

June 10, 1961

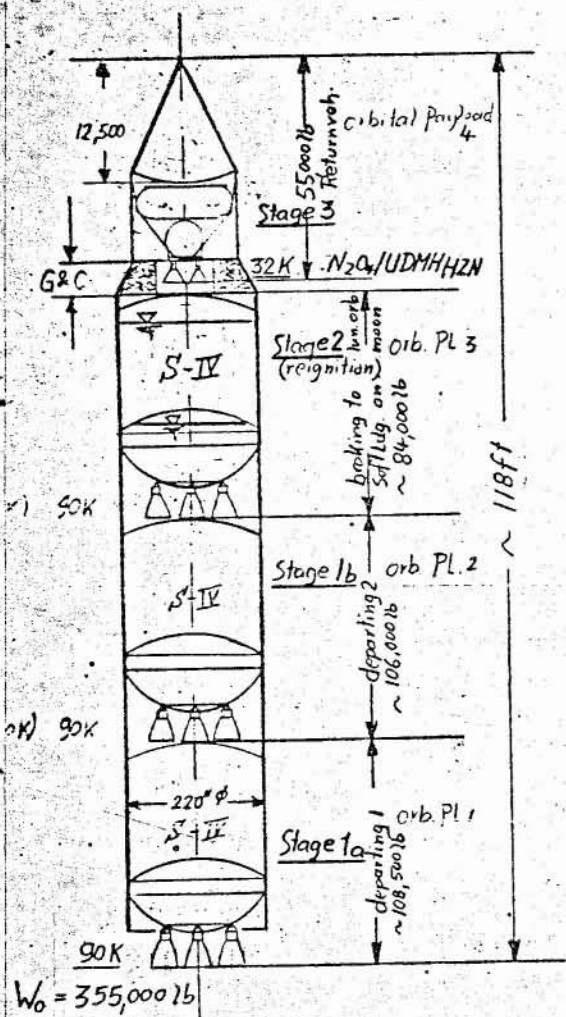
Appendix to Chapter II of
A SURVEY OF VARIOUS VEHICLE SYSTEMS
FOR THE MANNED LUNAR LANDING MISSION

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George C. Marshall Space Flight Center
Future Projects Office

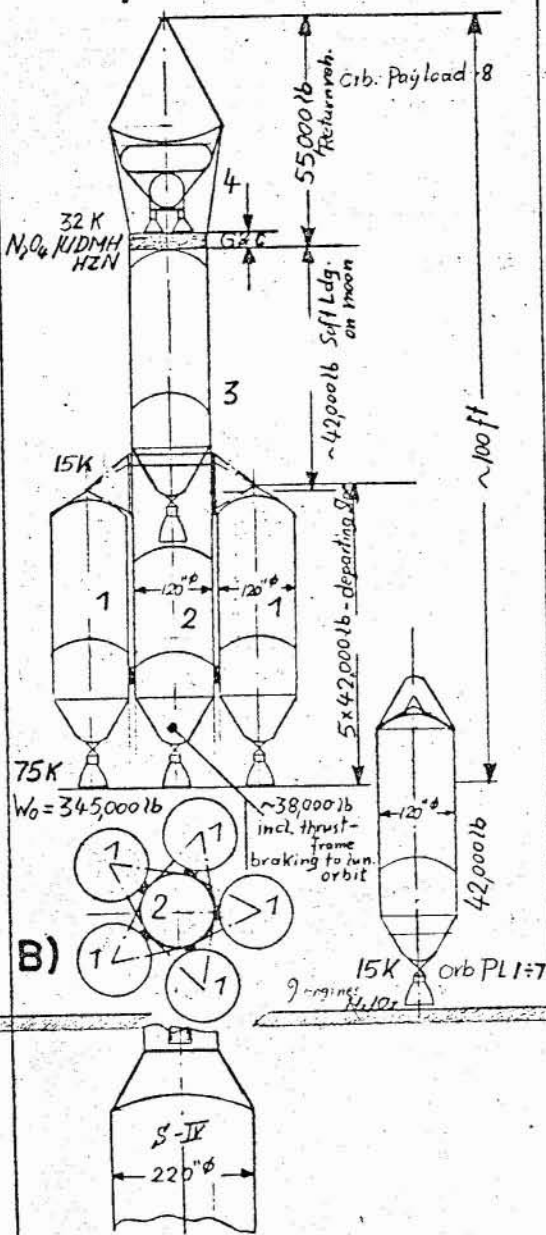
* Charts only
attached
retain original
+ appendix

ORBITAL LAUNCHED VEHICLES BASED ON SATURN C-2 & C-3

PURE ASSEMBLY-OPERATION



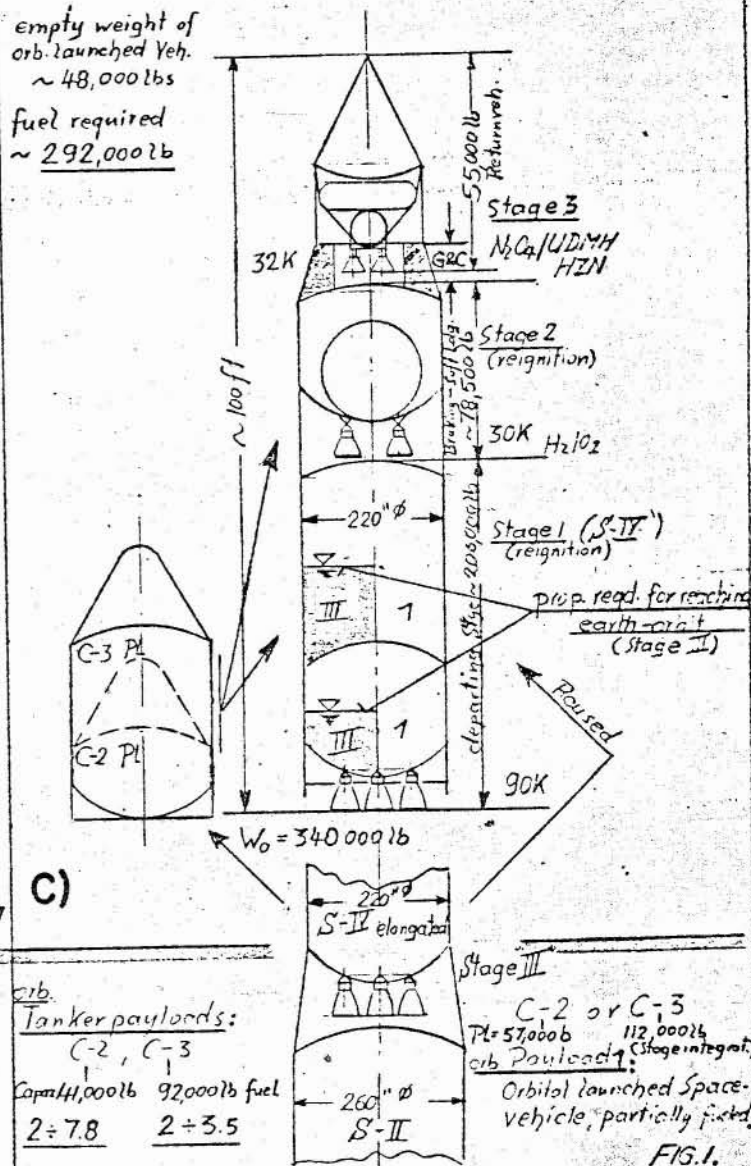
C-2



PURE REFUELING

C-2 & C-3

empty weight of orb. launched veh. ~ 48,000 lbs
fuel required ~ 292,000 lb



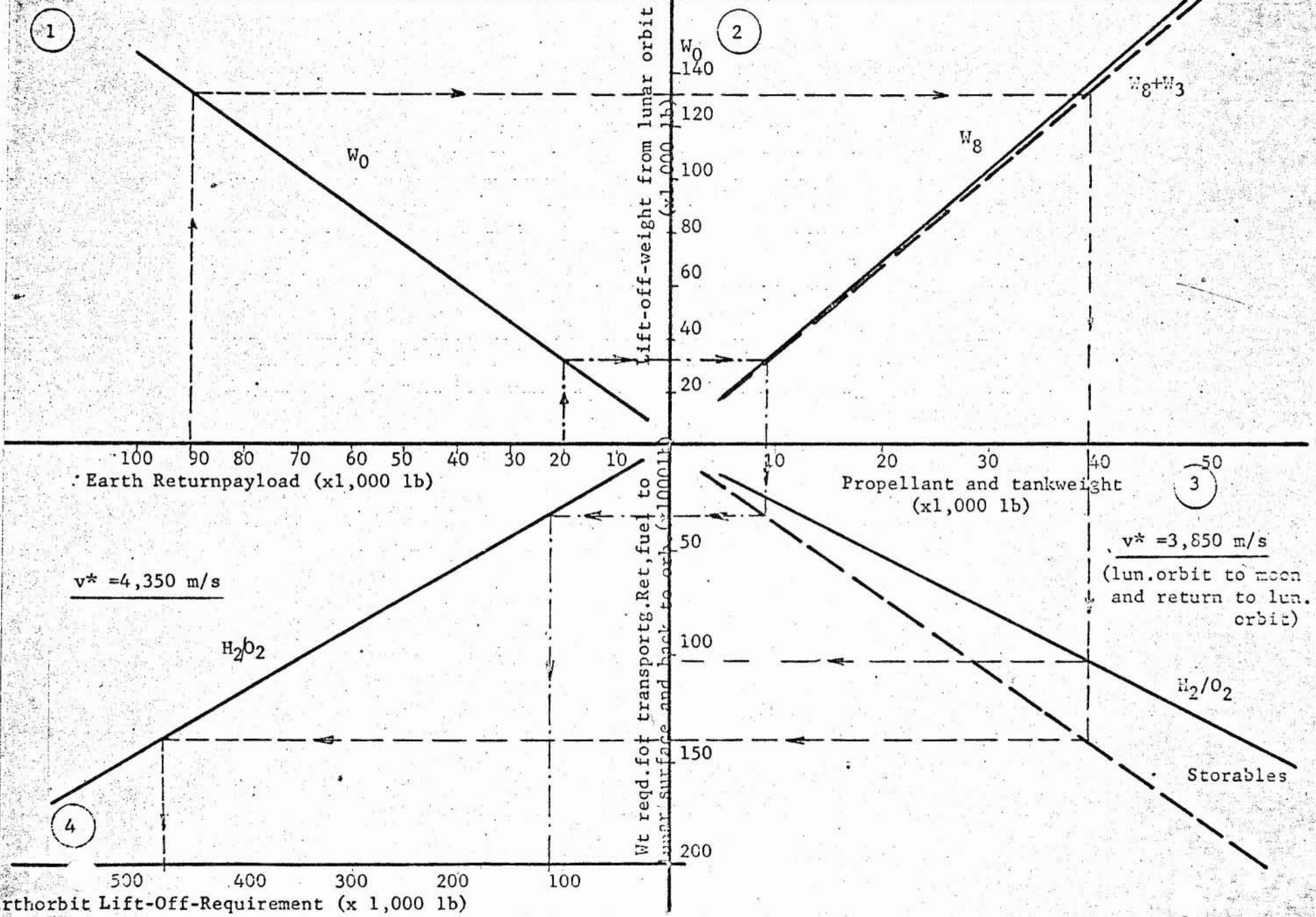
orb. Tanker payloads:
C-2, C-3
Capn 41,000 lb 92,000 lb fuel
2 = 7.8 2 = 3.5

Stage III
C-2 or C-3
Pl = 57,000 lb 112,000 lb
orb Payload 1: Stage integrat.
Orbital launched Space-vehicle, partially field.

FIG. 1.

Scale 1:200
1.7 June U.M.F.P.O.

Savings due to parking orbital Techniques for various Return payload requirements and lunar mission.

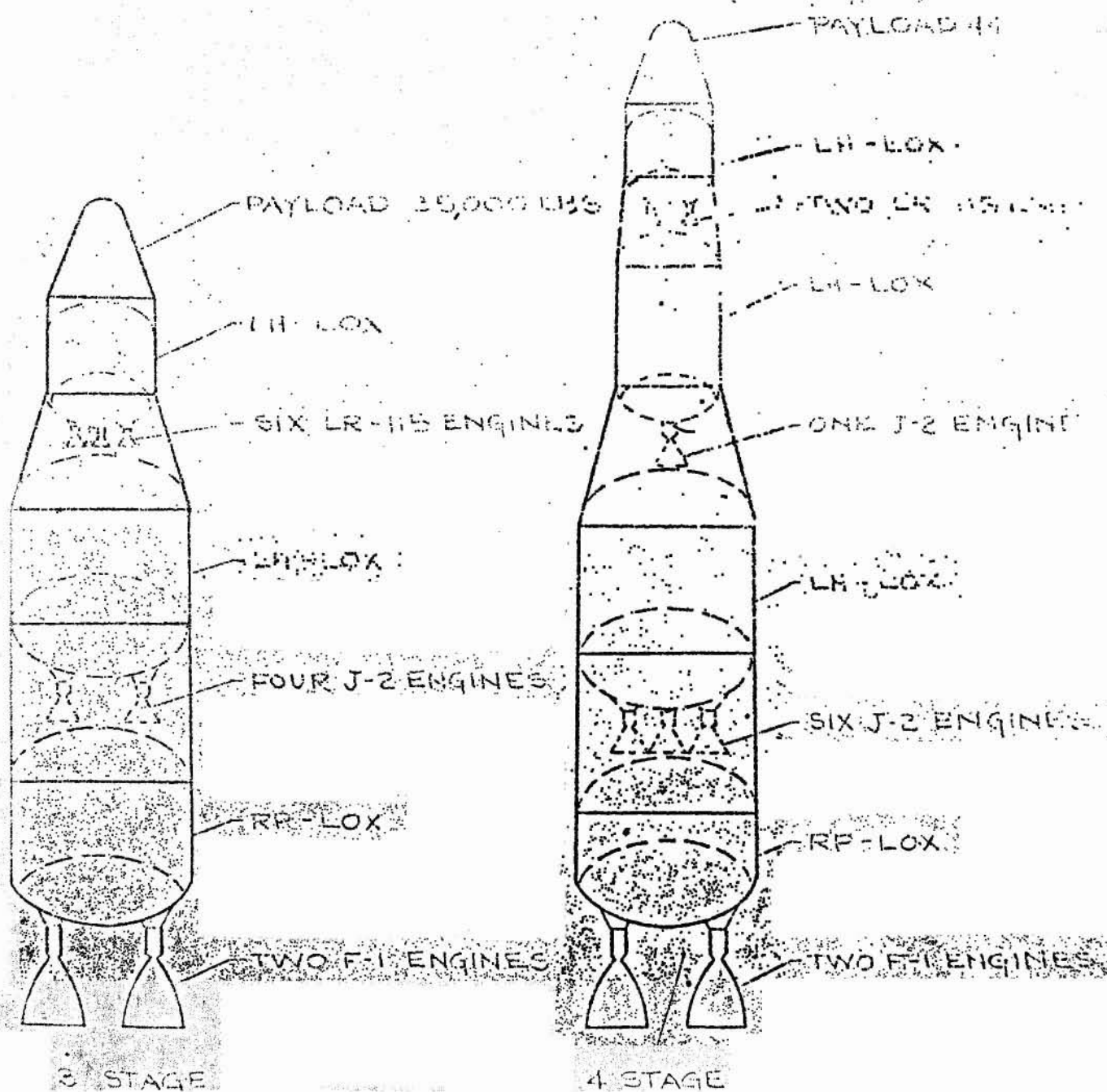


MANNED LUNAR MISSION

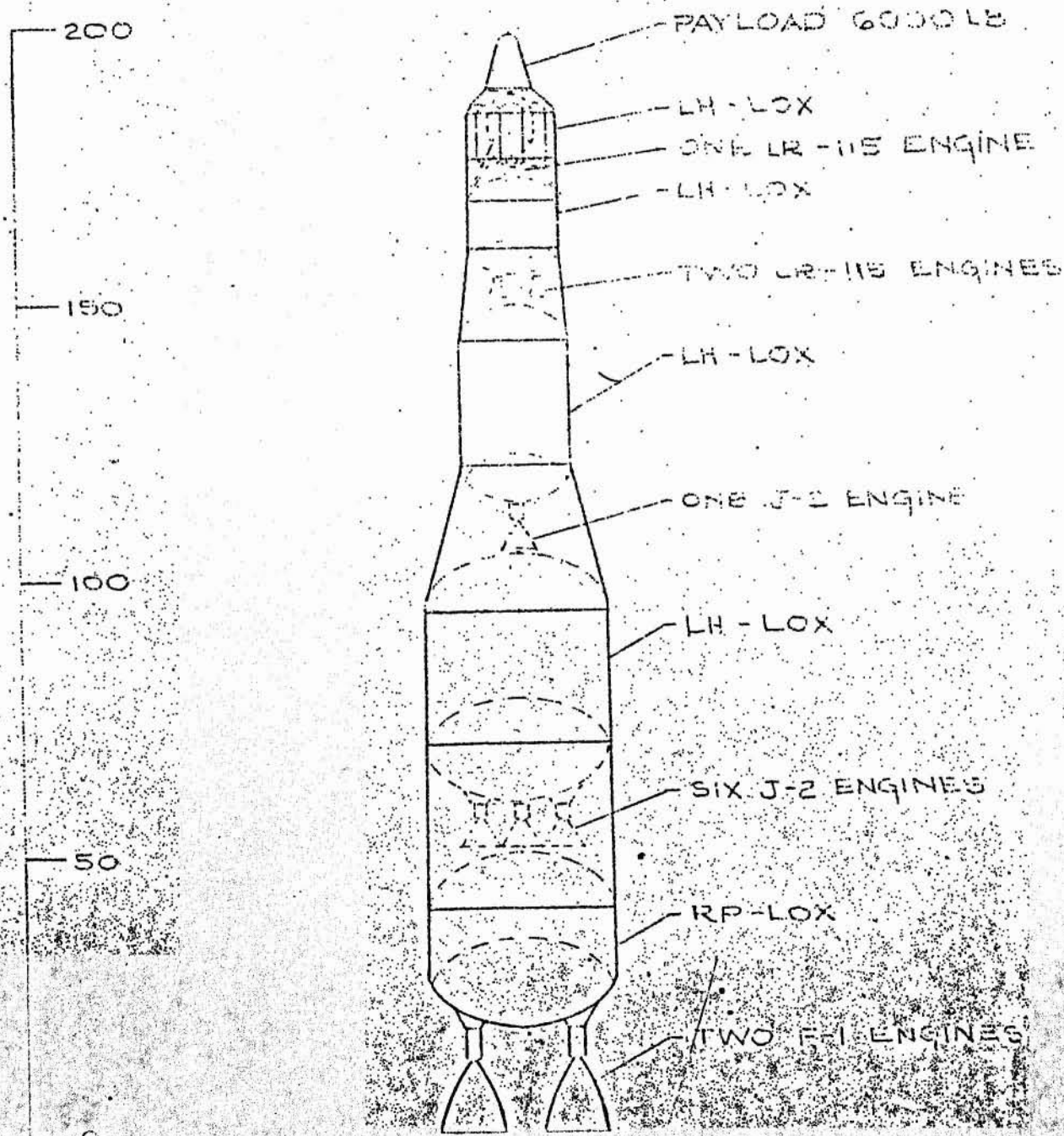
VELOCITY REQUIREMENTS

<u>SEGMENT</u>	<u>LOCAL VEHICLE ΔV REQUIRED, FT/SEC</u>
96 MIN. EARTH ORBIT	31,800
60 HR. TRANSFER	10,670
MIDCOURSE CORRECTION	167
34 H. M. LUNAR ORBIT	3,400
DESCENT, HOVER, LANDING	7,356
ASCENT TO 34 H. M. LUNAR ORB.	7,500
60 HR. TRANSFER	3,400
MIDCOURSE CORRECTION	167
RE-ENTRY	0

SATURN C-3 BOOSTER CONFIGURATIONS EARTH ESCAPE MISSION



SATURN C-3 LUNAR MISSION VEHICLE SINGLE SHOT



SATURN C-3 LUNAR MISSION VEHICLES TWO SHOT RENDEZVOUS

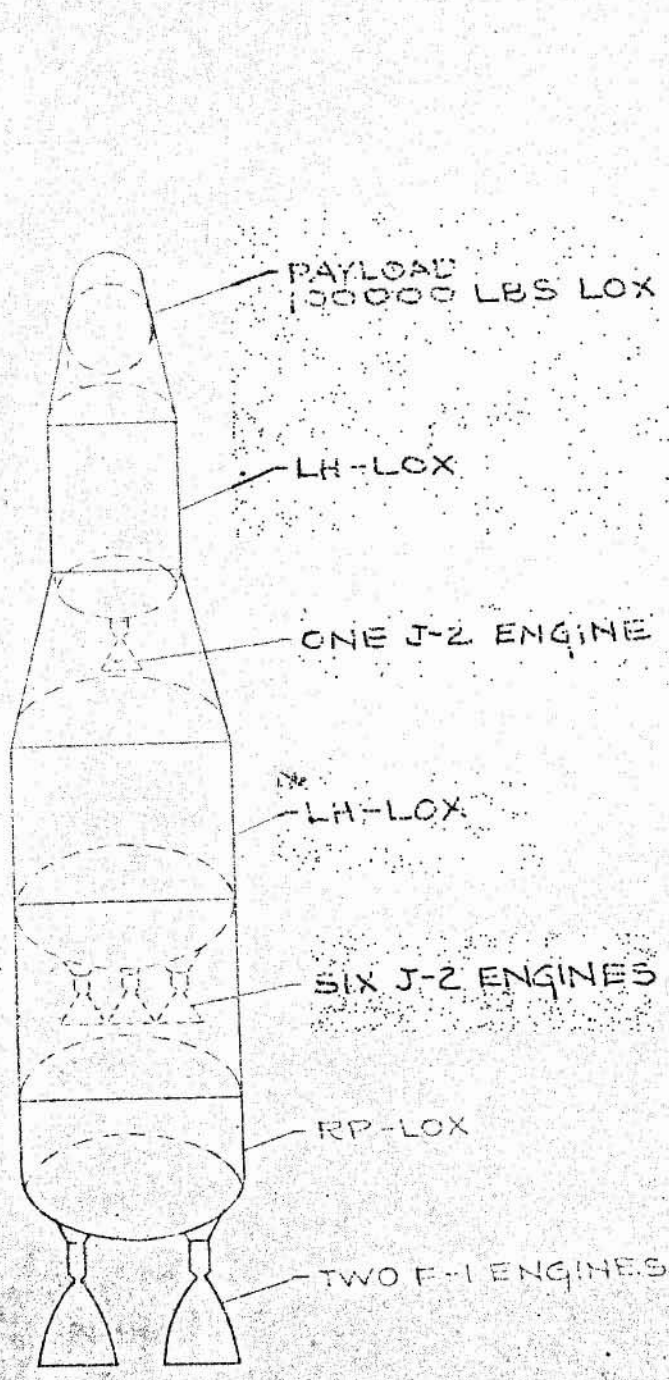
-200

-150

-100

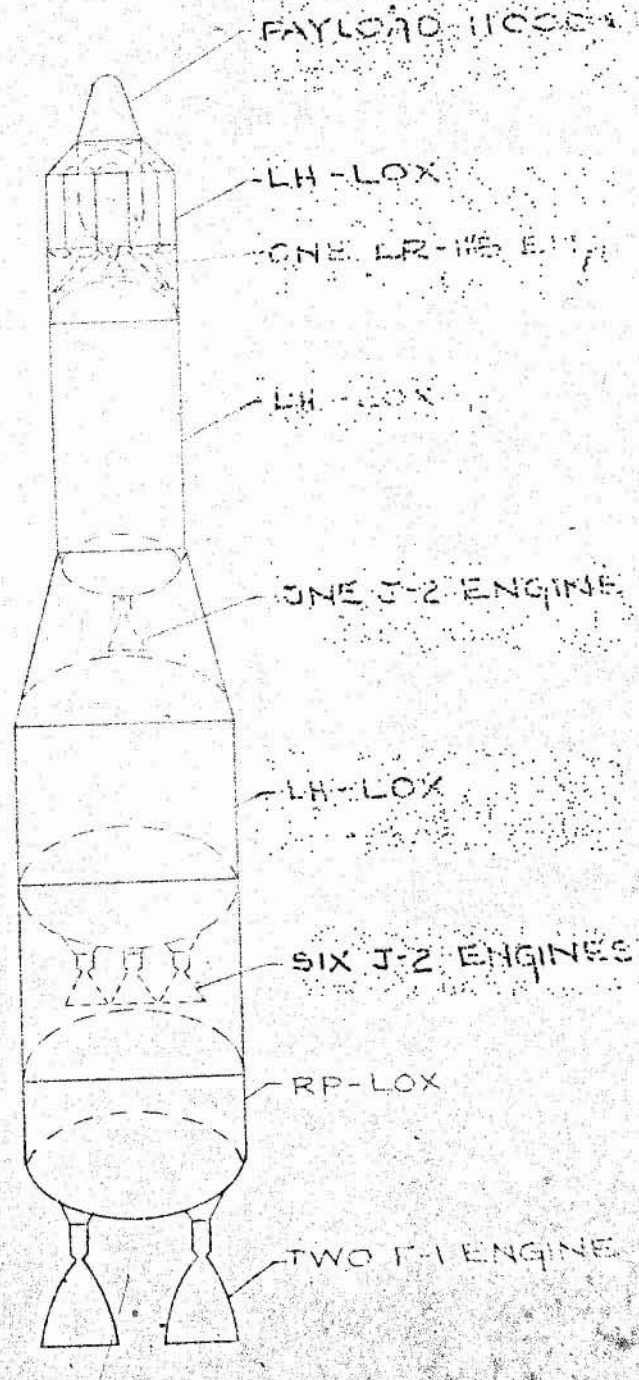
-50

-0



TANKER VEHICLE

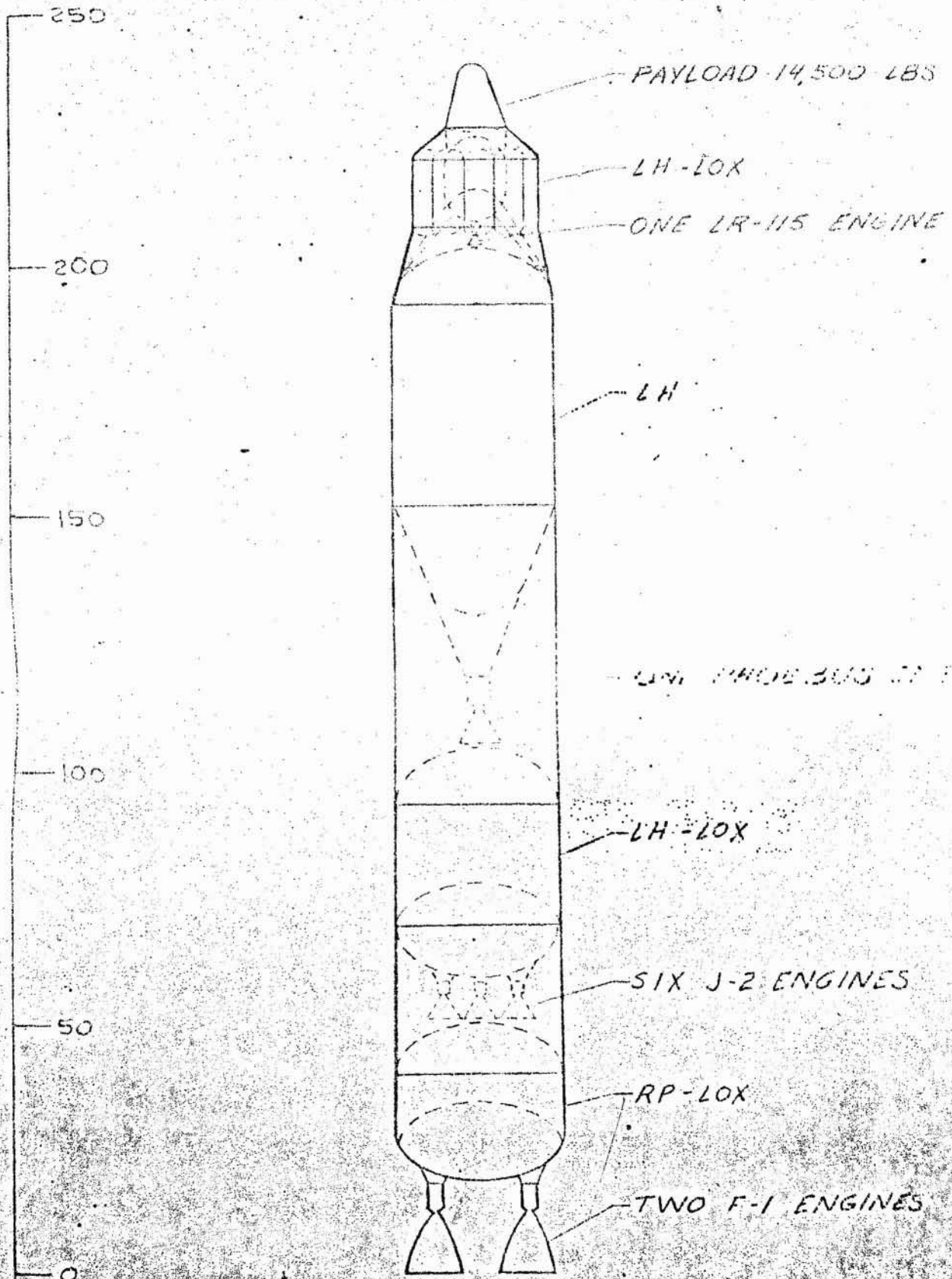
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MISSION VEHICLE

SAFETY BY DATE SUBJECT JOB NO.

SATURN C-3 BOOSTER WITH NUCLEAR THIRD STAGE LUNAR LANDING MISSION



LUNAR MISSION PAYLOADS

HYDROGEN-OXYGEN RETURN

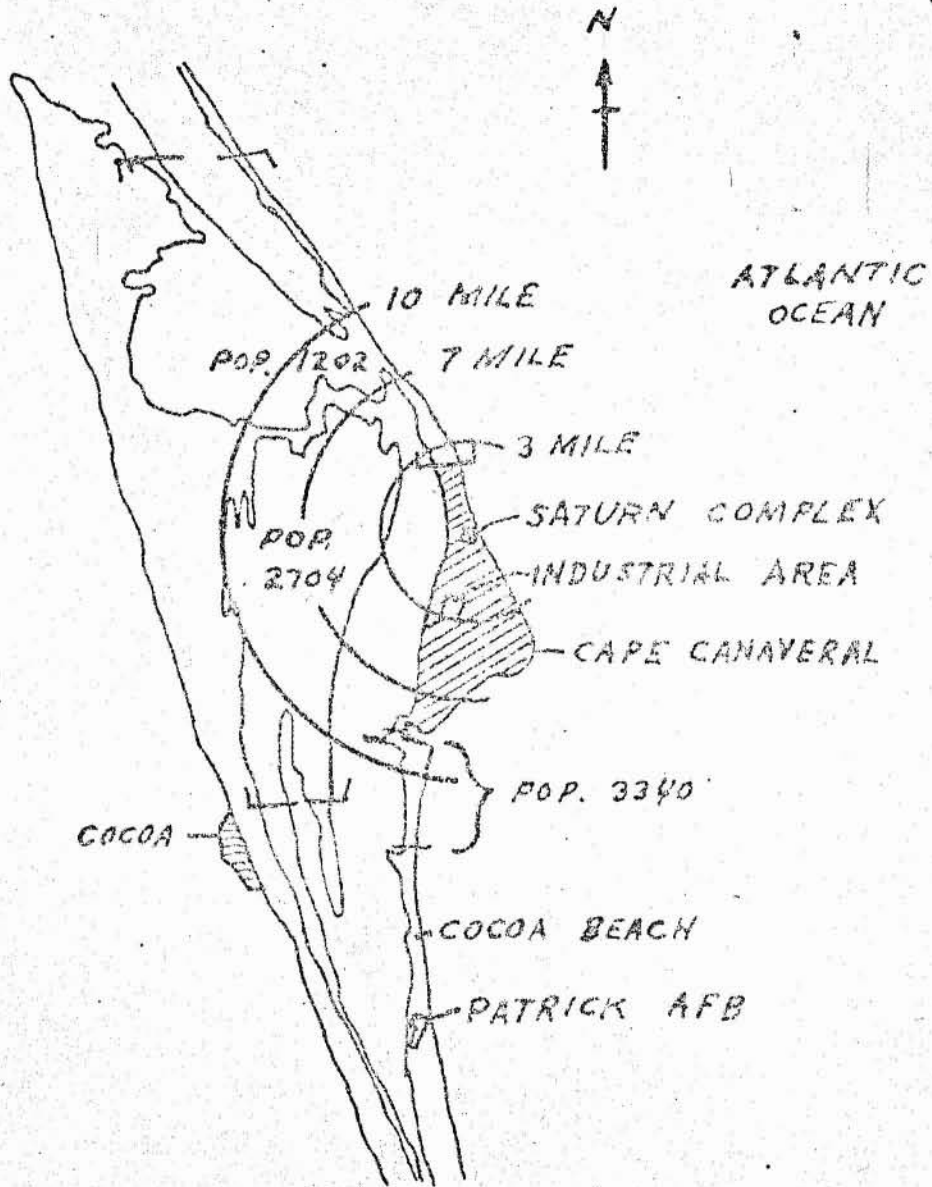
PARABOLIC RE-ENTRY

<u>VEHICLE</u>	<u>RE-ENTRY</u>	<u>CAPSULE WEIGHT, LBS</u>
NOVA ($F = 12 \times 10^6$)		14,000
OPTIMIZED NOVA ($F = 12 \times 10^6$)		23,000
SATURN C-3 ($F = 3 \times 10^6$)		
SINGLE SHOT, DIRECT		6,000
SINGLE SHOT, LUNAR ORB. REVD.		12,000
TWO SHOT, EARTH ORB. REVD.		11,000

6

VEHICLE SIZE

<u>VEHICLE</u>	<u>LAUNCH THRUST</u>	<u>HARDWARE WT.</u>	<u>PROPELLANT WT.</u>
NOVA	12,000,000	890,000	8,700,000
SATURN C-3	3,000,000	200,000	2,200,000



CAPE CANAVERAL
EXCLUSION RADII

SUMMARY

SATURN C-3

LUNAR MISSION

ADVANTAGES

1. EFFICIENT STAGING

2. MODERATE SIZE

DEVELOPMENT TIME

FACILITIES

LAUNCH COMPLEX

DEVELOPMENT COST

3. FLEXIBILITY

POSSIBILITY OF EARLY MINIMUM
MISSIONS WITH SINGLE SHOT

MORE AMBITIOUS MISSIONS
WITH TWO OR MORE SHOTS

4. PHASES EFFICIENTLY INTO
NUCLEAR UPPER STAGES

DISADVANTAGES

1. REQUIRES RENDEZVOUS
FOR THREE MAN MISSION

2. REQUIRES HYDROGEN-
OXYGEN RETURN FOR
SINGLE RENDEZVOUS