

NRO APPROVED FOR
RELEASE 1 JULY 2015

WEIGHTS REVIEW

MOL Program Review
2 April 1966

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MOL SYSTEM WEIGHT STATUS

WHS-005
101 PAGES
COPY ~~4~~ OF

~~SECRET~~

~~SPECIAL HANDLING~~

INTRODUCTION

}

L. M. WEEKS

GEMINI B

LABORATORY VEHICLE

}

B. MOSS

MISSION PAYLOAD

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SUMMARY & LAUNCH

VEHICLE PERFORMANCE

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L. M. WEEKS

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~~SPECIAL HANDLING~~

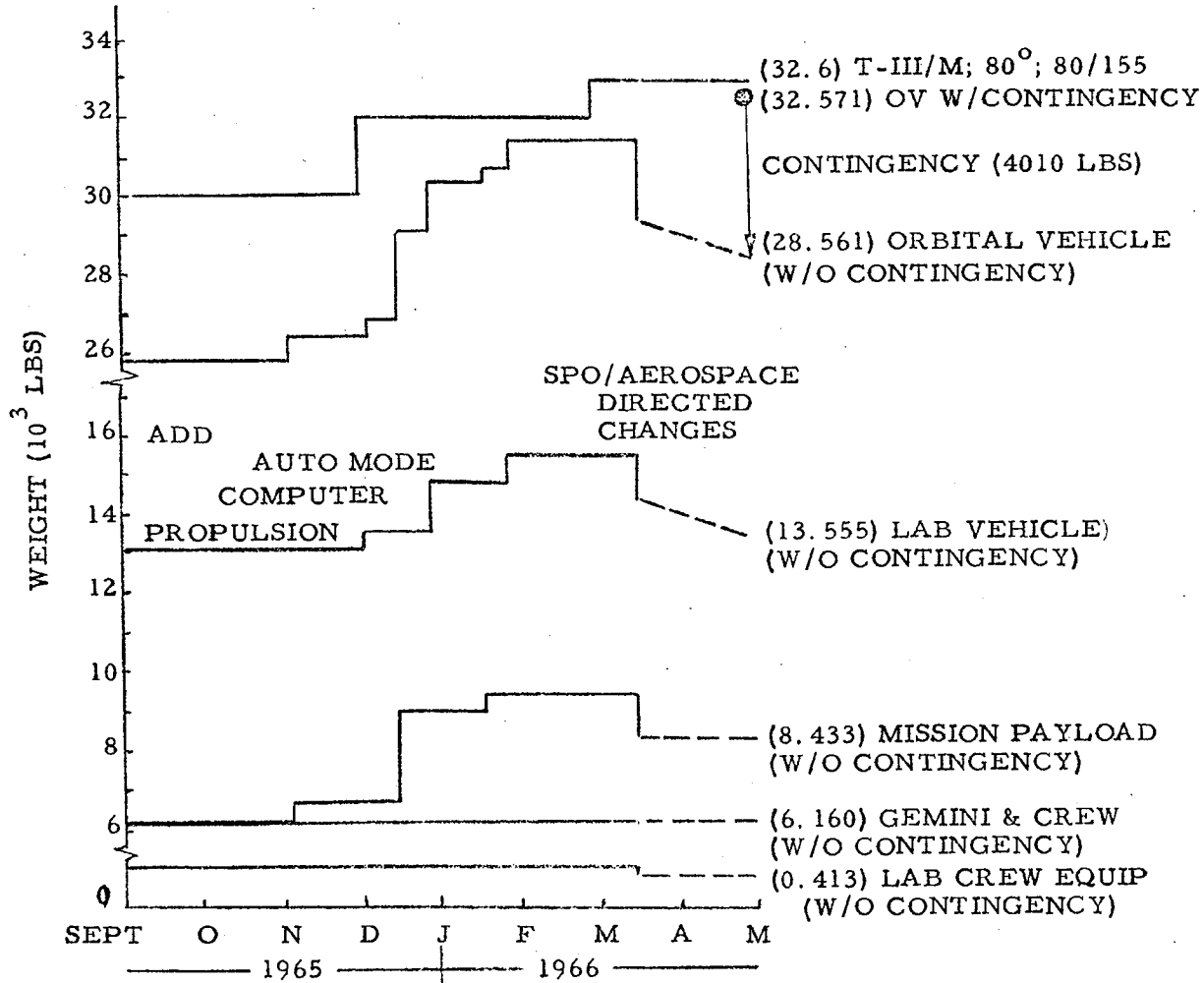
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MOL WEIGHT AND PERFORMANCE HISTORY

~~SPECIAL HANDLING~~



~~SECRET~~ SPECIAL HANDLING

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WEIGHT REDUCTION EFFORT

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~~SPECIAL HANDLING~~

- O AEROSPACE & INDUSTRY TIGER TEAMS
- O DESIGN CHANGES
- O SPECIFICATION CHANGES

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SPECIAL HANDLING

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SPECIAL HANDLING

GEMINI B
CURRENT WEIGHT STATUS
AND
WEIGHT IMPROVEMENT ITEMS

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SPECIAL HANDLING

MOL

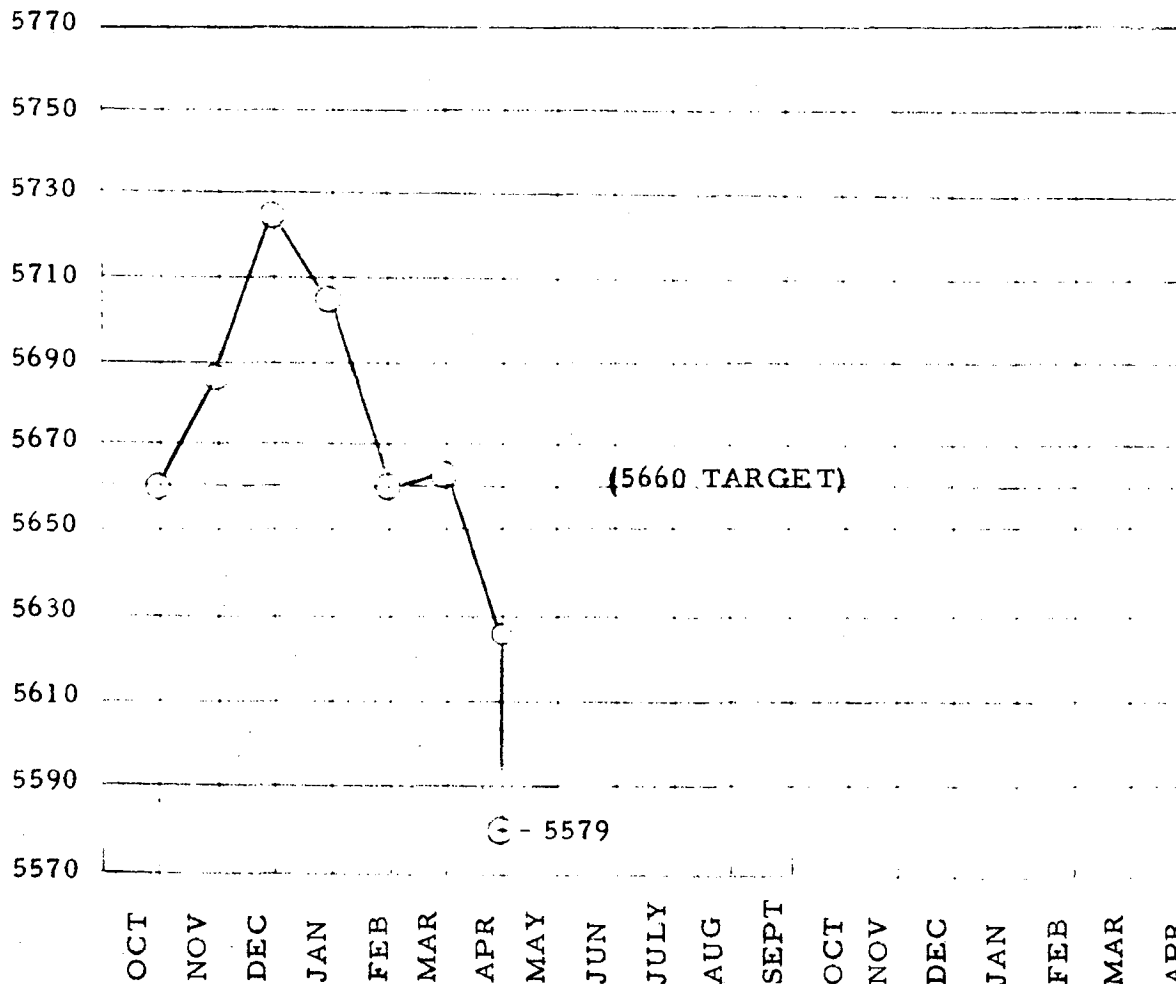
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GEMINI B WEIGHT HISTORY

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SPECIAL HANDLING

GEMINI B SEGMENT WEIGHT



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SPECIAL HANDLING

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GEMINI B RECOMMENDED WEIGHT REDUCTION

	<u>WEIGHT SAVING</u>
*1. RETRO ROCKET CIRCUITRY SHRAPNEL	22
*2. WIRE BUNDLE CLEAN UP	5
**3. CHANGE TO MIL-W-81044 WIRE	29
**4. REDUCE ECS PUMP HARDWARE	19
	<hr/>
	75
* INCORPORATED IN MAC BASELINE	
** TO BE INCORPORATED IN MAC BASELINE	

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POSSIBLE WEIGHT CHANGES REQUIRING FURTHER STUDY

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- o REDUCE RE-ENTRY MODULE O₂ 17
- o REDUCE LOITER TIME 0 TO 150
- o REDESIGN MAIN CHUTE ATTACHMENT 15
- o MOVE LIOH CARTRIDGE TO LOW POINT MOUNTING 5
- o REPLACE GEMINI COOLANT PUMPS WITH NEW PUMPS
- o / LEM PUMP 45
- o / HIGH/LOW CAPACITY NEW (40) LAB
- o REPLACE ASCENT OXYGEN WITH INTERFACE 20
- o WITH LABORATORY CRYOGENICS

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GEMINI B WEIGHT IMPROVEMENT, Continued

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	<u>WEIGHT</u>	<u>OVER/UNDER TARGET</u>
o SUMMARY		
/ TARGET WEIGHT	5660	
/ WEIGHT WITH RECOMMENDED CHANGE	5579	-81

	<u>SPECIFICATION WEIGHT</u>	<u>STATUS</u>
o WEIGHT AT LAUNCH		
/ GEMINI B	5660	5579
/ GFE PERSONNEL	500	500
/ CONTINGENCY	<u>290</u>	<u>290</u>
/ TOTAL	6450	6369

LVO-JR-4-1-66



LVO-041-RI

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LABORATORY VEHICLE WEIGHT STATUS

OUTLINE

~~SECRET~~ SPECIAL HANDLING

WEIGHT HISTORY

CURRENT WEIGHT

WEIGHT REDUCTIONS - COSTS

SUMMARY

~~SECRET~~ SPECIAL HANDLING

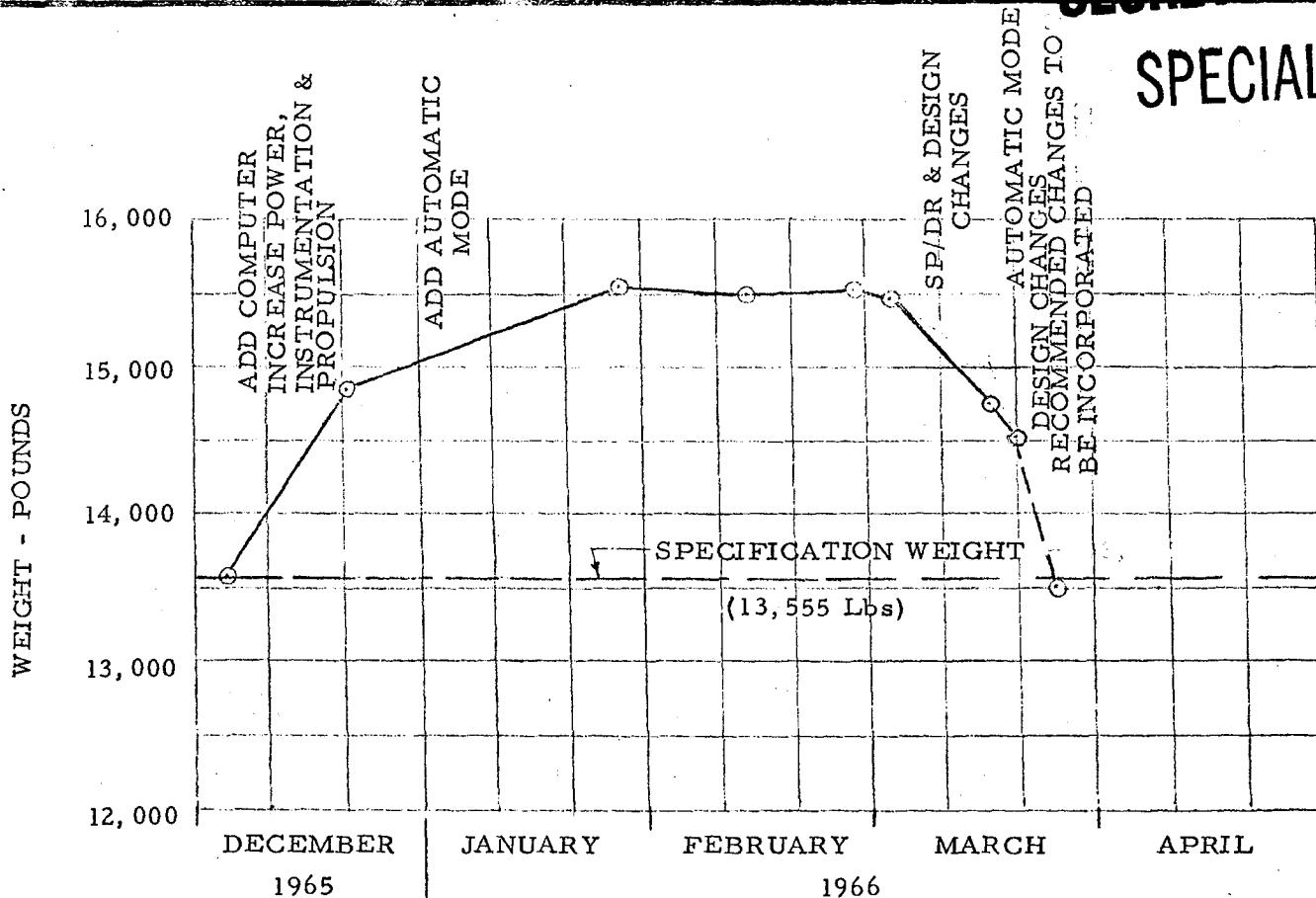
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LABORATORY VEHICLE SYSTEM SEGMENT WEIGHT HISTORY

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SPECIAL HANDLING



~~SECRET~~ SPECIAL HANDLING

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LABORATORY VEHICLE SYSTEM SEGMENT WEIGHT STATUS

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1 MARCH 1966

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	<u>WEIGHT (POUNDS)</u>
o BODY STRUCTURE - INCLUDES MISSION MODULE STRUCTURE (2140 LBS)	4186
o ENVIRONMENT PROTECTION	334
o ACTS PROPULSION	1003
o PRIME POWER SOURCE	1959
o POWER CONVERSION AND DISTR.	457
o ACTS ELECTRONICS	433
o INSTRUMENTATION & DATA MGMT	994
o COMMUNICATIONS	198
o ENVIRONMENTAL CONTROL	894
o PERSONNEL PROVISIONS	536
o CONTROLS, PANELS AND DISPLAYS	<u>435</u>
TOTAL DRY WEIGHT	11,429
o RESIDUAL PROP. & SERVICE ITEMS	412
o RESERVE PROP. & SERVICE ITEMS	326
o IN-FLIGHT LOSSES (ATMOSPHERE, REACTANTS & PROPELLANT)	<u>3289</u>
TOTAL FLUIDS	(4027)
TOTAL WEIGHT	15,456

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LABORATORY VEHICLE SYSTEM WEIGHT
SPO RECOMMENDED WEIGHT CHANGES
INCORPORATED IN DAC BASELINE

SPECIAL HANDLING

	POUNDS	COST (\$1000)
1. ELIMINATE TWO TRANSLATIONAL THRUSTERS	- 25	-420
2. REDUCE SAFETY FACTOR FOR ALL TANKS FROM 2.22 TO 2.0	- 50	+ 50
3. REDUCE PROPELLANT TANK CAPACITY FROM 2400 TO 2200 LBS	- 40	- 14
4. REPLACE CYLINDRICAL PRESSURANT TANKS WITH SPHERICAL TANKS & INCREASE ALLOWABLE STRESS LEVELS ON PRESSURANT & PROPELLANT TANKS	- 80	+ 60
5. ELIMINATE EMERGENCY BATTERY REQUIREMENTS	- 105	-270
6. REDUCE AVERAGE POWER & TANK CAPACITY FROM 1900 WATTS TO 1650 WATTS (RETAIN 10% REACTANT RESERVE)	- 270	- 68
7. INCREASE ALLOWABLE CO ₂ PRESSURE	- 15	-----
8. REMOVE WASTE WATER STORAGE PROVISIONS	- 10	- 24
9. REMOVE THE 10% ATMOS RESERVES & TANKS	- 35	- 21
10. ELIMINATE GAS PROVISIONS FOR EVA & PROVISIONS FOR REPRESSURIZATION	- 55	- 28
11. REDUCE METABOLIC OXYGEN REQ. (3000 TO 2600)	- 20	- 7
12. REDUCE WEIGHT OF CREW CONDITIONING EQUIPMENT	- 25	- 7
TOTAL	- 730	-749
<hr/>		
RE-ESTIMATION AUTOMATIC MODE DESIGN AND MISC. CHANGES	- 224	
	- 954	

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SPECIAL HANDLING

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LABORATORY VEHICLE SYSTEM SEGMENT WEIGHT SUMMARY

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18 MARCH 1966

~~SPECIAL HANDLING~~



	<u>WEIGHT (POUNDS)</u>
• BODY STRUCTURE - INCLUDES MISSION MODULE STRUCTURE (2140)	4255
• ENVIRONMENT PROTECTION	380
• ACTS PROPULSION	814
• PRIME POWER SOURCE (1.65 KW)	1652
• POWER CONVERSION & DISTRIBUTION	371
• ACTS ELECTRONICS	273
• INSTRUMENTATION & DATA MANAGEMENT	1011
• COMMUNICATIONS	198
• ENVIRONMENTAL CONTROL	894
• PERSONNEL PROVISIONS	506
• CONTROLS, PANELS & DISPLAYS	<u>435</u>
TOTAL DRY WEIGHT	10,789
• RESIDUAL PROP. & SERVICE ITEMS	385
• RESERVE PROP. & SERVICE ITEMS	102
• IN-FLIGHT LOSSES (ATMOSPHERE, REACTANTS, & PROPELLANT)	<u>3,226</u>
TOTAL FLUIDS	(3,713)
TOTAL WEIGHT	<u>14,502</u>

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LABORATORY VEHICLE SYSTEM SEGMENT
ADDITIONAL SPO RECOMMENDED WEIGHT CHANGES
TO BE INCORPORATED IN BASELINE

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	POUNDS	COST (\$1000)
1. REMOVE COMMON BULKHEAD - INCLUDES HATCHES, ECS, ETC.	- 460	-1890
2. INTEGRATE EQUIPMENT SUPPORT STRUCTURE & USE MAG-LITH ALLOY	- 50	+ 158
3. CHANGE TUNNEL MATERIAL TO MAG-LITH ALLOY	- 25	+ 16
4. USE DOMED TUNNEL HATCH IN LIEU OF FLAT	- 10	+ 14
5. IMPROVE DESIGN OF METEOROID SHIELD	- 20	+ 15
6. USE TETHERING IN PLACE OF RAILS FOR EVA	- 10	- 12
7. REDUCE PROPELLANT TO 2110 LBS (TANK CAP = 2200 LB)	- 90	+1035
8. REDESIGN PRATT & WHITNEY FUEL CELL	- 165	+1560
9. USE SUBCRITICAL CRYOGENIC STORAGE (OXYGEN ONLY)	- 135	+1500
10. USE RIBBON TYPE WIRING (30 GAGE) FOR LOW VOLTAGE APPLICATIONS (INSTRUMENTATION, ETC.)	- 30	+ 31
11. CHANGE MOLECULAR SIEVE FROM 3 TO 2 BED UNIT	- 20	- 145
12. SIMPLIFY TEMP CONTROL SYS. SAVE 11 LBS DRY WT PLUS A 110 LBS POWER REDUCTION (POWER WT SAVING NOT INCL. IN SUMMATION)	- 10	-----
13. USE WASTE HEAT FOR HEATING GEMINI - ADD 10 LBS DRY WT, SAVE 140 LBS POWER SYS (POWER WT SAV NOT INCL IN SUMMATION)	+ 10	+ 71
TOTAL	-1015	+2353

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~~SPECIAL HANDLING~~

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LVO-602-RI



LABORATORY VEHICLE WEIGHT SUMMARY
INCLUDING RECOMMENDED WEIGHT REDUCTIONS

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	<u>POUNDS</u>
CURRENT WEIGHT - 18 MARCH 1966	14,502
DIRECTED CHANGES NOT YET INCORPORATED	-1,015
TOTAL	<u>13,487</u>



LVO-601-R111

WHS-205

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POSSIBLE WEIGHT CHANGES REQUIRING FURTHER STUDY

(NOT ADDITIVE)

SPECIAL HANDLING

	<u>POUNDS</u>	<u>COST</u> <u>(\$1000)</u>
o <u>POSSIBLE WEIGHT REDUCTIONS</u>		
1. RAISED O ₂ /He PRESSURE (TOTAL 7 PSI)	-80	+100
2. ONE HOUR REPRESSURIZATION	-45	-70
3. REDESIGN MISSION MODULE STRUCTURE AT THE BOOSTER INTERFACE TO REPLACE 8 BOLTS SEPARATION WITH SHAPED CHARGE, AND DISTRIBUTE LOADS EQUALLY	-125	----
4. FUEL CELLS - OPERATE TWO HOT AND ONE ON WARM STANDBY	-56	+75
5. 95 PERCENT WINDS	-80	----
6. BERYLLIUM UNPRESSURIZED COMPARTMENT	-85	+5,000
7. BERYLLIUM MISSION MODULE	-530	+24,000
8. MAG-LITH MISSION MODULE FRAMES	-45	+500
o <u>POSSIBLE WEIGHT INCREASES</u>		
1A. USE NITROGEN IN LIEU OF HELIUM FOR DILUENT	+80	-1,000
2A. BLAST SHIELD	+100	+70

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SPECIAL HANDLING

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LABORATORY VEHICLE

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WEIGHT SUMMARY

SPECIAL HANDLING

- o SIGNIFICANT WEIGHT REDUCTION DESIGN & SP/DR CHANGES DIRECTED
 - COST INCREMENT LOW
 - ADDITIONAL REDUCTIONS - DIFFICULT & COSTLY
- o ADDITIONAL POSSIBLE WEIGHT REDUCTIONS IDENTIFIED
- o 13,555# SPEC WEIGHT CAN BE MET AT BEGINNING PHASE II

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SPECIAL HANDLING

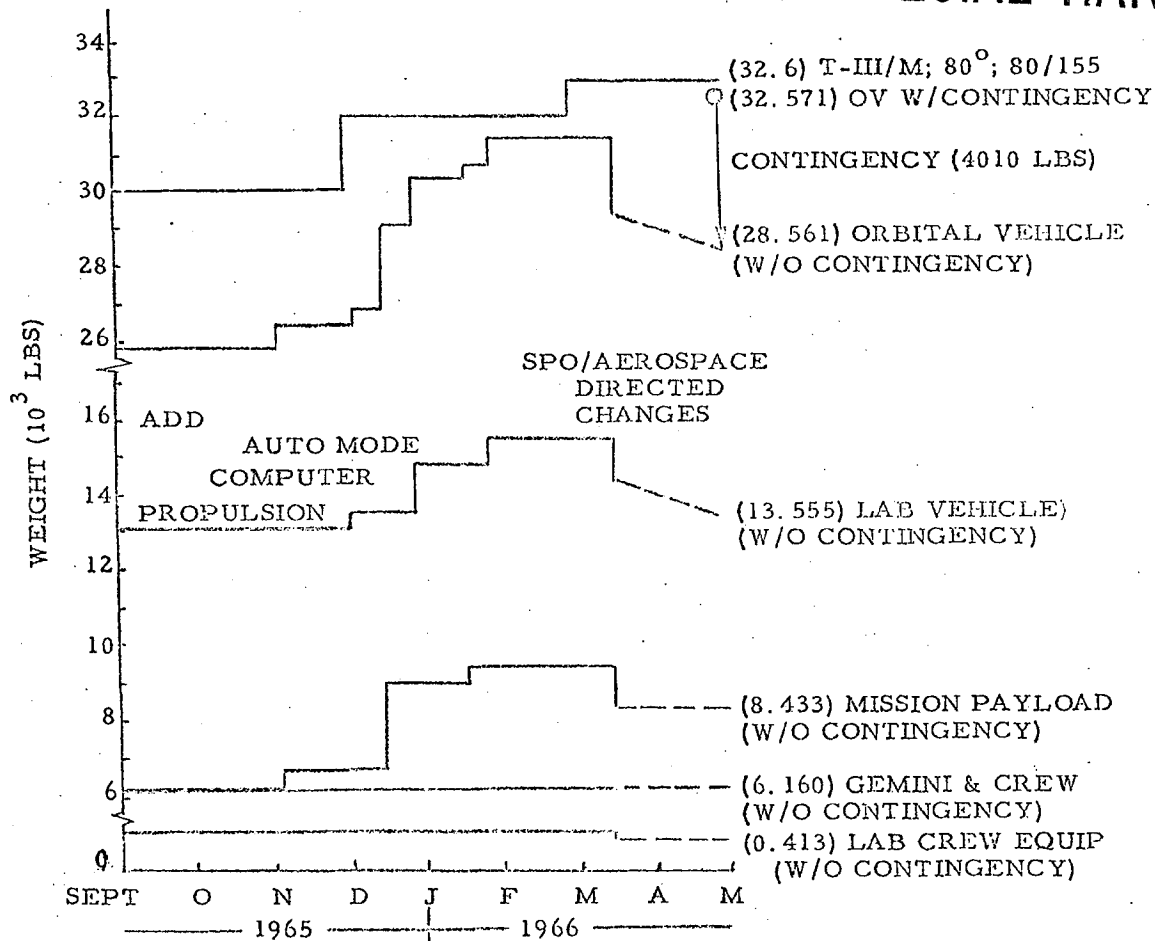
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MOL WEIGHT AND PERFORMANCE HISTORY

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~~SPECIAL HANDLING~~



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MOL PHASE I WEIGHT AND PERFORMANCE STATUS

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SPECIAL HANDLING

	CURRENT WEIGHT* (INCLUDING CONTINGENCIES)
GEMINI B	6450 (6160 + 290)
GEMINI B SEGMENT	5930 (5660 + 270)
CREW AND CREW EQUIPMENT SEGMENT	520 (500 + 20)
LABORATORY VEHICLE	15988 (13968 + 2020)
LABORATORY MODULE SEGMENT	15495 (13555 + 1940)
CREW EQUIPMENT SEGMENT	493 (413 + 80)
MISSION PAYLOAD	10133 (8433 + 1700)
TOTAL ORBITAL VEHICLE	32571 (28561 + 4010)
LAUNCH VEHICLE (T-III M; WTR LAUNCH)	
80°; 80/130	32,800
80°; 80/155	32,600

* TOTAL (ACTUAL + CONTINGENCY)

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SPECIAL HANDLING

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TITAN IIM LAUNCH VEHICLE STATUS

PERFORMANCE STATUS

SPECIAL HANDLING

- BASELINE--31,680 LB (80/130 N. M. -- 80° INCLINATION -- PERIGEE PLACEMENT)
- HIGH CONFIDENCE PERFORMANCE IMPROVEMENT ITEMS -- 1128 LB TOTAL
 - / VELOCITY MARGIN BASED ON 3σ INSTEAD OF 2.5% RSS-- 700 LB
 - / STAGE I ULLAGE REDUCTION (5097 LB PROPELLANT WEIGHT INCREASE)
--306 LB
 - / STRUCTURE ASSOCIATED WITH 55 LB/SEC TVC INJECTANT VALUES
(INSTEAD OF 103 LB/SEC) -- 122 LB
- ADDITIONAL PERFORMANCE IMPROVEMENT ITEMS UNDER CONSIDERATION --
1100 LB TOTAL
 - / 10° NOSE CONE ON SRM'S -- 300 LB
 - / SRM AFT SKIRT REDESIGN -- 200 LB
 - / CONDITIONED PROPELLANTS (45° F) -- 300 LB
 - / SRM HEATER BLANKETS (90° F) -- 300 LB

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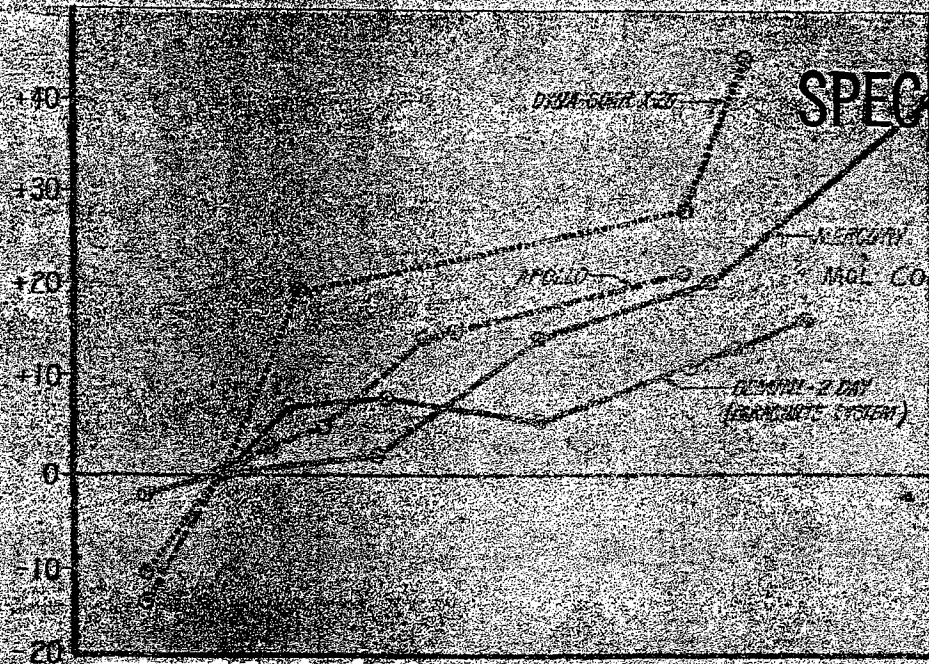
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MANNED RE-ENTRY VEHICLE WEIGHT GROWTH HISTORY ALL DEVELOPMENT PHASES

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VEHICLE WEIGHT
VARIATION
(% OF CONTRACT OR
PROGRAM INITIATION
WEIGHT)



SPECIAL HANDLING

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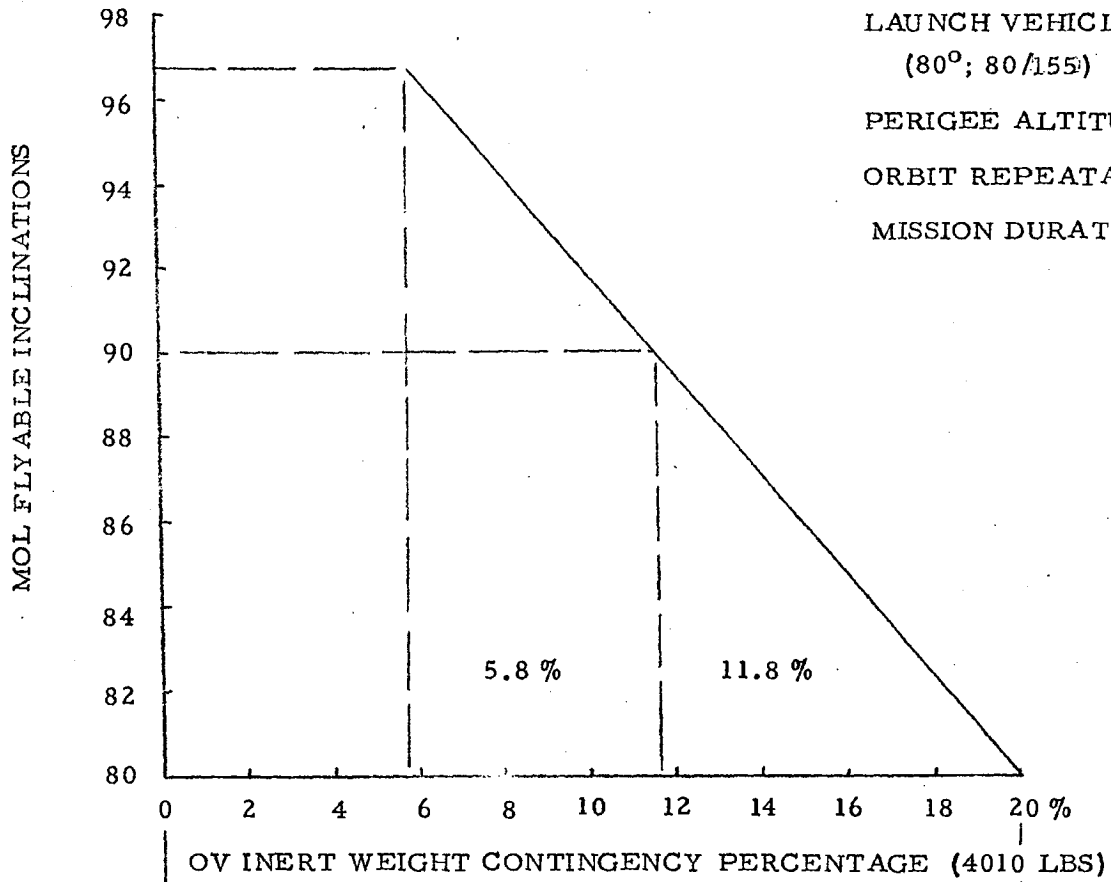


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MOL FLYABLE INCLINATIONS

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LAUNCH VEHICLE: 32,600 LBS
(80°; 80/155)

PERIGEE ALTITUDE: 80 N.M.

ORBIT REPEATABILITY: 7.5 DAYS

MISSION DURATION: 30 DAYS

OV INERT WEIGHT CONTINGENCY PERCENTAGE (4010 LBS)

28,561 LBS (EST. ACTUAL) (EST. ACT. + CONT.) 32,571 LBS

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WEIGHT & PERFORMANCE SUMMARY

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SPECIAL HANDLING

- 28,561 # PRESENT ESTIMATE
- 4,010 # CONTINGENCY PROVIDED (20%)
- 20% CAN BE HELD (OR BEATEN) DURING PHASE II
IF NO SIGNIFICANT SPEC/PROGRAM CHANGES
- WEIGHT CONTROL BOARD ESTABLISHED
- THIM LAUNCH VEHICLE & ORBITING VEHICLE COMPATIBLE

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SPECIAL HANDLING

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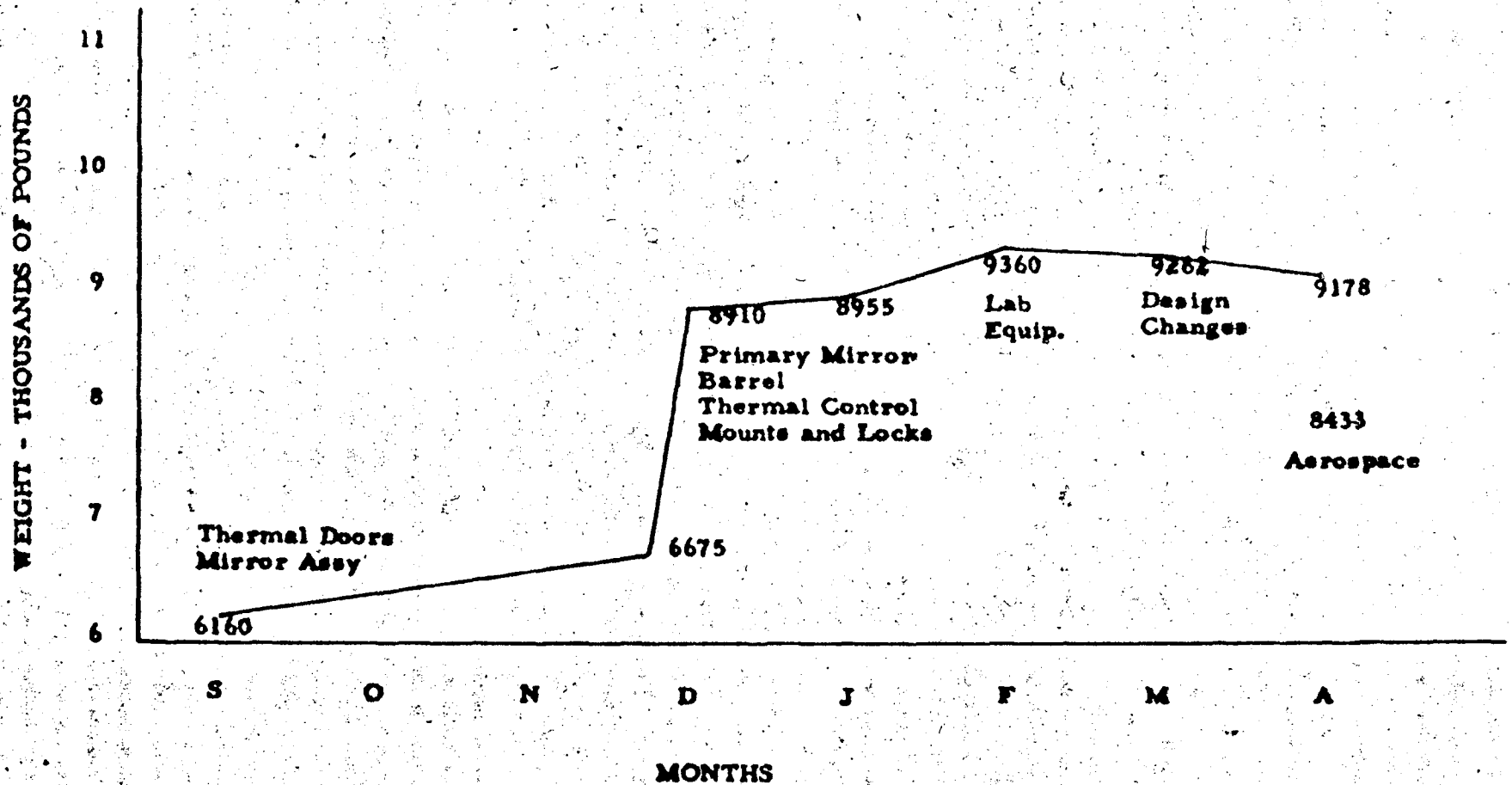
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WEIGHTS

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SPECIAL HANDLING

WEIGHT HISTORY



~~SECRET/SPECIAL HANDLING~~

WEIGHT SUMMARY

	<u>Aerospace</u>	<u>Contractor</u>
EK		
OPTICS	4095	5012
GLASS	2342	
STRUCTURE	1661	2578
ELECTRICAL	92	
LABORATORY	782	782
ELECTRICAL	99	
FILM PROCESSOR	107	
CAMERAS & FILM HANDLE	250	
FILM & BMAT	326	
GE		
STRUCTURE	1093	921
TRACKING MIRROR	514	342
SUSPENSION	295	
CREW DOORS	157	
SECONDARY STRUC- TURE	127	
THERMAL CONTROL	367	367
ELECTRICAL	226	226
COMMAND ADPT, WIDE BAND, TM	124	124
NAVIGATION	110	110
ACQUISITION	190	190
CONSOLES (4)	819	819
DATA RECOVERY	487	487
TRACKING MIRROR DRIVE	140	140
AEROSPACE MODIFIED OR ESTIMATED	8433	9178

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SPECIAL HANDLING
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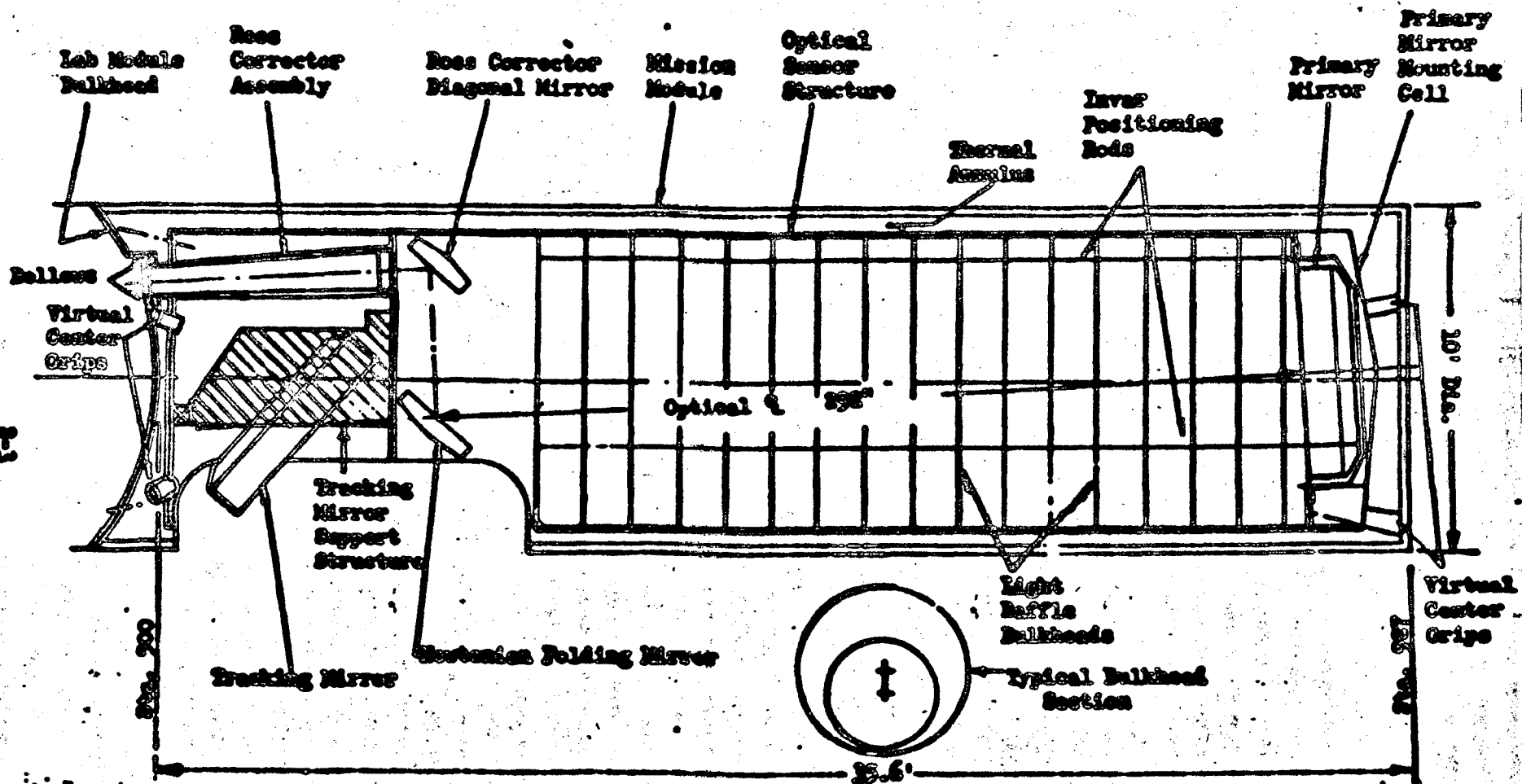


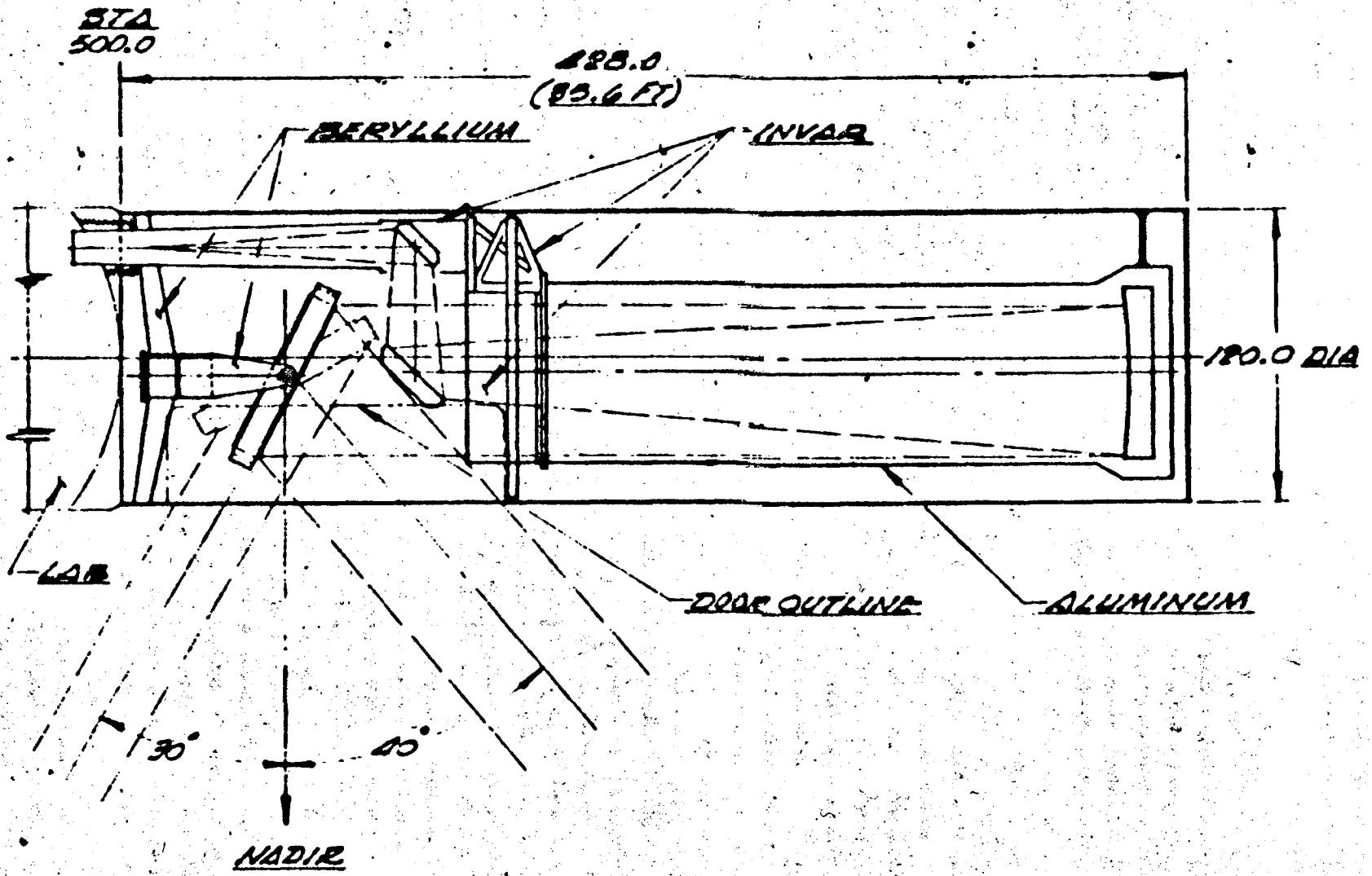
Figure 2-1. In-Line Configuration

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SPECIAL HANDLING

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MISSION MODULE



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WEIGHT IMPROVEMENT STUDY ITEMS

DELETE IMU		30
INVAR BARREL		159
ACQUISITION - TV TO OPTICAL		72
LOUVRE CLOSURE IN PLACE OF APERTURE DOOR		50
REFINE CONSOLE DESIGN		120
REARRANGE GIMBALING OF TRACKING MIRROR		125
BERYLLIUM SUPPORT STRUCTURE	300	
TILT MIRROR ROLL AXIS	52	
CERVIT FOR T/M AND PRIMARY		402
REDESIGN TRACKING AND PRIMARY MIRROR		800
CHANGE FROM LEAP FROG TO SPECIALIST		50
DELETE R/V		376
DELETE READOUT		
WIDE BAND DATA TRANSMISSION LINK		168
ONBOARD PROCESSING AND BIMAT		172

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DATA RETRIEVAL

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UNRESOLVED DATA RETRIEVAL CONSIDERATIONS

◦ MANNED

- READOUT
- NUMBER AND TYPE OF RECOVERY VEHICLE
- FILM PACKAGES ABOARD THE GEMINI B
- NUMBER AND TYPES OF CAMERAS AND FILM

◦ UNMANNED

- NUMBER AND TYPE OF RECOVERY VEHICLES
- MISSION DURATION
- ALTITUDE

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READOUT REQUIREMENTS

BASELINE: CREWMEN EDIT SELECTED FRAMES FOR READOUT

ASSUMPTIONS: RELIABLE, LOW WEIGHT / POWER, USE PAST EXPERIENCE

QUESTIONS:

SECURITY (CRYPTOGRAPHIC OR PRIVATE)

RESOLUTION (MULTIPLE OPTION ?)

QUANTITY

TARGET SIZE

TIME DELAY (TRACKING STATION PROCESSING)

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SECURITY

- o MOL-DORIAN REQUIRES MAXIMUM POSSIBLE SECURITY
- o SENSITIVITY OF MAN'S ROLE IN RECONNAISSANCE
- o PROTECT KNOWLEDGE OF HIGH RESOLUTION CAPABILITY
- o PROTECT USER'S INTEREST IN SPECIFIC TARGETS
- o NONENCRYPTED NARROW BEAM SYSTEM PROVIDES INADEQUATE PROTECTION
 - o UNAUTHORIZED STATION CAN BE LOCATED NEAR AUTHORIZED READOUT STATIONS
 - o SIMPLER INTERCEPTION STATION FEASIBLE BECAUSE
 - CAN OPERATE AT SHORTER RANGES AND STILL NULLIFY SECURITY OBJECTIVES
 - CAN OPERATE WITH LESS QUALITY MARGIN FOR WEATHER AND OTHER DEGRADATIONS
 - CAN COMMENCE OPERATIONS LATER WITH STATE-OF-ART IMPROVEMENTS

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DIGITAL READOUT

- MORE RELIABLE CONFIGURATION
 - FIXED ANTENNA
 - LOWER SCAN SPEED
- COMPATIBLE WITH SCF STANDARD
 - PROGRAM 266 COMMITTED TO 20 MBTS
- CRYPTO SECURITY
- SUFFICIENT QUANTITY
 - 1.3 SQUARE INCHES PER MINUTE
 - 1200 PICTURES IN 30 DAYS (1 X 1 INCH CHIPS,
8 - 4 MIN. PASSES PER DAY)

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QUALITY/QUANTITY

- READOUT SYSTEM SHOULD PRESERVE MAXIMUM RESOLUTION
 - DETAIL IMPORTANT IN TECHNICAL INTELLIGENCE
 - EVALUATION OF PHOTOGRAPHIC PERFORMANCE WHILE IN FLIGHT
- QUANTITY SHOULD NOT BE EXCESSIVE
 - RESPONSE TIME FOR TECHNICAL INTELLIGENCE LESS CRITICAL
TEAM FOR SURVEILLANCE
 - READOUT REDUCES TARGET YIELD IN A CLUSTER
 - DEMANDS ON CREW

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SYSTEM OPTIONS

- o DIRECT APPLICATION OF SP HARDWARE DEVELOPMENT
 - o CBS - BTL ANALOG SYSTEM

- o FOR IMPROVED SECURITY AND SCF COMPATIBILITY
 - o SIMPLIFIED CBS SCANNER
 - o CRYPTO UNIT NOW UNDER NSA CONTRACT
 - o 20 MBPS DIGITAL LINK (SCF STANDARD)

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READOUT SYSTEM APPROACHES

	<u>WIDE BAND ANALOG</u>	<u>DIGITAL</u>
VIDEO READOUT BANDWIDTH	100 MCPS	1 MCPS
MODULATING BASEBAND	100 MCPS	20 MCPS
RF SPECTRUM WIDTH	650 MCPS	20 MCPS
CARRIER FREQUENCY BAND	10.7 TO 11.7 GC	2.2 TO 2.3 GC
STATIONS	ONE - INLAND NEAR WASH, DC	NHS, VTS, KTS, HTS
VEHICLE ANTENNA	STEERABLE 3 FT. DISH	FIXED-BROAD BEAM
SECURITY	NARROW BEAM, LOW POWER NOISE MASKING IN SIDELOBES(?)	ENCRYPTION OF DATA
READOUT RATE	133 IN ² /MIN.	1 1/3 IN ² /MIN.
QUANTITY PER DAY	@4 1/2 X 9 25-PICTURES @1 X 1 1000 PICTURES	@1 X 1 40 PICTURES
WEIGHT		
FILM PROCESSING	100 Pounds	75 Pounds
SCANNER AND DATA PROCESSOR	275	100
TRANSMITTER AND ANTENNA	75	20
TOTAL	450 Pounds	195 Pounds

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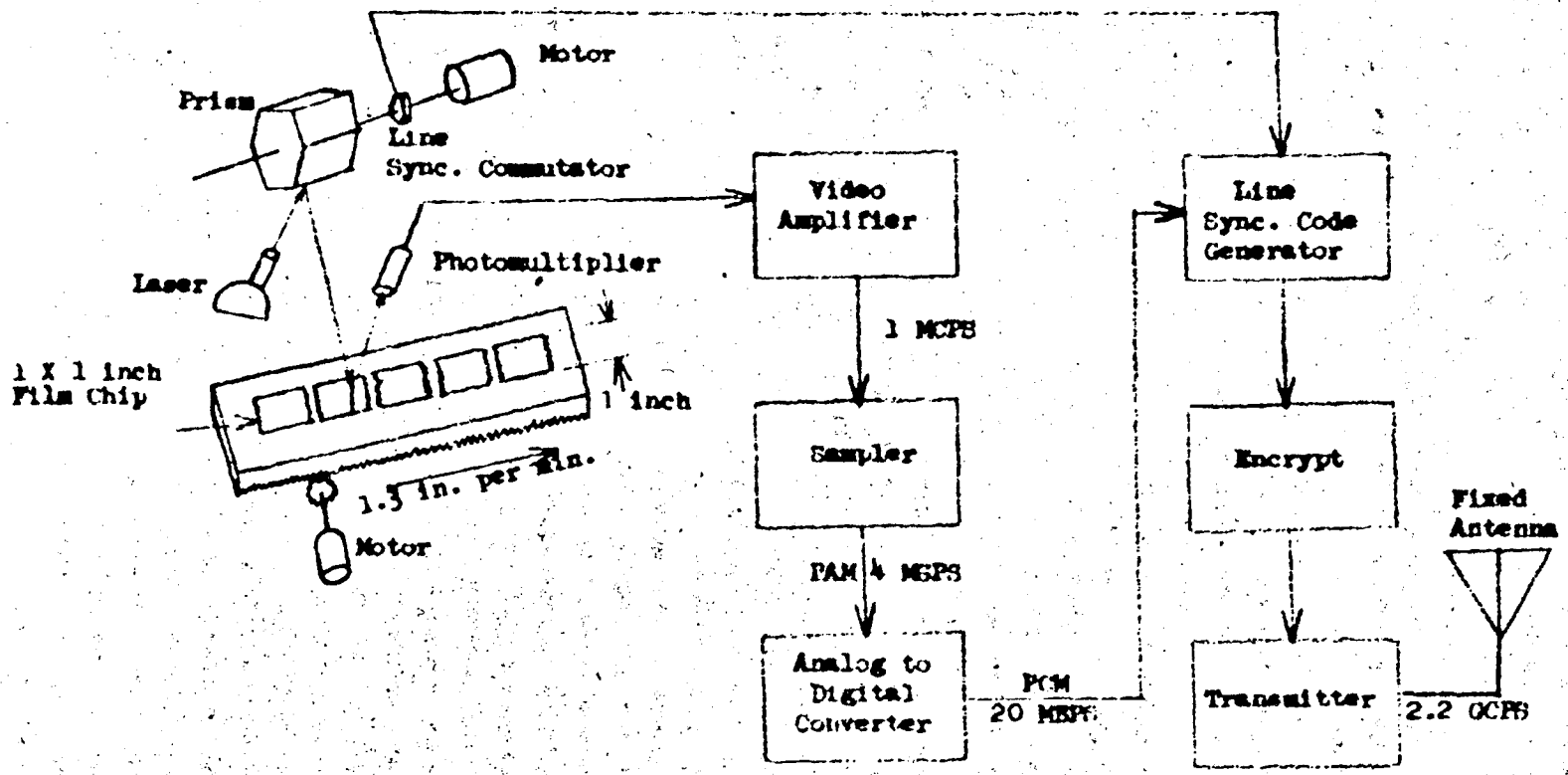
TRACKING STATIONS

- o STANDARD SGLS
 - o 60 FOOT DISH AND PREAMPLIFIER AVAILABLE AT VANDENBERG,
NEW BOSTON AND HAWAII
 - o IF REQUIREMENT CAN BE SHARED WITH ANOTHER PROGRAM
PROVIDE 60 FOOT DISH AT A FOURTH STATION
- o DATA RECORDING
 - o PROVIDE RECEIVER AND TAPE RECORDER AT READOUT STATIONS
 - o SHARE RECORDING CAPABILITY WITH OTHER PROGRAMS
- o IMAGE RECONSTRUCTION
 - o PRIMARY IMAGE RECONSTRUCTION AT USER FACILITIES
 - o SECONDARY CAPABILITY AT HTS AND VTS

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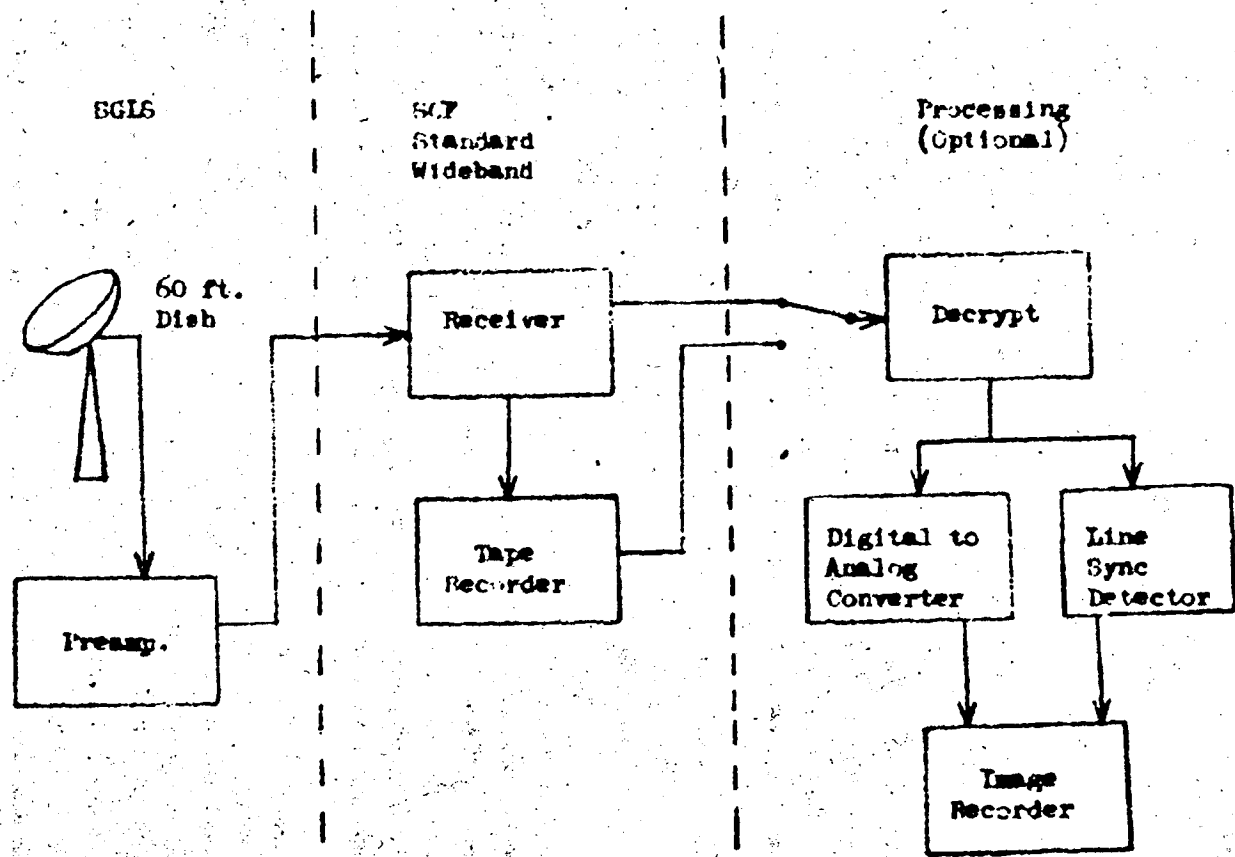
SCANNER CONFIGURATION



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TRACKING STATION CONFIGURATION



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CONCLUSIONS

SECURITY: [REDACTED]

RESOLUTION: SINGLE MODE - [REDACTED] (CONSERVATIVE)

QUANTITY: 1200 SQUARE INCHES IN 30 DAYS

TARGET SIZE: MINIMUM DIMENSION ONE TO TWO INCHES

READOUT PER PASS - 5 SQUARE INCHES

NOTE: ONE INCH (FILM) EQUALS 1000 FEET (GND)

RELIABILITY: 20 MBPS SCF STANDARD (LEAD PROGRAM -- 266)

FIXED VEHICLE ANTENNA

RELATIVELY LOW SCAN SPEED

TIME DELAY: MULTIPLE STATIONS (NHS, VTS, HTS, PLUS ONE)

LOCAL PROCESSING AT VTS AND HTS

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SPECIAL HANDLING

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RECOMMENDATIONS

- USE 20 MBPS ENCRYPTED LINK
- ASSIGN RESPONSIBILITY FOR COMPLETE SYSTEM TO SINGLE CONTRACTOR
- SPECIFIC CONTRACTOR TO BE IDENTIFIED LATER

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FILM RETURN CONCEPTS

- UP TO 12,000 FEET (220 LBS) OF EXPOSED FILM
- BASELINE SPECIFIES 350 LBS FOR R/V'S, LAUNCHER AND SUPPORTS
 - SINGLE 33" MK-V (60 LBS TO 70 LBS CAPABILITY)
 - UP TO 3 SMALLER R/V'S (\approx 20 LBS EACH)
- BALANCE RETURNED IN GEMINI B

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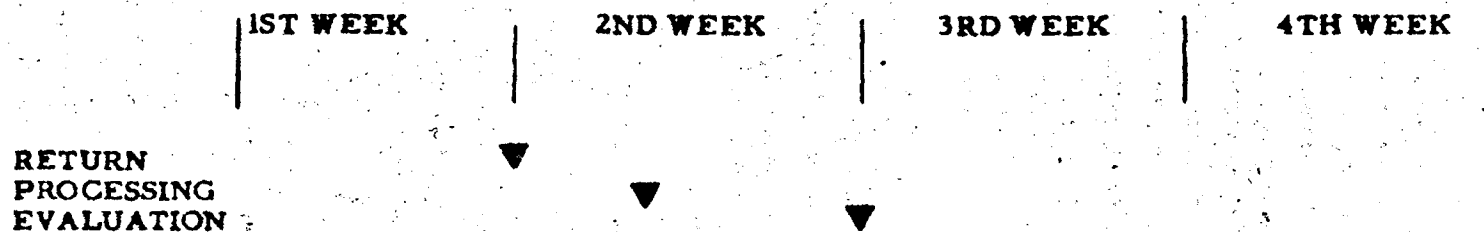
CONSIDERATIONS

- o WEIGHT
- o RELIABILITY, SAFETY
- o SECURITY
 - o POSITIVE PHYSICAL CONTROL
 - o SPECIAL PROVISIONS FOR CUES
- o EARLY OR PERIODIC RETURN
 - o QUALITY CHECK
 - o PERISHABLE DATA
 - o MISSION REPLANNING
- o GEMINI B CAPABILITY AND CONSTRAINTS

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EARLY OR PERIODIC RETURN



- o LAUNCH WILL BE SCHEDULED FOR GOOD WEATHER AT LEAST DURING FIRST WEEK
- o ALL TARGET AREAS ACCESSABLE DURING FIRST WEEK
- o FIRST WEEK RETURN COULD HAVE CONSIDERABLE EFFECT ON SUBSEQUENT MISSION PLANS
- o RETURN AT END OF 2ND WEEK WOULD EFFECT ONLY LAST WEEK OPERATION
- o RETURN AT END OF 3RD WEEK WILL HAVE NO EFFECT

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Copy 4 of _____
2 April 1966


PROGRAM PLANNING

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PROGRAM OBJECTIVES

- INTEGRAL LAUNCH
- 30 DAY MANNED DURATION
- 80 - 97° INCLINATION
- 80 N. MI. PERIGEE
- 
- 1500 TARGETS/MISSION
- DUAL MODE CAPABILITY
(MANNED & UNMANNED)

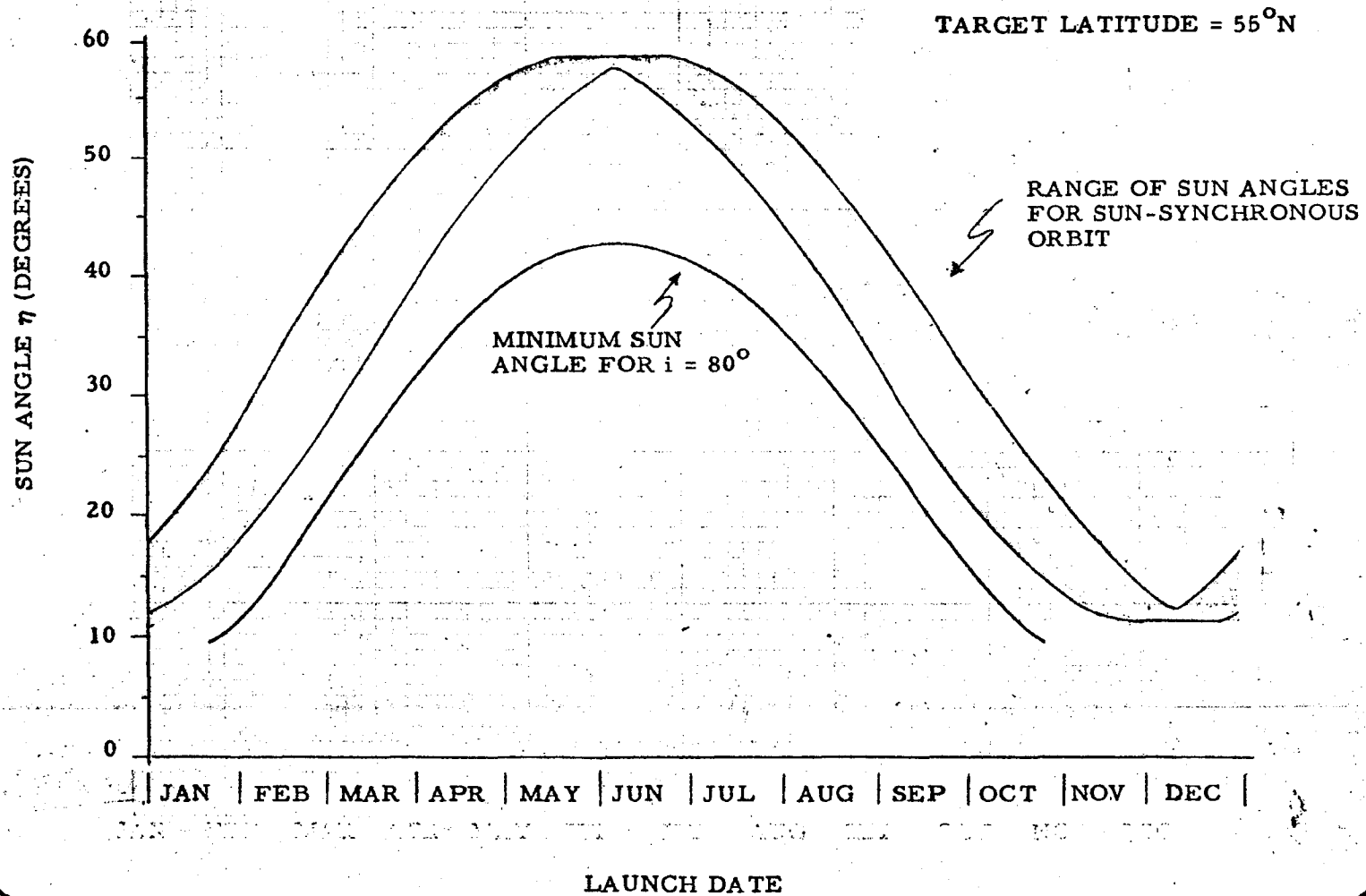
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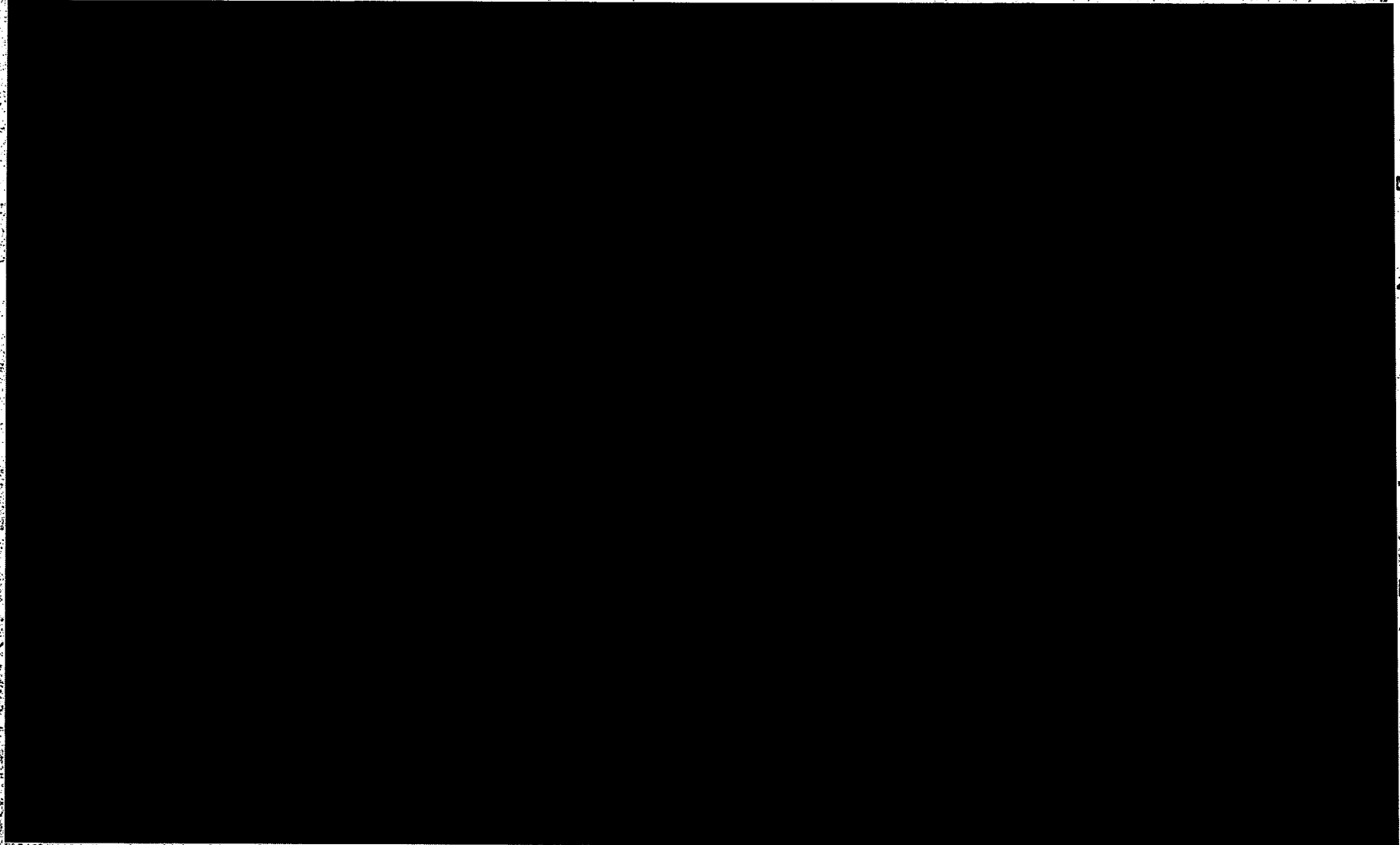
INCLINATION CONSIDERATIONS

(30 DAY MISSION)



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GROWTH CONSIDERATIONS

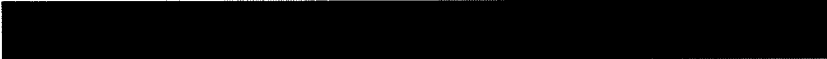
- OTHER MISSION APPLICATIONS

- DORIAN MISSION
 - IMPROVED ECONOMICS
 - IMPROVED PERFORMANCE

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ELINT APPLICATION

- BASIC FUNCTIONS
 - PROVIDE POINTING DATA TO LARGE OPTICS (THROUGH PTS)
 - 
 - ON-CALL, HIGH PRIORITY TI COLLECTION
- INTERFEROMETRIC ANTENNA SYSTEM FOR POINTING, ABOVE 3.5 GC
HIGH GAIN DISH (3 FT DIAMETER) FOR TI OBJECTIVE
- WEIGHT - 300 LBS - MINIMUM CAPABILITY TO 800 MAXIMUM CAPABILITY
- POWER - 20 WATTS MISSION AVERAGE WITH PEAKS TO 300 WATTS

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ECONOMIC FACTORS

PRESENT PROGRAM

	<u>RECURRING COST (MILLIONS/LAUNCH)</u>	<u>MEAN MISSION DURATION (DAYS)</u>	<u>COST/DAY (MILLIONS/DAY)</u>
o MANNED MODE			
GEMINI	19.0		
LABORATORY	29.0	80 NM	
MISSION MODULE	19.0	29	3.1
TRACKING, RECOVERY & LAUNCH VEHICLE	6.0	(P _{R 30} = .95)	
LAUNCH VEHICLE	<u>18.2</u>	70 NM 20	4.5
TOTAL	91.2	(P _{R 30} = .95)	
o UNMANNED MODE			
RECOVERY SECTION	4.0	70 NM	
LABORATORY	25.0	34	
MISSION MODULE	17.0		
TRACKING, RECOVERY & DATA REDUCTIONS	3.0	(P _{R 30} = .77)	2.0
LAUNCH VEHICLE	<u>18.2</u>		
TOTAL	67.2		

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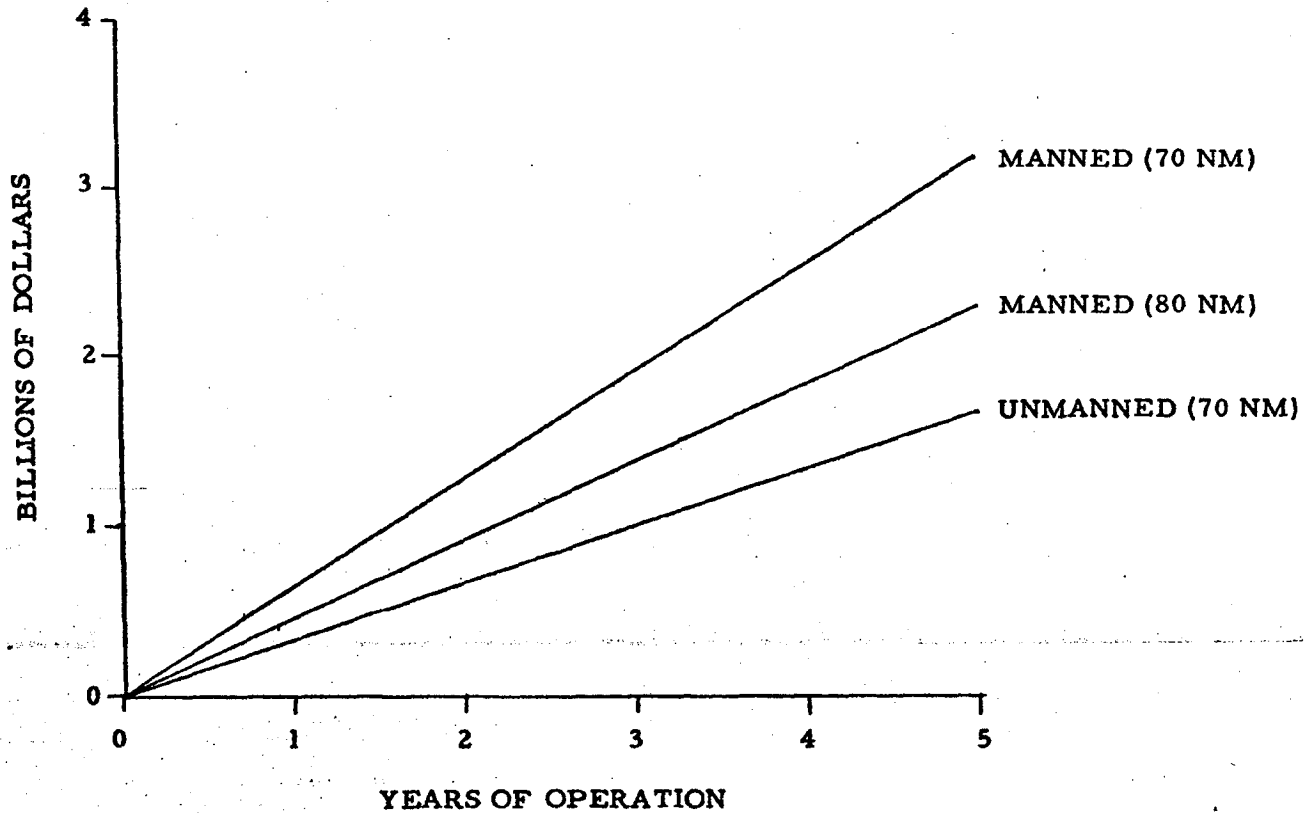
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COST EFFECTIVENESS
PRESENT PROGRAM
150 DAYS/YR ON ORBIT



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GROWTH AVENUES

INTEGRAL LAUNCH

RENDEZVOUS

BOOSTERS

- LDC-1
- LDC 1 AND 2

- TIIC (U)

PROGRAM
IMPLICATIONS

- SUBSYSTEM LIFE
EXTENSION
- BOOSTER
DEVELOPMENT
- ORBITING VEHICLE
MODIFICATION

- SUBSYSTEM LIFE
EXTENSION
- RESUPPLY VEHICLE
- RENDEZVOUS AND DOCKING
PROVISIONS

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MOL

EXTENSION OF ORBITING VEHICLE LIFE

● VEHICLE LIFE MAY BE EXTENDED BY:

METHODS

REMARKS

/ SUBSYSTEM REDUNDANCY	INFLEXIBLE; DIMINISHING RETURNS
/ STRETCH TESTING EXISTING COMPONENTS	LIMITED BY FUNDAMENTAL DESIGN
/ MANNED MAINTENANCE, REPAIR, AND REPLACEMENT (IV AND EV)	FLEXIBLE: REQUIRES CAREFUL DESIGN PROVISIONS
/ NEW SUBSYSTEM DEVELOPMENTS	TIME LIMITED

● COMBINATIONS OF METHODS APPEAR MOST EFFECTIVE FOR MOL

● STUDIES REQUIRED TO DEFINE OPTIMUM APPROACHES

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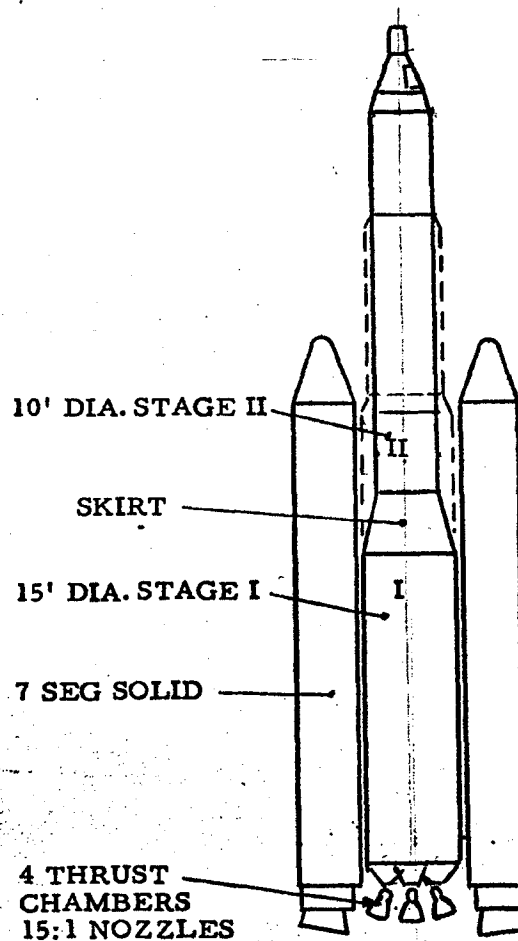


LARGE CORE TITAN III

- PAYLOADS ($i = 80^\circ$; 80/130 ORBIT)
 - .. LDC 1/7 SEG. --44,000 LBS.
 - .. LDC 1 & 2/7 SEG. --50,000 LBS.

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

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

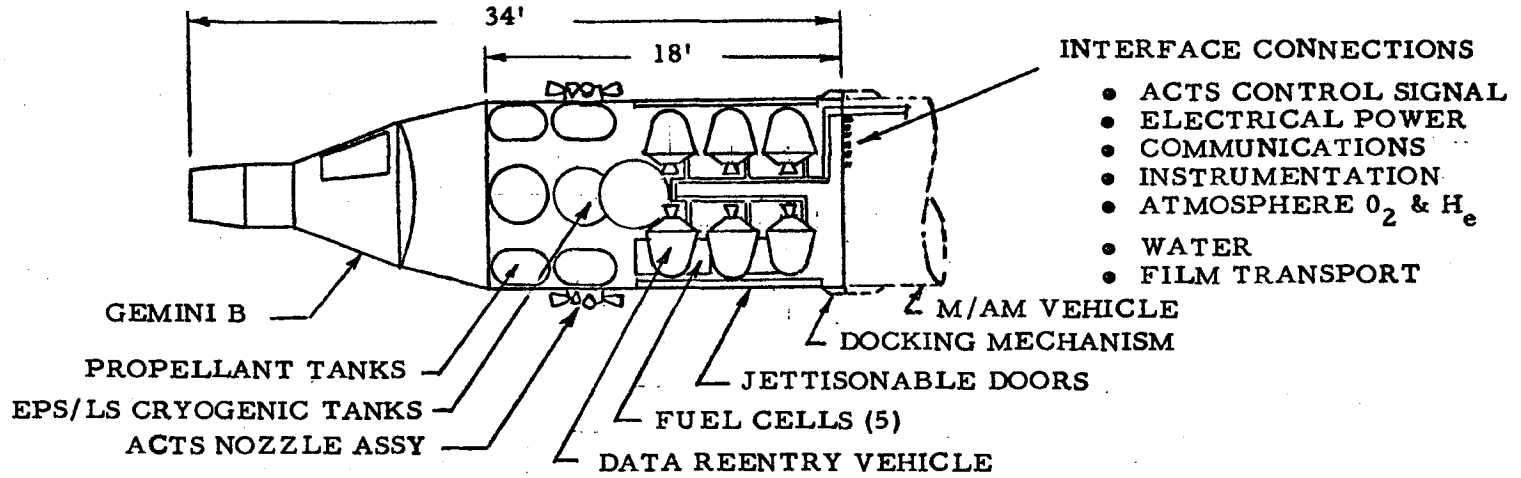


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RESUPPLY VEHICLE DESCRIPTION
(TYPICAL 60 DAY DESIGN)



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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ECONOMIC FACTORS
GROWTH AVENUES

	<u>NONRECURRING INCREMENTAL COSTS (MILLIONS)</u>	<u>RECURRING COSTS (MILLIONS)</u>	<u>MEAN MISSION DURATION (DAYS)</u>	<u>COST/DAY (MILLIONS/DAY)</u>
⊙ UNMANNED - THIC (U)		67.2	34	2.0
⊙ INTEGRAL LAUNCH				
- LDC - 7 SEG				
• VEHICLE MODIFICATIONS	50			
• SUBSYSTEM EXT.	80			1.9
• BOOSTER DEV.	50	96	50	
TOTAL	180			
⊙ RENDEZVOUS				
- THIC (U)				
• SUBSYSTEM EXT.	120			1.5
• RESUPPLY VEH.	230	OV 96	20	(2 - 4)
• REND. & DOCKING	50	RS 53	60	
• PAD	60			
TOTAL	460			

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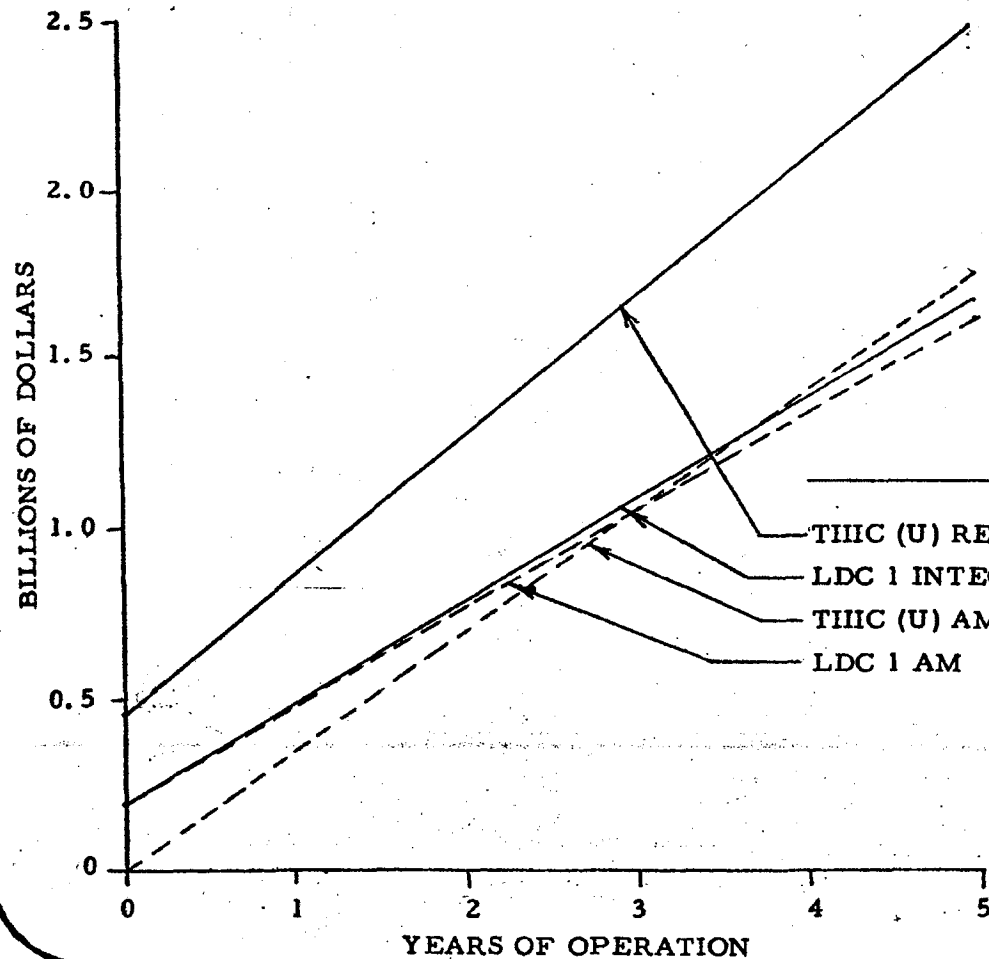
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COST EFFECTIVENESS
GROWTH PROGRAMS
3 SHOT RULE



YEARLY NO. OF LAUNCHES	COST PER DAY	DAYS PER YEAR
6	\$1.5M	280
3	\$1.9M	150
5	\$2.0M	170
4	\$1.7M	168

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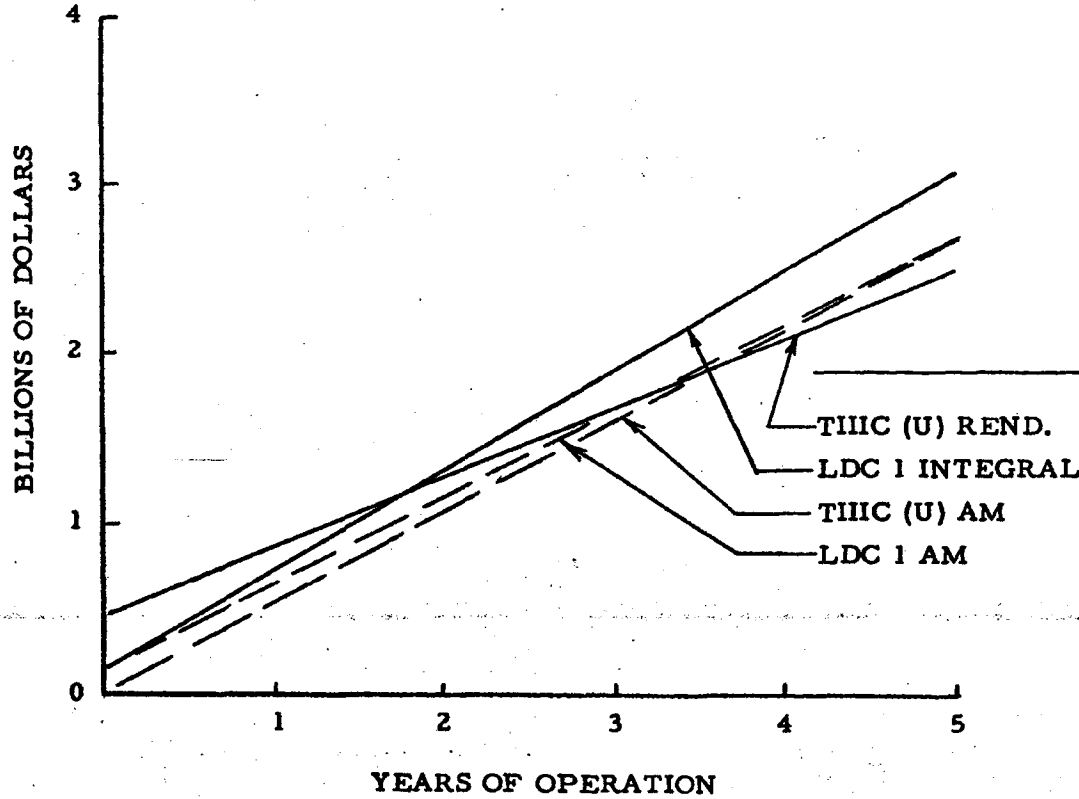
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COST EFFECTIVENESS
GROWTH PROGRAMS

~ 280 DAYS/YR



YEARLY NO. OF LAUNCHES	COST PER DAY
6	\$1.5M
7	\$1.9M
8	\$2.0M
6	\$1.7M

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SPECIAL HANDLING

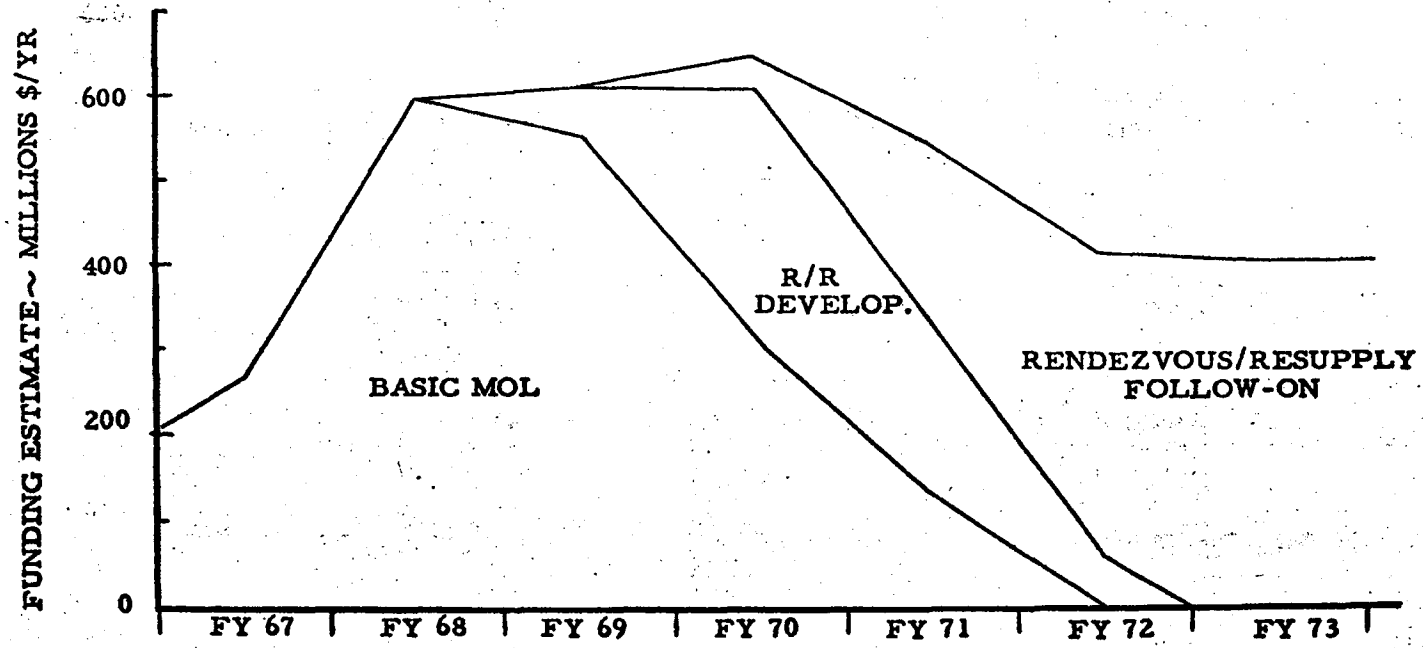
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RENDEZVOUS/RESUPPLY - POSSIBLE DEVELOPMENT
AND FOLLOW-ON

MILESTONE REF
 BASIC MOL FLIGHTS ○ ○ ● ● ● □ □ ● ●
 R/R DEV. FLIGHTS UNMANNED TEST — ⊗ ⊗
 RSV OPS. DEMONSTRATION P. II MAN RENDEZ. STATION KEEP ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ →

CY 66	CY 67	CY 68	CY 69	CY 70	CY 71	CY 72	CY 73
FY 67	FY 68	FY 69	FY 70	FY 71	FY 72	FY 73	



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SPECIAL HANDLING

TOTAL
3.505 BILLION \$
INCLUDING BASIC

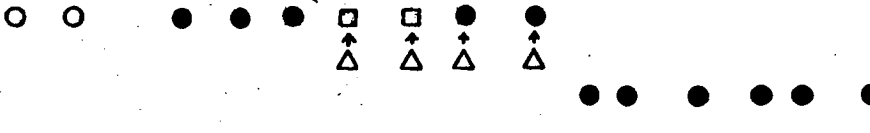
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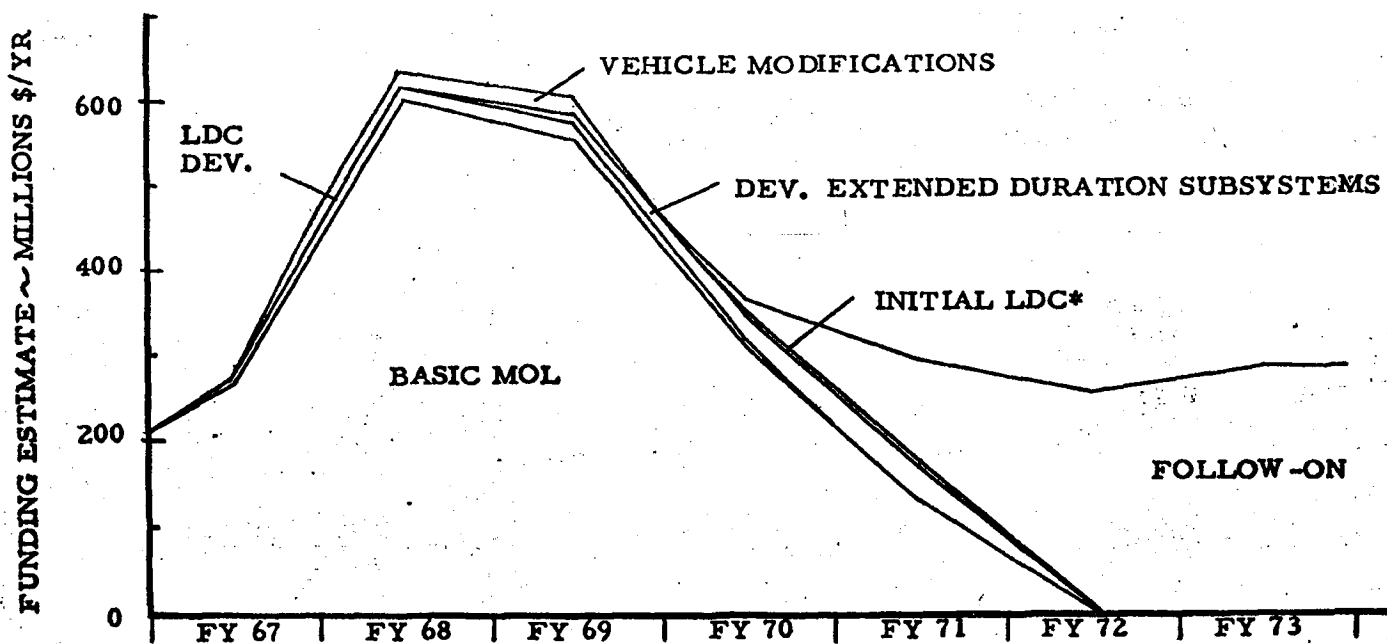


INTEGRAL LAUNCH LDC T-III - POSSIBLE DEVELOPMENT
AND FOLLOW-ON

MILESTONE REF
BASIC MOL FLIGHTS
INITIAL LDC
FOLLOW-ON LDC
P II



CY 66 | CY 67 | CY 68 | CY 69 | CY 70 | CY 71 | CY 72 | CY 73
FY 67 | FY 68 | FY 69 | FY 70 | FY 71 | FY 72 | FY 73



*REPR. Δ COST OVER TWO
PROGRAMMED T-III C (U)

TOTAL
2.721 BILLION \$
INCLUDING BASIC

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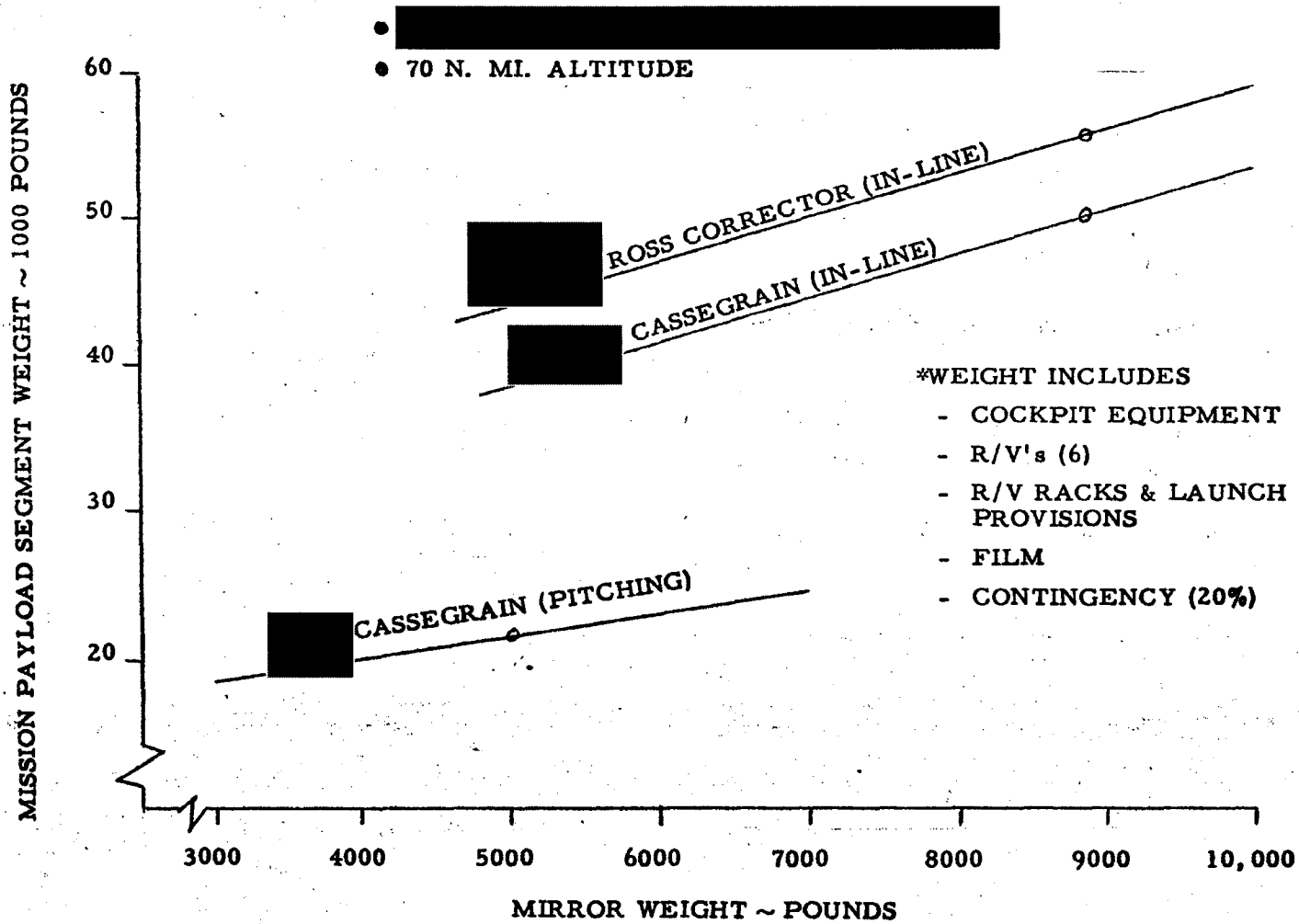
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ADVANCED SENSOR CONSIDERATIONS

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ADVANCED SENSOR PAYLOAD WEIGHTS



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POSSIBLE ADVANCED GROWTH CONFIGURATIONS

⊙ INTEGRAL LAUNCH (i = 90)

LDC 1 & 2

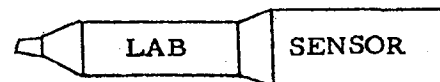


45 DAYS

$$6,200 + 14,800 + 18,000 = 49,000$$

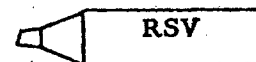
⊙ RENDEZVOUS (i = 97)

LDC 1



20 DAYS

$$6,200 + 17,800 + 18,000 = 42,000$$



70 DAYS

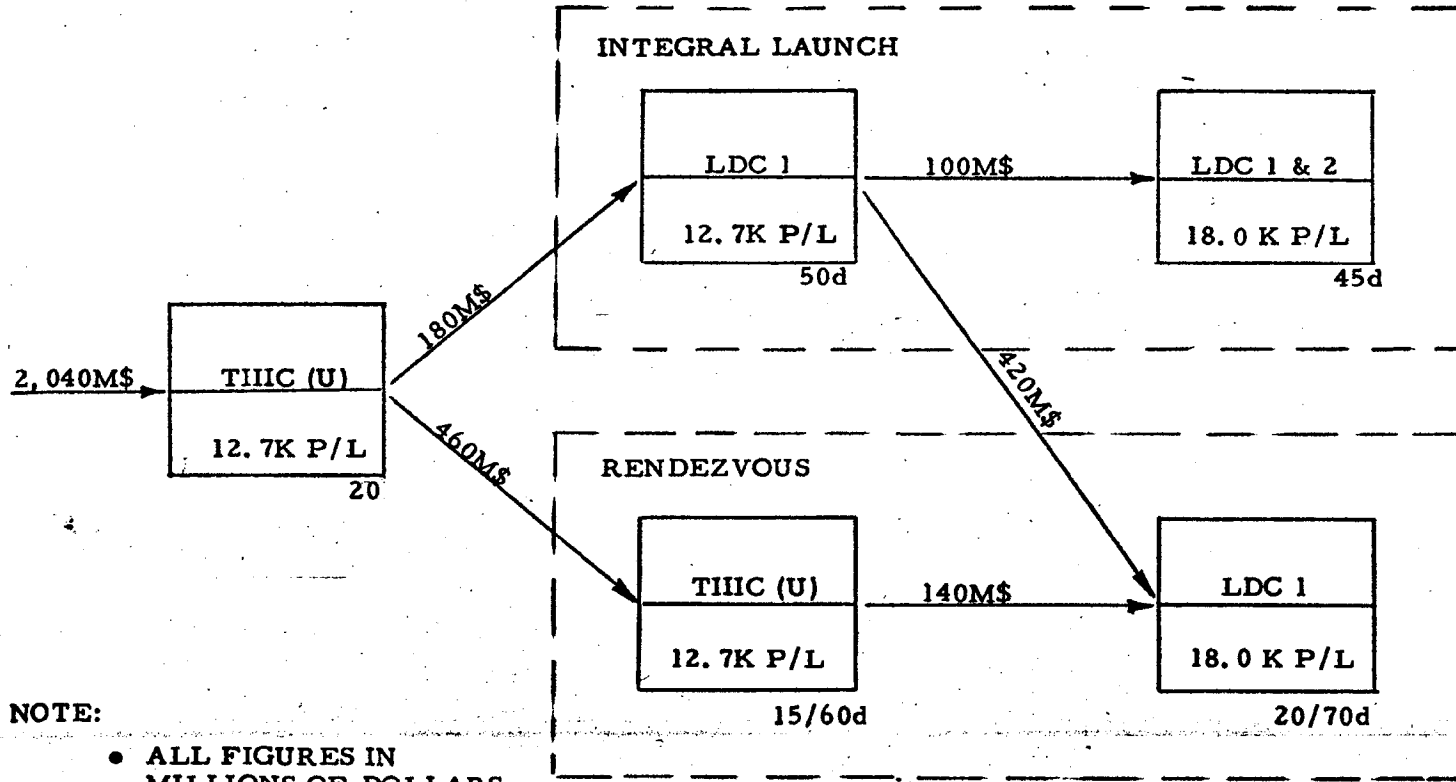
$$6,200 + 35,800 = 42,000$$

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MOL

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POSSIBLE MOL/DORIAN SYSTEM EVOLUTION



NOTE:

- ALL FIGURES IN MILLIONS OF DOLLARS
- NO ADVANCED SENSOR DEVELOPMENT COSTS INCLUDED

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CONCLUSIONS

- PRESENT PROGRAM MEETS THE EXISTING REQUIREMENTS
- LARGE CORE BOOSTER WILL ALLOW MORE COST EFFECTIVE DORIAN OPERATION AND BE AMORTIZED IN FIRST 70 DAYS OF OPERATION
- LARGE CORE BOOSTER PROGRAM CAN BE PHASED WITH MINIMUM PROGRAM DISRUPTION
- LARGE CORE BOOSTER PROGRAM PROVIDES A SOUND BASIS FOR MORE ADVANCED SENSOR SYSTEM AND OTHER MISSION APPLICATIONS
- IF REQUIREMENTS APPROACH 300 DAYS ON ORBIT/YEAR, RENDEZVOUS IS MORE COST EFFECTIVE THAN LARGE CORE INTEGRAL LAUNCH

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RECOMMENDED ACTIONS

- **CONTRACTOR STUDIES**
 - EXTENDED LIFE SUBSYSTEMS
 - LARGE CORE BOOSTER (PHASE I)
 - RESUPPLY VEHICLE
 - ORBITAL VEHICLE MODS FOR RENDEZVOUS AND DOCKING
 - ALTERNATIVE DEVELOPMENT PROGRAM APPROACHES
 - ORBITAL VEHICLE MODS FOR INTEGRAL LAUNCH

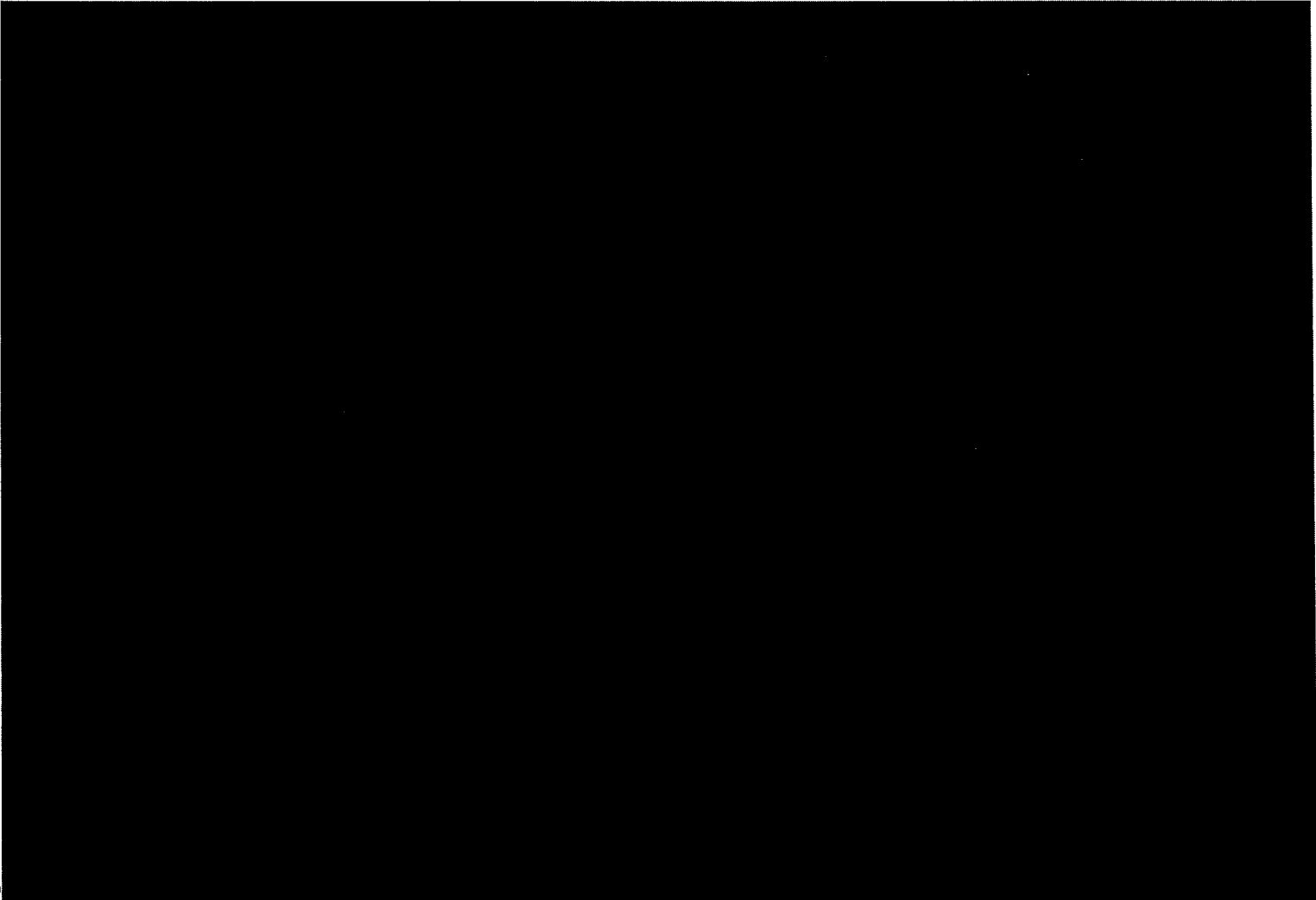
- **TECHNOLOGY PROGRAMS**
 - ADVANCED SENSOR TECHNOLOGY STUDIES

- **OTHER MISSIONS**

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AD 66 XXXX 00138
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MOL PERFORMANCE IMPROVEMENT PLAN

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AD 66 XXXX 00139 R1
MAR211966

MOL PERFORMANCE IMPROVEMENT PLAN

OBJECTIVES

- *FIRST LAUNCH UPRATED BOOSTER-JULY '70*
- *PAYLOAD CAPABILITY ≈ 40,000 LBS*
- *ORDERLY VEHICLE DEVELOPMENT*
- *MINIMIZE FY '66 & FY '67 COMMITMENT*
- *PLAN WHICH DOES NOT REQUIRE IMMEDIATE REDIRECTION OF PRESENT LAUNCH VEHICLE IN ORDER TO AVOID TWO INDEPENDENT DEVELOPMENTS*
 - ✓ *IDEALLY-PROVIDE PLAN IN WHICH DELTA DEVELOPMENT COST (OVER PRESENT PROGRAM) ESSENTIALLY INDEPENDENT OF TIME*

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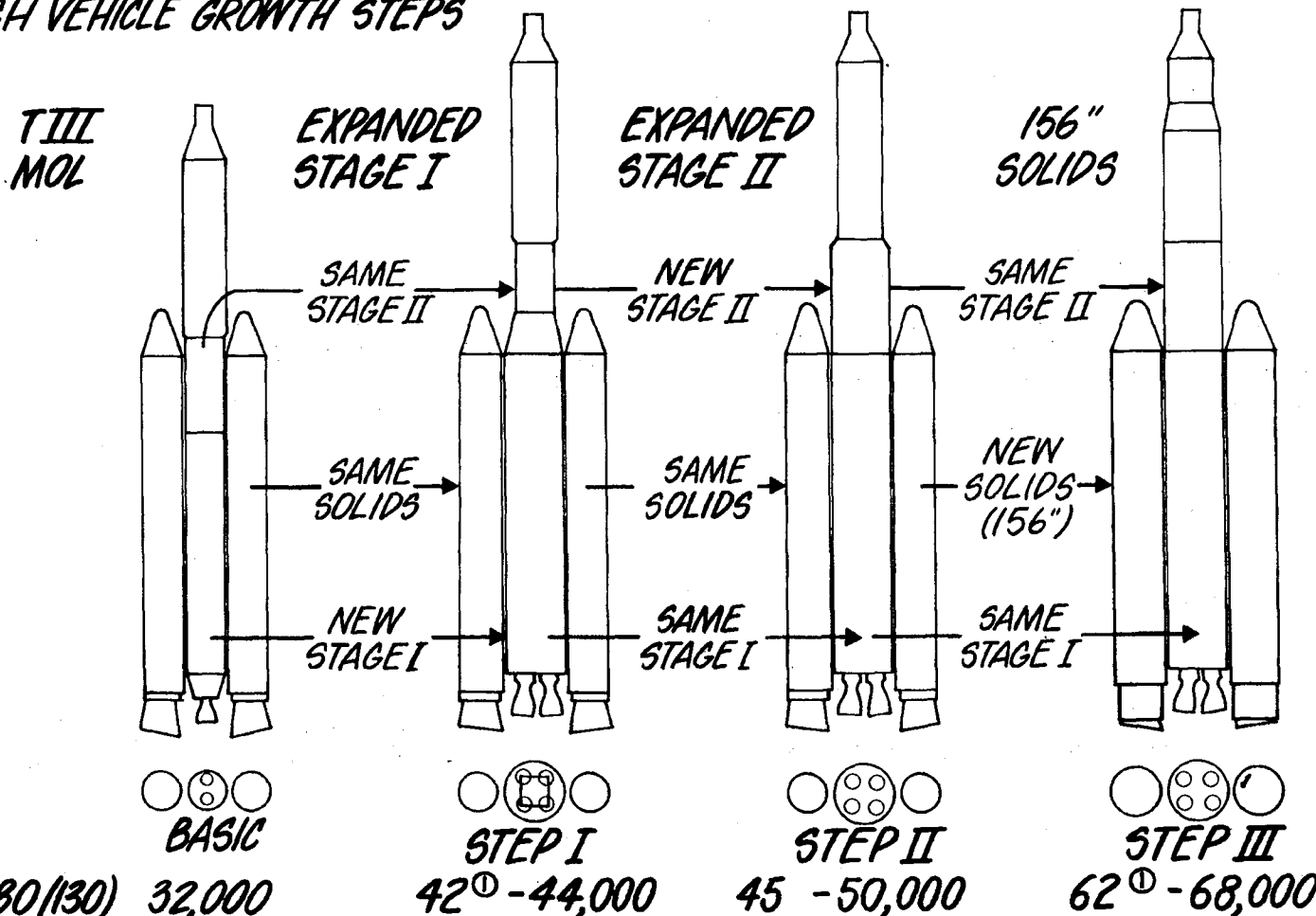
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AD 66 XXXX 00140 R11
MAR 21 1966

MOL PERFORMANCE IMPROVEMENT PLAN

● LAUNCH VEHICLE GROWTH STEPS



① NO EXTENDED STAGE I OR STAGE II BURN DURATION

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AD 66 XXXX 00160
MAR 25 1966

MOL PERFORMANCE IMPROVEMENT PLAN

● VEHICLE SIZING CONSIDERATIONS

/ CONSTRAINTS

- EXISTING TRANSPORTATION SYSTEMS - AIR AND GROUND
- 15:1 MOL ENGINES (BURNTIME ≤ 200 SEC + 3σ)
- TITAN III C FABRICATION TECHNIQUES
- MOL 7-SEGMENT SOLIDS
- MOL PAYLOAD
- MINIMUM CHANGES TO MOL STAGE II
- GROWTH TO 156" SOLIDS AND LARGER DIA PAYLOAD

/ CONCLUSIONS

- DIAMETER = 15'
- 4-15:1 ENGINES
- LENGTH = 80.7' (STAGE I/II SEPARATION TO ENGINE EXIT PLANE)
- $W_p = 670,000$ LBS (USABLE)
- MOL STAGE II WITHOUT CHANGE

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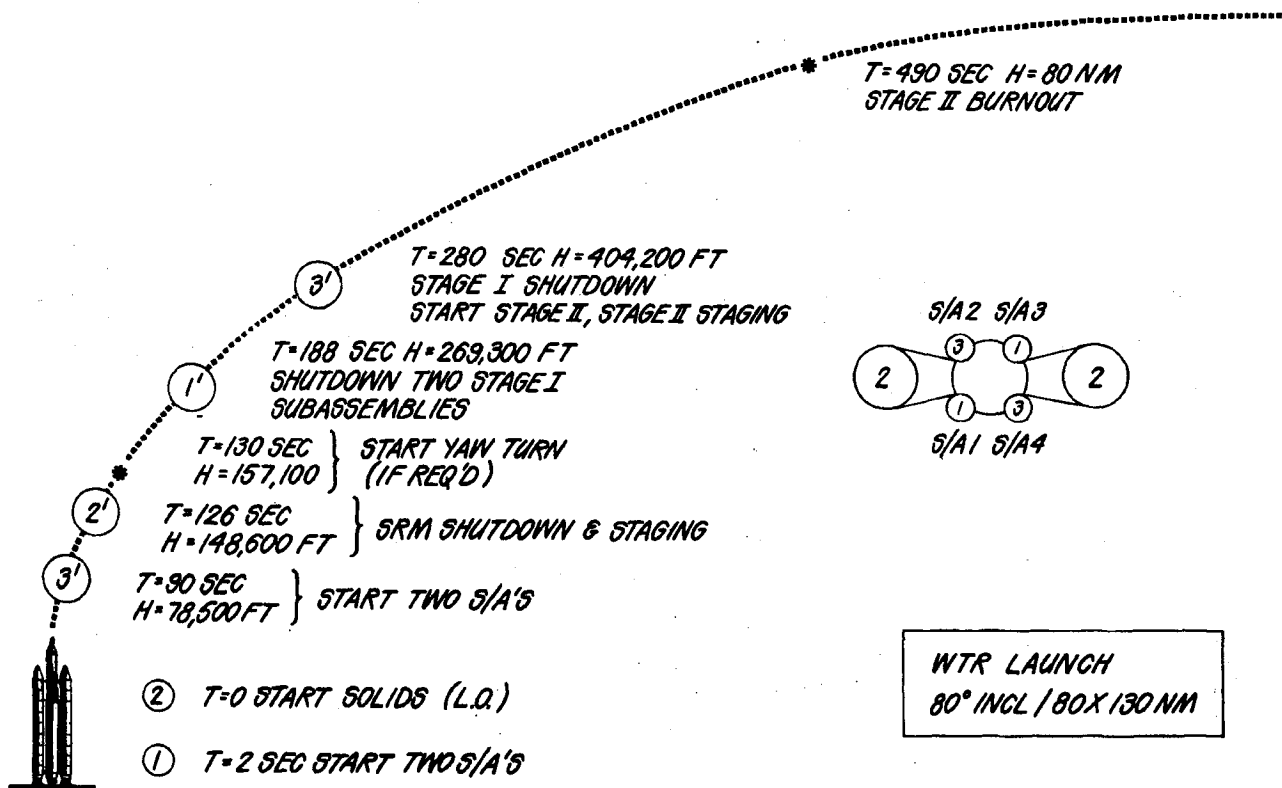
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MOL PERFORMANCE IMPROVEMENT PLAN

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



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MOL PERFORMANCE IMPROVEMENT PLAN

● TRAJECTORY CHARACTERISTICS

PARAMETER	LDC	T-III M
/ MAXIMUM ACCELERATION - G's ● STG 0 - START / B.O. } ● STG I - START / B.O. } MOL ● STG II - START / B.O. } PAYLOAD	1.48 / 3.74 1.95 / 3.39 0.84 / 1.94	1.60 / 3.35 1.30 / 4.13 0.90 / 2.40
/ DYNAMIC PRESSURE - LB/FT ² ● MAXIMUM ● TIME AT MAX Q (SEC) ● VELOCITY AT MAX Q (FT-SEC) ● MACH NO. AT MAX Q ● STG 0 - STG I STAGING ● STG I - STG II STAGING	841 60 2058 1.55 71.3 0	900 56.0 2092 1.59 32.5 0

DOWNGRADED AT 3 YEAR INTERVALS
DECLASSIFIED AFTER 12 YEARS
DOD DM 5200.10

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MOL PERFORMANCE IMPROVEMENT PLAN

● STAGING (STAGE 0/STAGE 1)

PARAMETER	LDC	T-III M
- CONDITIONS AT STAGING		
● ALTITUDE (FT)	148,600	166,800
● MACH NO.	5.80	5.52
● Q (LB/FT ²)	71.3	32.5
● α (DEG)	1.0	1.0
● β (DEG)	0.39	0.39
● STG I THRUST (LB)	1,047,563	519,000
● AXIAL ACCELERATION (G'S)	1.95	1.3
● 1 AFT STAGING ROCKET FAILURE	—	—
● 70,000 LB SRM RESIDUAL THRUST	—	—
● INITIAL CLEARANCE (FT)	1.14	0.9
- PHYSICAL PARAMETERS		
● SRM JETTISON WEIGHT (LB/MOTOR)	95,291	95,291
- STAGING RESULTS		
● CLEARANCE AFT CORE ENGINE BELL (FT)	2.0*	2.2
● TIME TO CLEAR	2.0*	2.6

* ESTIMATED

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AD 66 XXXX 00170
MAR 25 1966

MOL PERFORMANCE IMPROVEMENT PLAN

● STAGING (STAGE I/STAGE II)

PARAMETER	LDC	T-III M
/ CONDITIONS AT STAGING		
● MIN ENGINE SHUTDOWN IMPULSE ONE S/A	—	—
● MAX ENGINE SHUTDOWN IMPULSE OTHER S/A	—	—
● SLOW STAGE II THRUST BUILDUP	—	—
● Θ ERROR (DEG)	-1°	-1°
● CRITICAL PLANE	PITCH	PITCH
● Q (LB/FT ²)	0	0
● VELOCITY (FT/SEC)	16,446	16,353
● ALTITUDE (FT)	354,365	381,000
/ PHYSICAL PARAMETERS		
● STAGE I WEIGHT (LB)	36,784	17,806
● STAGE I MOMENT OF INERTIA (SLUG-FT ²)	1.97 x 10 ⁶	0.25 x 10 ⁶
● STAGE I DOME AREA (FT ²)	177	78.5
● MOMENT ARM, DOME TO C.G. (FT)	40.9	35.8
/ STAGING RESULTS		
● Δ TIME TO CLEAR (SEC)	0.42*	0.31
● MIN ENGINE BELL CLEARANCE (FT)	1.0*	1.2

*ESTIMATED

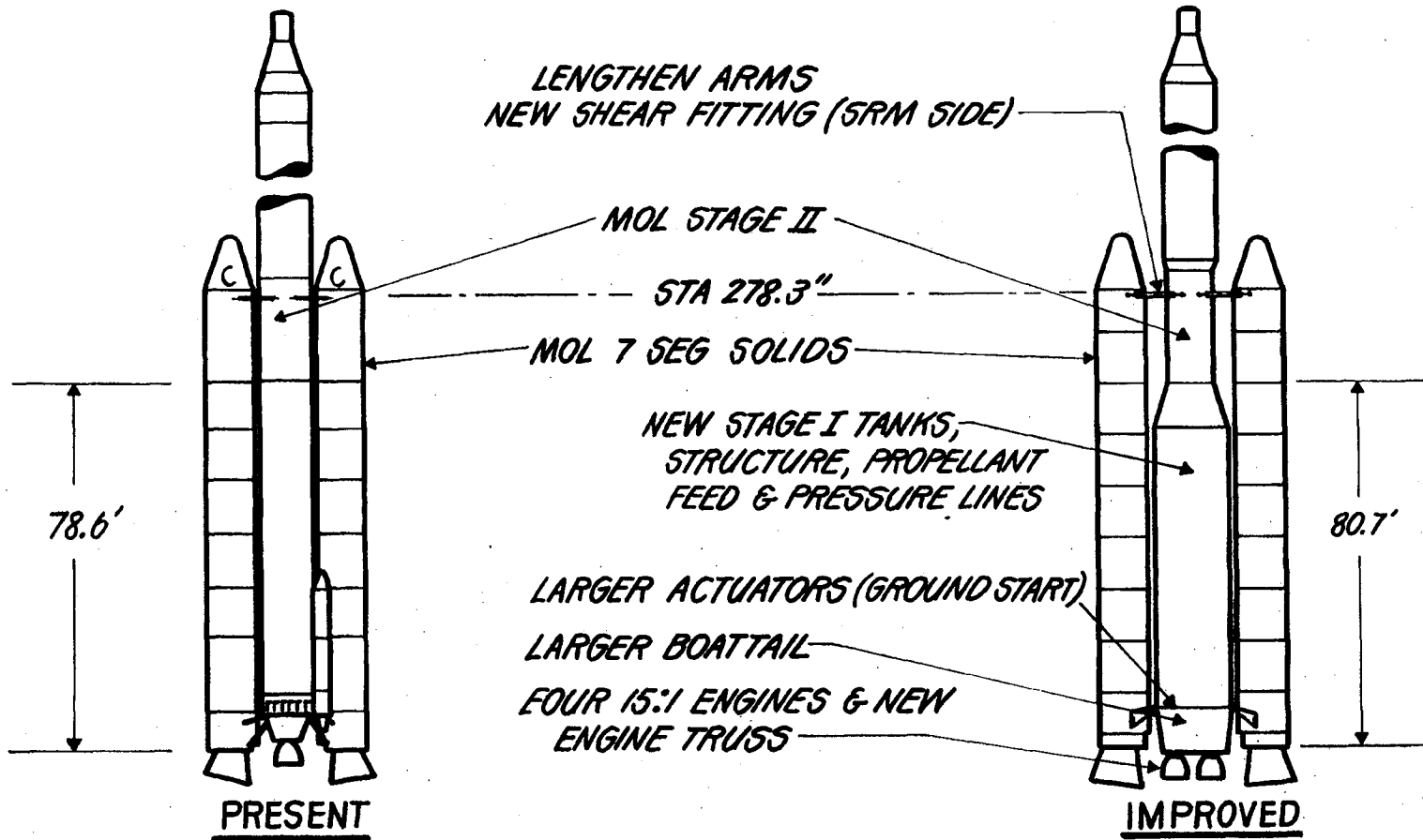
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~~SECRET~~ SPECIAL HANDLING MOL PERFORMANCE IMPROVEMENT PLAN

AD 66 XXXX 00161
MAR 25 1966

● VEHICLE CONFIGURATION



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AD 66 XXXX 00188 R-1
MAR 25 1966

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MOL PERFORMANCE IMPROVEMENT PLAN

TECHNICAL CONCLUSIONS - STEP I

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● **PERFORMANCE (80°-80/130 NM)**

- ✓ 42,000-44,000 LB (4-15:1 STAGE I ENGINES)

SPECIAL HANDLING

● **VEHICLE ENVIRONMENT**

- ✓ VIBRATION LEVELS \leq T-III C OR T-III M EXCEPT IN COMPARTMENT IA
- ✓ G'S AND MAX Q WITHIN CAPABILITY OF MOL/GEMINI/TITAN III CORE (STAGE II UNMODIFIED)

● **STRUCTURES**

- ✓ STAGE I REQUIRES COMPLETE TEST PROGRAM
- ✓ ALL STAGE II LOADS WITHIN CAPABILITY OF TITAN III M

● **STAGE I FABRICATION**

- ✓ FABRICATION TECHNIQUE IDENTICAL TO PRESENT TITAN III
- ✓ TOOLING MODS REQUIRED

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MAR 25 1966

MOL PERFORMANCE IMPROVEMENT PLAN

TECHNICAL CONCLUSIONS-STEP I (CONT'D)

● PROPULSION

NO ADDITIONAL ENGINE DEVELOPMENT (OVER PRESENT MOL PROGRAM) REQUIRED

- DEVELOPMENT OF MODULAR FRAME COMPATIBLE WITH MMC INTERFACE
- MOUNTING OF BOTH AUTOGENOUS SYSTEMS ON MODULAR ENGINE ASSEMBLY
- BATTLESHIP TEST PROGRAM AT AGC REQUIRED
 - ✓ MC SUPPLIED TANKS
 - ✓ SEQUENCED START AND SHUTDOWN
 - ✓ HYDRAULIC SYSTEM PERFORMANCE
 - ✓ FEED SYSTEM DYNAMICS
 - ✓ TRUSS INTEGRITY AND DYNAMICS
 - ✓ BASE HEATING
- STAND MODIFICATION (E-5)
 - ✓ SUPERSTRUCTURE FOR NEW TANKS
 - ✓ REINFORCE FOR INCREASED THRUST
 - ✓ NEW DEFLECTOR PLATE
 - ✓ MODIFY INSTRUMENTATION
 - ✓ PIPING MODIFICATIONS

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SPECIAL HANDLING

WHS-005

~~SECRET~~ SPECIAL HANDLING AD 66 XXXX 00190
MAR 25 1966

MOL PERFORMANCE IMPROVEMENT PLAN

TECHNICAL CONCLUSIONS - STEP I (CONT'D)

- **STAGING O/I**
 - / SATISFIES TITAN III STAGING CRITERIA
- **STAGING I/II**
 - / CLEARANCE ADEQUATE WITHOUT RAILS
- **FLIGHT CONTROLS**
 - / STAGE I ACTUATOR, HYDRAULIC RESERVOIR, & ELEC. MOTOR PUMP REDESIGN REQUIRED
 - / STAGE II UNCHANGED
- **POGO**
 - / CAN BE ELIMINATED BY BASIC DESIGN
 - LARGE OXIDIZER FEED LINES
 - HIGHER FUEL TANK PRESSURE
- **GROUND SYSTEMS**
 - / CRITERIA MODS ONLY TO ILG
 - / NO SAFETY CONSTRAINTS DUE TO EXPLOSIVE HAZARD, ACOUSTICS OR TOXICITY

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AD 66 XXXX 00191
MAR 25 1966

MOL PERFORMANCE IMPROVEMENT PLAN

● TRANSPORTATION ~~SECRET~~ SPECIAL HANDLING

/ "SUPER GUPPY" REQUIRED FOR STAGE I
AIR TRANSPORTATION TO WTR

/ ROAD TRANSPORTATION

● NEW TRANSPORTER

● ENGINES HUNG AT WTR

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AD 66 XXXX 00154 R#
MAR 21 1966

MOL PERFORMANCE IMPROVEMENT PLAN

● COST ESTIMATES - STEP I

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MMC

SIZING STUDIES
FACILITY CRITERA CHANGES
PHASE 1B SPEC PREPARATION
DEVELOPMENT PROGRAM

AGC

SIZING STUDIES
FACILITY CRITERA CHANGES
PHASE 1B SPEC PREPARATION
DEVELOPMENT PROGRAM

	CY 66	CY 67		CY 68		CY 69		CY 70
SIZING STUDIES	.50							
FACILITY CRITERA CHANGES	.50							
PHASE 1B SPEC PREPARATION	1.00							
DEVELOPMENT PROGRAM		1.00	3.00	3.50	6.50	8.00	4.50	3.00
SIZING STUDIES	.30							
FACILITY CRITERA CHANGES	.30							
PHASE 1B SPEC PREPARATION	.40							
DEVELOPMENT PROGRAM		1.60	3.00	4.00	2.00	2.50		
	3.00	2.60	6.00	7.50	8.50	10.50	4.50	3.00
	5.60	13.50		19.00		7.50		
	FY 67	FY 68		FY 69		FY 70		

$$\Sigma = \$45.60 \times 10^6 \text{①}$$

① FLIGHT HARDWARE, PROPELLANTS & FACILITY MODS NOT INCLUDED

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SPECIAL HANDLING

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AD 66 XXXX 00156 R//
MAR211966

MOL PERFORMANCE IMPROVEMENT PLAN

LAUNCH VEHICLE RECOMMENDATIONS - STEP I

- **COMMIT TO IMPLEMENTATION OF PERFORMANCE IMPROVEMENT PLAN UP TO JULY '67**

~~SECRET~~

✓ **REQUIRES ADDITIONAL \$ 3.0 x 10⁶**

SPECIAL HANDLING

✓ **CONTINUE STUDIES TO PROVIDE SMALL PAYLOAD INCREASES WITH PRESENT MOL LAUNCH VEHICLE**

✓ **EVALUATE RESULTS AT CRITICAL CHECK POINTS PRIOR TO JULY '67**

- **FINAL RECOMMENDATION ON SMALL PAYLOAD INCREASES ~ SEPT '66**

- **SUBMISSION OF LDC SPEC'S AND FIXED PRICE COSTS - DEC '66**

- **RE-EXAMINE REQUIREMENT - JULY '67**

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~~SECRET~~

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~~SPECIAL HANDLING~~

GEMINI B

DATA RETURN CAPABILITY

~~SECRET~~

SPECIAL HANDLING

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~~CONFIDENTIAL~~

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

~~SECRET~~

GEMINI B DATA RETURN CAPABILITY

WHS-005
~~SECRET~~

SPECIAL HANDLING

- o REQUIREMENTS
 - / UP TO 240 POUNDS OF PRIMARY DATA
 - o TRANSPORTED IN IDENTICAL PACKAGES
 - o TAKE UP EITHER IN GEMINI OR IN LABORATORY
 - / APPROXIMATELY 40 POUNDS OF SECONDARY DATA
 - / MINIMUM CHANGE TO GEMINI

- o GEMINI CONSTRAINTS
 - / VOLUME
 - / C.G.
 - / WEIGHT

~~SECRET~~ SPECIAL HANDLING



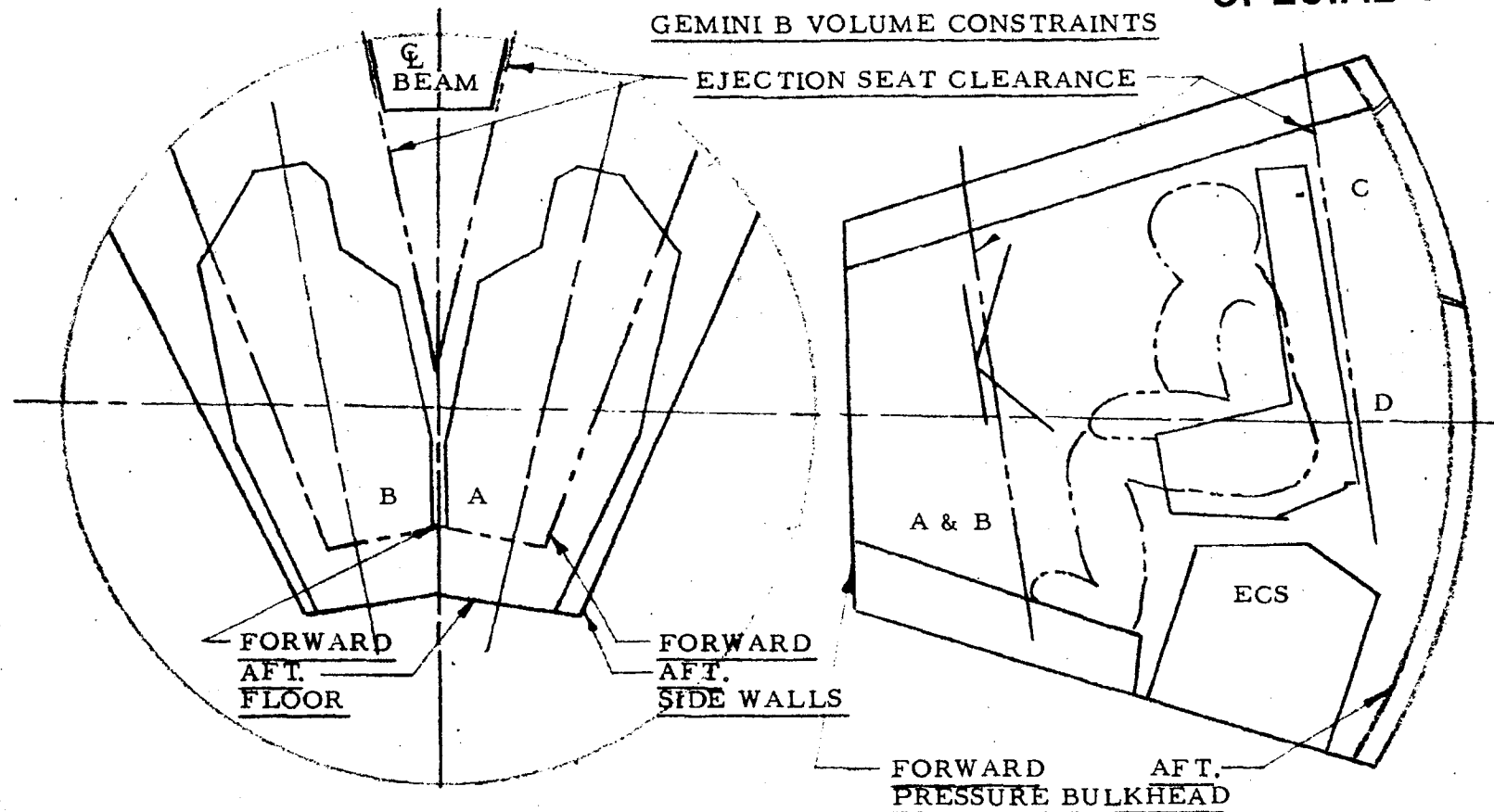
GEMINI B DATA RETURN CAPABILITY

~~SECRET~~

SPECIAL HANDLING

WHS-005

GEMINI B VOLUME CONSTRAINTS



~~SECRET~~

SPECIAL HANDLING



GEMINI B DATA RETURN CAPABILITY

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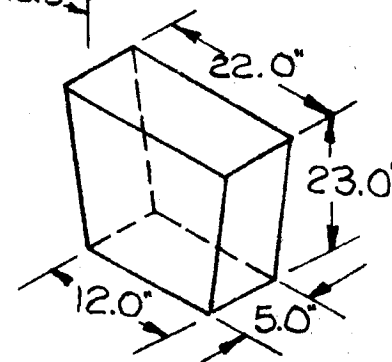
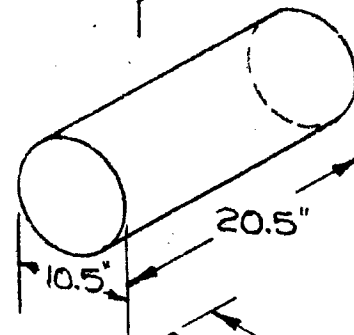
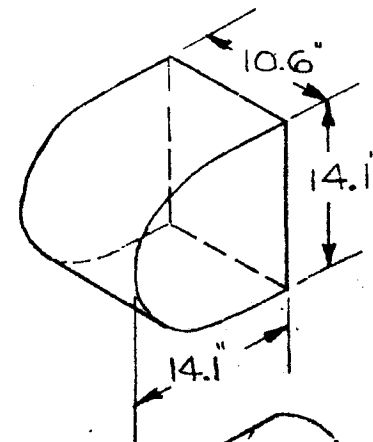
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~~SPECIAL HANDLING~~

- o PRIMARY DATA PACKAGE
 - / WEIGHT
 - o 60 POUNDS OF DATA
 - o 70 POUNDS TOTAL
 - / FITS A, B & C LOCATIONS (ONE EACH)

- o ALTERNATE PRIMARY DATA PACKAGE
 - / WEIGHT
 - o 60 POUNDS OF DATA
 - o 70 POUNDS TOTAL
 - / ONE PACKAGE IN A&B COMBINED
 - / FITS C LOCATION (TWO)

- o SECONDARY DATA PACKAGE
 - / TOTAL WEIGHT 30-50 POUNDS
 - / USE AS "GLOVE COMPARTMENT"
 - / D LOCATION



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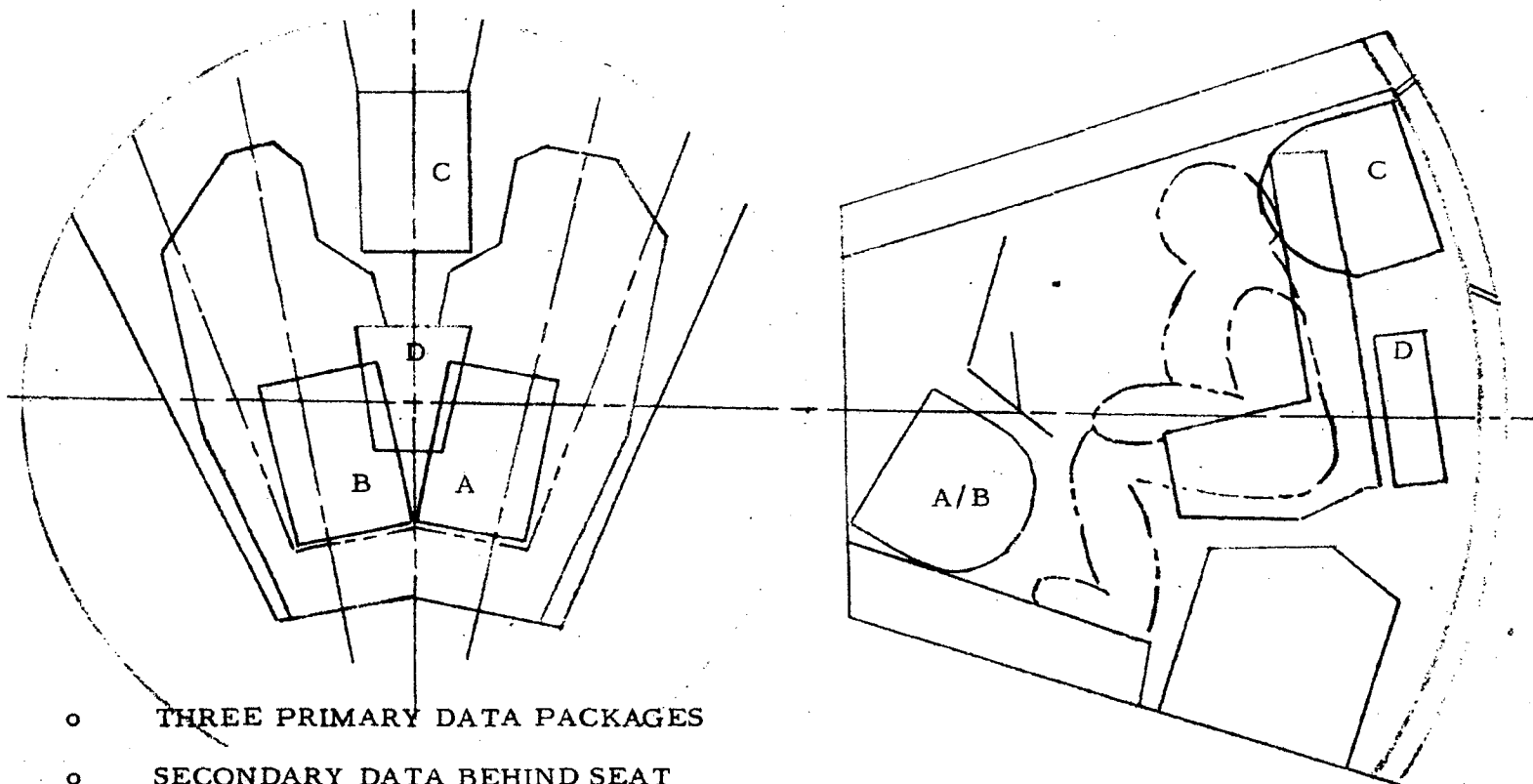


GEMINI B DATA RETURN CAPABILITY

WHS-005

~~SECRET~~

SPECIAL HANDLING



- THREE PRIMARY DATA PACKAGES
- SECONDARY DATA BEHIND SEAT

~~SECRET~~

SPECIAL HANDLING



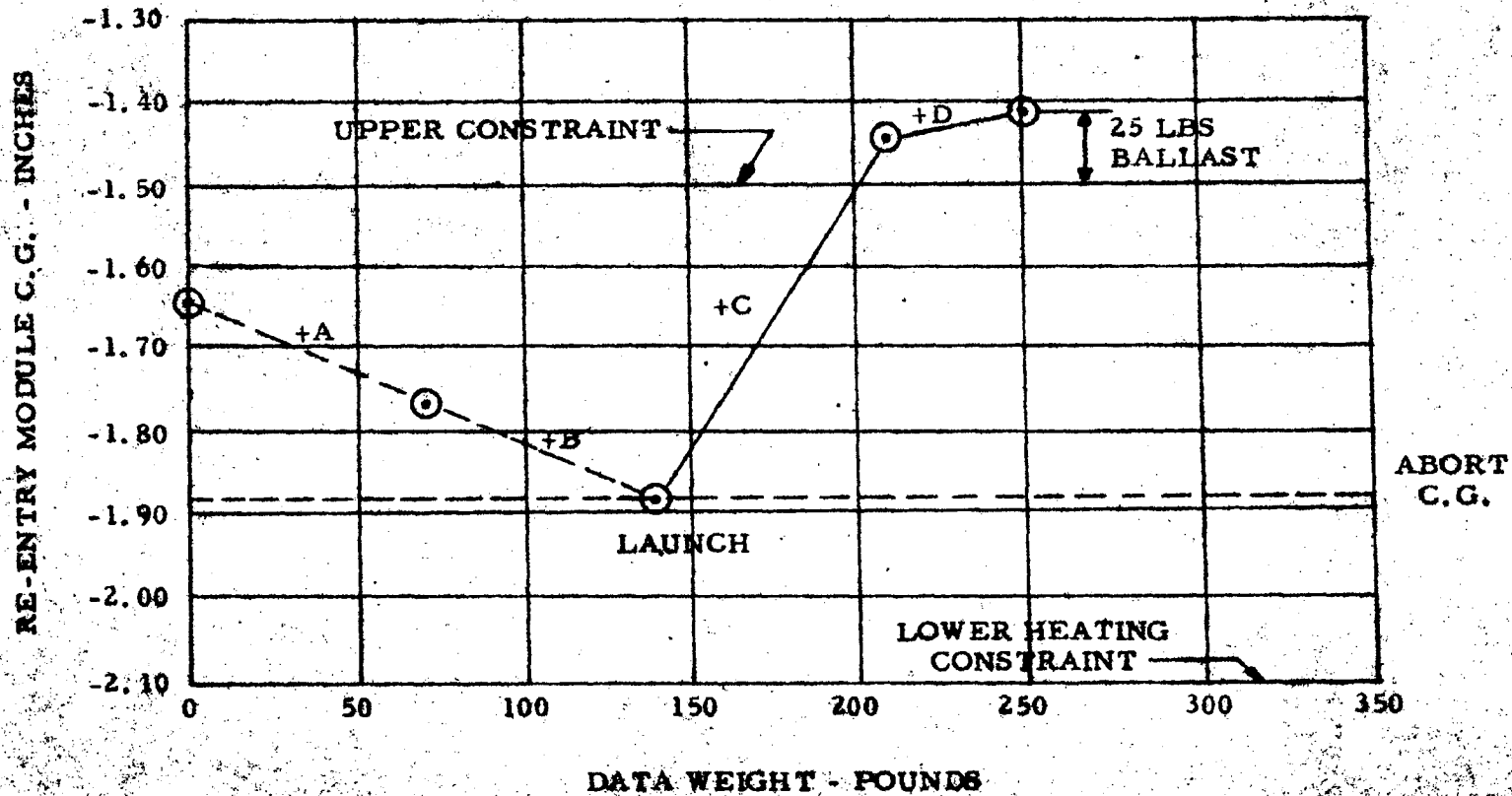
GEMINI B DATA RETURN CAPABILITY

~~SECRET~~

WHS-005

~~SPECIAL HANDLING~~

- o SPACECRAFT C.G. - CASE I
- / THREE PRIMARY DATA PACKAGES
- / A & B IN GEMINI AT LAUNCH



~~SECRET~~

~~SPECIAL HANDLING~~

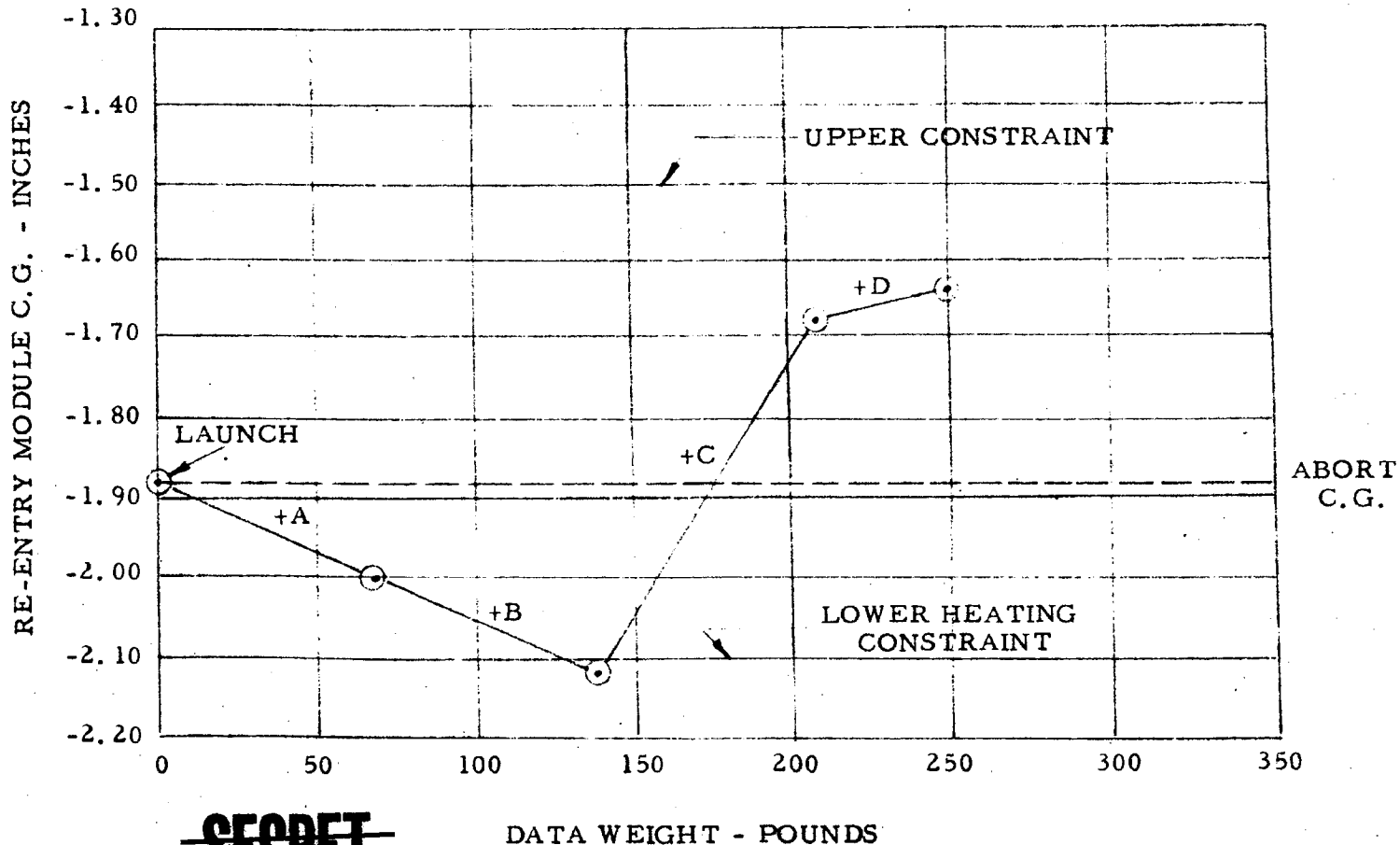


WHS-065

GEMINI B DATA RETURN CAPABILITY

- o SPACECRAFT C.G. - CASE II
- / THREE PRIMARY DATA PACKAGES
- / NO DATA IN GEMINI AT LAUNCH

~~SECRET~~
SPECIAL HANDLING



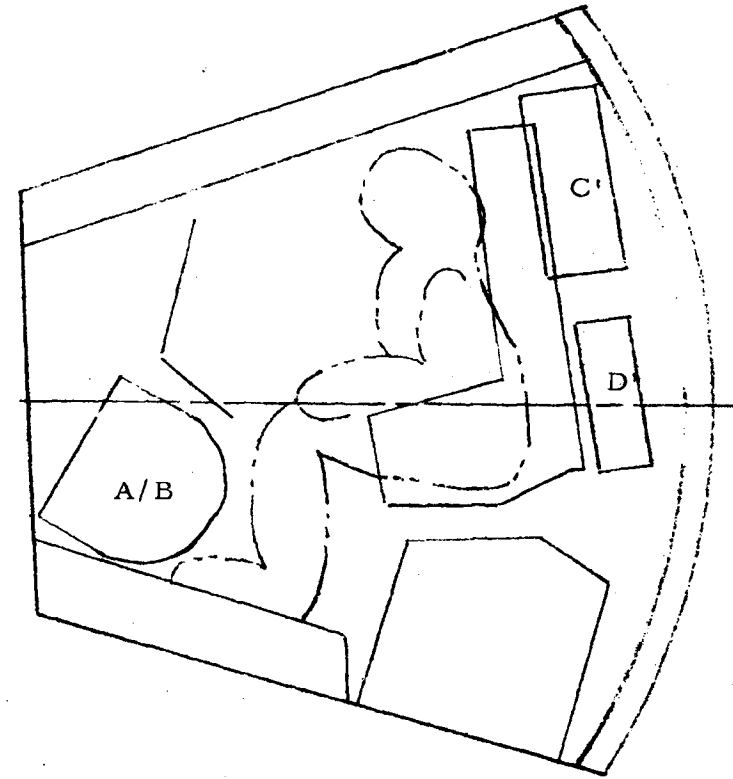
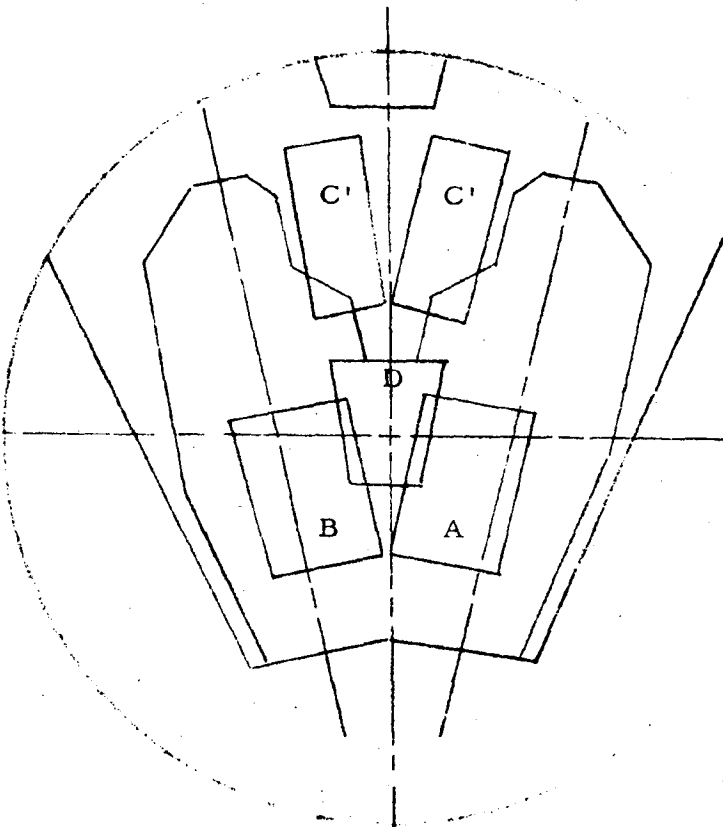
~~SECRET~~

SPECIAL HANDLING



GEMINI B DATA RETURN CAPABILITY

WHS-005
~~SECRET~~



- o FOUR PACKAGES OF PRIMARY DATA
/ TWO PRIMARY SHAPES
/ TWO ALTERNATE SHAPES

- o SECONDARY DATA BEHIND SEAT

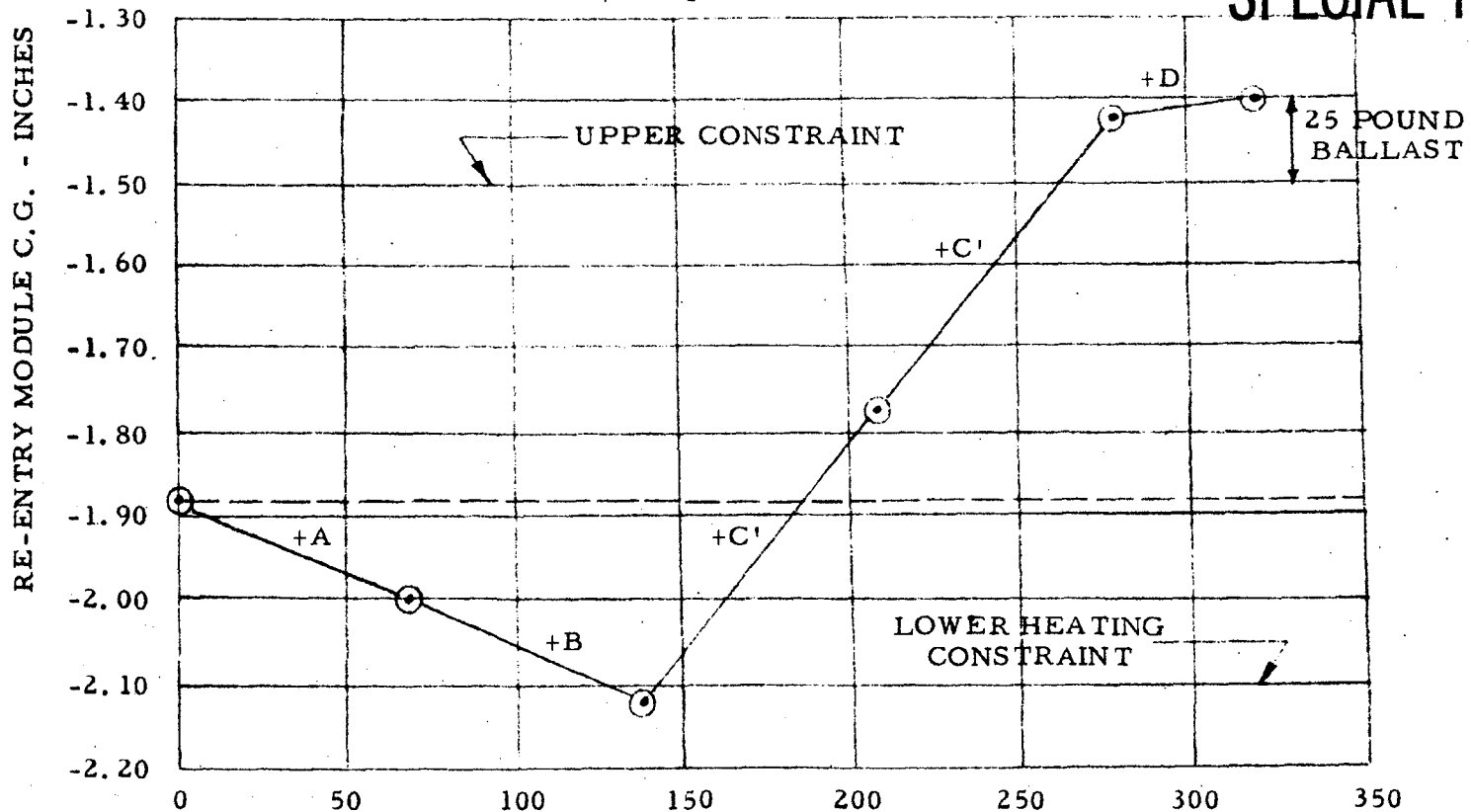
~~SECRET~~ SPECIAL HANDLING

WHS-005

GEMINI B DATA RETURN CAPABILITY

- o SPACECRAFT C.G. - CASE III
- / TWO PRIMARY AND TWO ALTERNATE DATA PACKAGES
- / NO DATA IN GEMINI AT LAUNCH

~~SECRET~~
SPECIAL HANDLING



~~SECRET~~

DATA WEIGHT - POUNDS

SPECIAL HANDLING

~~SECRET~~

WHS-005

GEMINI B DATA RETURN CAPABILITY

o CONCLUSIONS

/ CAN RETURN ~ 180 POUNDS PRIMARY DATA

- o THREE IDENTICAL PACKAGES
- o PLUS 30 - 50 POUNDS SECONDARY DATA
- o VOLUME IS AVAILABLE

/ WITH ONLY MINOR MODIFICATIONS TO GEMINI

- o CAN HANDLE C.G. PROBLEM

/ CAN RETURN ~ 240 POUNDS PRIMARY DATA

- o FOUR PACKAGES OF TWO SHAPES
- o PLUS 30 - 50 POUNDS SECONDARY DATA
- o VOLUME IS AVAILABLE

/ REQUIRES MORE SEAT MODIFICATIONS

- o C.G. PROBLEM WILL PROBABLY REQUIRE ADDING BALLAST
ON ORBIT

~~SECRET~~

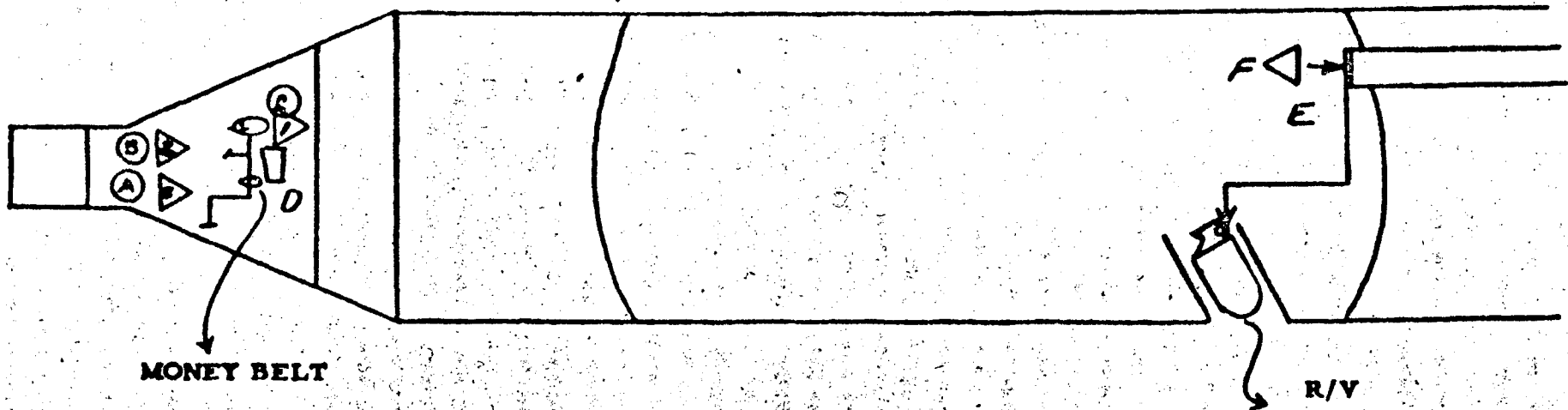
SPECIAL HANDLING

~~SECRET~~

SPECIAL HANDLING

~~SECRET~~/SPECIAL HANDLING

RETURN CONFIGURATION



CAMERAS

- **BASELINE SPECIFIES TWO CAMERAS**
 - **ONBOARD PROCESSING**
 - **READOUT**
 - **OTHER FILM (COLOR, HI SPEED, IR/COLOR)**
- **CURRENT SINGLE CAMERA WITH PLATTEN AND LOOPERS OCCUPIES A SPACE OF 36" X 24" X 24"**
- **LIMITATIONS IN LABORATORY DICTATE SINGLE CAMERA**
- **THIS REQUIRES A SINGLE PLATTEN CAPABLE OF BEING MOVED BACK FROM THE ROSS CORRECTOR FAR ENOUGH TO ACCEPT THE SECONDARY FILM AND FILTERS**
- **THIS HAS THE DISADVANTAGE THAT THE SECONDARY FILM WOULD NOT HAVE ACROSS THE FORMAT IMC**

~~SECRET~~/SPECIAL HANDLING

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FILM

o BASELINE

o PRIMARY -- 9" 3404 X (SO-362) THIN BASE

o SECONDARY -- WIDTH -- UNSPECIFIED

TYPE -- 3404 X COLOR, HI SPEED, IR/COLOR

o WEIGHT, SPACE AND READOUT CHIP SIZE OF 1" X 1" INDICATE

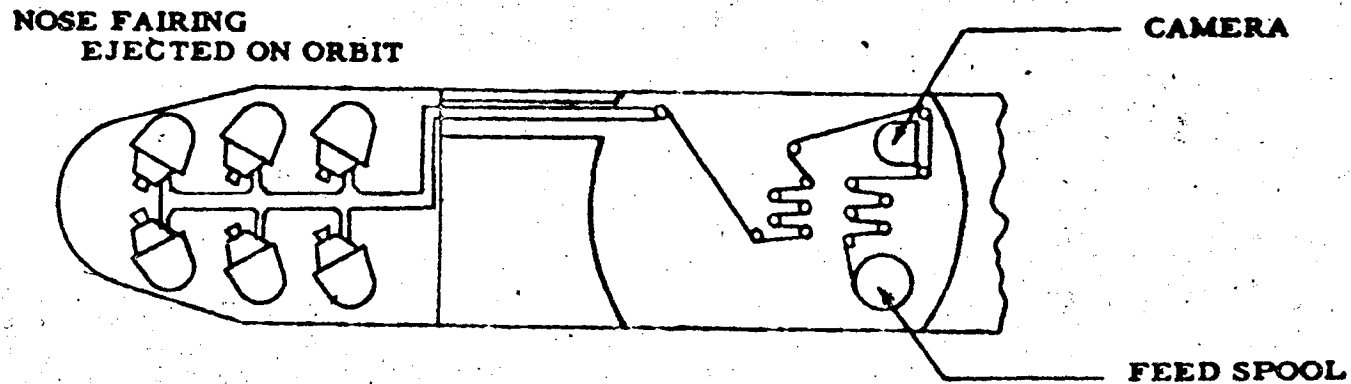
A 5" WIDTH MAY BE PREFERABLE

~~SECRET~~/SPECIAL HANDLING

W-5-005

~~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

RECOMMENDED BASELINE (MANNED AUTOMATIC)

- READOUT
 - ONBOARD PROCESSING
 - 20 MBPS INCRIPTEED DATA LINK
- SINGLE CAMERA MOVABLE PLATTEN
 - 9" FILM PRIMARY
 - 5" FILM SECONDARY
- SINGLE 33" R/V (MK-V)
- RECOVERY VEHICLE AND READOUT DESIGNED TO PERMIT EASY
REMOVAL PRIOR TO LAUNCH
- FILM PACKAGES FOR GEMINI B
 - EXACT WEIGHT AND CONFIGURATION OF FILM PACKAGES
UNRESOLVED
 - WILL BE RESOLVED PENDING FURTHER WORK WITH MCDONNELL

~~SECRET~~/SPECIAL HANDLING

WIS-005

RECOMMENDED BASELINE (UNMANNED)

- SIX RECOVERY VEHICLES
- EXTEND MISSION DURATION TO 40 DAYS
- ALTITUDE (MINIMUM)

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