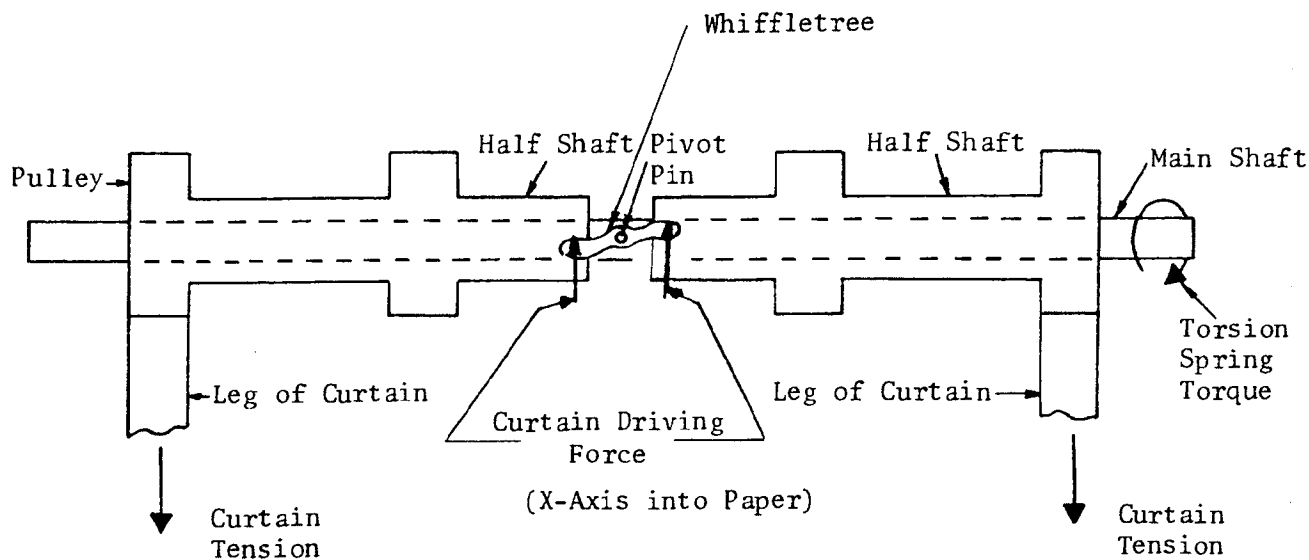
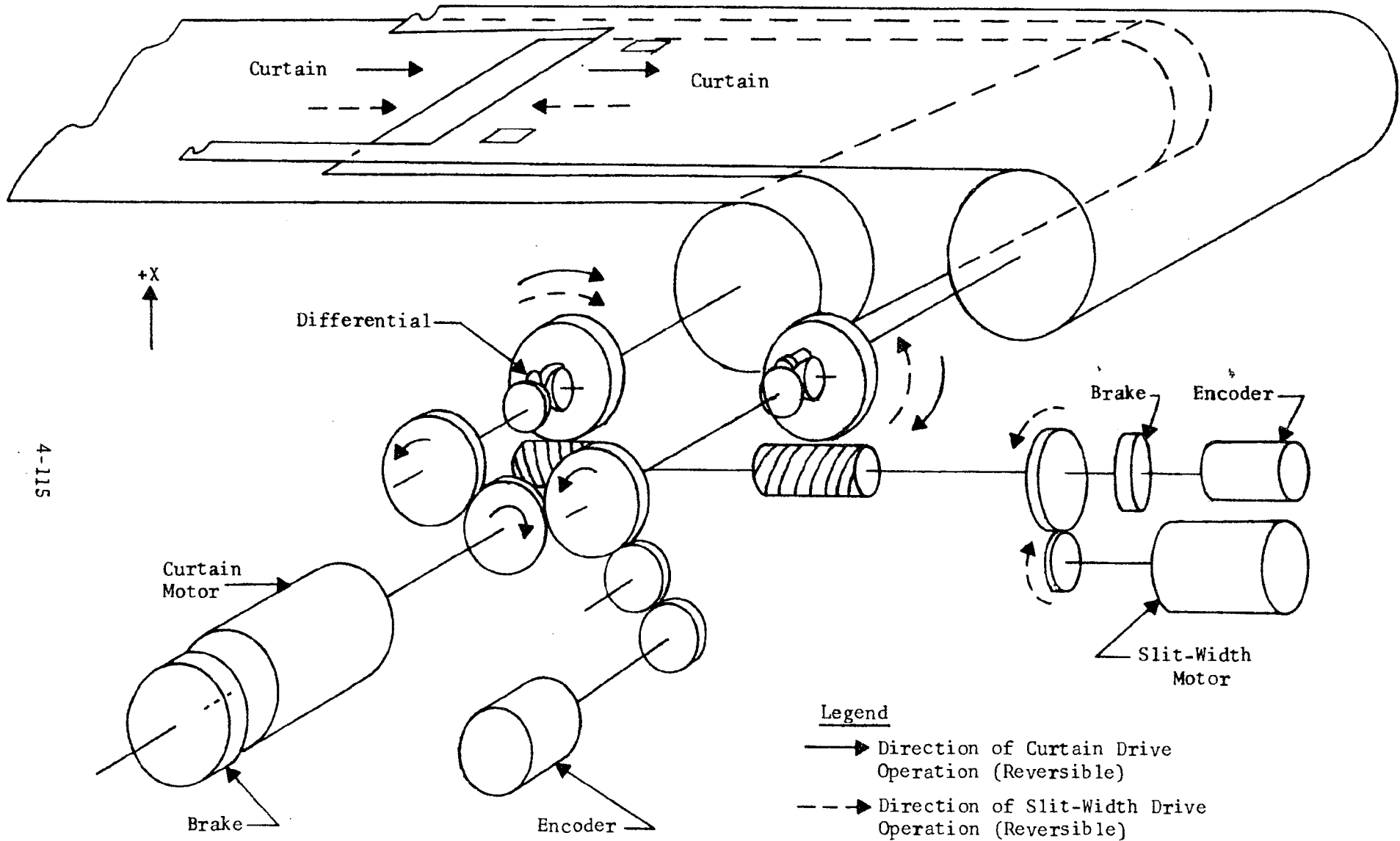


Figure 4.4-5. Whiffletree Assembly

~~SECRET~~ D

~~SECRET~~ D

BIF-008- F-035080-RH -68
(Control Number)



4-115

Figure 4.4-6. Curtain and Slit-Width Drive

Handle via **BYEMAN**
Control System Only

~~SECRET~~ D

~~SECRET~~ D

BIF-008- F-035080-RH -68
(Control Number)

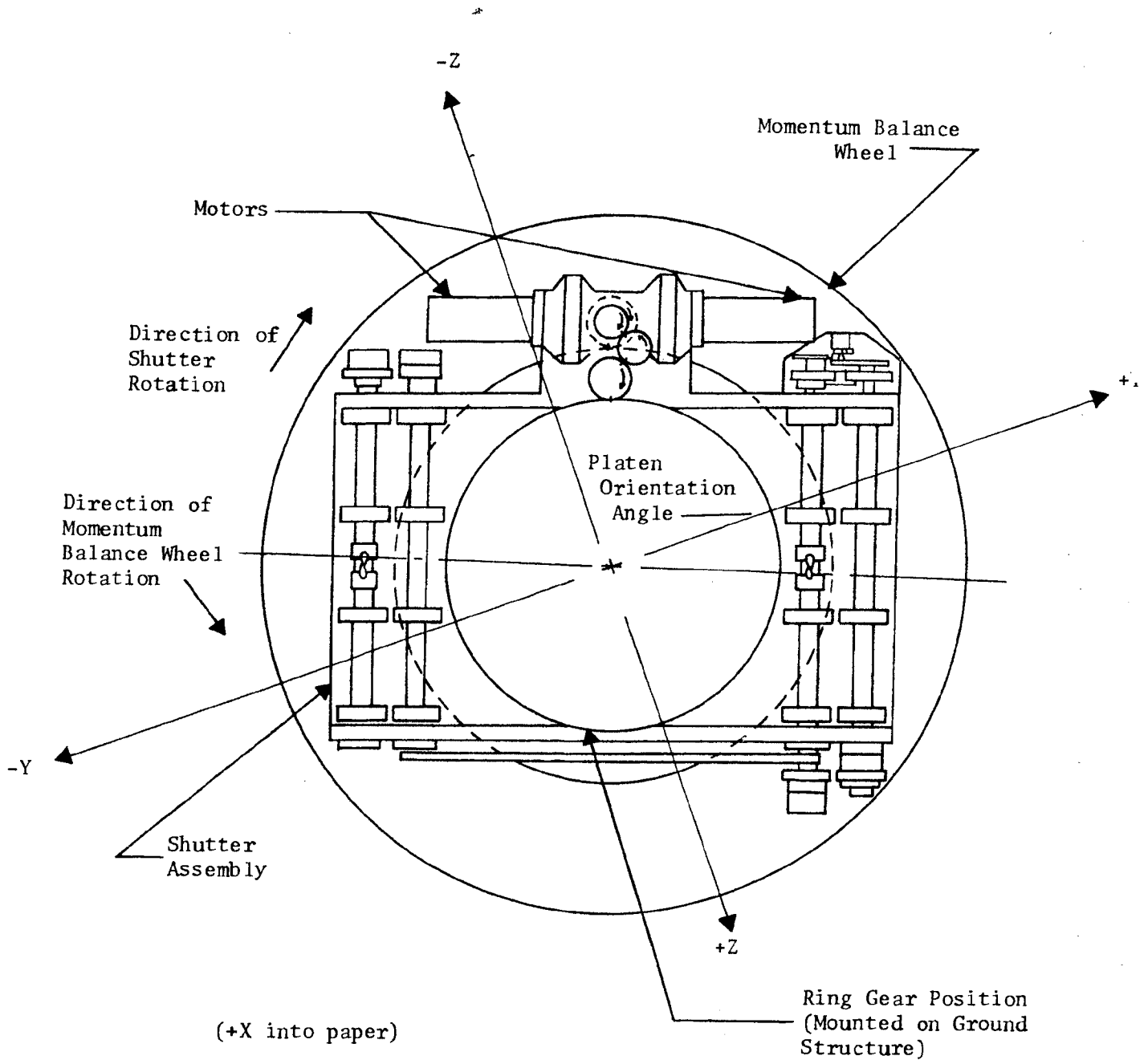


Figure 4.4-7. Shutter Rotation Drive

4-116

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Handle via **BYEMAN**
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

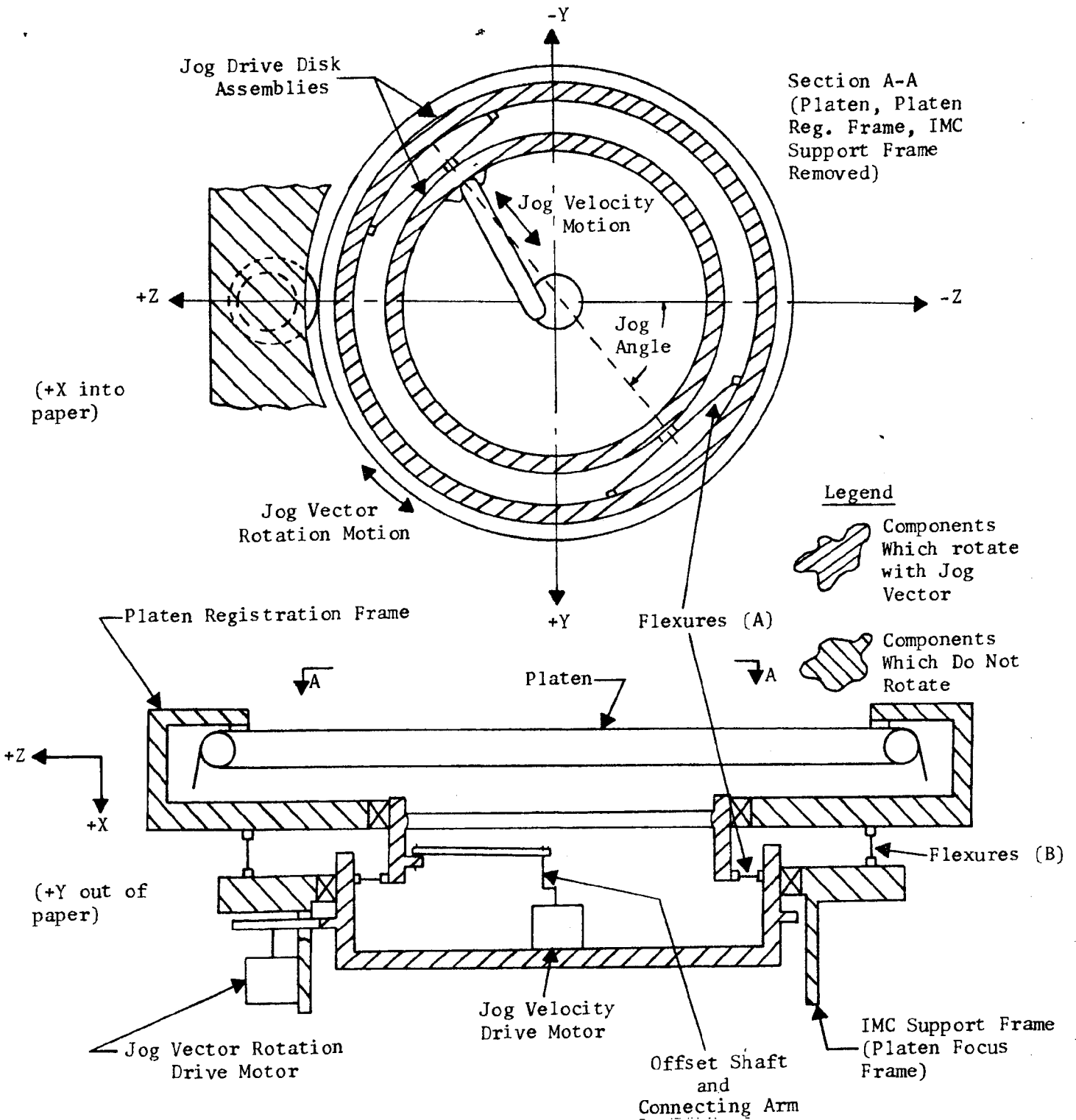


Figure 4.4-8. Image Motion Compensation Schematic

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BIF-008- F-035080-RH -68
(Control Number)

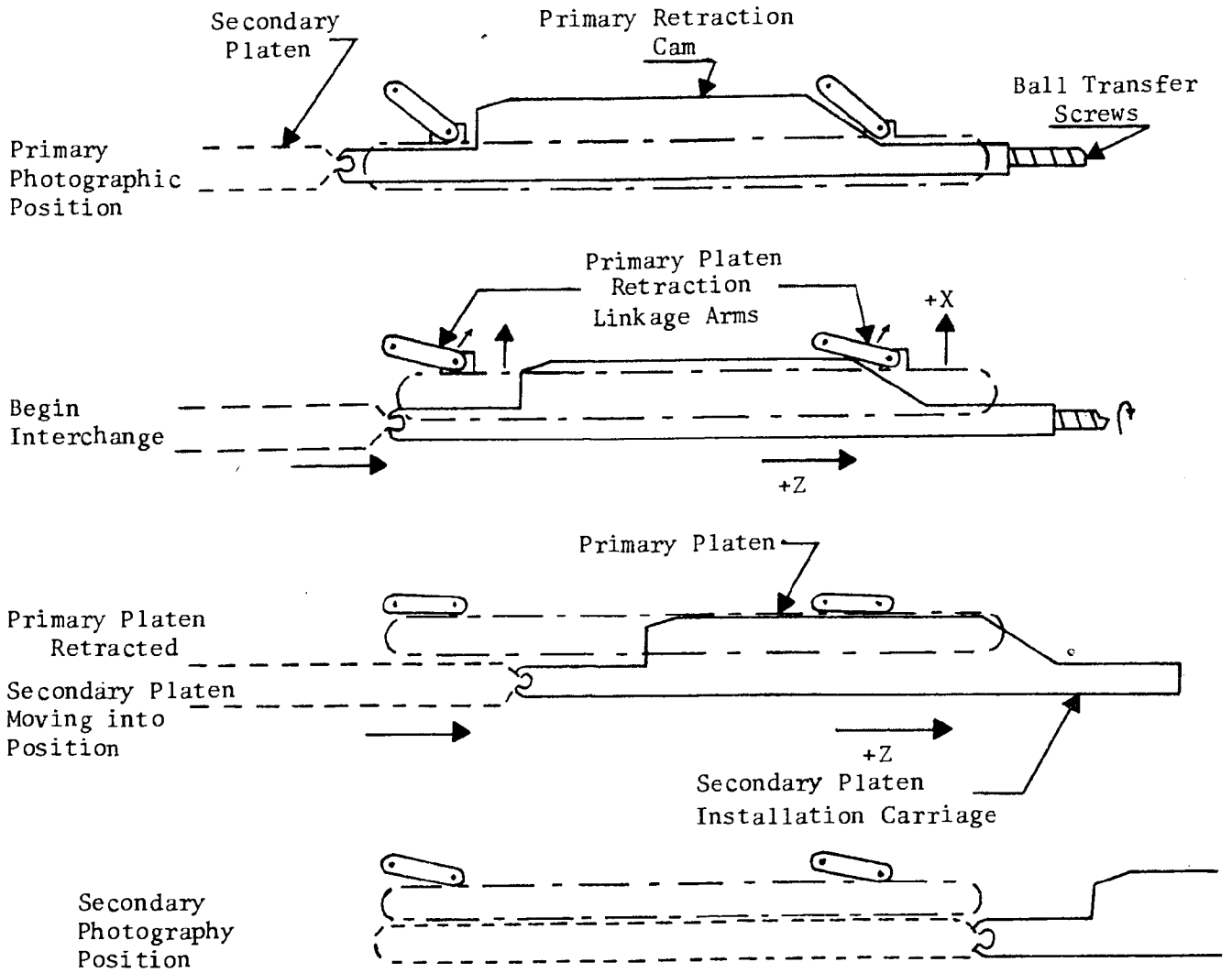


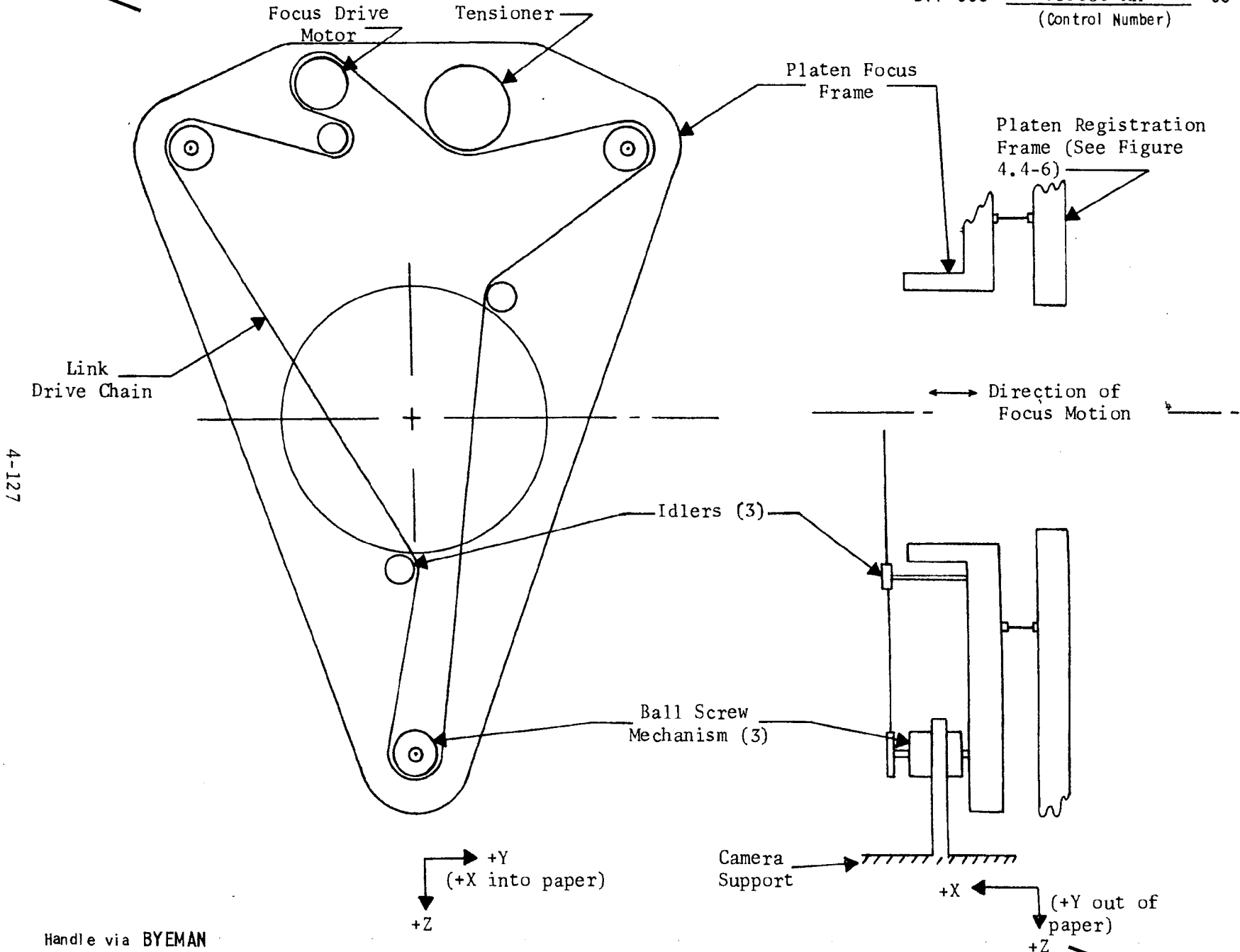
Figure 4.4-9. Schematic Diagram of Platen Interchange Mechanism Sequence

4-121
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Control System Only

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BIF-008- F-035080-RH -68
(Control Number)



4-127

Handle via BYEMAN Control System Only

Figure 4.4-10. Focus Drive Schematic

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BIF-008- F-035080-RH -68
(Control Number)

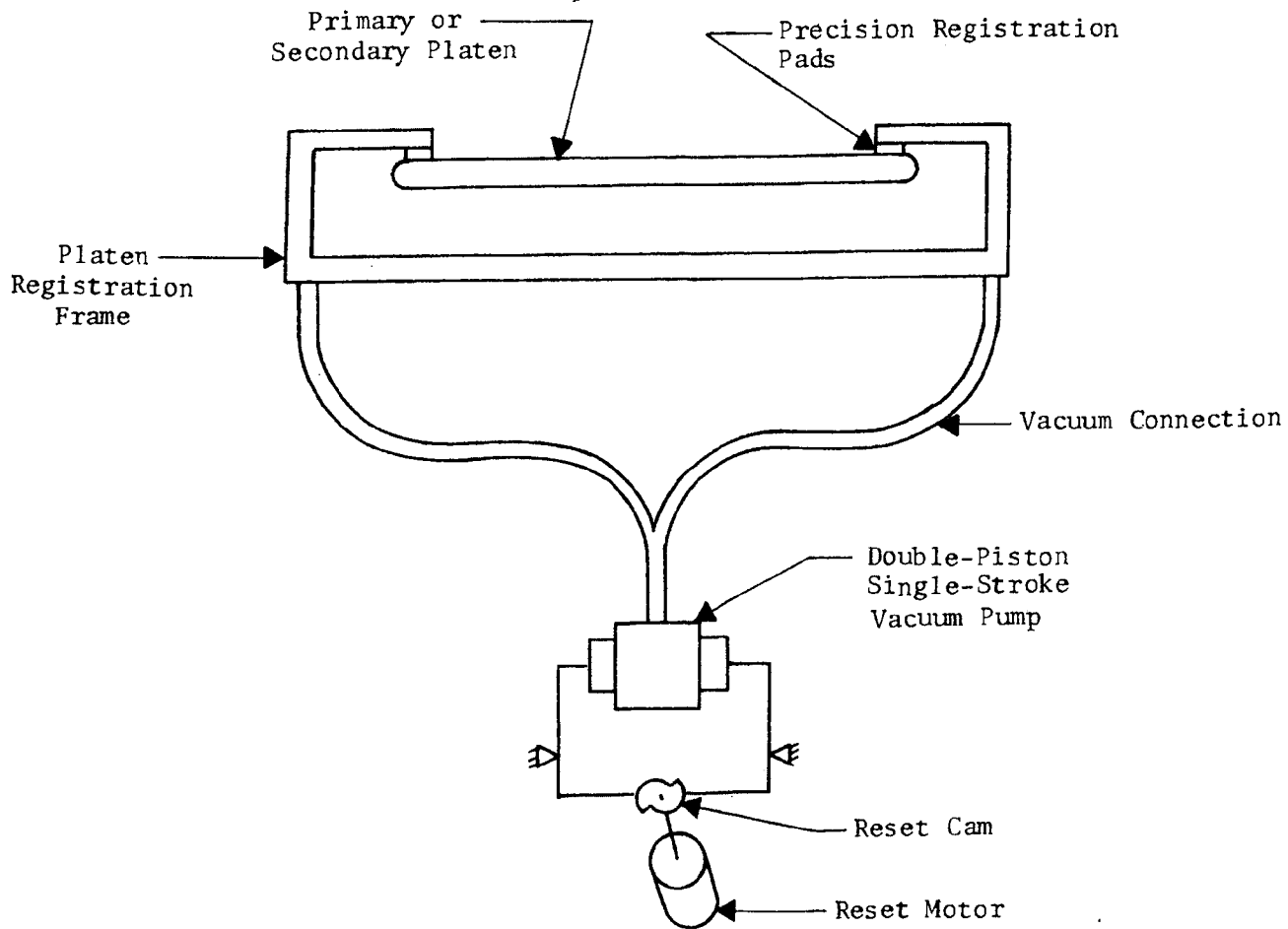


Figure 4.4-11. Vacuum System Schematic

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Handle via **BYEMAN**
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

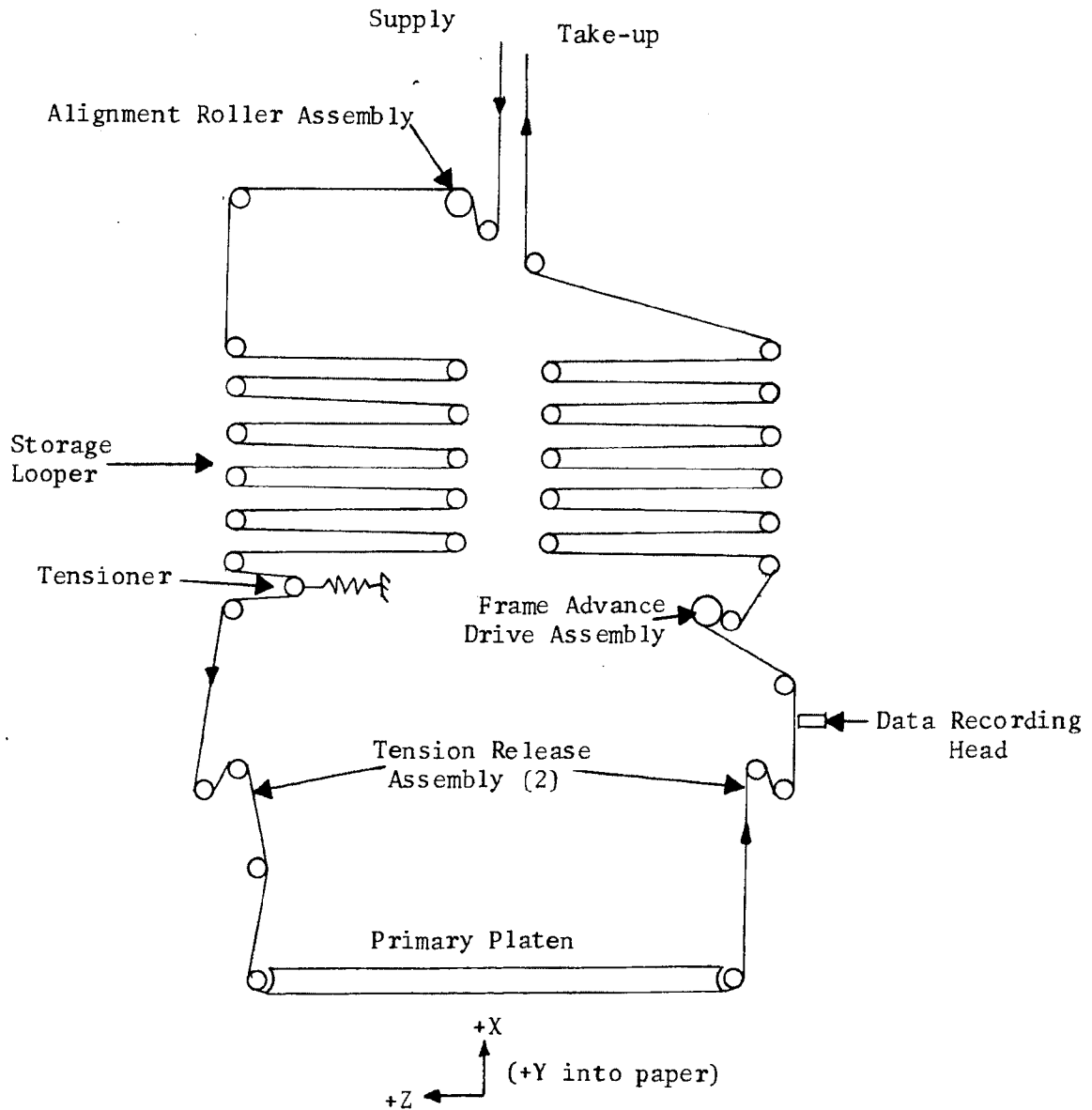


Figure 4.4-12. Primary Film Handling Assembly Schematic

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Handle via **BYEMAN**
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

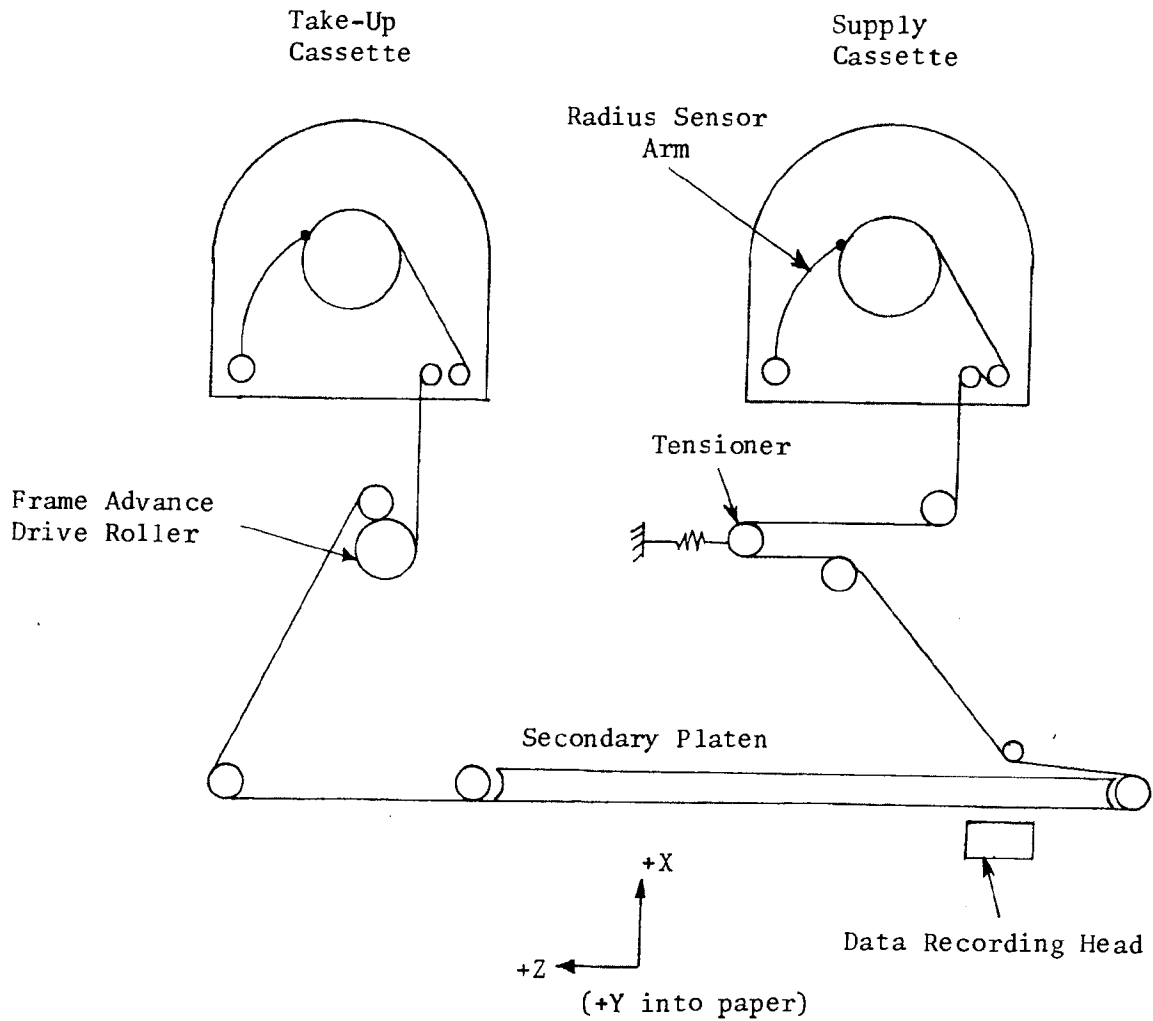


Figure 4.4-13. Secondary Film Handling Assembly Schematic

4-133

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Handle via **BYEMAN**
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

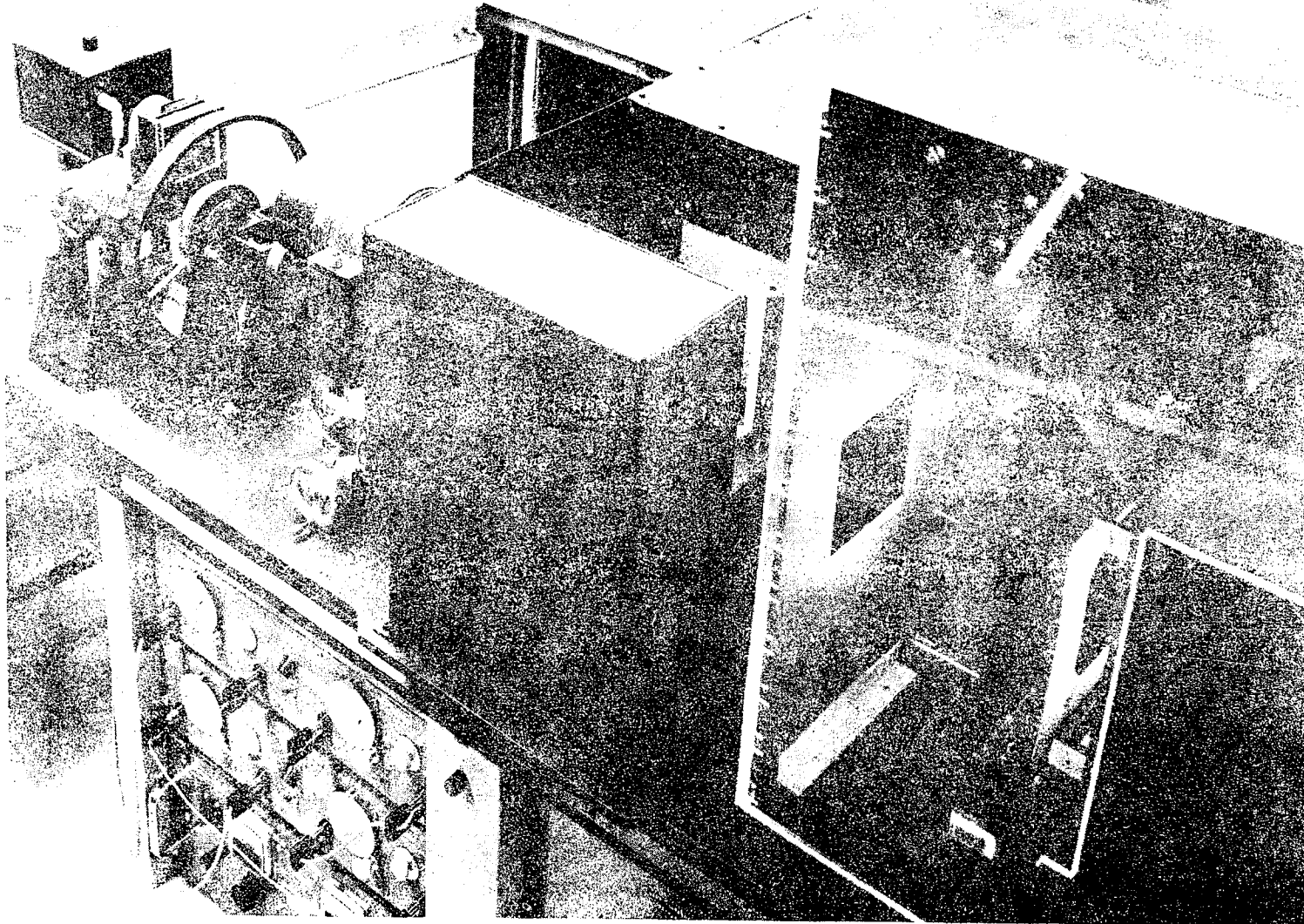


Figure 4.4-13(a). Focus Sensor Breadboard

Handle via BYEMAN
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

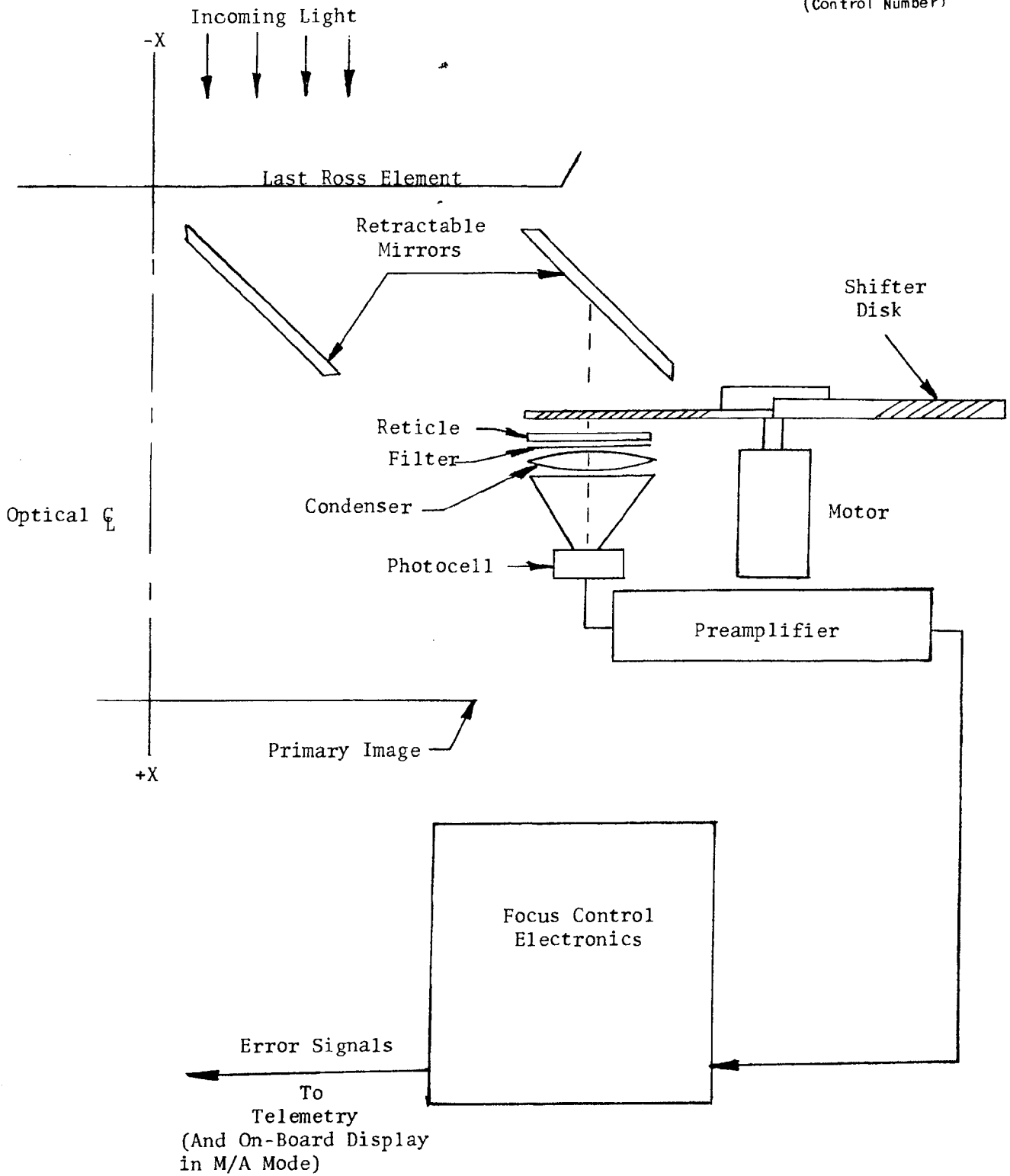


Figure 4.4-14. Focus Sensor Schematic Block Diagram

4-138
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Handle via **BYEMAN**
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

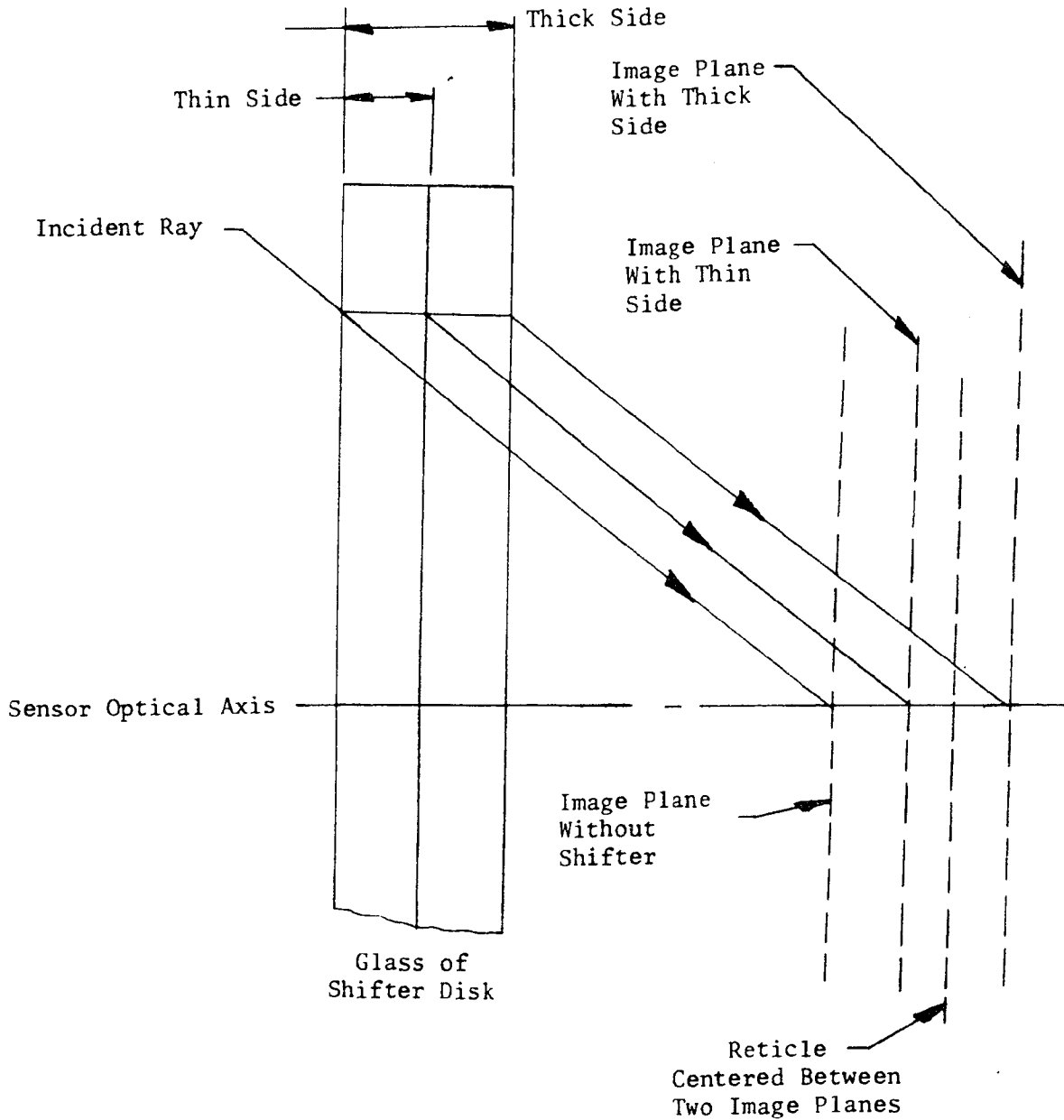


Figure 4.4-15. Focus Sensor Image Planes

4-139
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Handle via **BYEMAN**
Control System Only

4-144

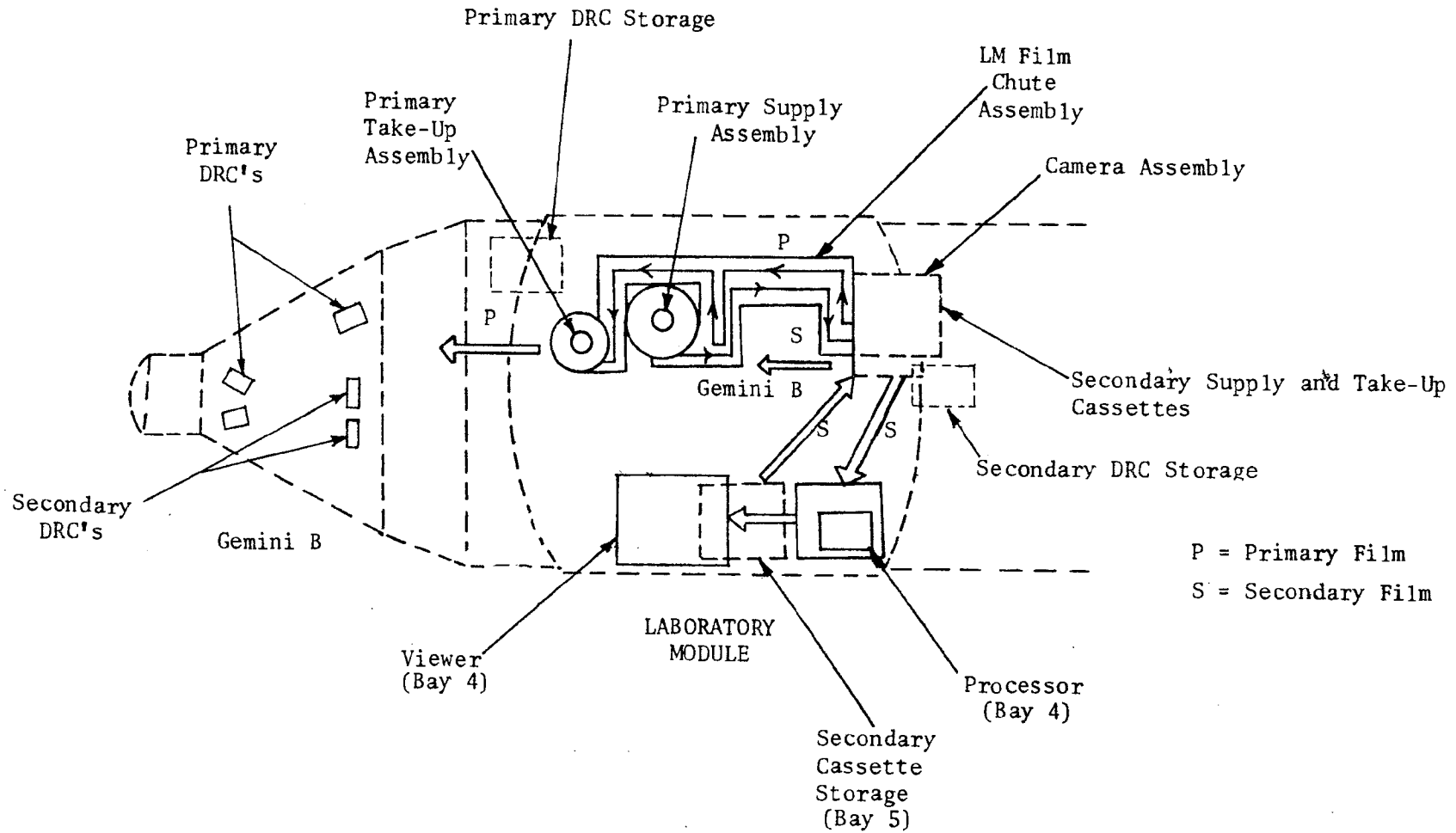


Figure 4.5-2. LM Film Handling Concept - M/A Mode

Handle via BYEMAN
Control System Only

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BIF-008- F-035080-RH -68
 (Control Number)

4-146

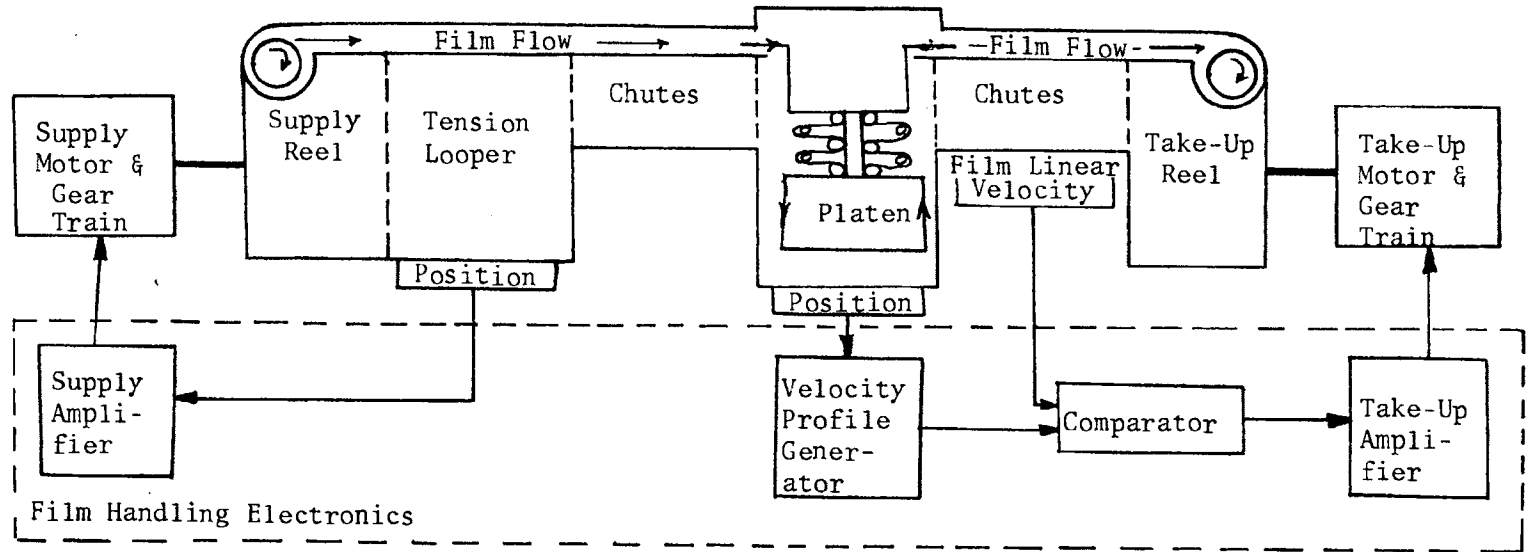


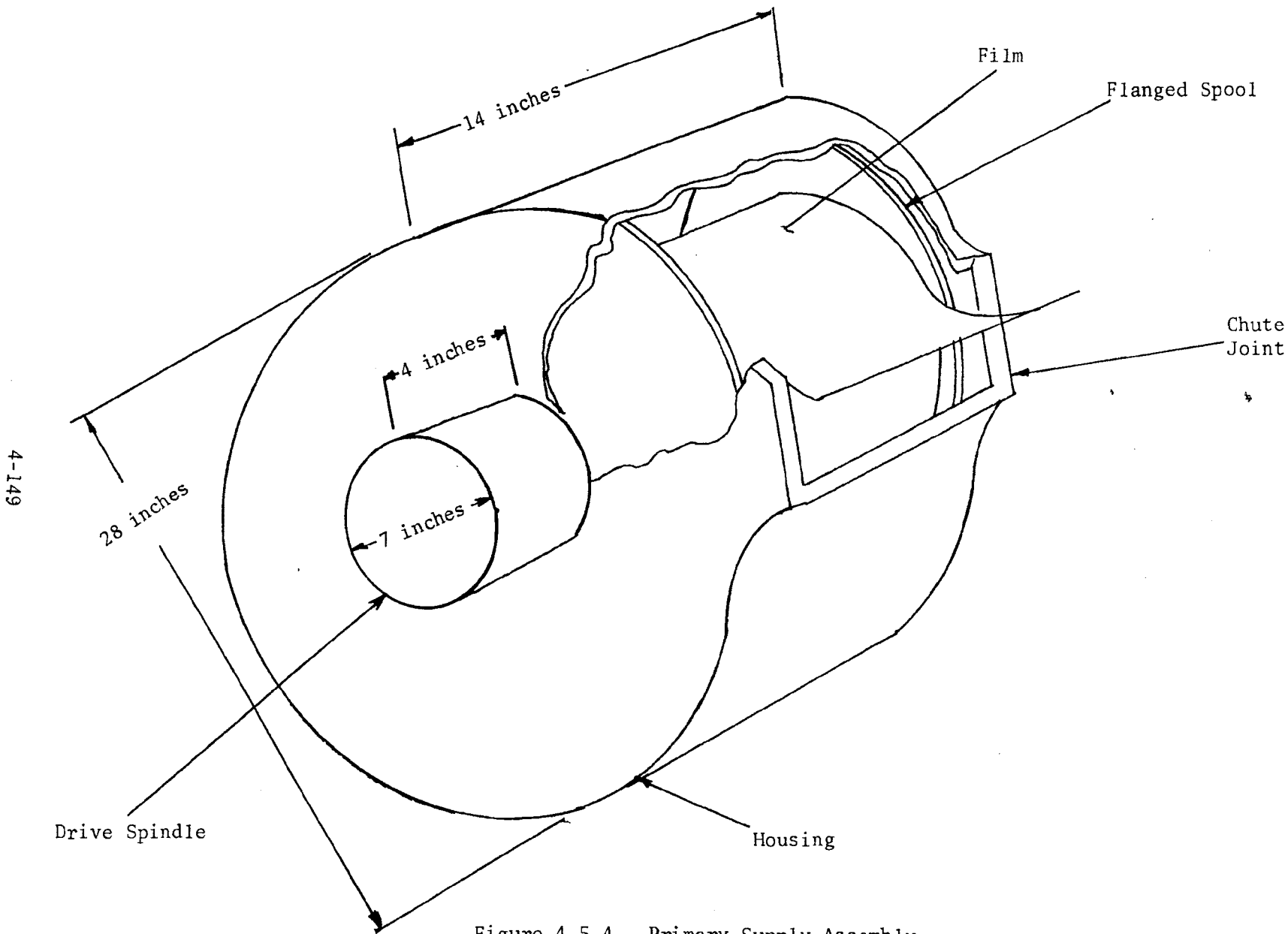
Figure 4.5-3. Block Diagram Primary Film Handling Control - Manned/Automatic Mode

Handle via **BYEMAN**
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BIF-008- F-035085-RH -68
(Control Number)



4-149

Figure 4.5-4. Primary Supply Assembly

Handle via **BYEMAN**
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BIF-008- F-035080-RH -68
(Control Number)

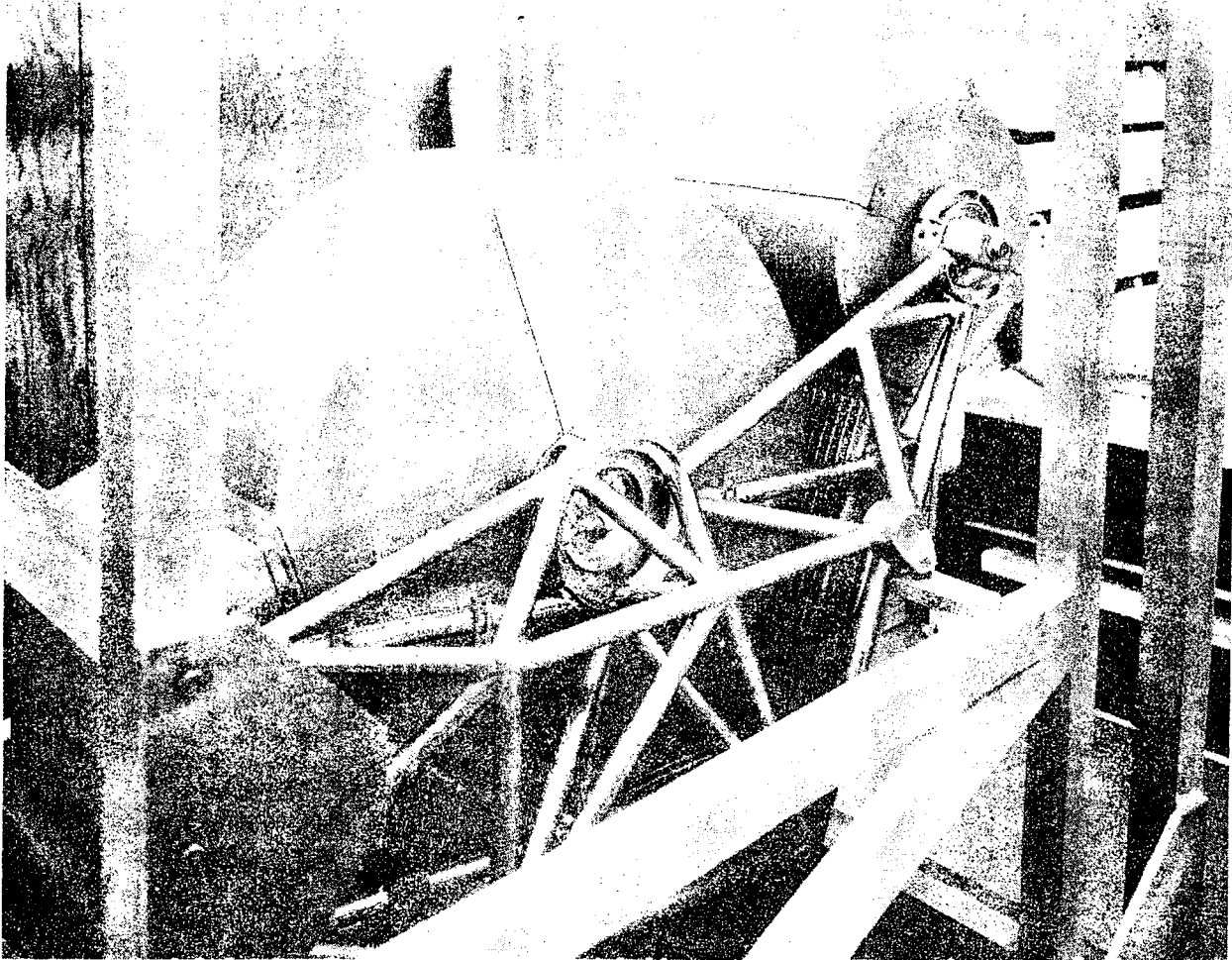


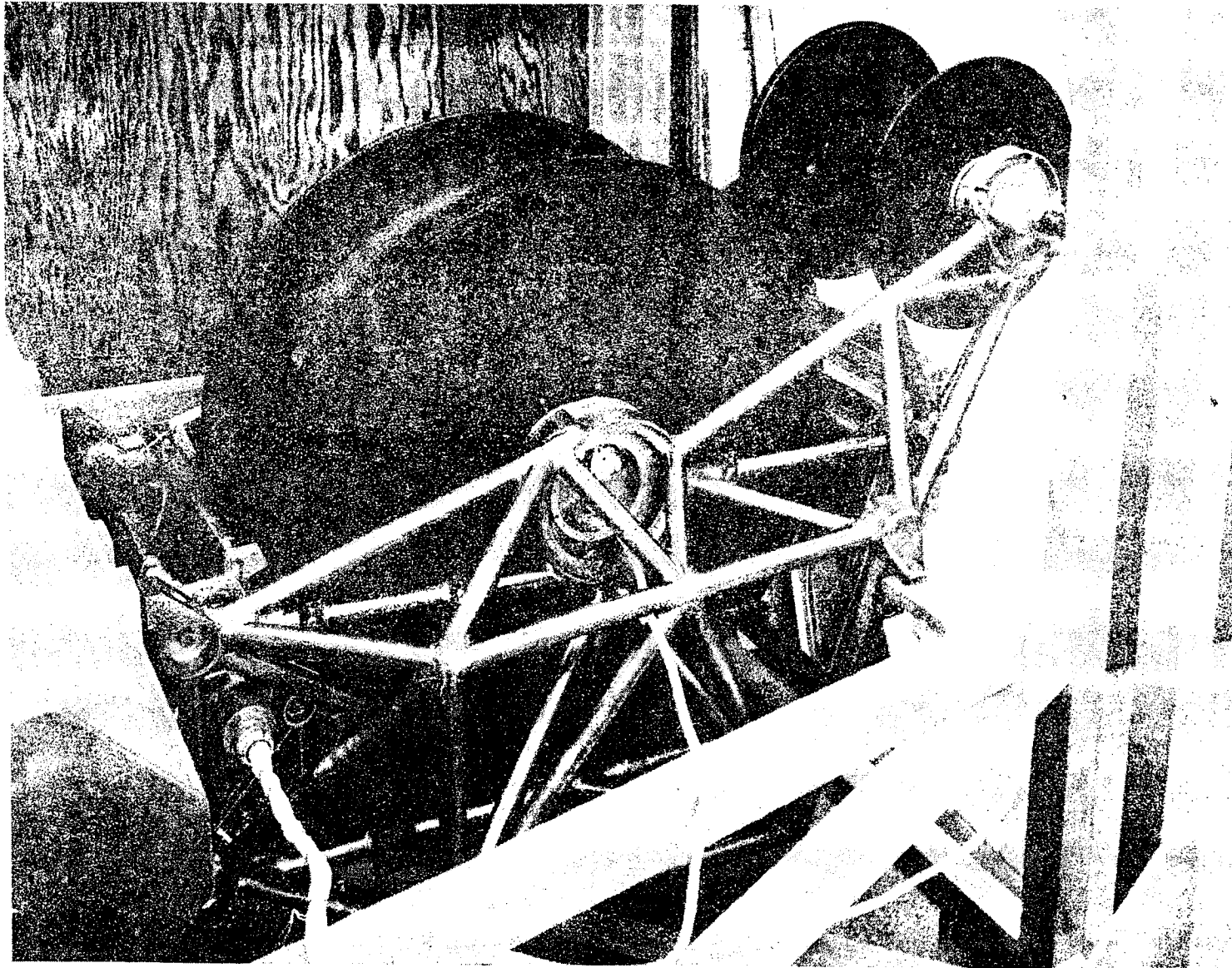
Figure 4.5-5. Primary Supply Assembly Engineering Model

4-150
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Handle via **BYEMAN**
Control System Only

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(Control Number)



4-151

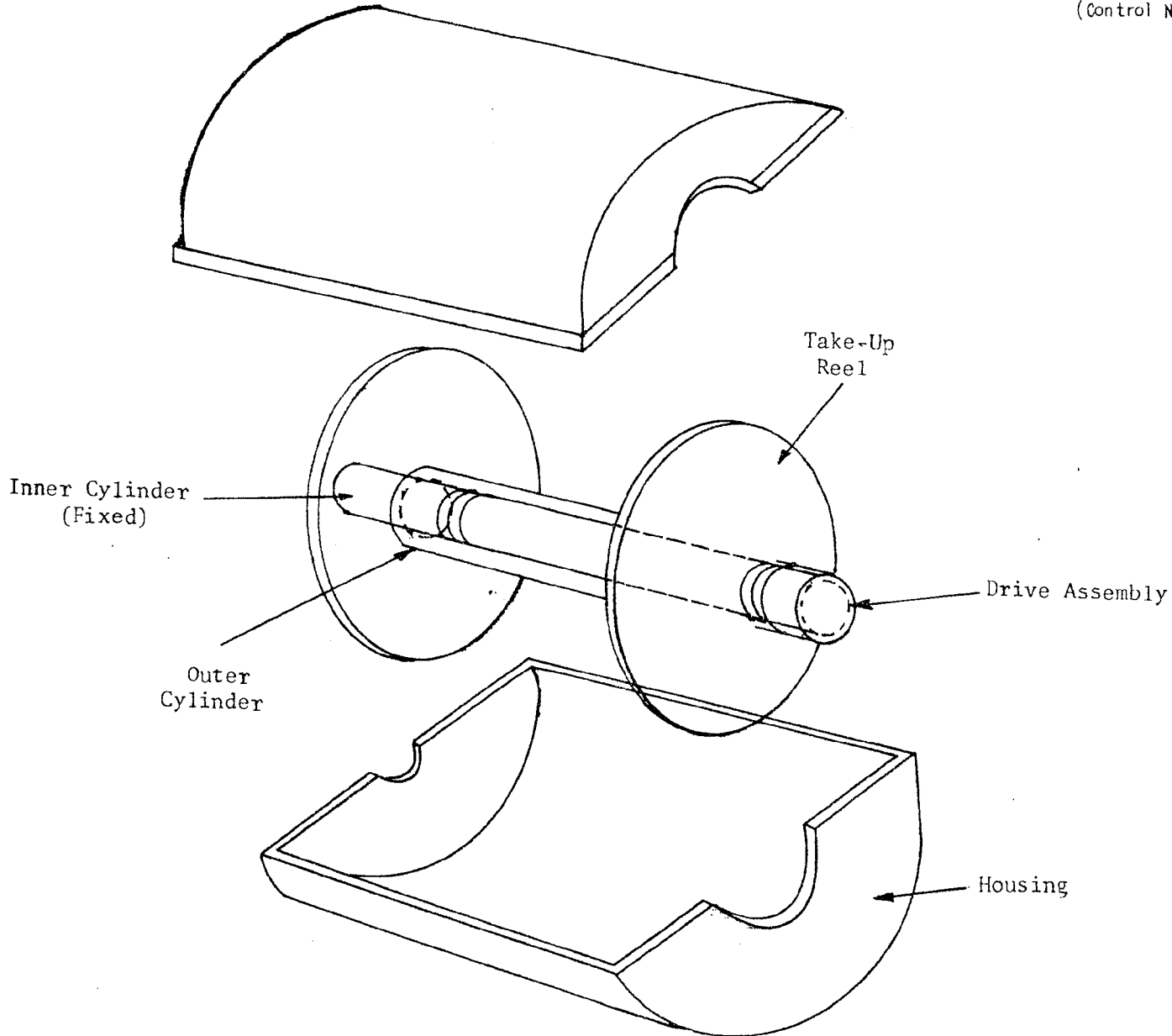
Handle via **BYEMAN**
Control System Only

Figure 4.5-6. Film Transport System Supply Spool and Take-Up Reel

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(Control Number)



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Figure 4.5-7. Primary Take-Up Assembly Concept

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BIF-008- F-035080-RH -68
(Control Number)

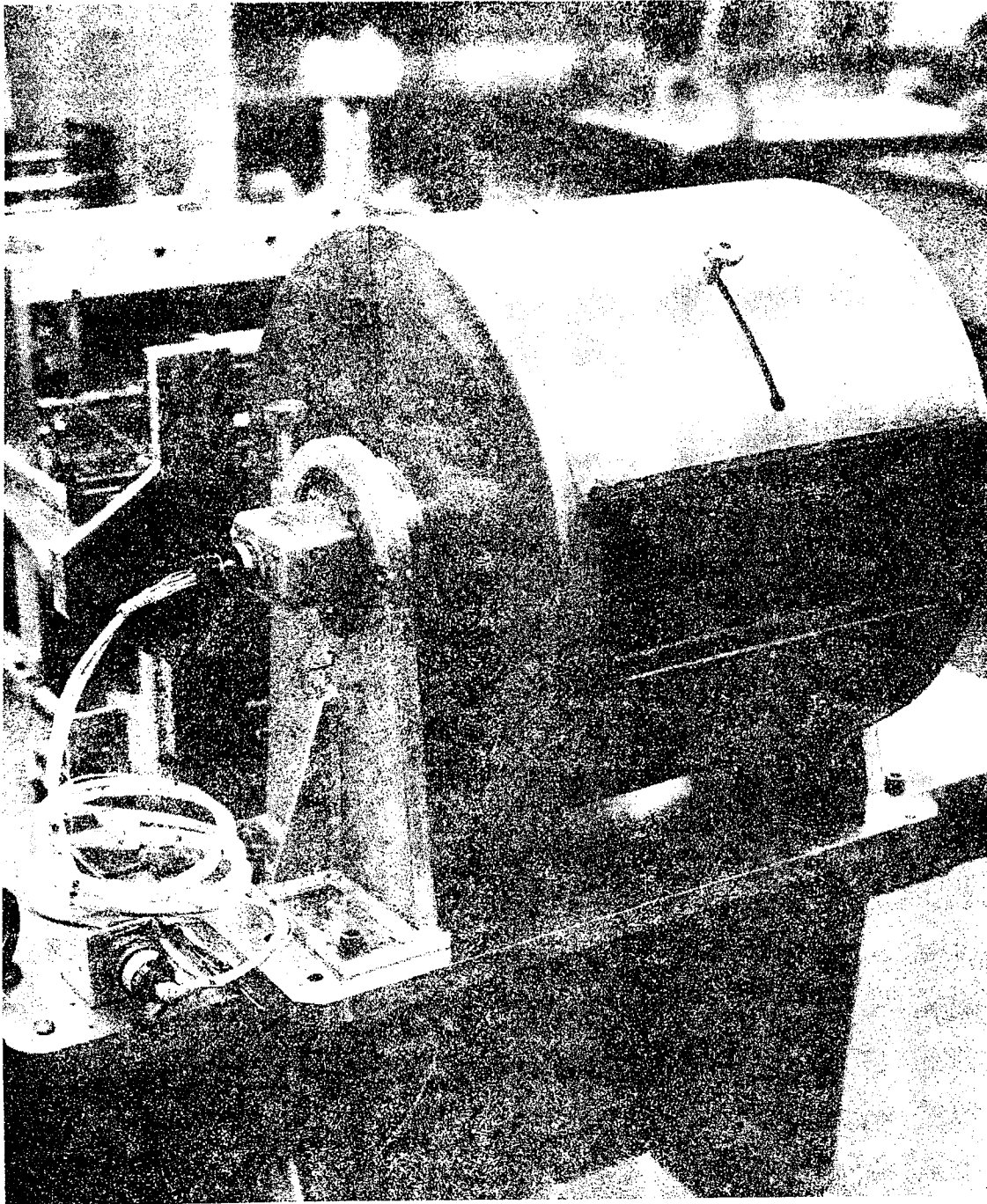


Figure 4.5-8. Film Take-Up Assembly

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Handle via **BYEMAN**
Control System Only

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(Control Number)

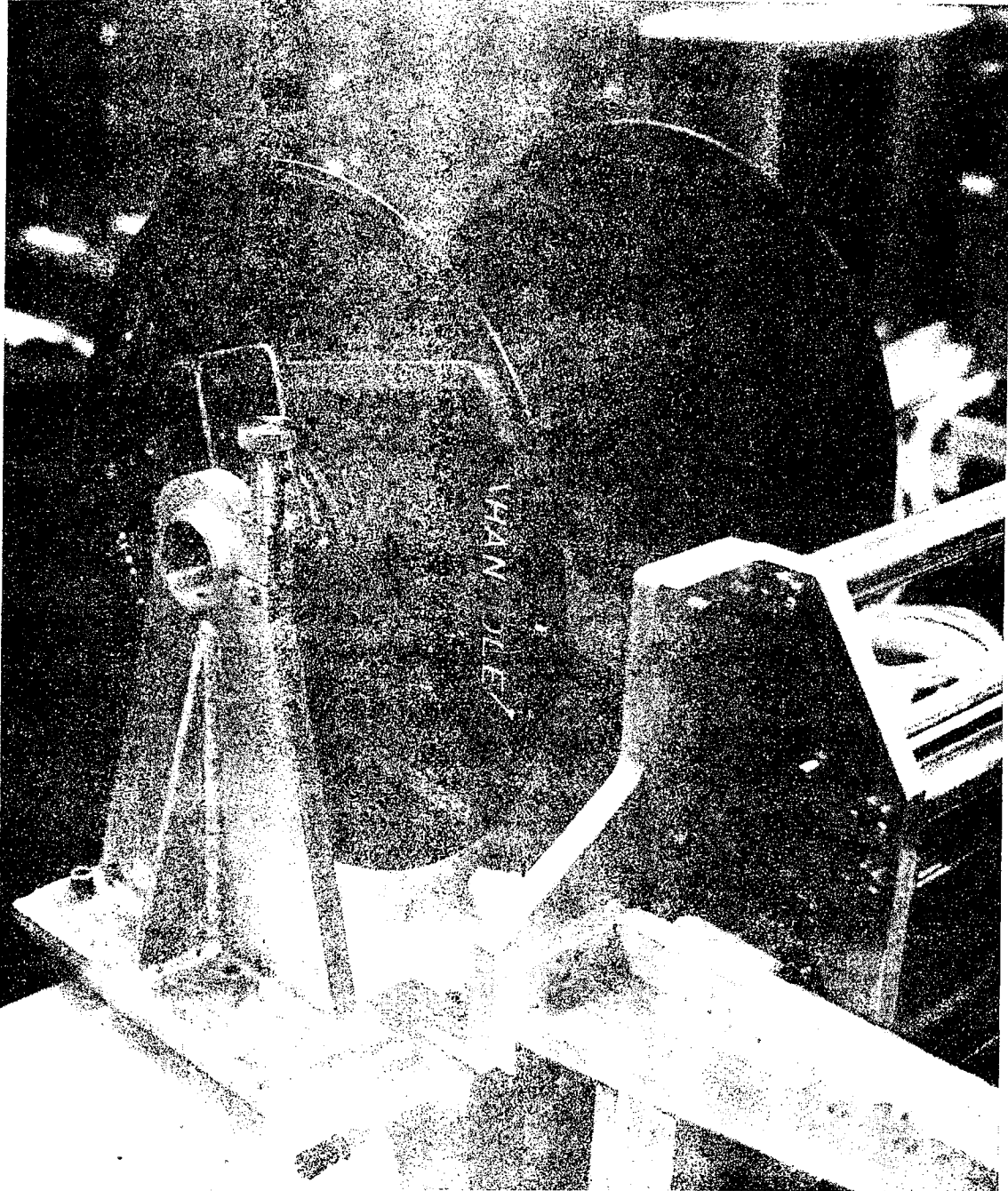


Figure 4.5-9. Film Take-Up Assembly - Spool and BSC Mounting Flange

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Handle via BYEMAN
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

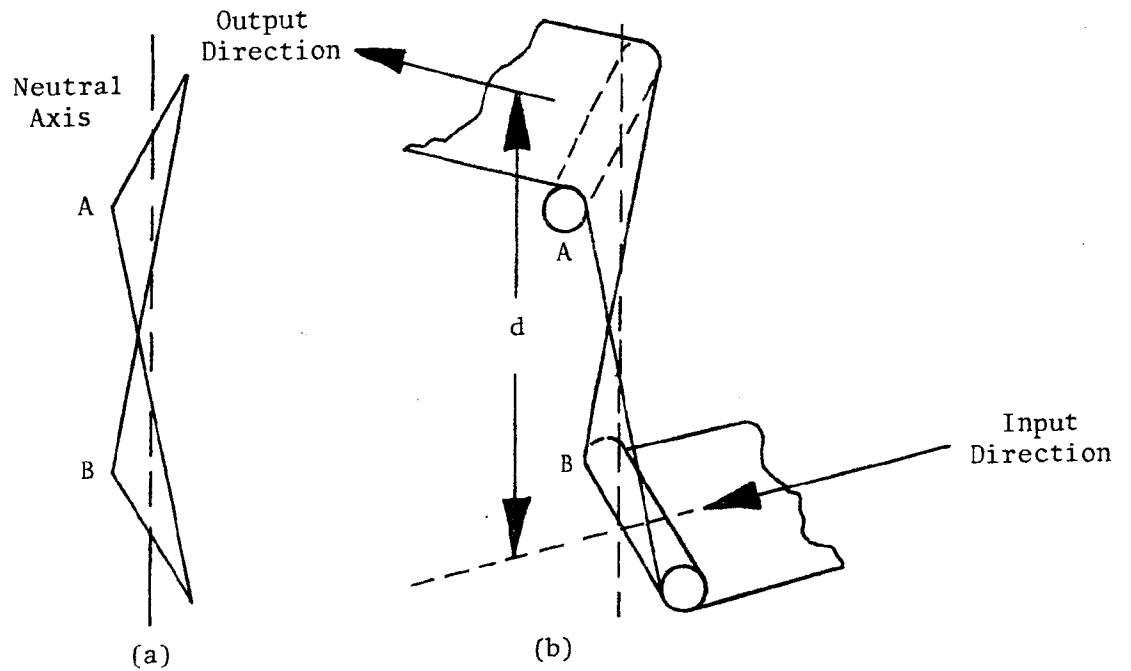


Figure 4.5-10. Film Neutral Axis

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Handle via **BYEMAN**
Control System Only

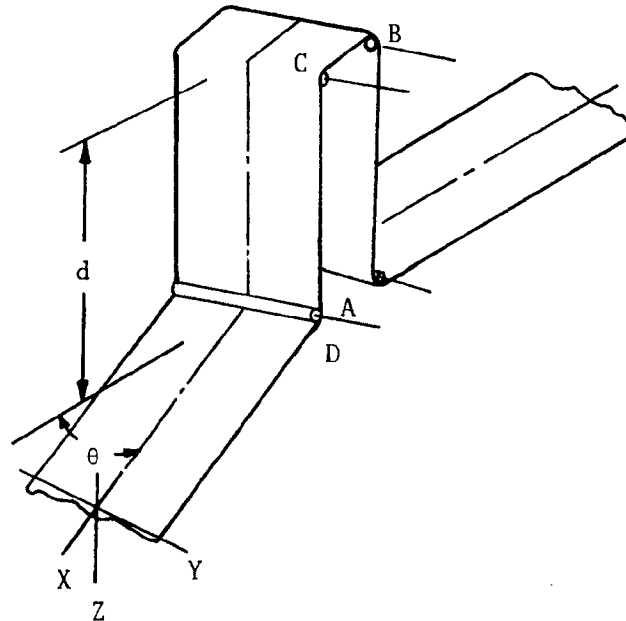
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(Control Number)

4-159

Limitation:

$$\theta = \frac{2 \text{ degrees} \times 2d}{\text{Foot}}$$



Ground Rules:

All rollers must lie in planes parallel to the XY plane.

Rollers B and C must be parallel to each other.

Figure 4.5-11. Neutral Axis Rotation Concept

Handle via **BYEMAN**
Control System Only

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(Control Number)

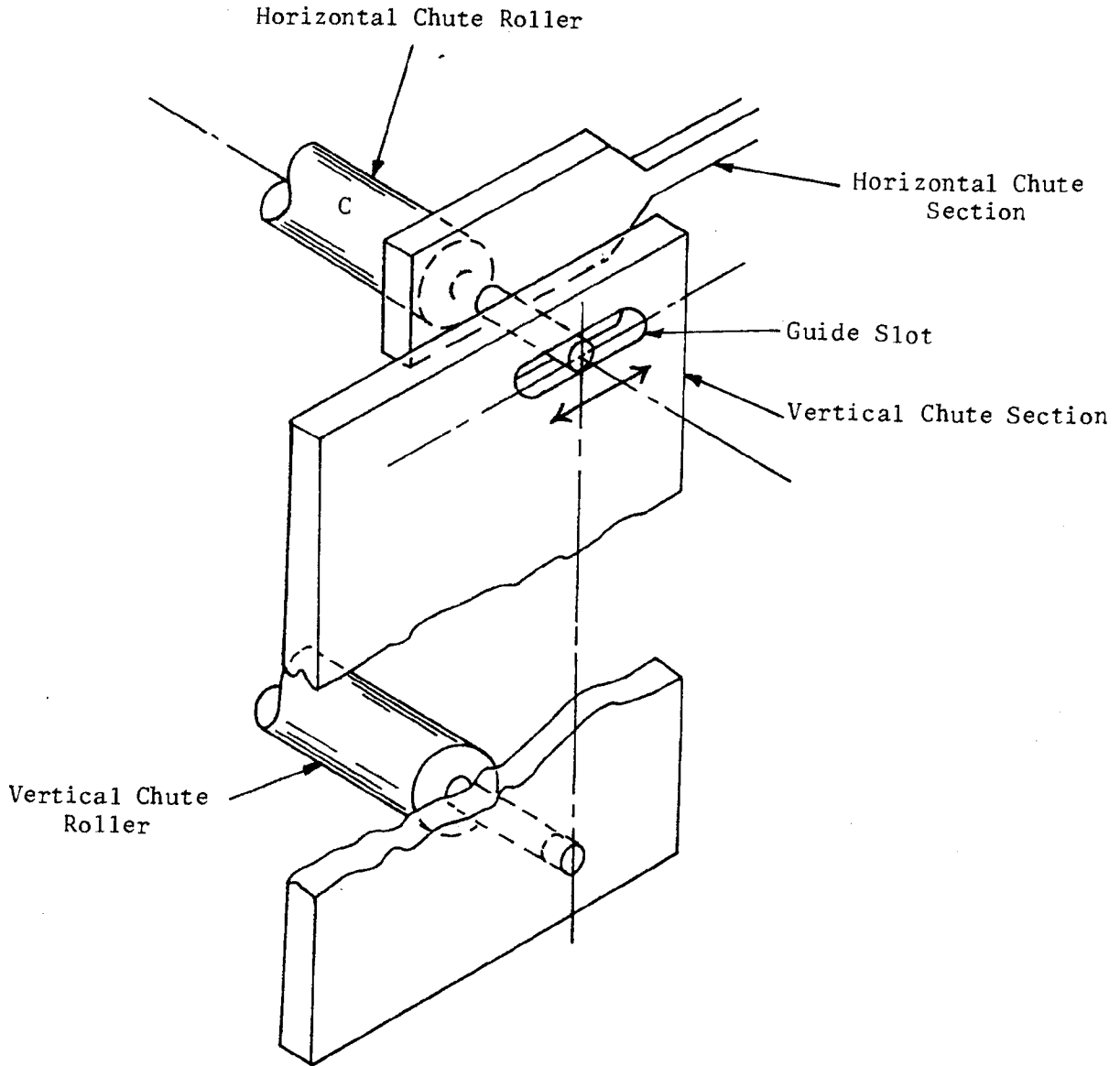
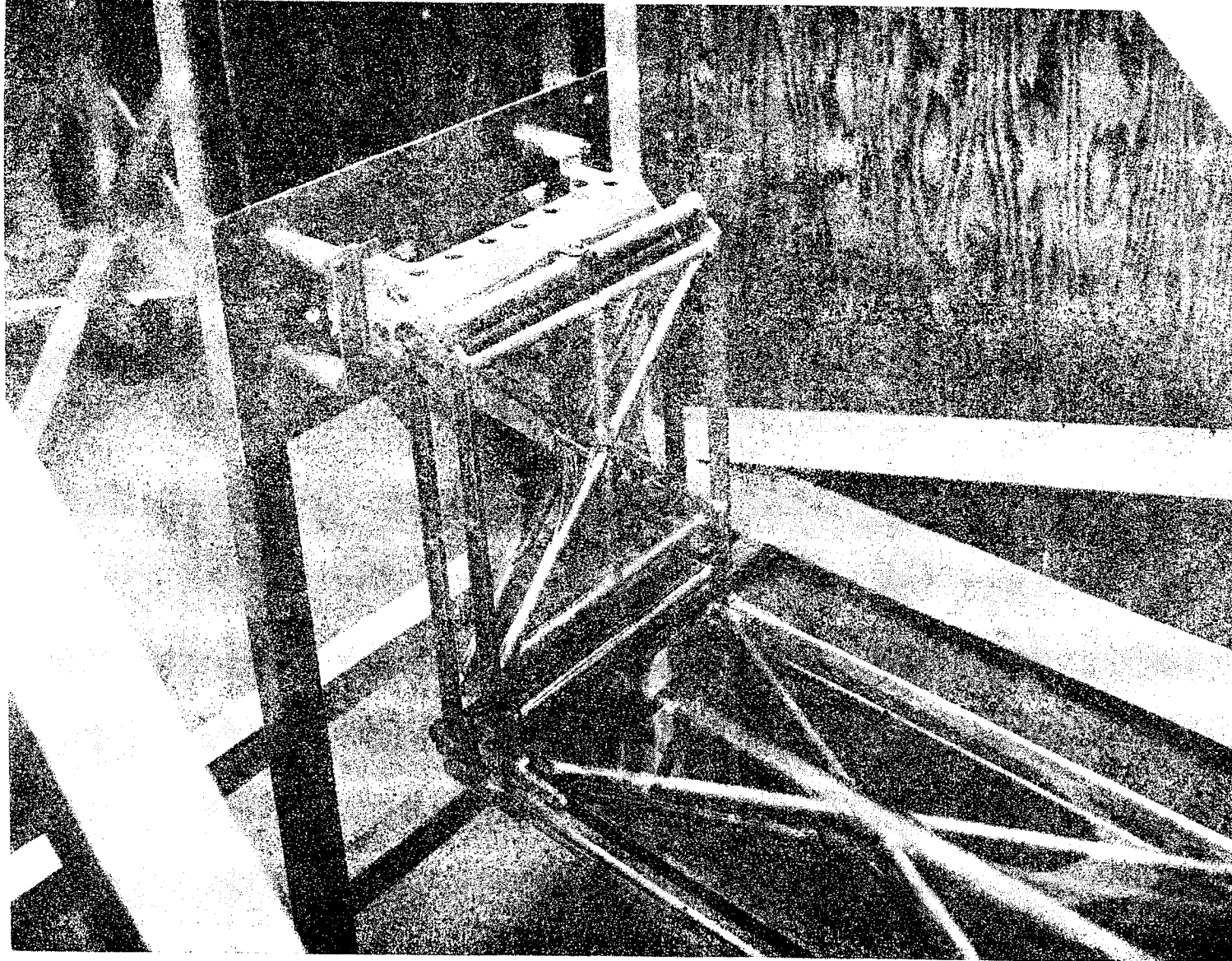


Figure 4.5-12. Horizontal Chute Support

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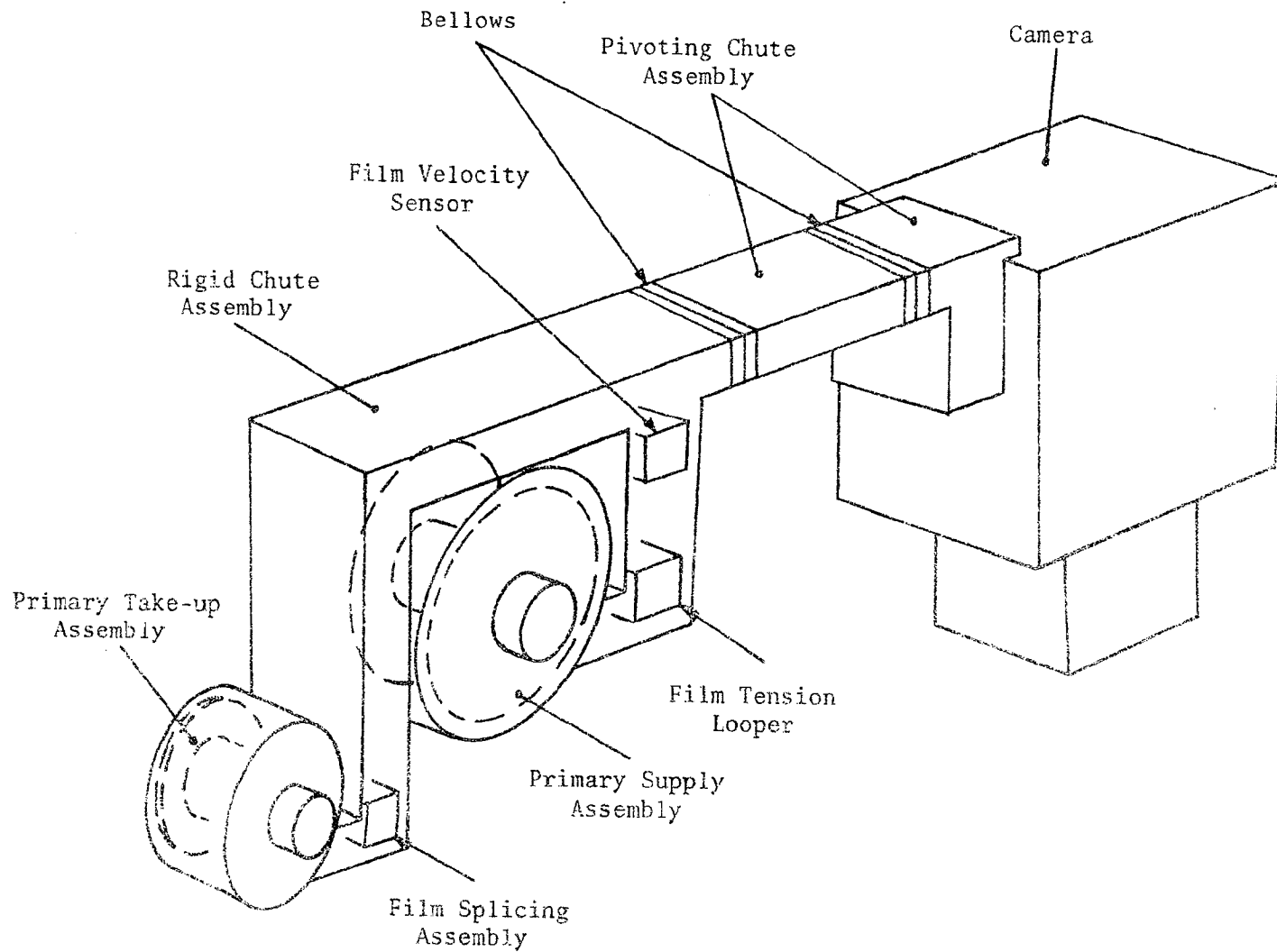
Handle via **BYEMAN**
Control System Only



4-162

Figure 4.5-13. Roller Pivots and Guide Slots

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Control System Only



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Figure 4.5-14. LM Chute Assembly Concept

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Control System Only

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BIF-008- F-035080-RI1 -68
(Control Number)

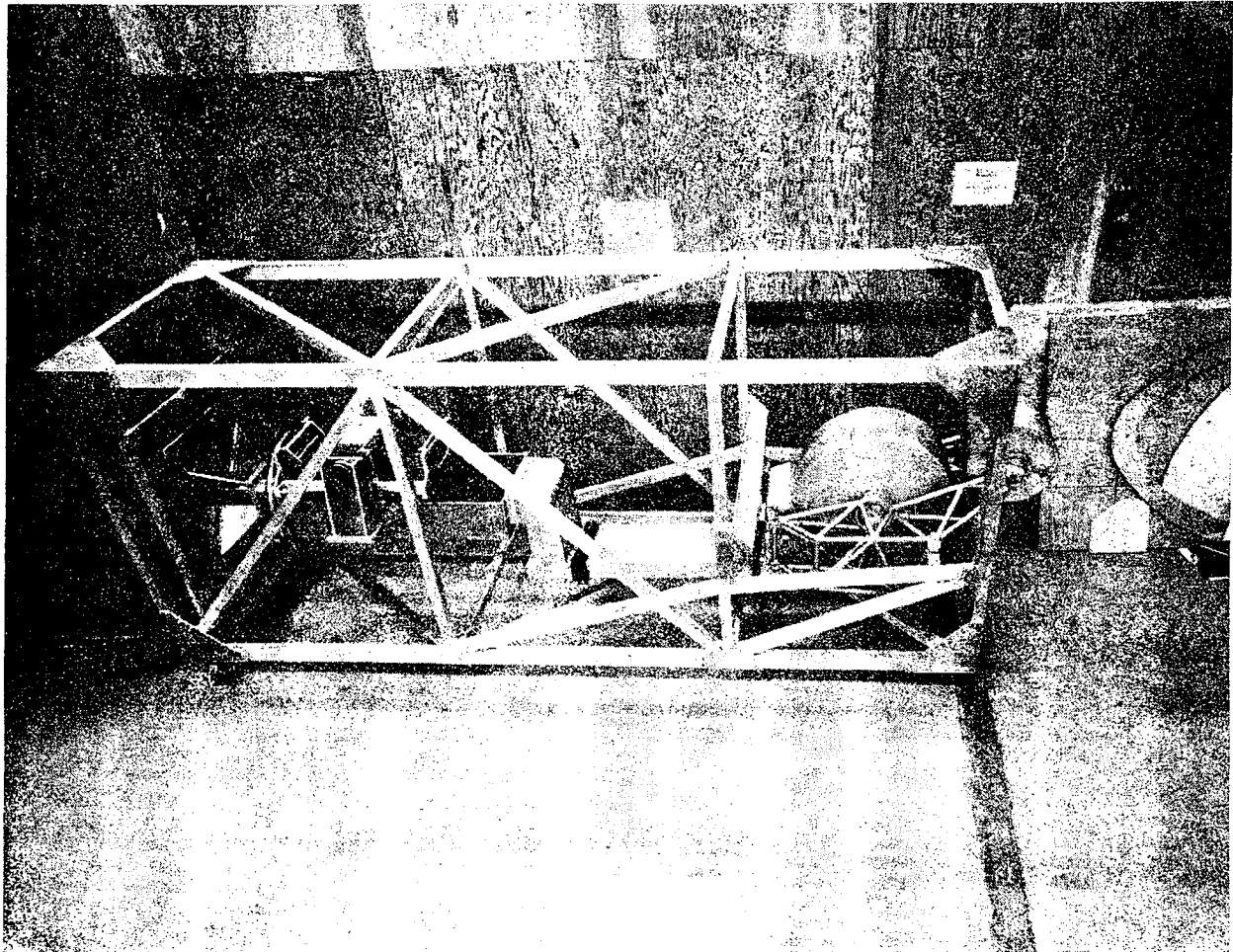


Figure 4.5-15. Film Transport System Engineering Model

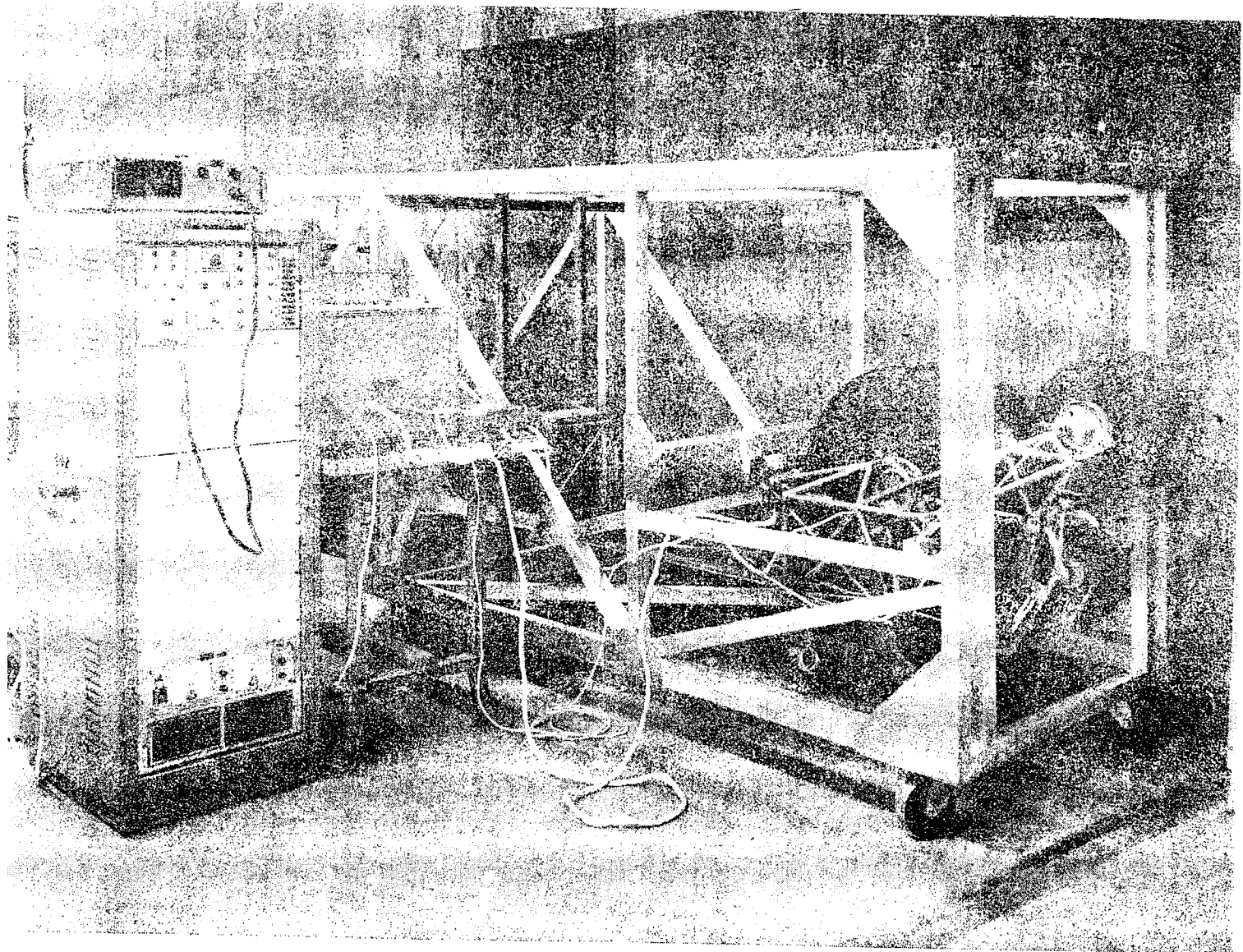
4-165

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Handle via **BYEMAN**
Control System Only

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(Control Number)



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Handle via BYEMAN
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Figure 4.5-16. Film Transport System Test Setup

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(Control Number)

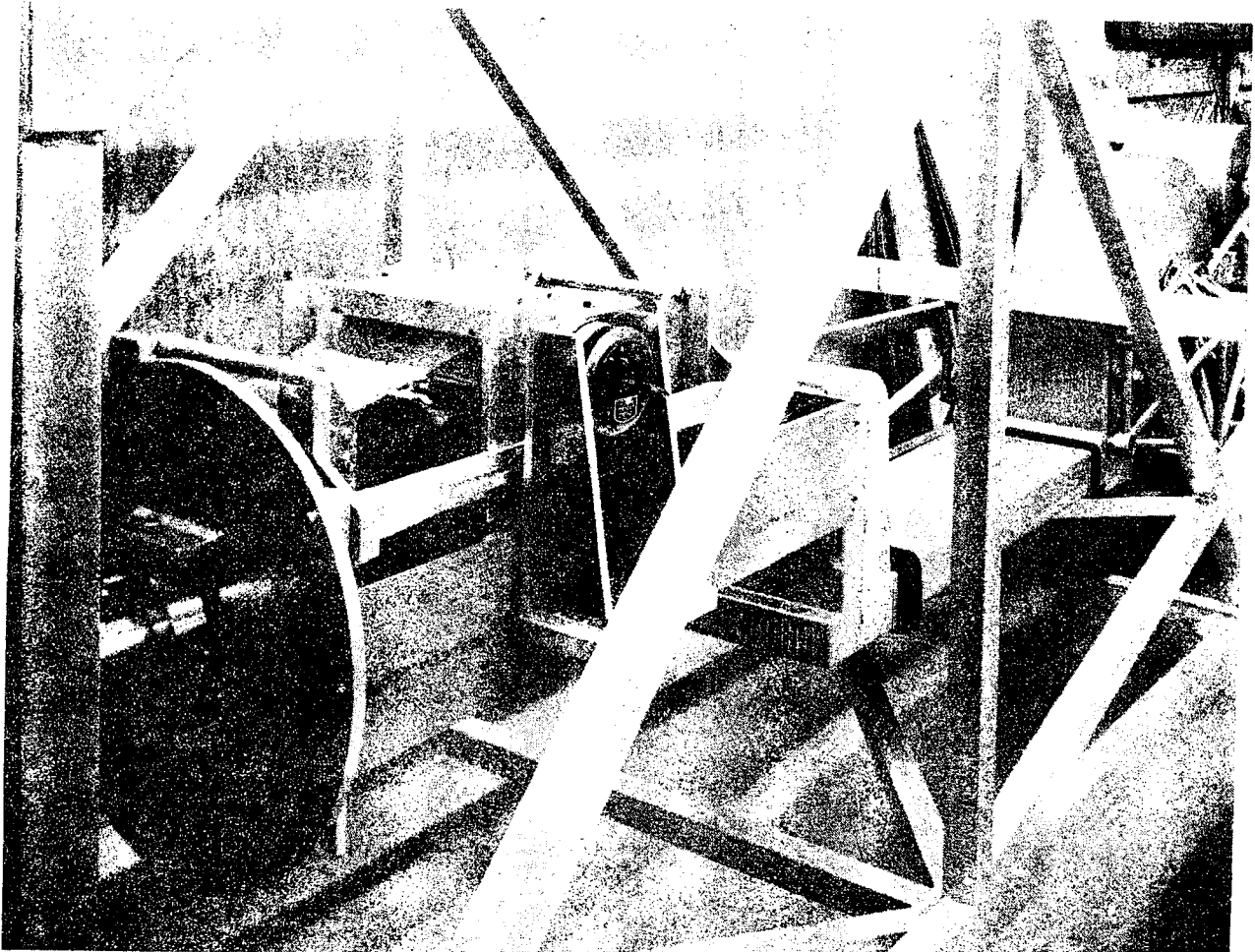


Figure 4.5-17. Simulated Camera

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Handle via BYEMAN
Control System Only

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BIF-008- F-035080-RH -68
(Control Number)

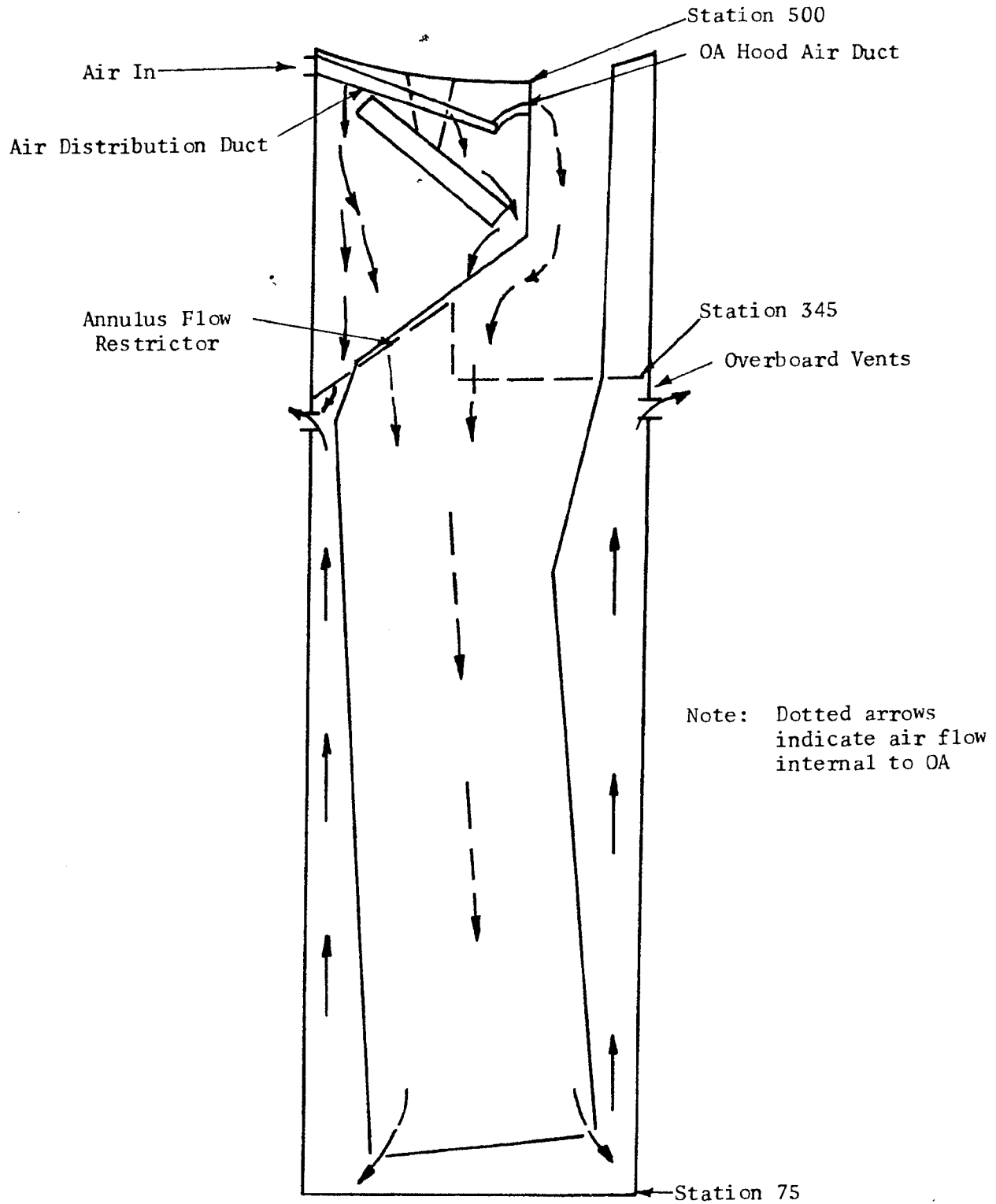
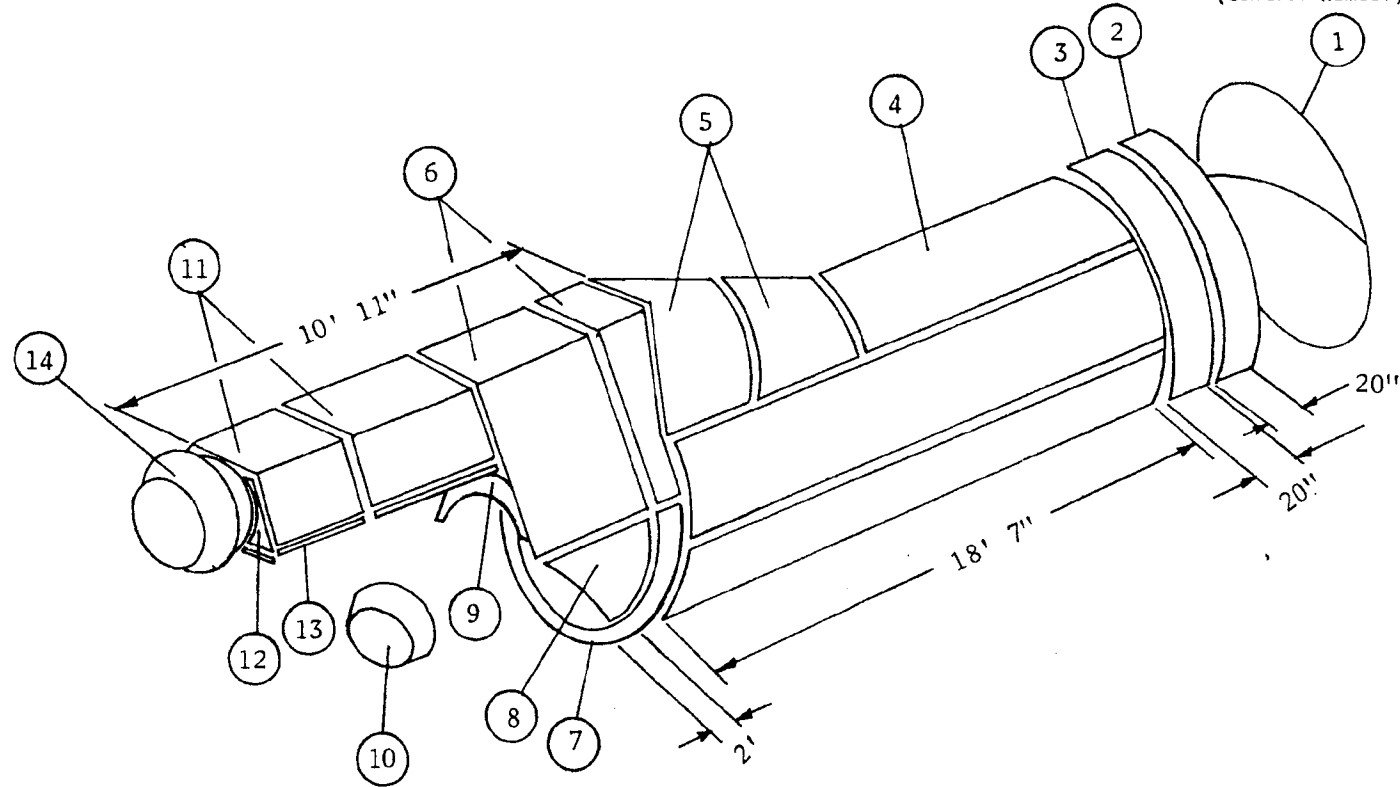


Figure 4.6-1. Ground Conditioning System

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Major Blanket Assemblies

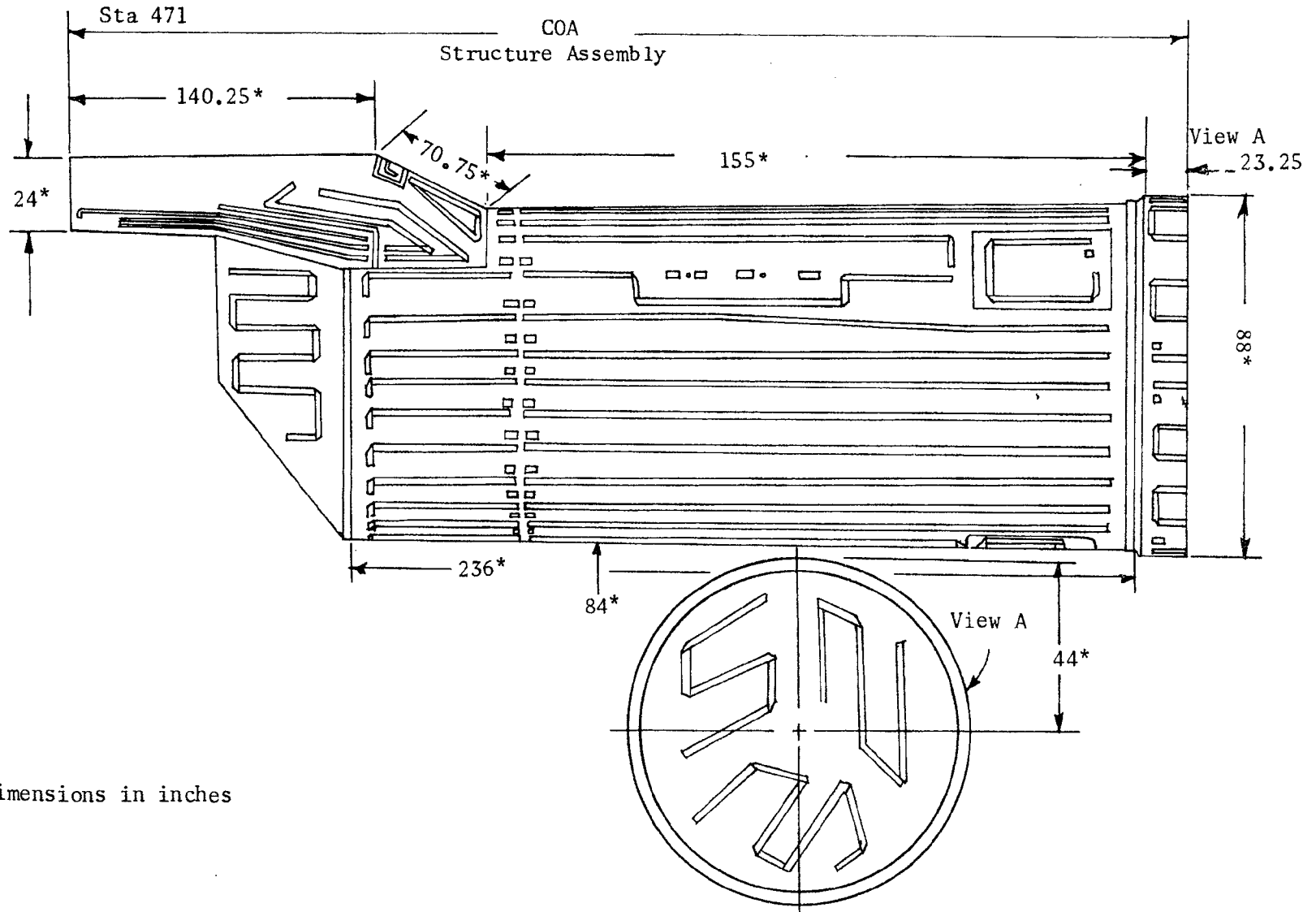
COA Bay Bkts (1) (2) (3) (4) (5)
 Ross Corrector Bkts (6) (11) (12) (13) (14)
 Mirror Support Bkts (7) (8) (9) (10)

- | | | |
|----------------------------------|---|------------------------------|
| 1. End Cap Bkt* | 6. Ross Corrector Transition Bkts | 11. Corrector Bkts |
| 2. Primary Mirror Barrel Bkts | 7. COA Transition Bkt to Mirror Support | 12. Corrector End-Cap Bkts |
| 3. Primary Mirror Transition Bkt | 8. Mirror Support Barrel Bkts | 13. Corrector Underpanel Bkt |
| 4. Barrel Bkts | 9. Mirror Support Cap Bkt | 14. Corrector Bellows Bkt |
| 5. Hood Bkts | 10. Newtonian Mirror Bkts | |

* Bkt = Blanket

4-190

Figure 4.6-7. Blanket Assembly Configuration



4-191

* Dimensions in inches

Figure 4.6-8. Heater Strips in Close Contact with the OA

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(Control Number)

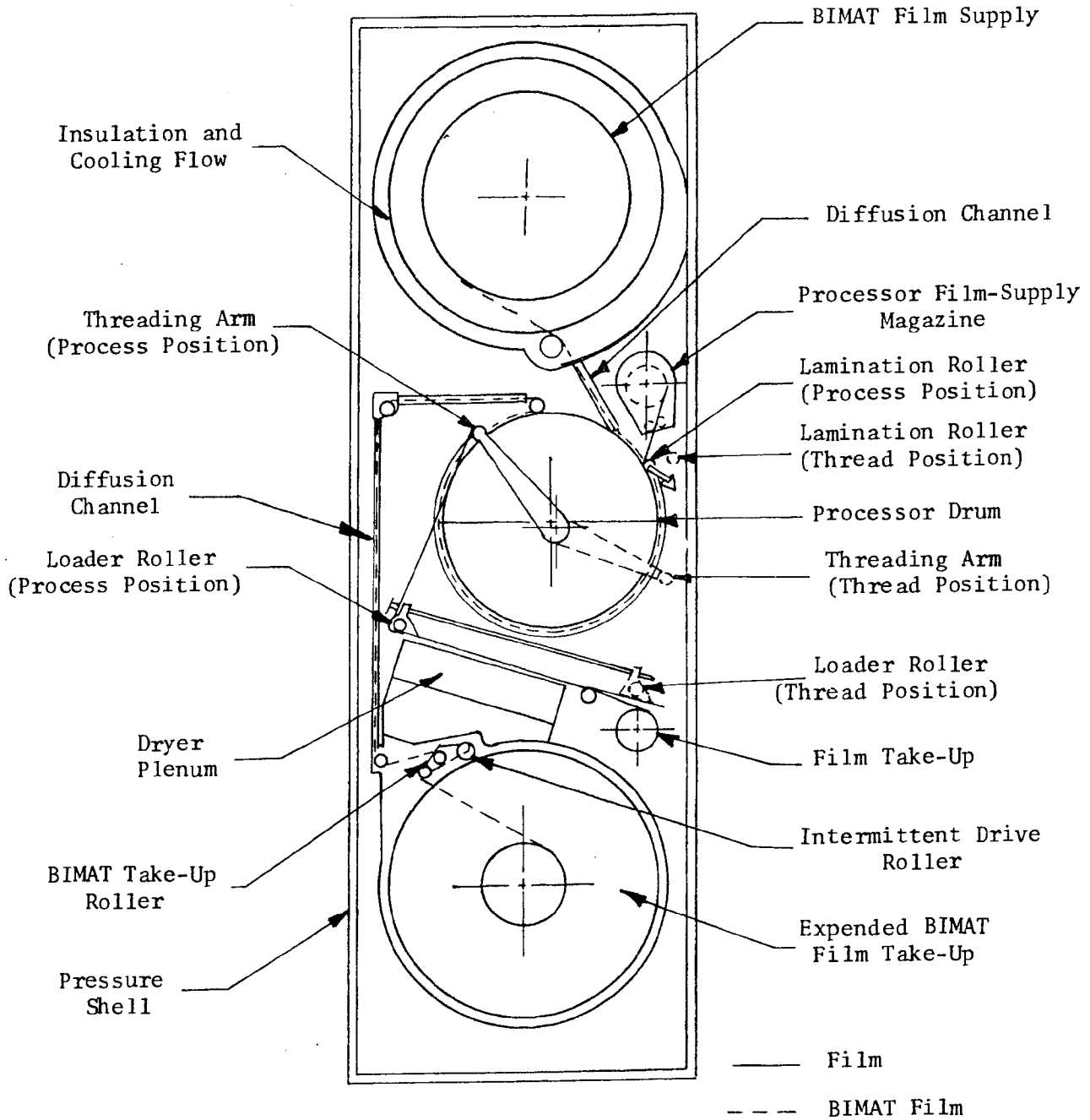


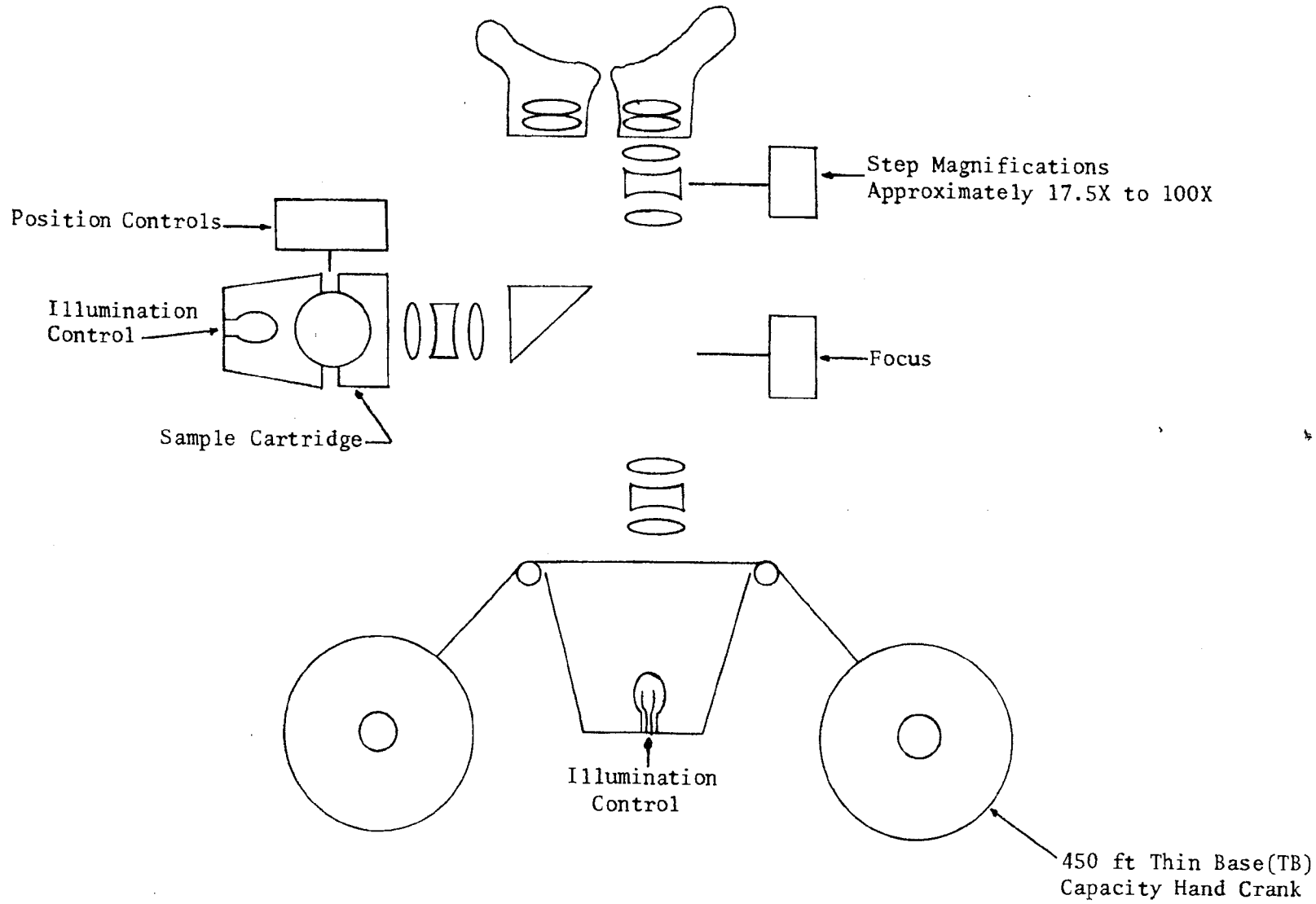
Figure 4.7-1. Side View Schematic of On-Board Processor

4-199

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4-204

Figure 4.8-1. Concept - Viewer Schematic

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(Control Number)

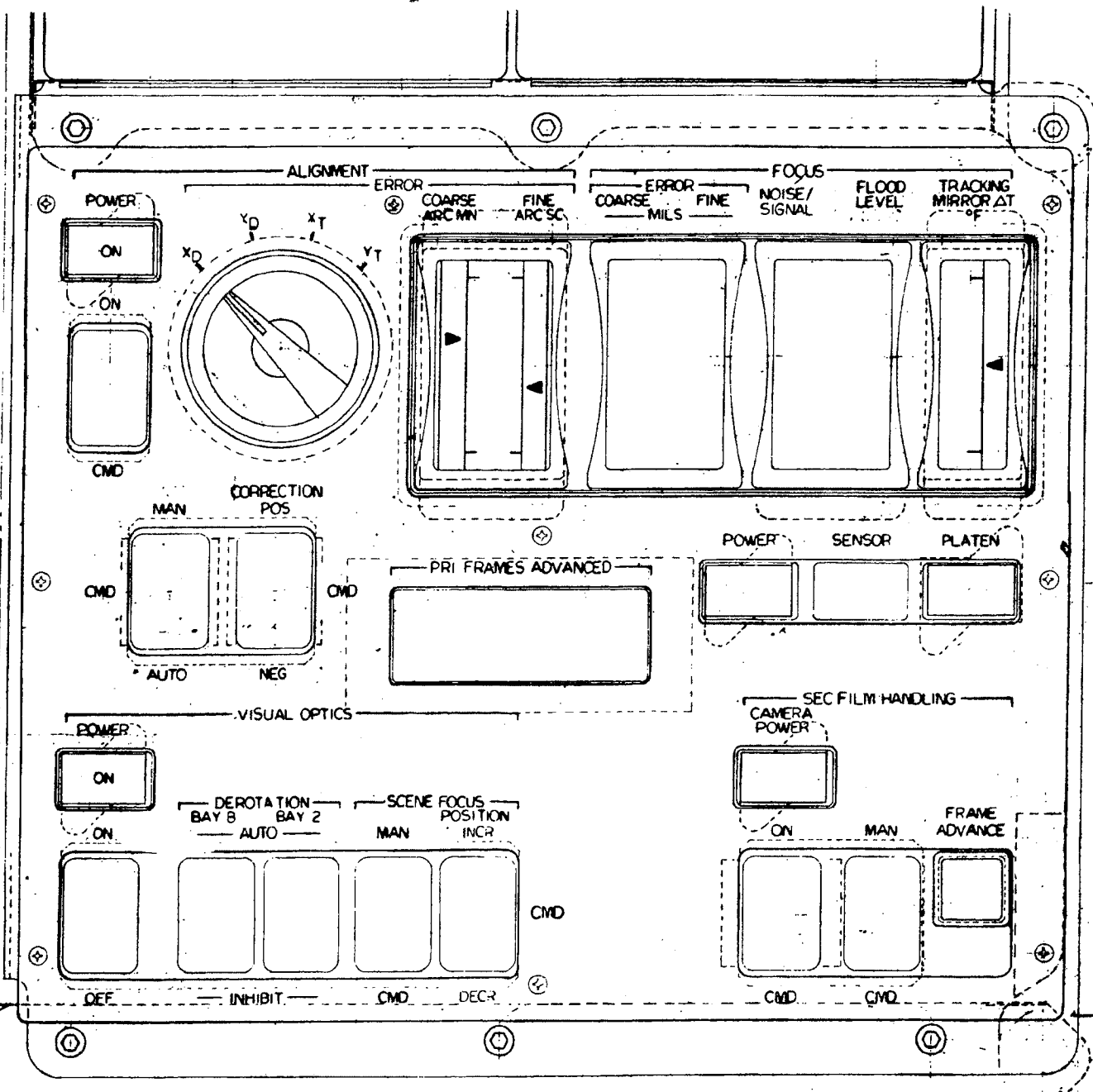


Figure 4.9-3. Panel 1-C

4-219
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BIF-008- F-035080-RH -68
(Control Number)

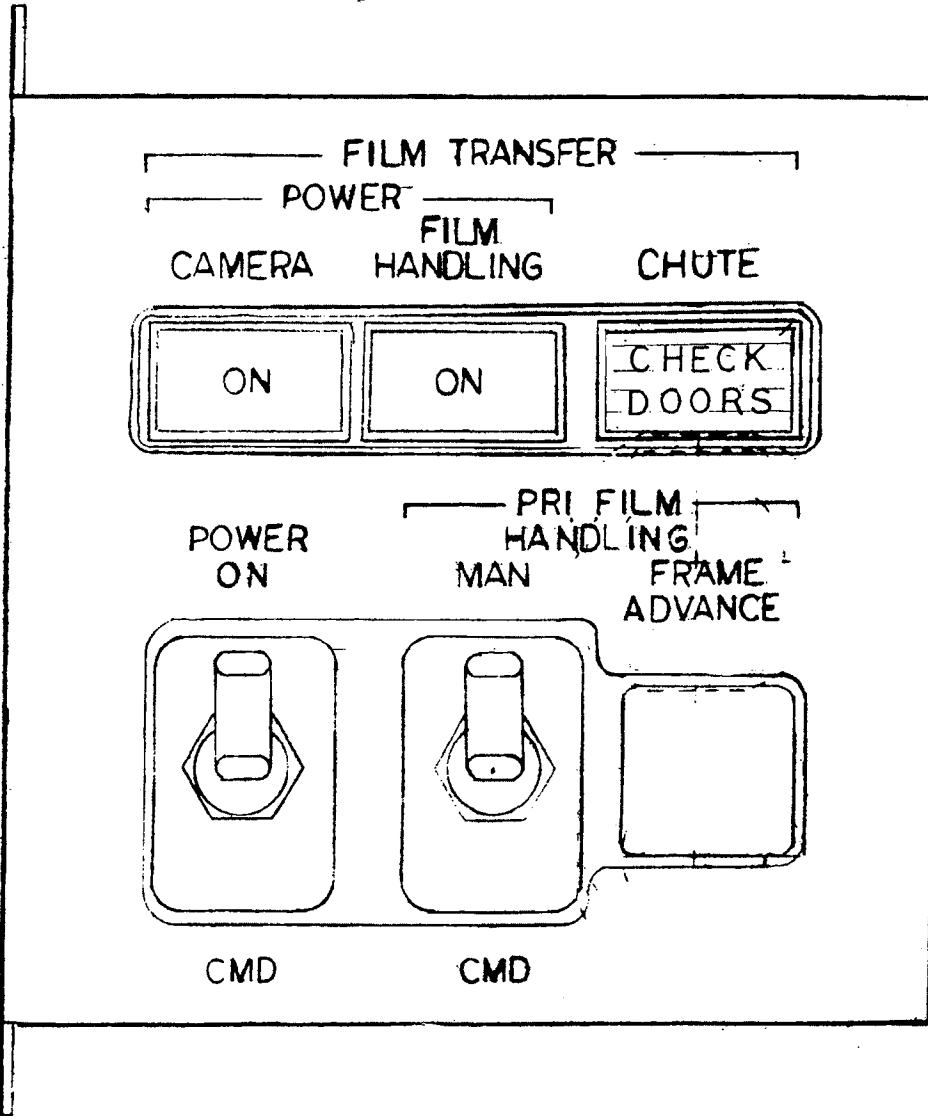


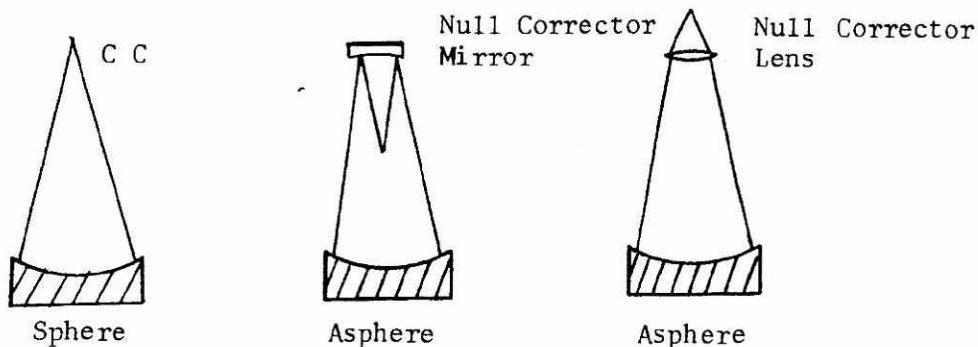
Figure 4.9-4. Film Transfer Panel

4-220
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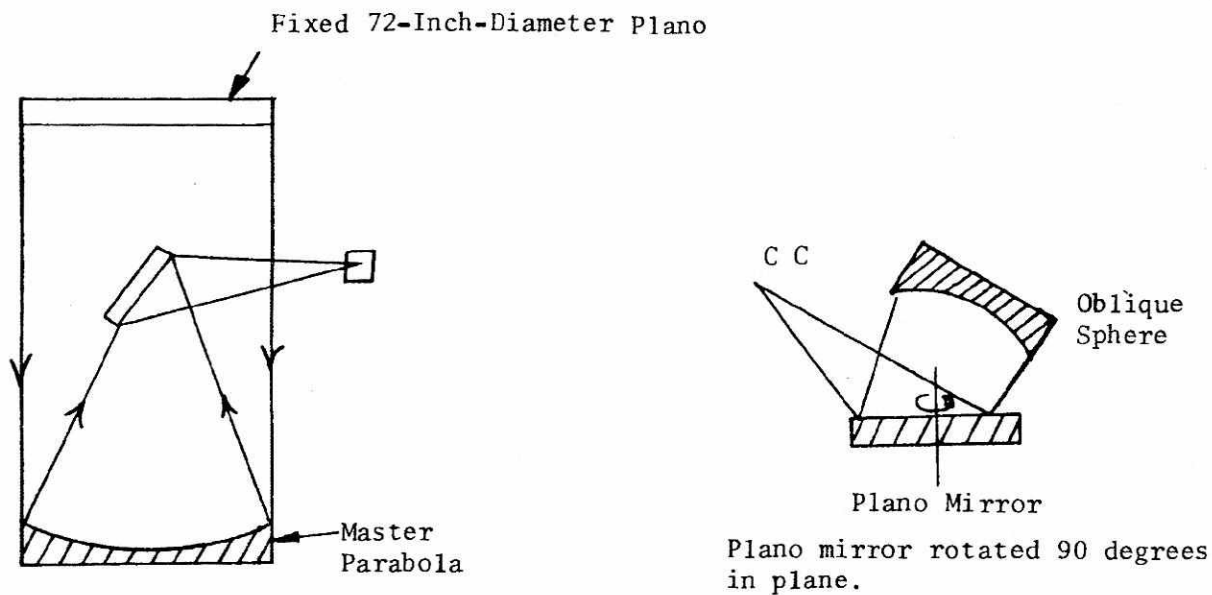
Handle via **BYEMAN**
Control System Only

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(Control Number)



(a) Optical Test Configurations for Mirrors with Power



(b) Plano-Mirror Test Configurations

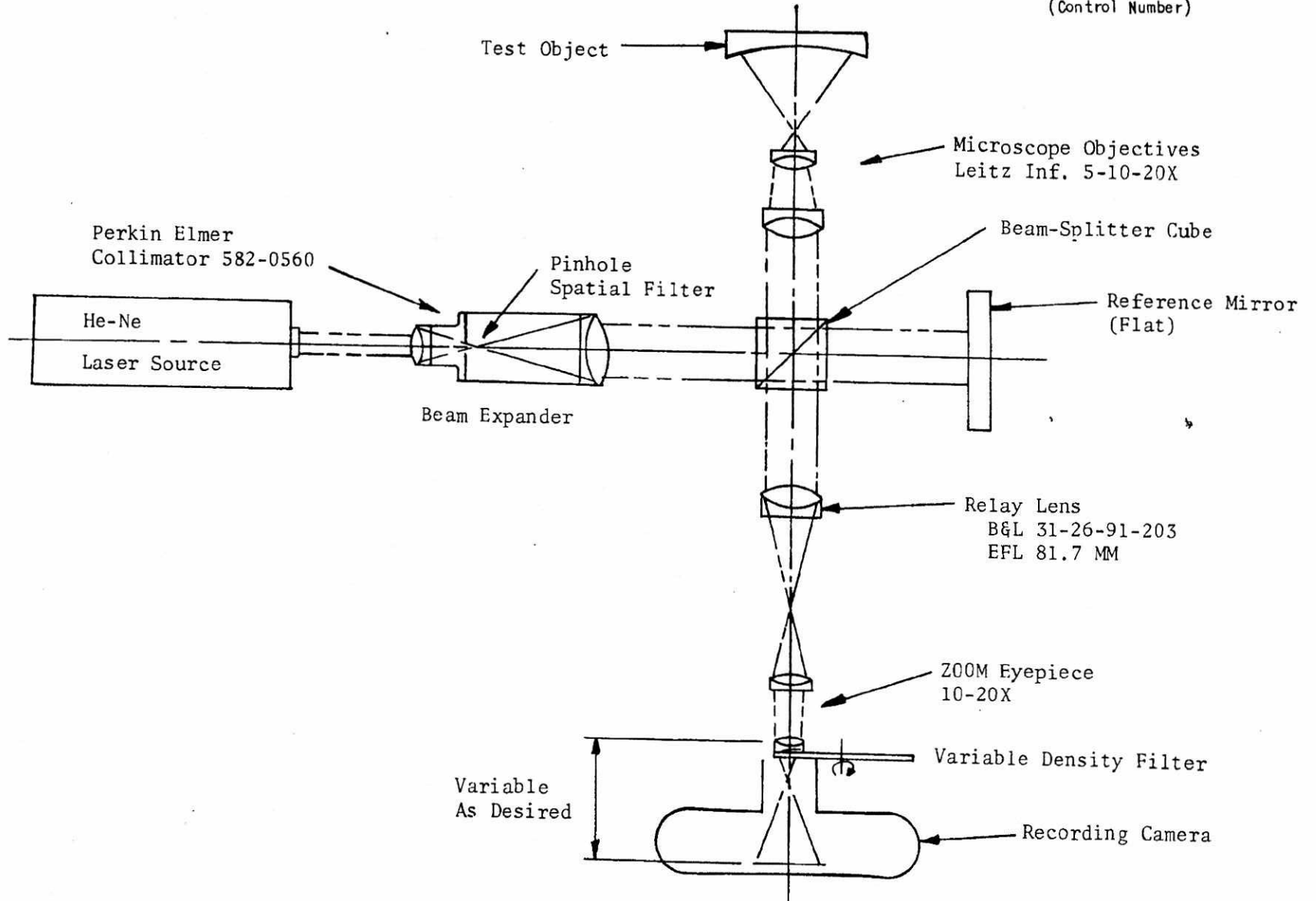
Figure 6.1-1. Mirror Test Configurations

6-7
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(Control Number)



6-15

Figure 6.2-2. MOD II Twyman-Green Interferometer Schematic

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BIF-008-F-035081-RH -68
(Control Number)

6-18

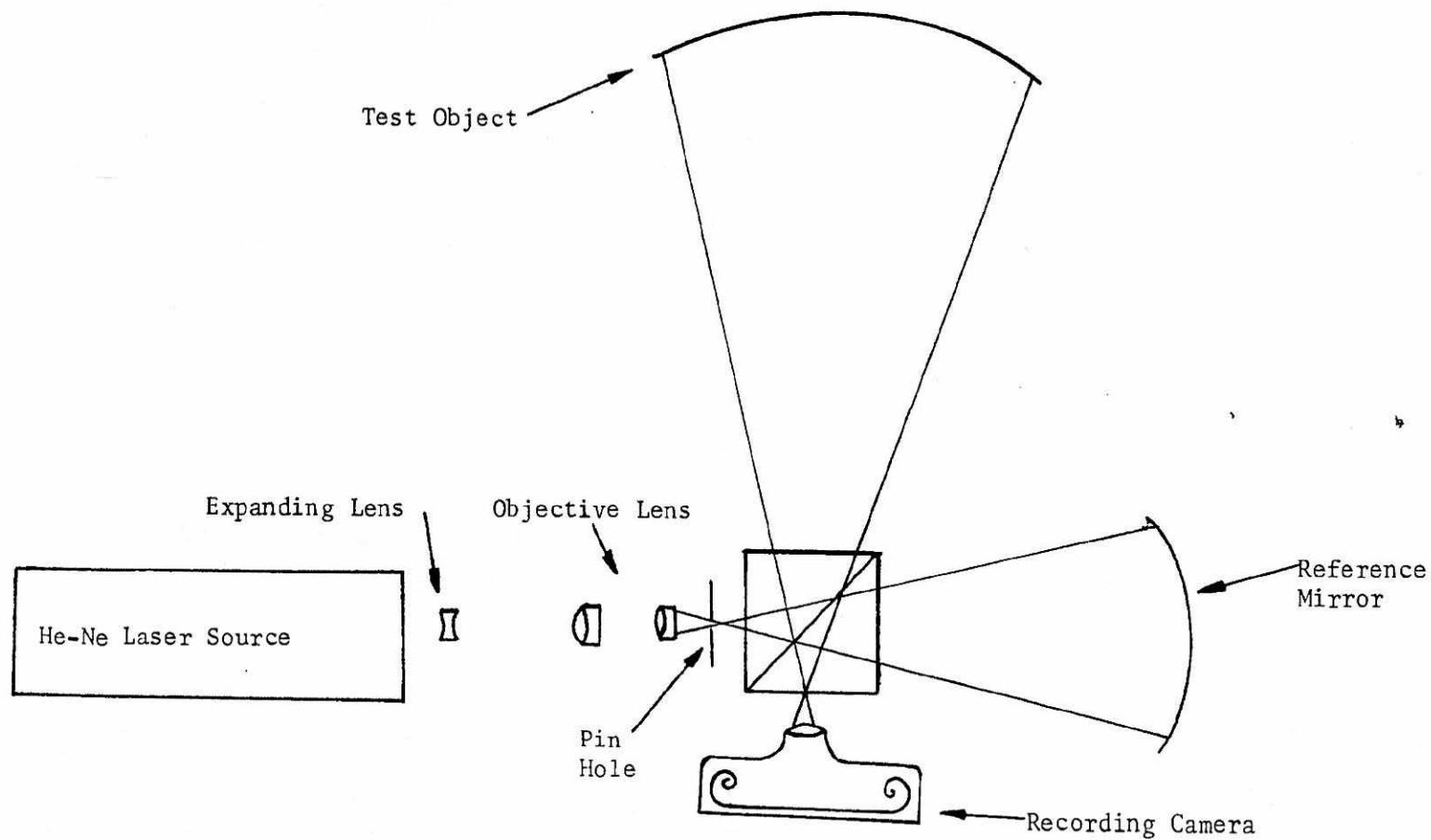


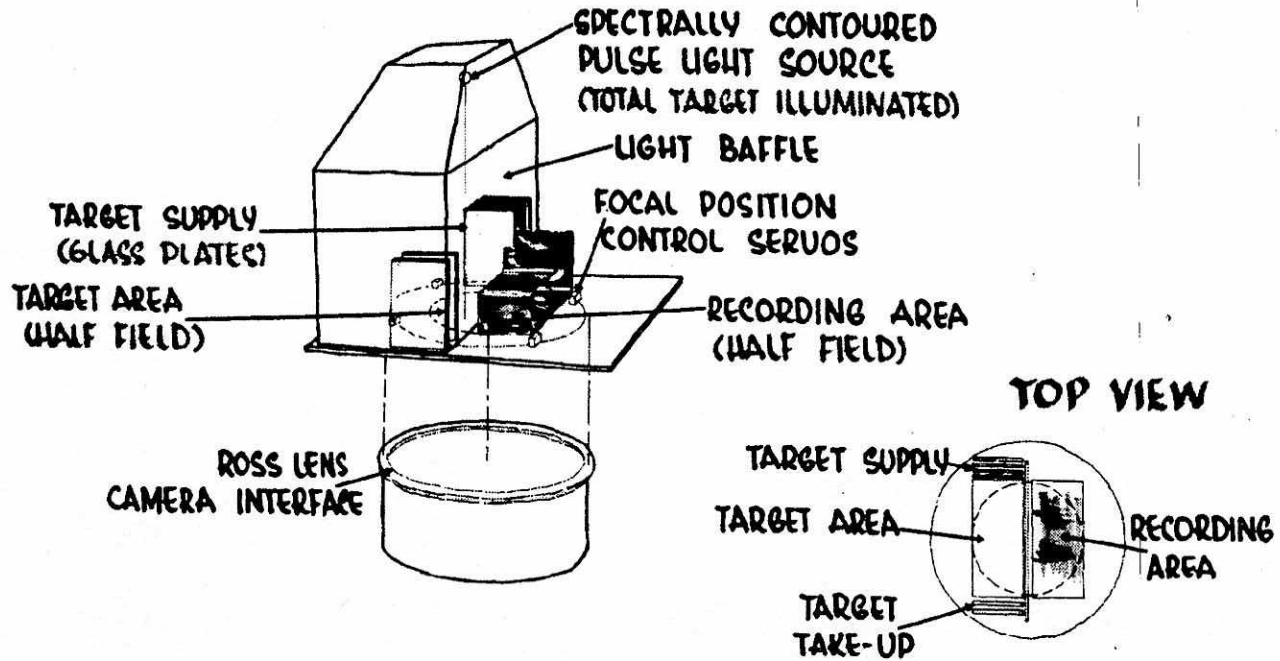
Figure 6.2-4. Williams Interferometer Schematic

Handle via BYEMAN
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(Control Number)



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Figure 6.2-6. Photographic Test Equipment

Handle via BYEMAN
Control System Only

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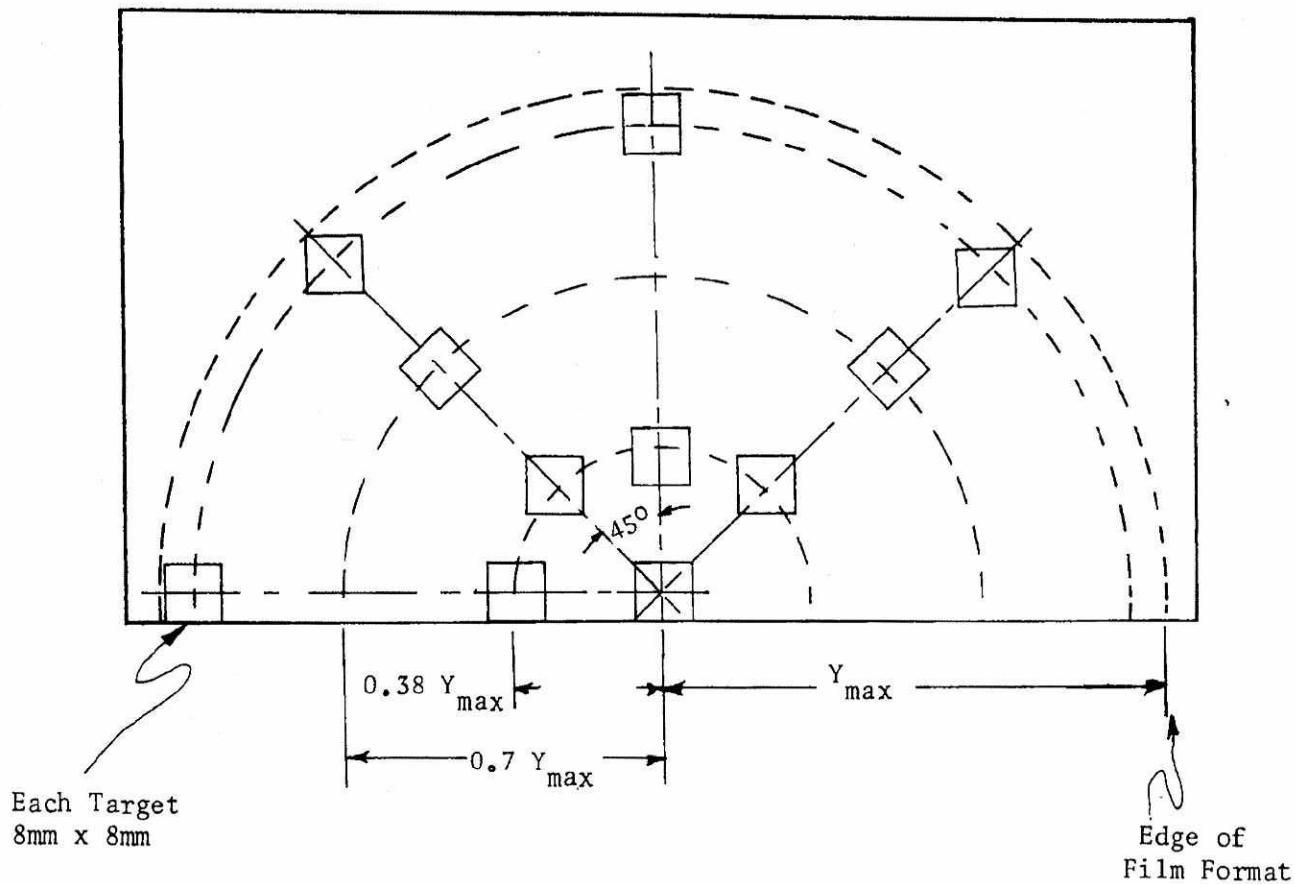
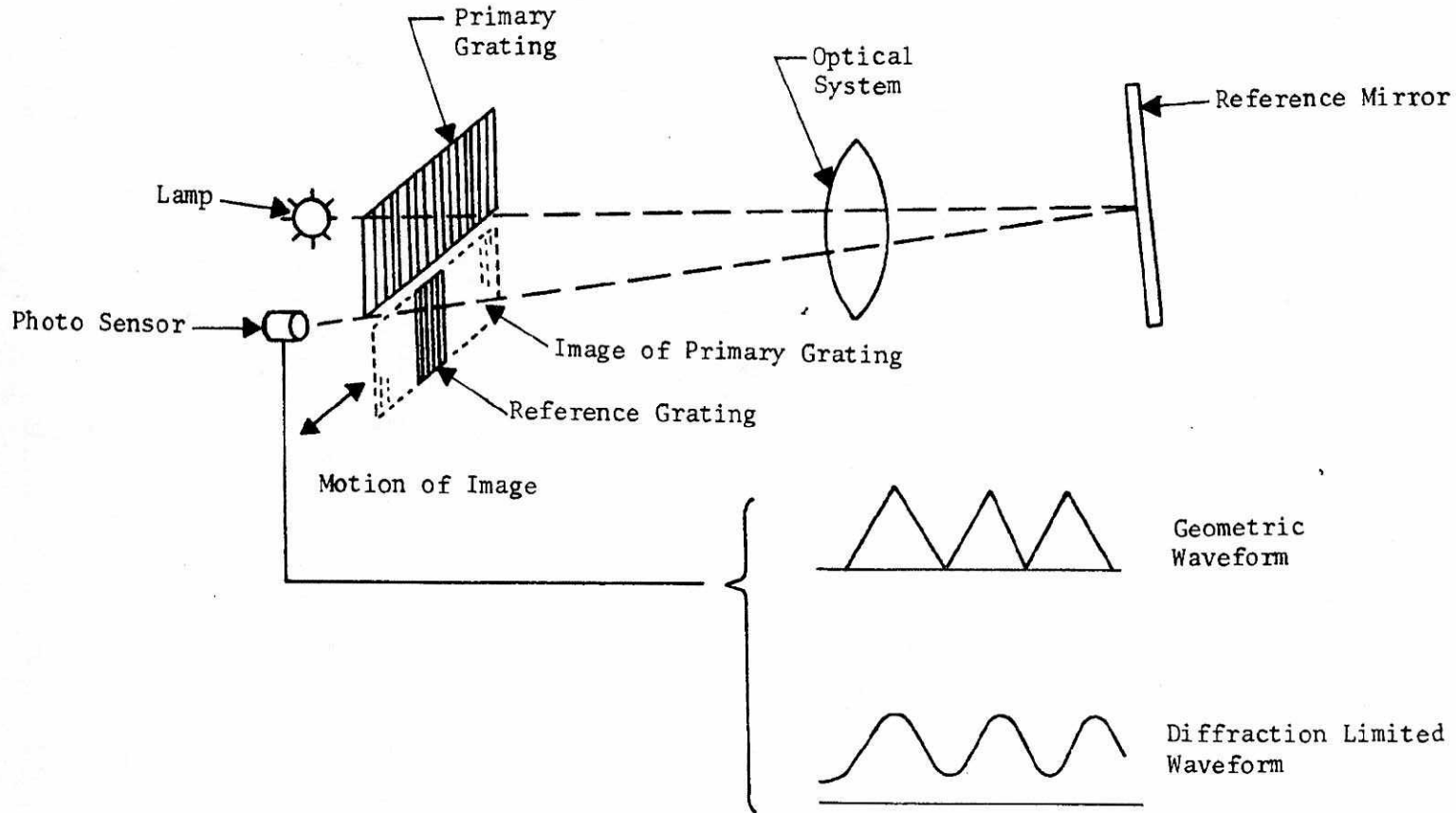


Figure 6.2-7. Photographic Target Format

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Control System Only



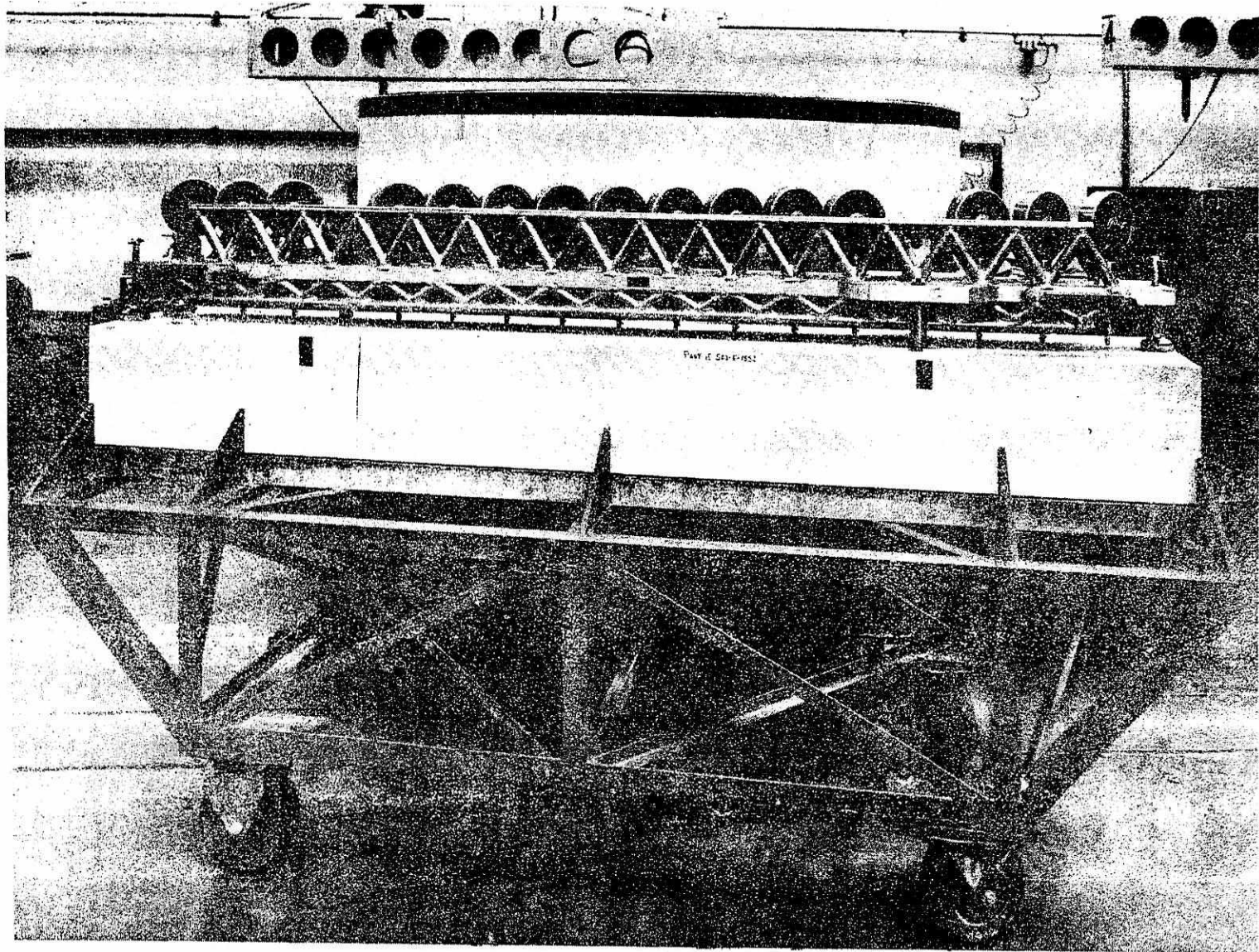
6-26

Figure 6.2-8. Optical Measurement of Image Smear.

Handle via **BYEMAN**
Control System Only

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(Control Number)



6-41

Figure 6.2-15. Profiling Spherometer on Pyroceram Master

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Control System Only

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(Control Number)

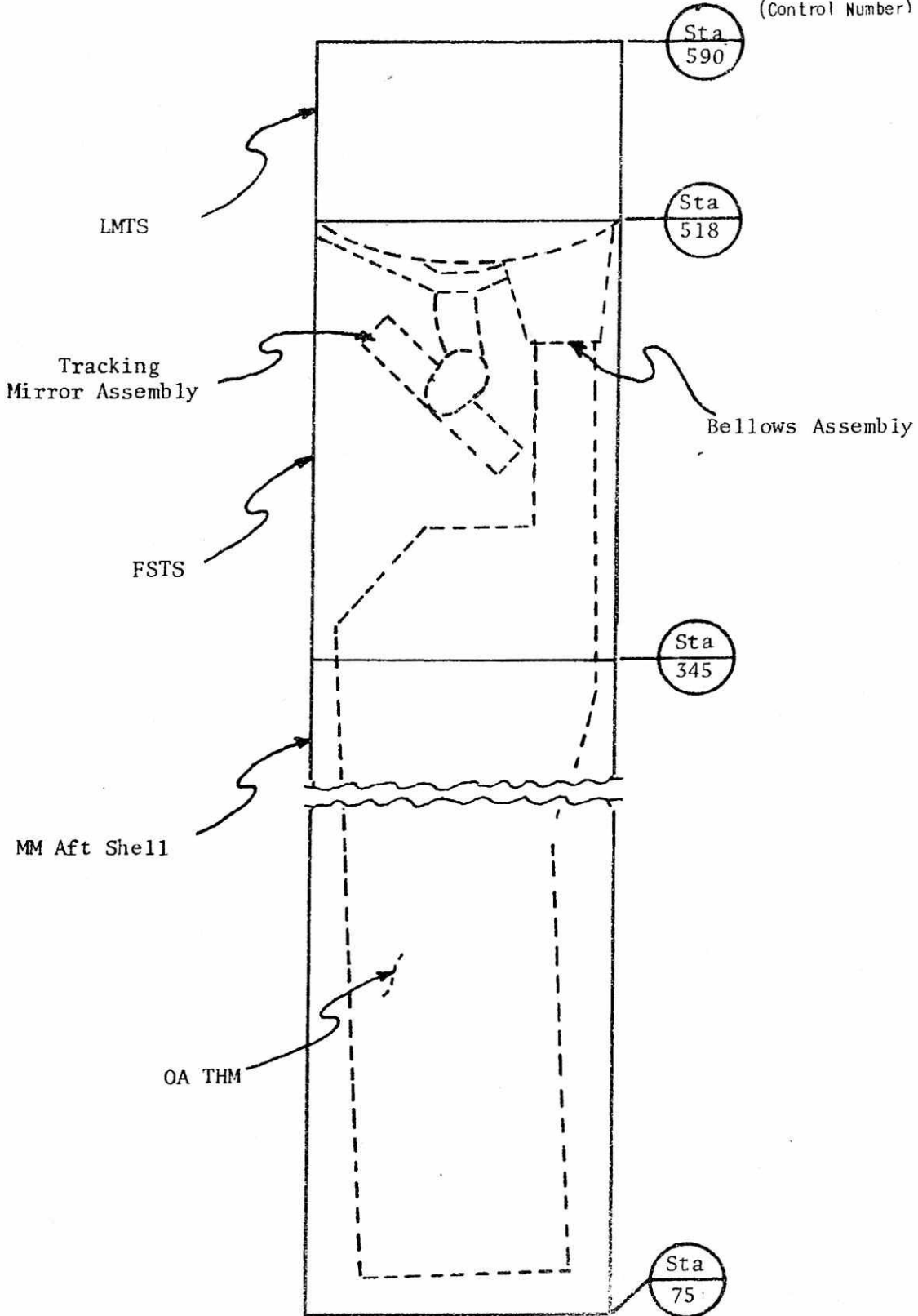


Figure 6.3-1. MMTHM Assembly Schematic

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Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

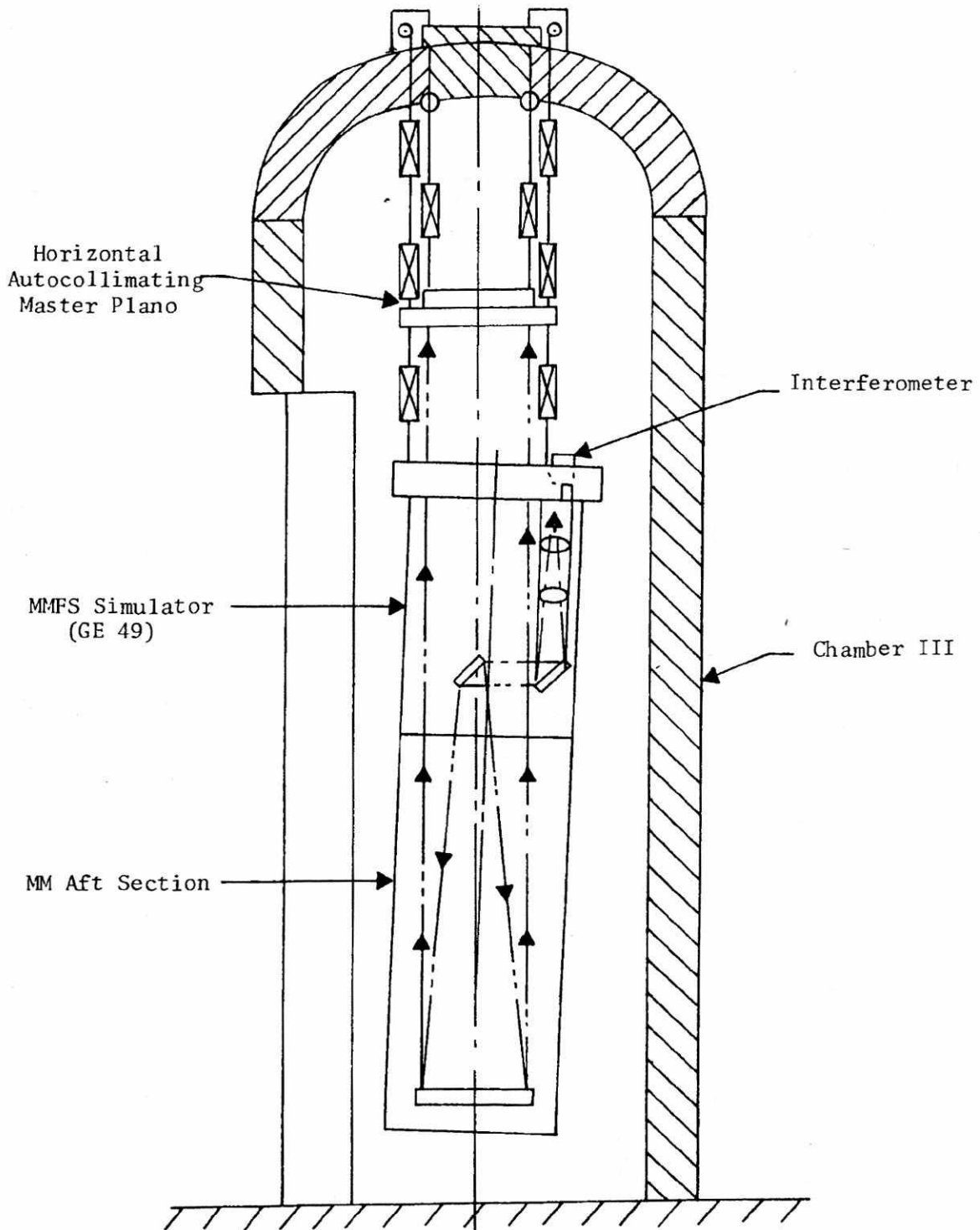


Figure 6.4-1. Mission Module Aft Section Isothermal Optical Quality Test Configuration in Chamber III

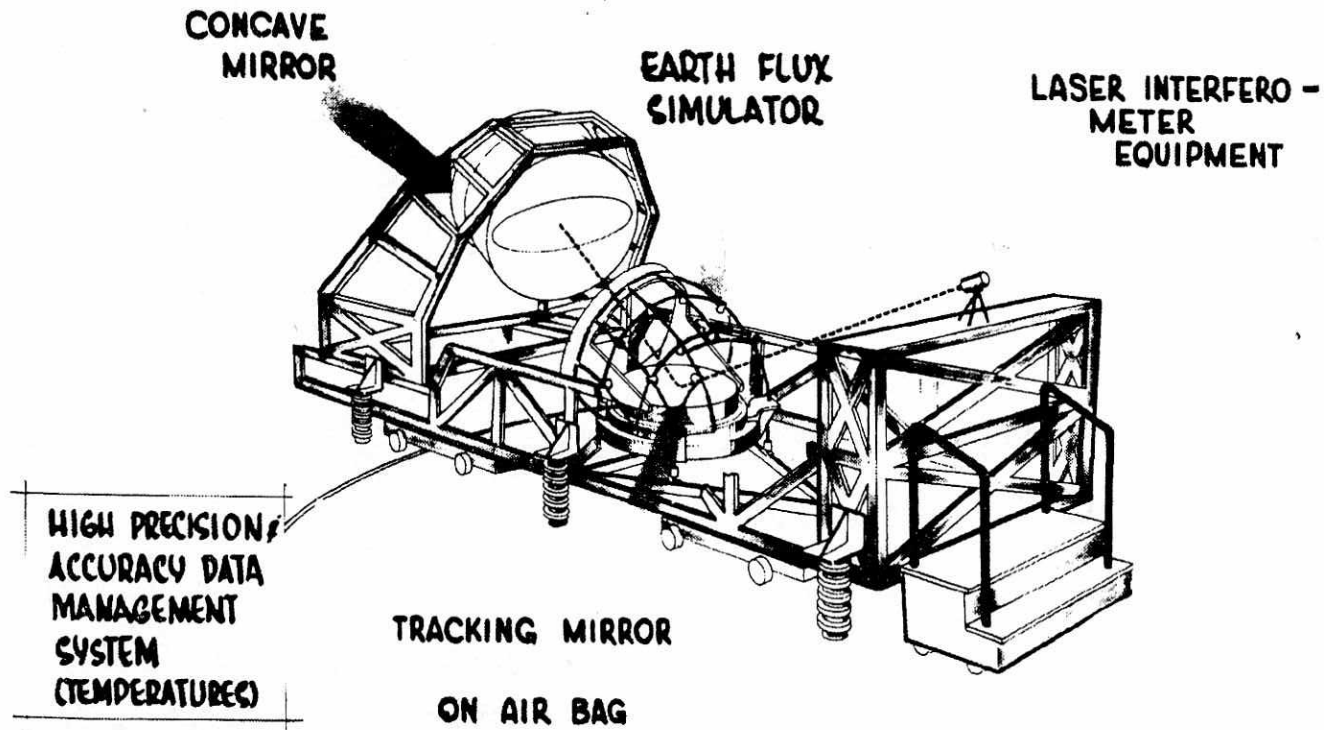
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(Control Number)



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Figure 6.4-2. Tracking Mirror Thermo-Optical Tests

Handle via BYEMAN
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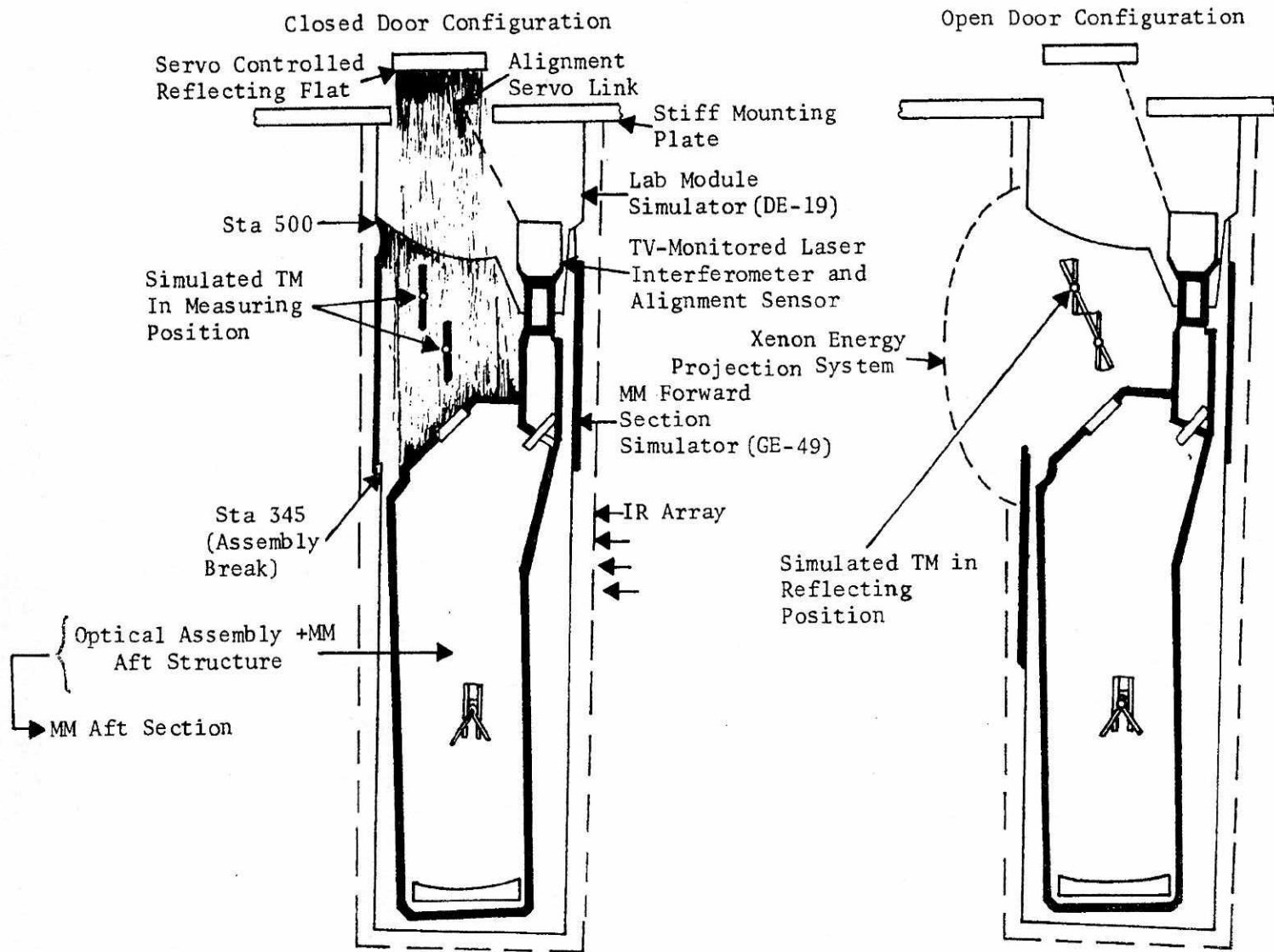
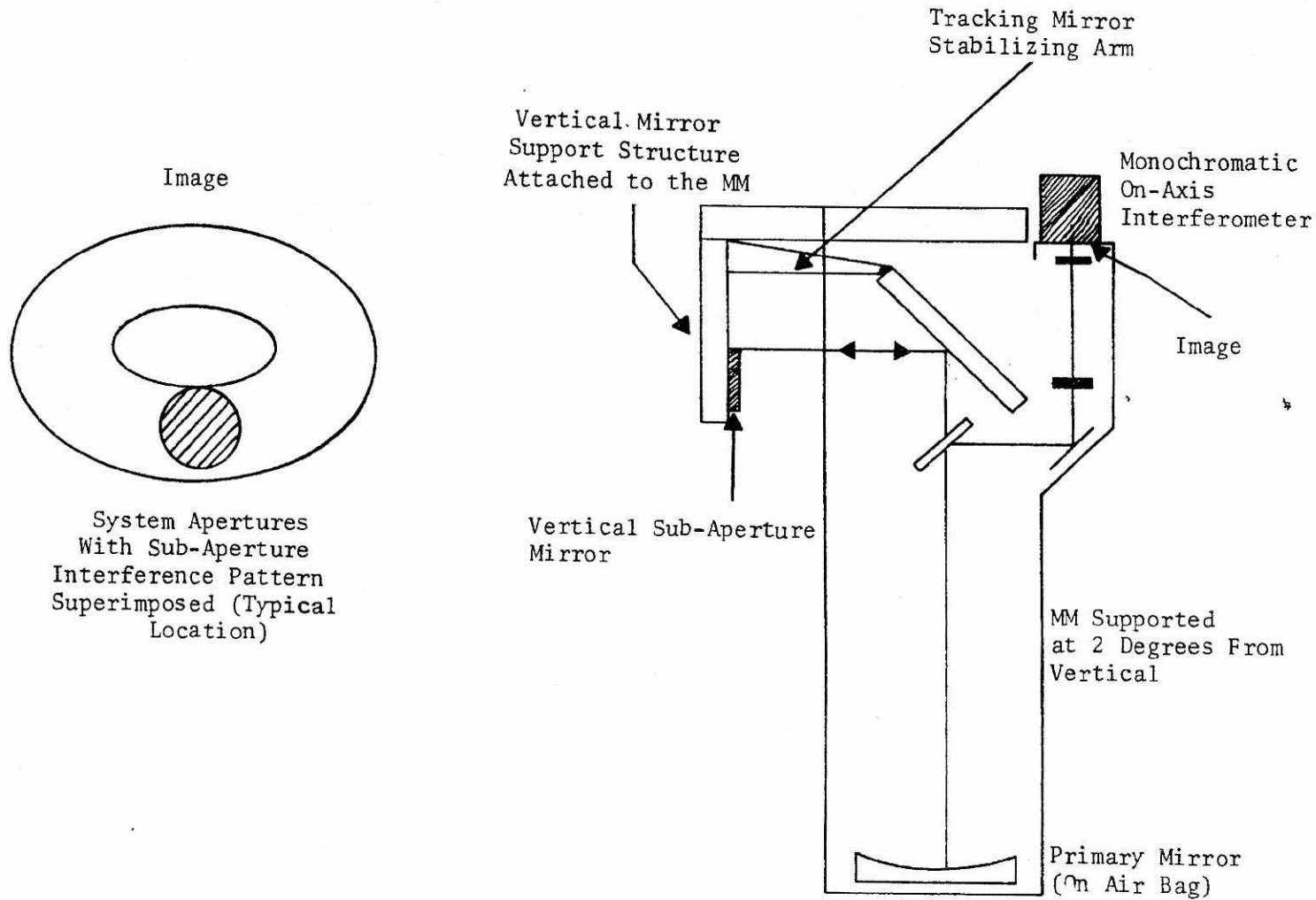


Figure 6.4-3. MMAS Thermal/Optical Test Configuration Chamber A

Handle via **BYEMAN**
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

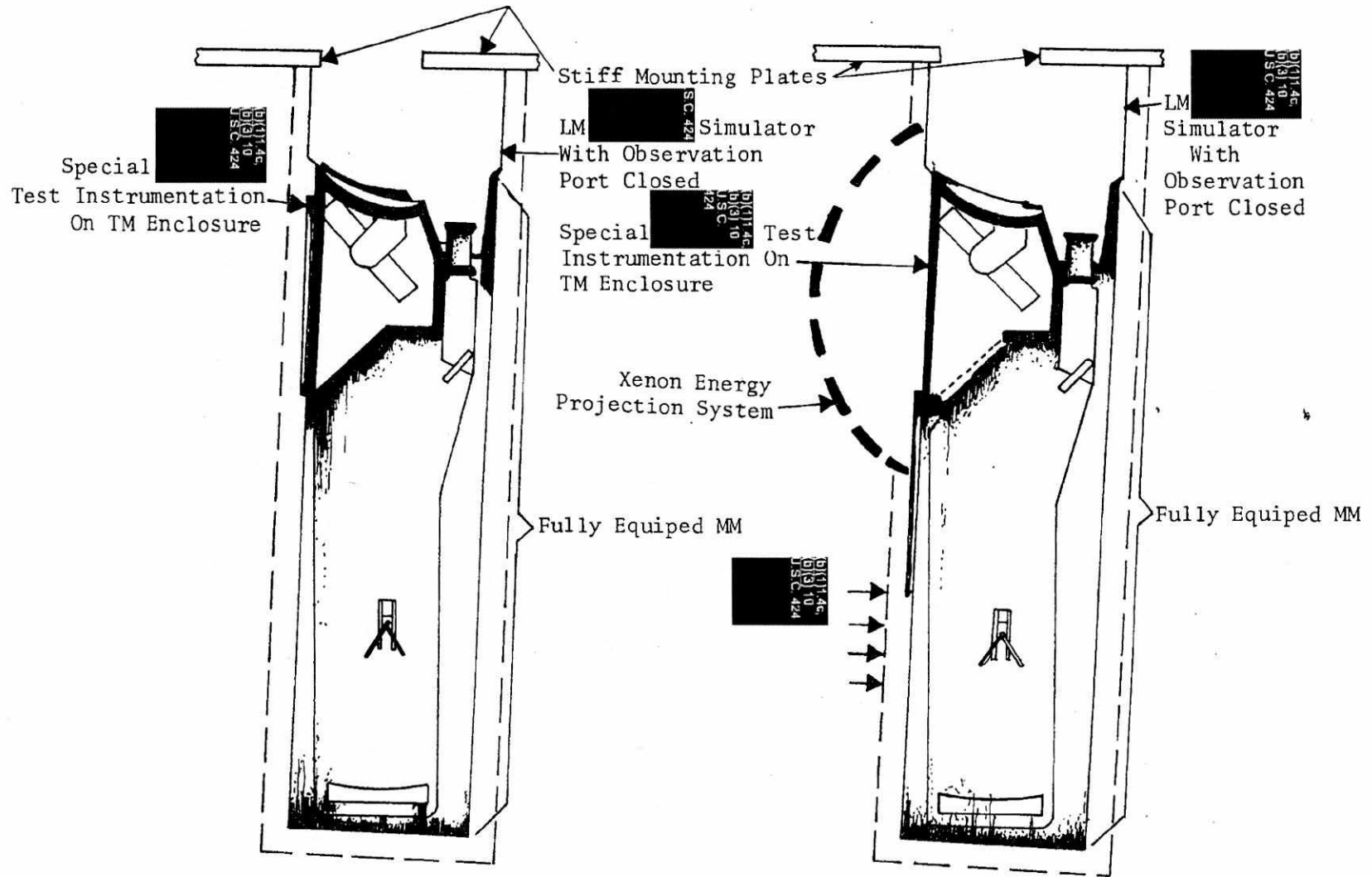


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Figure 6.4-4. Sub-Aperture Optical Test Configuration

Handle via BYEMAN
Control System Only

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Figure 6.4-5. MM Vacuum Test Configuration in Chamber A

Handle via BYEMAN
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

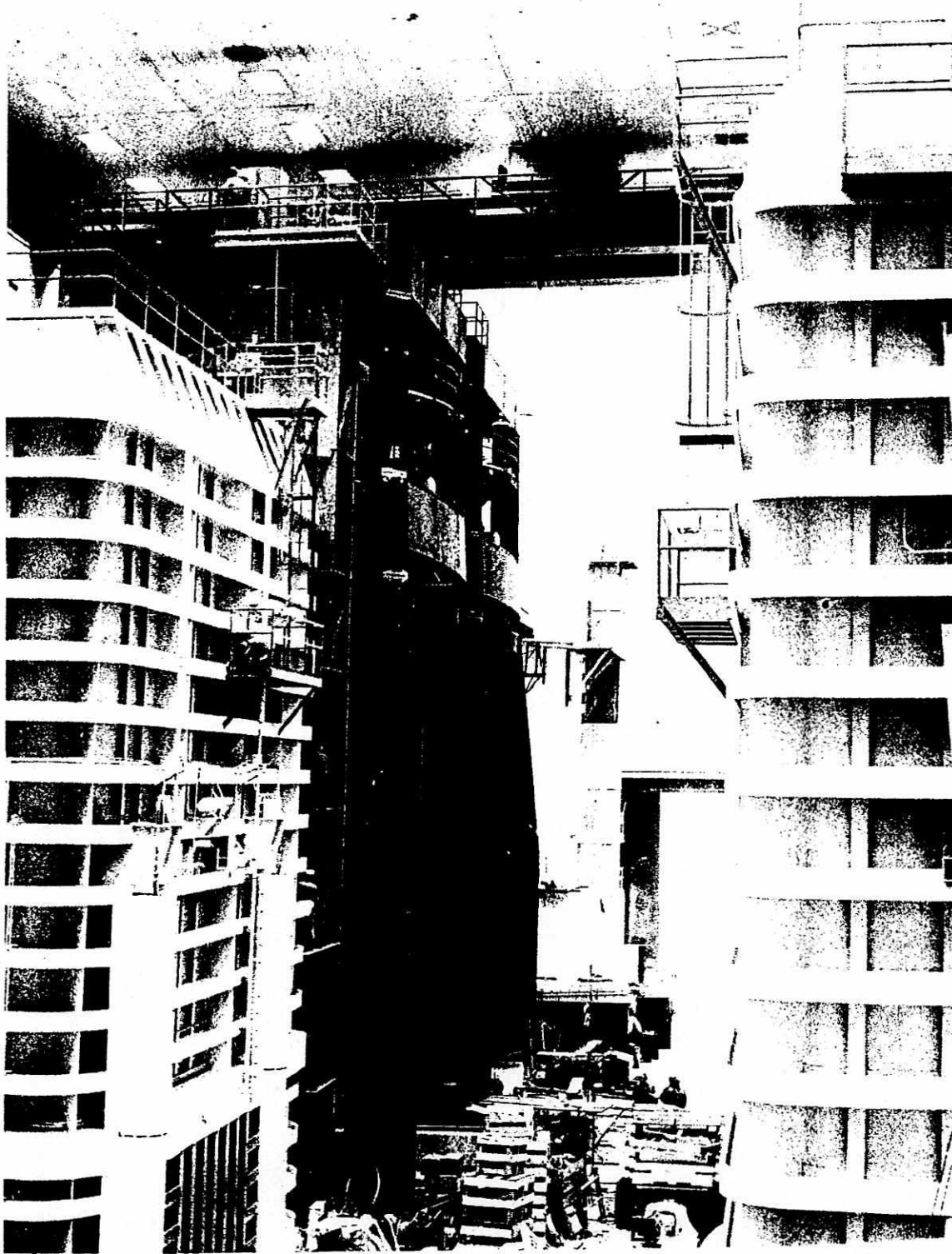


Figure 6.5-1. Test Facility - High Bay Area

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Handle via BYEMAN
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BIF-008- F-035081-RH -68
(Control Number)

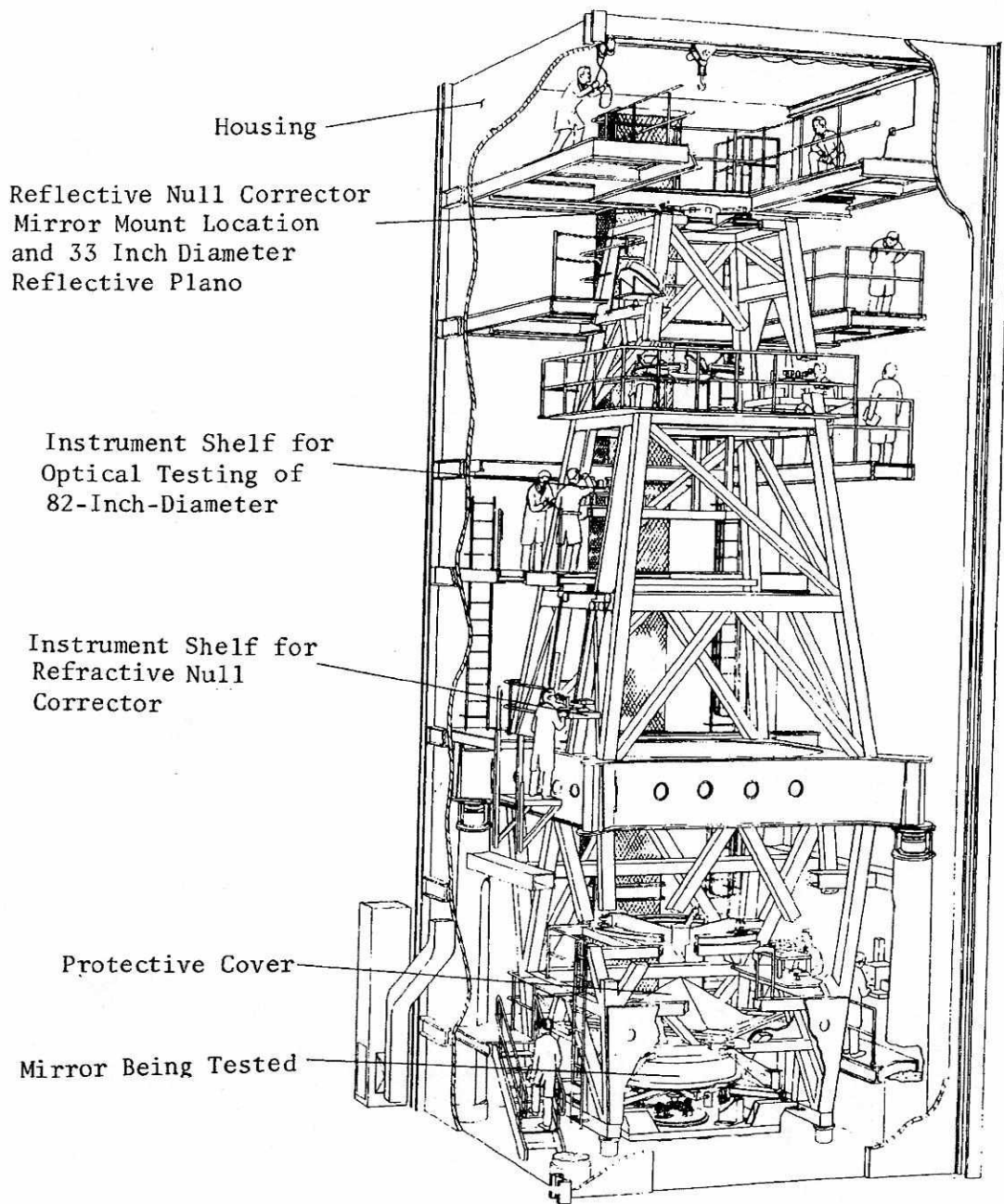


Figure 6.5-2. Chamber I_{em}

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BIF-008- F-035081-RH -68
(Control Number)

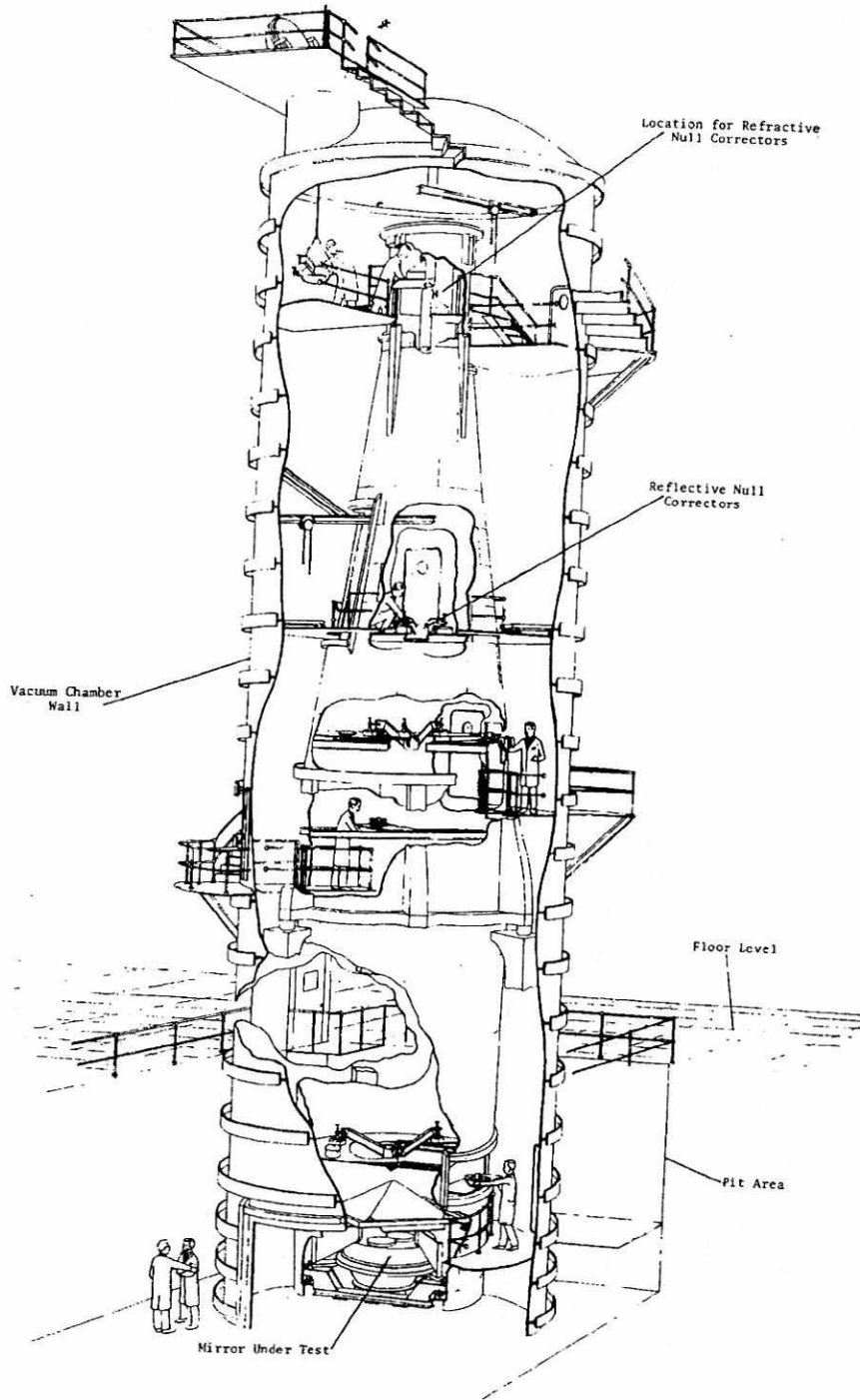


Figure 6.5-3. Chamber I

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Handle via **BYEMAN**
Control System Only

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(Control Number)

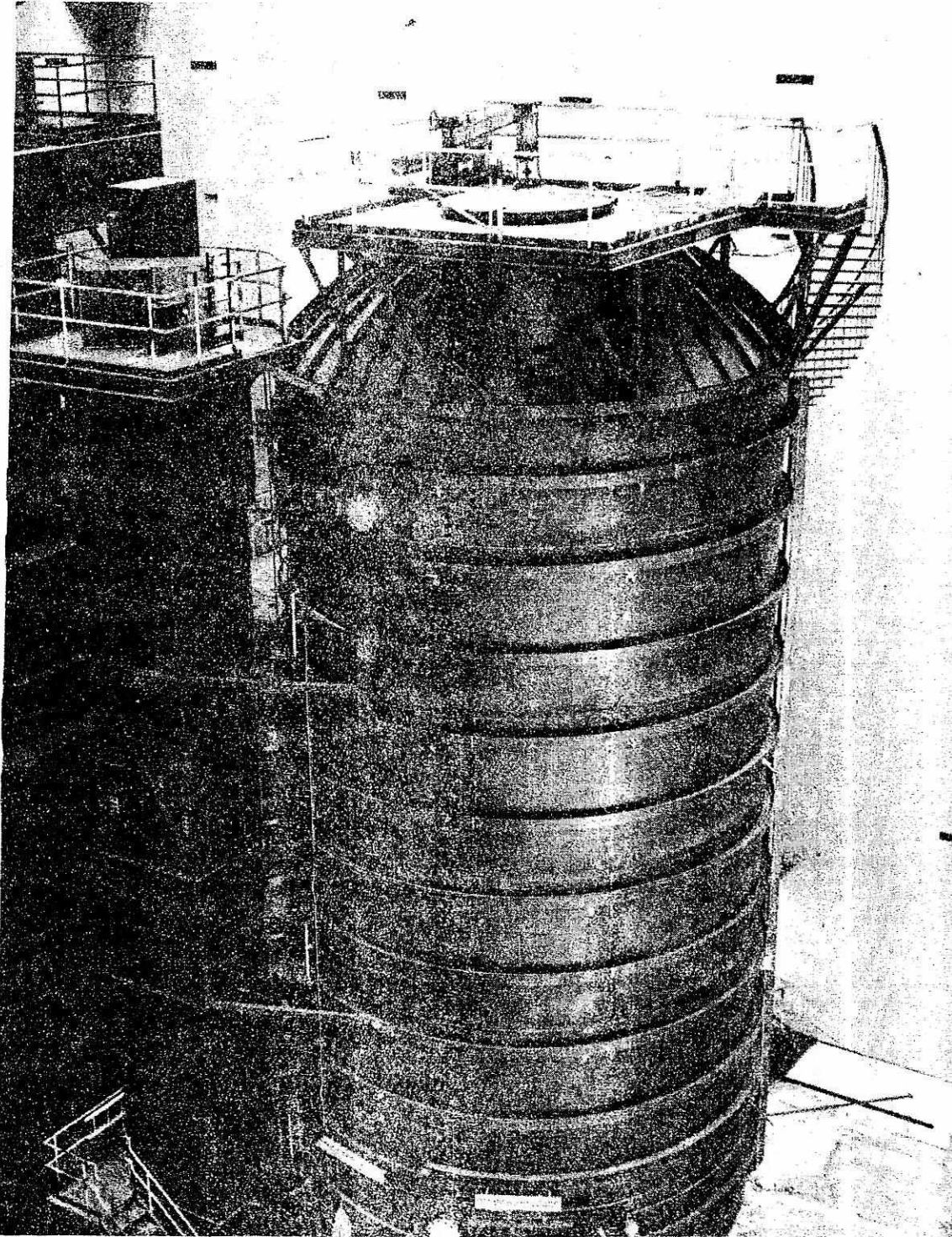


Figure 6.5-4a. Chamber I

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Control System Only

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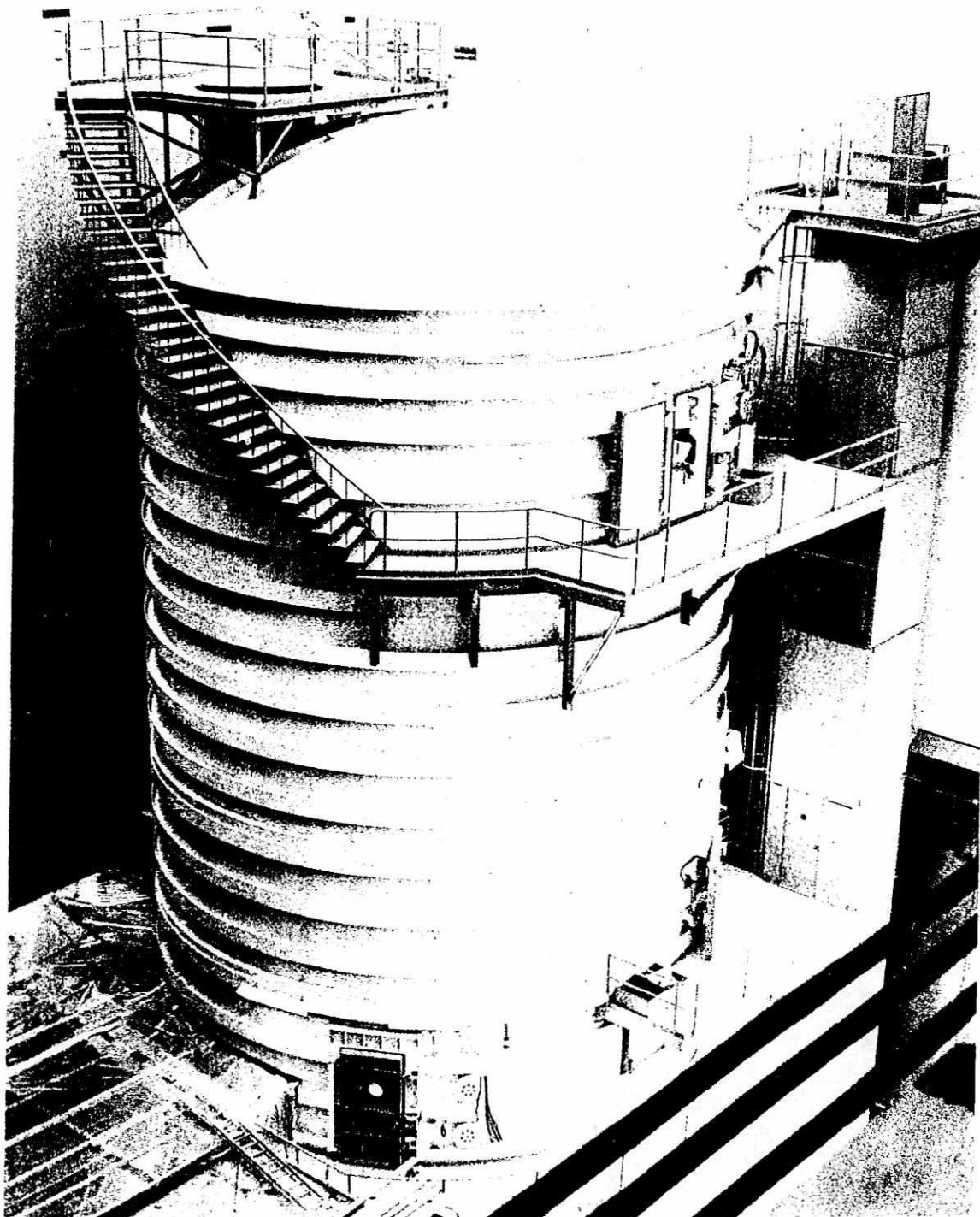


Figure 6.5-4b. Chamber Ig

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Handle via BYEMAN
Control System Only

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(Control Number)

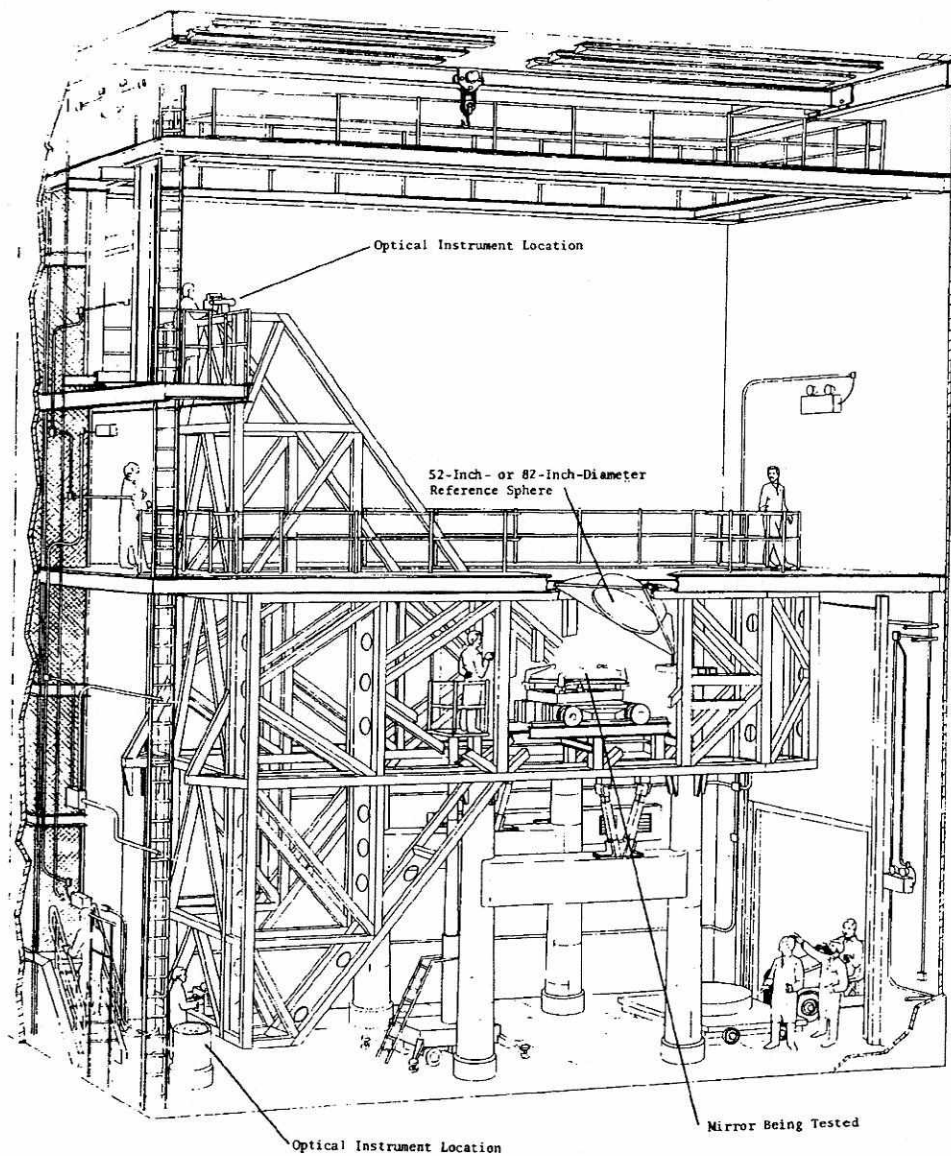


Figure 6.5-5. Chamber II_{em}

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Handle via **BYEMAN**
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

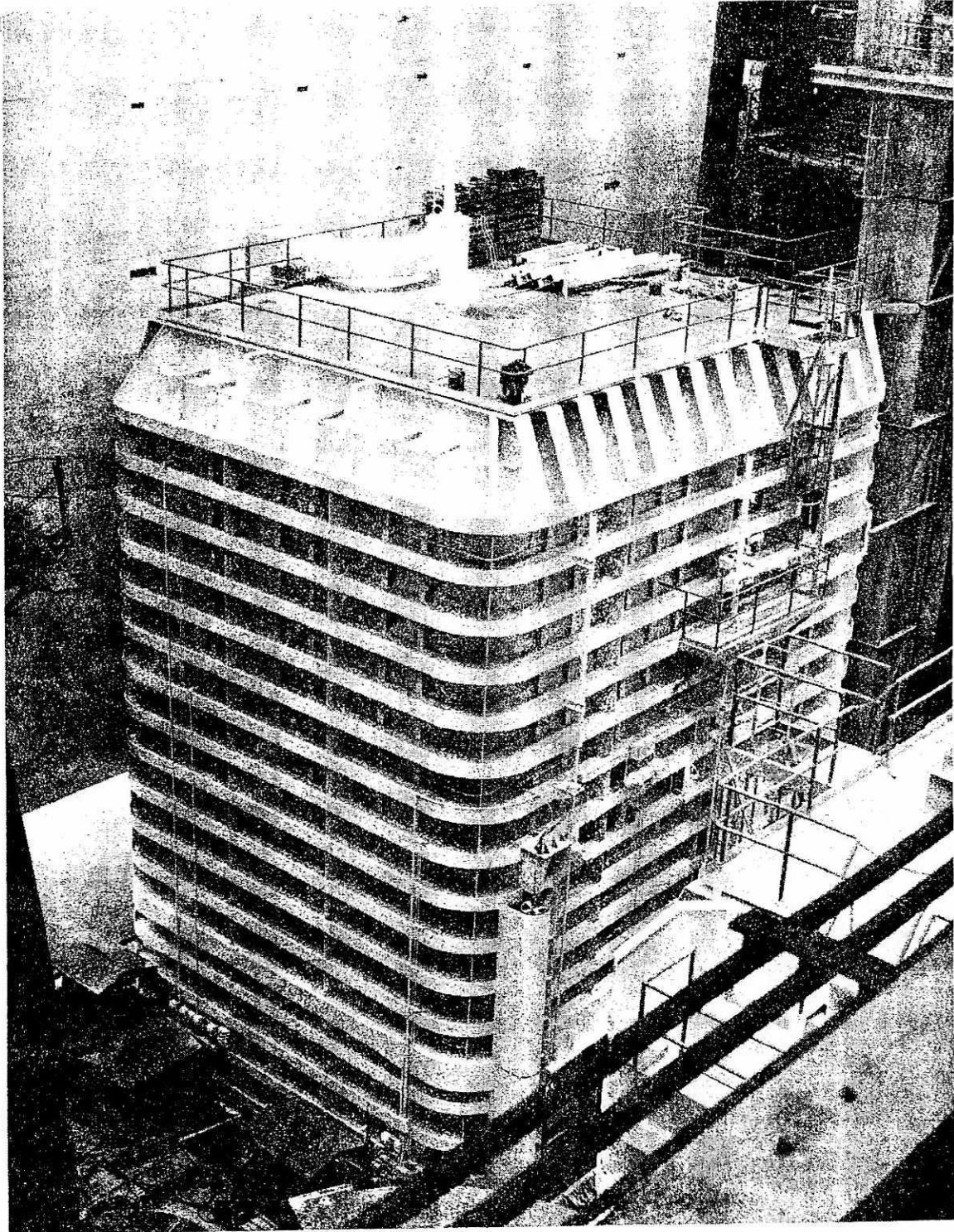


Figure 6.5-6. Chamber IIg

6-91
~~SECRET~~ D

Handle via BYEMAN
Control System Only

~~SECRET~~ D

BIF-008- F-035081-RH -68
(Control Number)

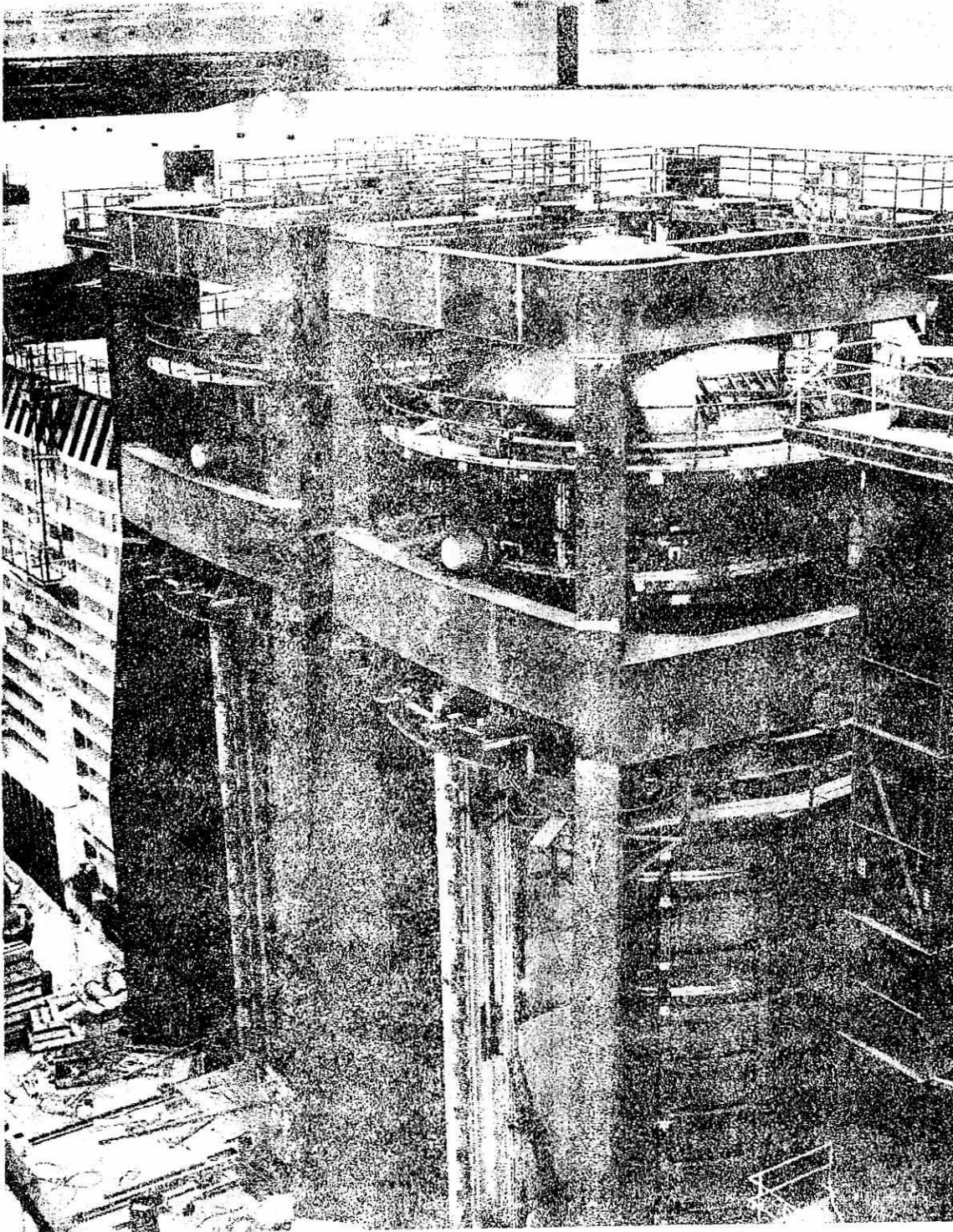


Figure 6 C-7. Chambers IIIa and b

6-92

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Handle via BYEMAN
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

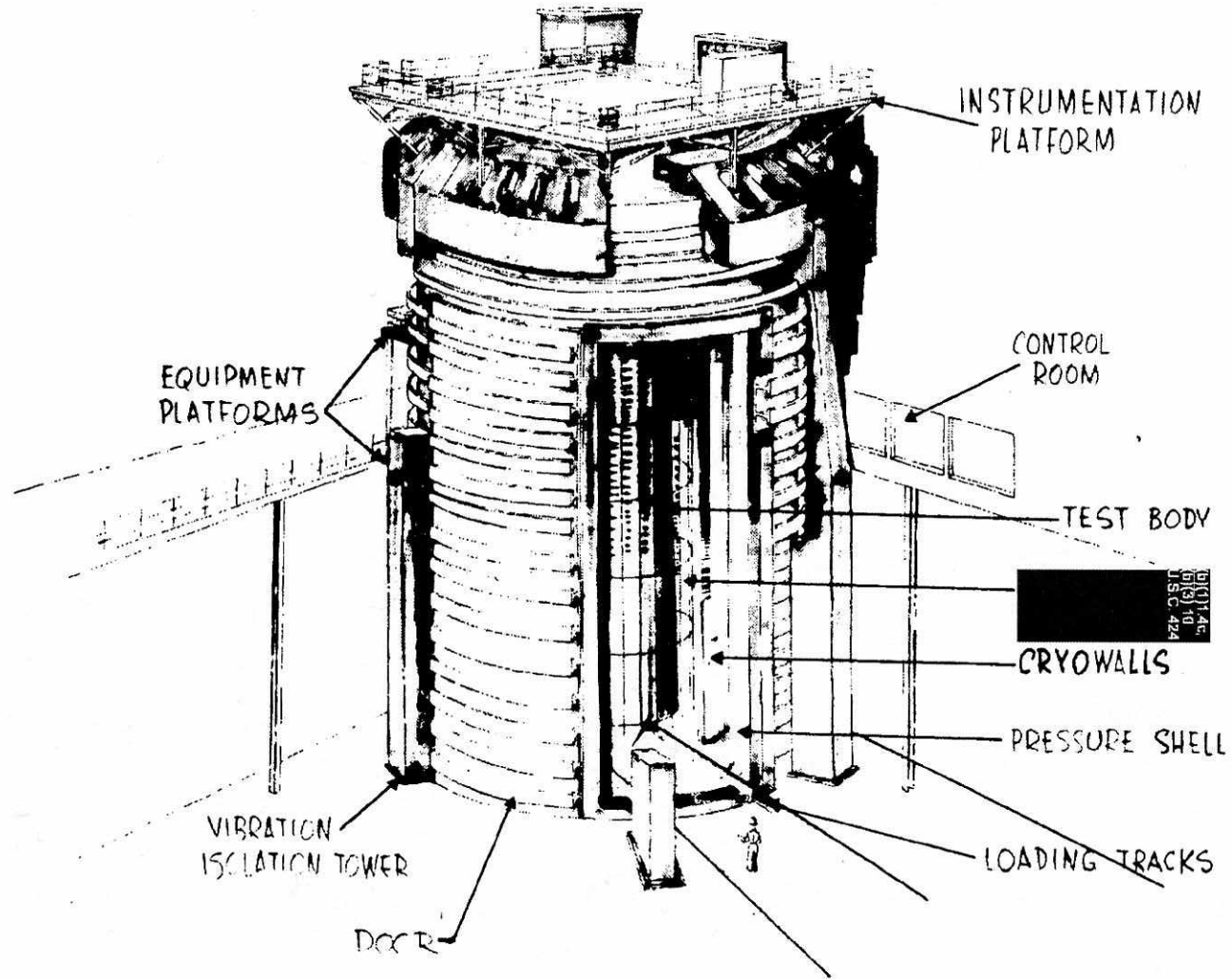


Figure 6.5-8. Chamber A

Handle via BYEMAN
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)



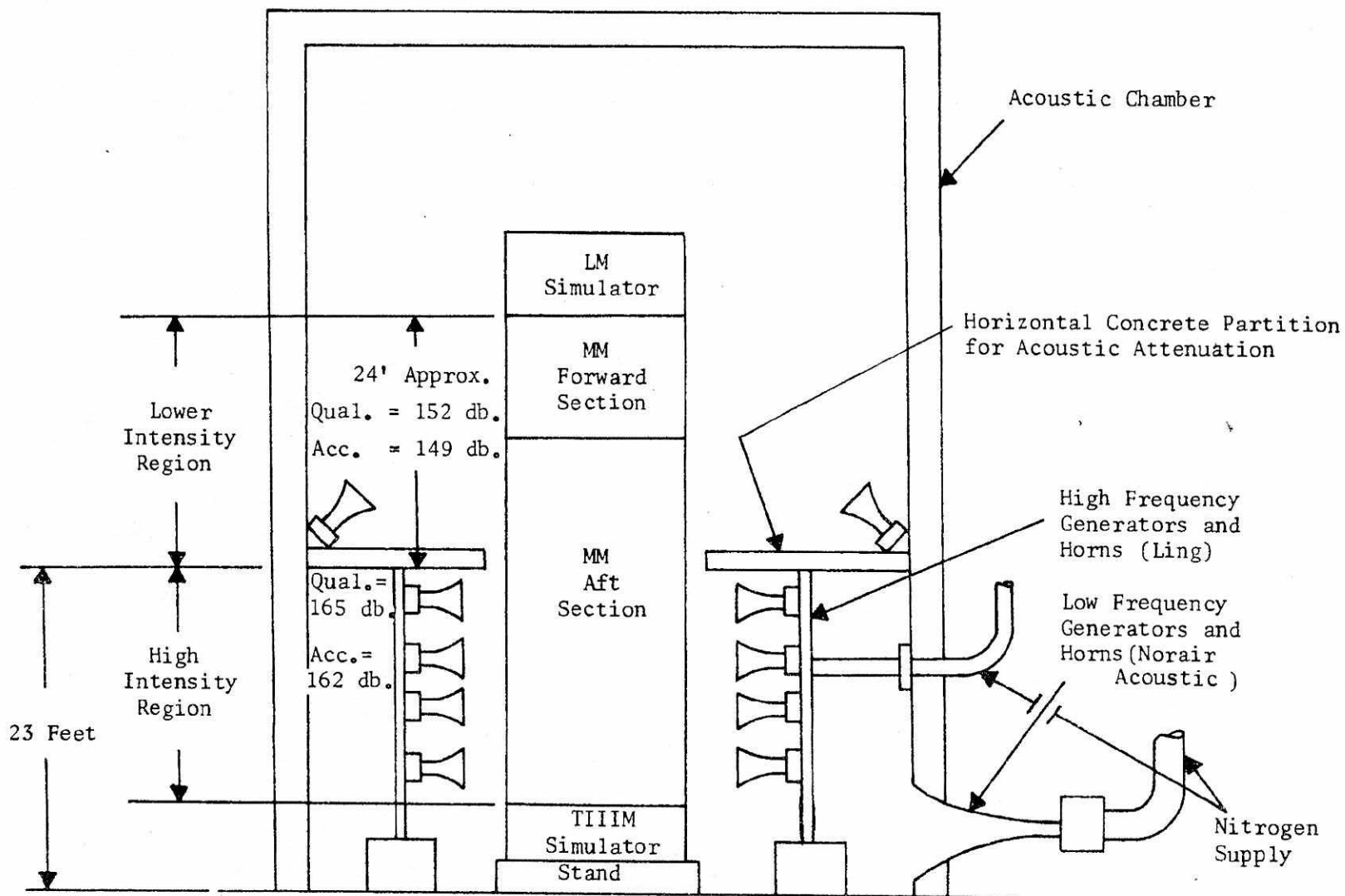
Figure 6.5-9. Chamber A

6-95
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Handle via BYEMAN
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)



86-9

Figure 6.5-10. MM Acoustic Vibration Test Configuration

Handle via **BYEMAN**
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

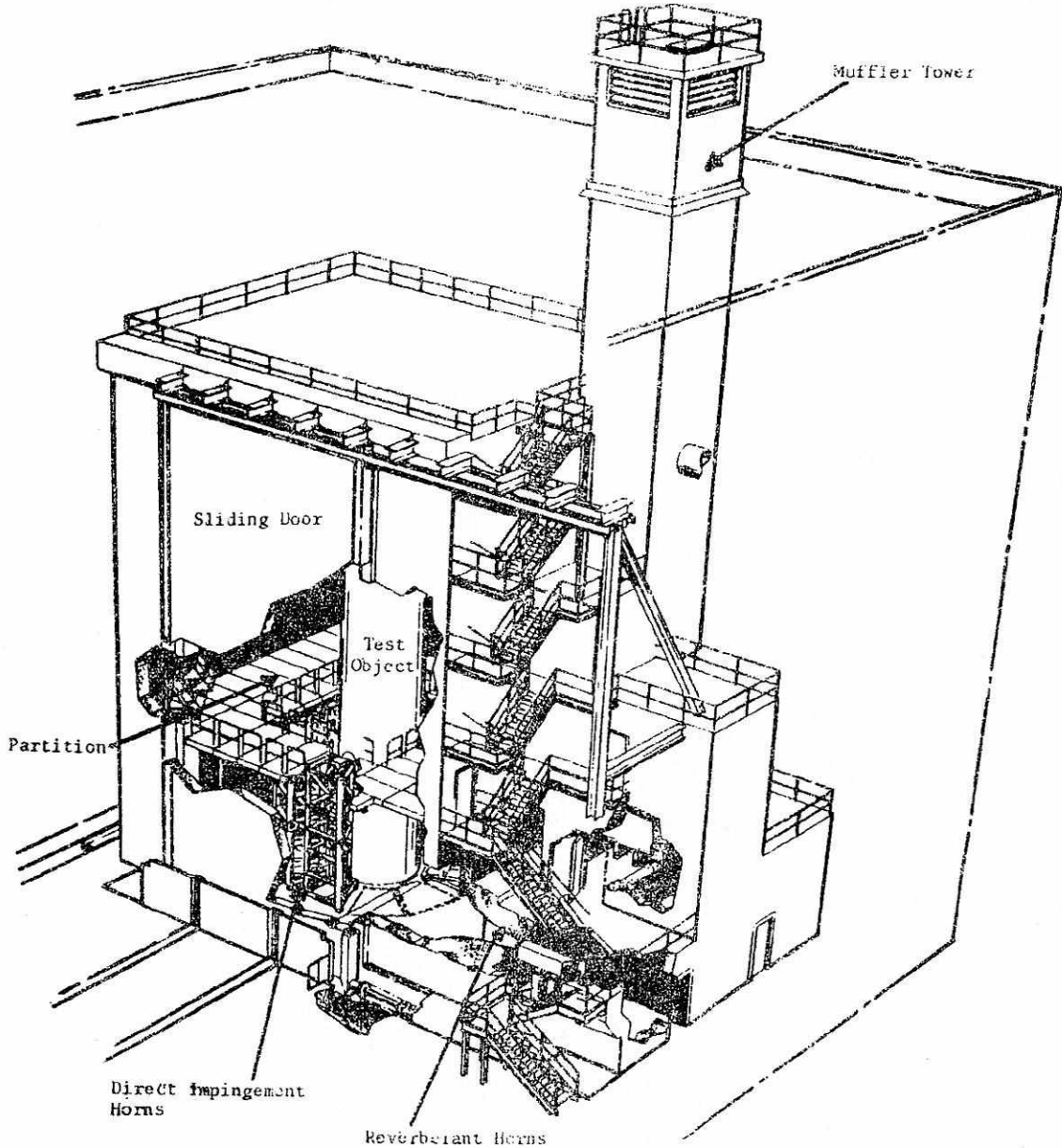


Figure 6.5-11. Acoustic Test Chamber

6-99

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Handle via BYEMAN
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

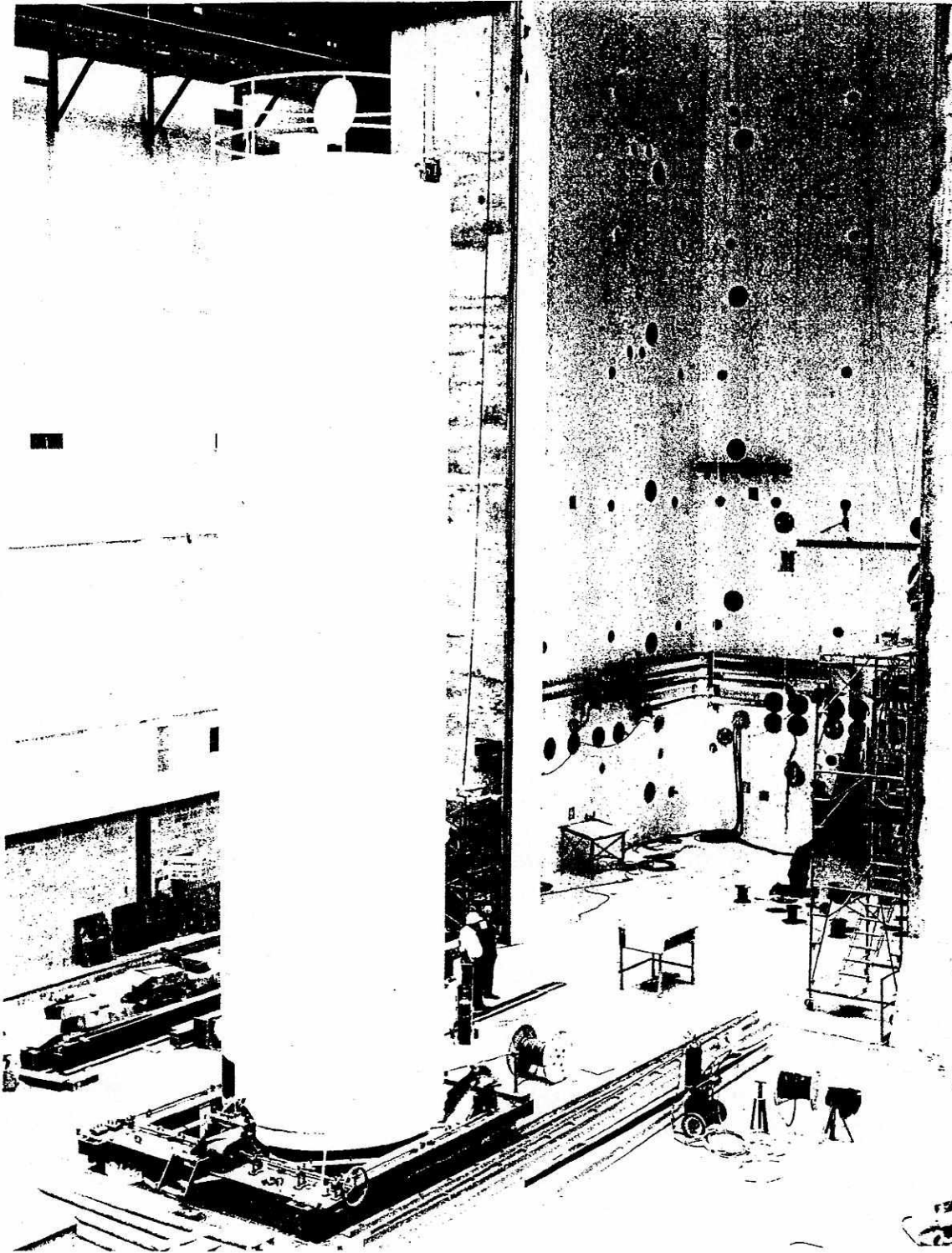


Figure 6.5-12. Acoustic Test Facility

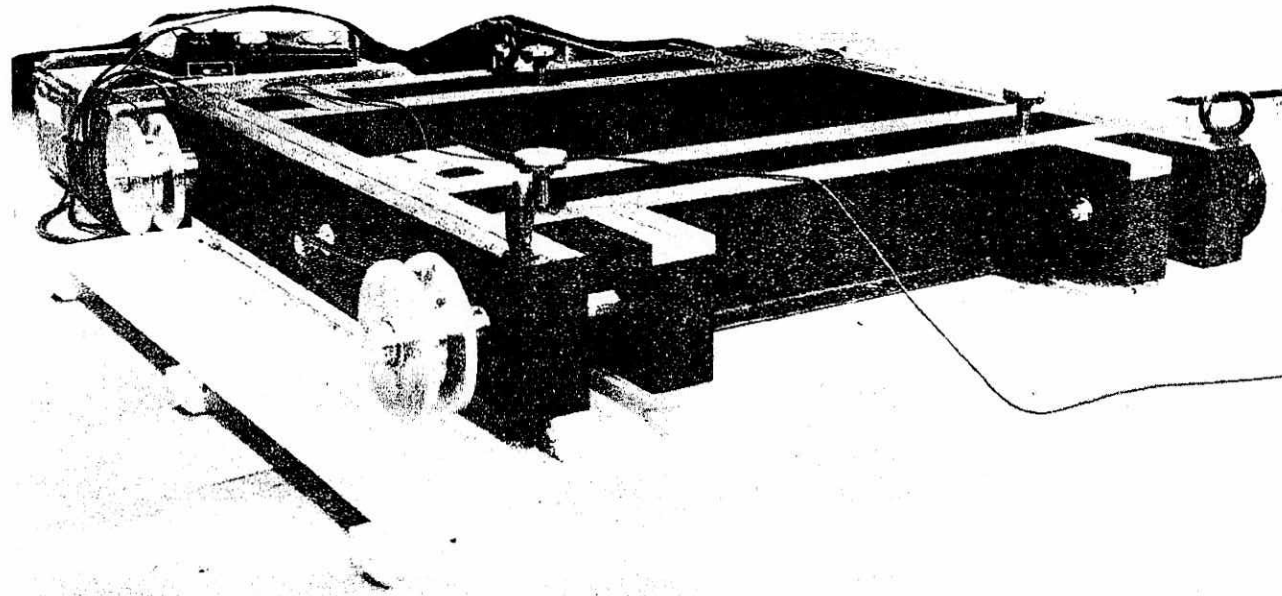
6-101

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Handle via BYEMAN
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)



6-107

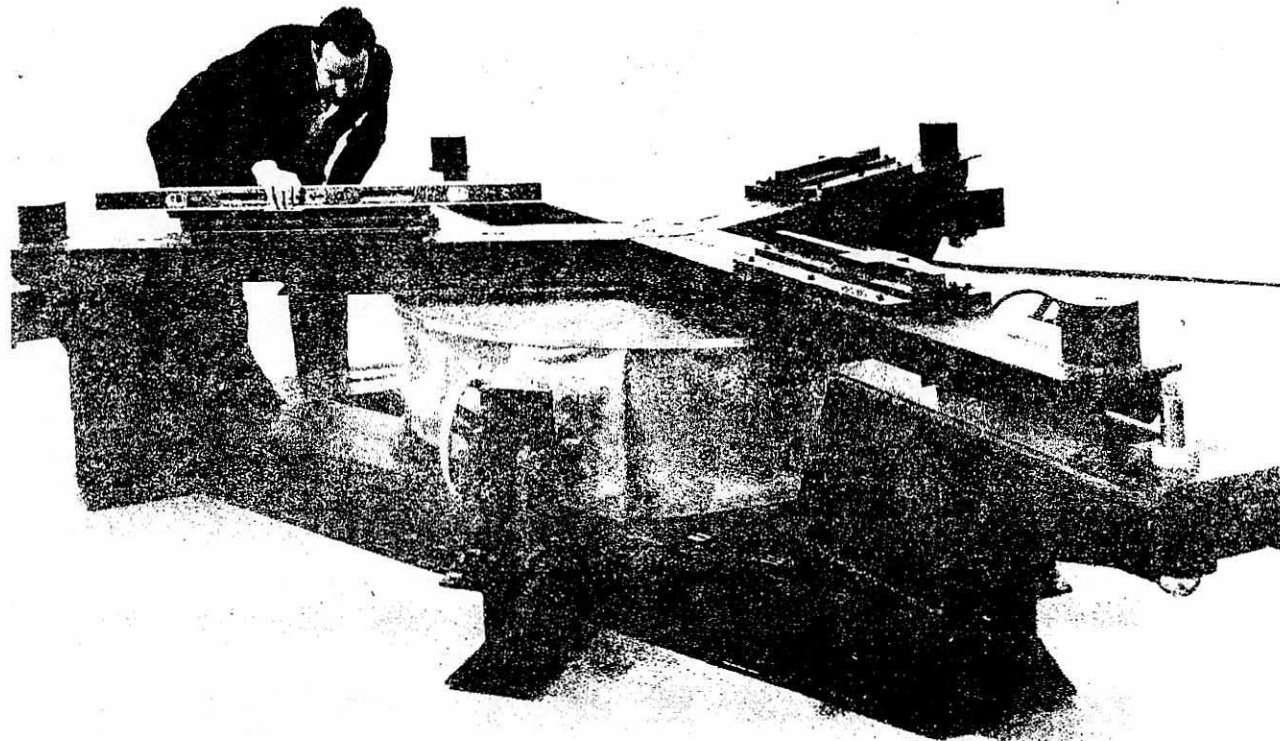
Figure 6.6-1. Positioner Dolly, Chamber II_{EM}

Handle via **BYEMAN**
Control System Only

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BI F-008- F-035081-RH -68
(Control Number)



6-108

Figure 6.6-2. Upright Adjustable Mirror Support, Chamber I_{EM}

Handle via **BYEMAN**
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

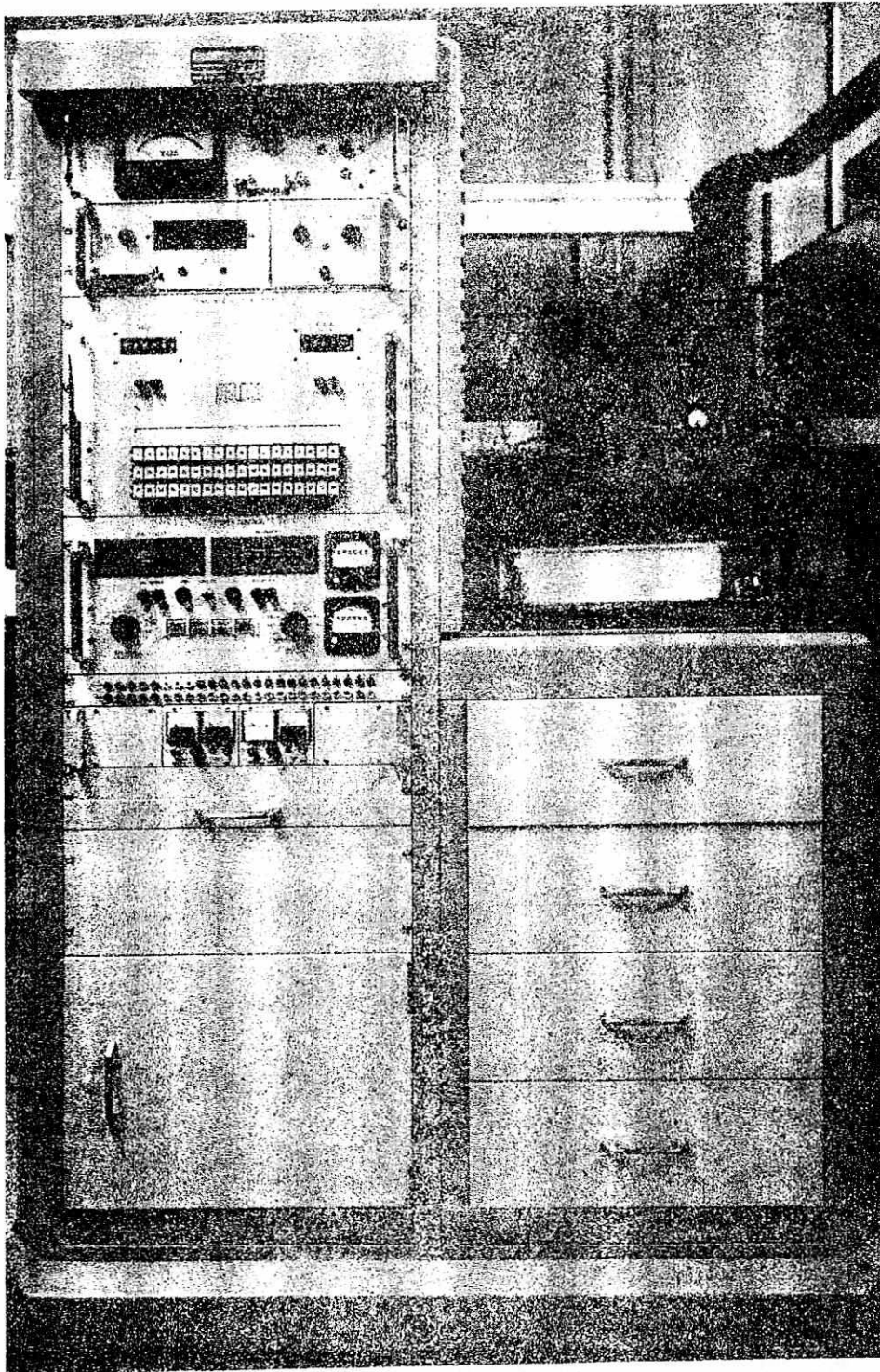


Figure 6.6-3. Instrumentation Processor Test Set
Front Panel View

6-109

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Handle via **BYEMAN**
Control System Only

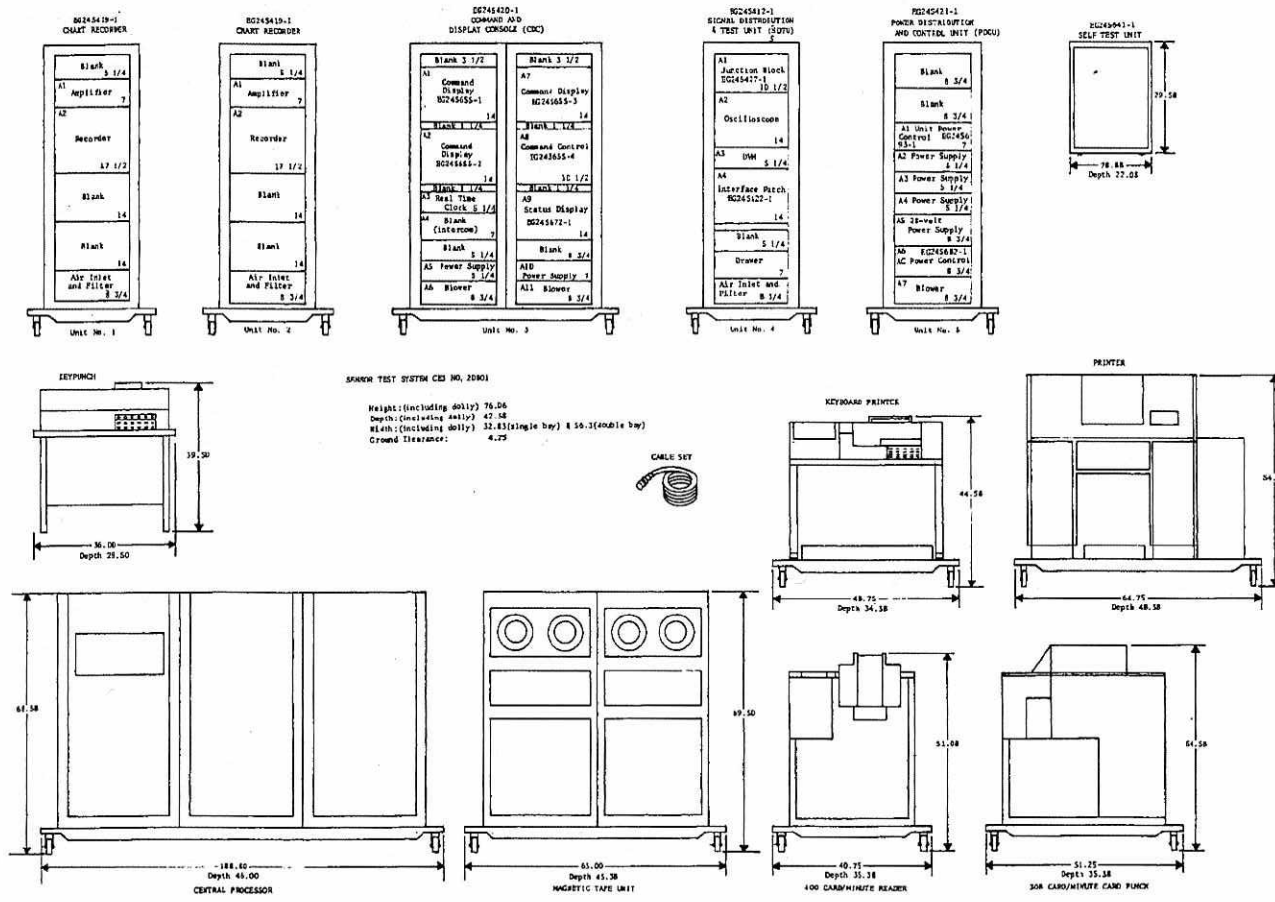


Figure 6.6-4. Layout Drawing of Sensor Test System

Handle via BYEMAN Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

6-116

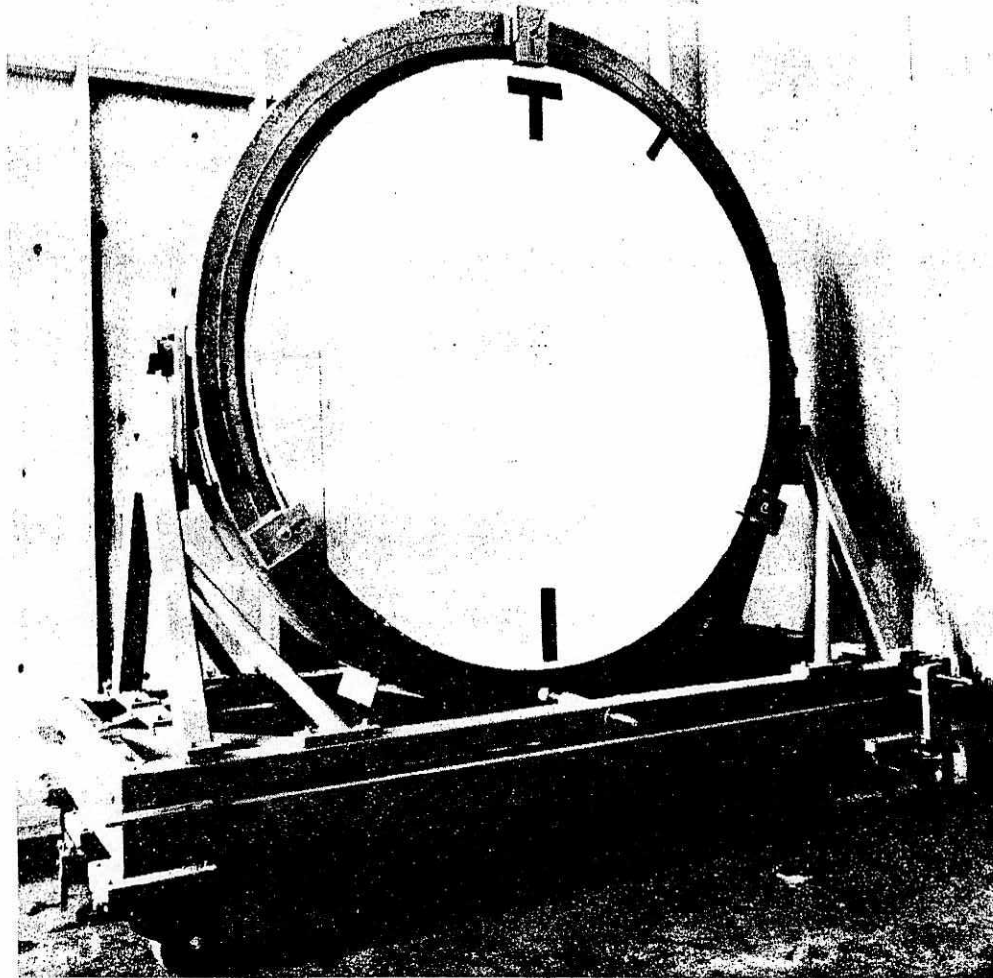


Figure 6.6-6. Horizontal Test Stand Setup

Handle via BYEMAN
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

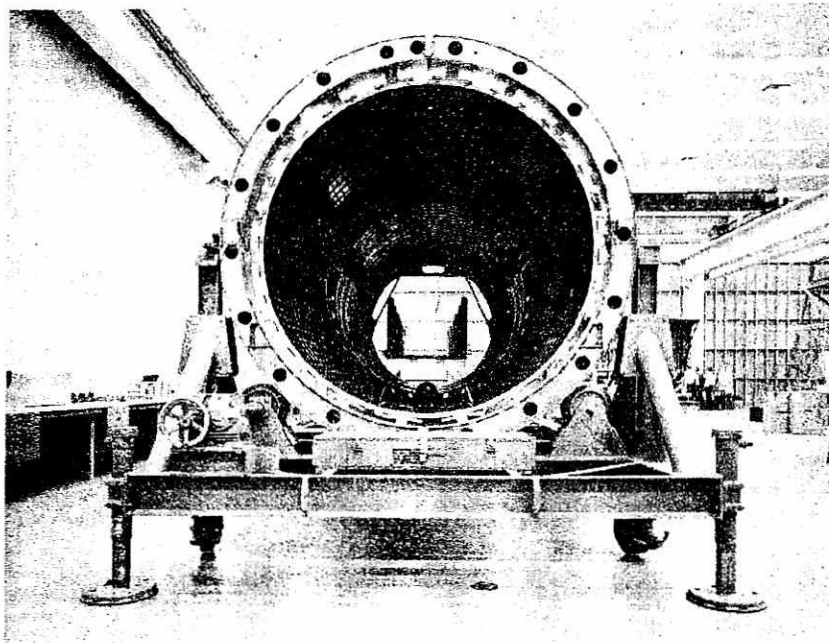
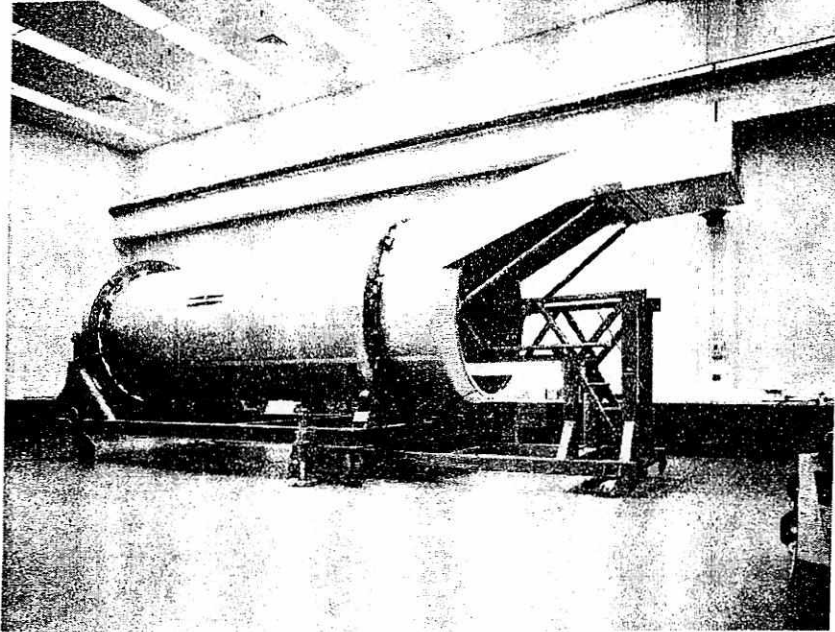


Figure 6.6-7. Checkout Cradle and Cantilever Catwalk
(With SDM Aft Structure)

6-117

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Handle via **BYEMAN**
Control System Only

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BI F-008- F-035081-RH -68
(Control Number)

6-120

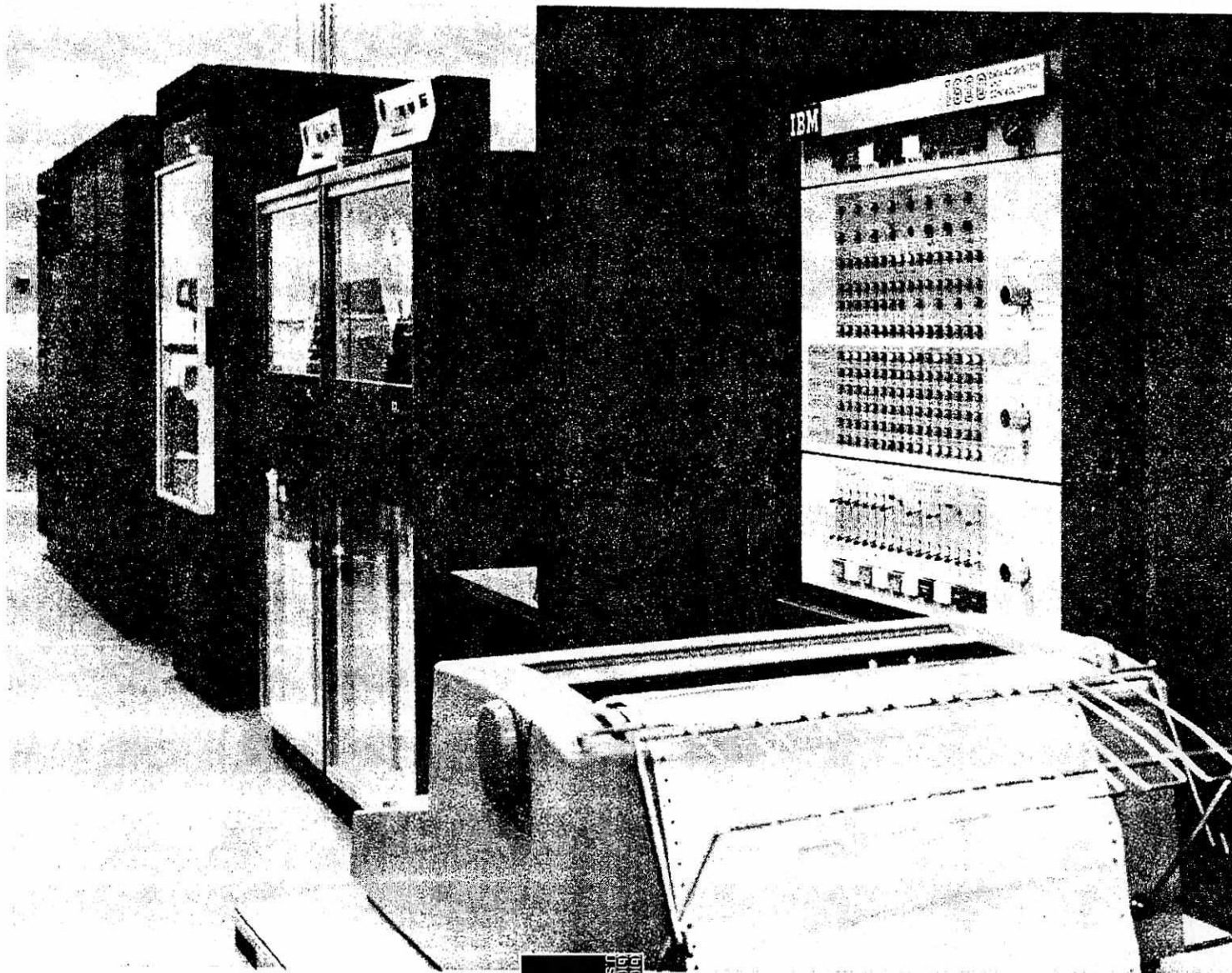


Figure 6.6-8. [REDACTED] Data Management System
Central Computer (IBM)

Handle via **BYEMAN**
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

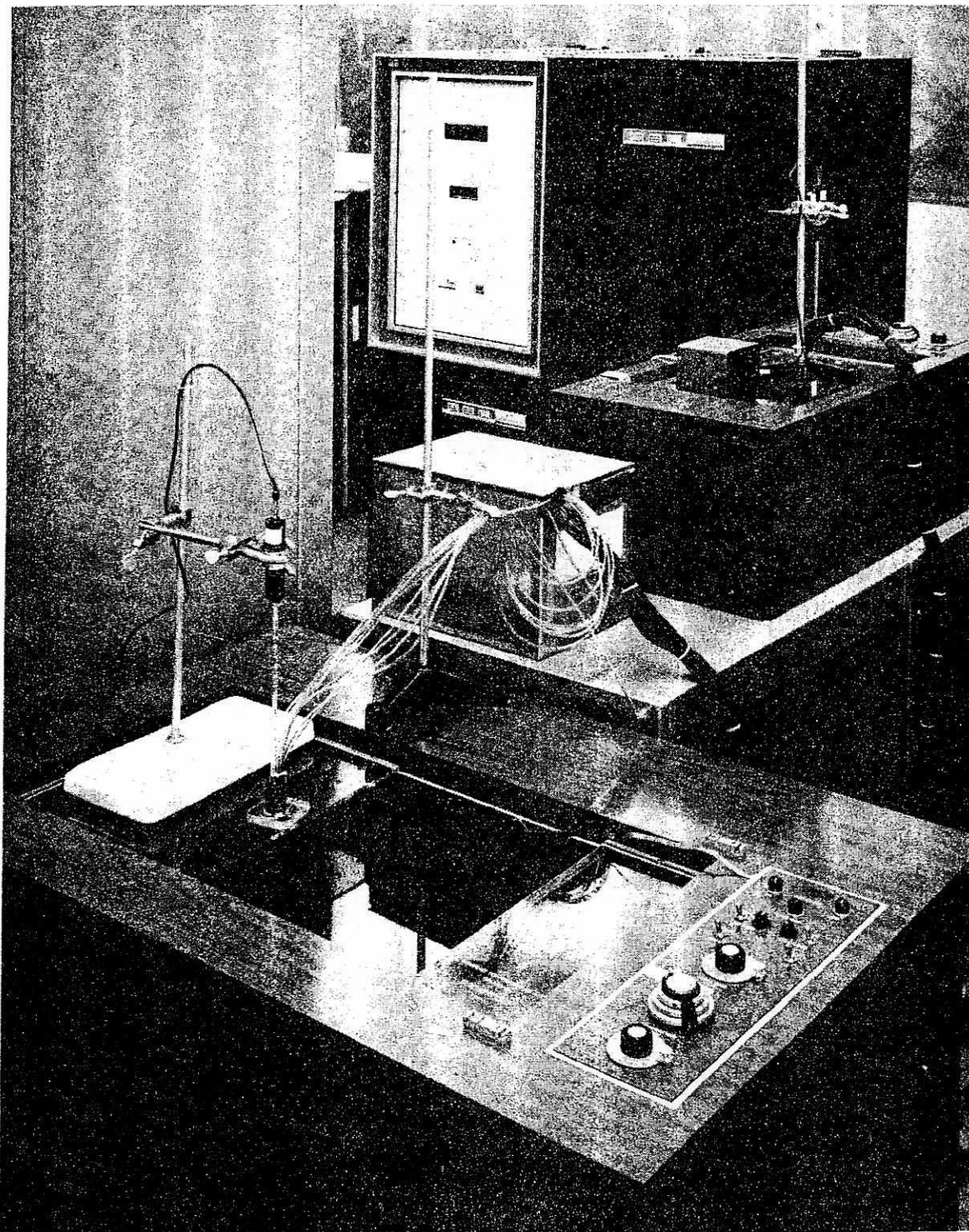


Figure 6.6-9. (b)(1), 4c, (b)(3)
10 U.S.C. 424 Data Acquisition Equipment Breadboard
(Systems Engineering Laboratories), Shown Being
applied in Thermocouple Calibration.

6-121

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Handle via BYEMAN
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

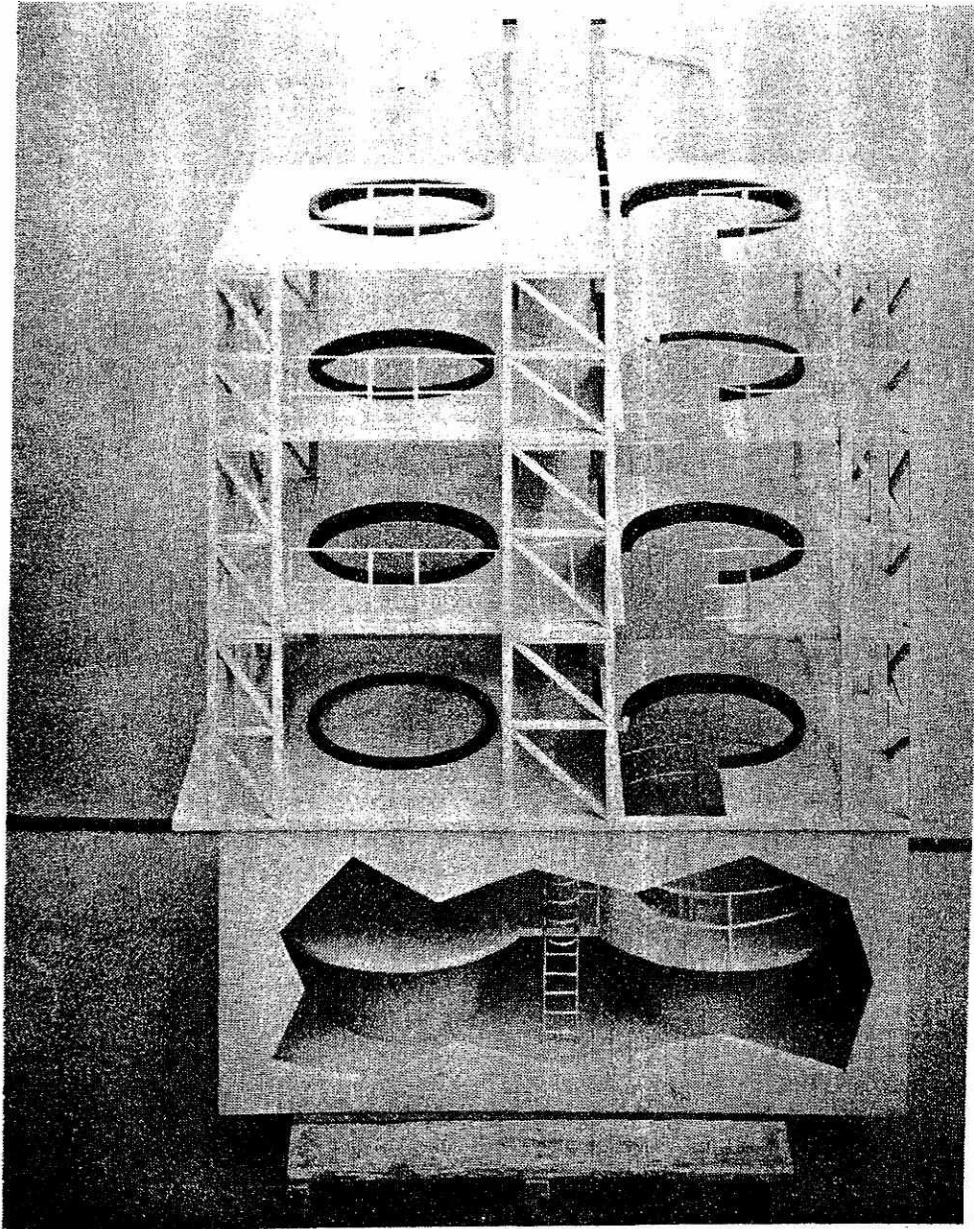


Figure 6.6-10. Mission Module Assembly Stand Scale Model

6-123

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Handle via **BYEMAN**
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

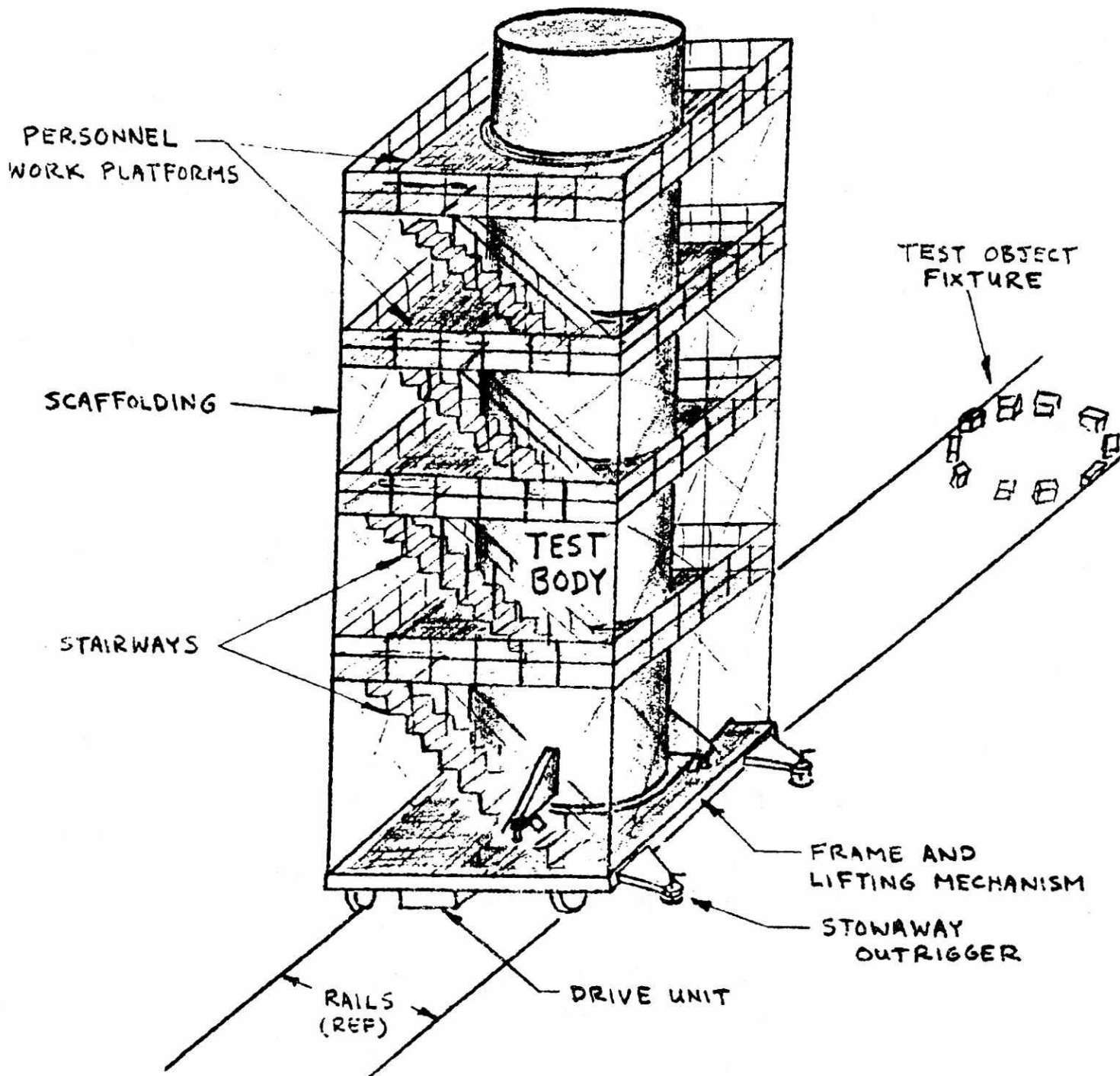


Figure 6.6-11. Test Body Transporter and Scaffolding Unit

6-125-
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Handle via BYEMAN
Control System Only

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BIF-008- F-035081-RH -68
(Control Number)

α_0 - magnitude of \bar{q}_0 , and
 \hat{q}_0 - unit vector defining the direction of \bar{q}_0 .

The unit vector \hat{q}_0 is given by:

$$\hat{q}_0 = \begin{bmatrix} \sin \Sigma_0 \\ -\cos \Sigma_0 \sin \Omega_0 \\ \cos \Sigma_0 \cos \Omega_0 \end{bmatrix}. \quad \text{Equation A.2-1}$$

A.2.2 Vehicle Coordinate System (VCS)

The VCS is defined in Figure A.2-2.

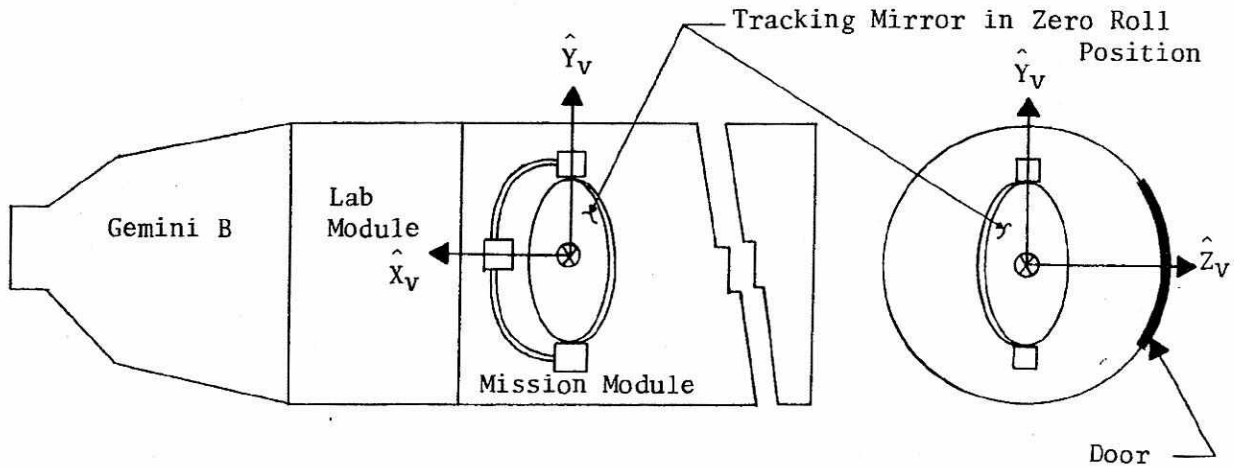


Figure A.2-2
 Vehicle Coordinate System

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BIF-008- F-035081-RH -68
(Control Number)

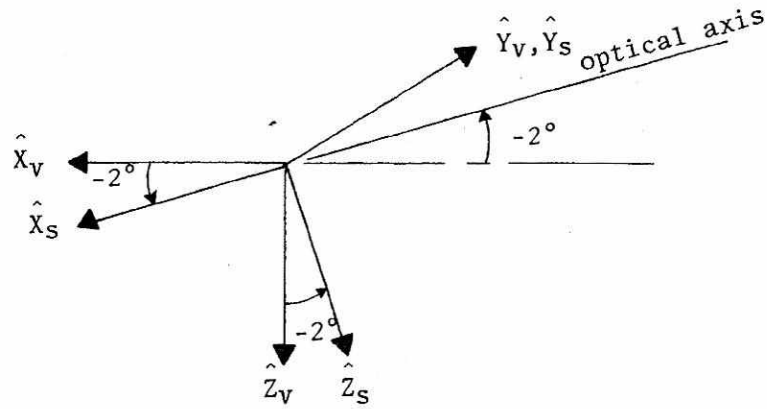


Figure A.2-3
Optical Sensor Coordinate System

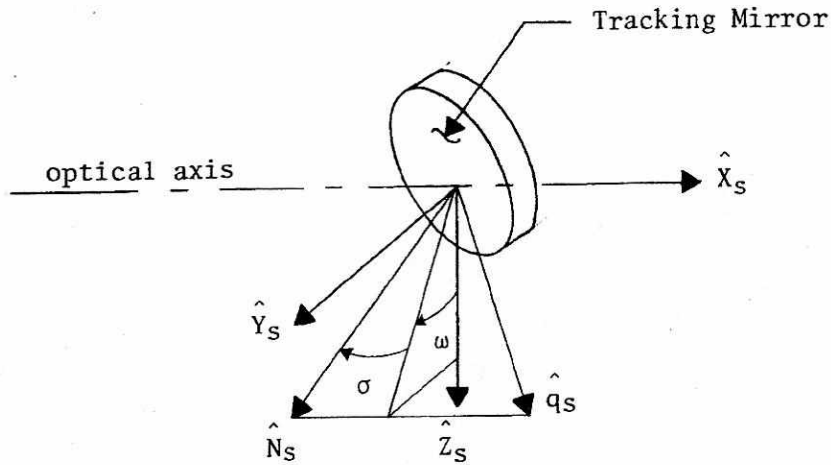


Figure A.2-4
Tracking Mirror Gimbal Angles

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SPECIAL HANDLING

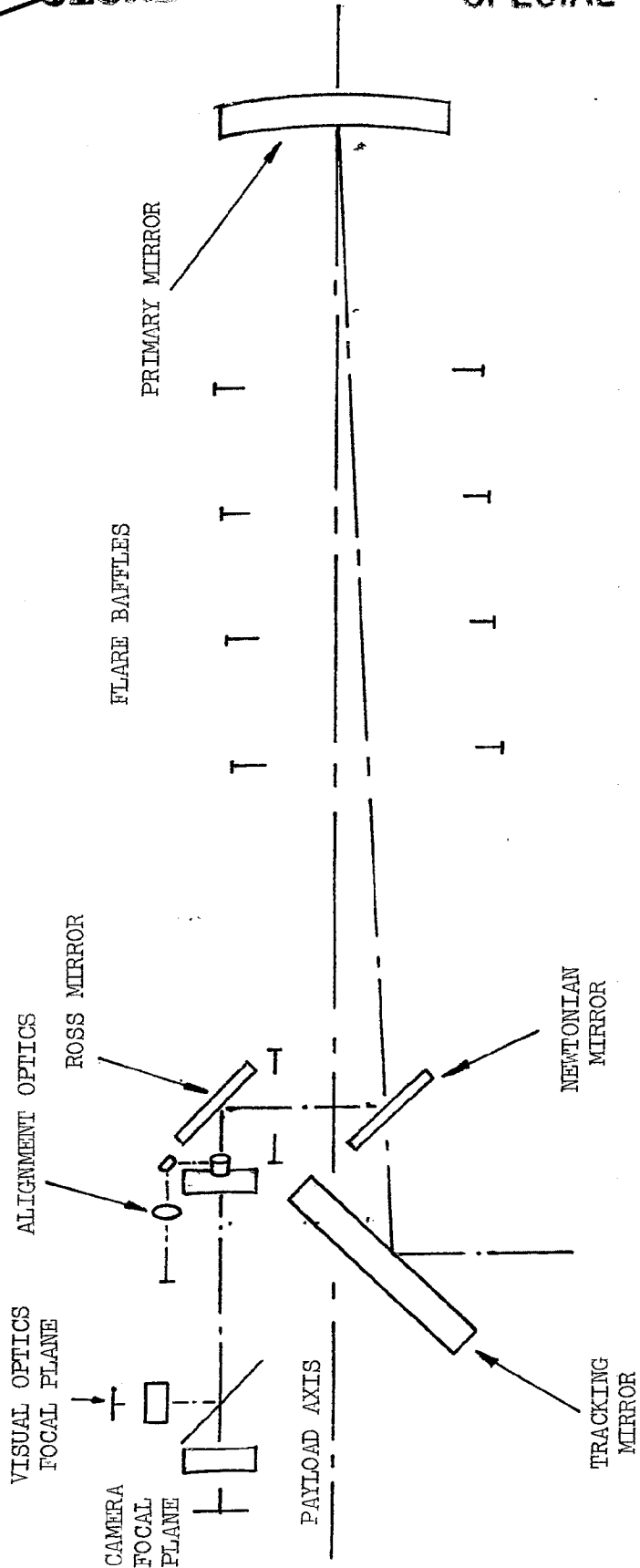


FIGURE 3-5 OPTICAL SENSOR BASIC CONFIGURATION

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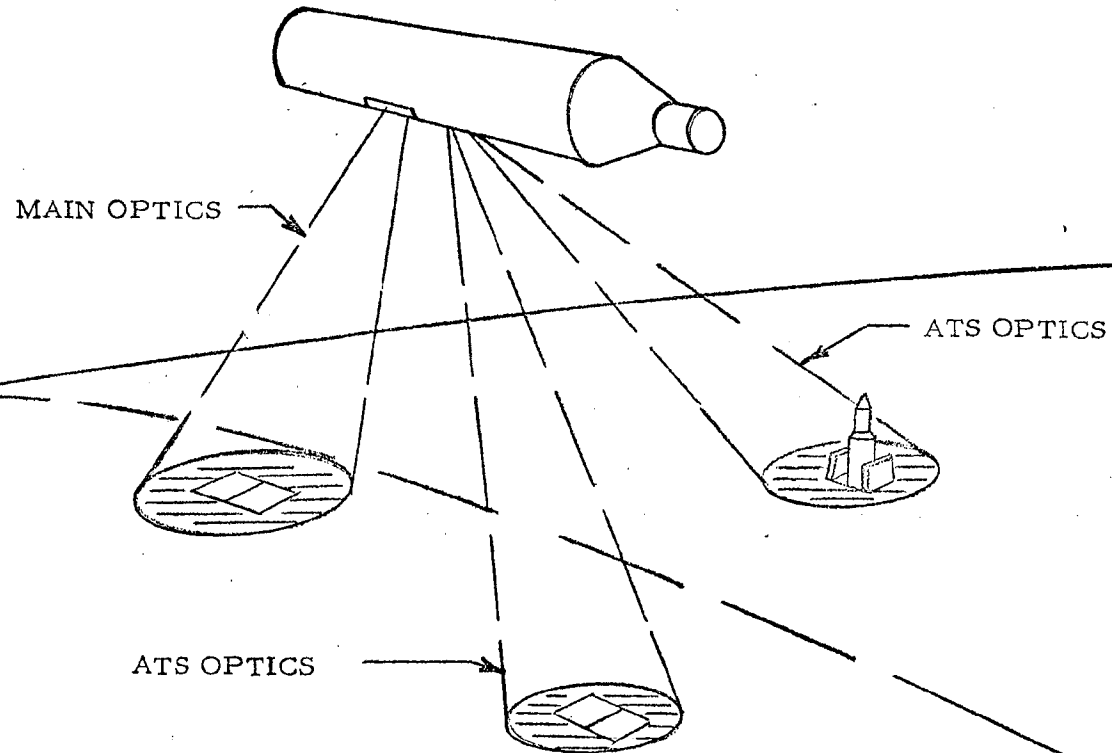
SPECIAL HANDLING

~~SECRET~~ SPECIAL HANDLING

WHS-056

10

CONCEPT OF MANNED EXAMINATION FOR ACTIVE INDICATORS



- IF EITHER ALTERNATE HAS ACTIVE INDICATORS, TAKE IT

~~SECRET~~ SPECIAL HANDLING

10
Rev 8/11

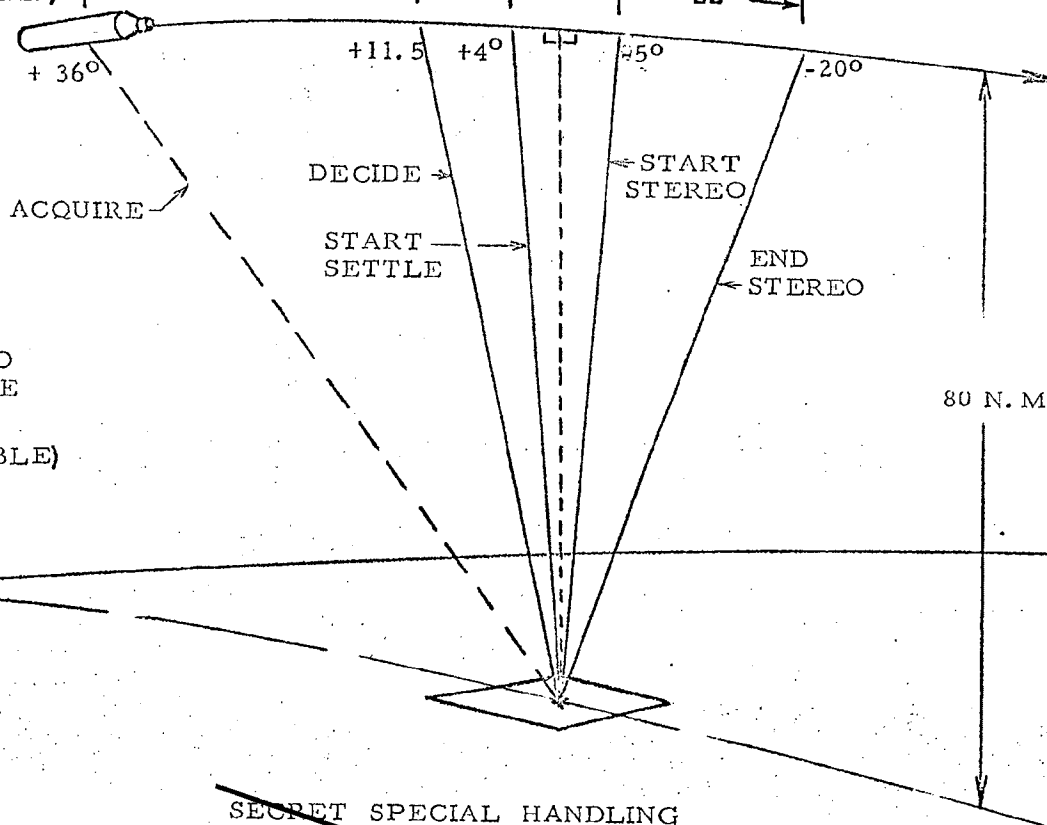
1120
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WHS-056

ACTIVE INDICATOR EXAMINATION AND SPECIAL PHOTOGRAPHY SEQUENCE

TIMES (SEC.)	10	2.5	3	5.2
DISTANCE (N. MI.)	42	10.5	12.5	22



NOTE

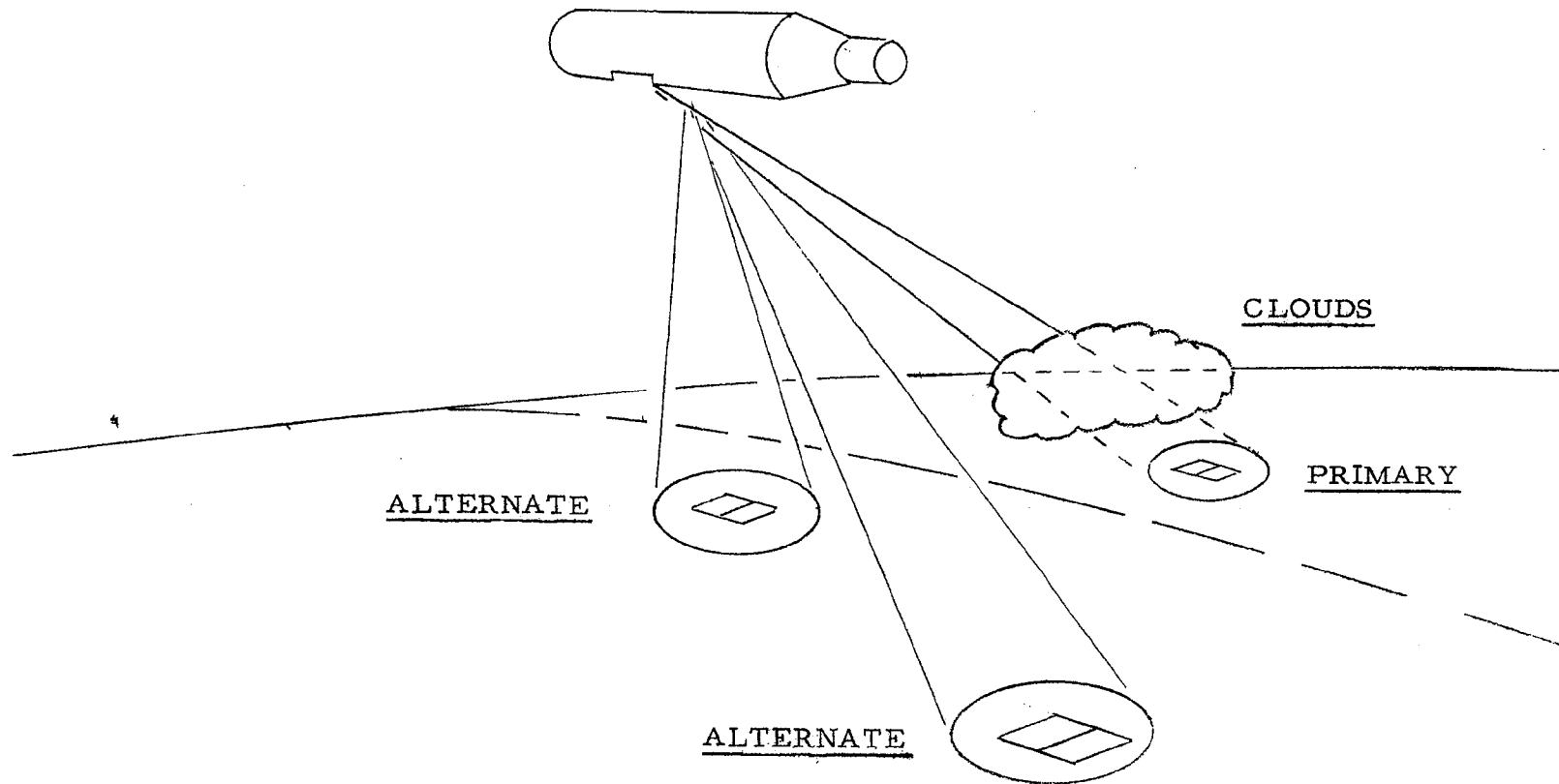
*WORST CASE - STEREO
CAN START ANYWHERE
FROM +20° TO -5°
(+20° TO -20° AVAILABLE)

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WHS-056
Page 18

WEATHER AVOIDANCE



- IF PRIMARY COVERED AND ALTERNATE CLEAR, SWITCH TO ALTERNATE

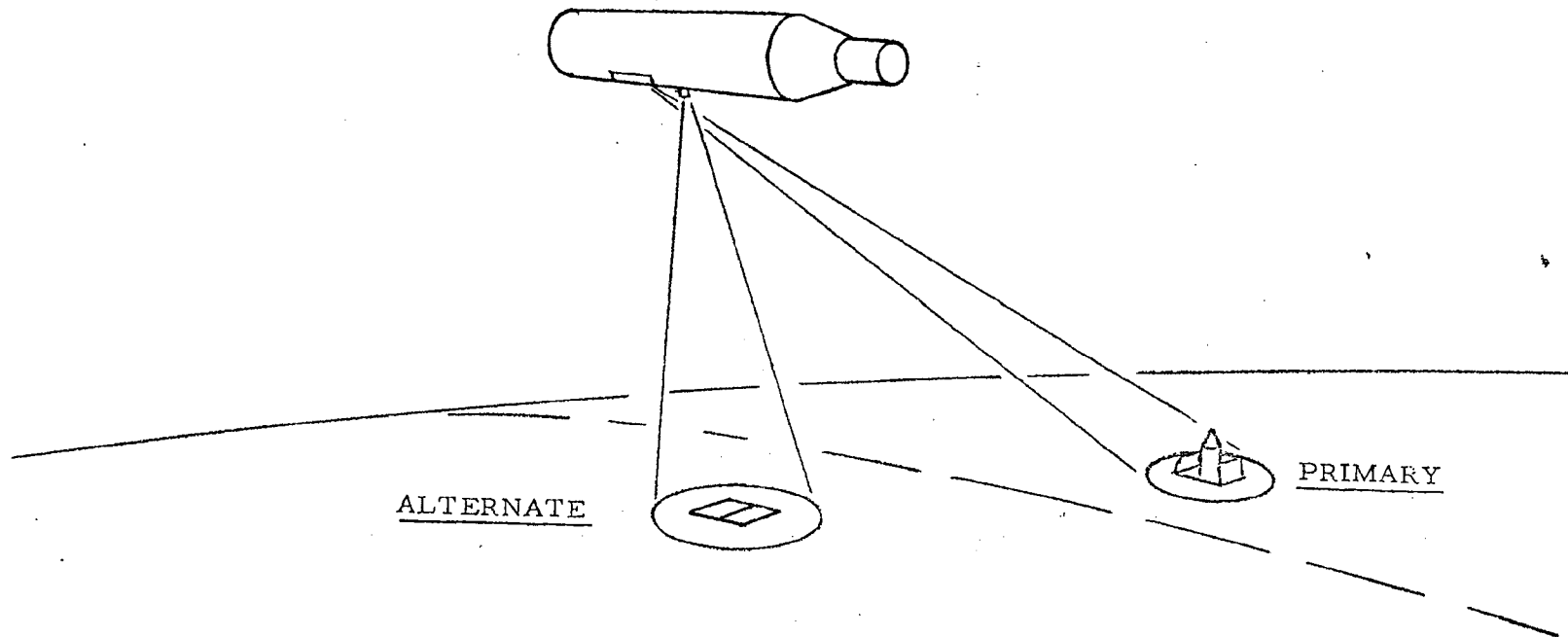
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WHS-056
18

WEATHER AVOIDANCE



● IF PRIMARY COVERED AND ALTERNATE CLEAR, SWITCH TO ALTERNATE

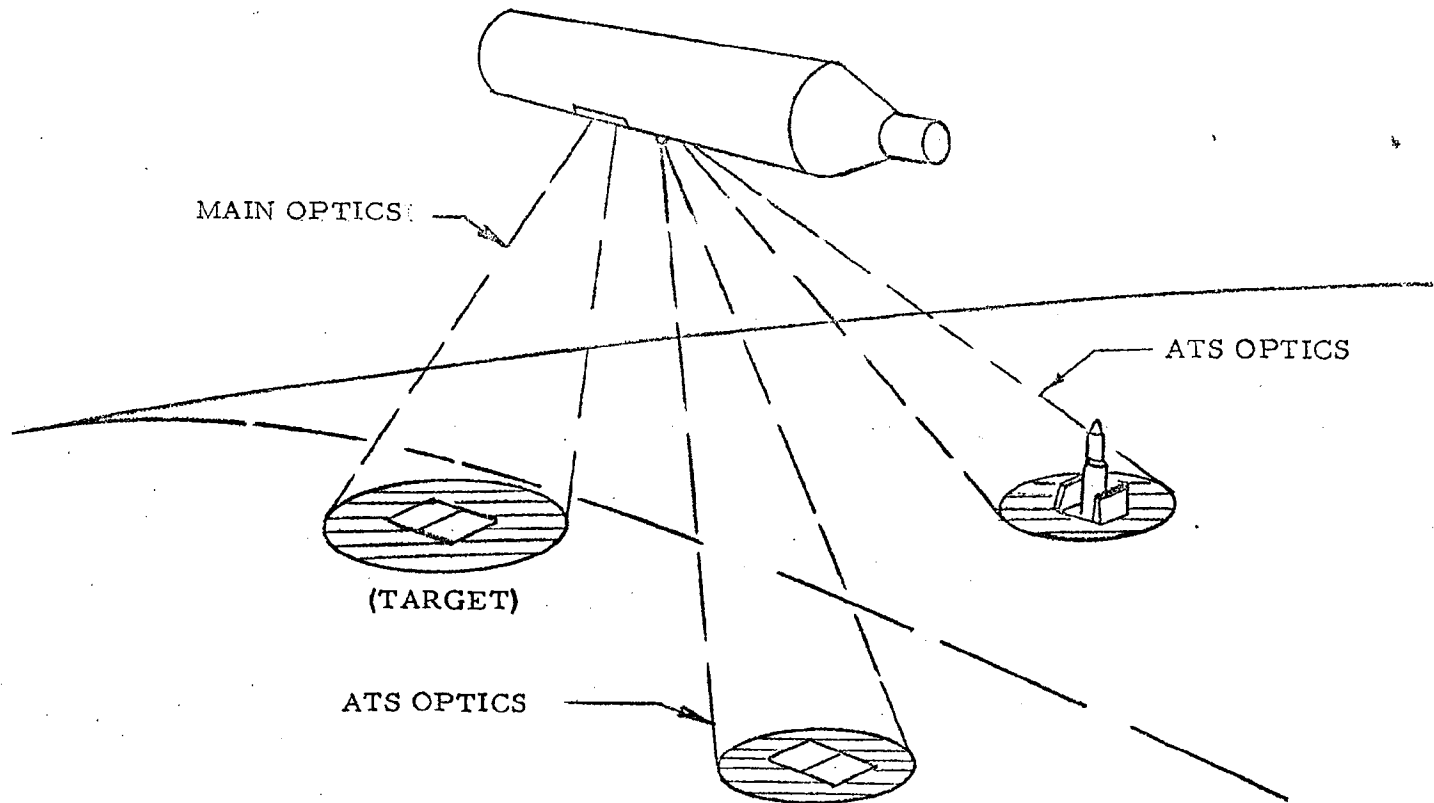
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WHS-056

22

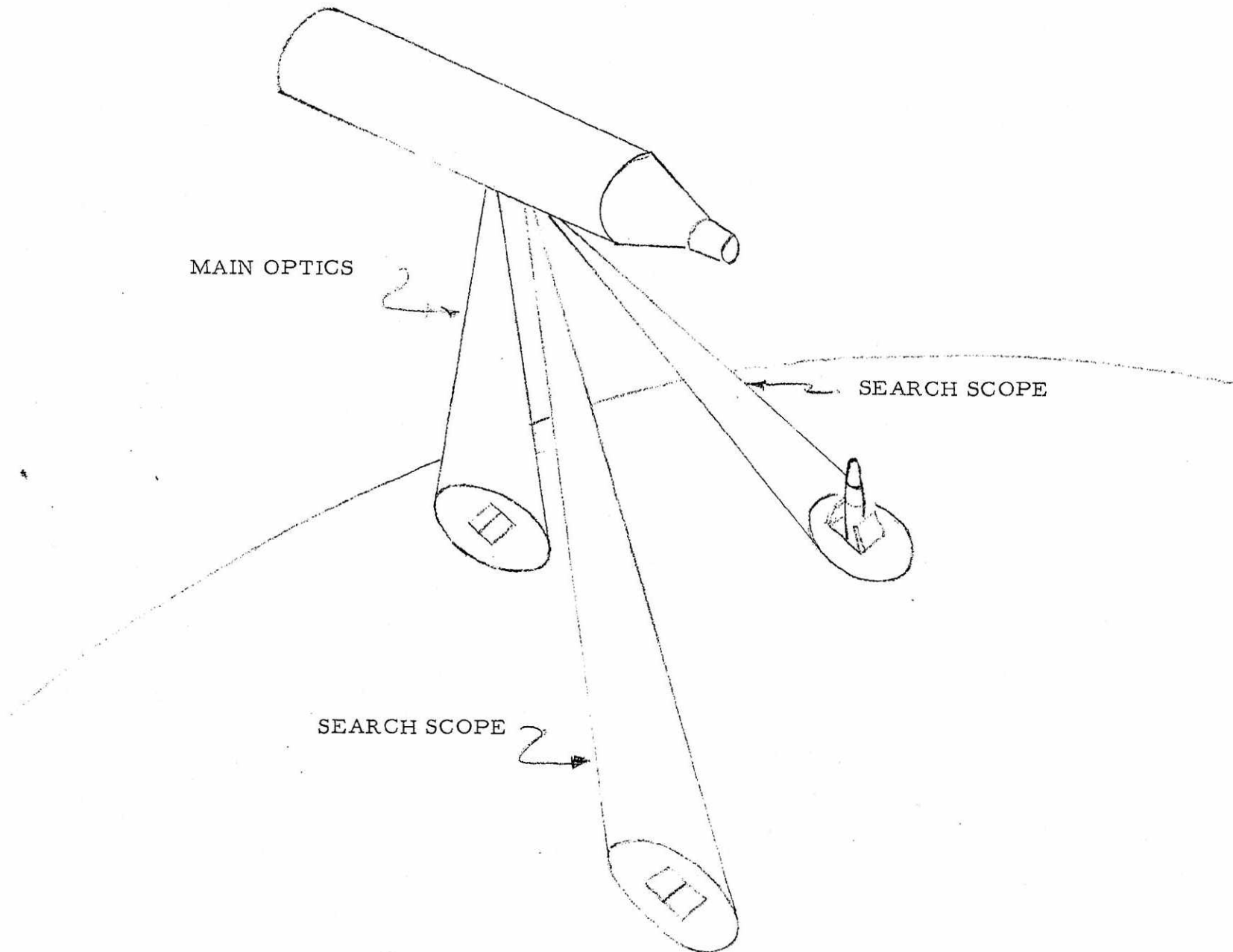
WEATHER VERIFICATION



⊙ IF TARGET IS CLEAR AT TIME OF PHOTOGRAPH, COUNT IT DOWN.

~~SECRET~~ SPECIAL HANDLING

MANNED ACQUISITION OF ACTIVE TARGETS



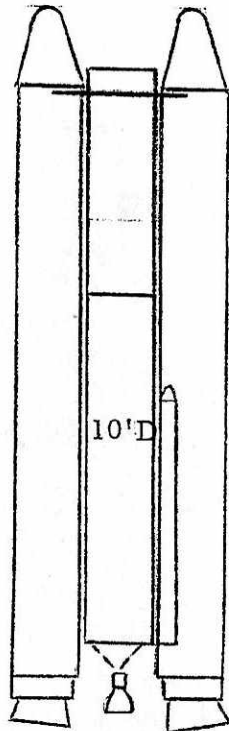


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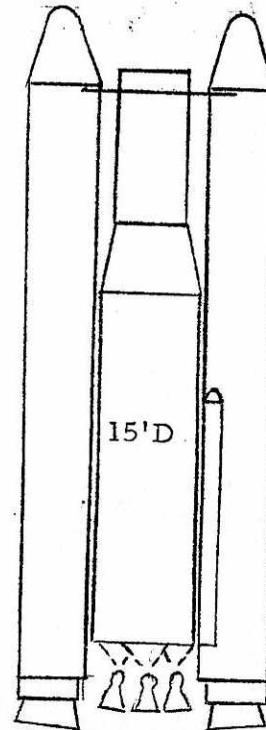
WHS-022

MOL LAUNCH VEHICLES

THI C (U)
32.8K# REF. P/L



THI C - LDC 1
44.0K# REF. P/L



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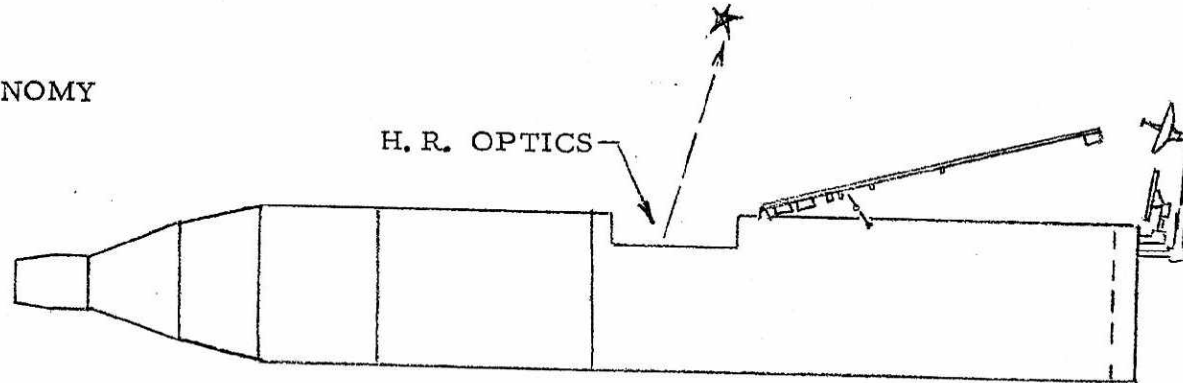


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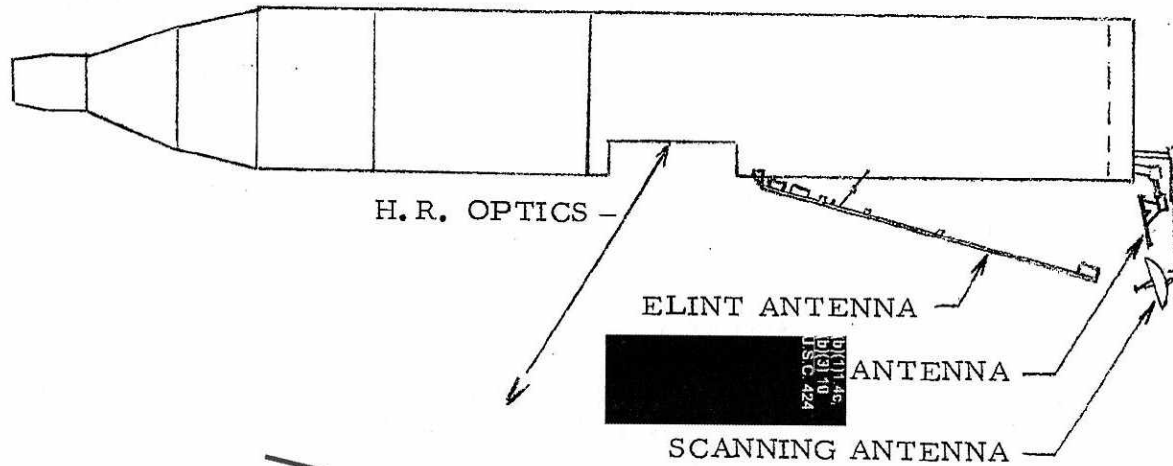
WHS-022

MULTI-MISSION
GROWTH APPROACHES
(APPLICABLE TO INTEGRAL OR RENDEZVOUS)

○ ASTRONOMY



○ ELINT, [REDACTED] AND H. R. PHOTOGRAPHY



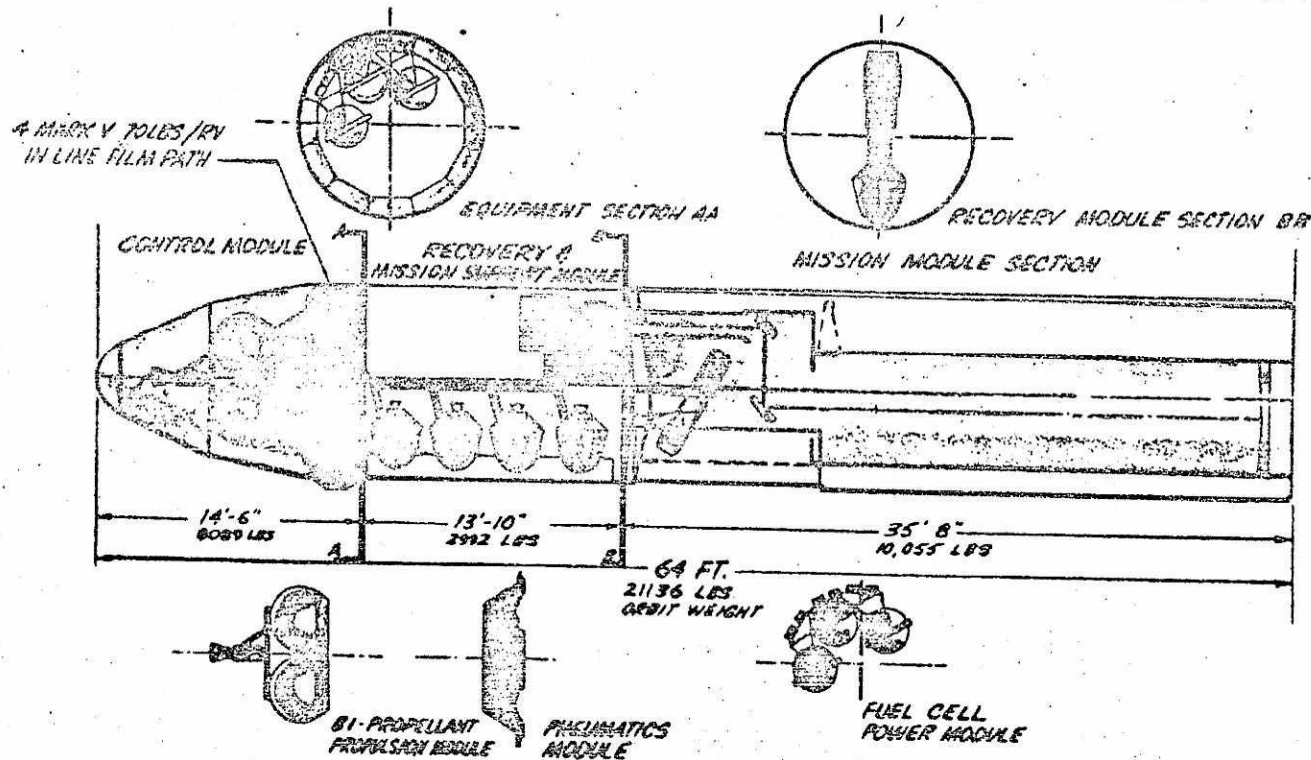
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WHS-022

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30 DAY DORIAN SYSTEM

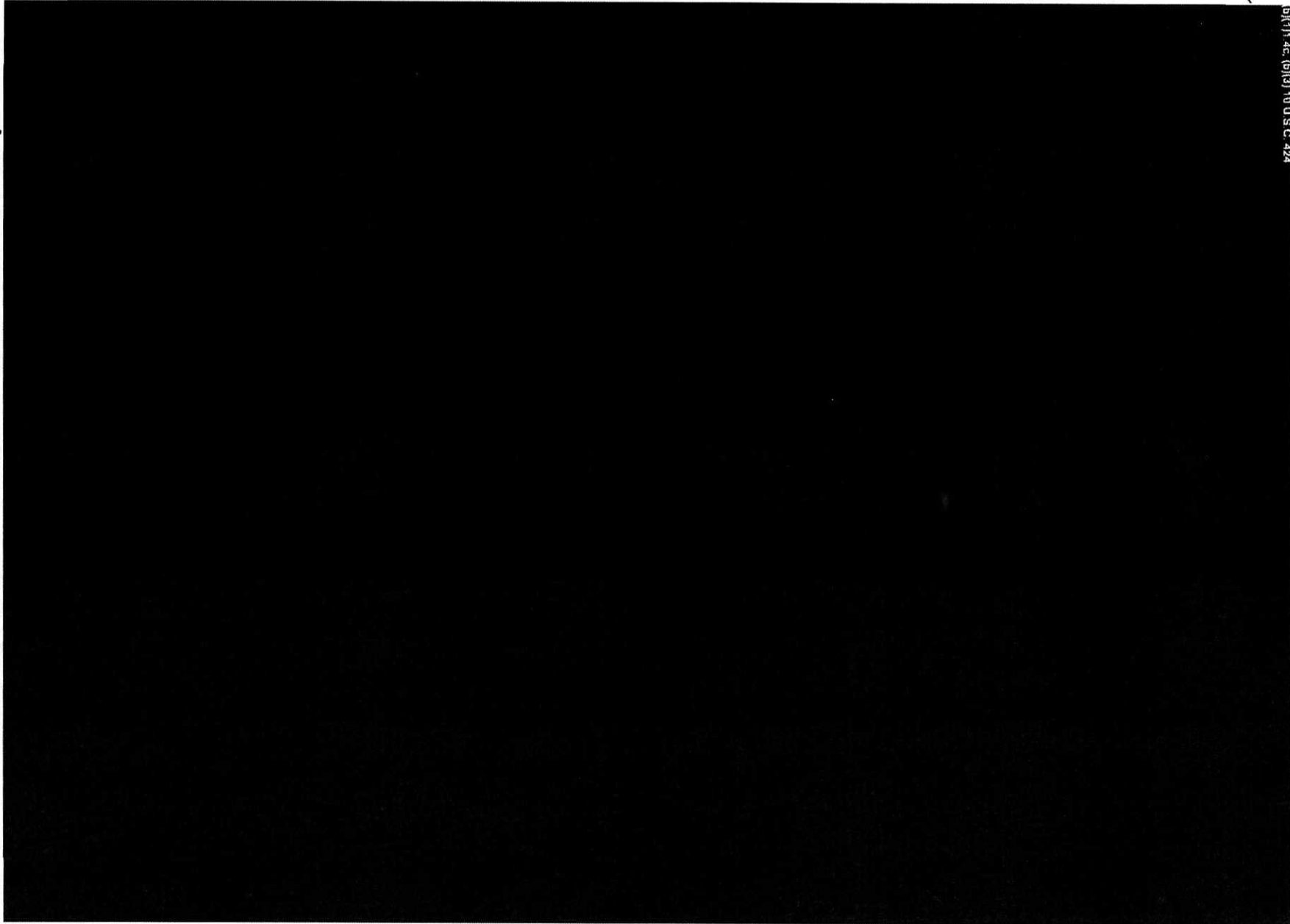
TITAN III D-5 SEGMENT BOOSTER - 97° INCLINATION, 70-170 N.M. ORBIT



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WHS-022



501014c (b)(3) 10 USC 424

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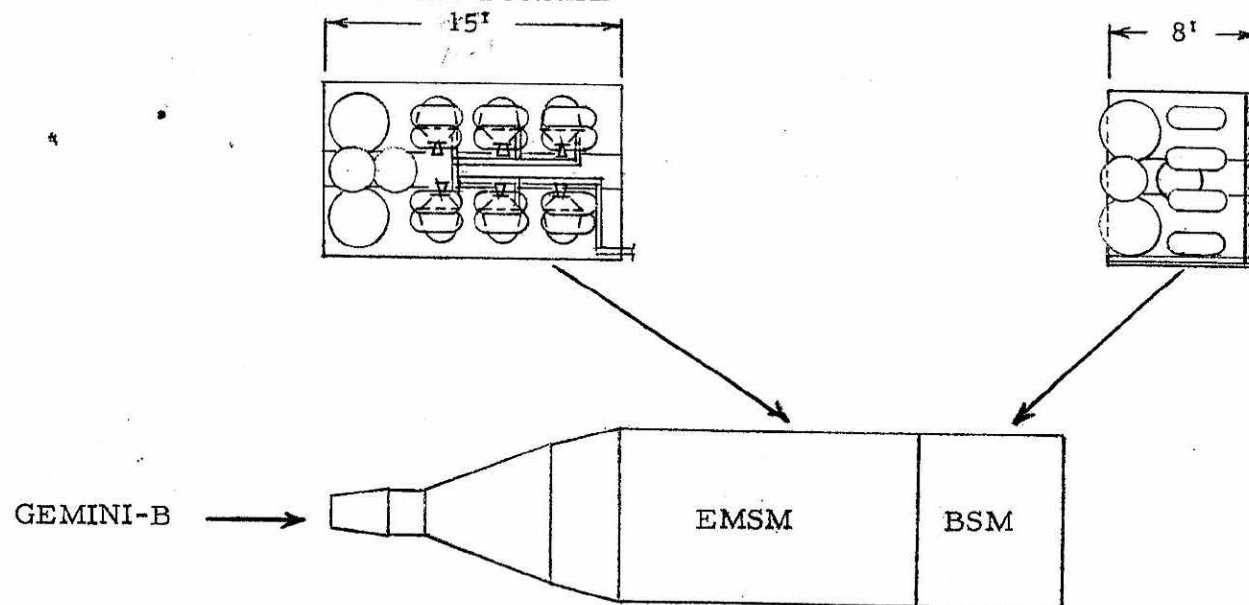
RENDEZVOUS/RESUPPLY VEHICLE

EXTENDED MISSION SERVICE MODULE

- o AUTOMATIC MODE VEHICLE SERVICE MODULE
- o ADD CRYOGENIC TANKS, FUEL CELLS, AND PROPULSION SYSTEM
- o ADD CREW TRANSFER TUNNEL

BASELINE SERVICE MODULE

- o BASELINE VEHICLE UNPRESSURIZED SECTION
- o ADD DOCKING HARDWARE



- o LAUNCH WEIGHT 30, 800 LBS

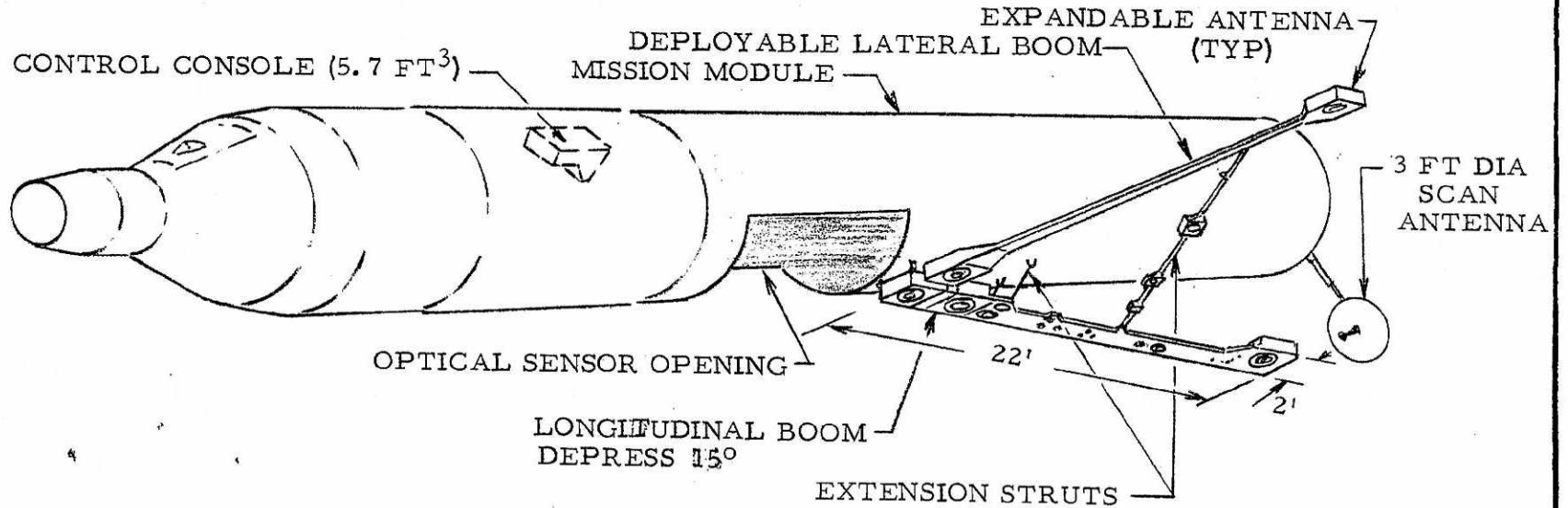
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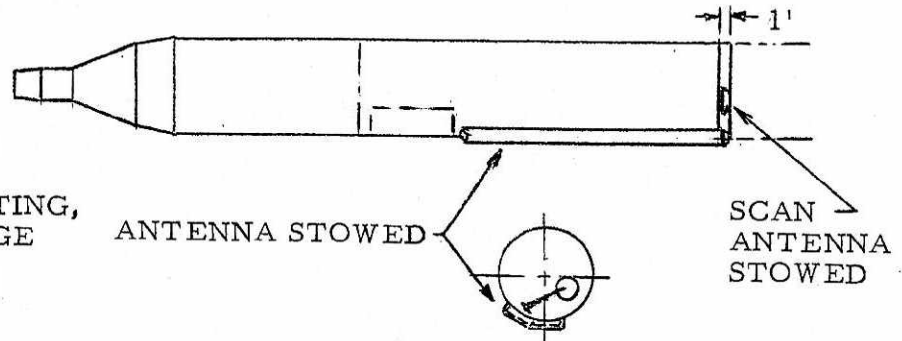
WHS-022

TYPICAL ELINT INSTALLATION



INSTALLATION CHARACTERISTICS

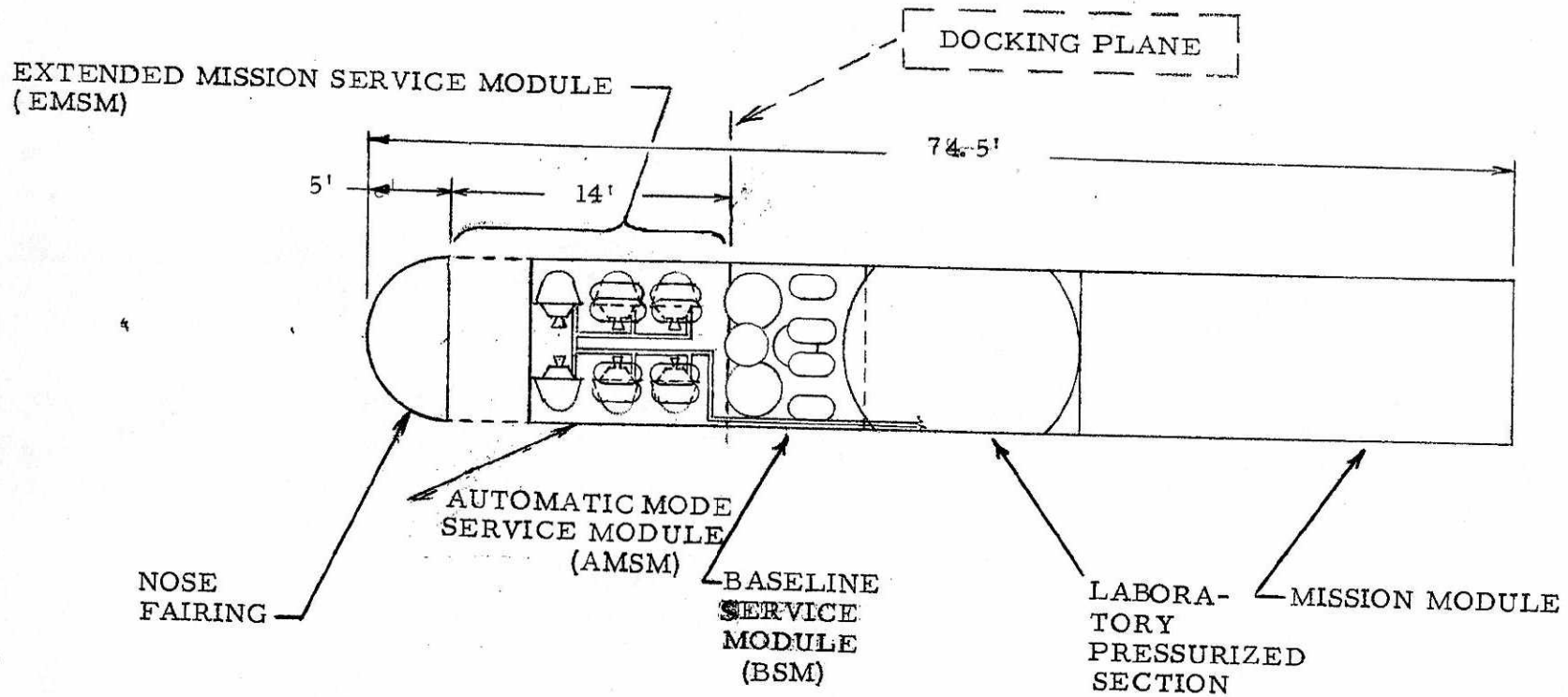
- HARDWARE WEIGHT INCLUDING STRUCTURE - 480#
- POWER PENALTY - 250 WATTS OPERATING, 25 WATTS AVERAGE
- DUTY CYCLE - 10% ORBITAL DURATION
- DEPLOYMENT CYCLE - 100%
- PROPULSION PENALTY - 1 FPS/DAY



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MOL AUTOMATIC MODE/RENDEZVOUS AUTOMATIC MODE VEHICLE



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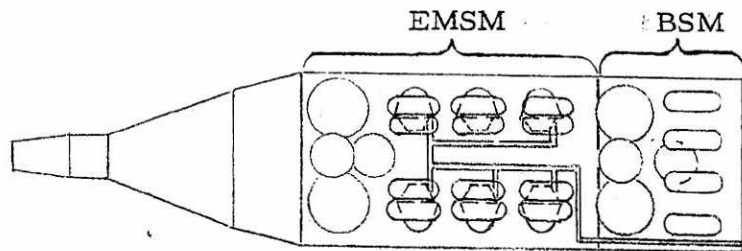


~~SECRET SPECIAL HANDLING~~

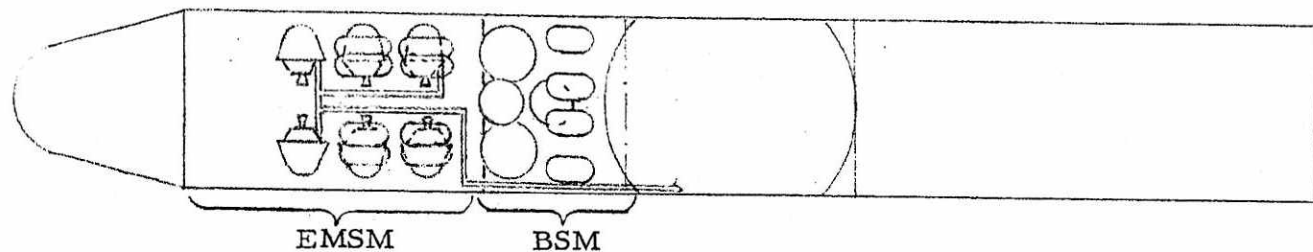
WHS-022

RENDEZVOUS VEHICLE FAMILY

○ RENDEZVOUS/RESUPPLY VEHICLE (RRV)



○ RENDEZVOUS/AUTOMATIC MODE VEHICLE (RAMV)



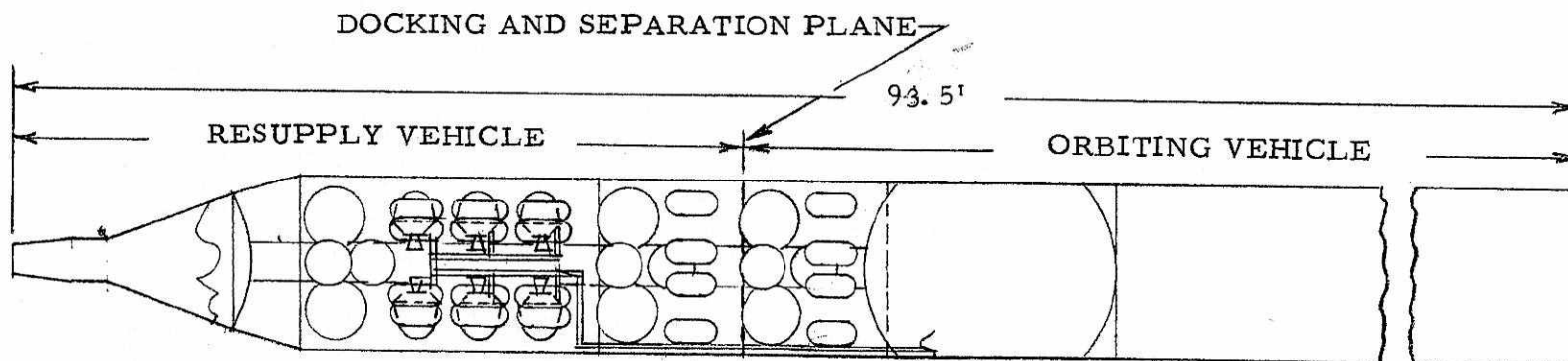
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WHS-022

RENDEZVOUS VEHICLE CONFIGURATION

- o ONE YEAR ORBITING VEHICLE OPERATION
- o 60 DAY RESUPPLY CYCLE

RRV FUNCTIONS

- o ATTITUDE CONTROL (ACTS PROPULSION)
- o PRIME POWER SYSTEM
- o LIFE SUPPORT EXPENDABLES
- o DATA SYSTEM

RAMV FUNCTIONS

- o LIFE SUPPORT SYSTEM
- o ATTITUDE CONTROL ELECTRONICS
- o COMMUNICATIONS AND DATA HANDLING
- o ENVIRONMENTAL CONTROL

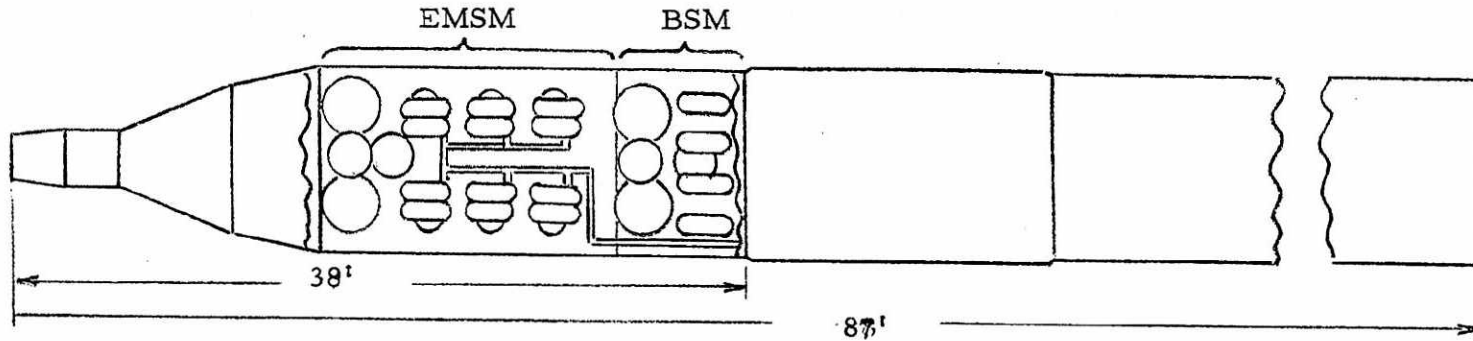
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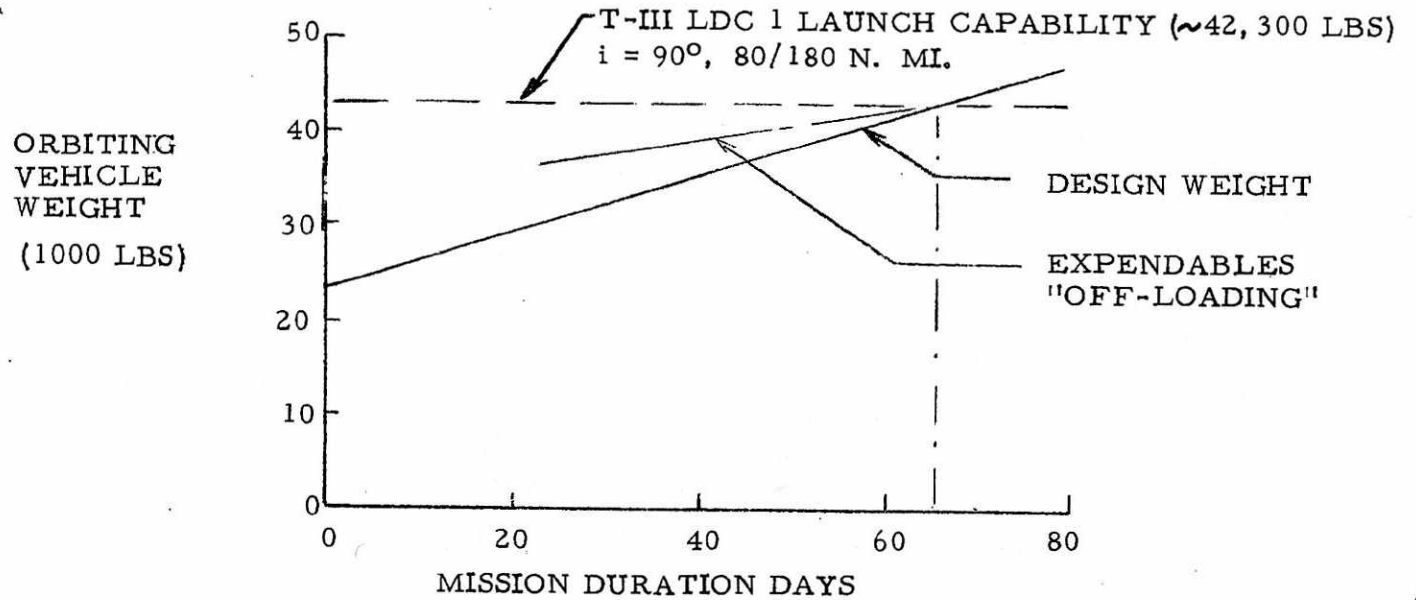
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WHS-022

T-III LDC I GROWTH
INTEGRAL LAUNCH



o TYPICAL 60 DAY VEHICLE WGT. = 41,000 LBS

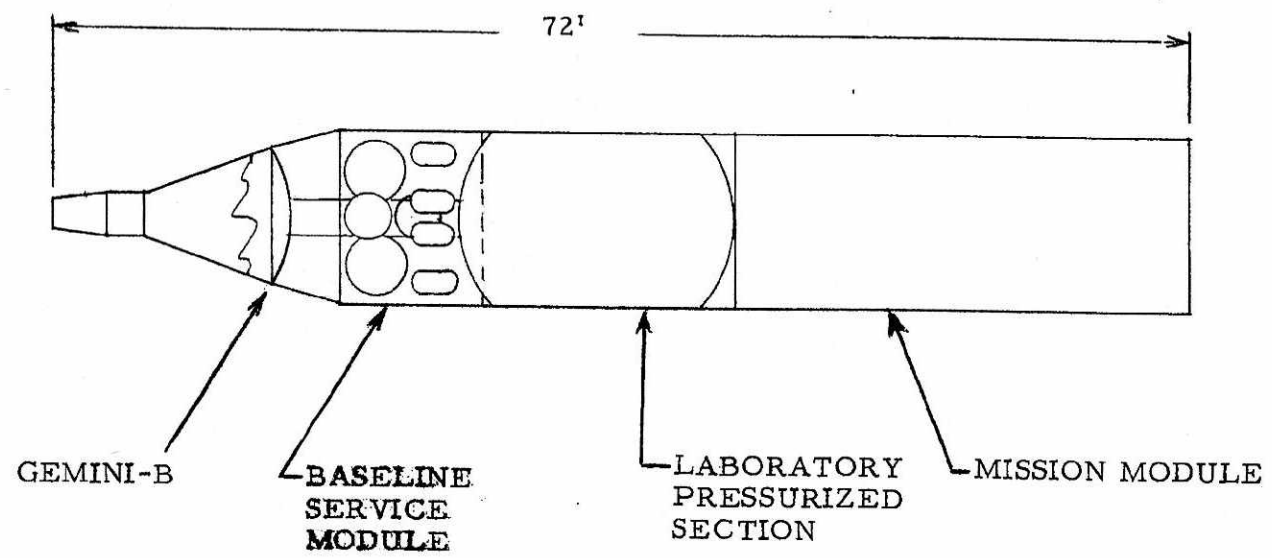


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WHS-022

MOL BASELINE VEHICLE



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D ~~SECRET~~ SPECIAL HANDLING

MOL RENDEZVOUS ORBITING VEHICLE EVOLUTION
(BLOCK III)

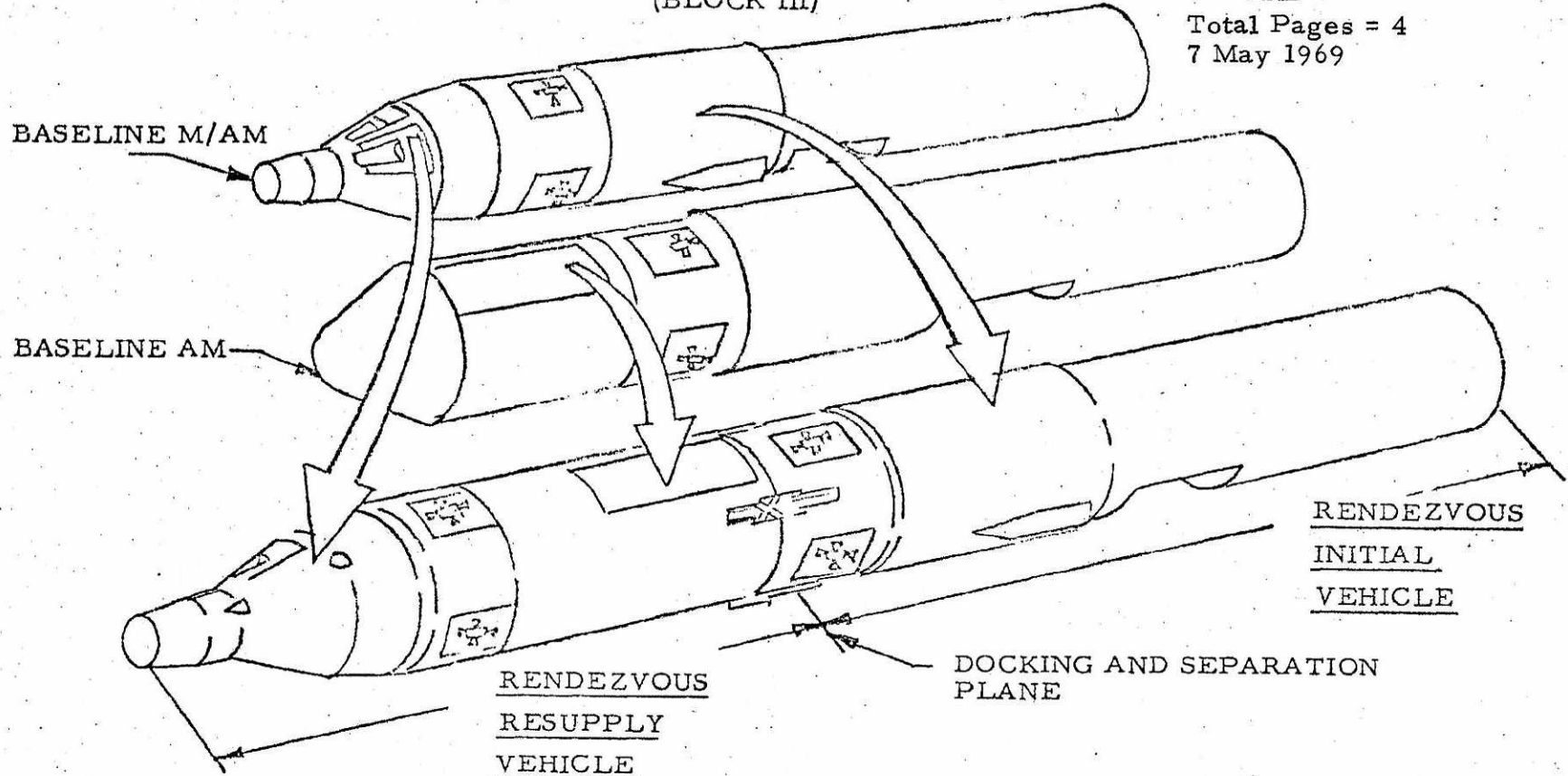
BIF-107-50137-69

Page 1

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Total Pages = 4

7 May 1969



RRV FUNCTIONS

- ⊙ CREW TRANSPORT VEHICLE
- ⊙ ACTS PROPULSION
- ⊙ PRIME POWER SYSTEM
- ⊙ LIFE SUPPORT EXPENDABLES
- ⊙ DATA RETURN SYSTEM
- ⊙ SUBSYSTEM SPARES/REPLACEMENTS

RIV FUNCTIONS

- ⊙ LIFE SUPPORT SYSTEM
- ⊙ ATTITUDE CONTROL REFERENCE/ELECTRONICS
- ⊙ COMMUNICATIONS AND DATA HANDLING
- ⊙ ENVIRONMENTAL CONTROL
- ⊙ HRO SYSTEM

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HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

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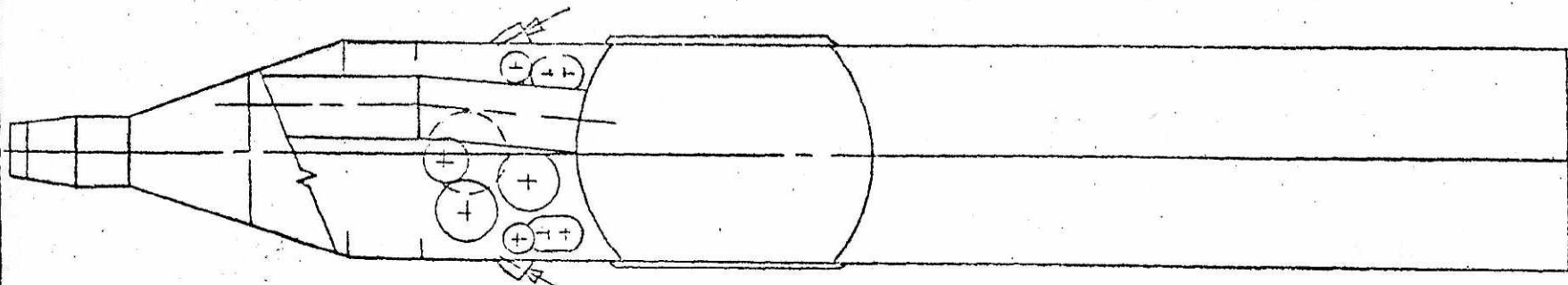
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Page 2

POSSIBLE BLOCK II MOL OPERATING OPTIONS AND CHARACTERISTICS

✓ ADDITIONAL EXPENDABLE

✓ PAYLOAD IMPROVEMENTS



<u>MISSION</u>	<u>DURATION</u>	<u>PERIGEE ALTITUDE</u>	<u>OPTICAL RESOLUTION</u>	
			BASELINE	IMPROVED
• NOMINAL	45 DAYS	80 MILES		
• LOW FLIGHT	30 DAYS	70 MILES		
• EXTENDED DURATION	60 DAYS	90 MILES		

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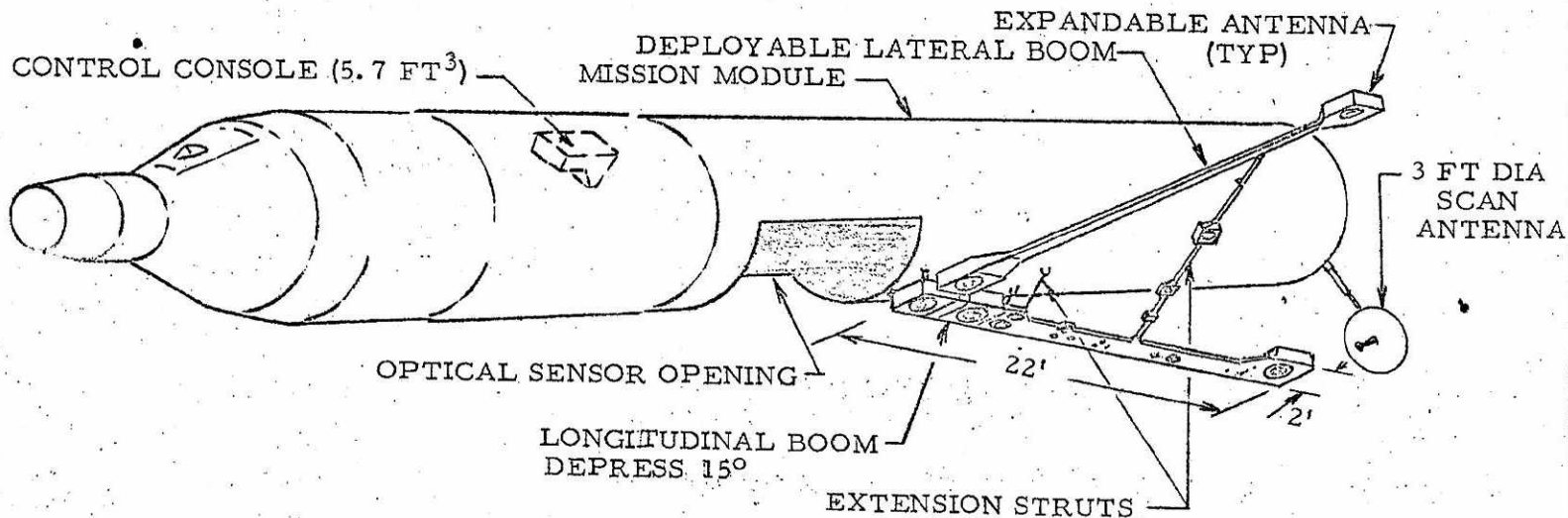
HANDLE VIA BYEMAN
CONTROL SYSTEM ONLY

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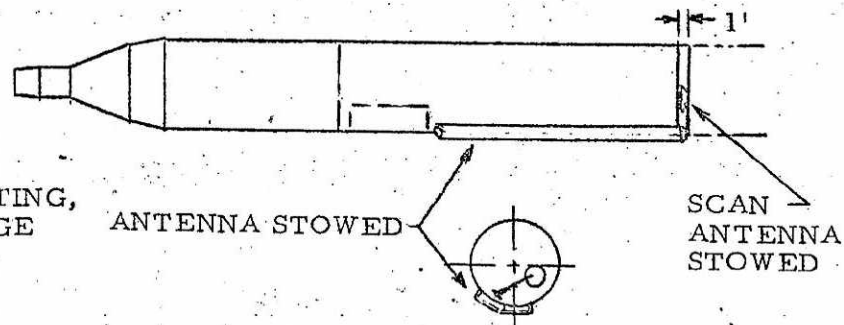
WHS-025-24

TYPICAL ELINT INSTALLATION



INSTALLATION CHARACTERISTICS

- HARDWARE WEIGHT
- INCLUDING STRUCTURE - 480#
- POWER PENALTY - 250 WATTS OPERATING, 25 WATTS AVERAGE
- DUTY CYCLE - 10% ORBITAL DURATION
- DEPLOYMENT CYCLE - 100%
- PROPULSION PENALTY - 1 FPS/DAY



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System
5-19-6

ce

~~SECRET SPECIAL HANDLING~~

WHS-025-29

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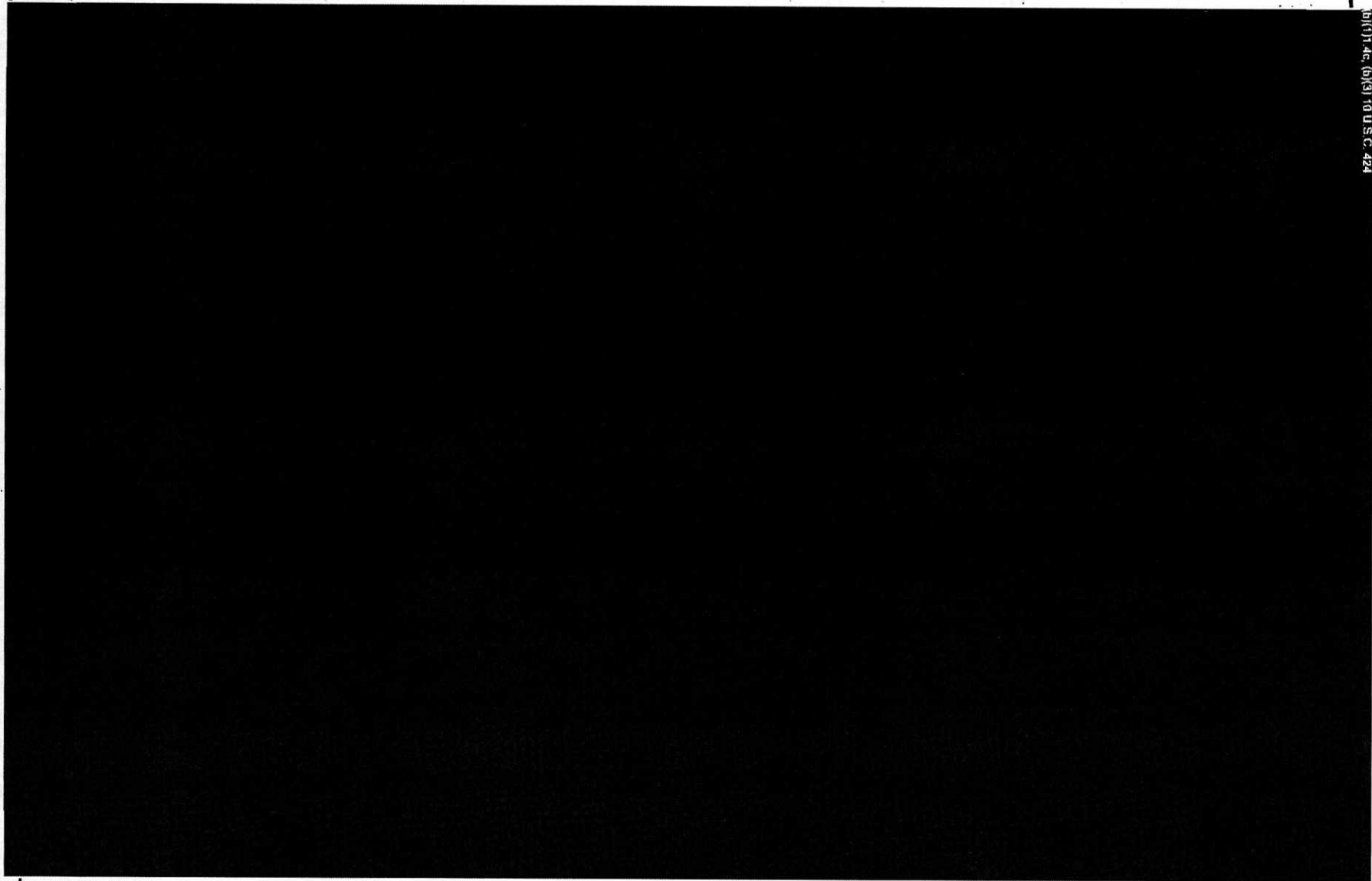
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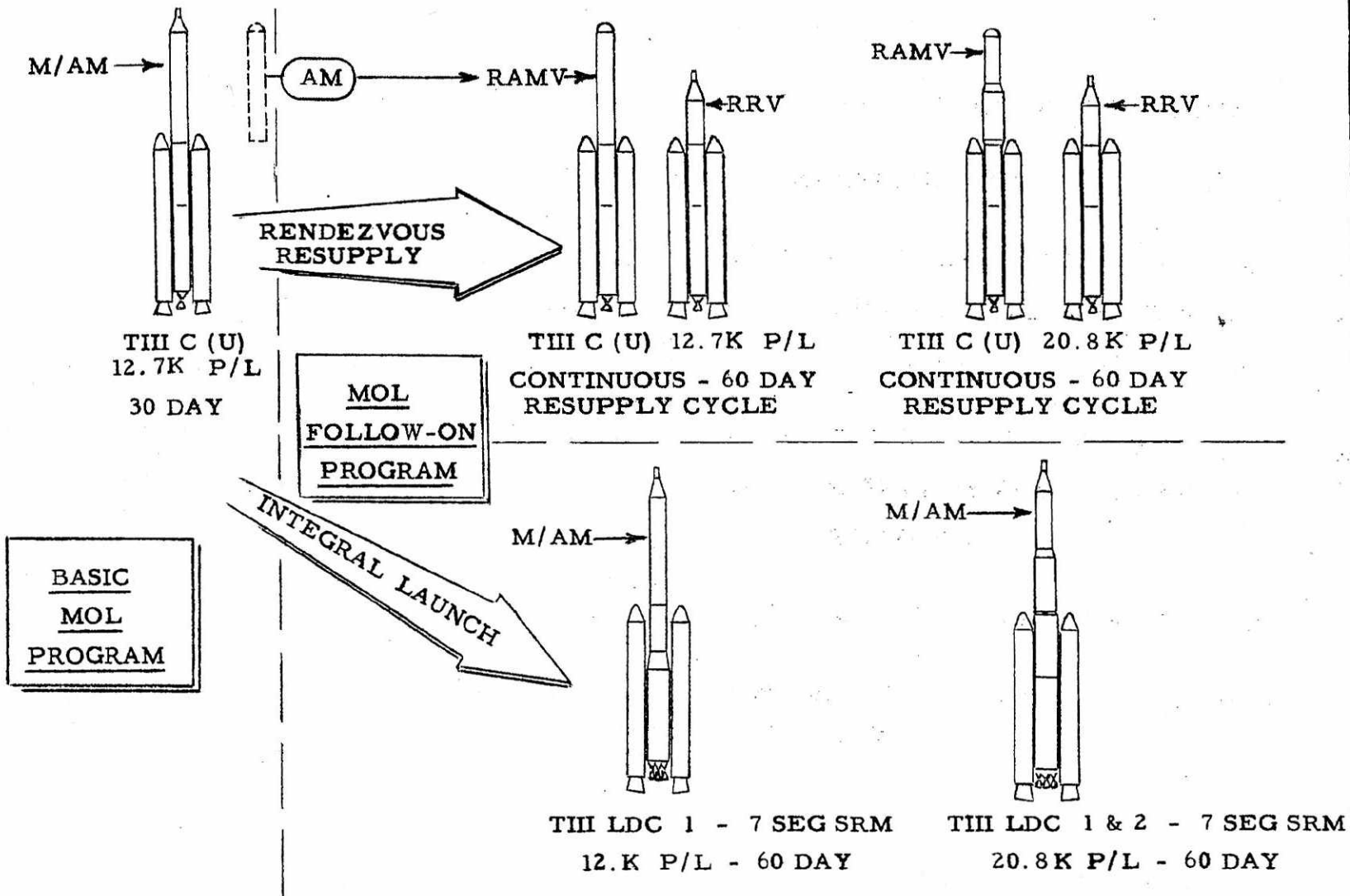
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WHS-025-38

MOL PROGRAM EVOLUTION

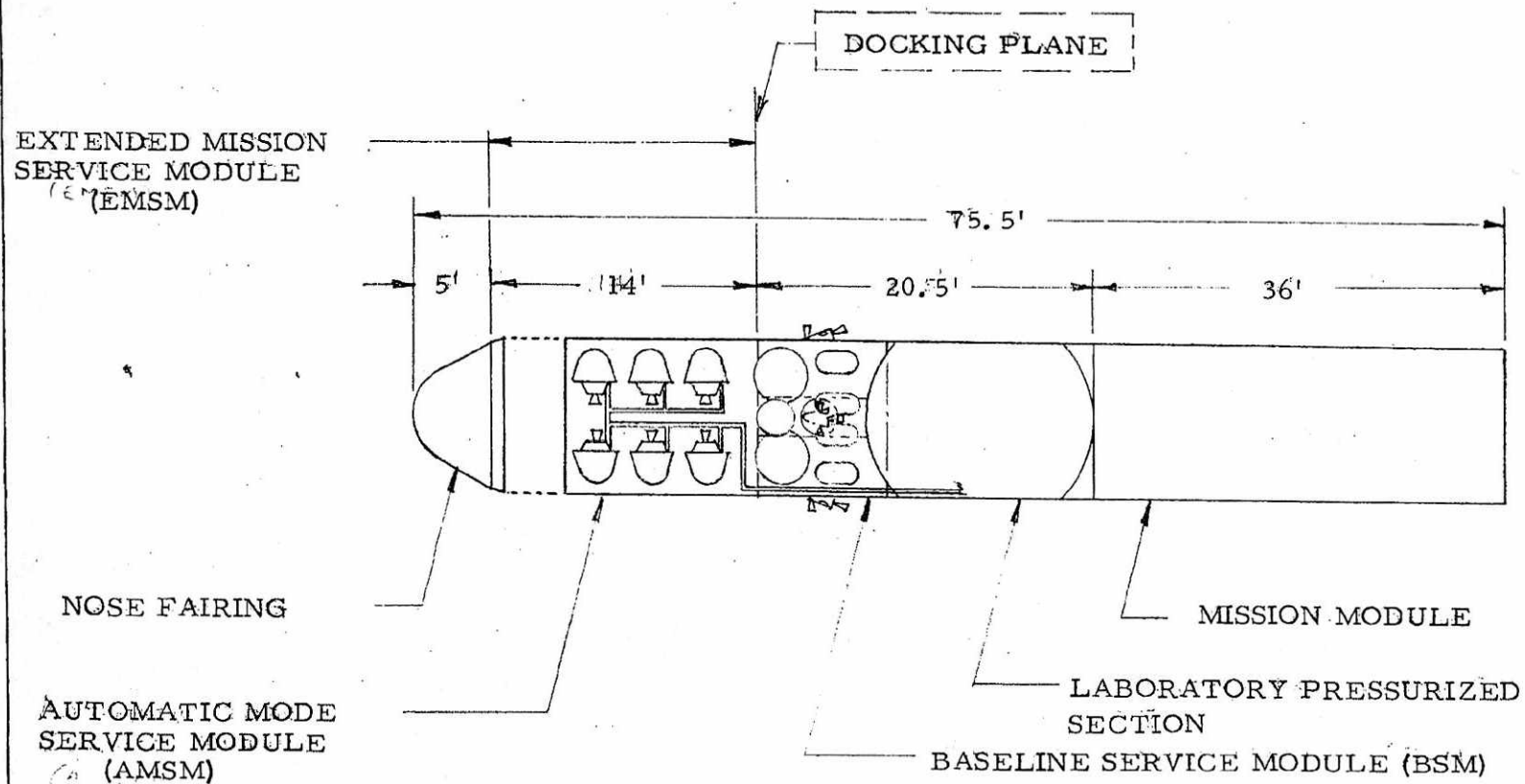


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WHS-025-39

'MOL AUTOMATIC MODE/RENDEZVOUS AUTOMATIC MODE VEHICLE



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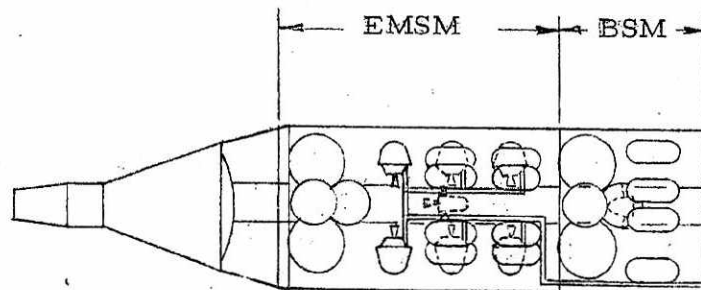
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35

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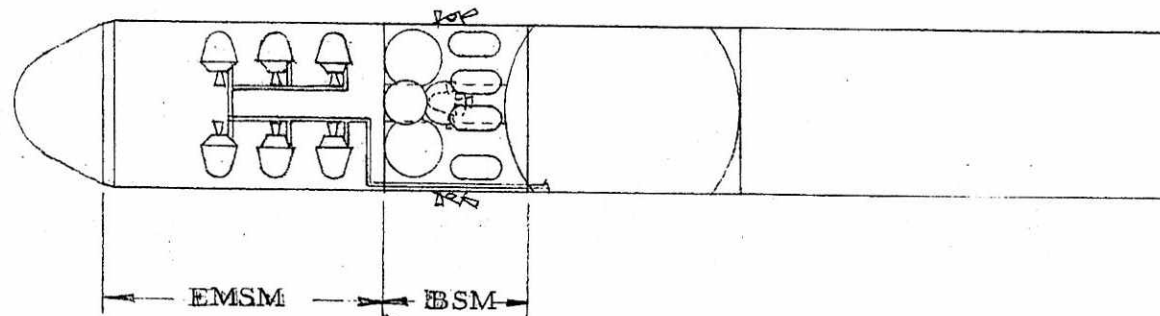
WHS-025-40

RENDEZVOUS VEHICLE FAMILY

o RENDEZVOUS/RESUPPLY VEHICLE (RRV)



o RENDEZVOUS/AUTOMATIC MODE VEHICLE (RAMV)



DOCKING AND SEPARATION PLANE

~~SECRET~~ SPECIAL HANDLING

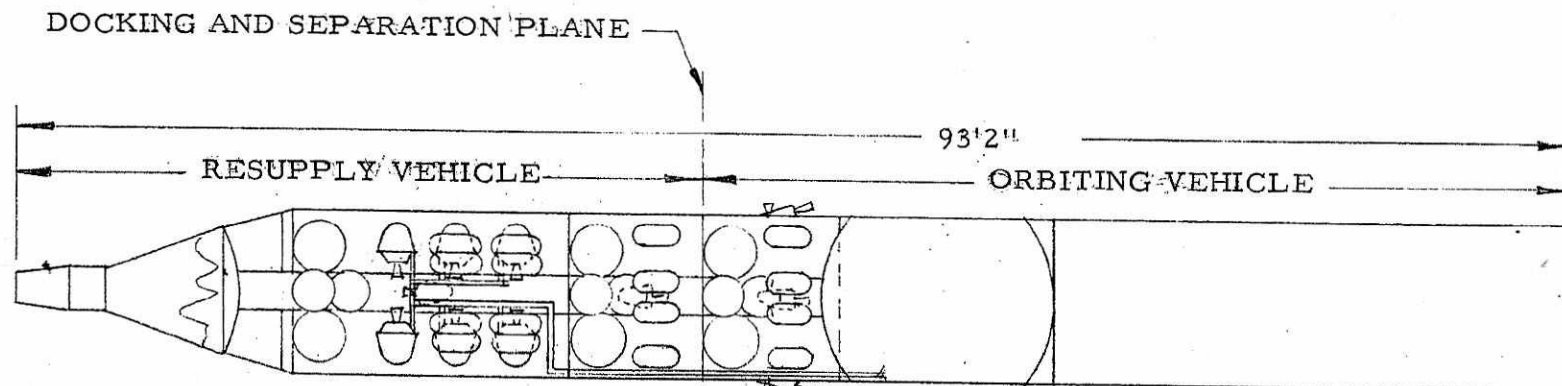
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WHS-025-41

36
20

RENDEZVOUS VEHICLE CONFIGURATION

o 60 DAY RESUPPLY CYCLE

RRV FUNCTIONS

- o ATTITUDE CONTROL (ACTS PROPULSION)
- o PRIME POWER SYSTEM
- o LIFE SUPPORT EXPENDABLES
- o DATA SYSTEM

RAMV FUNCTIONS

- o LIFE SUPPORT SYSTEM
- o ATTITUDE CONTROL ELECTRONICS
- o COMMUNICATIONS AND DATA HANDLING
- o ENVIRONMENTAL CONTROL
- o HRO OPERATIONS

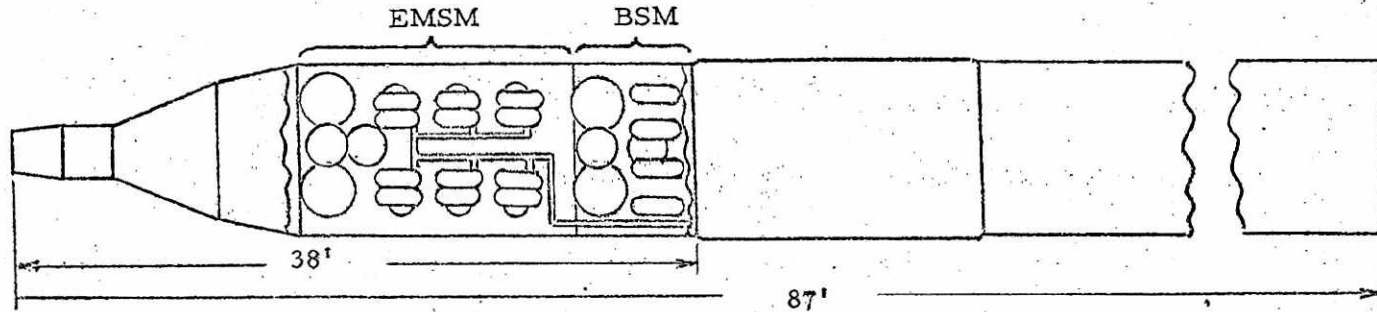
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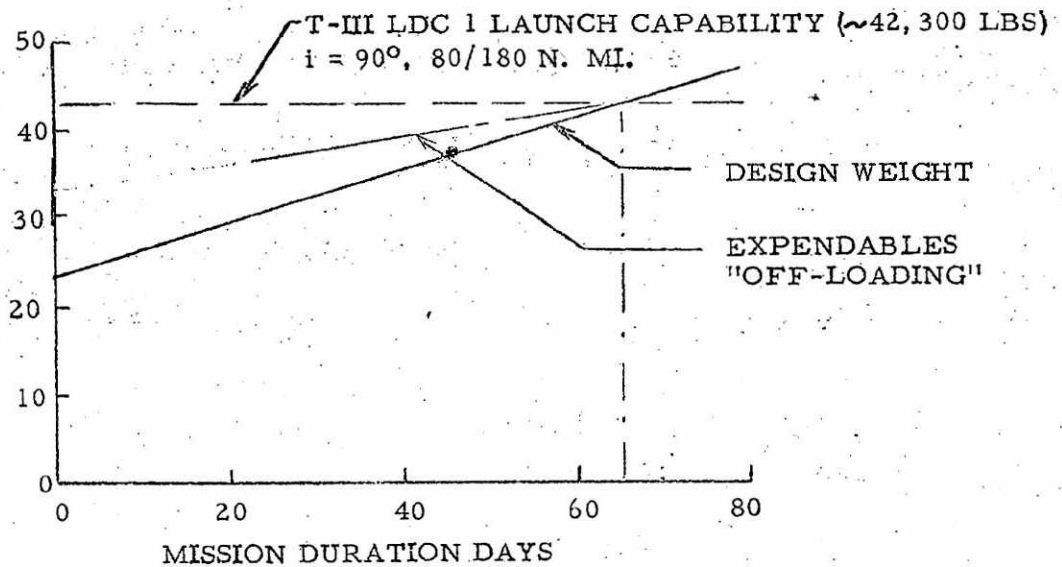
WHS-025 (BU)

T-III LDC 1 GROWTH
INTEGRAL LAUNCH



o TYPICAL 60 DAY VEHICLE WGT. = 41,000 LBS

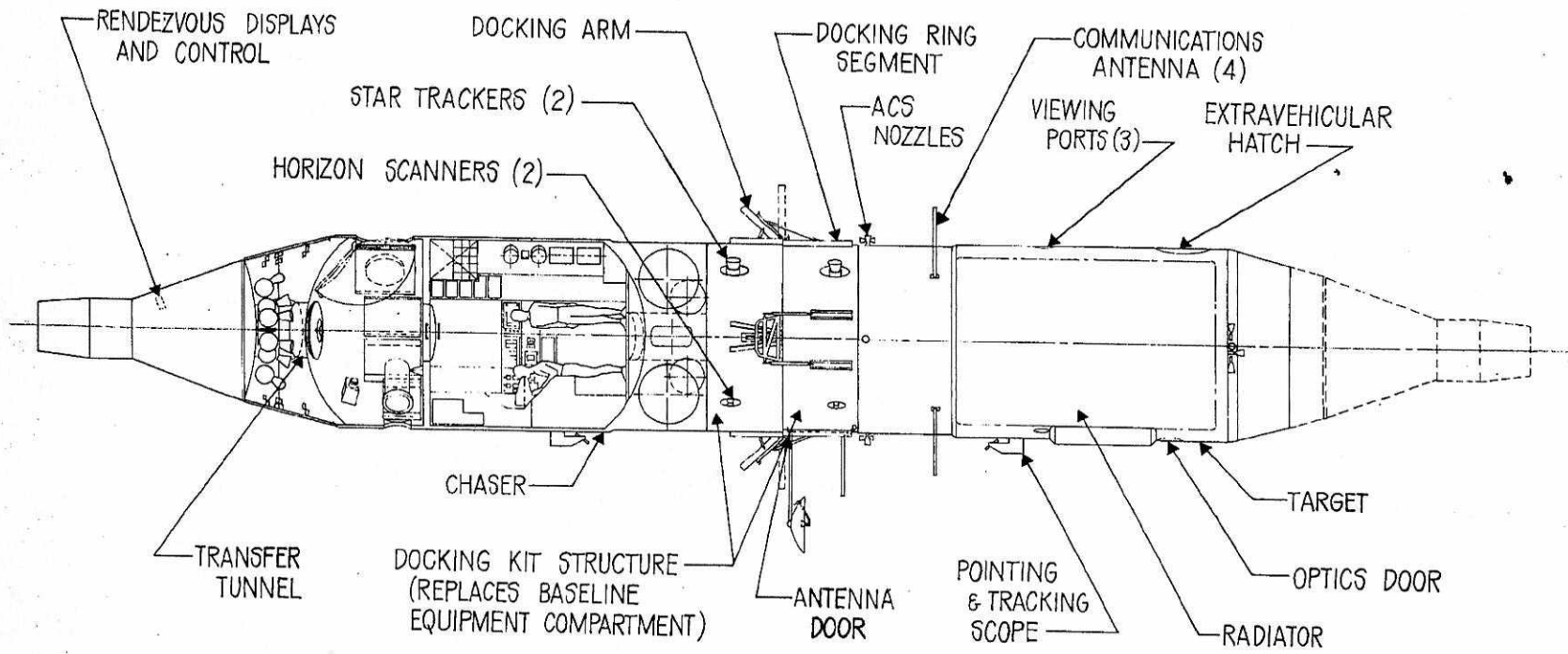
ORBITING
VEHICLE
WEIGHT
(1000 LBS)



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BASELINE RENDEZVOUS CONFIGURATION GENERAL ARRANGEMENT



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RECLASSIFIED AFTER 13 YEARS
DOD OIR 5300.10

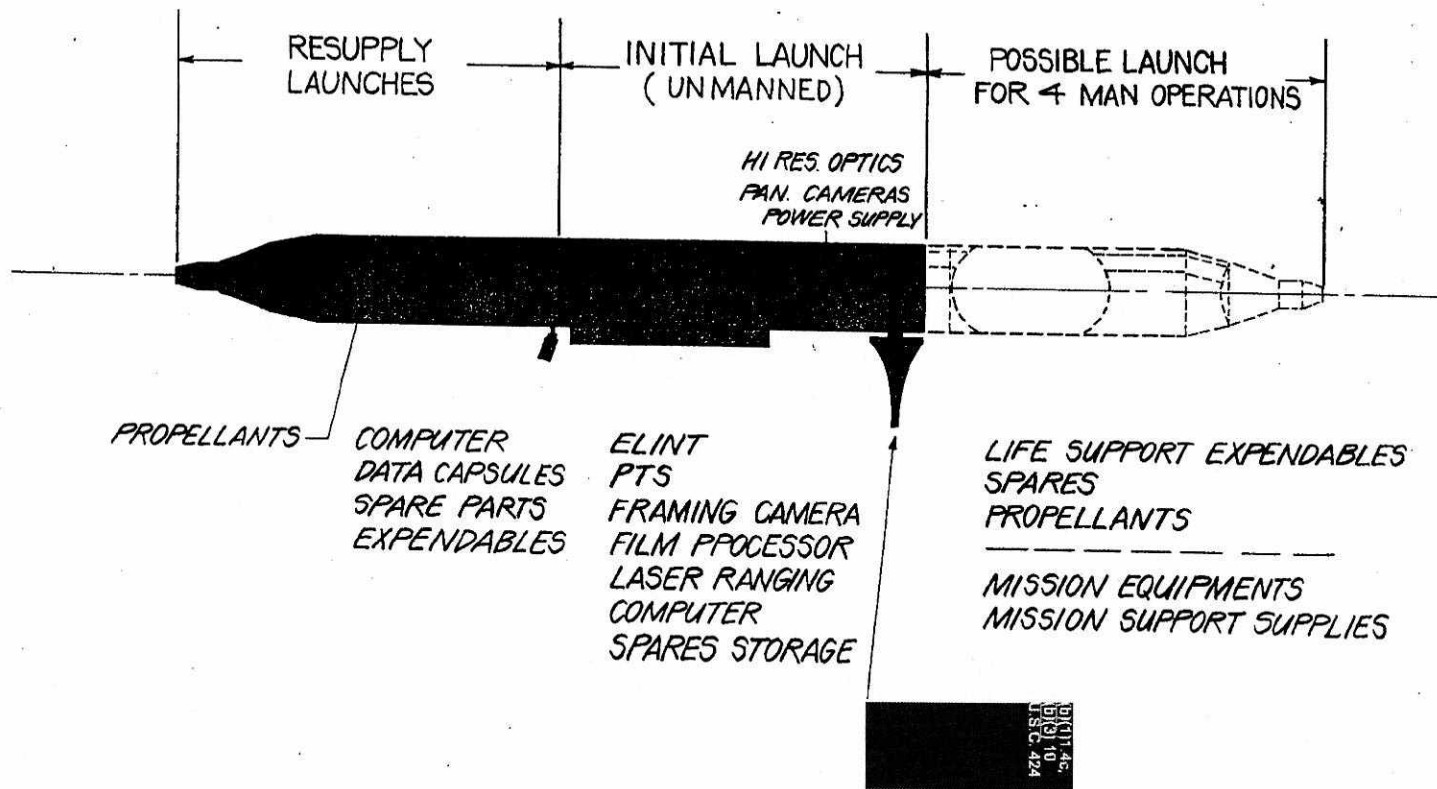
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VEHICLE CONFIGURATION



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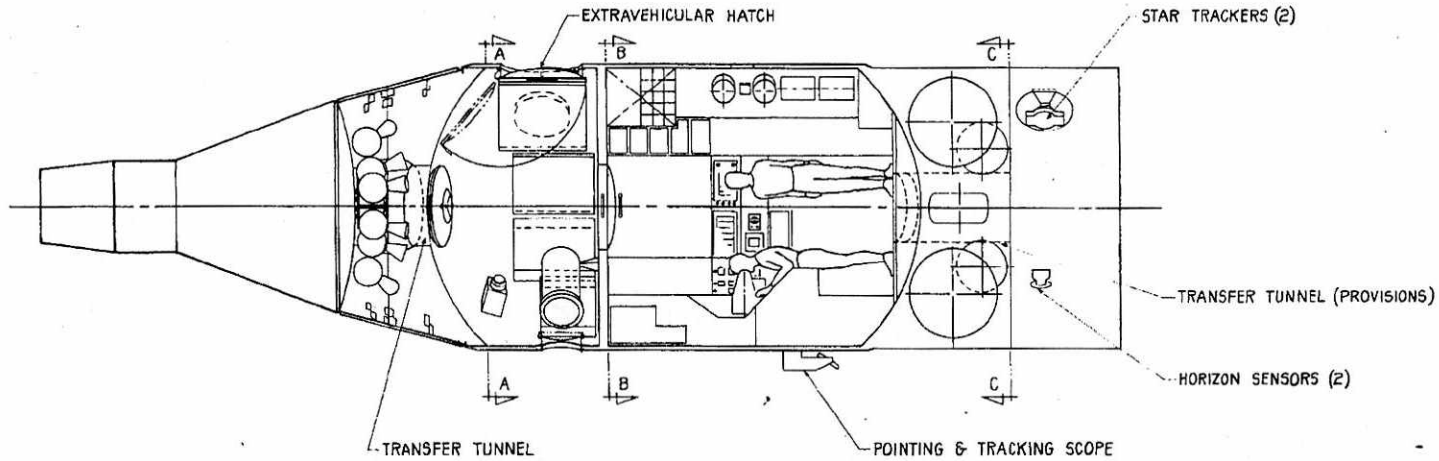
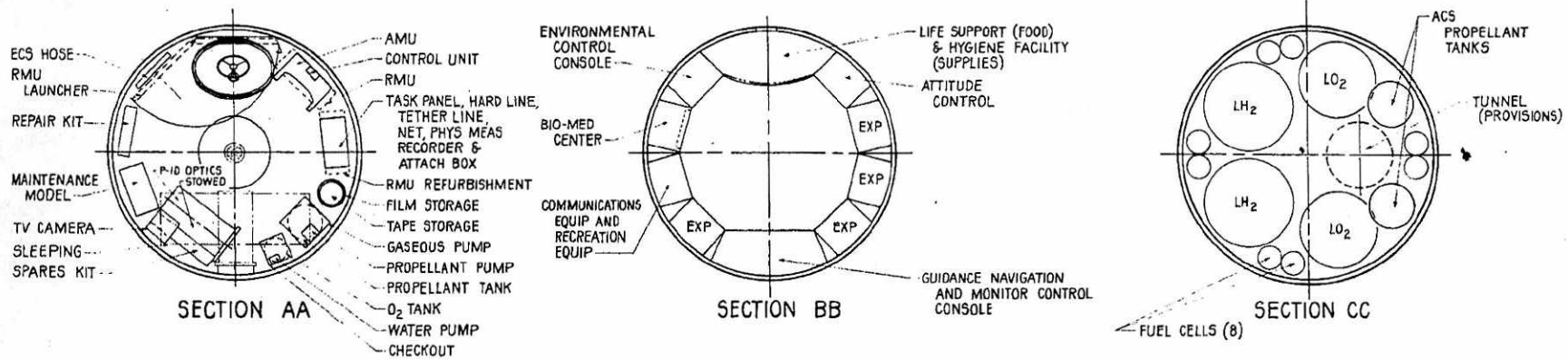
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IN 11-19 64

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LABORATORY VEHICLE INTERIOR ARRANGEMENT



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DOD DIR 5-000-10

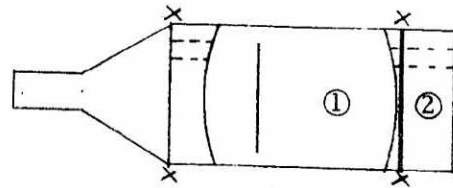
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21

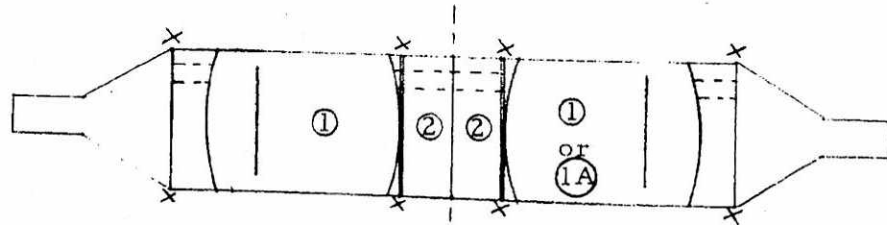
V19815

MODULAR CONCEPT

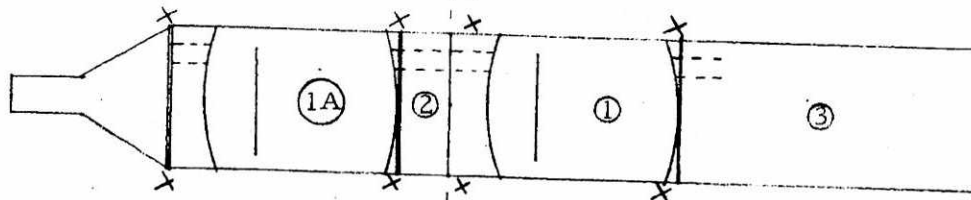


● INITIAL MOL FLIGHTS

- ① : CAN; INCL. MISSION EQUIPT.
- ①A : CAN; LESS MISSION EQUIPT.
- ② : FUEL CELL/PROPELLANTS/
TEST MODULE SECTION
- ③ : SENSOR MODULE



● BACK-TO-BACK RENDEZVOUS



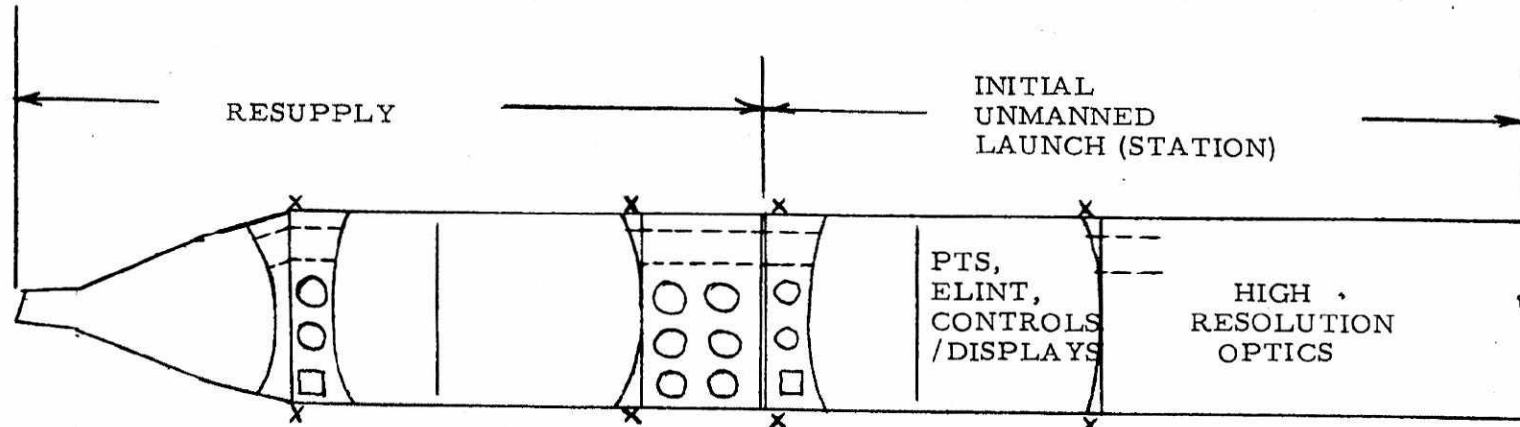
● OPERATIONAL FLIGHTS

RESUPPLY

1ST LAUNCH (UM)

VI9809
AD65-0000-00259-003

OPERATIONAL CONFIGURATION CONCEPT



- ATTITUDE CONTROL/SUSTENANCE
- POWER (FUEL CELLS)
- LIFE SUPPORT (ECS + EXPENDABLES)
- MISSION SUPPLIES (E. G. FILM)
- DATA CAPSULES
- REACTANTS & PROPELLANTS

← OR →

- ATTITUDE CONTROL/SUSTENANCE
- (RADIOISOTOPES)
- LIFE SUPPORT (ECS)
- SENSORS
- INFORMATION SUBSYSTEM
- CONTROL/DISPLAYS

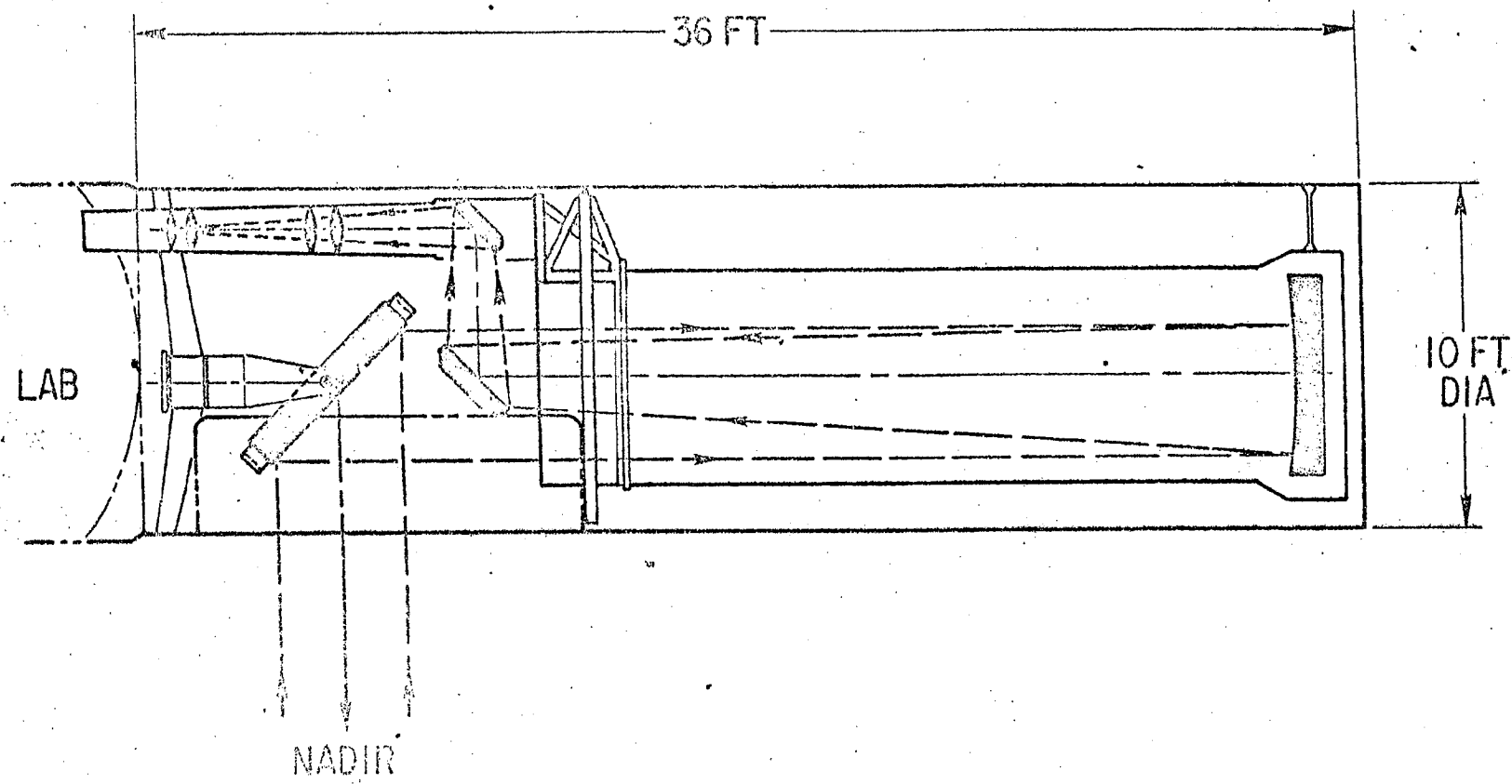
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SPECIAL HANDLING

WHS-293
P-8

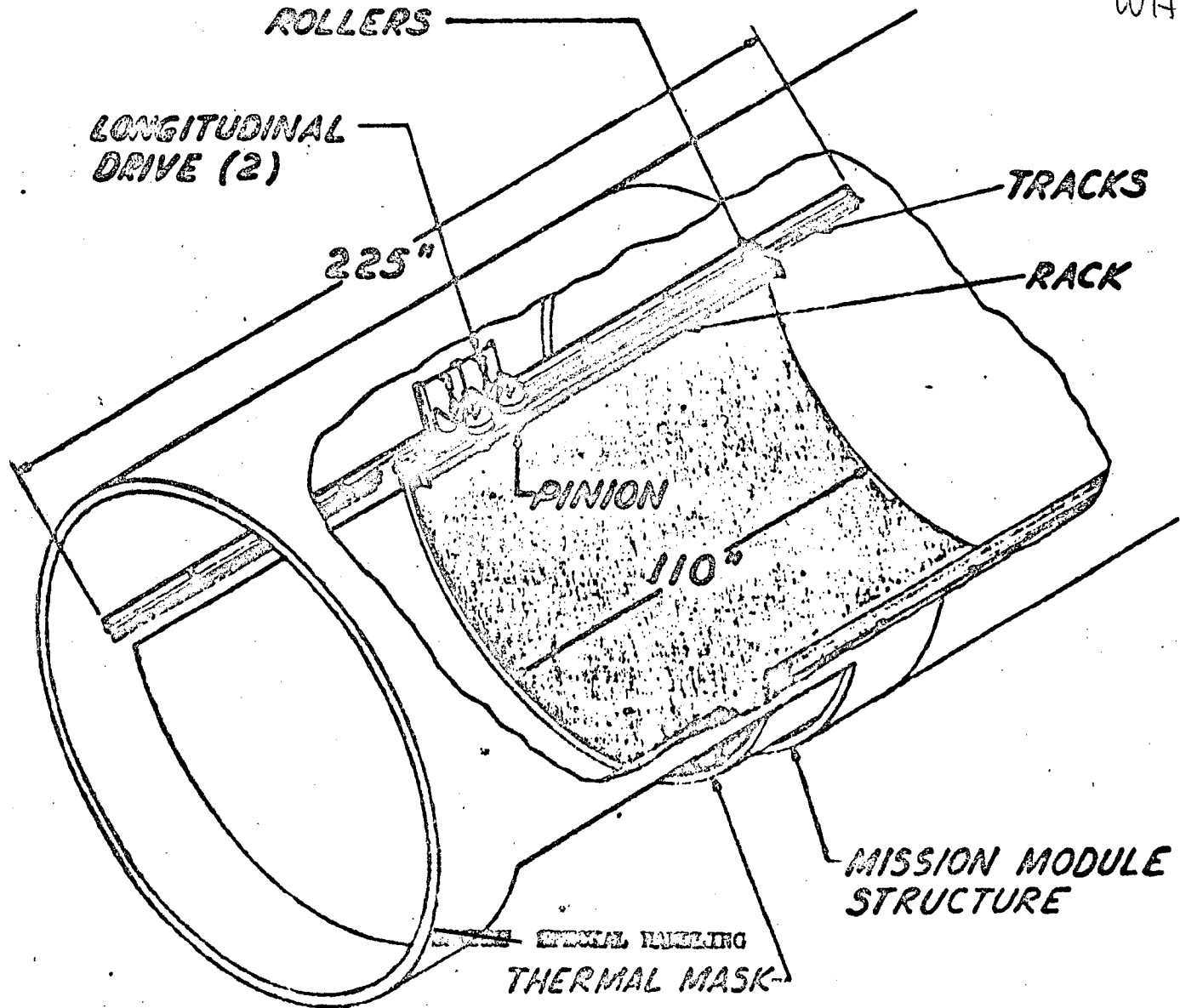
MISSION PROFILE



SPECIAL HANDLING
~~SECRET~~

THERMAL MASK ASSEMBLY & INSTL

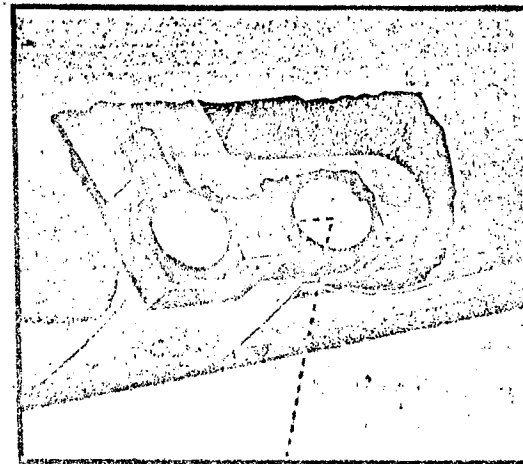
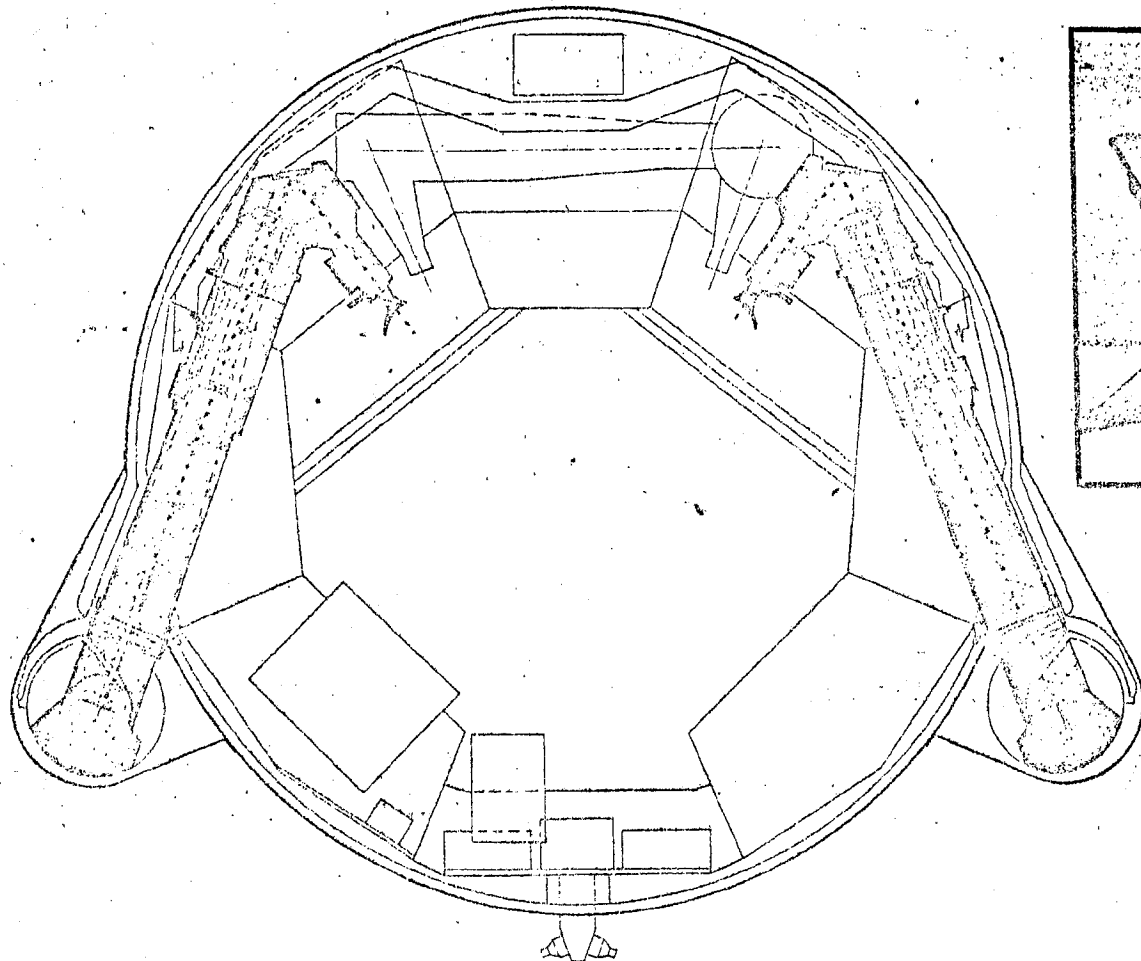
WHS-293
p. 13



SSS-101

~~SECRET~~
SPECIAL HANDLING

WITS-293
p. 15



HIGH RANGE 63-127X

LOW RANGE 16-32X

1° FOV @ 63X

4° FOV @ 16X

2 MM. EXIT PUPIL

@ 127X

10" APERTURE

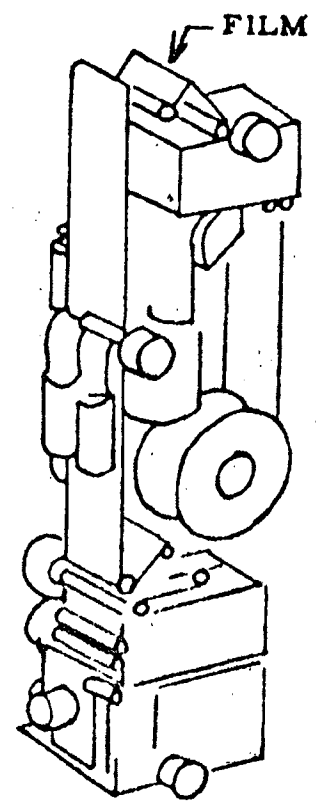
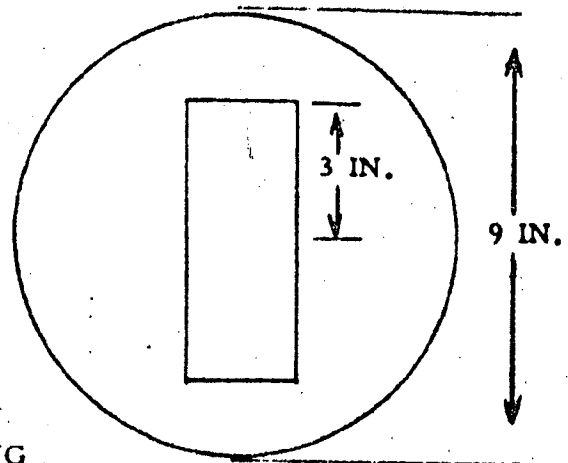
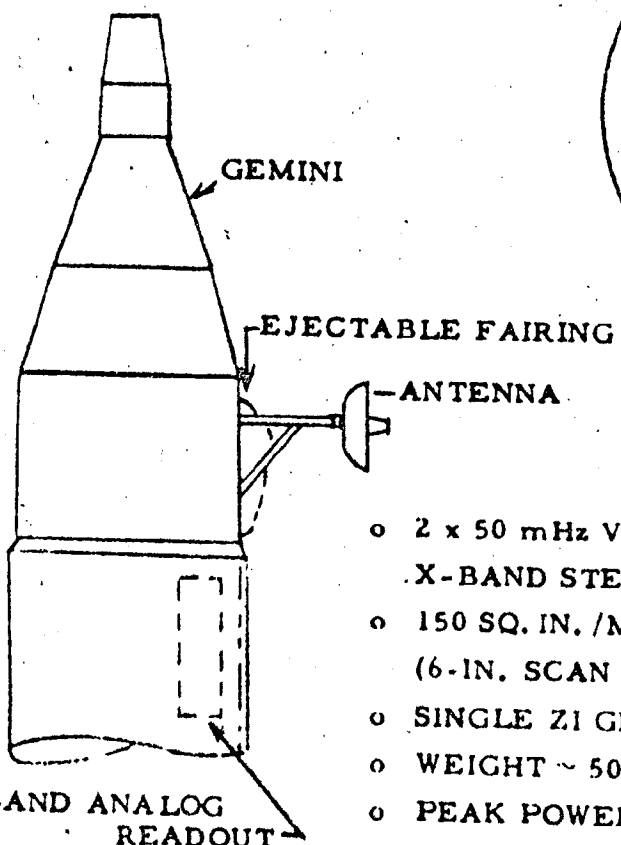
SPECIAL HANDLING

~~SECRET~~

~~(D) SECRET-SPECIAL HANDLING~~

WIDEBAND READOUT

WHS-293
p. 16

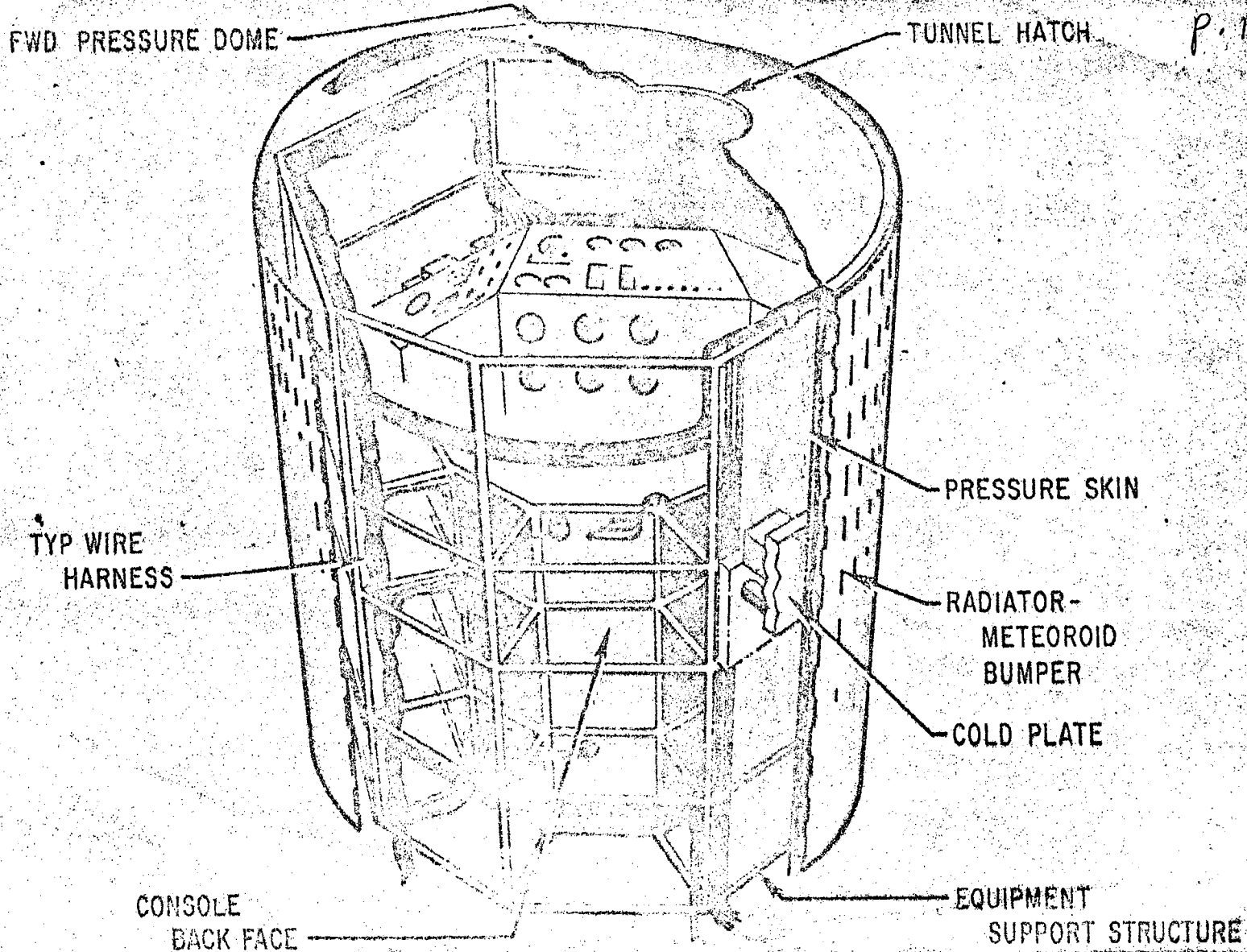


- o 2 x 50 MHz VIDEO CHANNELS
- o X-BAND STEERABLE ANTENNA - 3 FT. DISH
- o 150 SQ. IN. /MIN. FILM READOUT (6-IN. SCAN WIDTH)
- o SINGLE ZI GROUND STATION
- o WEIGHT ~ 500 LB
- o PEAK POWER ~ 630 WATTS

~~(D) SECRET-SPECIAL HANDLING~~

LABORATORY PRESSURIZED COMPARTMENT TYPICAL EQUIPMENT AND WIRING ARRANGEMENT

WHS-293
P. 18

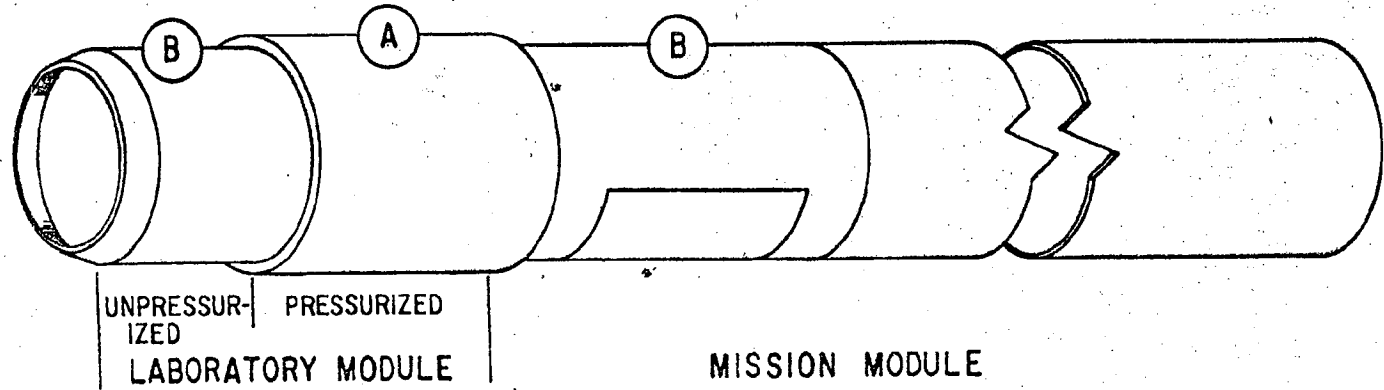
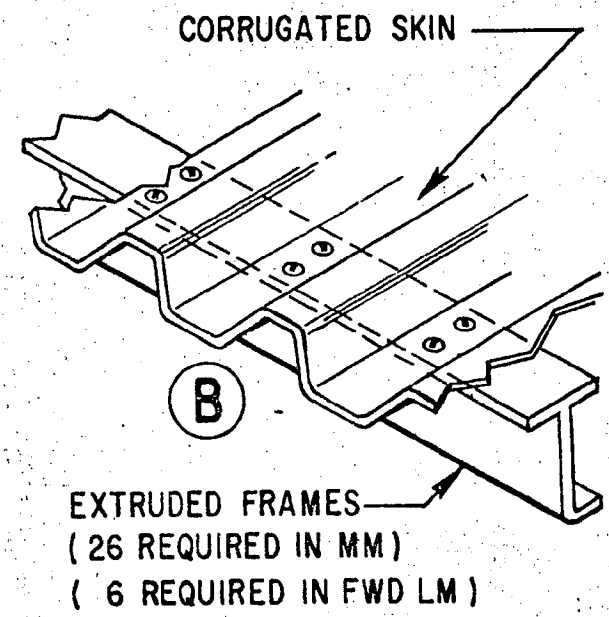
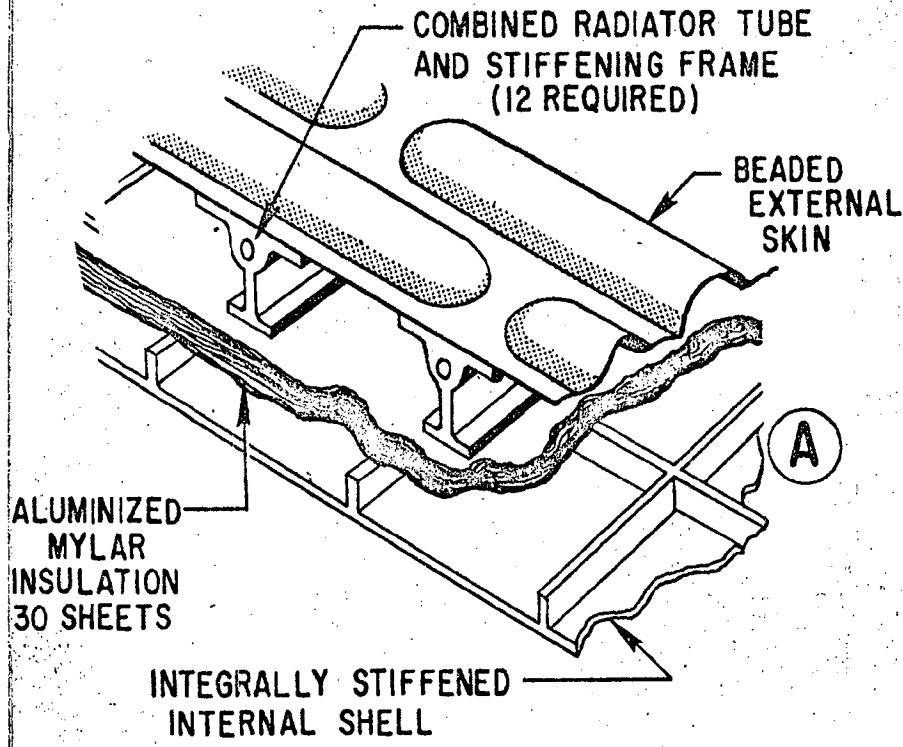


JAMPSON

STRUCTURAL ARRANGEMENT

V-28911
~~WFS-090~~

WFS-293
p. 19



WFS-090

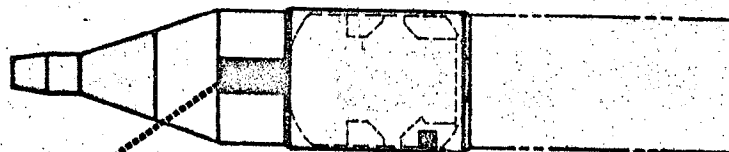
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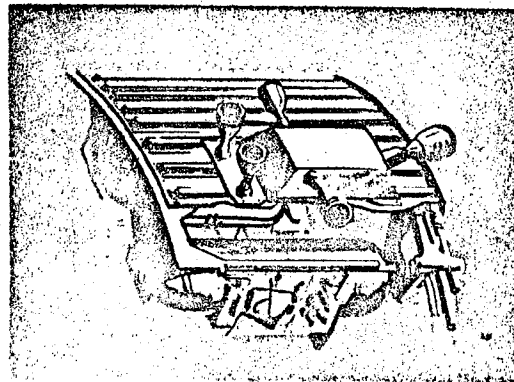
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ATTITUDE CONTROL & TRANSLATION SYSTEM BASELINE LABORATORY VEHICLE

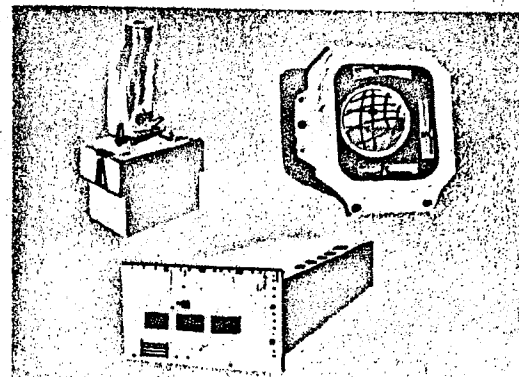


REACTION JETS



- 16-25 LBS
- 4-100 LBS
- RADIATION COOLED
- HYPERGOLIC BI-PROPELLANT
- MODULAR UNITS

A.C.T.S. ELECTRONICS



- 0.5 DEG POINTING TOLERANCE
- 0.004 DEG/SEC RATE TOLERANCE
- MULTIPLE MODES, MANUAL AND AUTOMATIC
- COMPUTER INDEPENDENT ELECTRONICS; HORIZON SENSORS AND BMG REFERENCE

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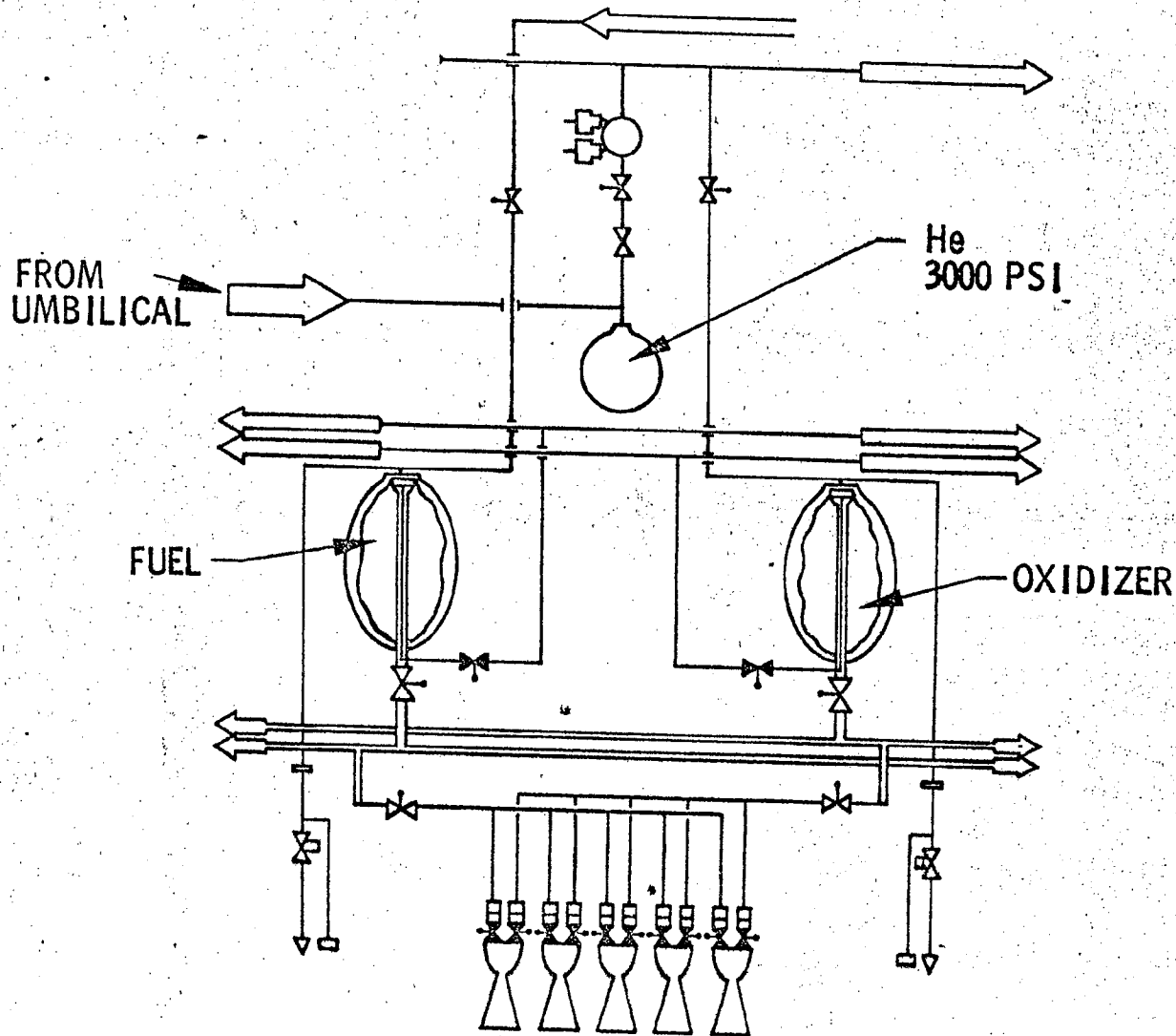
AEROSPACE CORPORATION



ACTS/PROP SINGLE SECTOR SCHEMATIC

V587-6B⁺

WHS-293
P. ~~20~~ 21



TYPICAL ACTS/PROP SECTOR

V587-5

WHS-293
p. 22

TYPICAL RELIEF VALVE

THRUSTOR INJECTOR VALVES

TYPICAL THRUSTOR ISOLATION VALVES OXIDIZER AND FUEL

HIGH PRESSURE HELIUM TANK

PLENUM

HELIUM REGULATOR

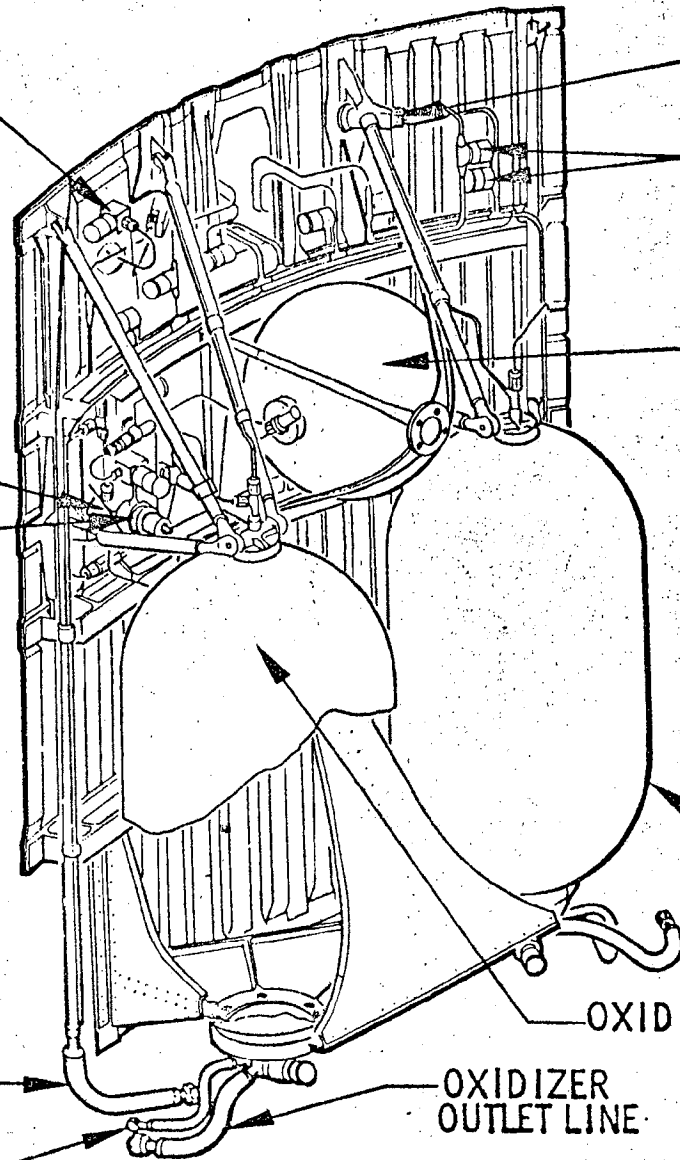
FUEL TANK

TYPICAL PROPELLANT MANIFOLD

OXIDIZER TANK

TYPICAL VENT AND RECIRCULATION LINE

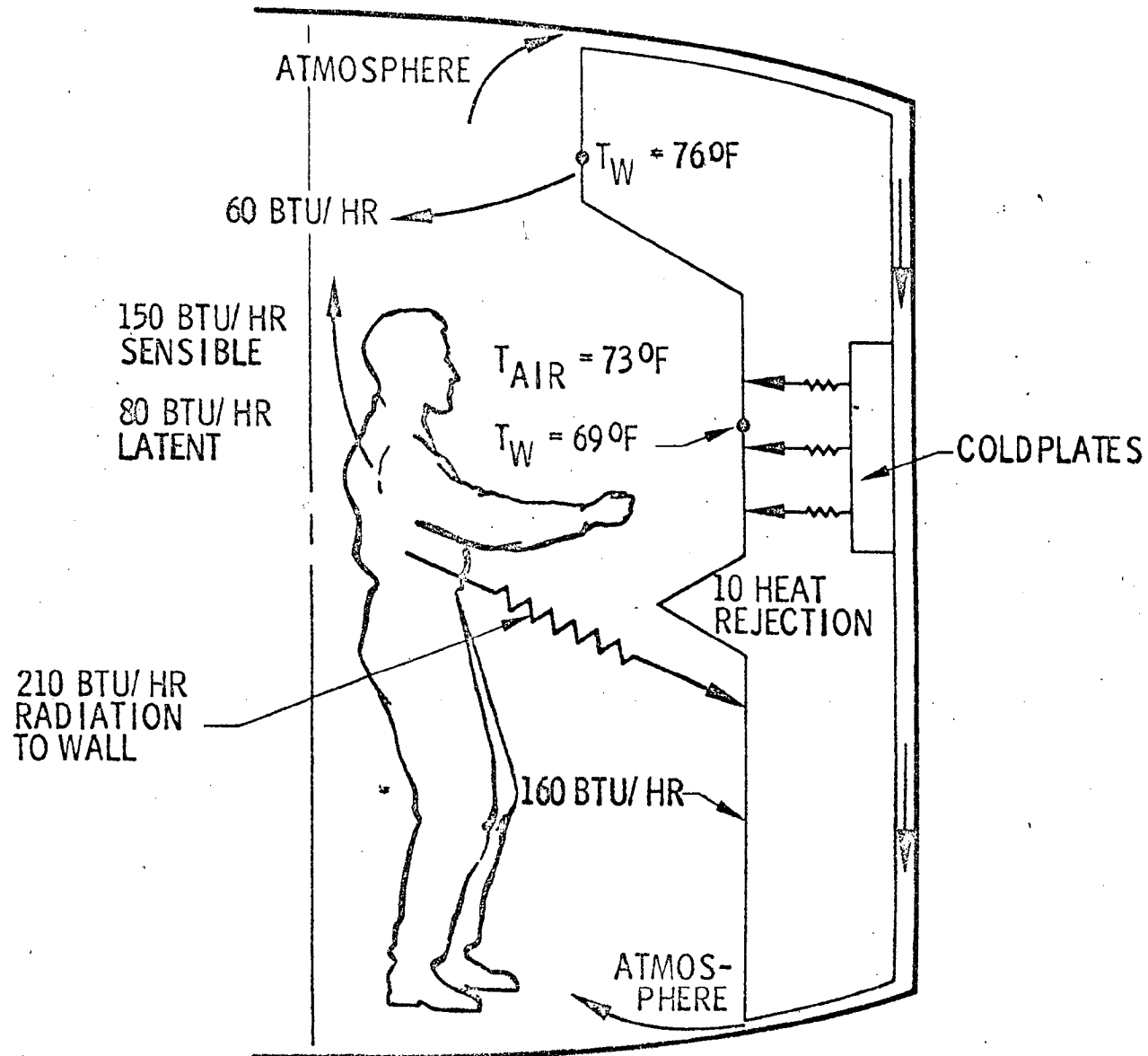
OXIDIZER OUTLET LINE



COLD WALL METABOLIC BALANCE

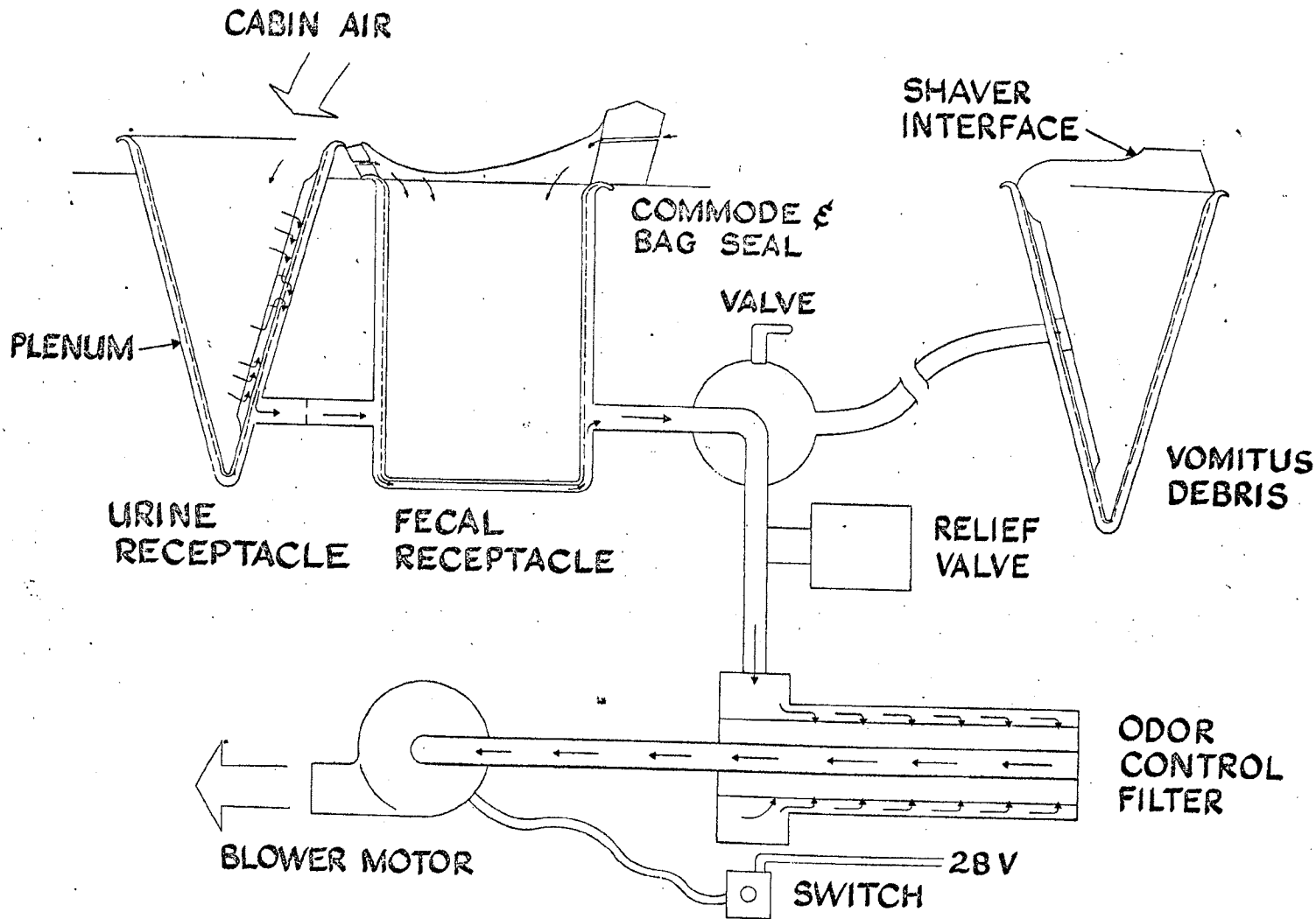
V754-9 B

WHS-293
P. 37



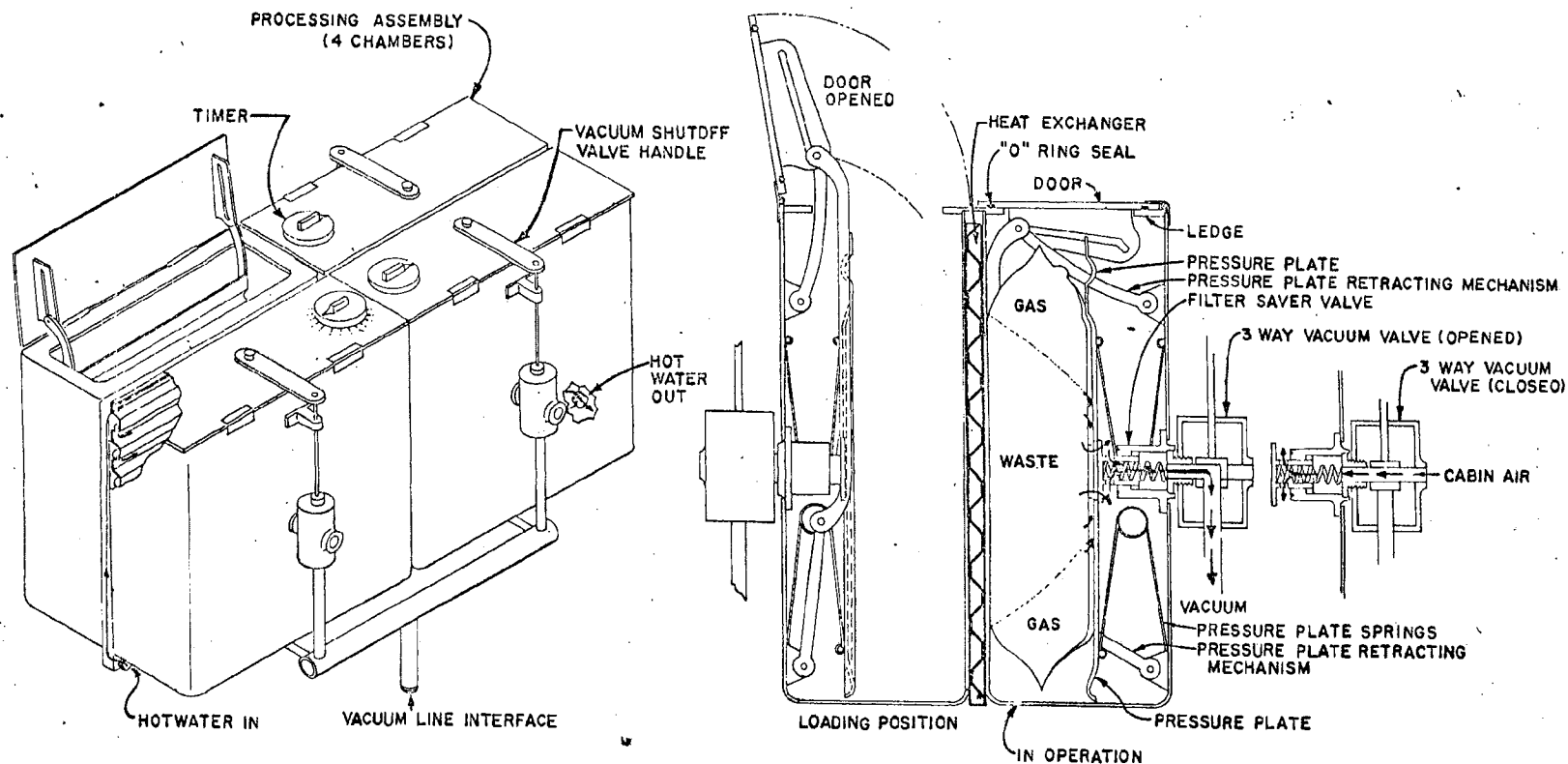
COLLECTION SYSTEM

WHS-293
P. 32



WASTE PROCESSOR UNIT

WHS-293
P. 38



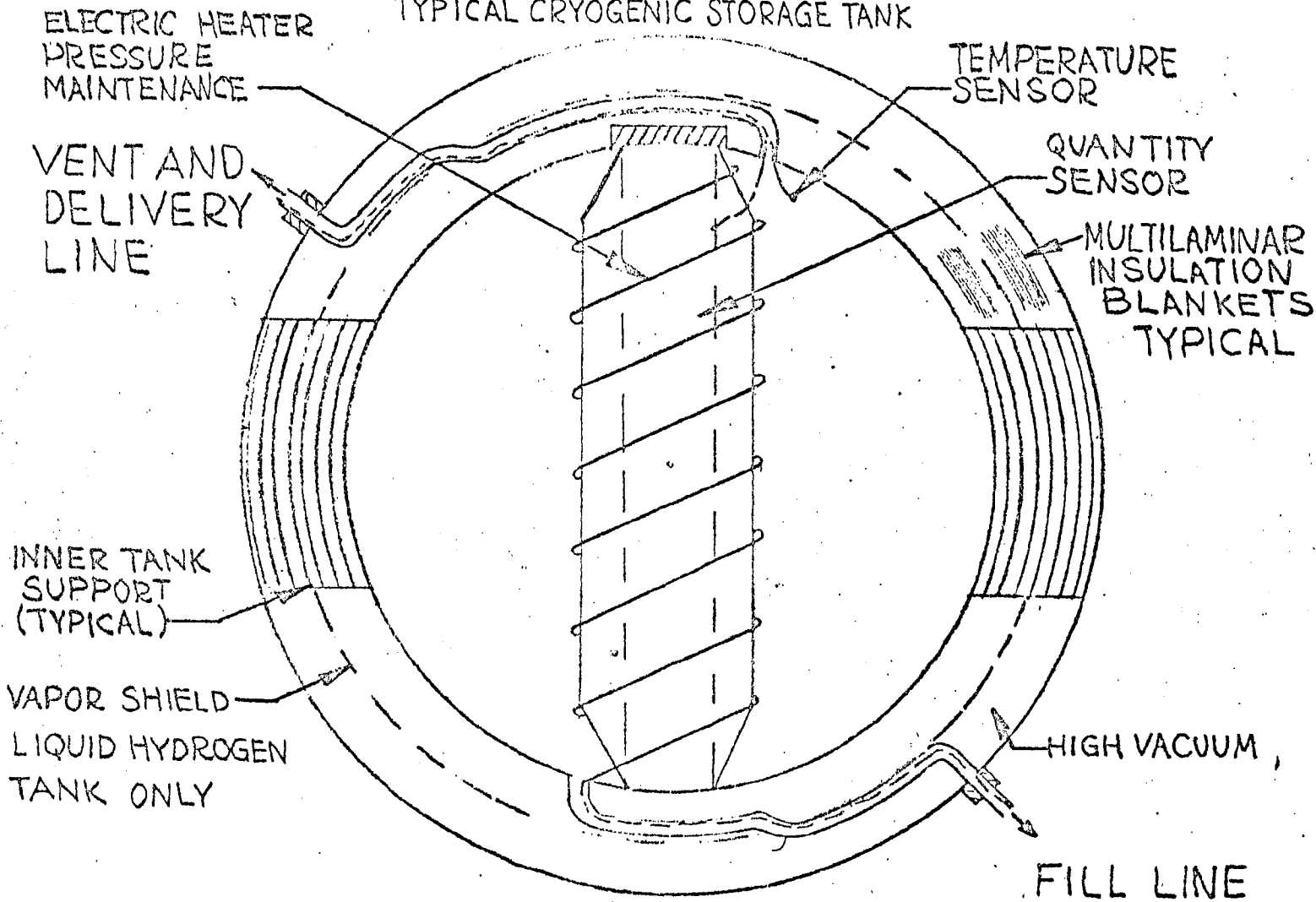
26

ATMOSPHERE AND REACTANT SUPPLY SUBSYSTEM

#21
6 MAR 67

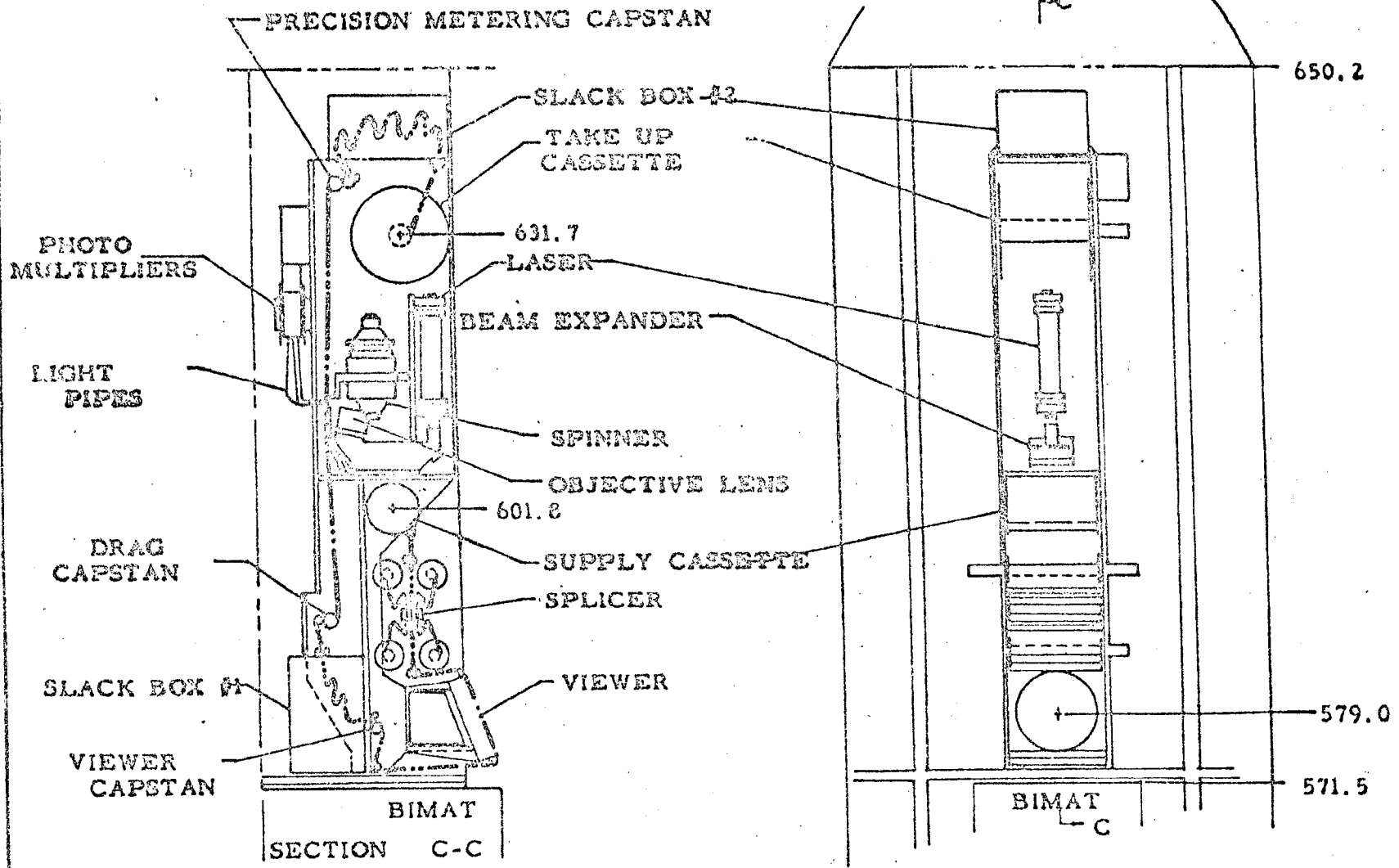
WHS-293
P. 35

TYPICAL CRYOGENIC STORAGE TANK



~~SECRET~~ SPECIAL HANDLING

WHS-392
p. 17

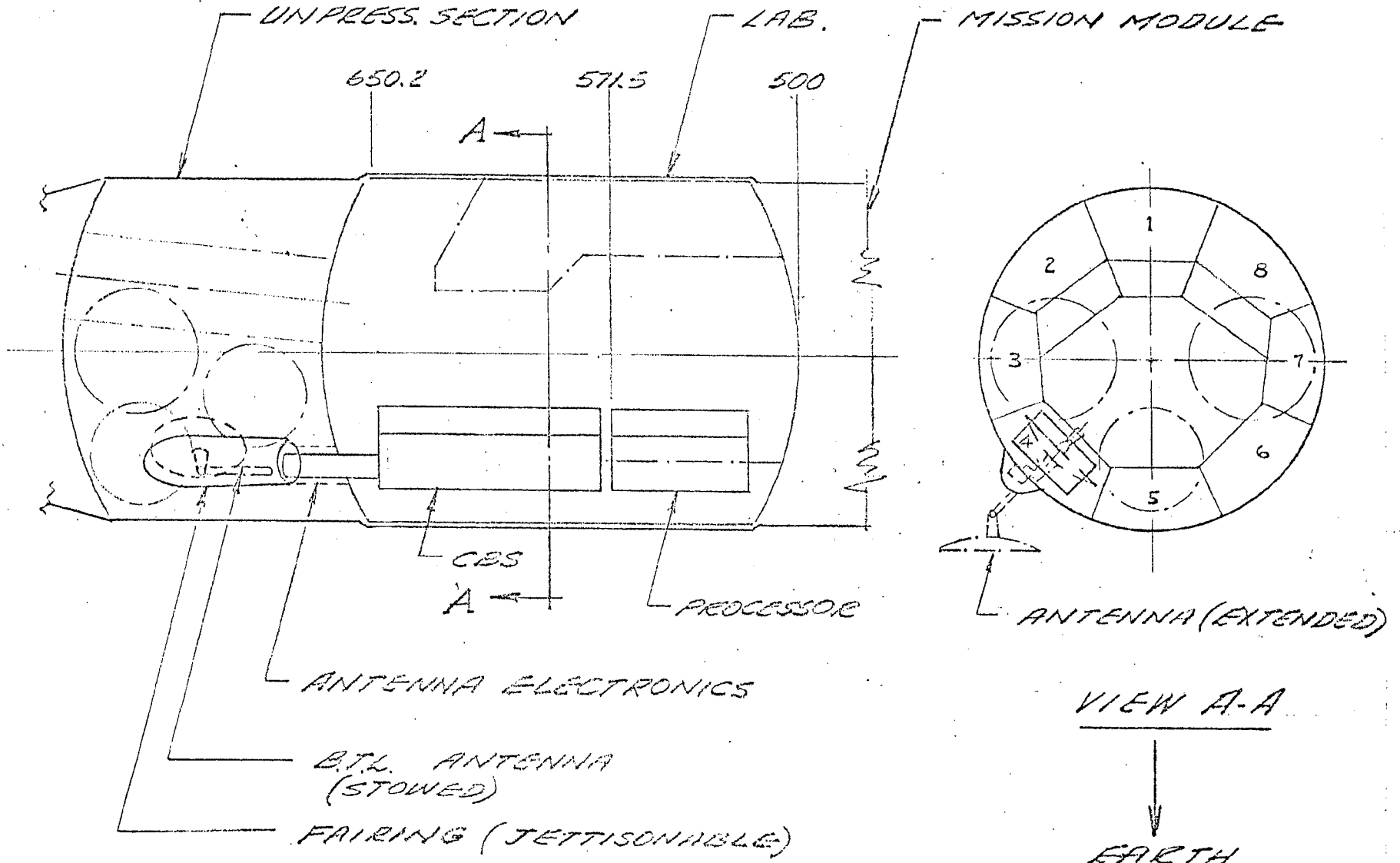


COMPONENT ARRANGEMENT FOR CASSETTE LOADING FROM BIMAT PROCESSOR

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~~SECRET~~ SPECIAL HANDLING
BTL WIDE-BAND SYSTEM

WHS-392
P. 20



HANDLE VIA BYEMAN SYSTEM ONLY

~~SECRET/DORIAN~~

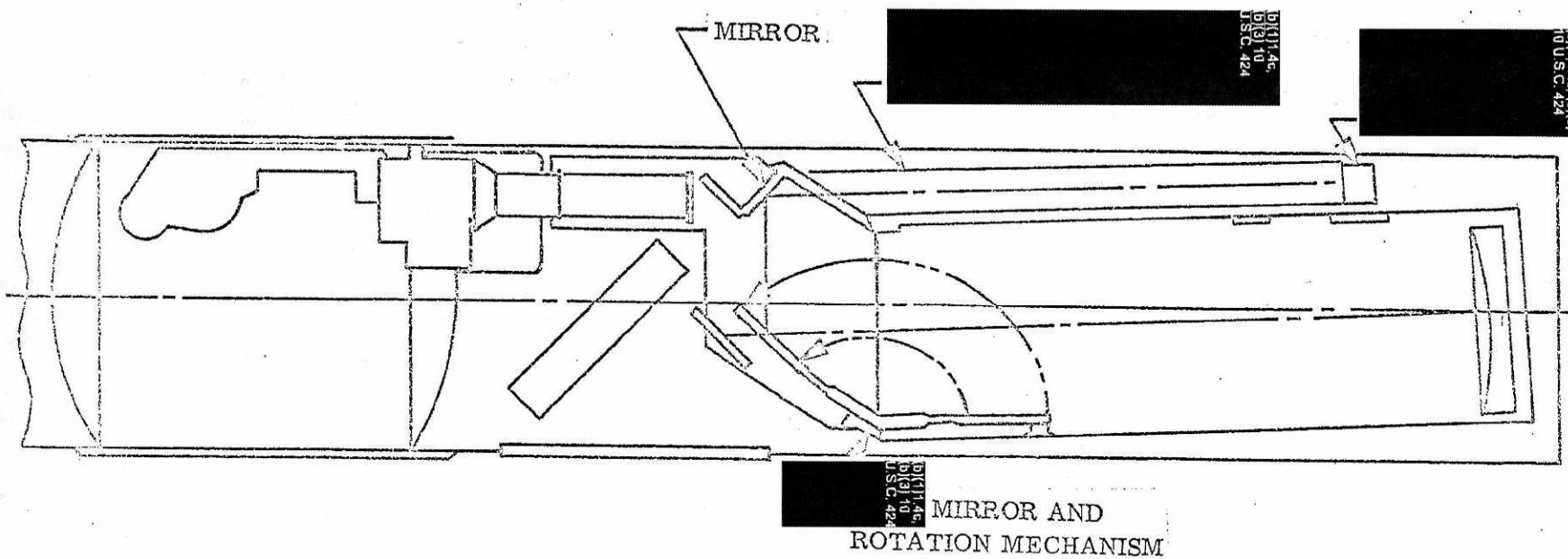


FIGURE 4.1-3

~~SECRET/DORIAN~~
HANDLE VIA BYEMAN SYSTEM ONLY

~~SECRET/SPECIAL HANDLING~~

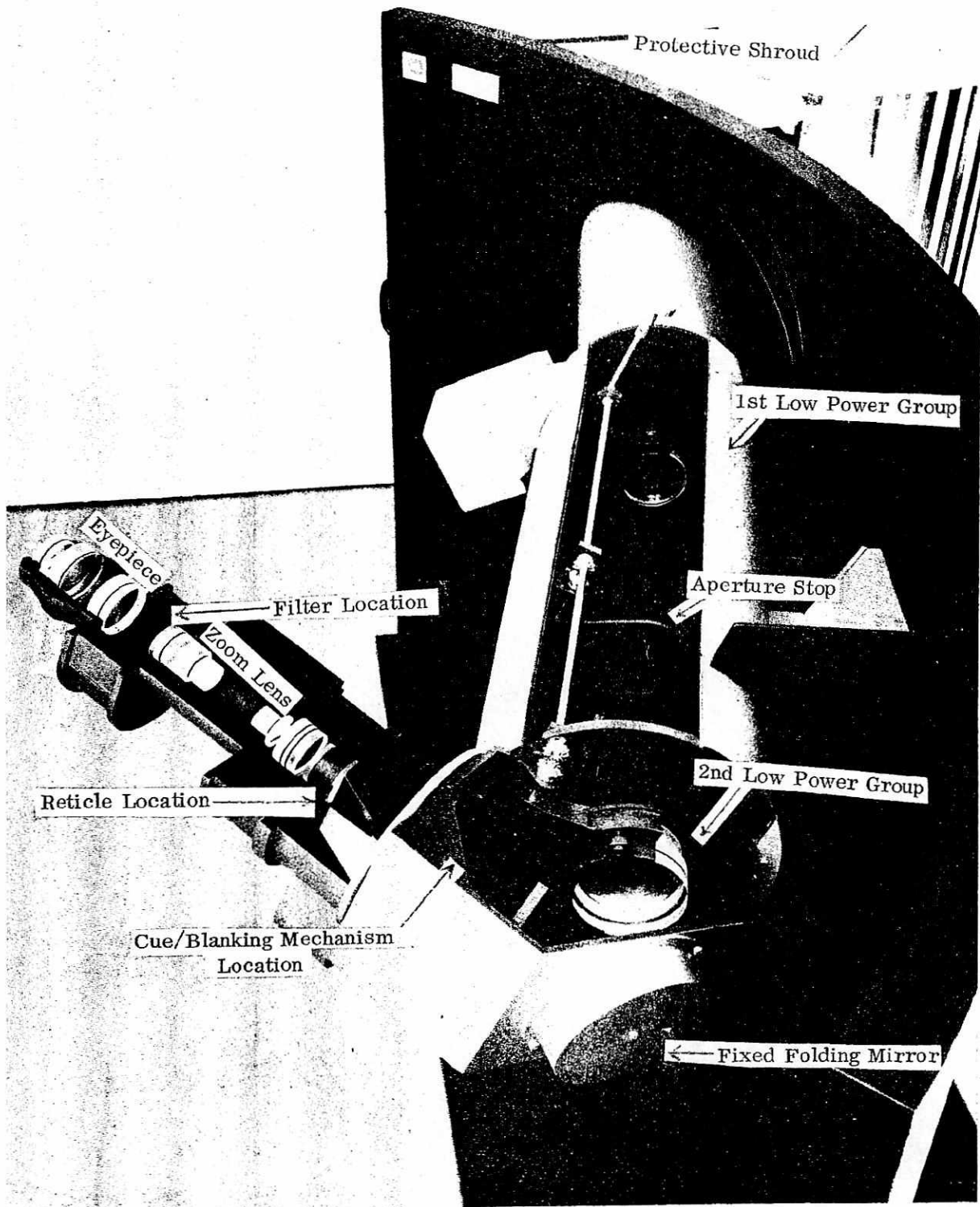


Fig. 1.1-1 — Mockup of AO subsystem telescope showing internal arrangement

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~~SECRET/SPECIAL HANDLING~~

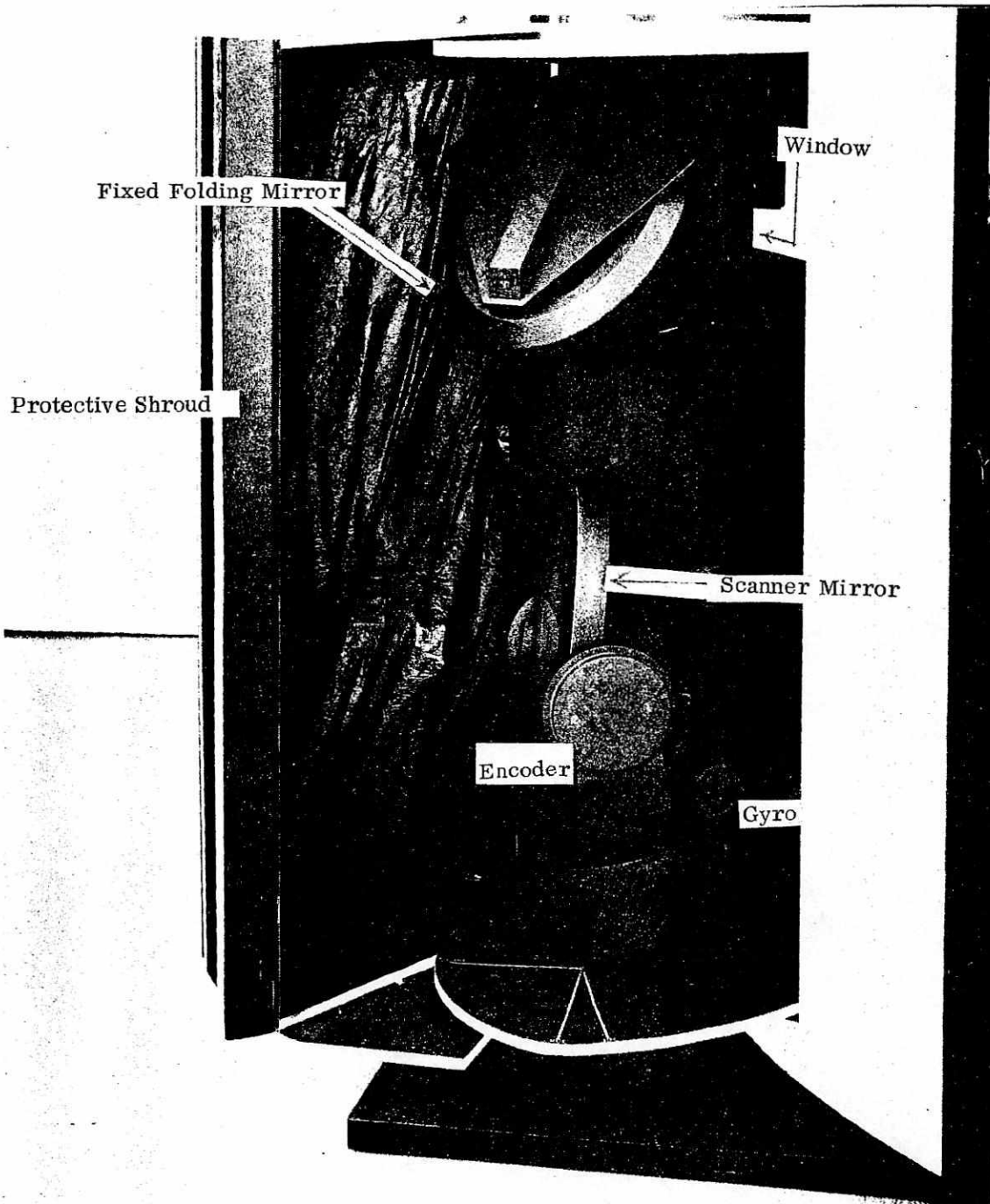


Fig. 1.1-2 — Mockup of external components of AO subsystem (protective cover open)

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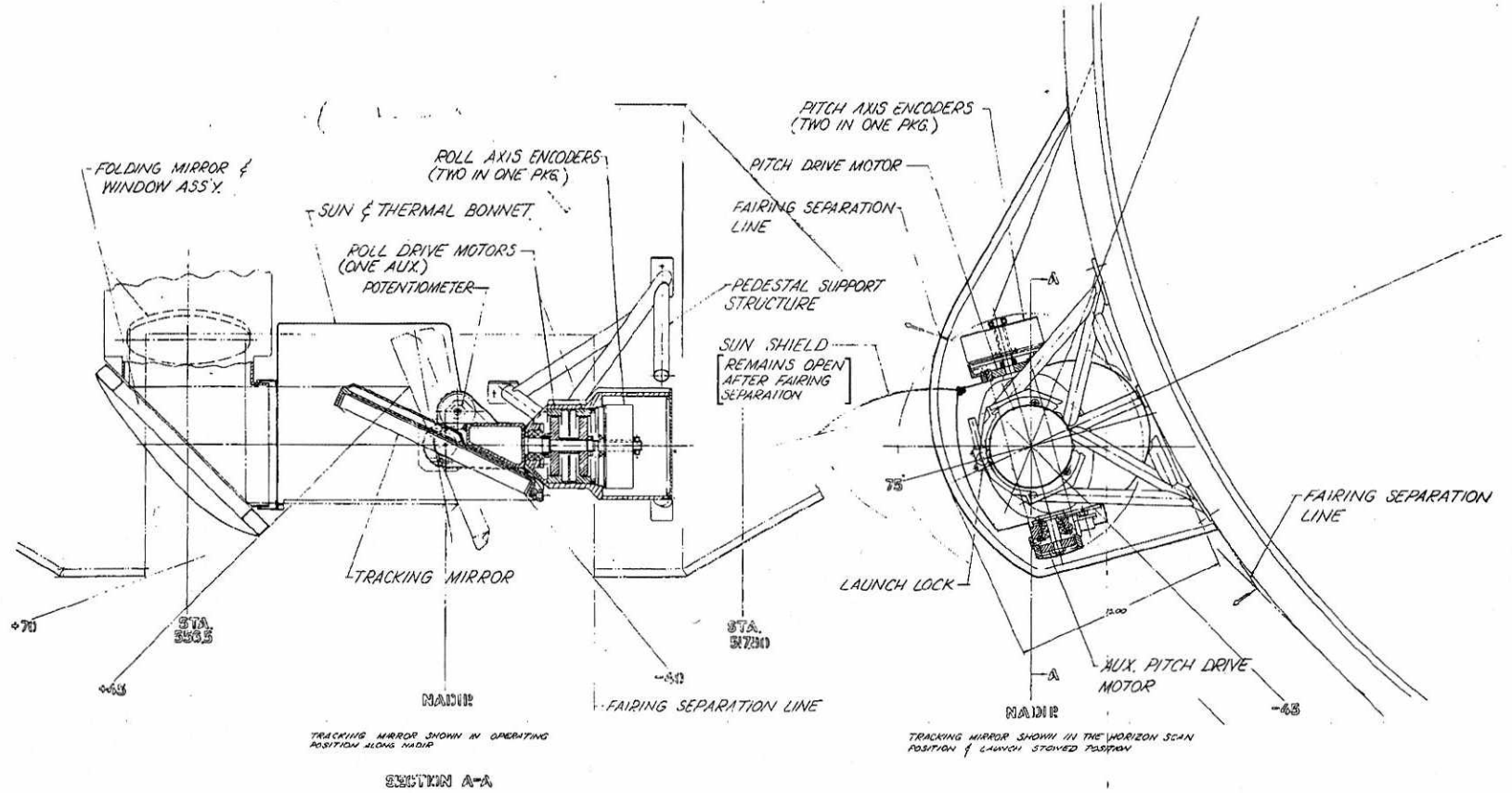


Fig. 3.5.1-1 — Tracking pedestal assembly (8-inch aperture)

~~D SECRET~~ SPECIAL HANDLING

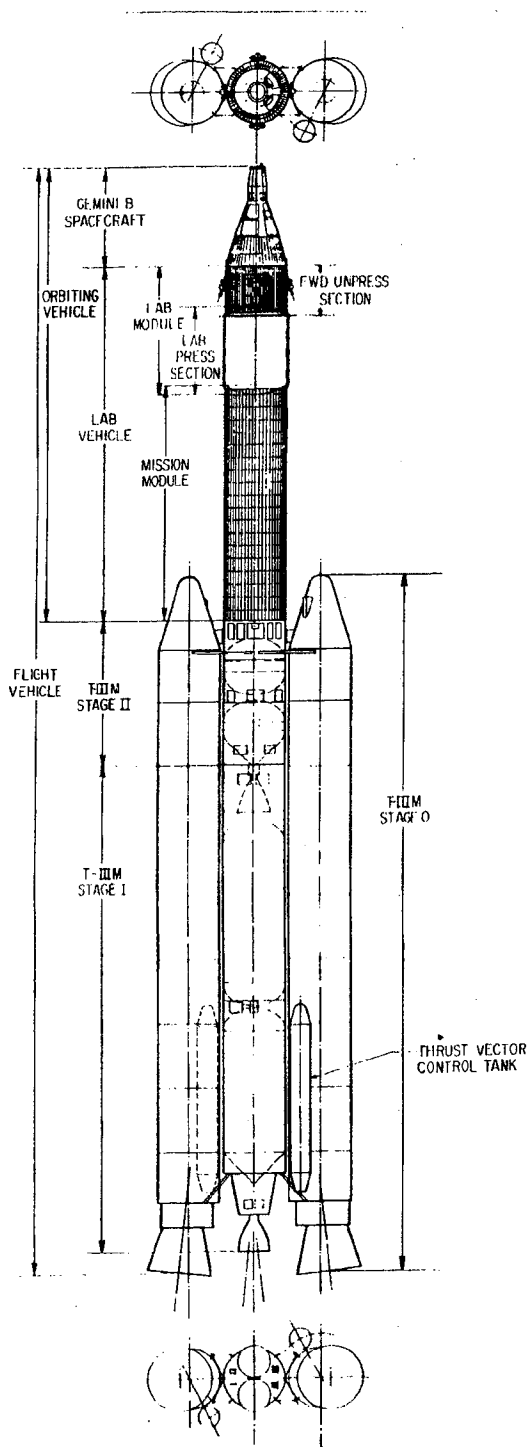
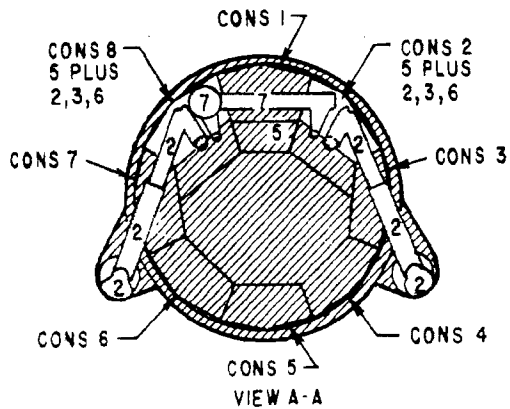
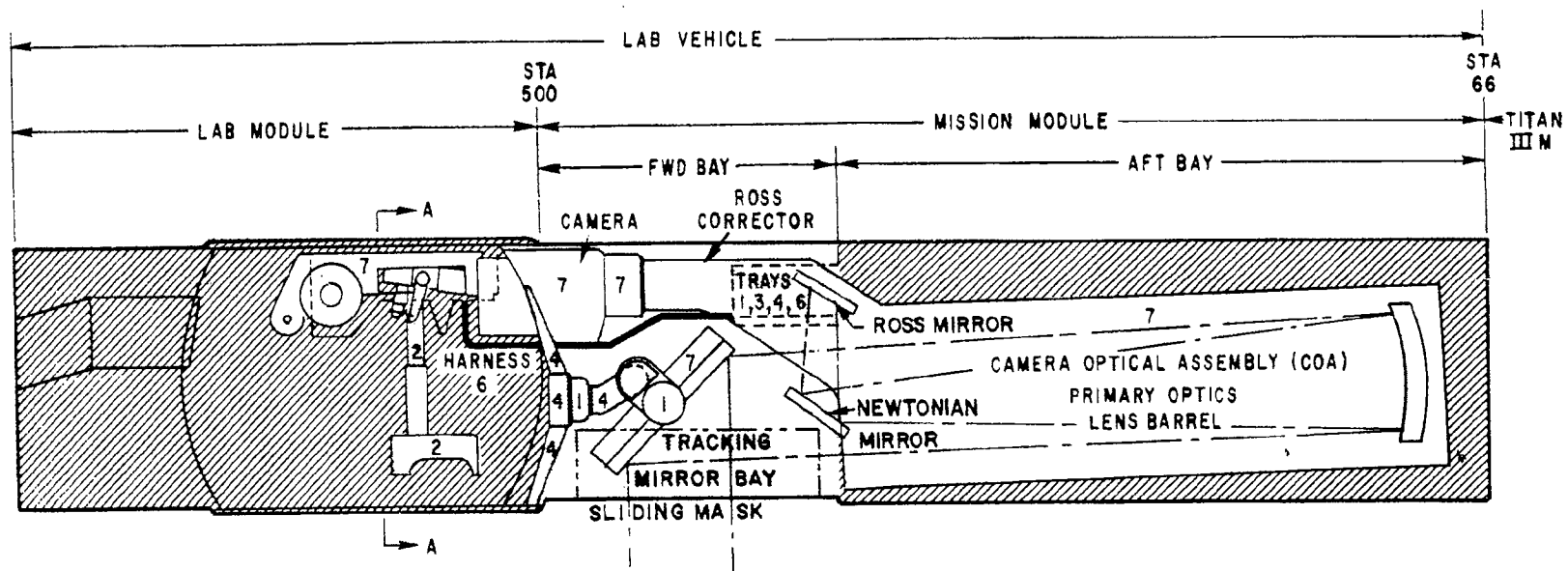
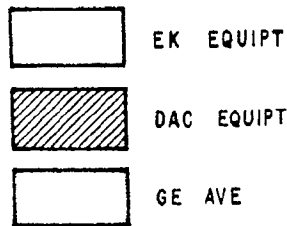


Figure 1-2 MOL Flight Vehicle

~~D SECRET~~ SPECIAL HANDLING



LEGEND



GE AVE SUBSYSTEMS

- 1- NAVIGATION & CONTROL
- 2- ACQUISITION
- 3- COMMAND & INSTRUMENTATION
- 4- STRUCTURE (& ENVR CONTROL)
- 5- CONSOLES & DISPLAYS
- 6- ELECTRICAL POWER & SIGNAL

EK AVE DISTRIBUTION

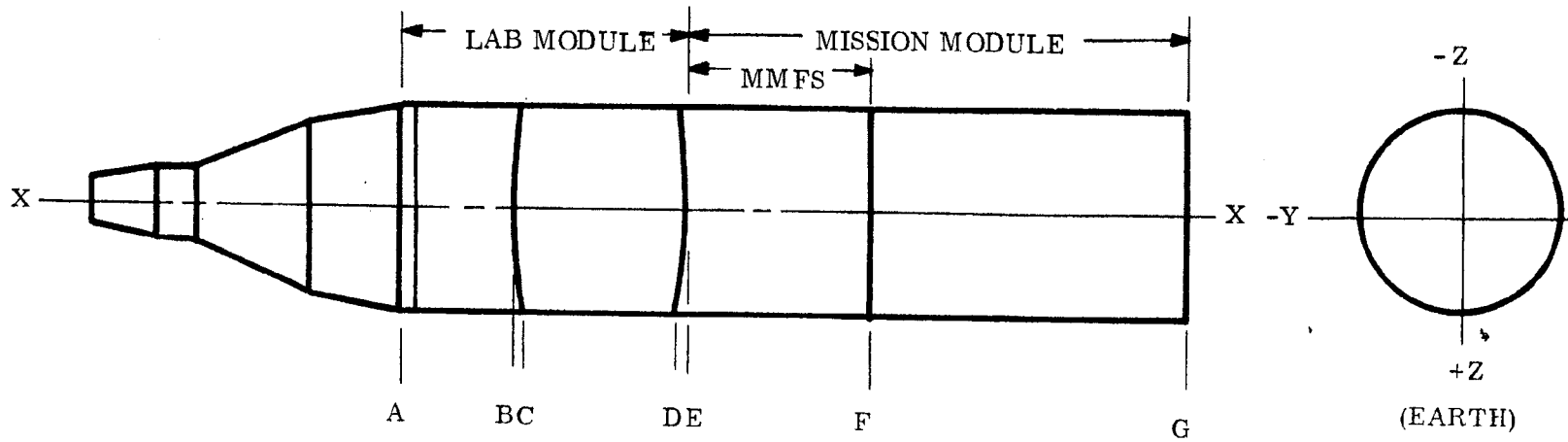
- 7- PAYLOAD

Figure E-1 Mission Payload System Segment

D SECRET SPECIAL HANDLING

10-3

D SECRET SPECIAL HANDLING



CODE	STATION (INCHES)
A	746.0
B	668.0
C	650.5
D	517.47
E	500.0
F	345.0
G	75.0

SECRET/DORIAN
HANDLE VIA BYEMAN SYSTEM ONLY

SECRET/DORIAN
HANDLE VIA BYEMAN SYSTEM ONLY

Figure 1-2. Orbiting Vehicle

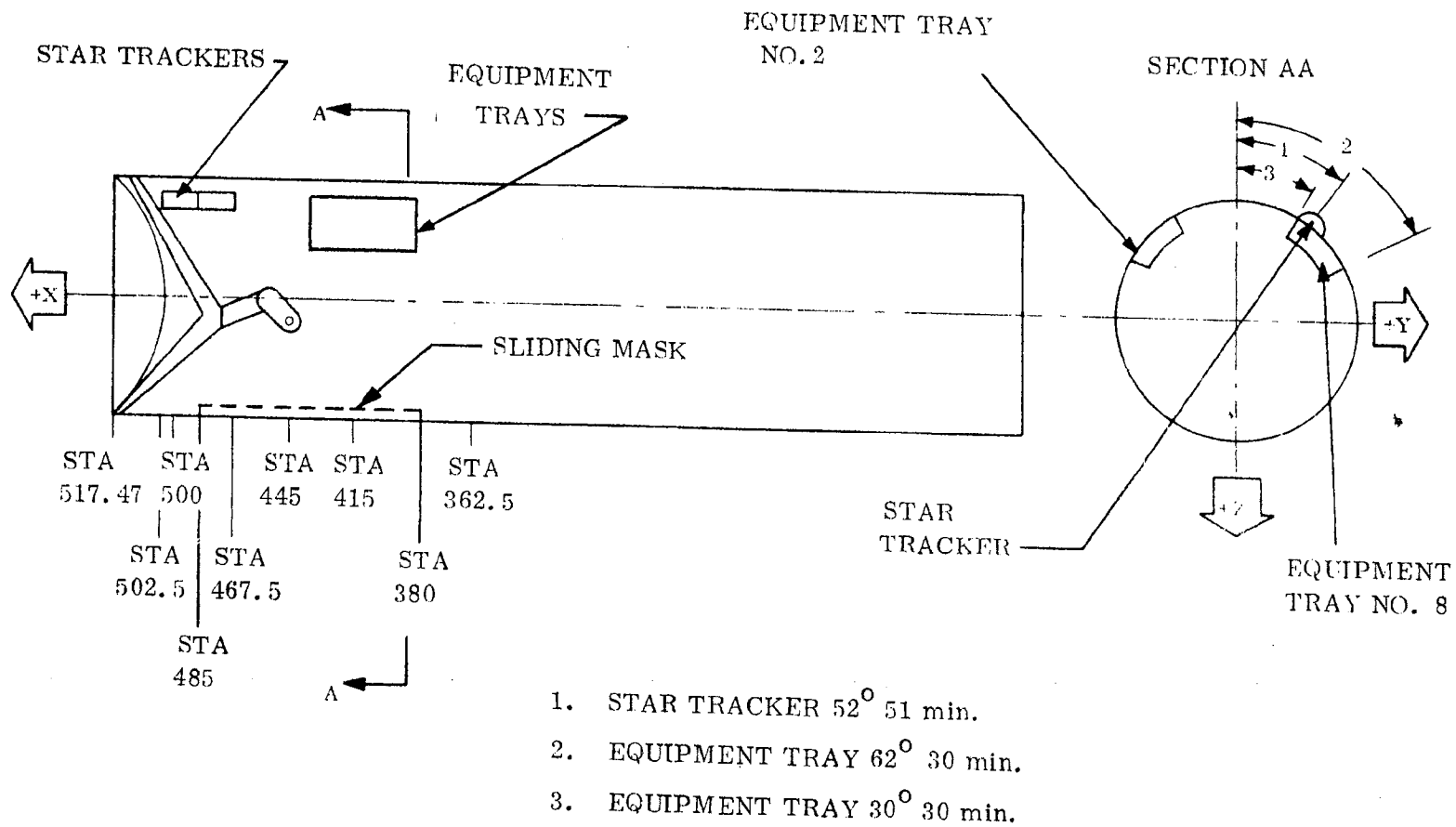
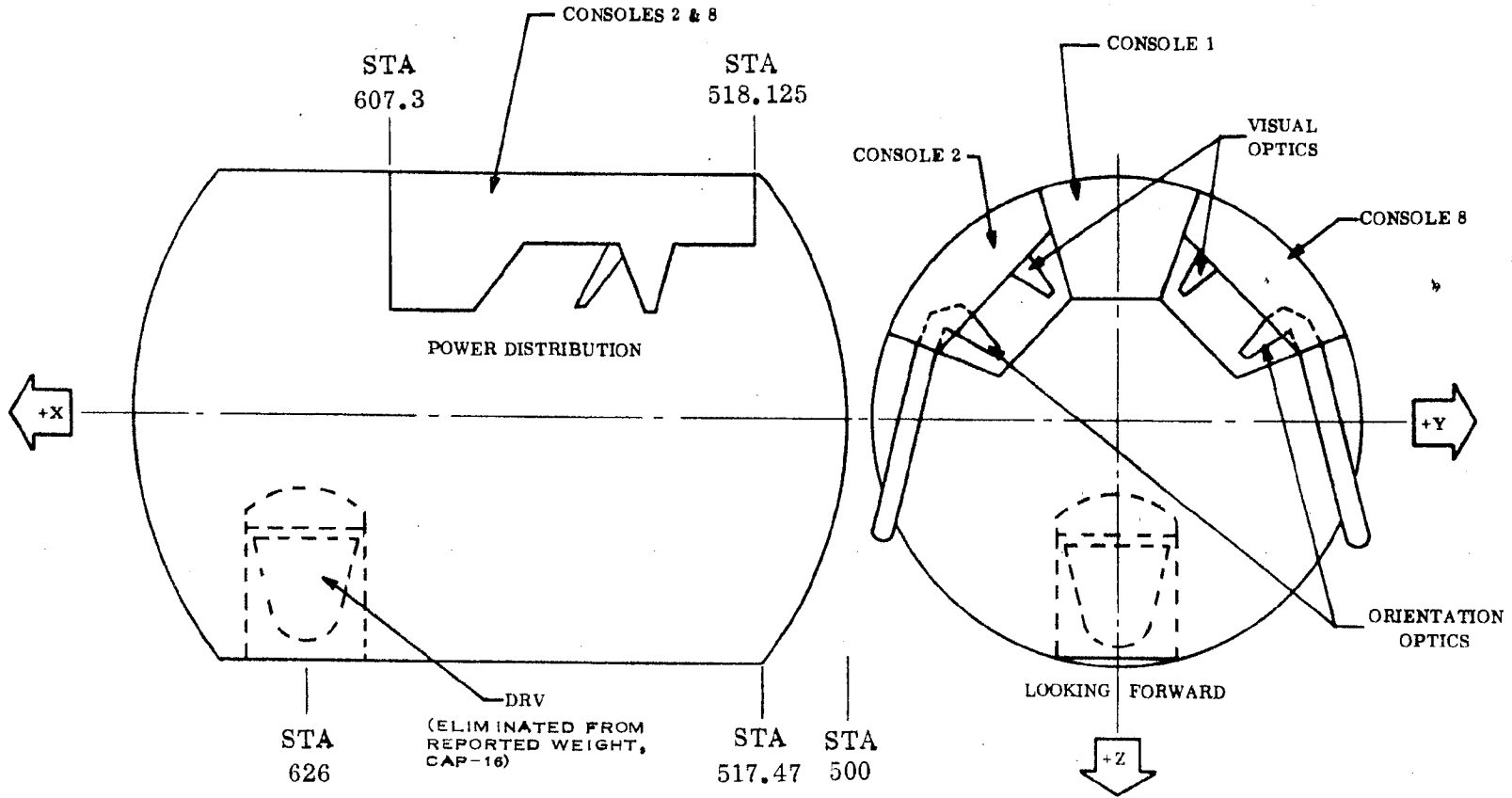


Figure 1-3. Mission Module

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HANDLE VIA BYEMAN SYSTEM ONLY

HANDLE VIA BYEMAN SYSTEM ONLY
SECRET/DORIAN

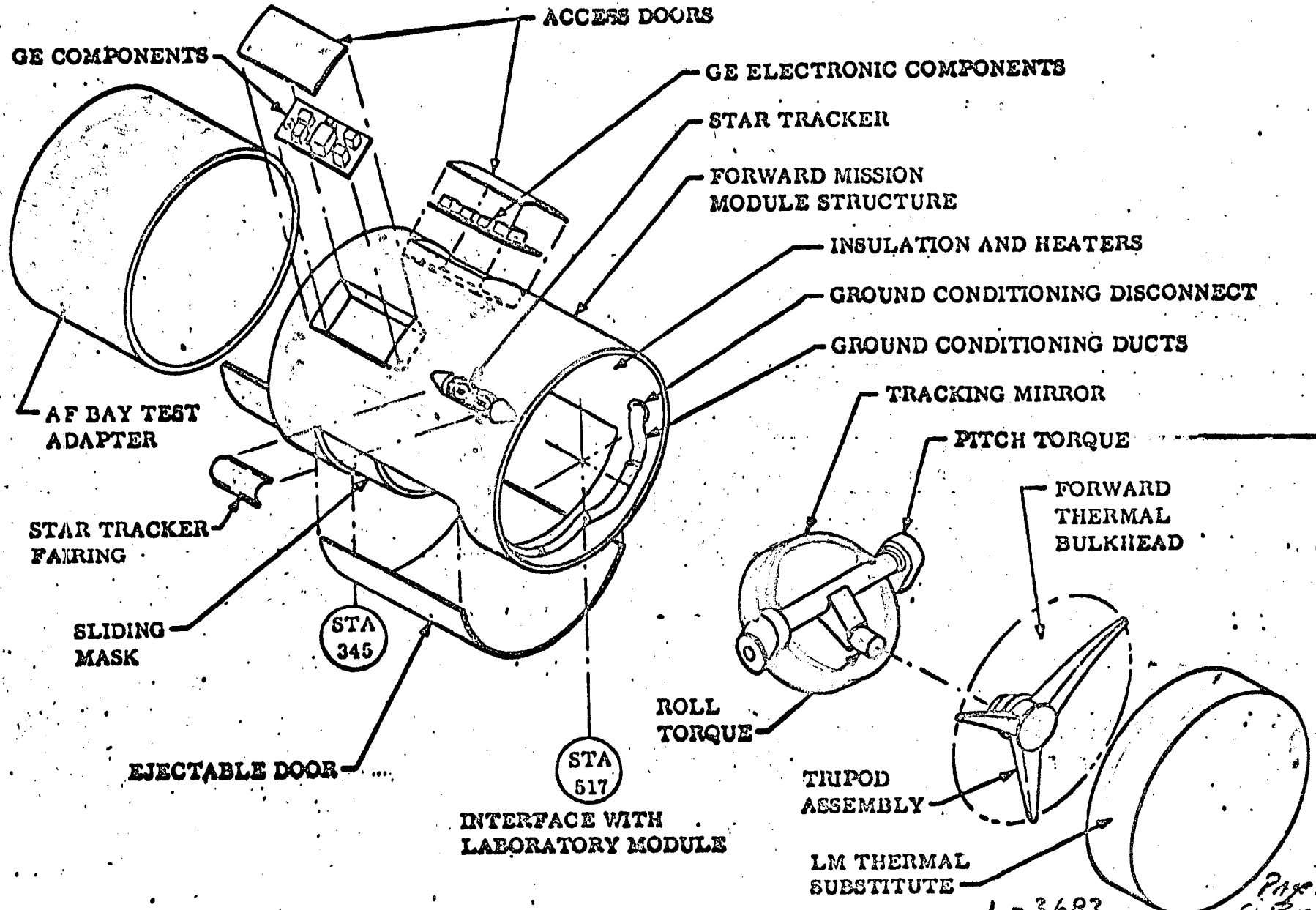
SECRET/DORIAN
HANDLE VIA BYEMAN SYSTEM ONLY



HANDLE VIA BYEMAN SYSTEM ONLY
SECRET/DORIAN

Figure 1-4. Laboratory Module

~~SECRET~~ SPECIAL HANDLING MISSION MODULE FORWARD STRUCTURE ASSEMBLY

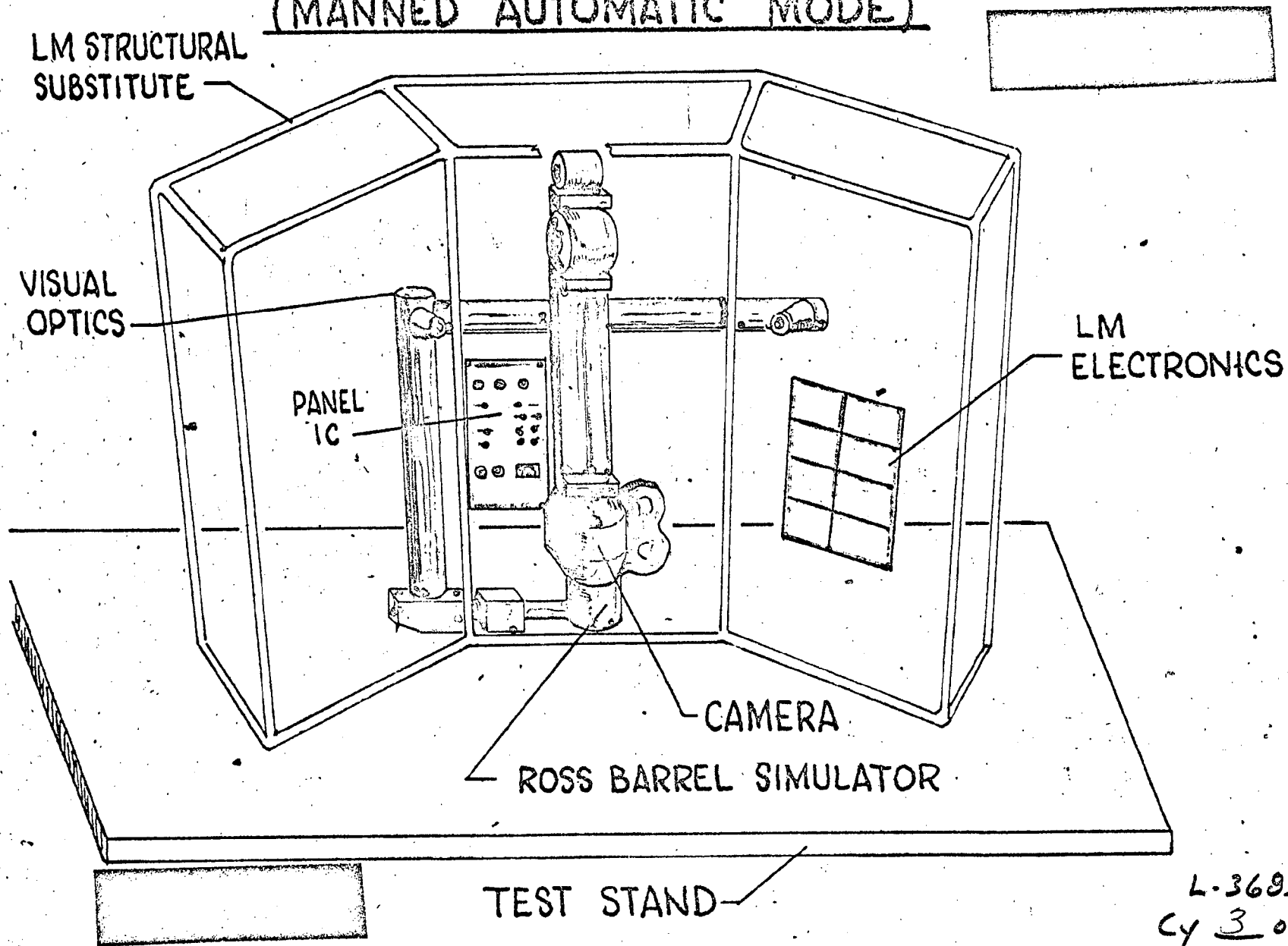


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L-3683

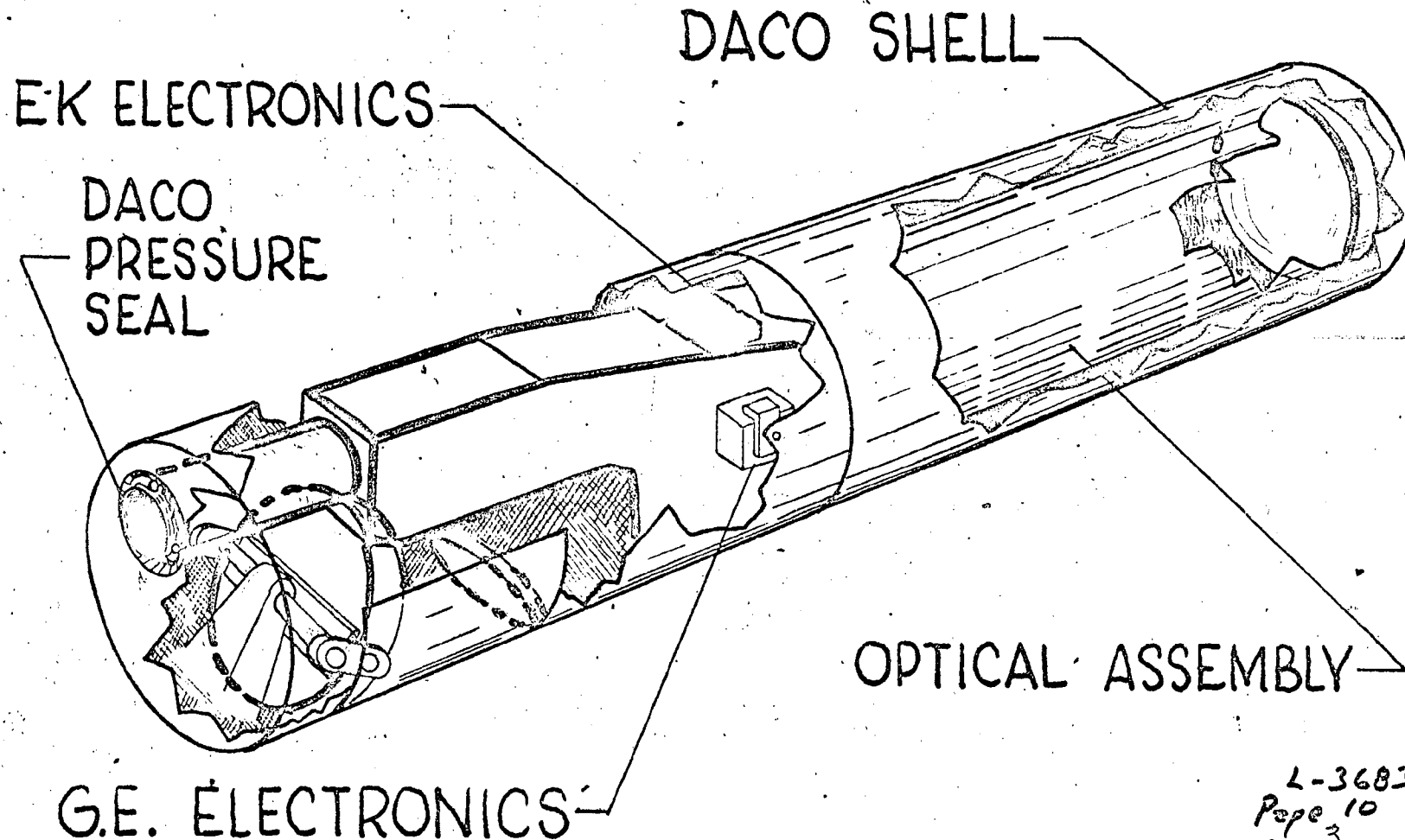
Page 7 of 59
Cy 3 of 26

LAB MODULE SUBSYSTEM TEST CONFIGURATION (MANNED AUTOMATIC MODE)

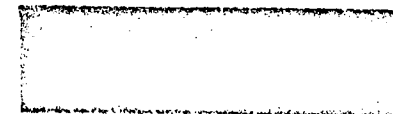


L-3693
Cy 3 of 26
Page 9 of 59

MISSION MODULE TEST CONFIGURATION



L-3683
Page 10 of 59
cy 3 of 26



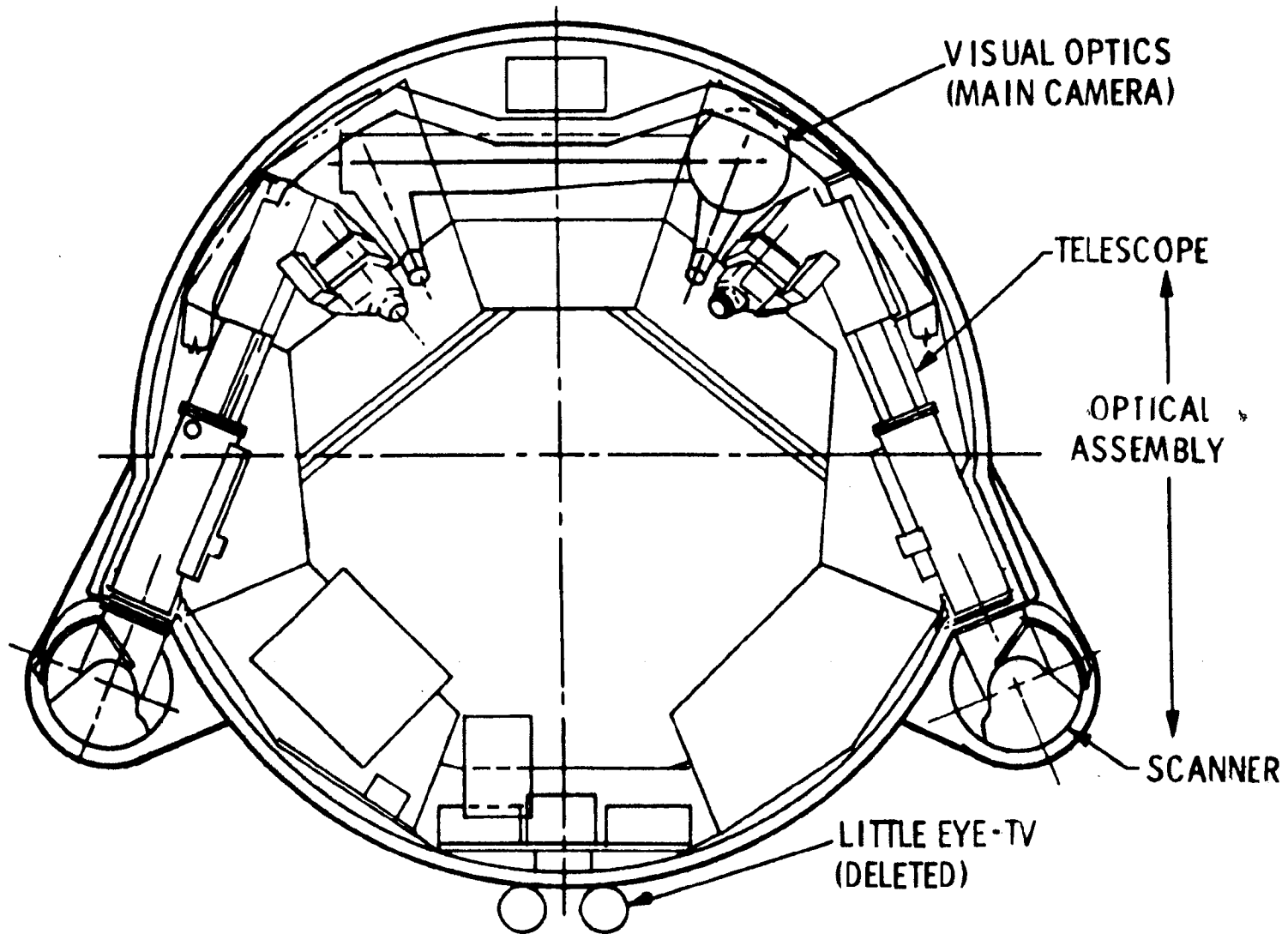


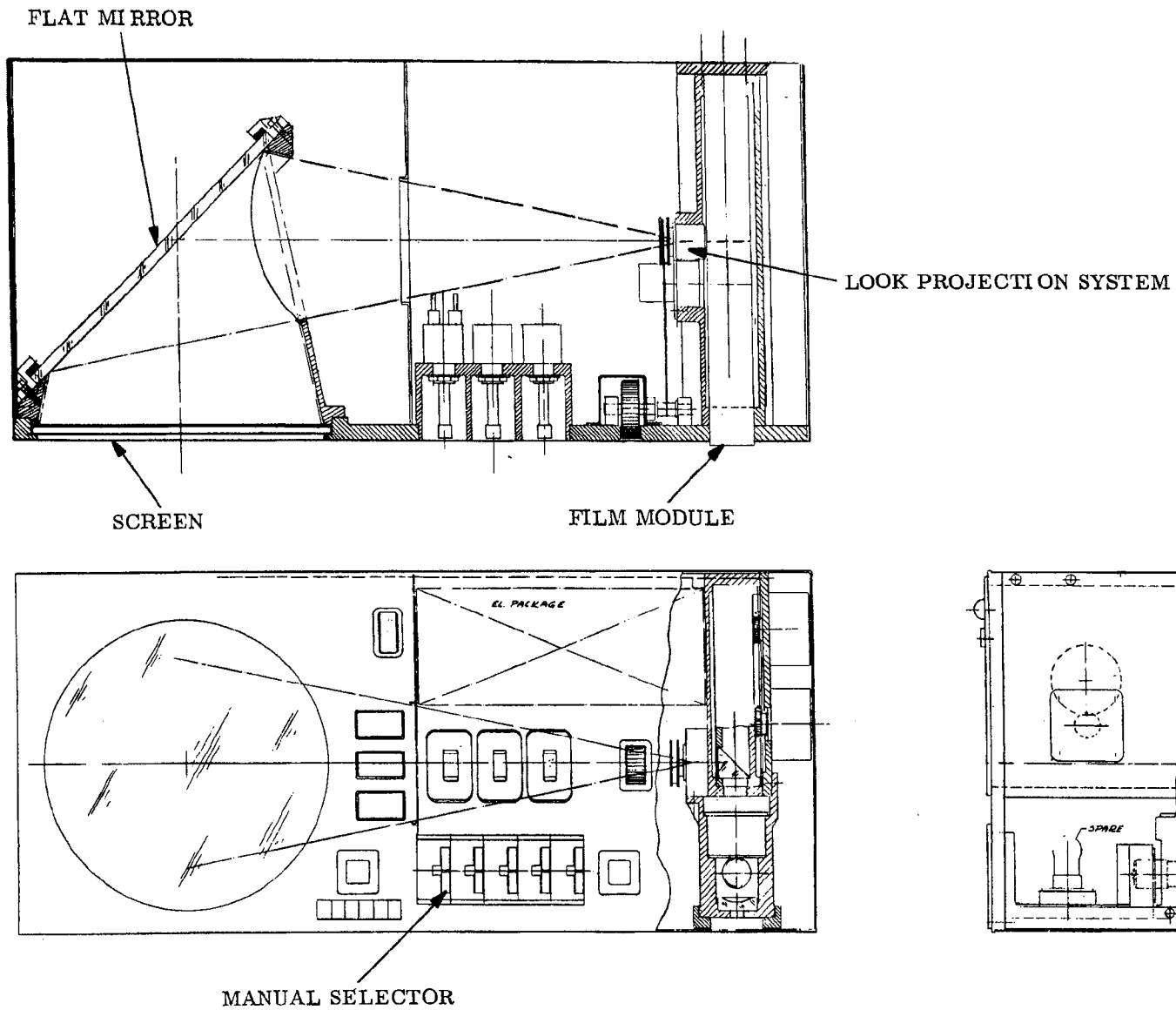
Figure 1.3-4. LM Installation of ATS

~~SECRET~~ SPECIAL HANDLING

~~SECRET~~ SPECIAL HANDLING

1-42

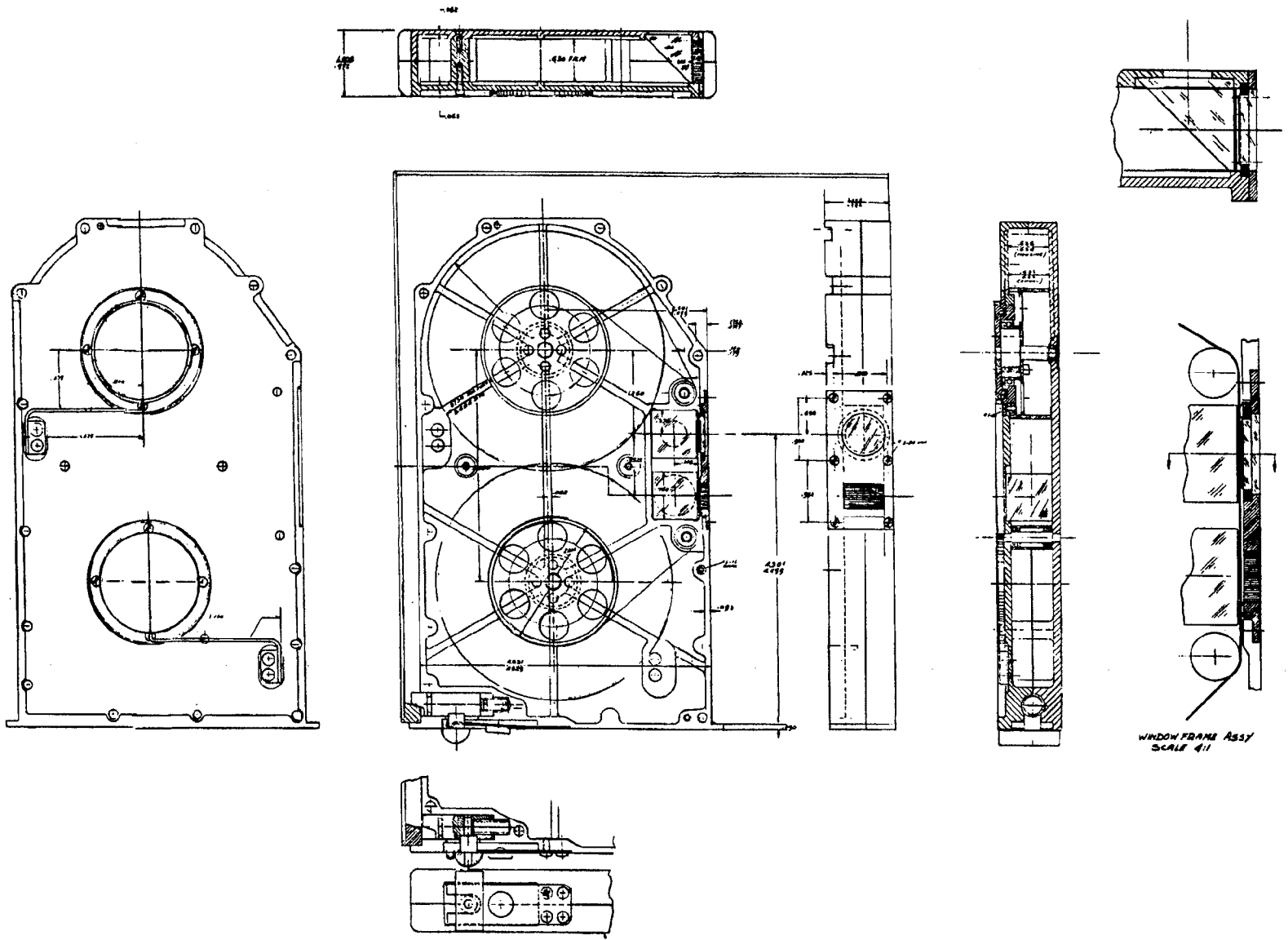
~~SECRET~~ SPECIAL HANDLING



~~SECRET~~ SPECIAL HANDLING

Figure 1.3-6. Visual Display Projector Layout

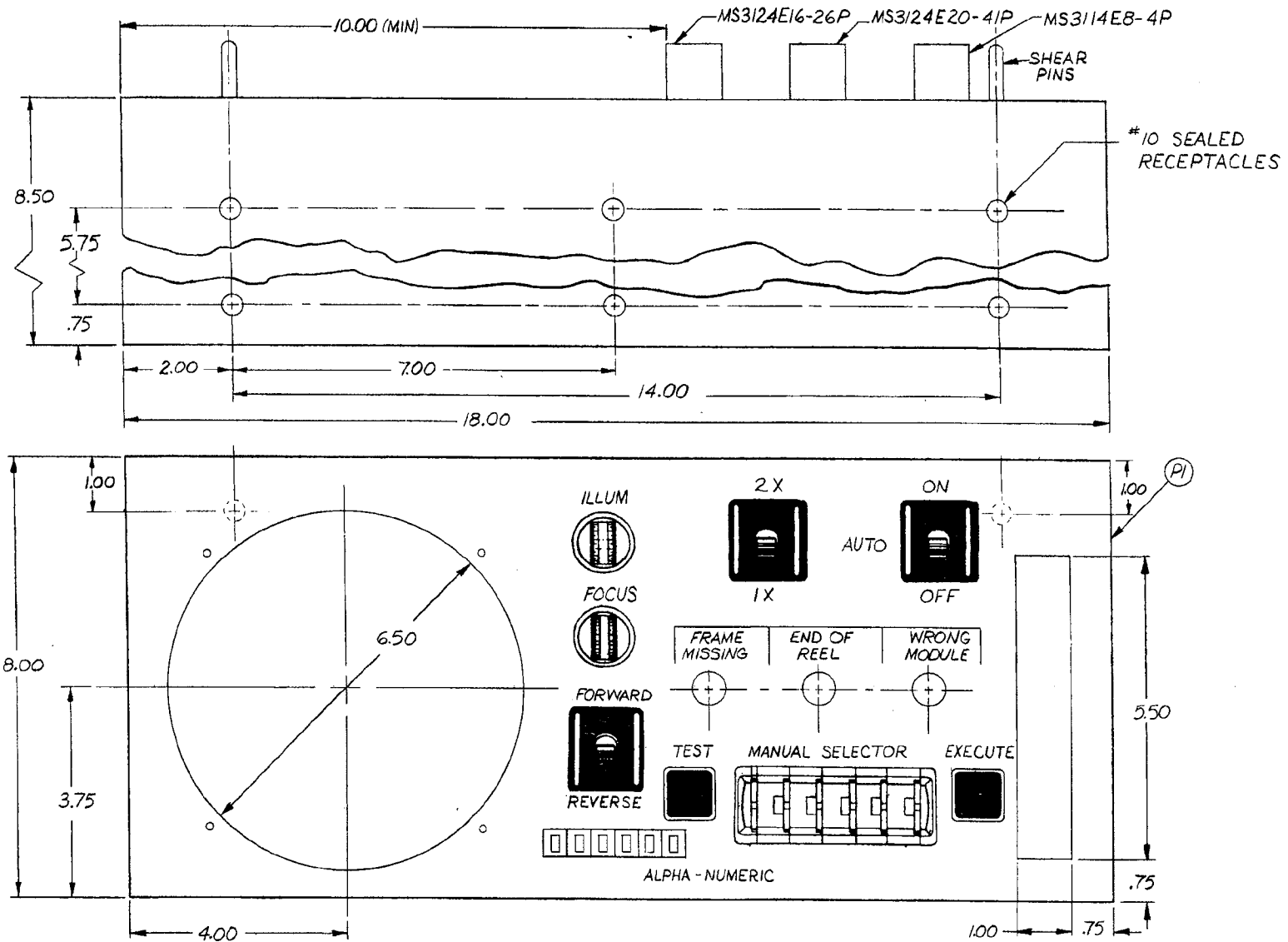
~~SECRET~~ SPECIAL HANDLING



~~SECRET~~ SPECIAL HANDLING

Figure 1.3-7. Film Module Layout

~~SECRET~~ SPECIAL HANDLING



~~SECRET~~ SPECIAL HANDLING

Figure 1.3-9. Outline Drawing, Visual Display Projector

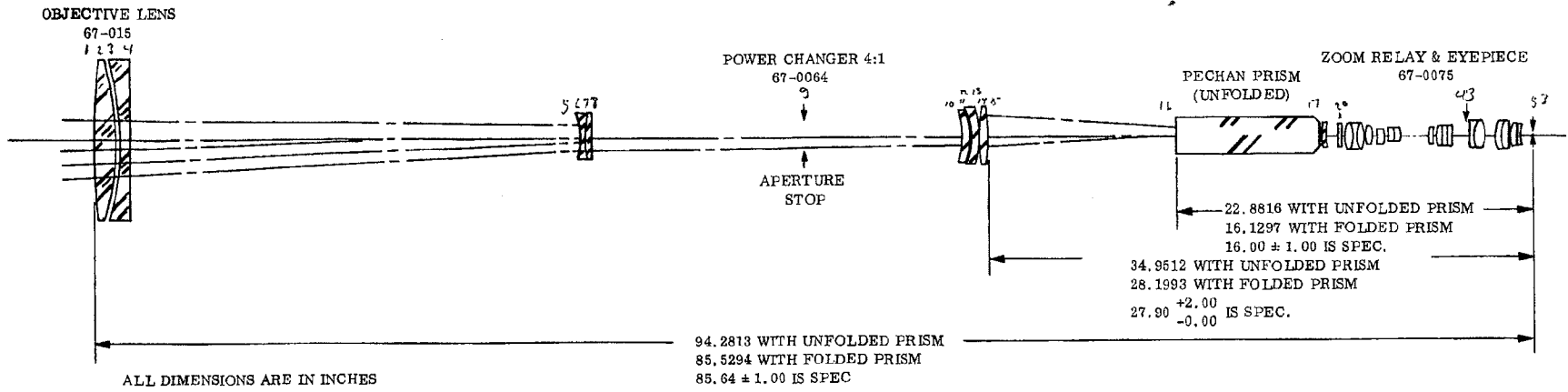


Figure 2.1-1. Optical Design - Low Power

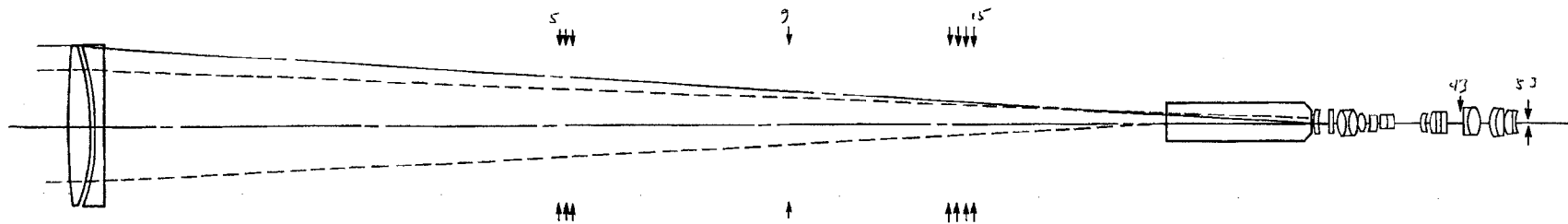
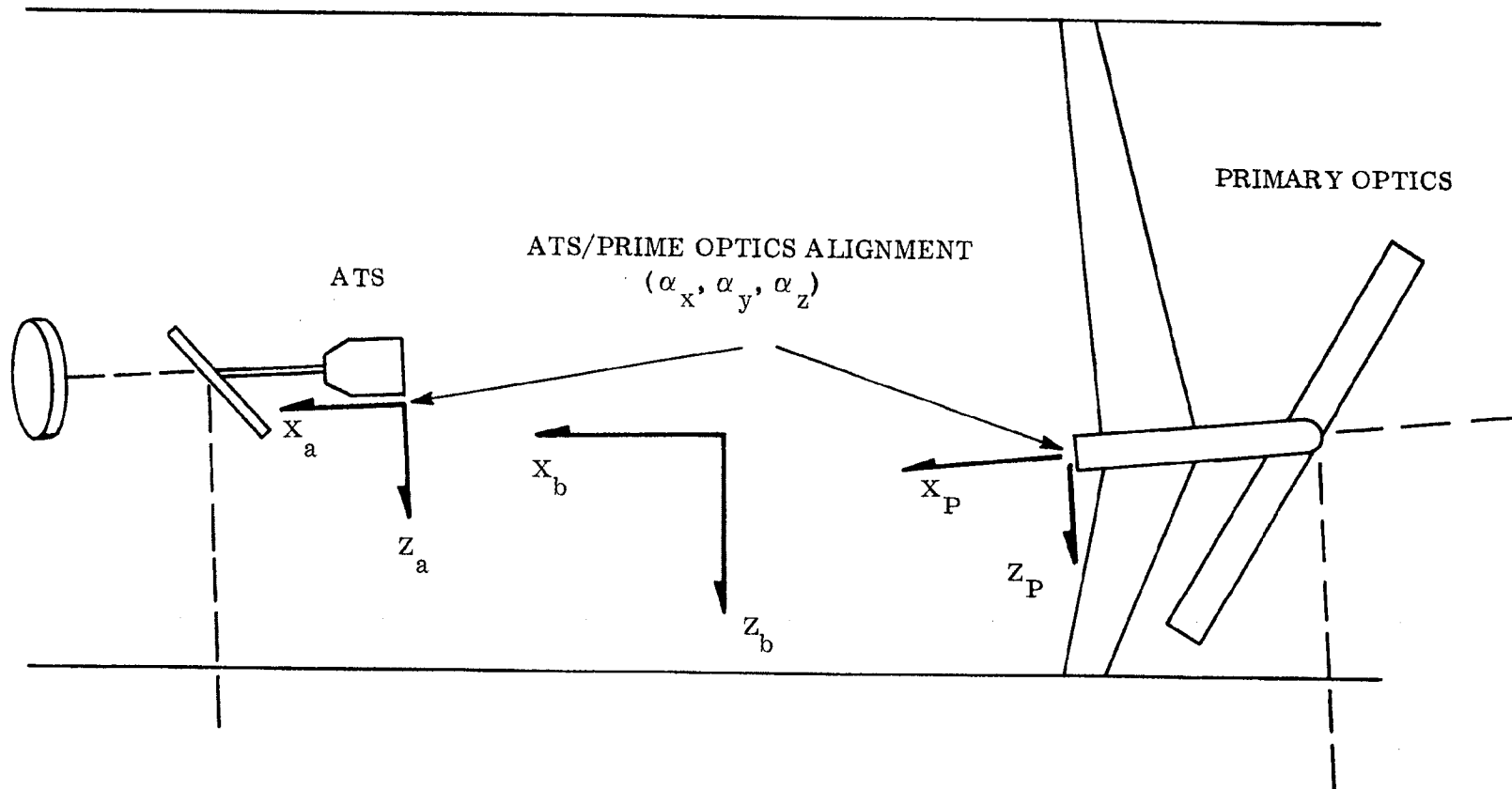


Figure 2.1-2. Optical Design - High Power

2-7/2-8

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~~SECRET~~ SPECIAL HANDLING

Figure 2.3-1. ATS and Primary Optics Configuration (Side View)

~~SECRET~~ SPECIAL HANDLING

~~SECRET~~ SPECIAL HANDLING

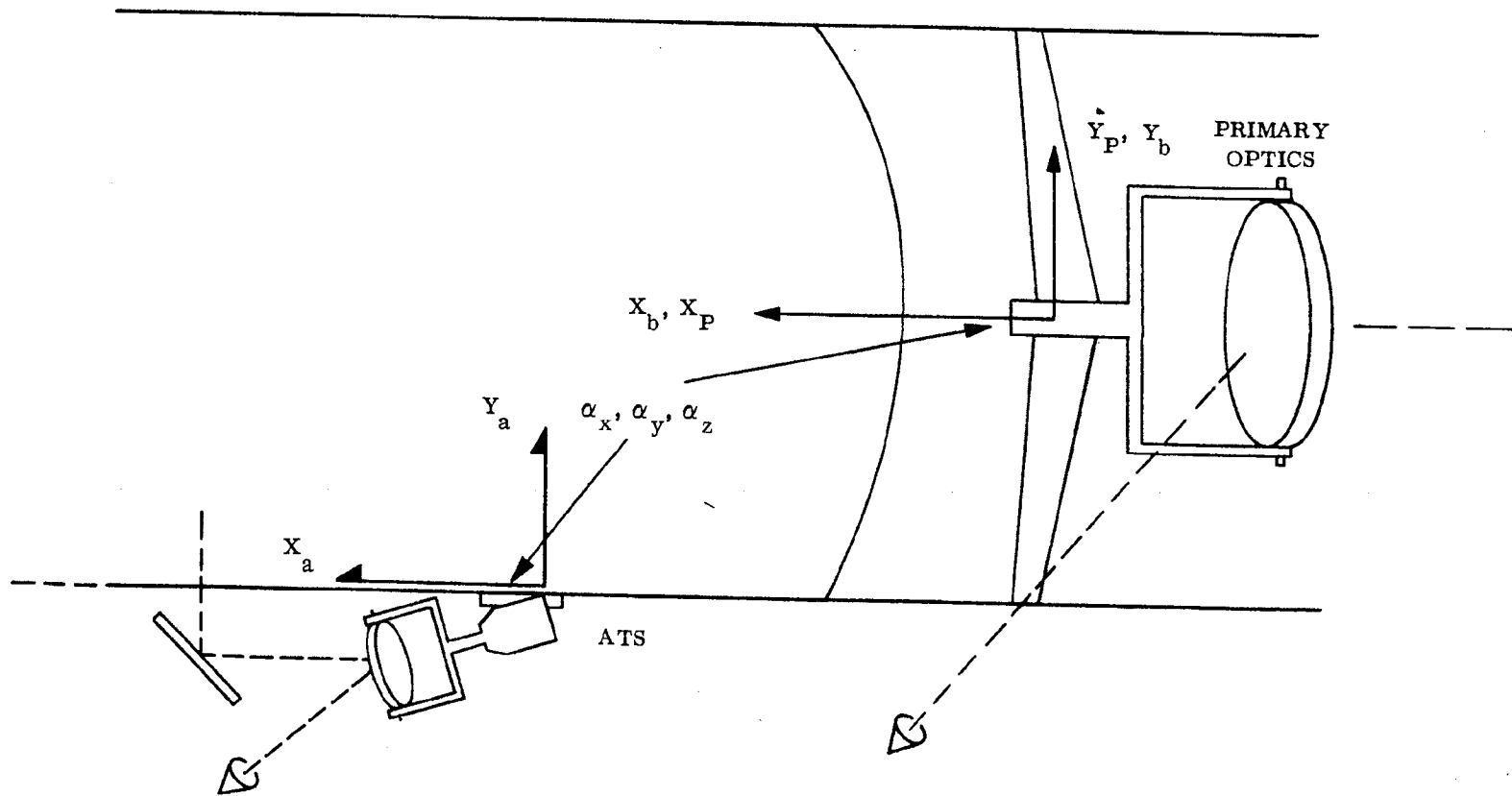


Figure 2.3-2. ATS and Main Optics Configuration (Top View)

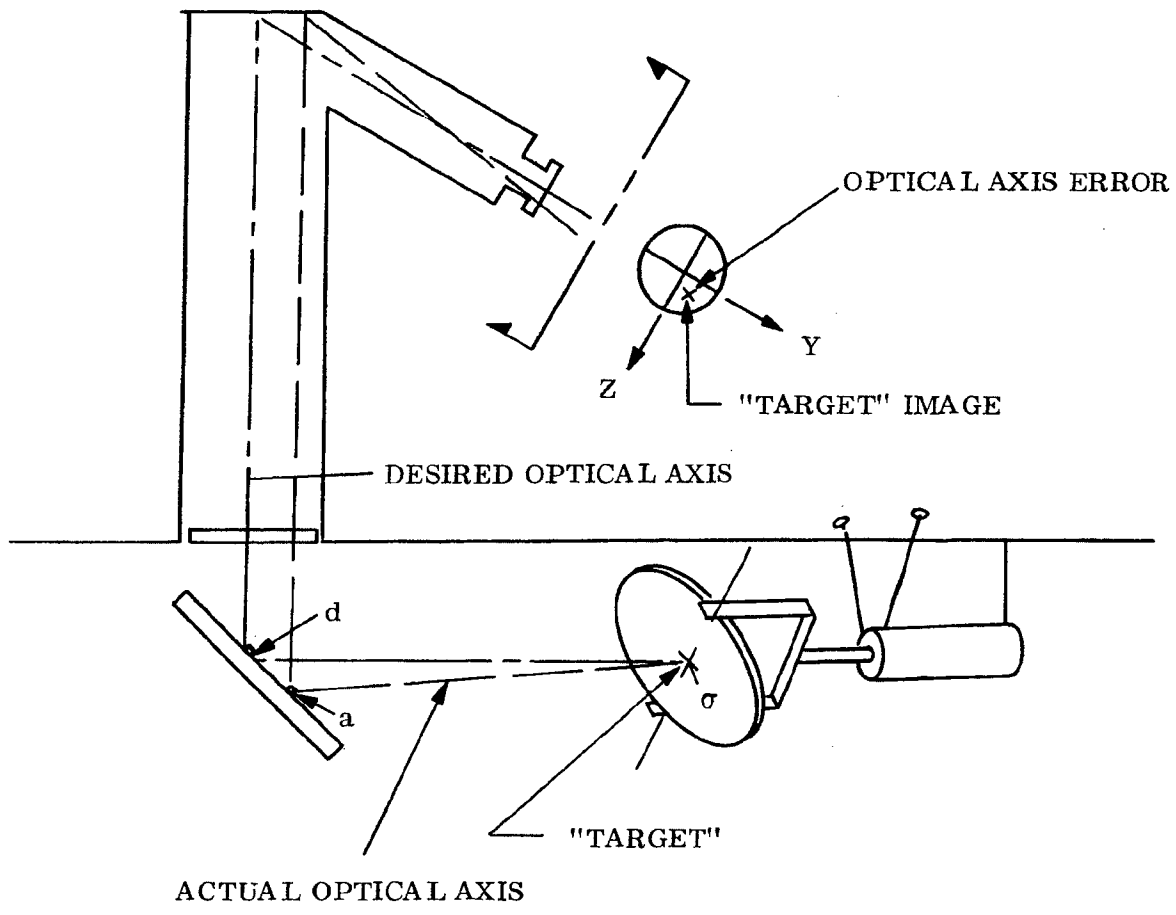
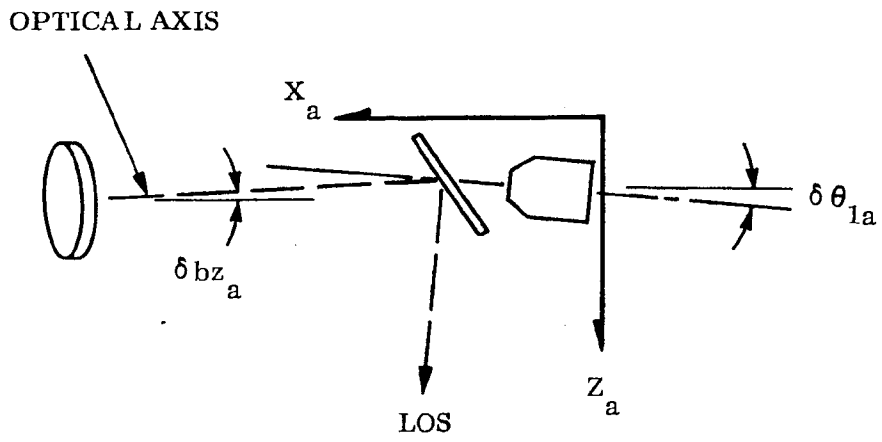


Figure 2.3-3. ATS Configuration



$\delta by_a, \delta bz_a$ - OPTICAL AXIS ERRORS
 $\delta \theta_{1A}, \delta \psi_{1a}$ - ROLL GIMBAL DIRECTION ERRORS

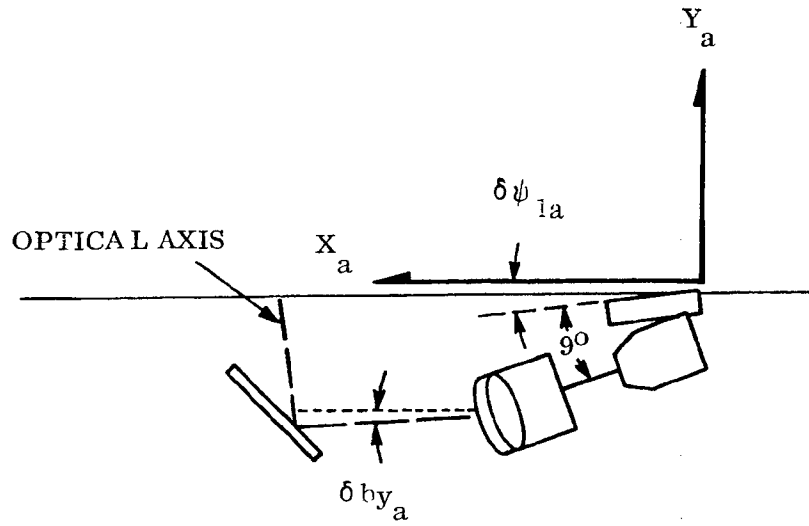
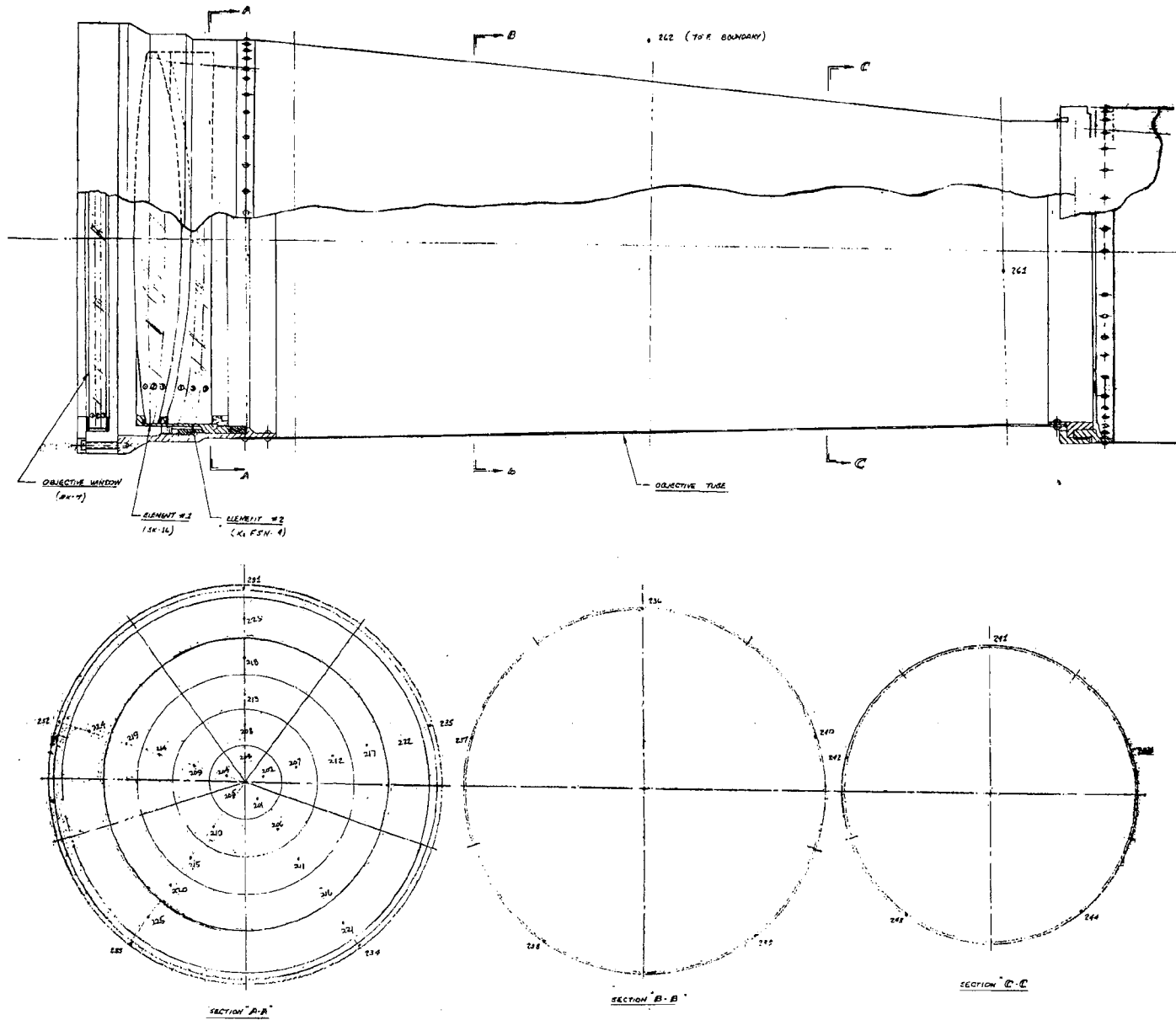


Figure 2.3-4. ATS Errors

2-268

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Figure 2.4-23. Nodal Network of Outer Elements

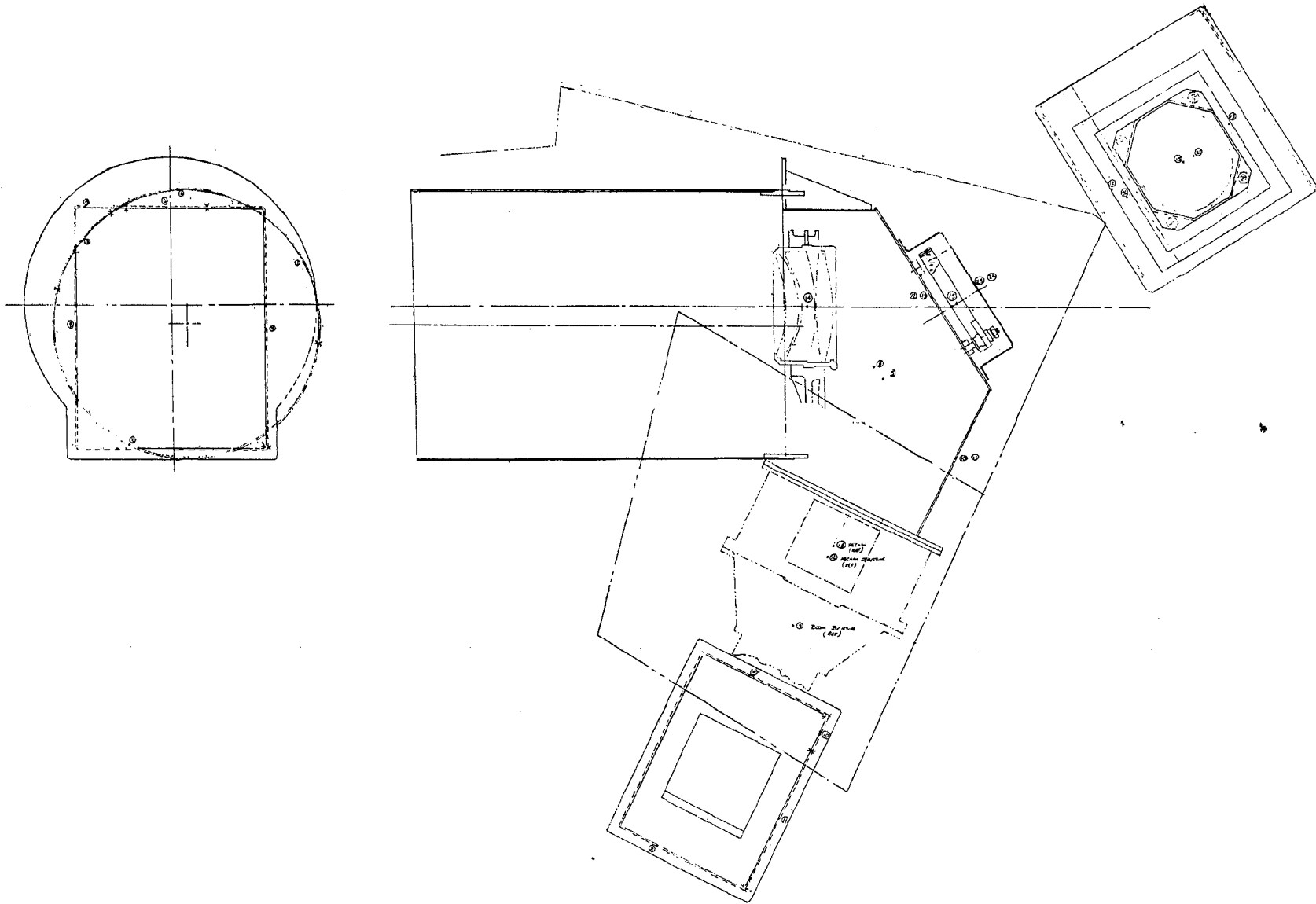
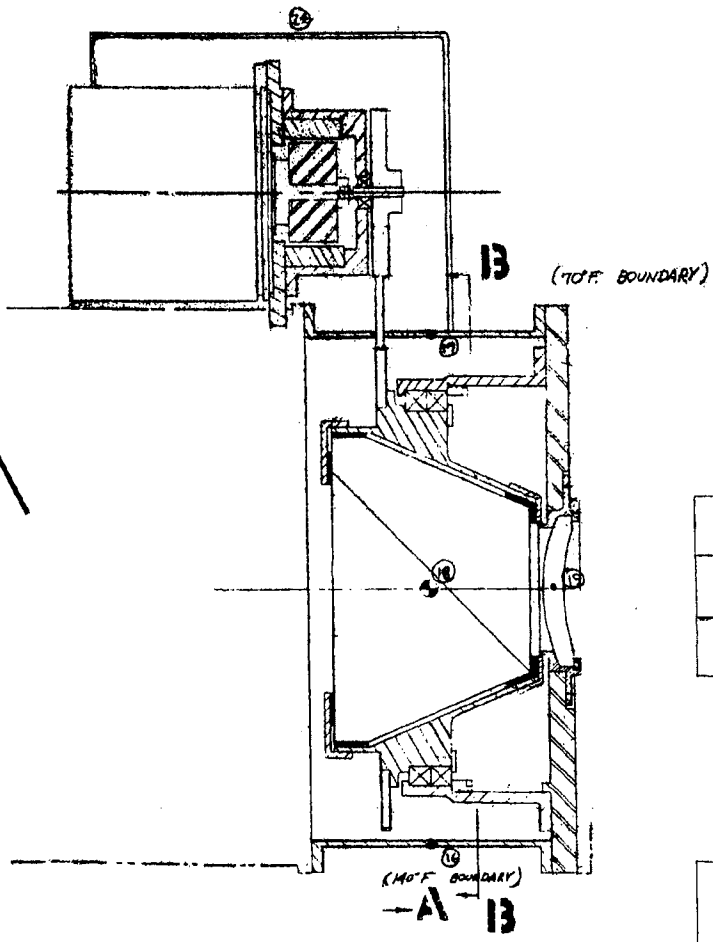


Figure 2.4-24. Node Designations of Elbow

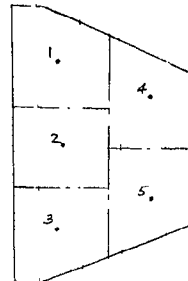
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~~SECRET~~ SPECIAL HANDLING

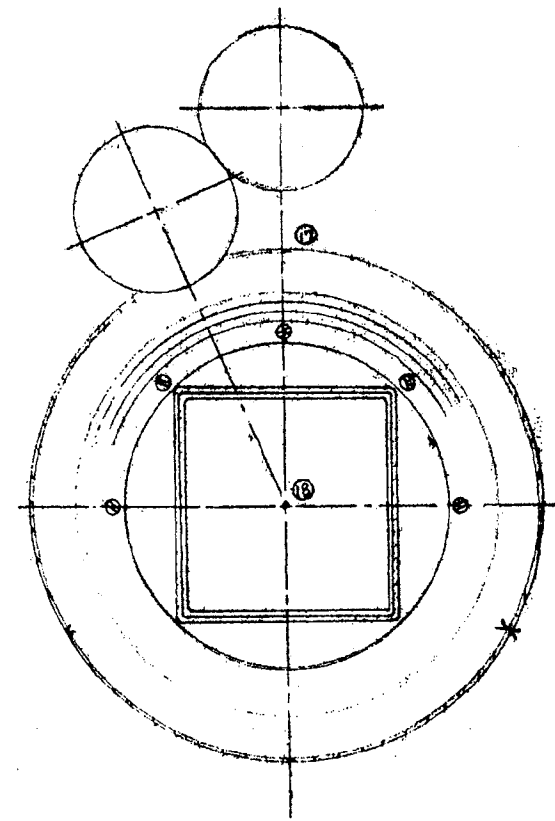
~~SECRET~~ SPECIAL HANDLING



11	14
6	9
1	4



1	6	11
4	9	14
2	7	12
5	10	15
3	8	13



SECTION 13 13

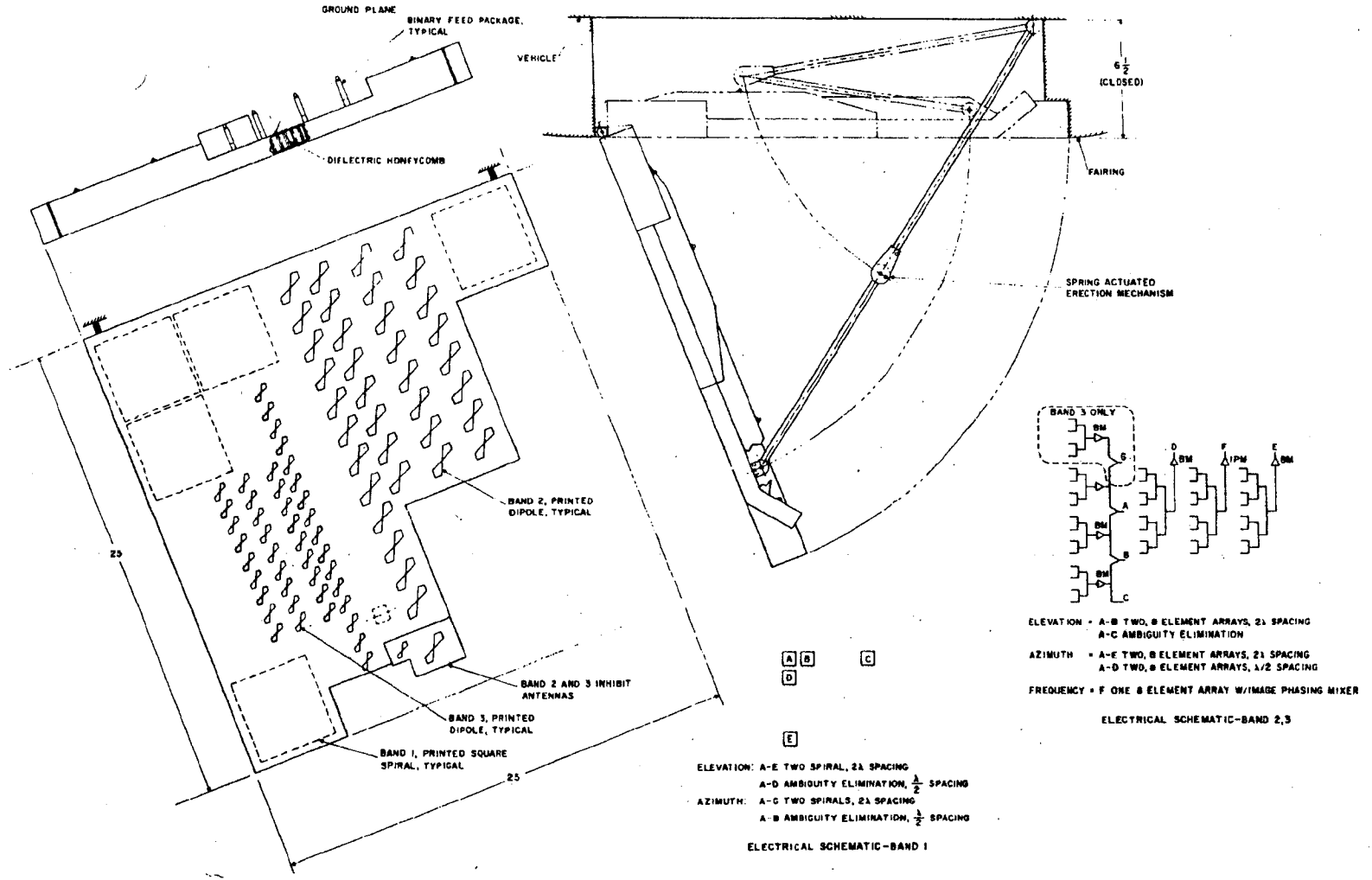
~~SECRET~~ SPECIAL HANDLING

Figure 2.4-25. Node Designations for Pechan and Structure

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6-17



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Figure 6-3. Experiment P-4 Acquisition Antenna Elements

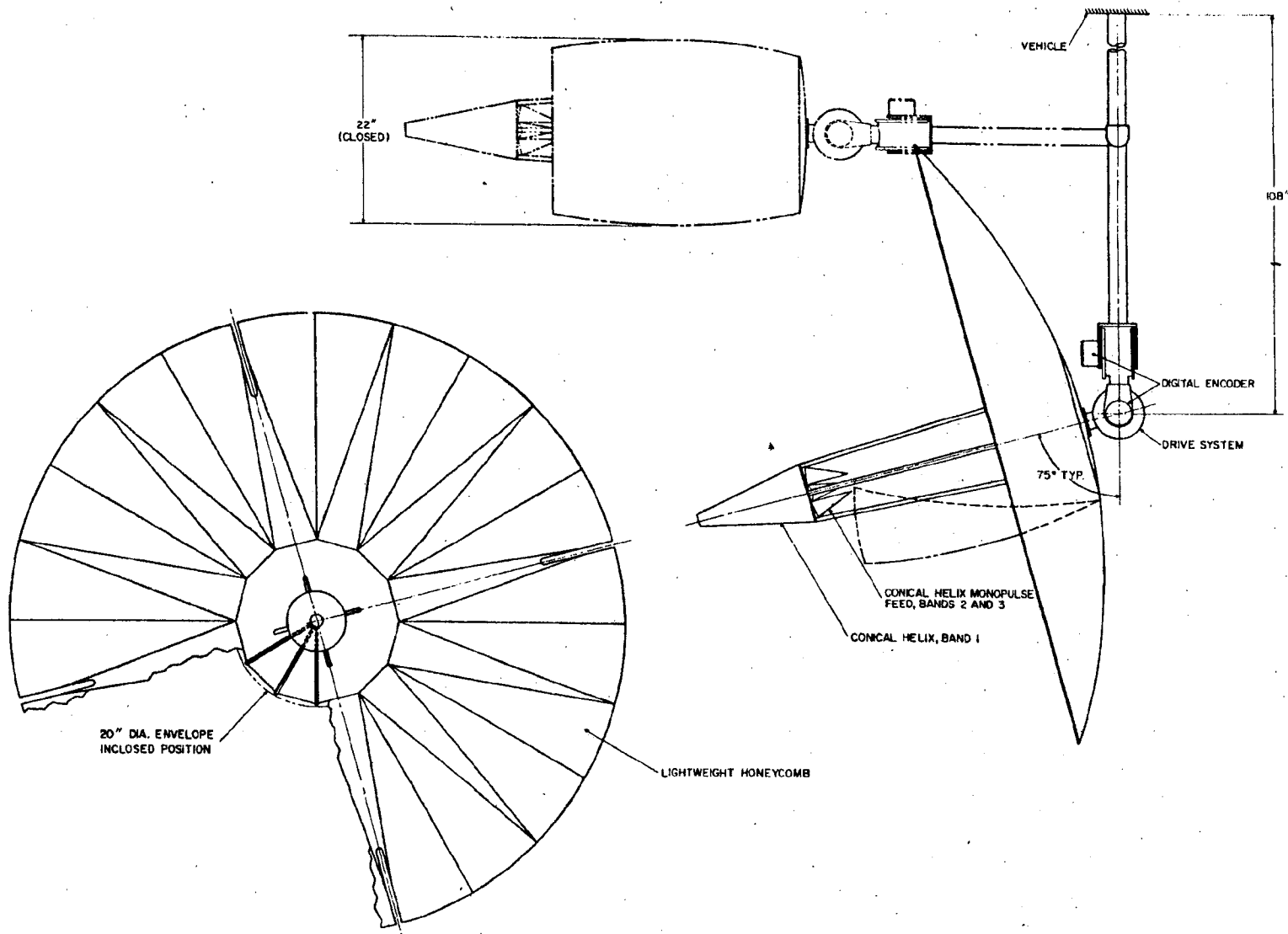


Figure 6-4. Experiment P-4 Proposed Tracking Antenna

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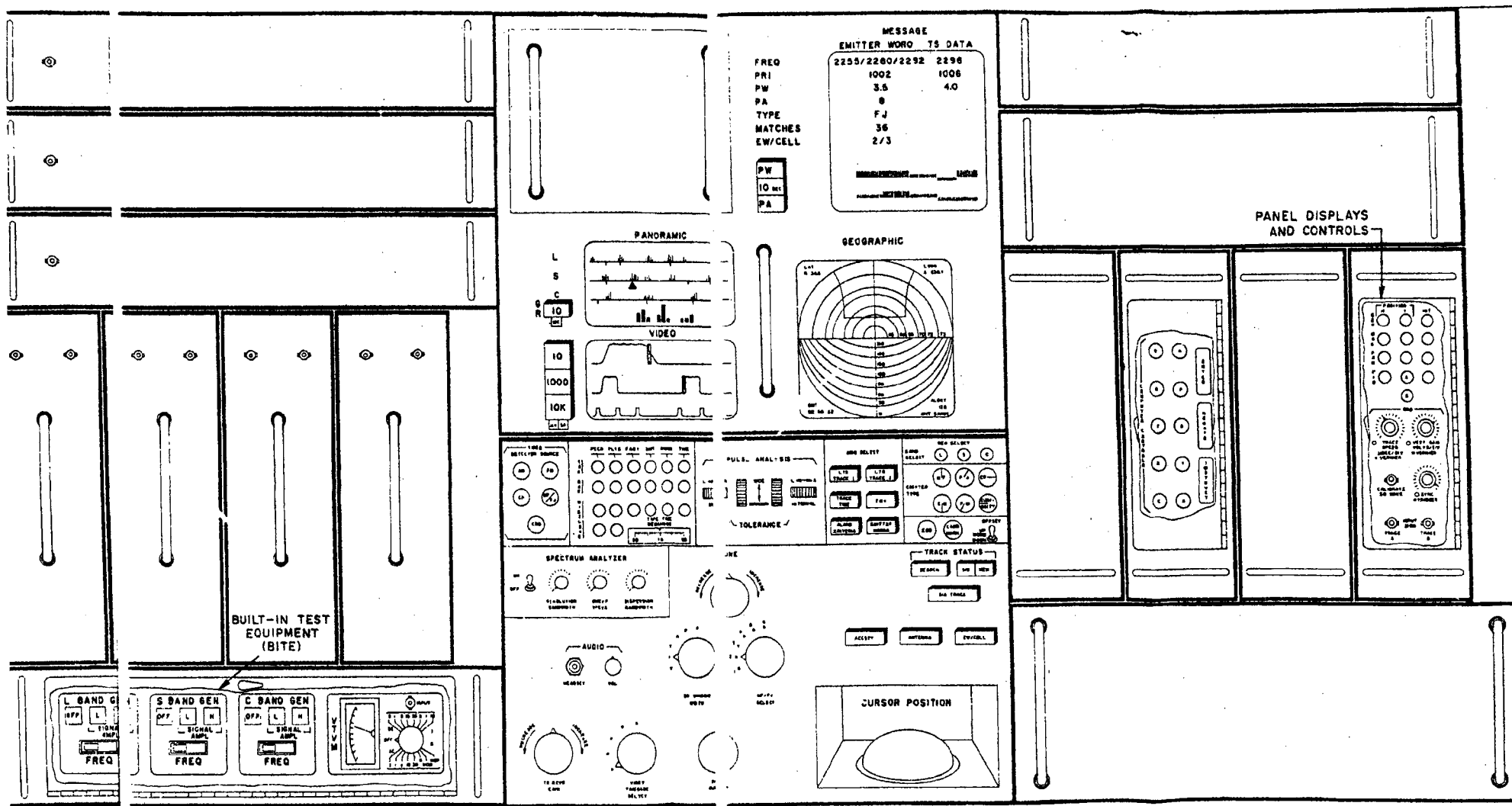


Figure 6-5. Experiment P-4 Equipment Arrangement

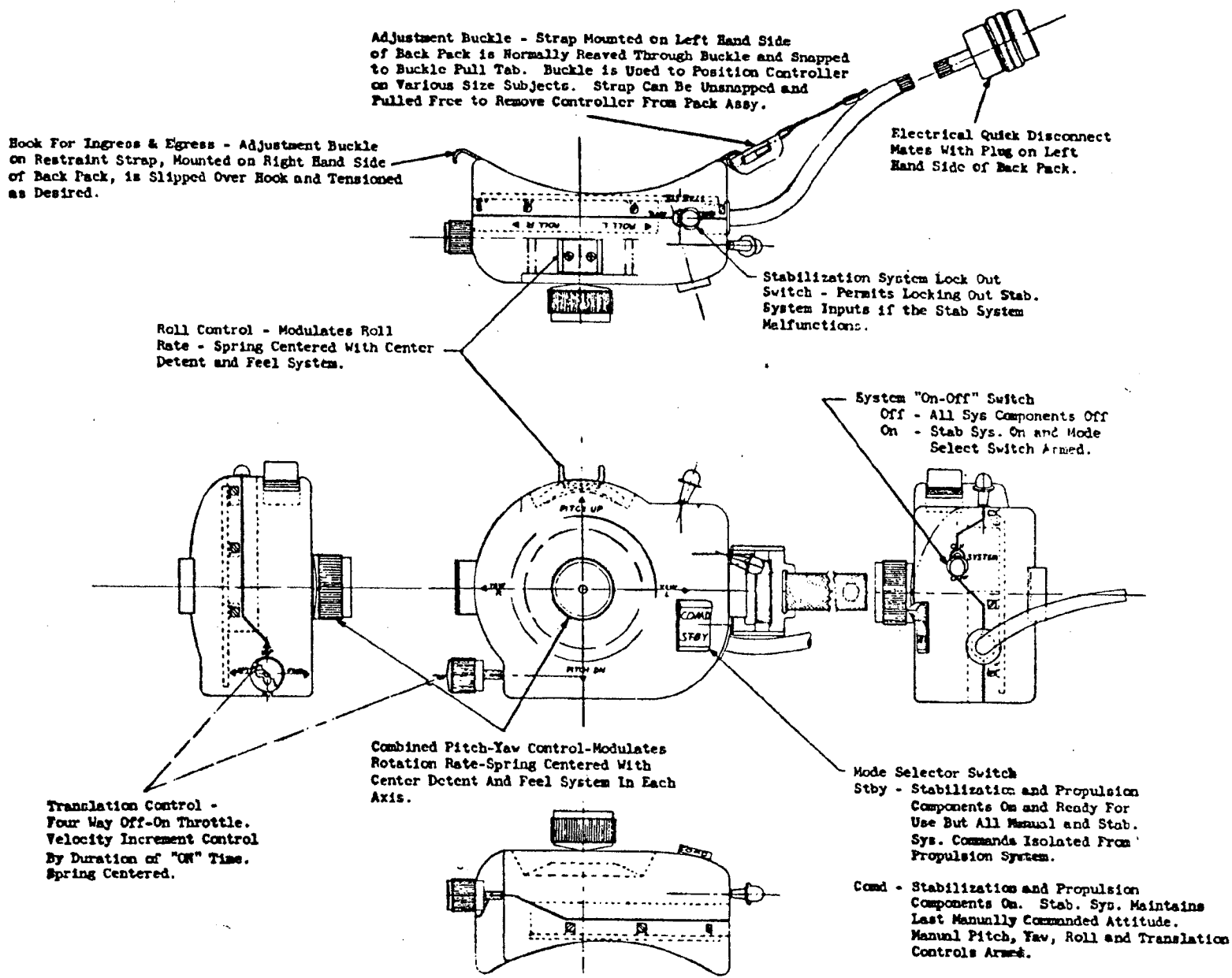


Figure 8-2. Typical AMU Manual Controller

8-7

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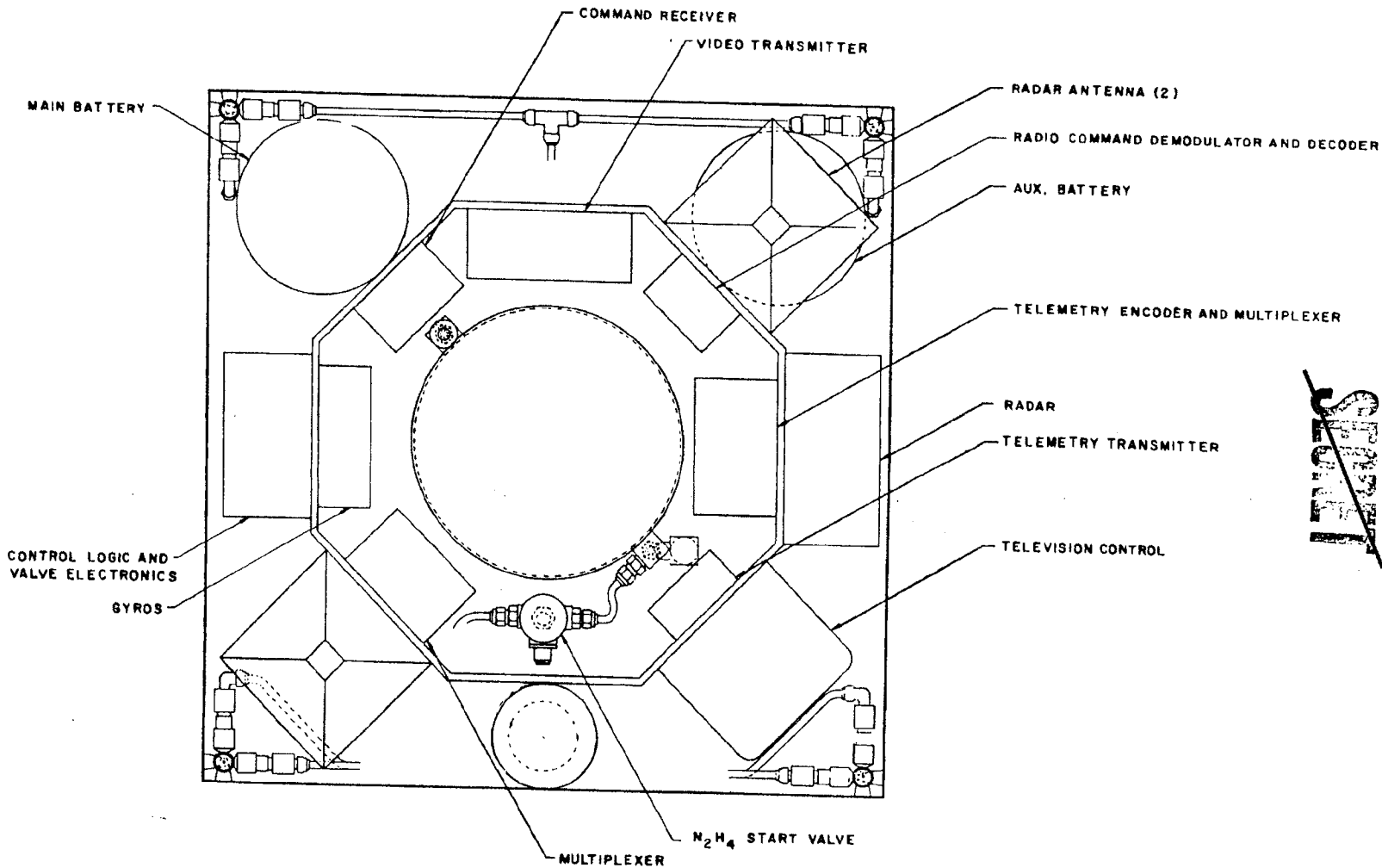


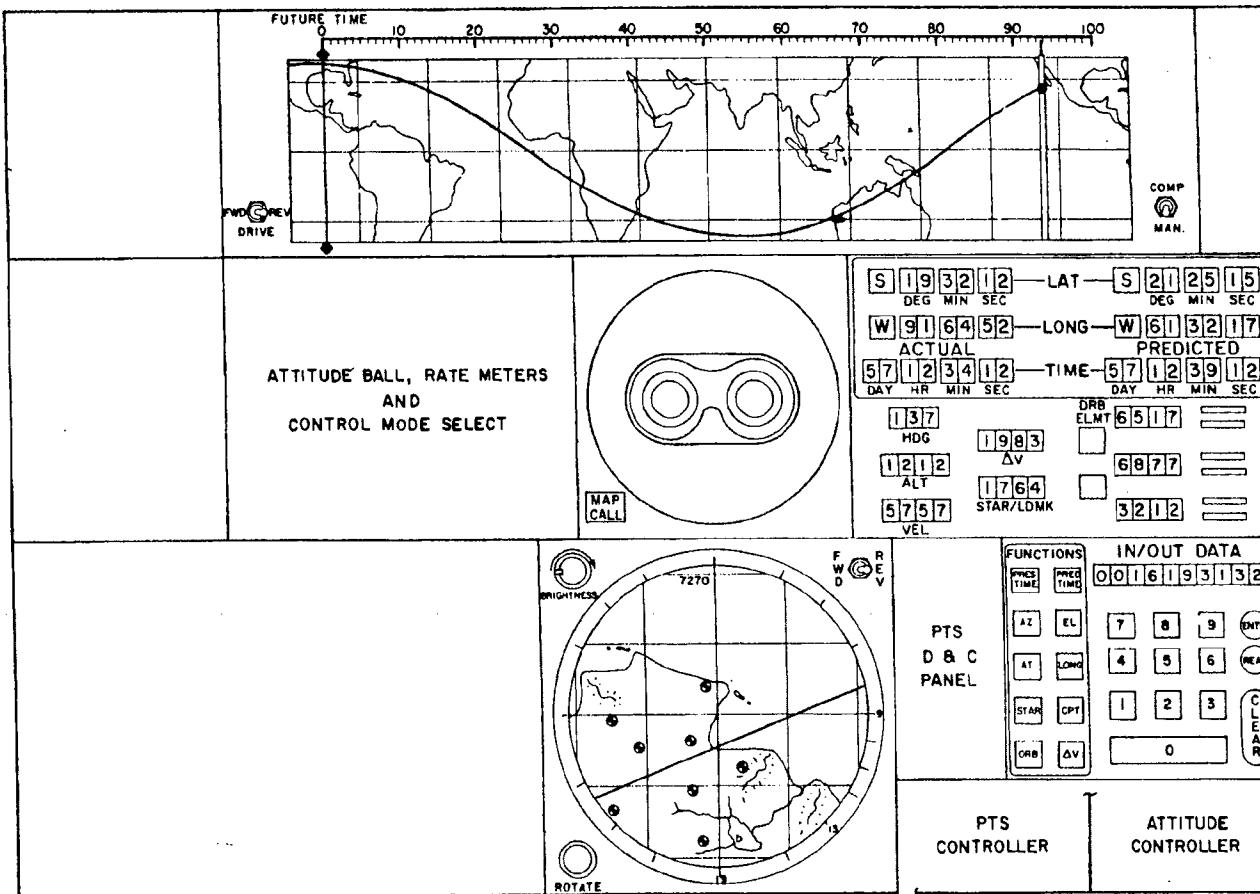
Figure 9-3. RMU Arrangement

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9-11

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SEATED, ERECT
EYE LEVEL

SCALE
2 IN.

Figure 10-4. Preliminary MOL Autonomous Navigation Display and Control

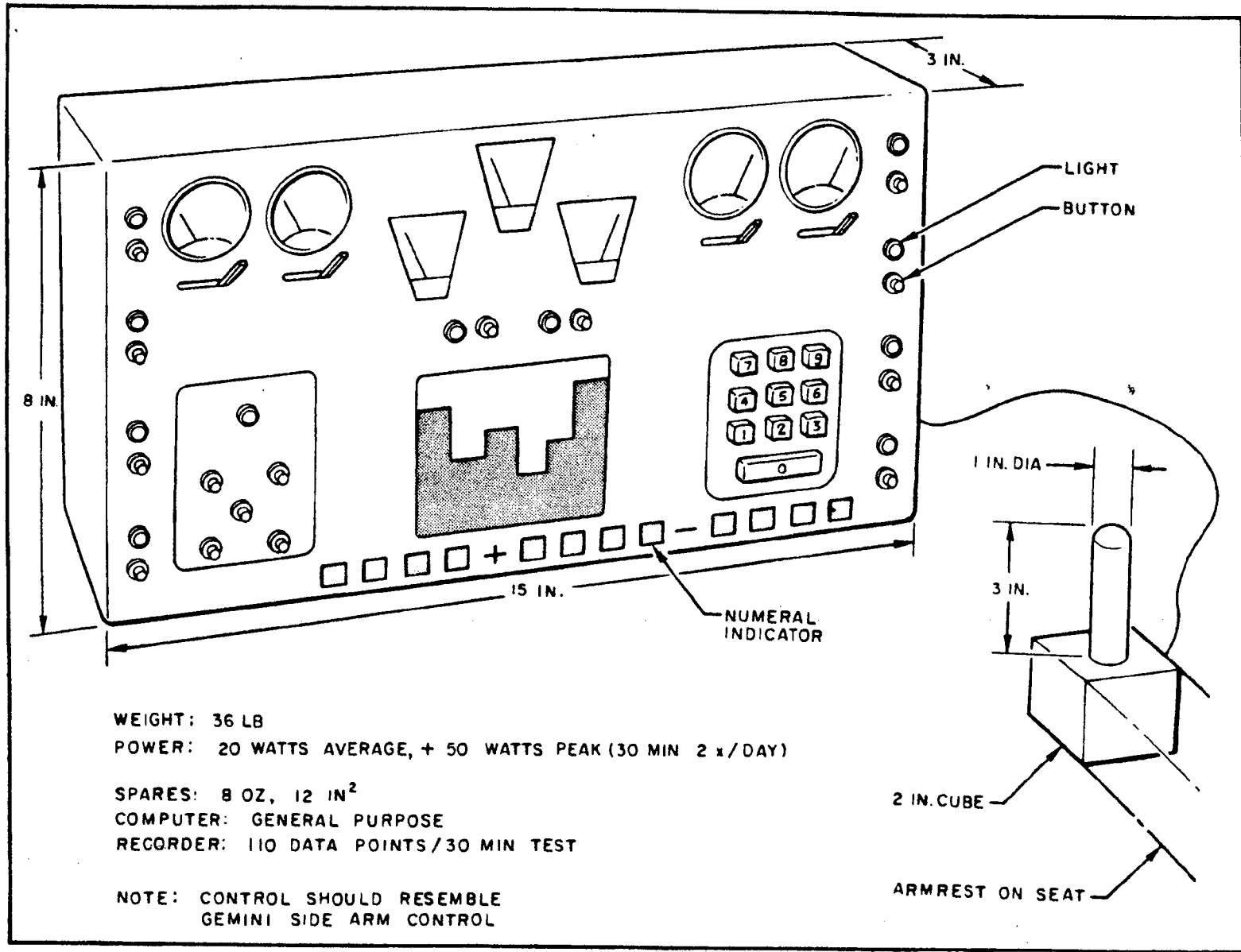
This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C., Section 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

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10-9

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13-3

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Figure 13-1. Preliminary Sketch of Equipment for P-11

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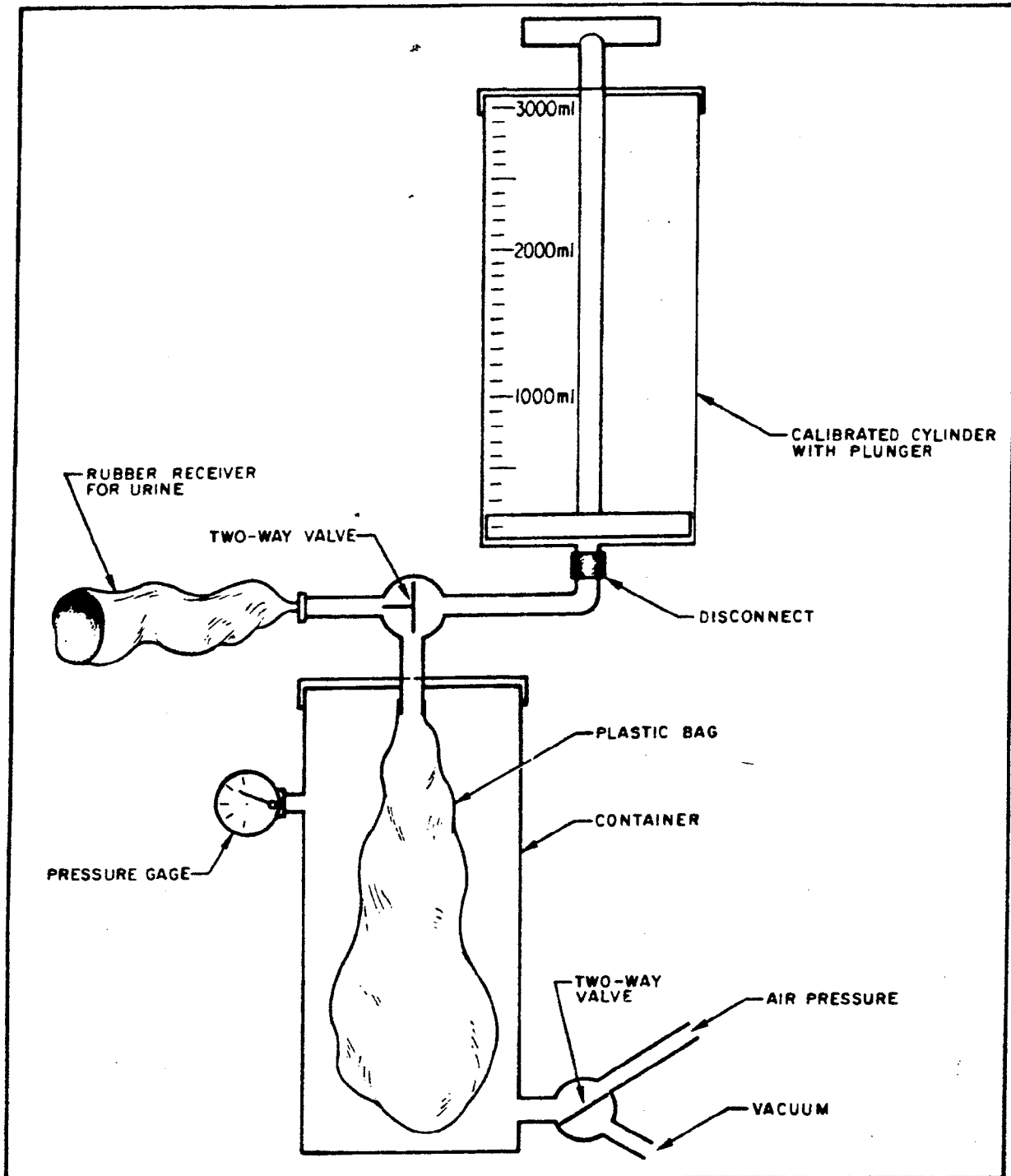
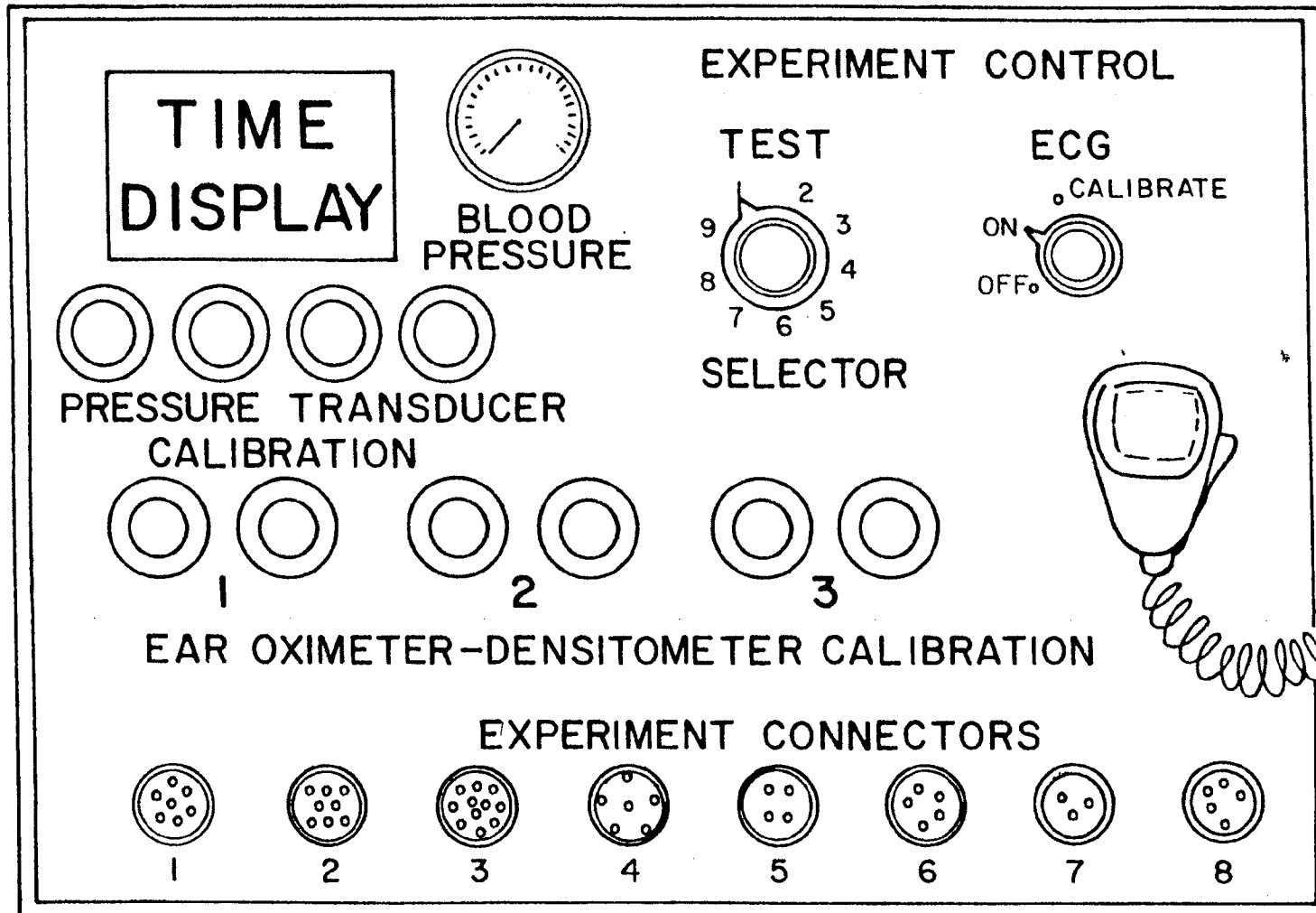


Figure 14-5. Device for Collecting Urine and Measuring Urine Volume

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14-29

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Figure 14-6. Medical Experiment Control Panel

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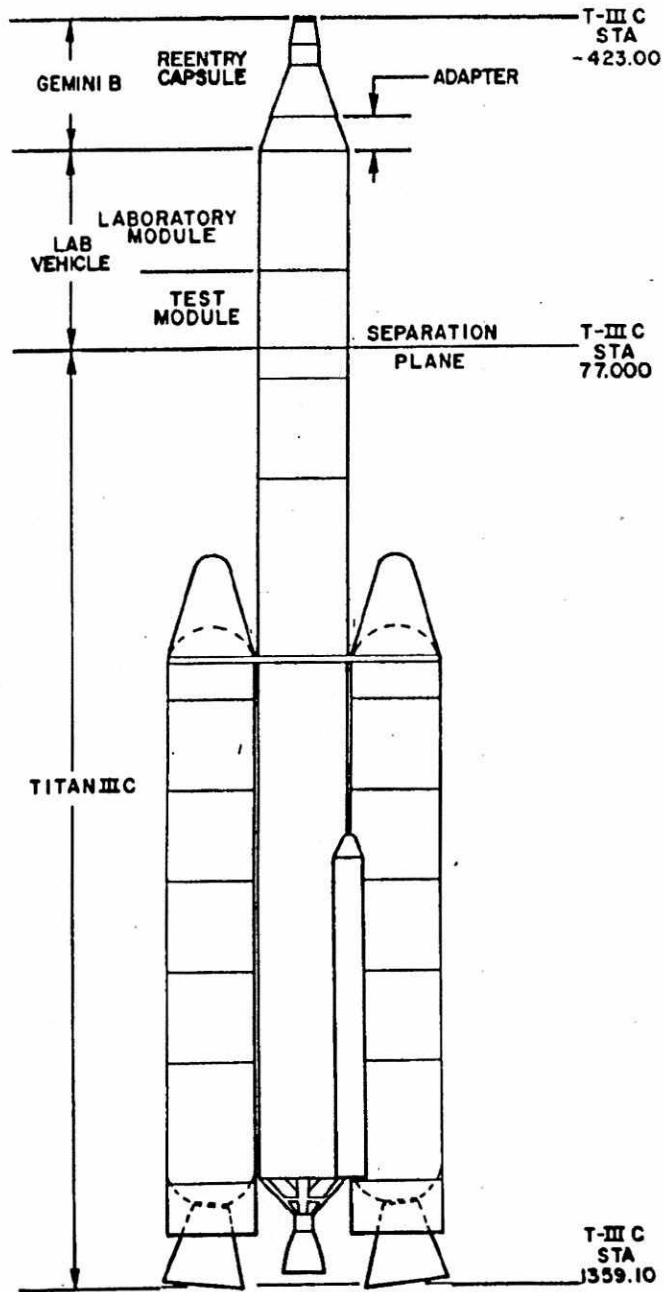


Figure 6.0-1. MOL Flight Vehicle

SSM-50
6-2

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SSM-50
6-68

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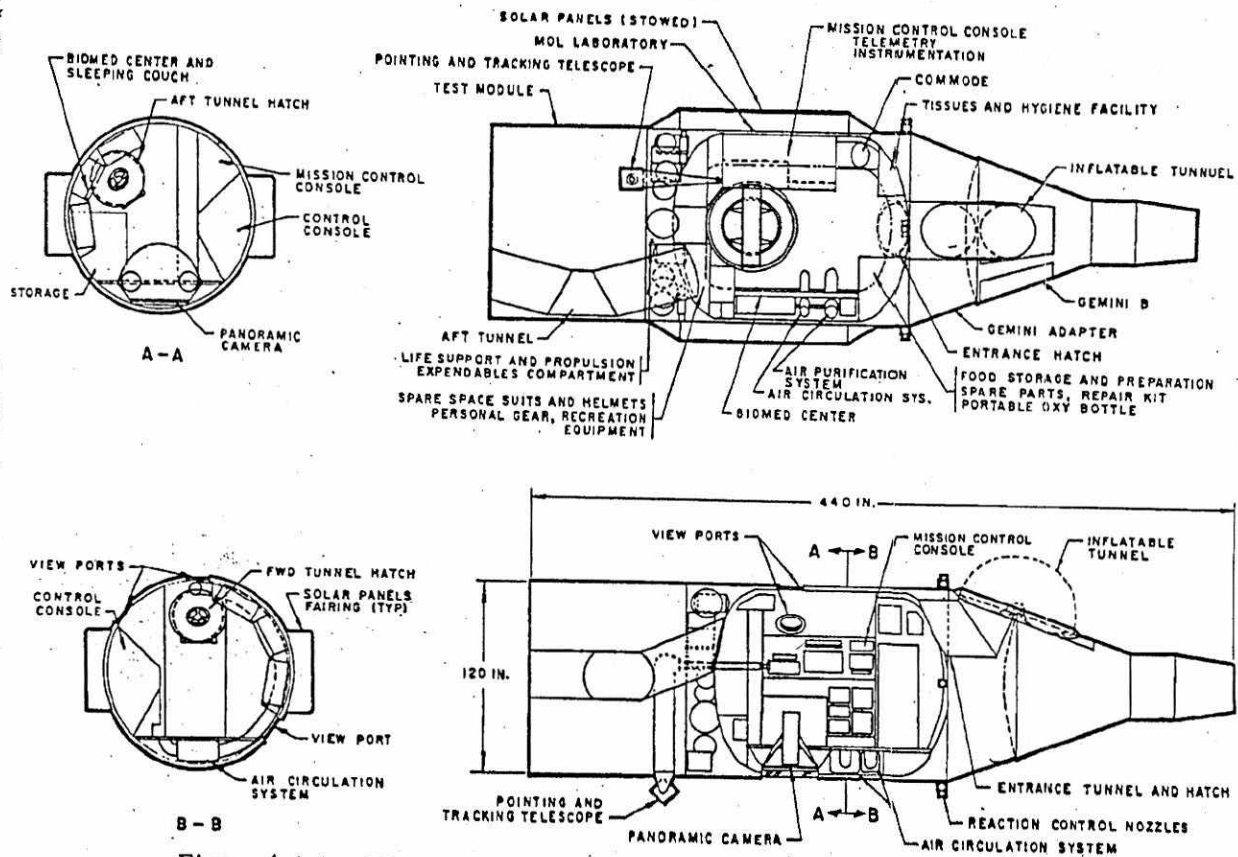


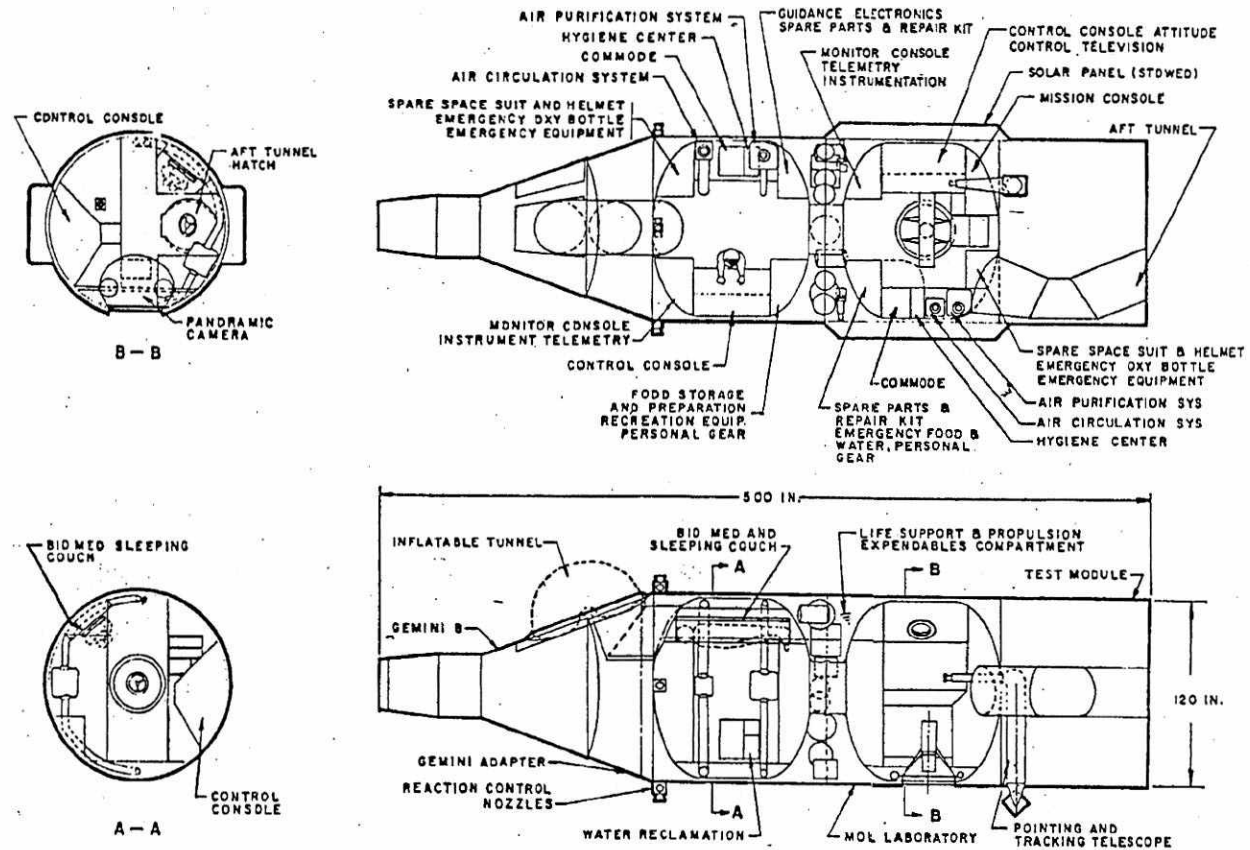
Figure 6.4-1. MOL Laboratory Vehicle - Single Pressure Compartment

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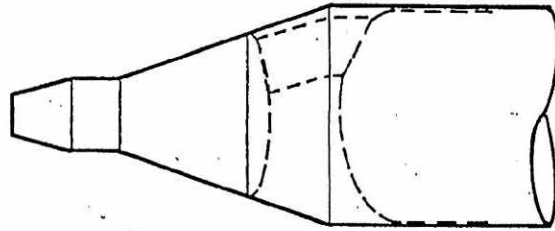
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SSM-50
6-69

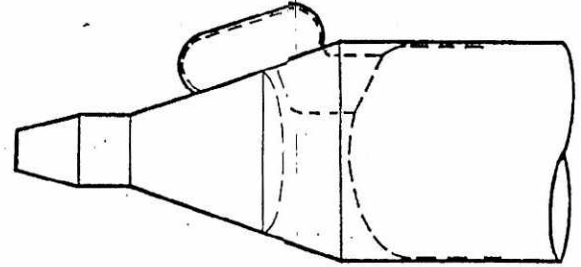


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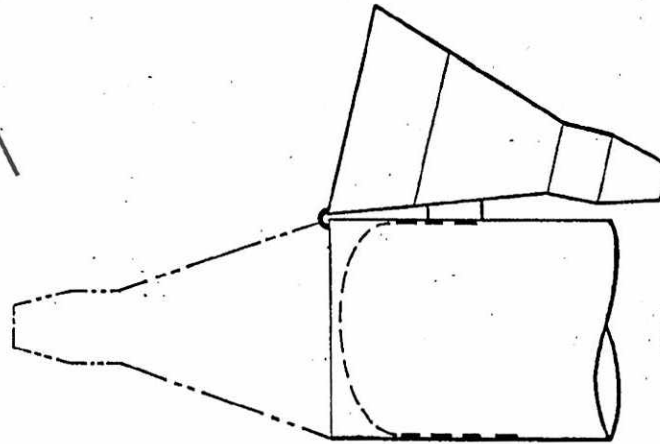
Figure 6.4-2. MOL Laboratory Vehicle - Dual Pressure Compartment



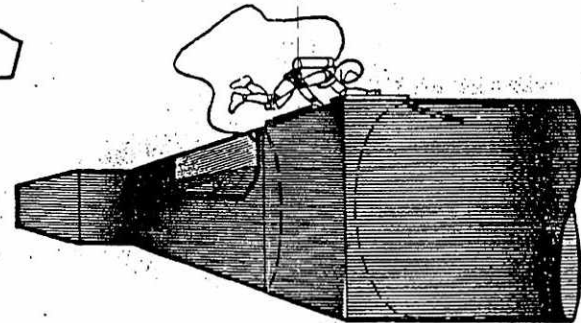
HATCH IN GEMINI HEAT SHIELD



INFLATABLE TUNNEL



GEMINI ROTATED



EXTRA VEHICULAR

Figure 6.4-3. Astronaut Transfer Concepts

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C., Section 793 and 794, the transmission of which in any manner to an unauthorized person is prohibited by law.

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SSM-50
6-71

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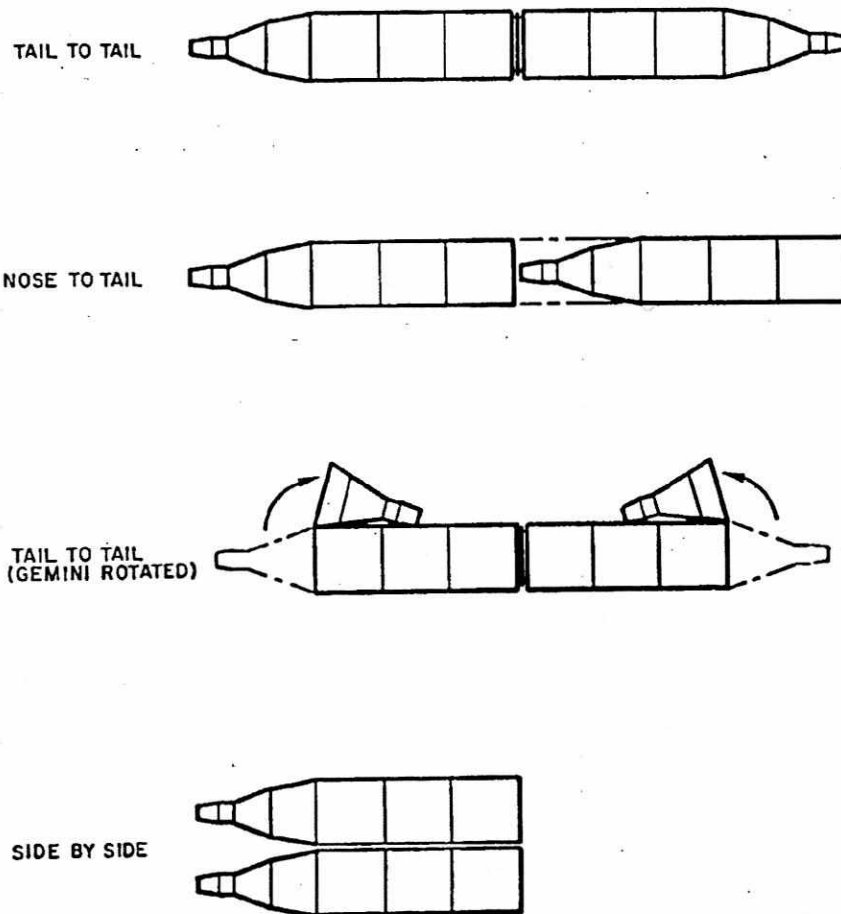


Figure 6.4-4. Docking and Mooring Concepts

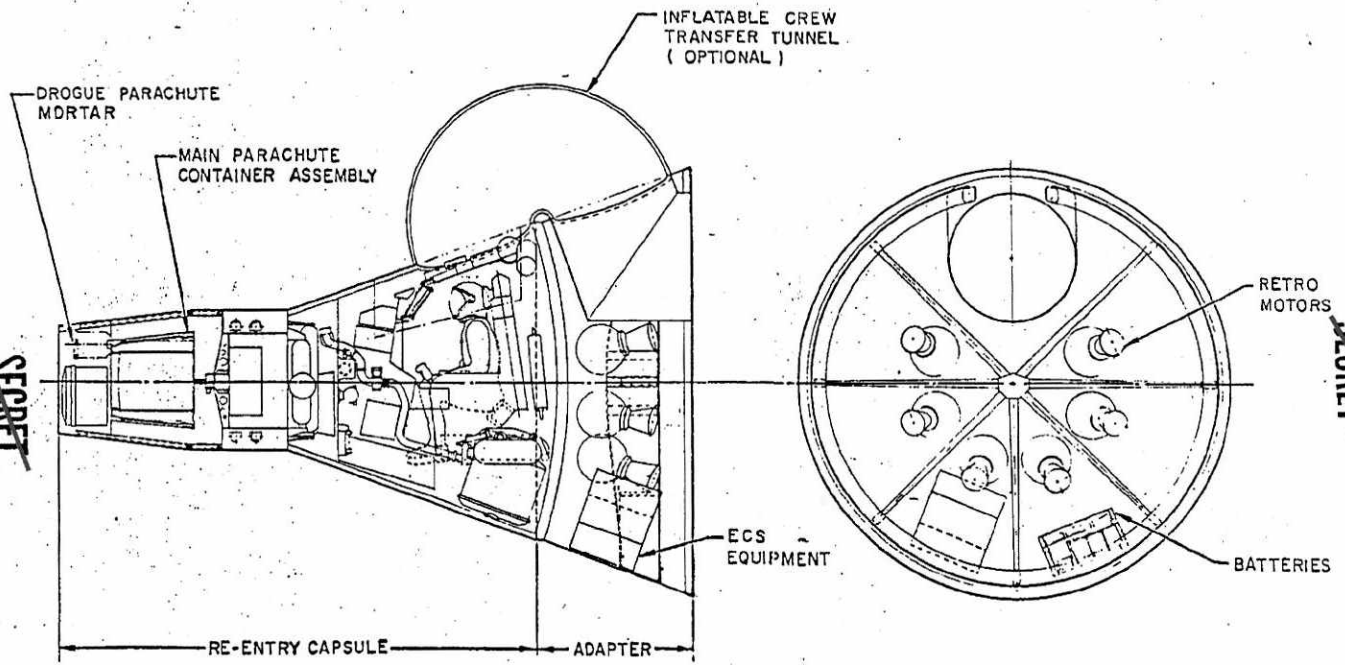
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SSM-50
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SSM-50
6-79



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Figure 6.5-1. Gemini B Vehicle

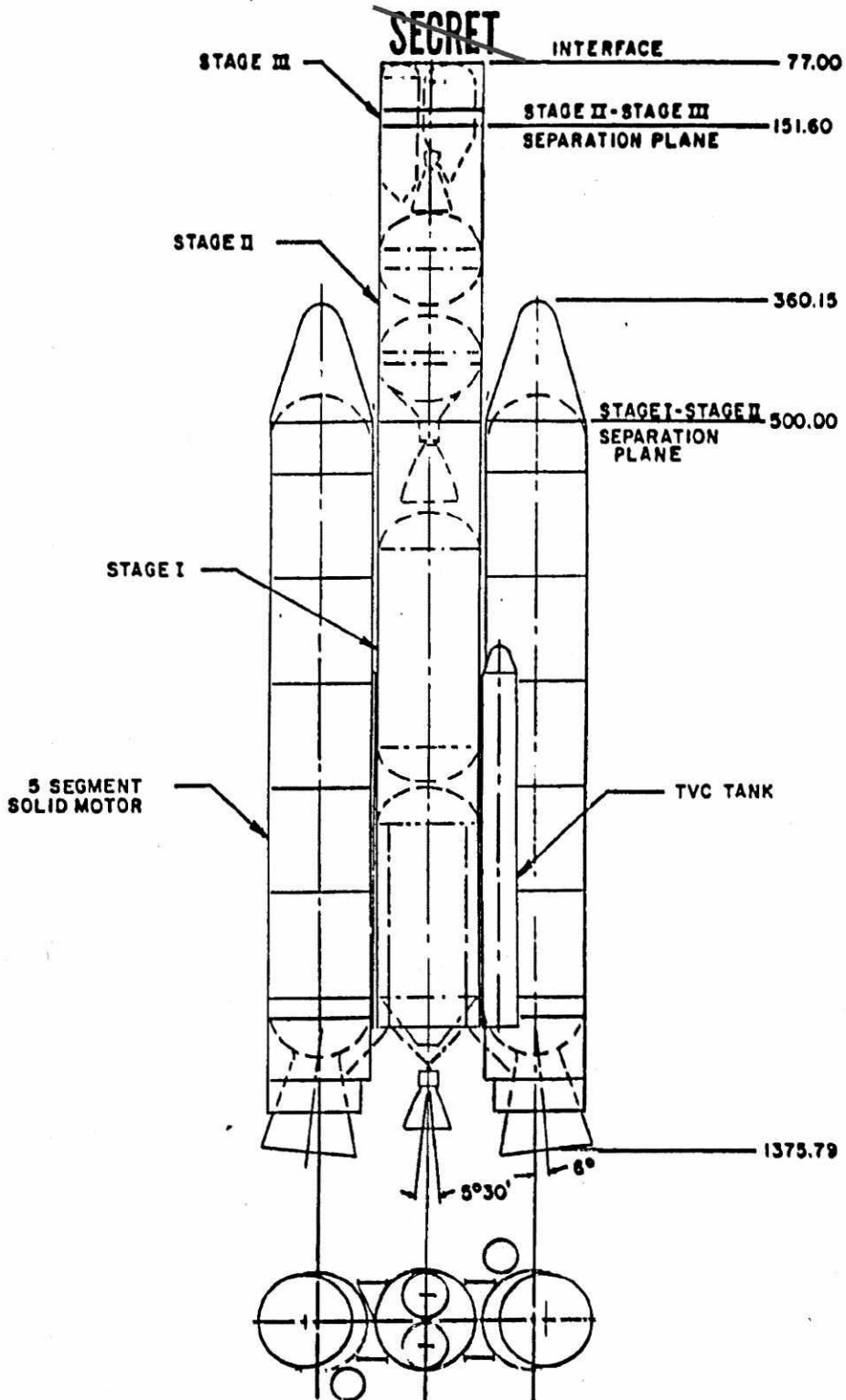


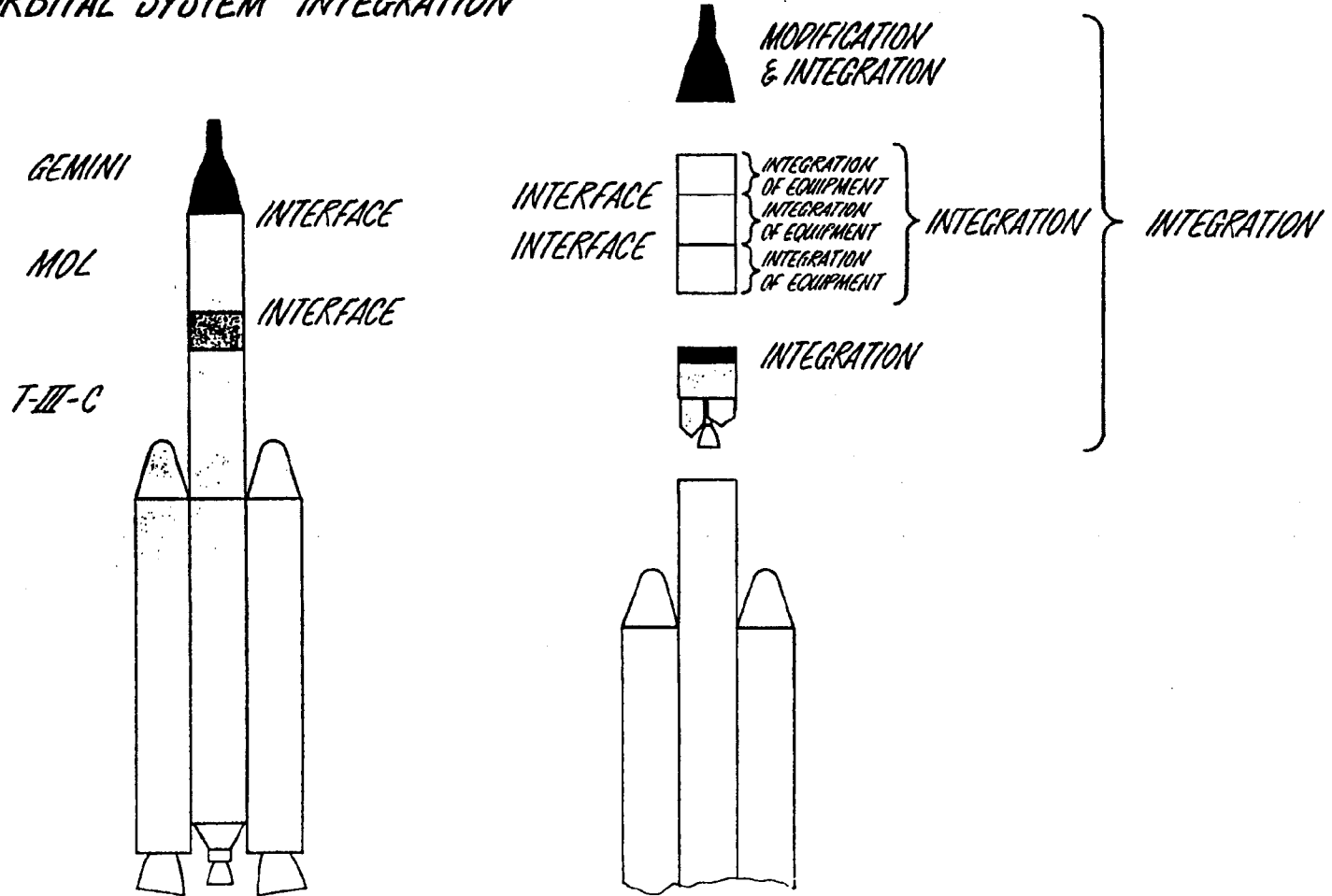
Figure 6.6-1. Titan IIC Vehicle

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SSM-50
6-83

MAJOR DEVELOPMENT PROBLEM

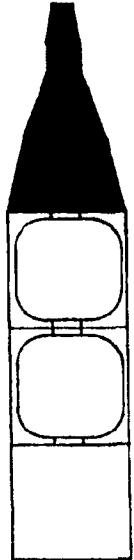
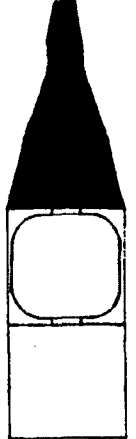
ORBITAL SYSTEM INTEGRATION



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MOL-3 - 115714-01

TYPICAL MOL SPACECRAFT CONFIGURATIONS

	AMR		PMR
	GEMINI B 6000		GEMINI B 6000
	MOL (1000 FT ³)* 8400		MOL (500 FT ³)* 6200
	CONTINGENCY 2000		CONTINGENCY 2000
	TOTAL SPACECRAFT WEIGHT 16,400		TOTAL SPACECRAFT WEIGHT 14,200
	T III C, 200 N.MI.		T III C, 200 N.MI. 19,000
	106° LAUNCH		POLAR
	AZIMUTH 23,000		CONTINGENCY 0
	CONTINGENCY 2000		
	GROSS PAYLOAD 4,600		GROSS PAYLOAD 4,800

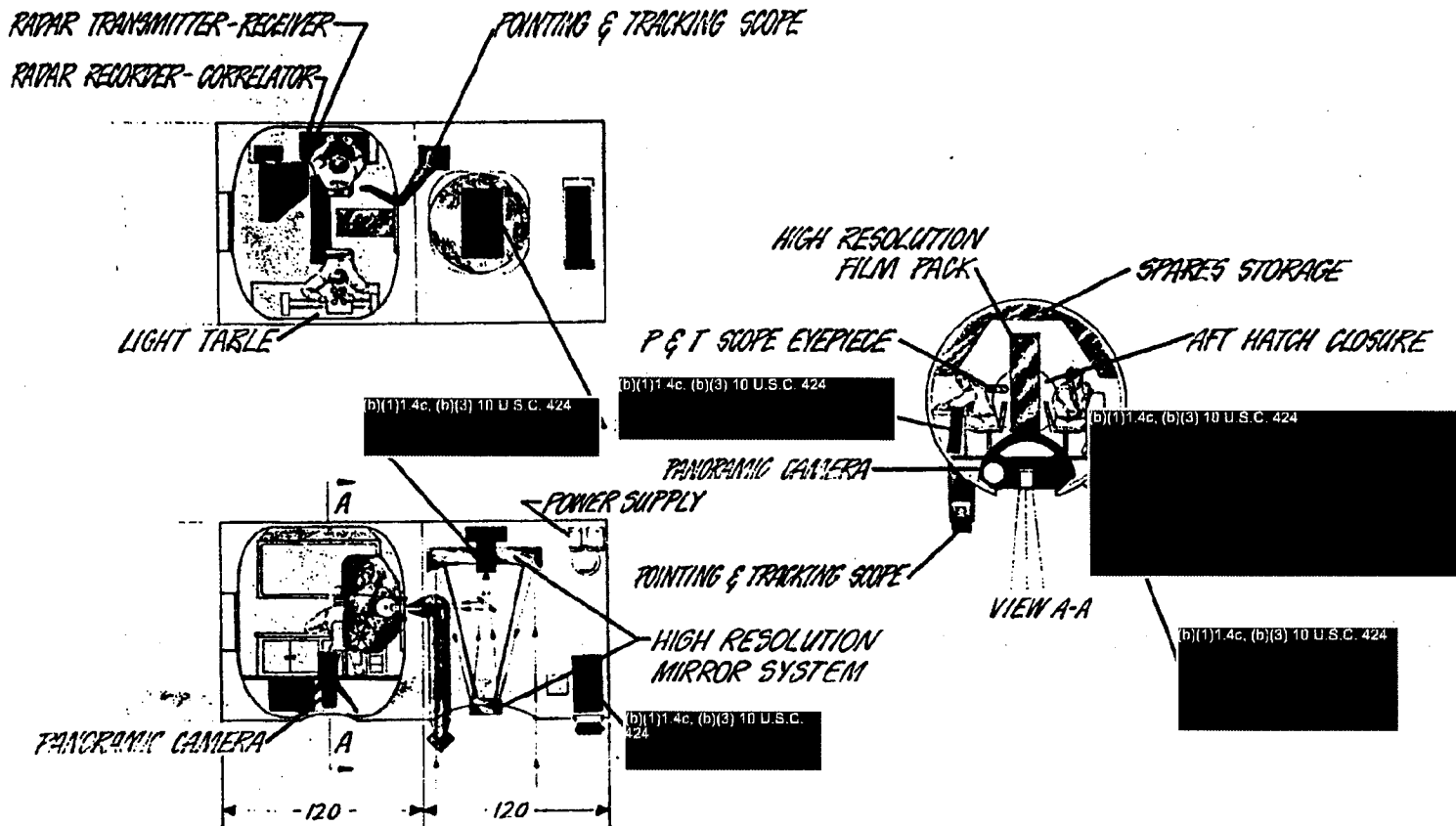
* 30 DAYS EXPENDABLES PLUS RESERVES

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AERONAUTICAL CORPORATION 

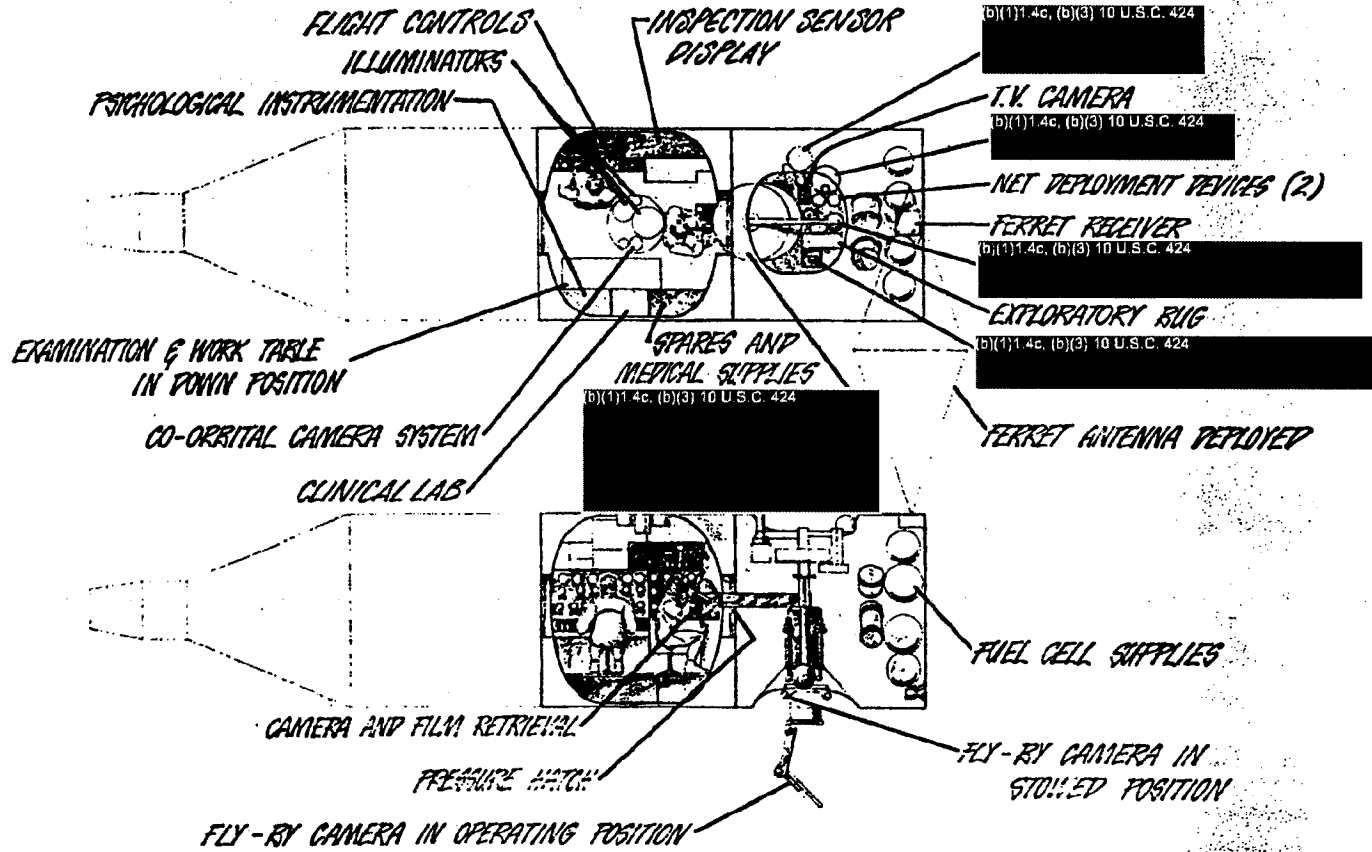
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TYPICAL MANNED RECONNAISSANCE TEST LAYOUT



MDL-35-123694-81

TYPICAL SATELLITE INSPECTION TEST LAYOUT



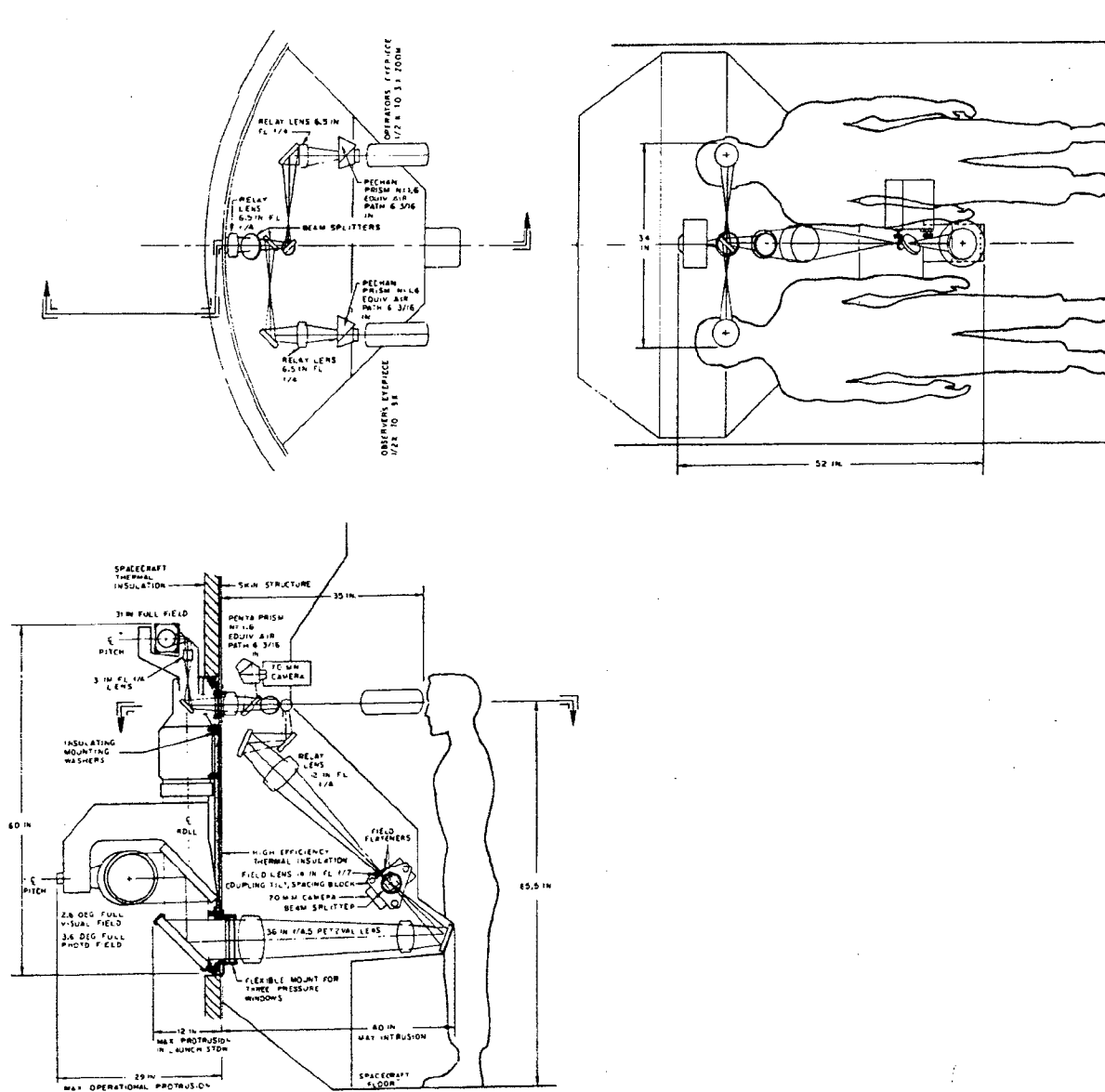


Figure 3-4. Pointing and Tracking Scope Configuration

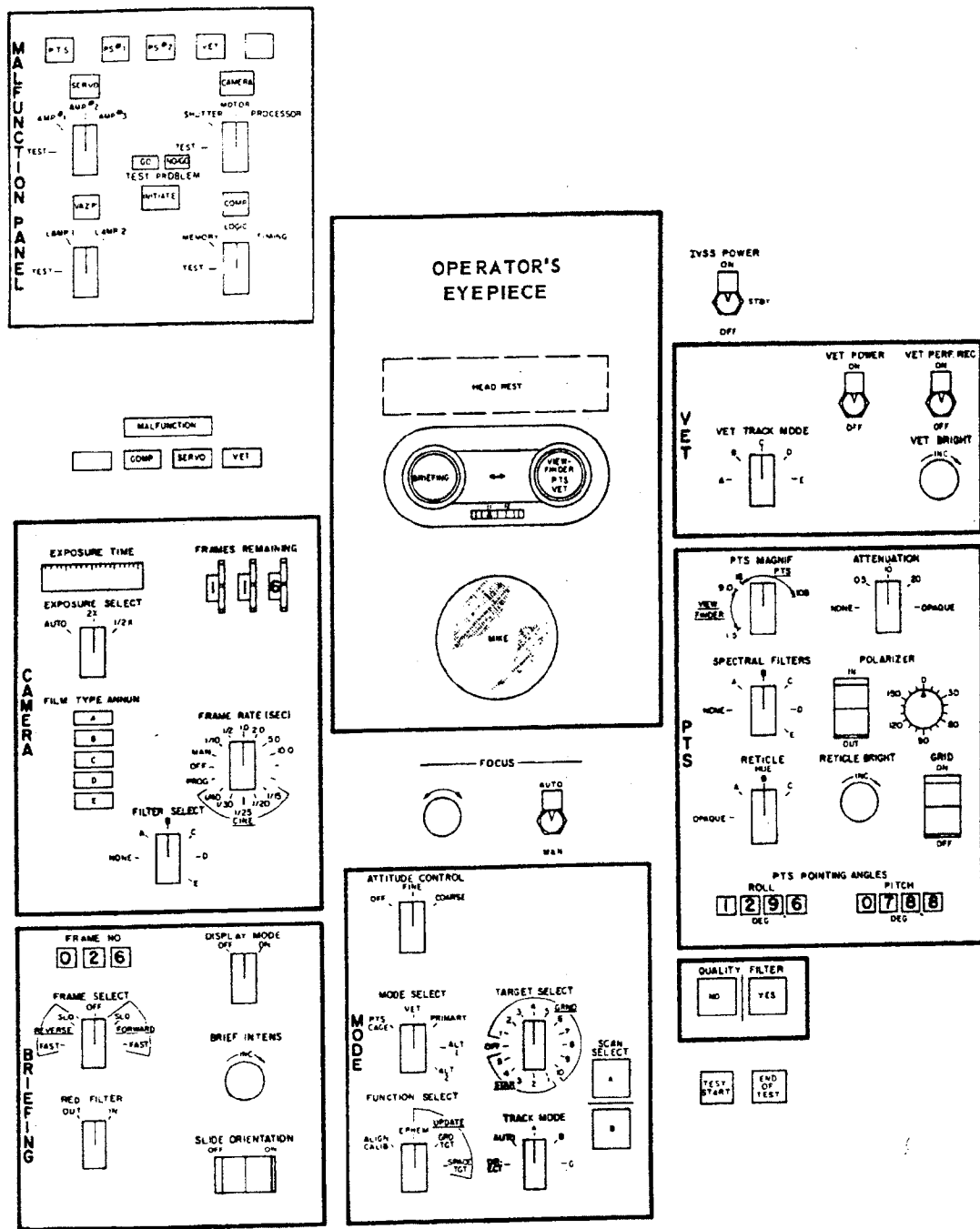
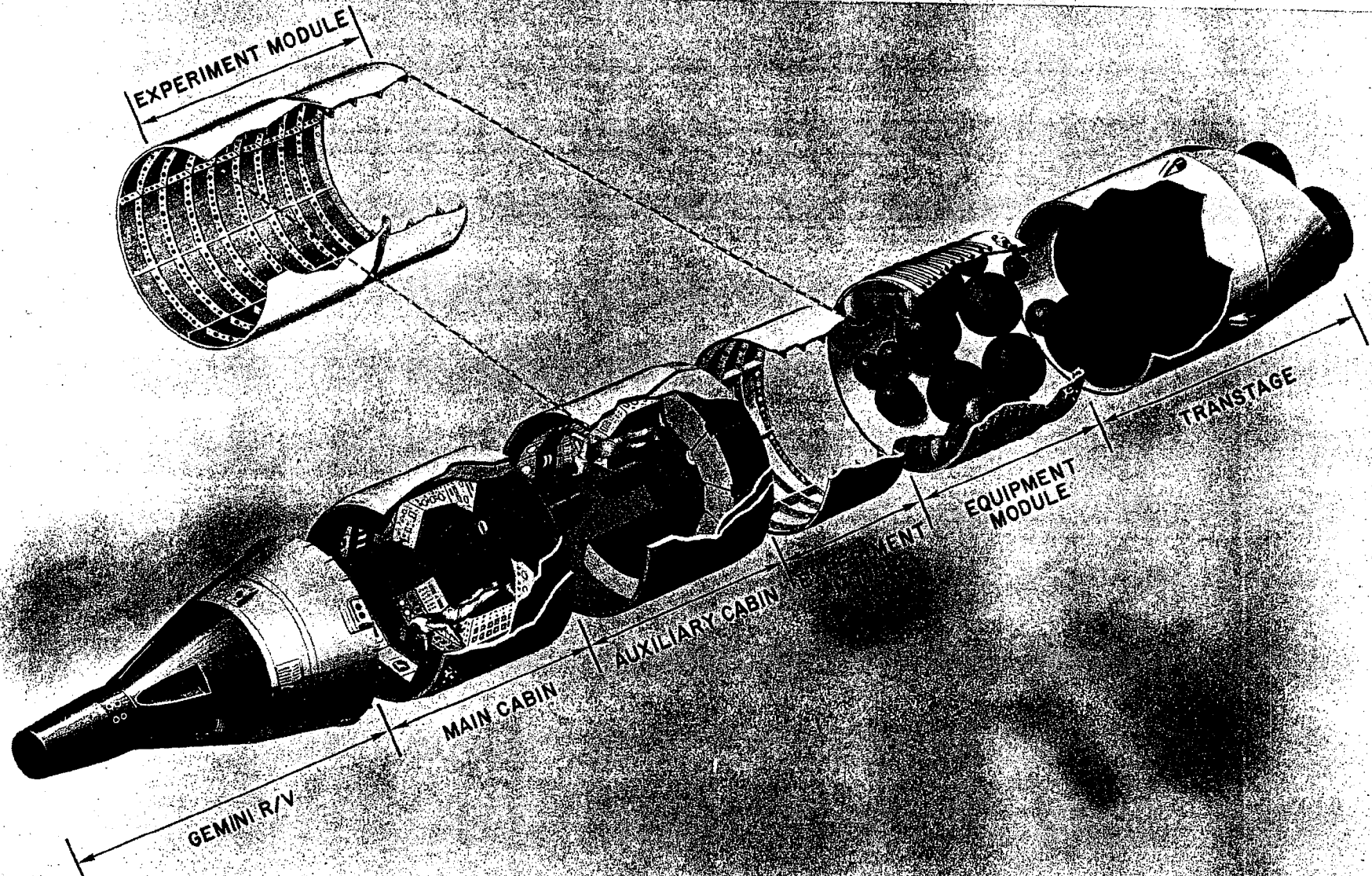


Figure 3-6. IVSS Control Panel

MANNED ORBITING LABORATORY

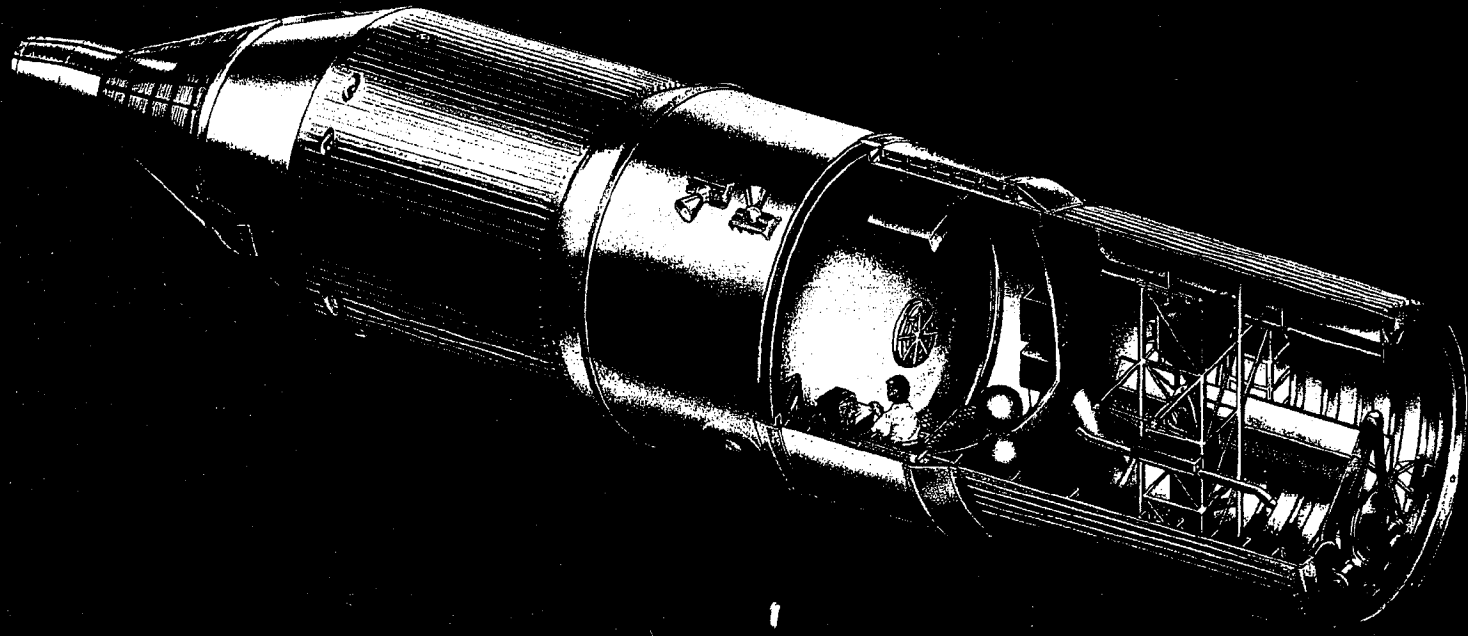


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LABORATORY VEHICLE

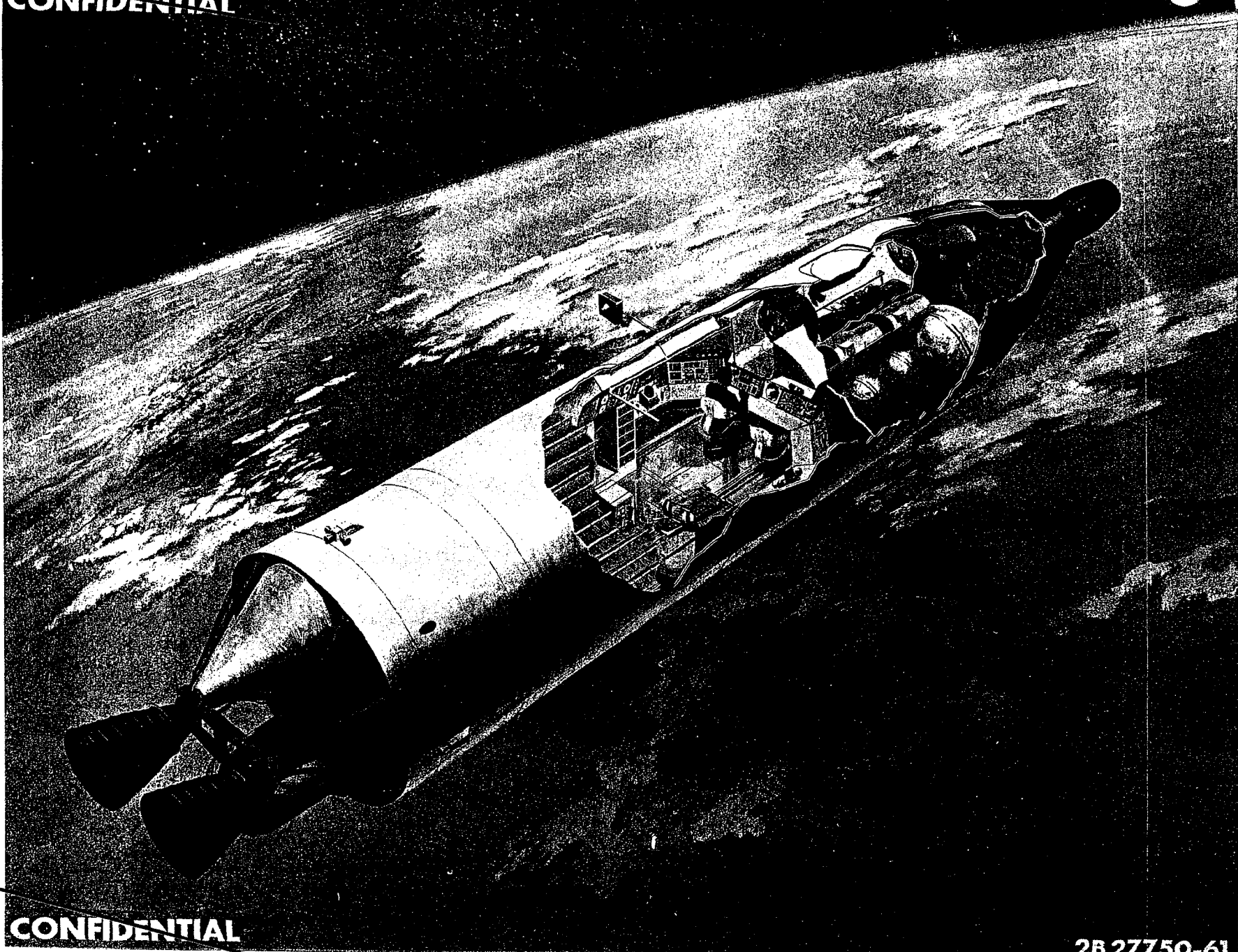
EXPERIMENTS ACCOMMODATION

2387



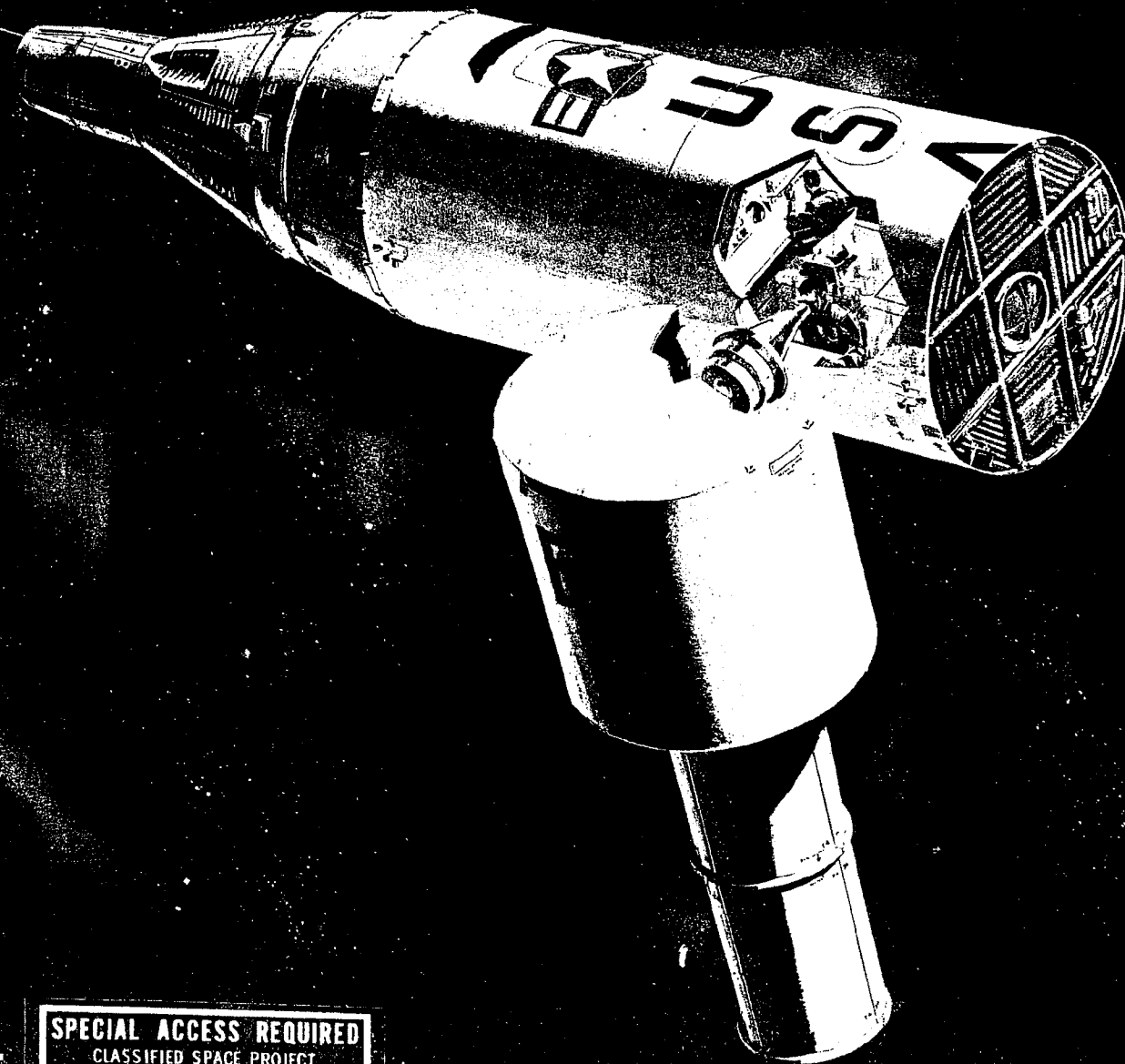
SECRET

CONFIDENTIAL



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SECRET



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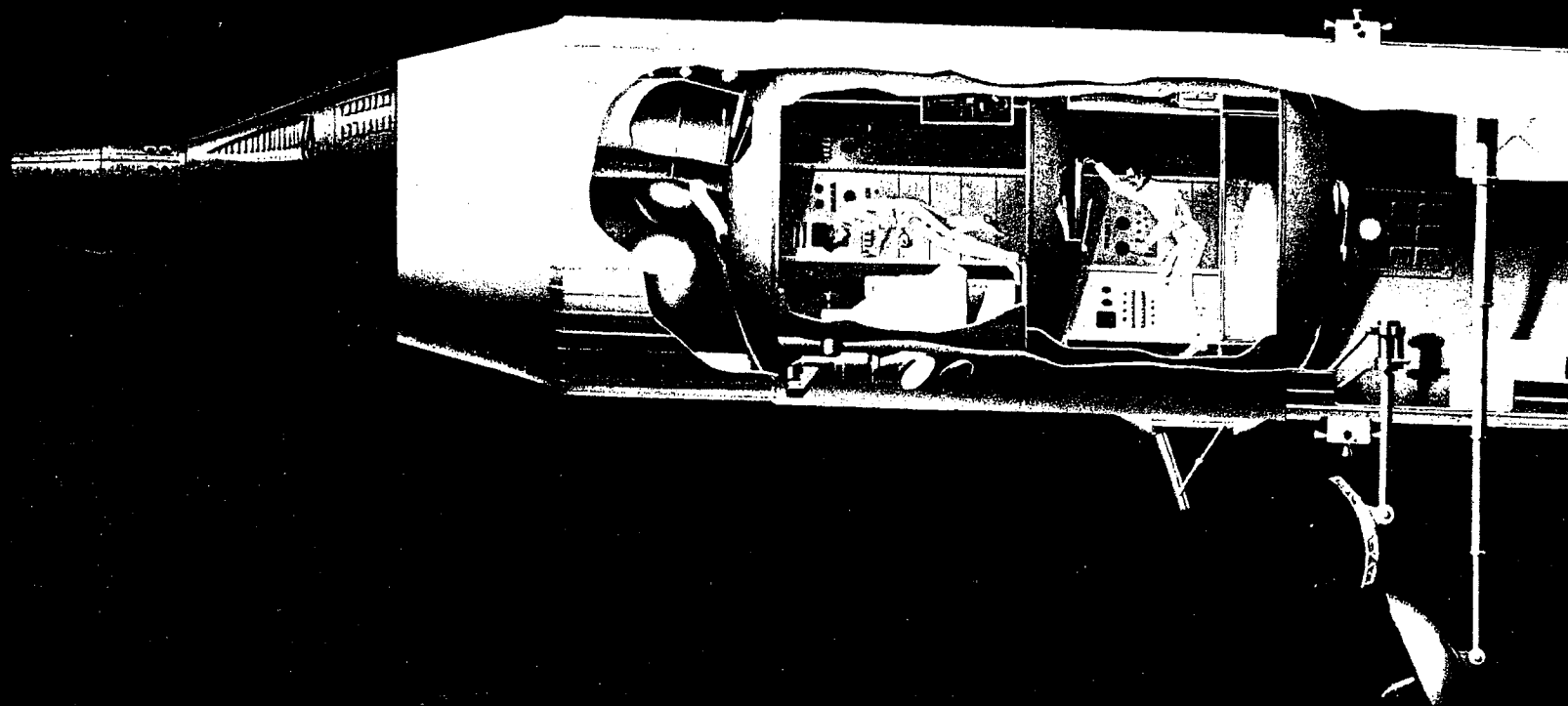
SPECIAL ACCESS REQUIRED
CLASSIFIED SPACE PROJECT
PROGRAM NO. 632A

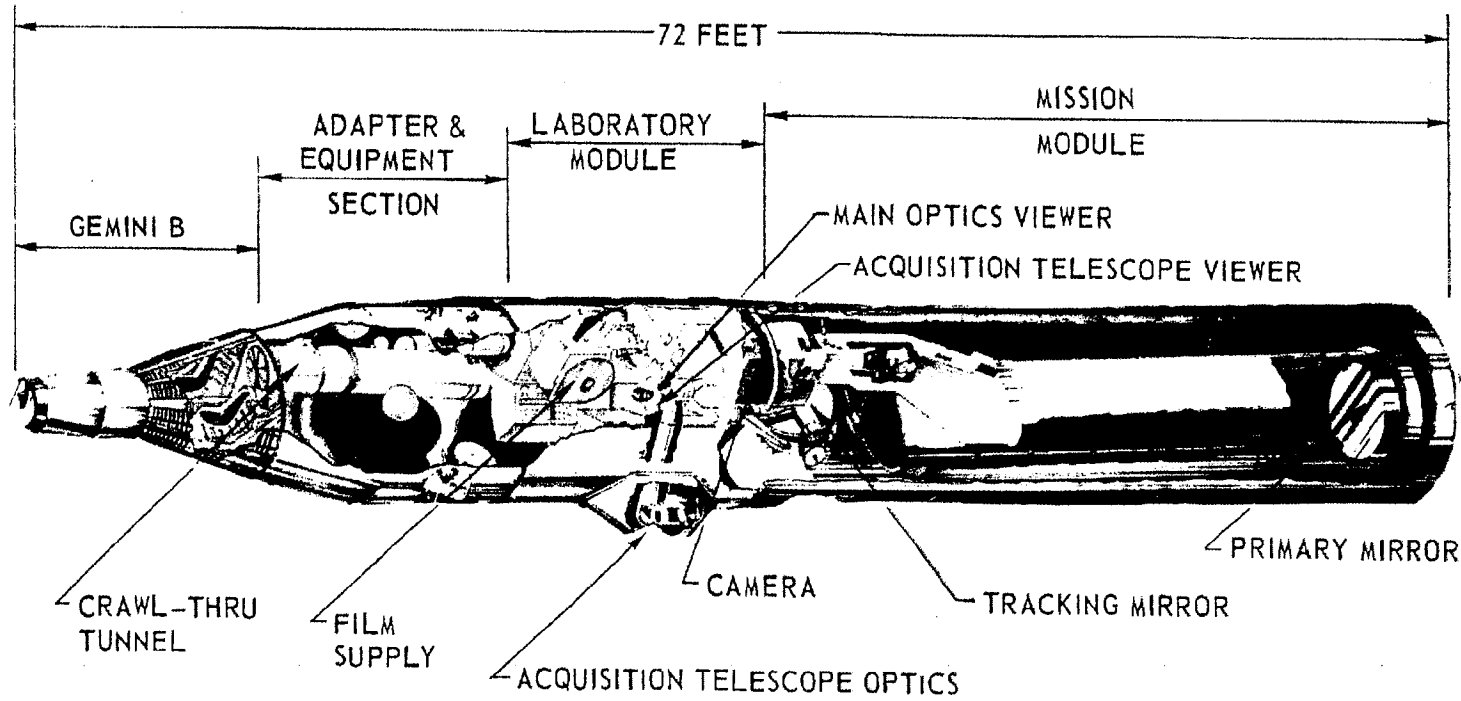
2B-27750-60

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M24434
C06129

MOL CONFIGURATION





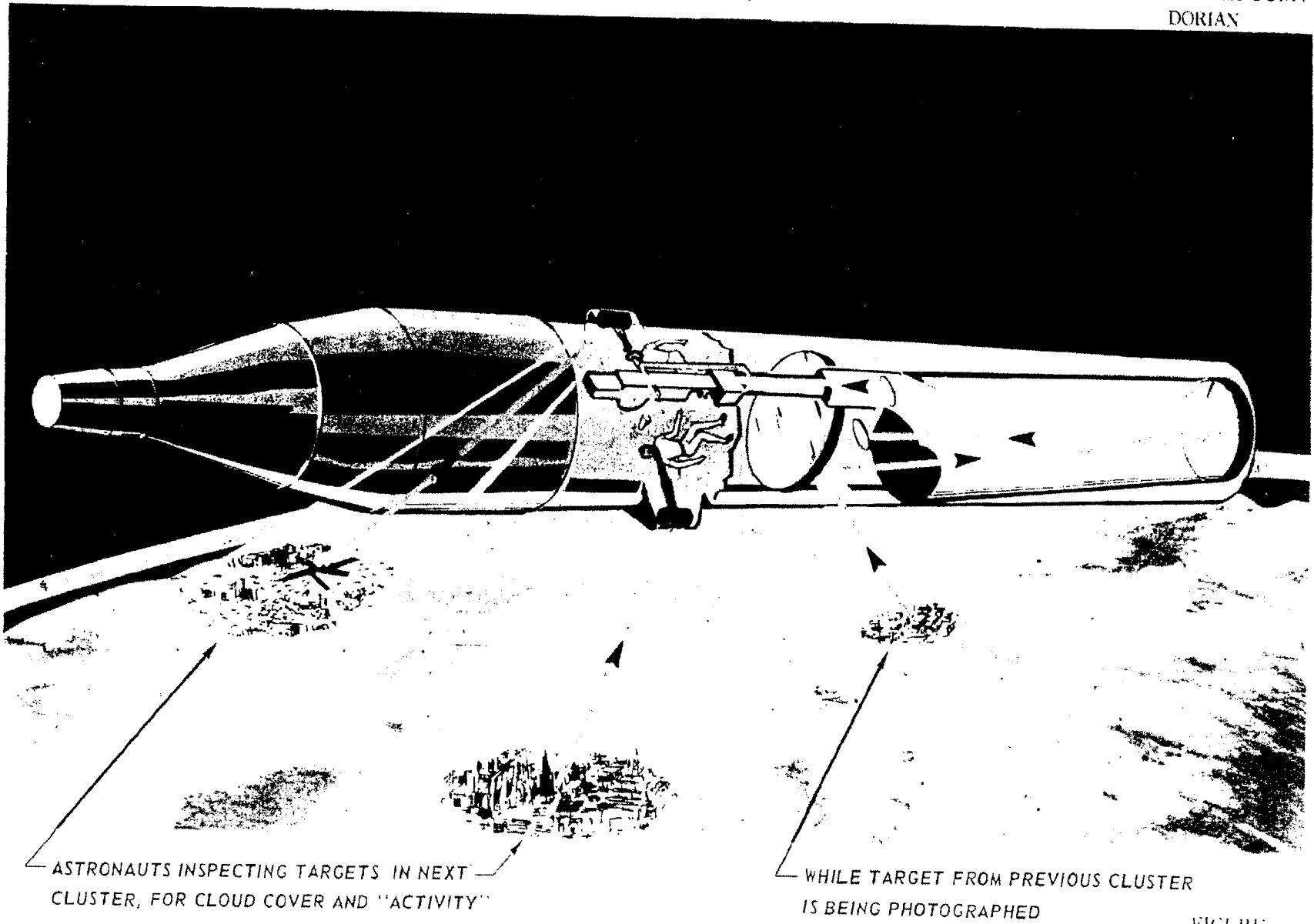
MOL BASELINE SYSTEM

FIGURE 1

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HANDLE VIA
MAN LENS EYE
CONTROL SYSTEMS JOINTLY
DORIAN



ASTRONAUTS INSPECTING TARGETS IN NEXT CLUSTER, FOR CLOUD COVER AND "ACTIVITY"

WHILE TARGET FROM PREVIOUS CLUSTER IS BEING PHOTOGRAPHED

FIGURE

DORIAN
HANDLE V/A
BYEMAN TALENT-KEYHOLE
CONTROL SYSTEMS JOINTLY

ACQUISITION TELESCOPE SYSTEM OPERATING CONCEPT

~~TOP SECRET~~

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HANDLE VIA
BYEMAN/TALENT-KEYHOLE
CONTROL SYSTEMS JOINTLY

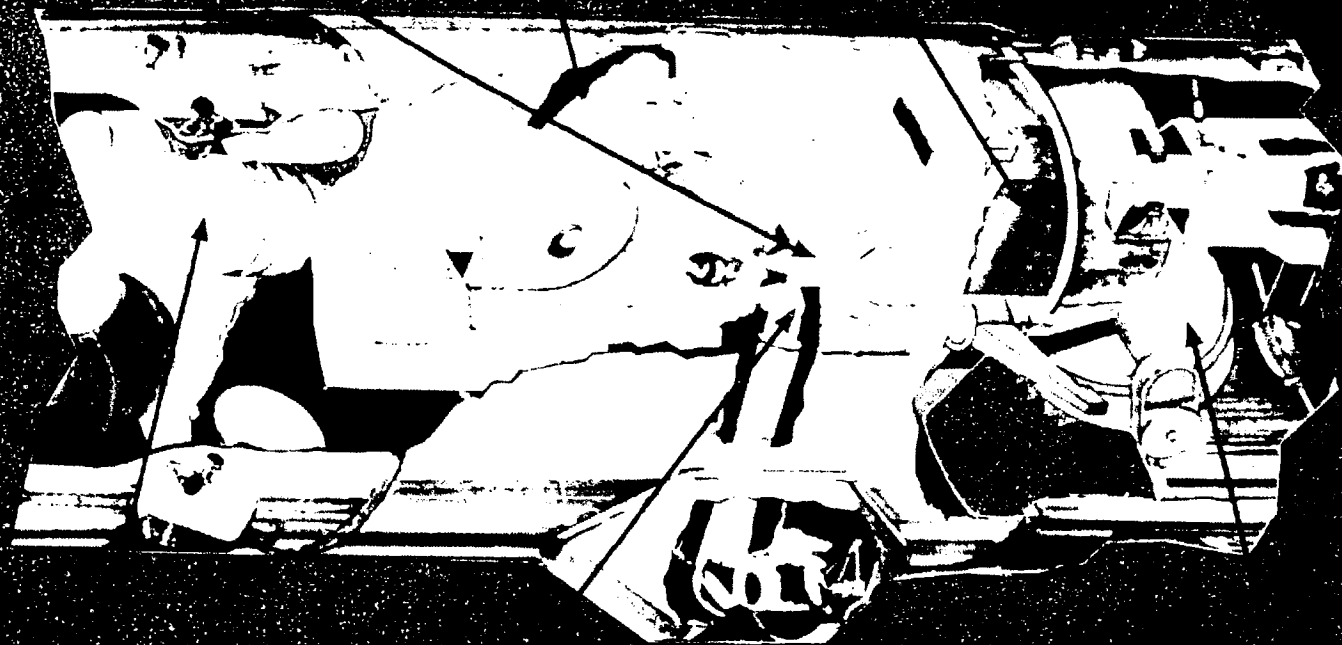
DORIAN

MAIN OPTICS

ACQUISITION
TELESCOPE No. 2

CAMERA

TO GEMINI B



CRAWL-THRU
TUNNEL

ACQUISITION
TELESCOPE No.1

A.T.S. TRACKING
MIRROR

MAIN OPTICS
TRACKING MIRROR

DORIAN

HANDLE VIA
BYEMAN/TALENT-KEYHOLE
CONTROL SYSTEMS JOINTLY

LOCATION OF ACQUISITION TELESCOPE SYSTEMS
IN MOL LABORATORY COMPARTMENT

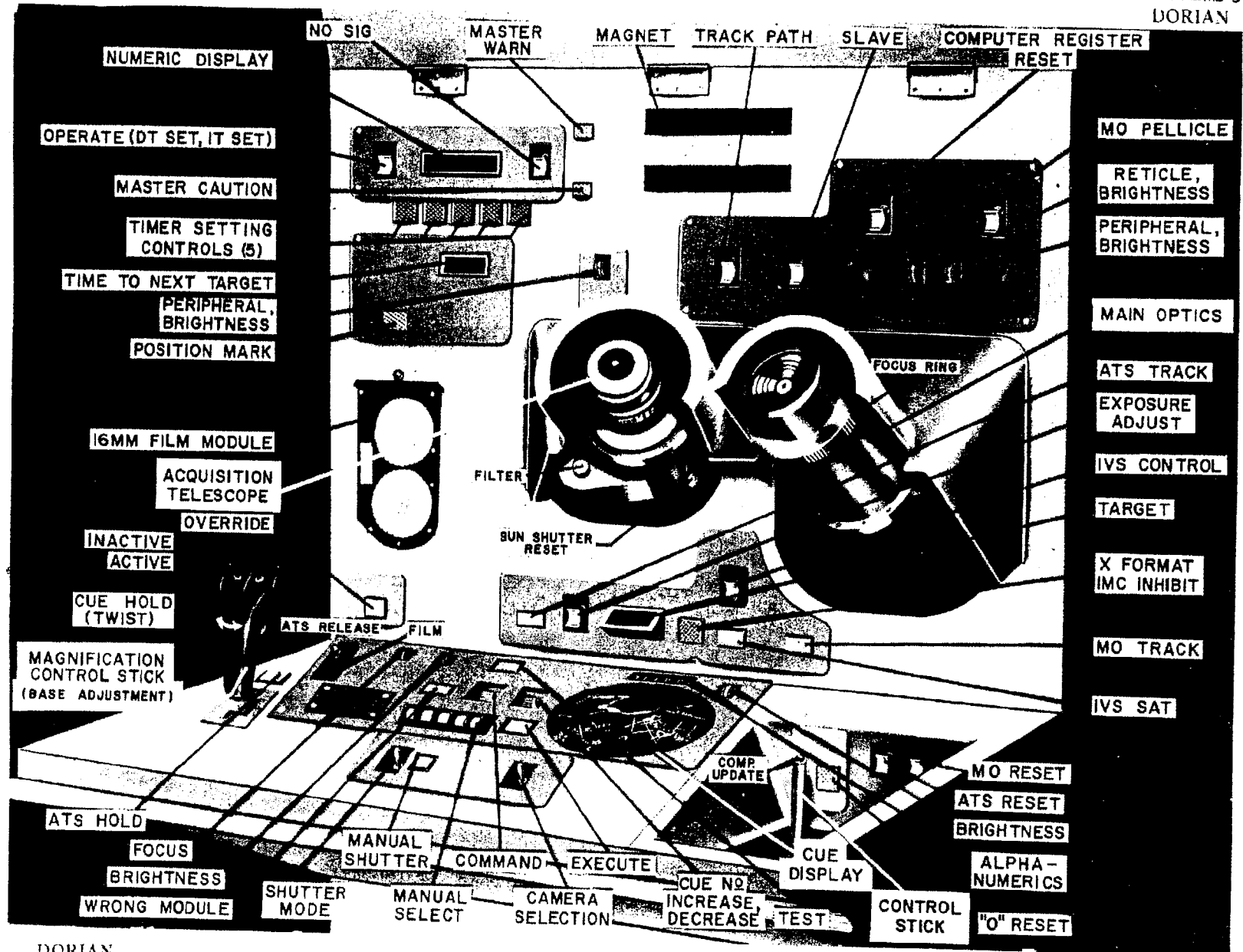
~~TOP SECRET~~

Figure 5

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HANDLE VIA
...EMAIL...KEYHOLE
CONTROL SYSTEMS JOINTLY
DORIAN

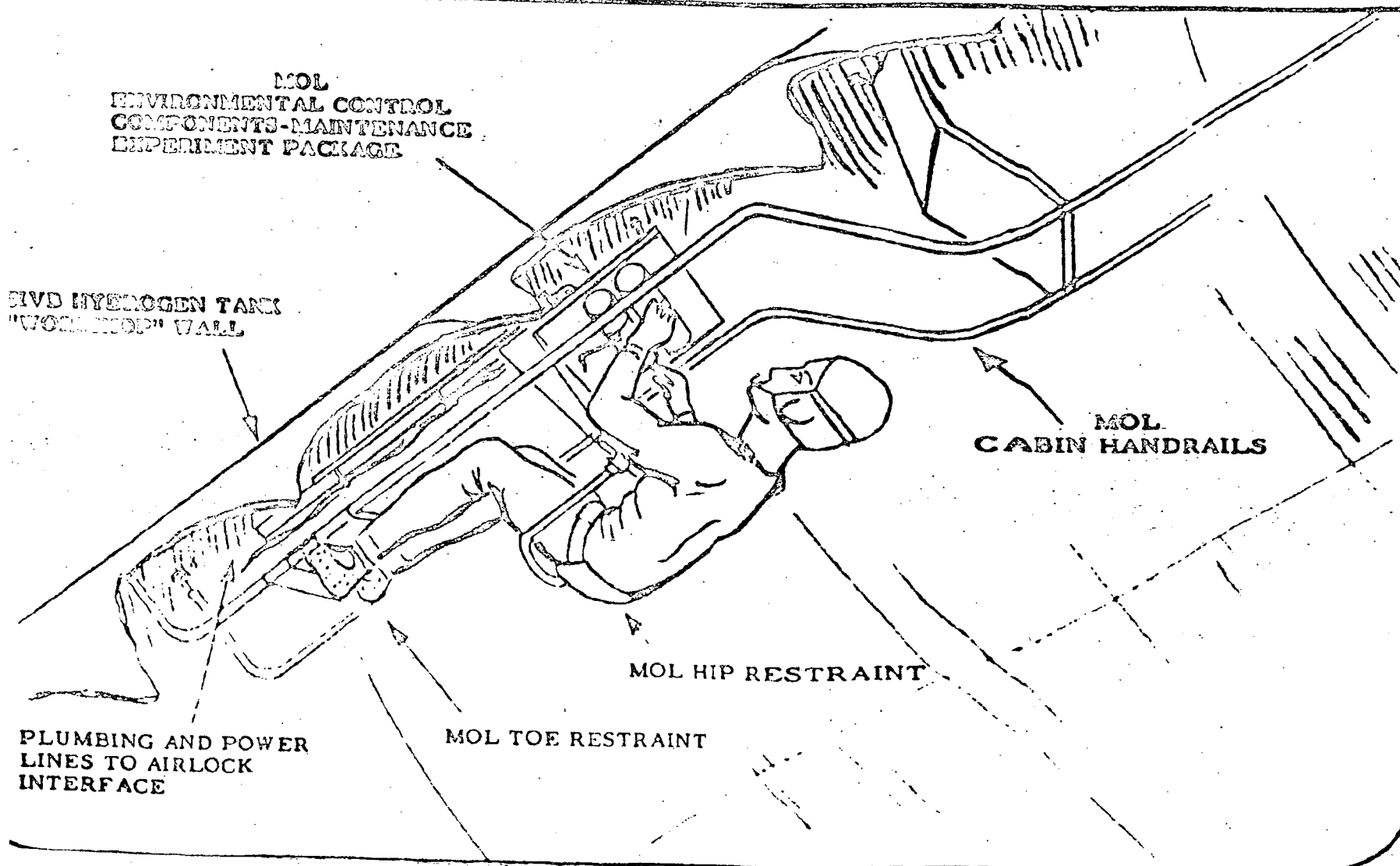


DORIAN
HANDLE VIA
BYEMAN/TALENT-KEYHOLE
CONTROL SYSTEMS JOINTLY

MOL MISSION CONSOLE (CURRENT CONFIGURATION)

~~TOP SECRET~~

POSSIBLE MOL EXPERIMENT, SA-209
INTEGRATED MAINTENANCE EXPERIMENT - MAINTENANCE TASKS



MOL
ENVIRONMENTAL CONTROL
COMPONENTS-MAINTENANCE
EXPERIMENT PACKAGE

FIVE HYDROGEN TANKS
"WORKTOP" WALL

MOL
CABIN HANDRAILS

MOL HIP RESTRAINT

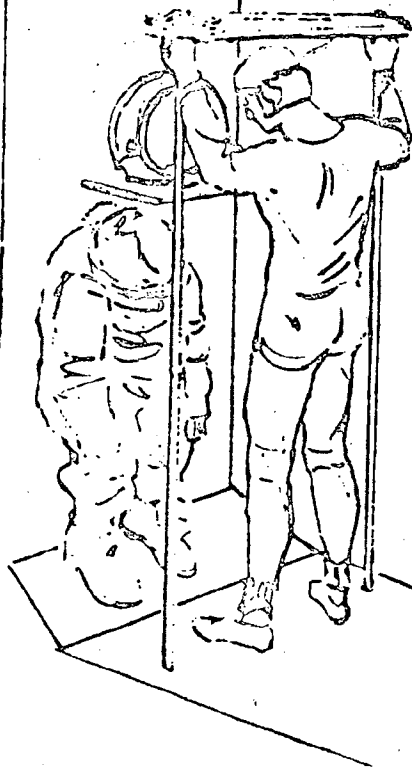
MOL TOE RESTRAINT

PLUMBING AND POWER
LINES TO AIRLOCK
INTERFACE

POSSIBLE MOL EXPERIMENT. SA-209
SUIT-DONNING AND SLEEP STATION EVALUATION



STEP 1



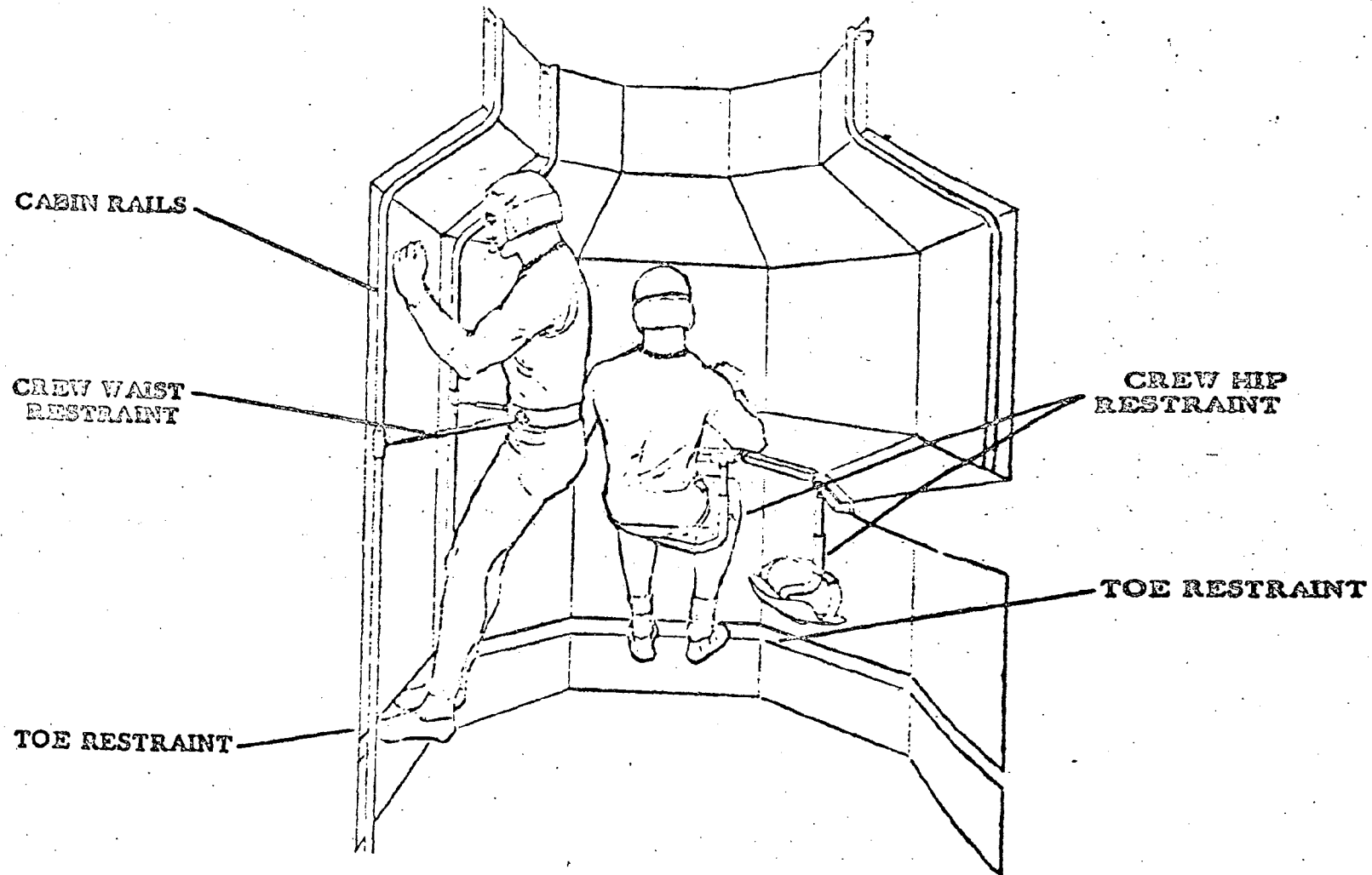
STEP 2



STEP 3

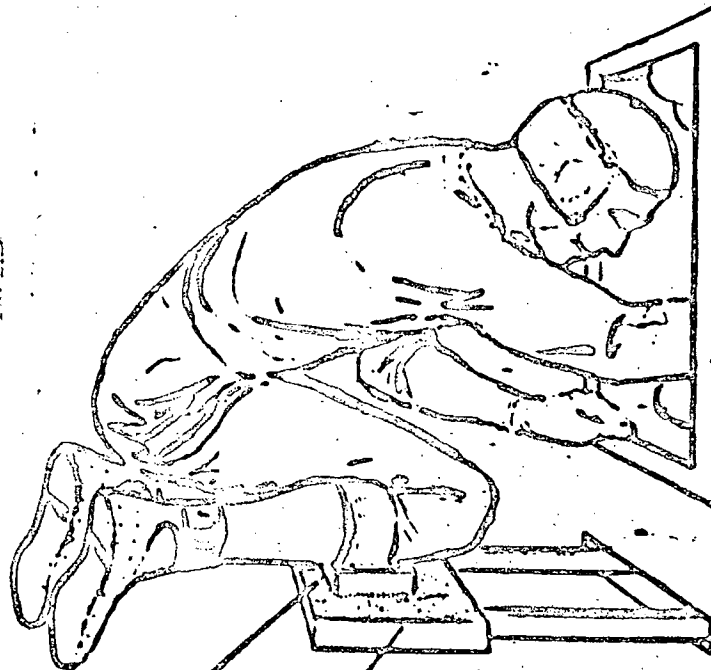
MOL

REPRESENTATIVE LAYOUT OF CONSOLES
SHOWING MOL CREW RESTRAINTS

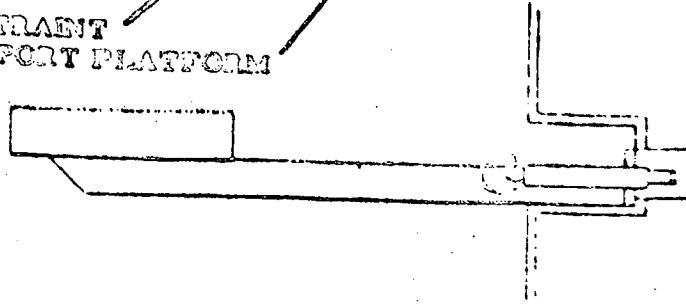




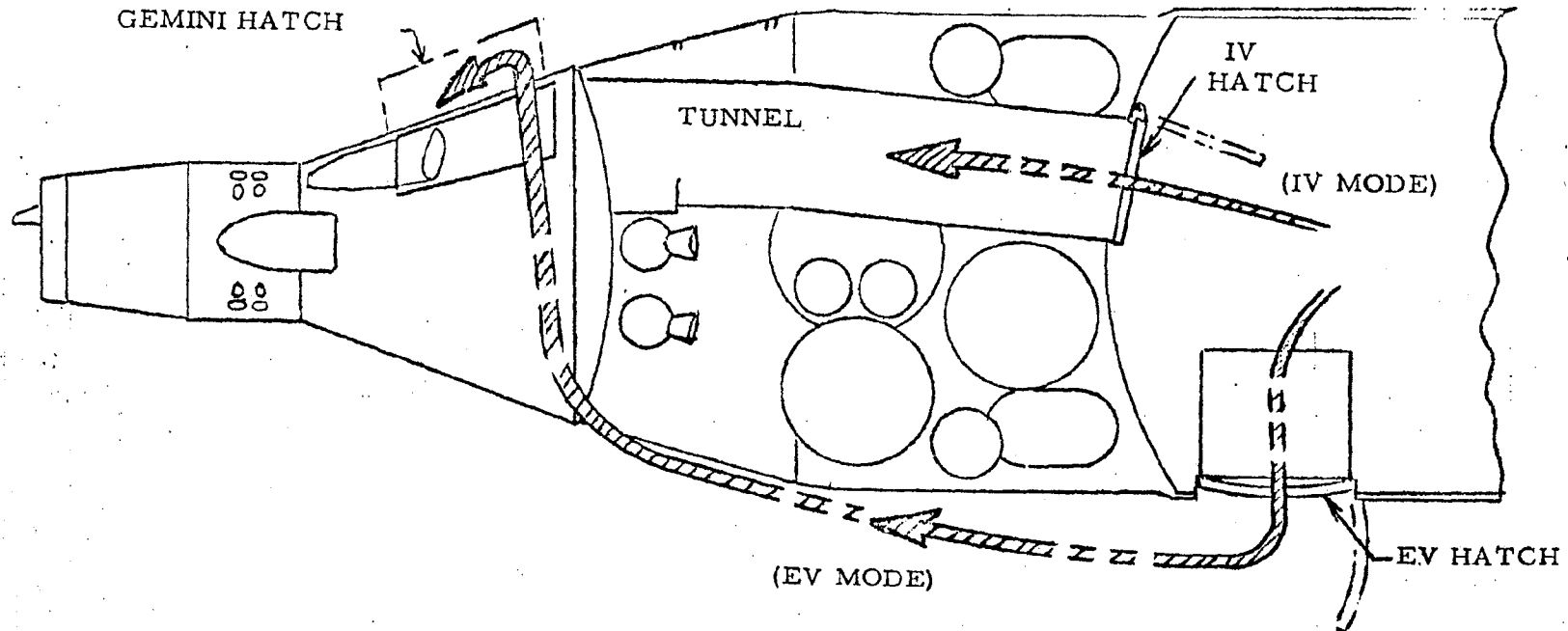
FORNIBLE MOL EXPERIMENT, CA-300
EVALUATION OF ALTERNATE RESTRAINTS
FOR MOBILITY AND MAINTENANCE TASKS



VELCRO
SLIPPERS
SHOEN RESTRAINT
SUPPORT PLATFORM



ACCESS ROUTE PROBABILITIES
(LABORATORY TO GEMINI B)



INTRA-VEHICULAR MODE (IV)

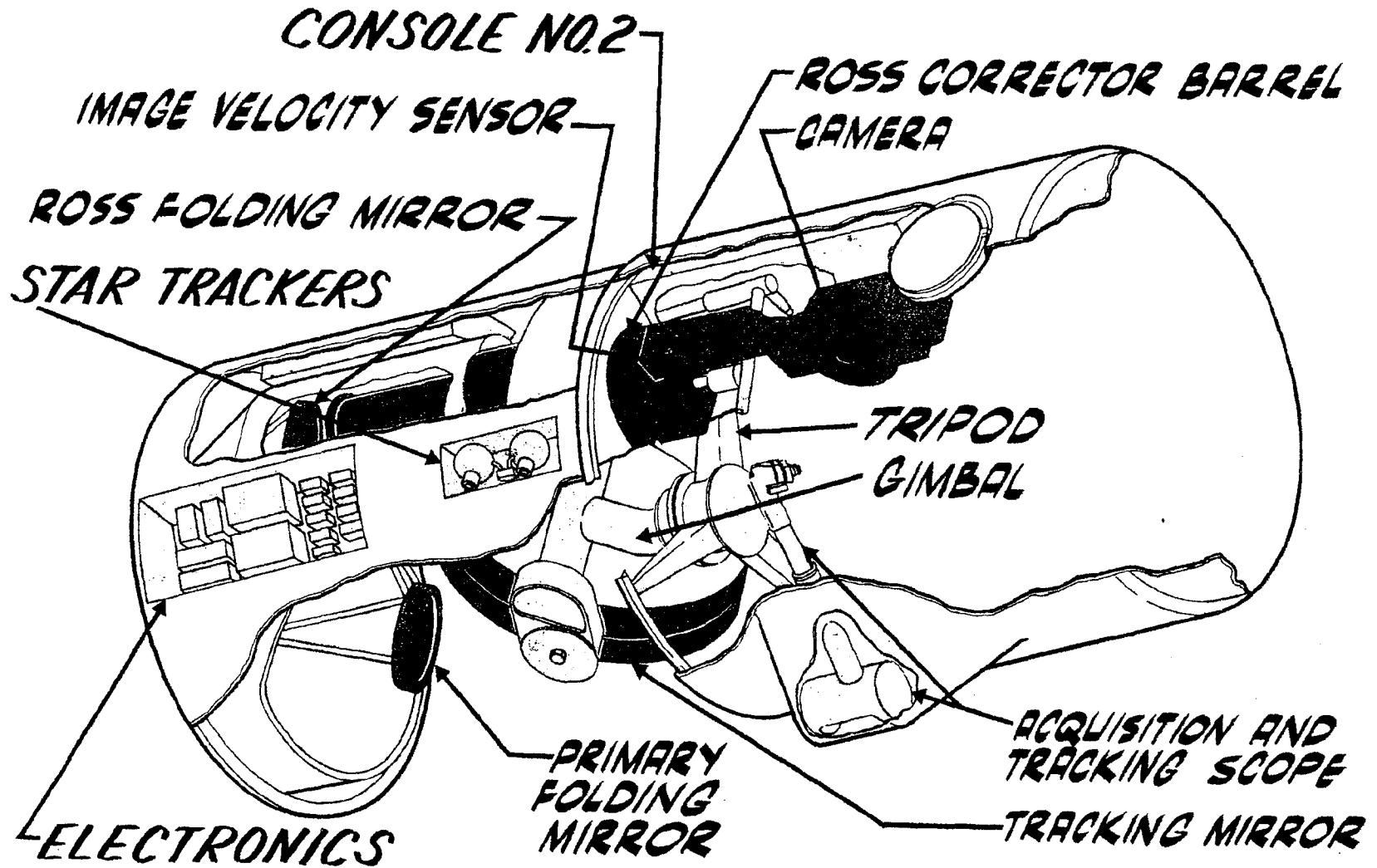
<u>EVENT</u>	<u>PROBABILITY*</u>
⊙ HATCH INOPERATIVE	3.0×10^{-6}
⊙ CRUSHED TUNNEL	$.3 \times 10^{-6}$

EXTRA-VEHICULAR MODE (EV)

<u>EVENT</u>	<u>PROBABILITY*</u>
⊙ DRV TUBE HATCH INOPERATIVE	3.0×10^{-6}
⊙ PRESSURE SUIT ASSEMBLY INOPERATIVE	$.03 \times 10^{-6}$
⊙ GEMINI B HATCH INOPERATIVE (OPEN)	6×10^{-6}

* PROBABILITY OF OCCURRENCE FOR 30 DAY IN-ORBIT

~~SECRET~~ SPECIAL HANDLING



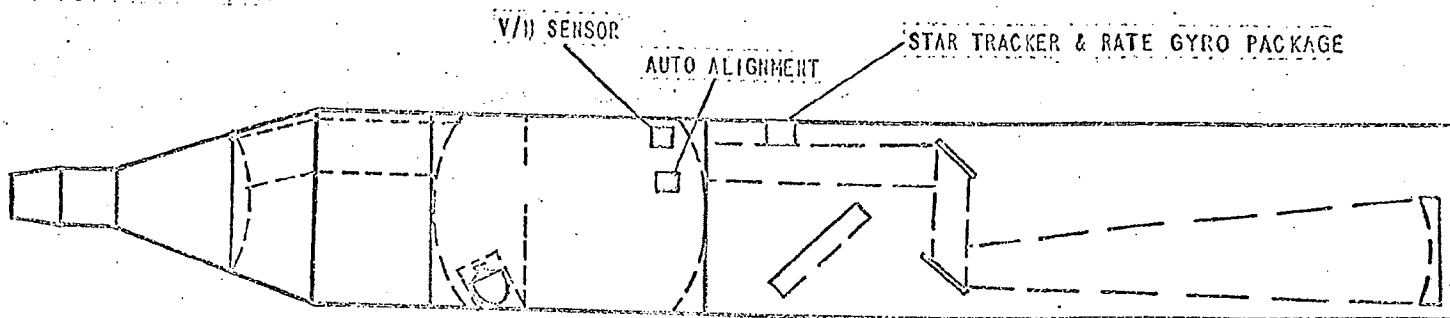
105

~~SECRET~~ SPECIAL HANDLING

MANNED/UNMANNED SYSTEM

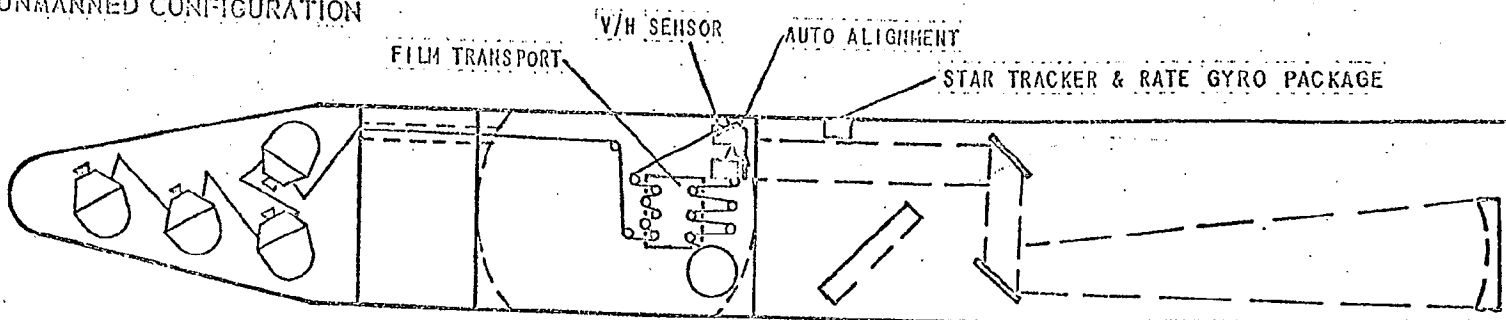
Handle via BYEMAN
Control System

MANNED CONFIGURATION



/ Add Automated Capability to Laboratory and Payload.

UNMANNED CONFIGURATION



- / Remove Gemini B
- / Remove Crew Segment and Portable Crew Segment Equipment
- / Add Nose Cone and Data Recovery Capsules
- / Add Auto Film Transport.

DORIAN CAMERA SYSTEMS

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~~TOP SECRET~~

(S)

DORIAN

~~SECRET~~

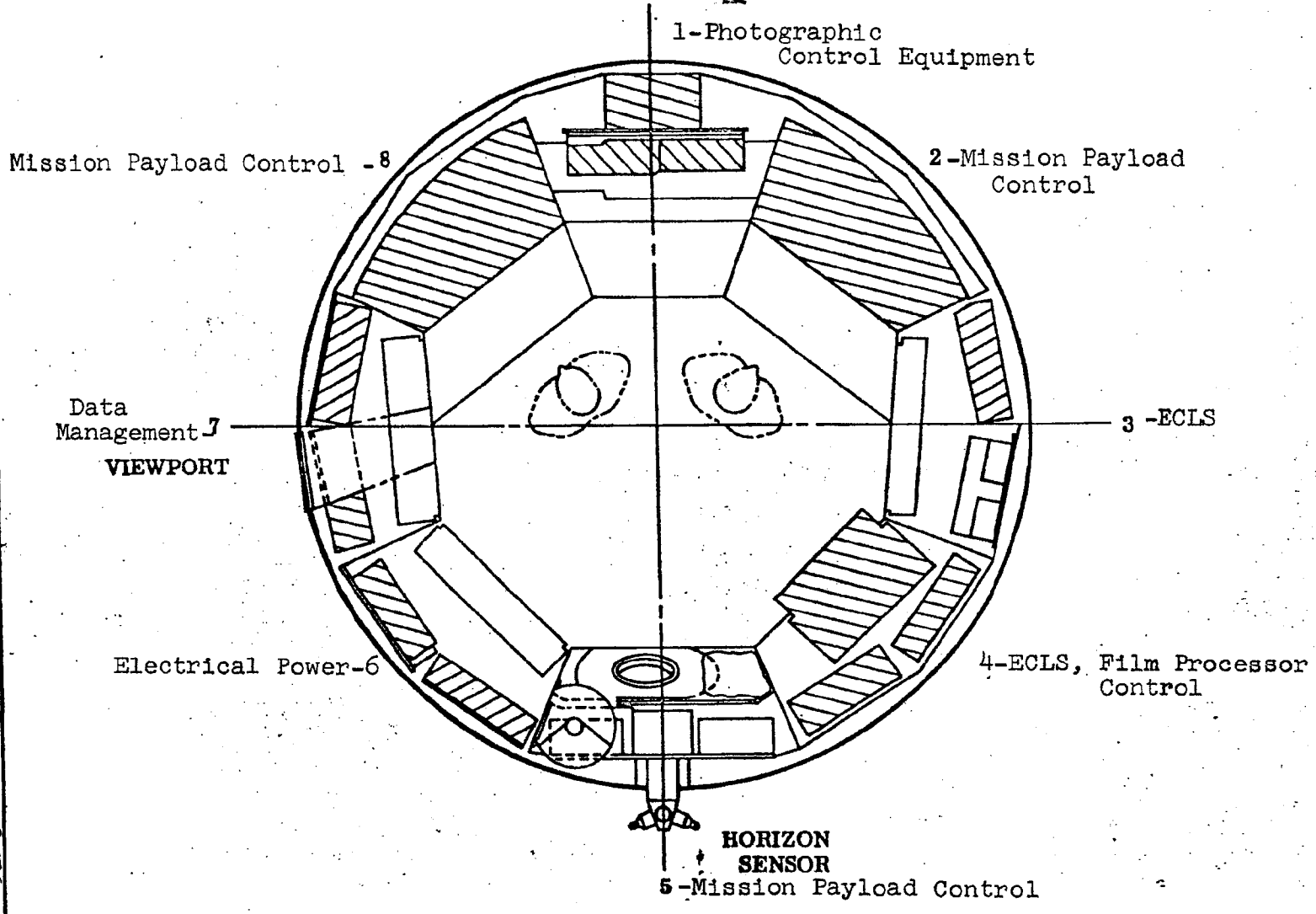


Figure I-1 Bay Layout Laboratory Vehicle Aft

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HANDLE VIA BYEMAN CONTROL SYSTEM ONLY

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