[redacted]

M-D MA 500-1-1

SE010-000-1

MANNED SPACE FLIGHT

PROGRAM DIRECTIVE

CLASSIFICATION CHANGE

To UNCLASSIFIED
By authority of GDS-Gp-4
Changed by L Shirley Date 12/15
Classified Document Master Control Station, NASA
Scientific and Technical Information Facility

APOLLO FLIGHT MISSION ASSIGNMENTS (U)

SEPTEMBER 10, 1965

[redacted]

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

GROUP-4
Downgraded at 12 year intervals,
declassified after 12 years

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C.

[redacted]

~~CONFIDENTIAL~~

M-D MA 500-11

SE010-000-1

~~C66-6555~~

C69-1827

APOLLO FLIGHT MISSION ASSIGNMENTS (U)

Date Effective:

SEPTEMBER 10, 1965

Manned Space Flight
National Aeronautics and Space Administration
Washington, D.C.

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

MANNED SPACE FLIGHT

DIRECTIVE

M-D MA 500-11

SE010-000-1

PROGRAM REQUIREMENT DOCUMENT

This document is an official release of Manned Space Flight and its requirements shall be implemented by all cognizant elements of the Manned Space Flight Program.

The effective date of this document is September 10, 1965

Apollo Program Director

Approved:

Associate Administrator for Manned Space Flight

Limit Access to:
Cognizant NASA and
NASA Contractor Activities

~~CONFIDENTIAL~~

CONTENTS

INTRODUCTION

This document contains the flight mission assignments for the Apollo flight programs. Document NPC C 500-11 dated February 19, 1965, and Change No. 1 to that document dated May 17, 1965, are superseded by this issue.

Proposed changes to this document shall be submitted to MSF for review and coordination. The Apollo Flight Mission Assignments document will be revised, as required, to reflect approved changes.

APOLLO FLIGHT PROGRAMS

The Apollo flight mission assignments charts on pages 29 through 33 summarize the missions, primary objectives, payloads, profiles and flight data for the Little Joe II, Saturn IB, and Saturn V launch vehicles. Both primary and alternate mission assignments are specified. The chart on page 34 summarizes the approved launch vehicle schedules.

At least two flights each of the Saturn IB and Saturn V vehicles are required for launch vehicle development objectives. Vehicles 204 and 503 are identified as the first potential opportunities for manned flight in the Saturn IB and Saturn V series, respectively.

It is planned that spacecraft test flights on the Saturn IB in support of the lunar landing program will be transferred to the Saturn V as soon as that vehicle is capable of being manned. All LEM and Block II CSM spacecraft shall be capable of flight missions on either the Saturn IB or Saturn V vehicle without significant modification.

Water landings and CM recovery are to be planned for all Apollo flight test missions in the Saturn IB and Saturn V series on which a Command Module (other than a boilerplate) is carried.

Present program activity is being directed toward a capability for delivery of eight complete spacecraft, six Saturn IB, and six Saturn V launch vehicles per year in 1968 and toward a capability for launch of eight manned and four unmanned missions per year in 1969.

Where an alternate mission assignment appears for the spacecraft or launch vehicle, the capability for performing each mission shall be retained until the appropriate decision point is reached.

Saturn IB vehicles 201, 202, 203, and 205 have no assigned alternate missions. Saturn IB vehicle 204 has an alternate mission assigned, "L/V and CSM Development" The planning for this vehicle shall be such that the mission type can be selected five and one-half months prior to the scheduled launch of vehicle 204 and not result in a delay in the launch of 204.

The planning for alternate use of Saturn IB vehicle 206 to conduct a "CSM-LEM Operations" mission need not consider flight earlier than the current AS-207 schedule.

The alternate mission listed for Saturn IB vehicle 207 is a modified "CSM-LEM Operations" mission. Conversion to this alternate mission shall be possible during the interval between the scheduled launch dates of vehicles 206 and 207.

Saturn IB vehicles 208 through 212 are assigned a "CSM-LEM Operations" mission. Potential release of these vehicles from this assignment is not anticipated prior to the flight of Saturn V vehicle 502.

The objectives, configuration, and profile of the alternate missions may be altered to focus on the problems being encountered.

OBJECTIVES, CONFIGURATION, AND IN-FLIGHT EXPERIMENTS FOR APOLLO-SATURN MISSIONS

VEHICLE 201

I. MISSION TYPE:

Launch Vehicle and CSM Development

II. PRIMARY OBJECTIVES:

1. Demonstrate structural integrity and compatibility of the launch vehicle and spacecraft and confirm launch loads.
2. Demonstrate separation of:
   a) S-IVB/IU/Spacecraft from S-IB.
   b) LES and Boost Protective Cover from CSM/Launch Vehicle.
   c) CSM from S-IVB/IU/SLA.
   d) CM from SM.
3. Verify operation of the following subsystems:
   a) Launch vehicle: propulsion, guidance and control, and electrical systems.
   b) Spacecraft: CM heat shield (adequacy for entry from low earth orbit); SPS (including restart); ECS (pressure and temperature control); Communications (partial); CM RCS; SM RCS; SCS; ELS; EPS (partial).
4. Evaluate performance of the space vehicle EDS in an open-loop configuration.
5. Evaluate the CM heat shield at a heating rate of approximately 200 BTU/ft^2-sec during entry at approximately 28,000 ft/sec.
6. Demonstrate the mission support facilities and operations required for launch, mission conduct and CM recovery.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IB Stage

   Additions: R&D Instrumentation

   Exceptions: Saturn I structure

2. S-IVB Stage

   Additions: R&D Instrumentation

   Exceptions: Lower engine Isp

VEHICLE 201 - CONTINUED

3. Instrument Unit

   Additions: R&D Instrumentation

4. Adapter (009)

   Additions: Tie-bar to replace LEM

5. Block I Command and Service Module (009)

   Deletions:
   (1) G&N Subsystem
   (2) ECS (partial)
   (3) EPS (Fuel Cells)
   (4) S-Band Communications
   (5) Instrumentation (partial)
   (6) Displays and Controls (partial)
   (7) Couches and Crew Restraints
   (8) Crew Provisions

   Additions:
   (1) Programmer
   (2) R&D Instrumentation

   Exceptions: Modified Aft Heat Shield

6. Launch Escape System

   Operational configuration

IV. IN-FLIGHT EXPERIMENTS:

None

VEHICLE 202

I. MISSION TYPE:

Launch Vehicle and CSM Development

II. PRIMARY OBJECTIVES:

1. Demonstrate structural integrity and compatibility of the launch vehicle and spacecraft and confirm launch loads.
2. Demonstrate separation of:
   a) S-IVB/IU/Spacecraft from S-IB.
   b) LES and Boost Protective Cover from CSM/Launch Vehicle.
   c) CSM from S-IVB/IU/SLA.
   d) CM from SM.
3. Verify operation of the following subsystems:
   a) Launch vehicle: propulsion, guidance and control, and electrical systems.
   b) Spacecraft: CM heat shield (adequacy for entry from low earth orbit); SPS (including multiple restart); G&N; ECS; Communications (partial); CM RCS; SM RCS; SCS; ELS; EPS.
4. Evaluate performance of the space vehicle EDS in closed-loop configuration.
5. Evaluate the heat shield at high heat load during entry at approximately 28,000 ft/sec.
6. Demonstrate the mission support facilities and operations required for launch, mission conduct and CM recovery.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IB Stage
   Additions: R&D Instrumentation
   Exceptions: Saturn I structure
2. S-IVB Stage
   Additions: R&D Instrumentation
   Exceptions: Lower engine Isp
3. Instrument Unit
   Additions: (1) R&D Instrumentation
   (2) TV camera for CSM separation

VEHICLE 202 - CONTINUED

4. Adapter (011)

   Additions: Tie-bar to replace LEM

5. Block I Command and Service Module (011)

   Deletions: (1) DSIF S-Band Antenna
   (2) Couches and Crew Restraints
   (3) Crew Provisions

   Additions: (1) Programmer
   (2) R&D Instrumentation

   Exceptions: Modified Aft Heat Shield

6. Launch Escape System

   Operational configuration

IV. IN-FLIGHT EXPERIMENTS:

None

VEHICLE 203

I. MISSION TYPE:

Liquid Hydrogen Experiment

II. PRIMARY OBJECTIVES:

1. Evaluate the S-IVB LH_2 continuous venting system.
2. Evaluate engine chilldown and recirculation system.
3. Determine tank fluid dynamics.
4. Determine heat transfer into liquid through tank wall, and obtain data required for propellant thermodynamic model.
5. Evaluate S-IVB and IU checkout in orbit.
6. Demonstrate orbital operation of the launch vehicle attitude control and thermal control systems.
7. Demonstrate the ability of the launch vehicle guidance to insert a payload into orbit.
8. Demonstrate operational structure of the launch vehicle.
9. Demonstrate the mission support facilities and operations required for launch and mission conduct.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IB Stage

   Additions: R&D Instrumentation

2. S-IVB Stage

   Additions: (1) R&D Instrumentation
   (2) LH_2 Instrumentation and Sequencer

   Exceptions: (1) Lower engine Isp
   (2) Open-loop P. U. system

3. Instrument Unit

   Additions: (1) R&D Instrumentation
   (2) High-Rate TV Instrumentation

4. Shroud

   (Not standard Apollo equipment)

IV. IN-FLIGHT EXPERIMENTS:

MSC-13 Subcritical Cryogenic Storage

VEHICLE 204 (PRIMARY MISSION)

I. MISSION TYPE:

CSM Long Duration Operations

II. PRIMARY OBJECTIVES:

1. Verify spacecraft/crew operations for a mission of up to 14 days duration.
2. Determine CSM subsystem performance in earth orbital environment.
3. Evaluate S-IVB and IU checkout in orbit.
4. Demonstrate the adequacy of the launch vehicle attitude control system for orbital operation.
5. Demonstrate crew/CSM/launch vehicle/mission support facilities performance during long duration earth orbital mission.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IB Stage

   Additions: R&D Instrumentation

2. S-IVB Stage

   Additions: R&D Instrumentation

3. Instrument Unit

   Additions: R&D Instrumentation

4. Adapter (012)

   Additions: Tie bar to replace LEM

5. Block I Command and Service Module (012)

   Deletions: DSIF S-Band Antenna

   Additions: R&D Instrumentation

6. Launch Escape System

   Operational configuration

IV. IN-FLIGHT EXPERIMENTS:

M-1A	Cardiovascular Conditioning	M-12	Exercise Ergometer
M-4A	In-Flight Phonocardiogram	S-5	Synoptic Terrain Photography
M-5A	Bioassays Body Fluids	S-6	Synoptic Weather Photography
M-6A	Bone Demineralization	T-3	In-Flight Nephelometer
M-9A	Human Otolith Function		
M-11	Cytogenetic Blood Studies		

VEHICLE 204 (ALTERNATE MISSION)

I. MISSION TYPE:

Launch Vehicle and CSM Development (Orbital)

II. PRIMARY OBJECTIVES:

1. Demonstrate structural integrity and compatibility of the launch vehicle and spacecraft, and confirm launch loads.
2. Demonstrate separation of:
   a) S-IVB/IU/Spacecraft from S-IB.
   b) LES and Boost Protective Cover from CSM/Launch Vehicle.
   c) CSM from S-IVB/IU/SLA.
   d) CM from SM.
3. Verify operation of the following subsystems:
   a) Launch vehicle: propulsion, guidance and control, and electrical systems.
   b) Spacecraft: CM heat shield (adequacy for entry from low earth orbit); SPS (including multiple restart); G&N; ECS; Communications; CM RCS; SM RCS; SCS; ELS; EPS.
4. Evaluate performance of the space vehicle EDS in closed-loop configuration.
5. Evaluate S-IVB and IU checkout in orbit.
6. Demonstrate the adequacy of the launch vehicle attitude control system for orbital operation.
7. Demonstrate the mission support facilities and operations required for launch, mission conduct, and CM recovery.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IB Stage
   Additions: R&D Instrumentation
2. S-IVB Stage
   Additions: R&D Instrumentation
3. Instrument Unit
   Additions: R&D Instrumentation
4. Adapter (012)
   Additions: Tie bar to replace LEM

VEHICLE 204 (ALTERNATE MISSION) - CONTINUED

5. Block I Command and Service Module (012)

Deletions:
(1) DSIF S-Band Antenna
(2) Couches and Crew Restraints
(3) Crew Provisions

Additions:
(1) Programmer
(2) R&D Instrumentation

6. Launch Escape System

Operational Configuration

IV. IN-FLIGHT EXPERIMENTS:

None

VEHICLE 205

I. MISSION TYPE:

CSM Long Duration Operations

II. PRIMARY OBJECTIVES:

1. Verify spacecraft/crew operations for a mission of up to 14 days duration.
2. Determine CSM subsystem performance in earth orbital environment.
3. Demonstrate crew/CSM/launch vehicle/mission support facilities performance during long duration earth orbital mission.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IB Stage

   Operational configuration (Thrust not up-rated)

2. S-IVB Stage

   Operational configuration (Thrust not up-rated)

3. Instrument Unit

   Operational configuration

4. Adapter (014)

   Additions: Tie bar to replace LEM

5. Block I Command and Service Module (014)

   Deletions: DSIF S-Band Antenna

   Additions: R&D Instrumentation

6. Launch Escape System

   Operational configuration

IV. IN-FLIGHT EXPERIMENTS:

M-4A	In-Flight Phonocardiogram
M-5A	Bioassays Body Fluids
M-6A	Bone Demineralization
M-7A	Calcium Balance Study
M-9A	Human Otolith Function
M-11	Cytogenetic Blood Studies
M-12	Exercise Ergometer
M-19	Metabolic Rate Measurement

VEHICLE 205 - CONTINUED

M-20	Pulmonary Function
S -14	Frog Otolith Function
S -15	Zero-G - Single Human Cells
S -16	Trapped Particles Assymetry
S -17	X-Ray Astronomy
S -18	Micrometeorite Collection

VEHICLE 206 (PRIMARY MISSION)

I. MISSION TYPE:

LEM Development

II. PRIMARY OBJECTIVES:

1. Verify operation of the following LEM subsystems: G&N, SCS, RCS, APS and DPS (including restart), EPS, Structure, ECS, Communications (LEM/MSFN).
2. Evaluate LEM fire-in-the-hole abort.
3. Verify uprated H-1 engine performance.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IB Stage

   Operational configuration

2. S-IVB Stage

   Operational configuration (Thrust not up-rated)

3. Instrument Unit

   Operational configuration

4. Adapter

   Additions: R&D Communications

   Exceptions: Modified Deployment and Separation System

5. Command and Service Module (BP-30)

   Not operational equipment

6. Lunar Excursion Module (No. 1)

   Additions: (1) R&D Instrumentation
   (2) Programmer

7. Launch Escape System

   Deletions: (1) Escape Propulsion System
   (2) Canard System
   (3) Boost Protective Cover
   (4) Pitch Control Motor

   Additions: Sequencer

   Exceptions: Simulations of some components

VEHICLE 206 (PRIMARY MISSION) - CONTINUED

IV. IN-FLIGHT EXPERIMENTS:

None

VEHICLE 206 (ALTERNATE MISSION)

I. MISSION TYPE:

CSM-LEM Operations

II. PRIMARY OBJECTIVES:

1. Verify spacecraft/crew operation in earth orbit, including:
   a) Closed-loop CSM/S-IVB attitude control.
   b) Transposition and dock.
   c) Rendezvous maneuvers.
   d) Docking (CSM and LEM active modes).
2. Verify Block II CSM subsystems performance in earth orbital environment.
3. Verify operation of the following LEM subsystems: G&N, SCS, RCS, APS and DPS (including restart), EPS, Structure, ECS, Communications.
4. Evaluate LEM fire-in-the-hole abort.
5. Verify uprated H-1 engine performance.
6. Demonstrate crew/spacecraft/mission support facilities performance during earth orbital mission.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IB Stage

   Operational configuration

2. S-IVB Stage

   Operational configuration (Thrust not up-rated)

3. Instrument Unit

   Operational configuration

4. Adapter (101)

   Operational configuration

5. Block II Command and Service Module (101)

   Deletions: (1) Scientific Equipment
   (2) ECS (spare LIOH cannisters)
   (3) Consumables commensurate with three-day mission

   Additions: R&D Instrumentation

VEHICLE 206 (ALTERNATE MISSION) - CONTINUED

6. Lunar Excursion Module (No. 1)

Deletions:
(1) Scientific Equipment
(2) Landing Gear
(3) ECS (spare LIOH cannisters)
(4) Consumables commensurate with three-day mission
(5) Crew Equipment (partial)
(6) Communications (erectable antenna and cable)

Additions:
(1) R&D Instrumentation
(2) Extra Docking Probe
(3) Programmer

7. Launch Escape System

Operational configuration

IV. IN-FLIGHT EXPERIMENTS:

To be determined

VEHICLE 207 (PRIMARY MISSION)

I. MISSION TYPE:

CSM-LEM Operations

II. PRIMARY OBJECTIVES:

1. Verify spacecraft/crew operation in earth orbit, including:
   a) Closed-loop CSM/S-IVB attitude control.
   b) Transposition and dock.
   c) Rendezvous maneuvers.
   d) Docking (CSM and LEM active modes).
2. Verify Block II CSM subsystems performance in earth orbital environment.
3. Determine LEM subsystems performance in earth orbital environment.
4. Demonstrate crew/spacecraft/mission support facilities performance during earth orbital mission.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IB Stage

   Operational configuration

2. S-IVB Stage

   Operational configuration (Thrust not up-rated)

3. Instrument Unit

   Operational configuration

4. Adapter (101)

   Operational configuration

5. Block II Command and Service Module (101)

   Deletions: (1) Scientific Equipment
   (2) ECS (spare LIOH cannisters)
   (3) Consumables commensurate with three-day mission

   Additions: R&D Instrumentation

6. Lunar Excursion Module (No. 2)

   Deletions: (1) Scientific Equipment
   (2) Landing Gear

VEHICLE 207 (PRIMARY MISSION) - CONTINUED

(3) ECS (spare LIOH cannisters)

(4) Consumables commensurate with three-day mission

(5) Communications (erectable antenna and cable)

Additions: (1) R&D Instrumentation

(2) Extra Docking Probe

7. Launch Escape System

Operational configuration

IV. IN-FLIGHT EXPERIMENTS:

D-8A	Radiation in Spacecraft
D-9A	Simple Navigation
M-23	Lower Body Negative Pressure
S-19	UV Stellar Astronomy
S-20	UV/X-Ray Solar Photography

VEHICLE 207 (ALTERNATE MISSION)

I. MISSION TYPE:

CSM-LEM Operations

II. PRIMARY OBJECTIVES:

1. Verify spacecraft/crew operation in earth orbit, including:
   a) Closed-loop CSM/S-IVB attitude control.
   b) Transposition and dock.
   c) Rendezvous maneuvers.
   d) Docking (CSM and LEM active modes).
2. Verify Block II CSM subsystems performance in earth orbital environment.
3. Verify operation of the following LEM subsystems: G&N, SCS, RCS, APS and DPS (including restart), EPS, Structure, ECS, Communications.
4. Evaluate LEM fire-in-the-hole abort.
5. Demonstrate crew/spacecraft/mission support facilities performance during earth orbital mission.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IB Stage

   Operational configuration

2. S-IVB Stage

   Operational configuration (Thrust not up-rated)

3. Instrument Unit

   Operational configuration

4. Adapter (101)

   Operational configuration

5. Block II Command and Service Module (101)

   Deletions: (1) Scientific Equipment
   (2) ECS (spare LIOH cannisters)
   (3) Consumables commensurate with three-day mission

   Additions: R&D Instrumentation

VEHICLE 207 (ALTERNATE MISSION) - CONTINUED

6. Lunar Excursion Module (No. 2)

Deletions:
(1) Scientific Equipment
(2) Landing Gear
(3) ECS (spare LIOH cannisters)
(4) Consumables commensurate with three-day mission
(5) Crew Equipment (partial)
(6) Communications (erectable antenna and cable)

Additions:
(1) R&D Instrumentation
(2) Extra Docking Probe

7. Launch Escape System

Operational configuration

IV. IN-FLIGHT EXPERIMENTS:

D-8A Radiation in Spacecraft
D-9A Simple Navigation
M-23 Lower Body Negative Pressure
S-19 UV Stellar Astronomy
S-20 UV/X-Ray Solar Photography

VEHICLE 501

I. MISSION TYPE:

Launch Vehicle and CSM Development

II. PRIMARY OBJECTIVES:

1. Demonstrate the structural and thermal integrity and compatibility of the launch vehicle and spacecraft. Confirm launch loads and dynamic characteristics.
2. Demonstrate separation of:
   a) S-II from S-IC (dual plane).
   b) LES and Boost Protective Cover from CSM/Launch Vehicle.
   c) S-IVB from S-II.
3. Verify operation of the following subsystems:
   a) Launch vehicle: propulsion (including S-IVB restart), guidance and control, and electrical system.
   b) Spacecraft: CM heat shield (adequacy of Block II design for entry at lunar return conditions); SPS (no-ullage start); and selected subsystems.
4. Evaluate performance of the space vehicle EDS in an open-loop configuration.
5. Demonstrate mission support facilities and operations required for launch, mission conduct and CM recovery.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IC Stage
   Additions: R&D Instrumentation
   Exceptions: (1) R&D Structure
   (2) Lower nominal thrust and Isp
2. S-II Stage
   Additions: R&D Instrumentation
   Exceptions: (1) R&D Structure
   (2) Lower thrust and Isp
3. S-IVB Stage
   Deletions: Helium heater
   Additions: R&D Instrumentation
   Exceptions: Lower thrust and Isp

VEHICLE 501 - CONTINUED

4. Instrument Unit

   Additions: R&D Instrumentation

5. Adapter (017)

   Operational configuration

6. Block I Command and Service Module (017)

   Deletions: (1) DSIF S-Band Antenna
   (2) SCS (partial)
   (3) Couches and Crew Restraints
   (4) Crew Provisions
   (5) Instrument Panel (partial)

   Additions: (1) R&D Instrumentation
   (2) Programmer

   Exceptions: Simulated Block II Heat Shield

7. Lunar Excursion Module

   A LEM Test Article will be used.

8. Launch Escape System

   Operational configuration

IV. IN-FLIGHT EXPERIMENTS:

None

VEHICLE 502

I. MISSION TYPE:

Launch Vehicle and CSM Development

II. PRIMARY OBJECTIVES:

1. Demonstrate the structural and thermal integrity and compatibility of the launch vehicle and spacecraft. Confirm launch loads and dynamic characteristics.
2. Demonstrate separation of:
   a) S-II from S-IC (dual plane).
   b) LES and Boost Protective Cover from CSM/Launch Vehicle.
   c) S-IVB from S-II.
3. Verify operation of the following subsystems:
   a) Launch vehicle: propulsion (including S-IVB restart), guidance and control (optimum injection), and electrical system.
   b) Spacecraft: CM heat shield (adequacy of Block II design for entry at lunar return conditions); SPS (no-ullage start); and selected subsystems.
4. Evaluate performance of the space vehicle EDS in a closed-loop configuration.
5. Demonstrate mission support facilities and operations required for launch, mission conduct and CM recovery.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IC Stage
   Additions: R&D Instrumentation
   Exceptions: (1) R&D Structure
   (2) Lower nominal thrust and Isp
2. S-II Stage
   Additions: R&D Instrumentation
   Exceptions: (1) R&D Structure
   (2) Lower thrust and Isp

VEHICLE 502 - CONTINUED

3. S-IVB Stage

   Deletions: Helium heater

   Additions: R&D Instrumentation

   Exceptions: Lower thrust and Isp

4. Instrument Unit

   Additions: R&D Instrumentation

5. Adapter (020)

   Operational configuration

6. Block I Command and Service Module (020)

   Deletions: (1) DSIF S-Band Antenna
   (2) SCS (partial)
   (3) Couches and Crew Restraints
   (4) Crew Provisions
   (5) Instrument Panel (partial)

   Additions: (1) R&D Instrumentation
   (2) Programmer

   Exceptions: Simulated Block II Heat Shield

7. Lunar Excursion Module

   A LEM Test Article will be used.

8. Launch Escape System

   Operational configuration

IV. IN-FLIGHT EXPERIMENTS:

None

VEHICLE 503 (PRIMARY MISSION)

I. MISSION TYPE:

Lunar Mission Simulation

II. PRIMARY OBJECTIVES:

1. Demonstrate launch vehicle capability of inserting a manned Apollo, fully-loaded spacecraft on an ellipse, employing a nearly full duration S-IVB burn, including S-IVB restart in orbit.
2. Demonstrate capability of the Apollo spacecraft/crew/ground support facilities to perform the LOR mission operations by simulations of the following:
   a) Deep space navigation
   b) Midcourse corrections
   c) LEM descent
   d) LEM fire-in-the-hole
   e) LEM ascent
   f) Rendezvous and docking
   g) Deboost into lunar parking orbit
   h) Deep space communications and tracking
   i) Transearth injection
3. Demonstrate crew/spacecraft performance in simulated lunar mission.

III. CONFIGURATION:

Each stage and module to be flown is listed below with the deletions, additions, or exceptions that make it different from an operational unit.

1. S-IC Stage
   - Additions: R&D Instrumentation
   - Exceptions: (1) R&D Structure
     (2) Lower nominal thrust and Isp
2. S-II Stage
   - Additions: R&D Instrumentation
   - Exceptions: (1) R&D Structure
     (2) Lower thrust and Isp
3. S-IVB Stage
   - Additions: R&D Instrumentation

VEHICLE 503 (PRIMARY MISSION) - CONTINUED

4. Instrument Unit

   Additions: R&D Instrumentation

5. Adapter (102)

   Operational configuration

6. Block II Command and Service Module (102)

   Additions: R&D Instrumentation

7. Lunar Excursion Module (No. 3)

   Additions: R&D Instrumentation

8. Launch Escape System

   Operational configuration

IV. IN-FLIGHT EXPERIMENTS:

M-5A Bioassays Body Fluids
M-11 Cytogenetic Blood Studies

LAUNCH RECORD

Apollo - Little Joe II (Including Pad Abort)

Launch Vehicle	Launch Date	Payload	Description
None	Nov. 7, 1963	BP-6	LES Development. Demonstration of LES operation during a pad abort.
Little Joe II-2	May 13, 1964	BP-12	Transonic Abort. Demonstration of abort at transonic speed. One main chute did not deploy fully.
Little Joe II-3	Dec. 8, 1964	BP-23	Max-Q Abort. Demonstration of abort in region of maximum dynamic pressure; first test with canard subsystem and boost protective cover.
Little Joe II-4	May 19, 1965	BP-22	High Altitude Abort. Mission terminated by an abort at low altitude due to launch vehicle instability. Abort sequence was carried out successfully.
None	June 29, 1965	BP-23A	LES Development. Demonstration of LES operation with canard subsystem and boost protective cover during a pad abort.

Apollo - Saturn I

Launch Vehicle	Launch Date	Payload	Description
SA-1	Oct. 27, 1961	None	Launch Vehicle Development. Test of the S-I stage propulsion; verification of aerodynamic and structural design of entire Saturn I vehicle.
SA-2	Apr. 25, 1962	Water (95 tons)	Launch Vehicle Development. Observation of water dispersion at high altitude ("Project High Water").
SA-3	Nov. 16, 1962	Water (95 tons)	Launch Vehicle Development. Second test for "Project High Water".

Apollo - Saturn I (Cont'd)

Launch Vehicle	Launch Date	Payload	Description
SA-4	Mar. 28, 1963	None	Launch Vehicle Development. Demonstration of propellant utilization system by in-flight engine cut-off.
SA-5	Jan. 29, 1964	None	Launch Vehicle Development. First flight operation of the S-IV second stage.
SA-6	May 28, 1964	BP-13	Launch Vehicle Development. Verification of aerodynamic and structural design of Saturn I with Apollo boilerplate. Successful insertion into orbit following premature cutoff of one first-stage engine.
SA-7	Sept. 18, 1964	BP-15	Launch Vehicle Development. Demonstration of LES jettison.
SA-9	Feb. 16, 1965	Pegasus A BP-16	Meteoroid Experiment. Determination of near-earth meteoroid environment.
SA-8	May 25, 1965	Pegasus B BP-26	Meteoroid Experiment. Determination of near-earth meteoroid environment.
SA-10	July 30, 1965	Pegasus C BP-9	Meteoroid Experiment. Determination of near-earth meteoroid environment.

APOLLO-LITTLE JOE II FLIGHT MISSIONS

LAUNCH VEHICLE		LITTLE JOE II - 5
MISSION		INTERMEDIATE ALTITUDE ABORT
OBJECTIVES		DEMONSTRATE SATISFACTORY LEV PERFORMANCE FOR AN ABORT IN THE POWER-ON TUMBLING BOUNDARY REGION. DEMONSTRATE STRUCTURAL INTEGRITY OF THE LEV AIRFRAME IN THE POWER-ON TUMBLING BOUNDARY REGION.
SPACECRAFT		002 (BLOCK I CSM)
TEST CONDITIONS AT ABORT	ALTITUDE (FEET)	53,000 TO 73,500
	DYNAMIC PRESS. (PSF)	425 TO 575
	MACH NUMBER	1.9 - 2.8

7/27/65

NOTE: LITTLE JOE II - 6 IS AVAILABLE AS A BACKUP FOR THE INTERMEDIATE ALTITUDE ABORT MISSION.

APOLLO-SATURN FLIGHT MISSIONS
SATURN IB PRIMARY MISSION ASSIGNMENTS

LAUNCH VEHICLE		201	202	203	204	205	206	207	208 THROUGH 212
MISSION		L/V & CSM DEVELOPMENT		LH_2 EXPERIMENT	CSM LONG DURATION OPERATIONS		LEM DEVELOPMENT	CSM-LEM OPERATIONS	CSM-LEM OPERATIONS
SUMMARY OF PRIMARY OBJECTIVES		L/V DEVELOPMENT. COMPATIBILITY AND STRUCTURAL INTEGRITY OF CSM-SATURN IB. CSM SUBSYSTEMS DEVELOPMENT. HEAT SHIELD PERFORMANCE AT APPROX. 28,000 fps. MISSION SUPPORT FACILITIES OPERATION.		DYNAMICS OF LH_2 CONTAINMENT IN NEAR ZERO-G ENVIRONMENT. S-IVB AND INSTRUMENT UNIT CHECKOUT IN ORBIT. MISSION SUPPORT FACILITIES OPERATION.	MAN/SYSTEM INTERFACES. CREW/CSM/GROUND SYSTEMS PERFORMANCE ON EXTENDED MISSION. S-IVB AND INSTRUMENT UNIT CHECKOUT IN ORBIT.		LEM SUBSYSTEMS OPERATION. FIRE-IN-THE-HOLE ABORT. LEM STAGING CHARACTERISTICS.	TRANSPOSITION AND DOCK. BLOCK II CSM SUBSYSTEMS OPERATION. LEM SUBSYSTEMS OPERATION RENDEZVOUS AND DOCK. CREW/LEM/GROUND SYSTEMS OPERATION. MAN/SYSTEM INTERFACES.	(NOTE 2)
SPACECRAFT	CSM	009 (BLOCK I)	011 (BLOCK I)	NONE (SHROUD ONLY)	012 (BLOCK I)	014 (BLOCK I)	BP-30	101 (BLOCK II)	
	LEM	NONE	NONE	NONE	NONE	NONE	1	2	
PAYLOAD REQUIREMENT (NOTE 1)		37,400 LBS. (NON ORBITAL)	47,600 LBS. (NON ORBITAL)	S-IVB IN ORBIT WITH 19,400 LBS. LH_2	35,300 LBS.	35,300 LBS.	36,200 LBS.	38,100 LBS.	
PROFILE		POWERED FLIGHT OF L/V ON NON-ORBITAL SUPER-CIRCULAR ENTRY "LOB-TYPE" TRAJECTORY. CSM/S-IVB SEPARATION. USE SPS TO ACHIEVE DESIRED ENTRY CONDITIONS FOR MAX. HEAT RATE ON 201 AND MAX. HEAT LOAD ON 202.		INSERT INTO 100 N.MI. CIRCULAR ORBIT. NO RECOVERY.	INSERT INTO 85/130 N.MI. ELLIPTIC ORBIT. CSM/S-IVB SEPARATION AFTER APPROX. ONE ORBIT. USE SPS TO ACHIEVE HIGHER ORBIT REQUIRED FOR LONG DURATION MISSION. DE-ORBIT WITH SPS. ENTRY.		JETTISON CSM WITH LES. INSERT INTO 85/120 N.MI. ELLIPTIC ORBIT. S-IVB STABILIZATION FOR APPROX. ONE ORBIT. S-IVB/LEM SEPARATION. ORBITAL ALTITUDE AND PLANE CHANGES USING DESCENT & ASCENT PROP. (NOT TO EXCEED 300 N.MI. ALTITUDE).	INSERT INTO 81/107 N.MI. ELLIPTIC ORBIT. TRANSPOSITION AND DOCK. SPACECRAFT/S-IVB SEPARATION. RENDEZVOUS AND DOCK OPERATIONS. DE-ORBIT WITH SPS. ENTRY.	PROFILE TO BE DEVELOPED.
LAUNCH COMPLEX		34		37B	34		37B	37B	
FLIGHT AZIMUTH		105 DEGREES		72 DEGREES	72 DEGREES		72 DEGREES	72 DEGREES	
MISSION DURATION		LESS THAN 1 ORBIT		3 ORBITS	UP TO 14 DAYS		LESS THAN 1 DAY	UP TO 3 DAYS	

NOTE 1: WEIGHT OF ADAPTER AND SPACECRAFT (CSM AND/OR LEM), INCLUDING PROPELLANTS LOADED FOR THE SPECIFIED MISSION, AT THE TIME OF LV/SC SEPARATION, EXCEPT FOR 203 AS INDICATED.

NOTE 2: FIRST PRIORITY USE OF LAUNCH VEHICLES 208 THROUGH 212 IS FOR "CSM-LEM OPERATIONS" MISSIONS IN SUPPORT OF THE LUNAR LANDING OBJECTIVE. ALTERNATE MISSIONS FOR THESE VEHICLES ARE BEING CONSIDERED.

9/10/65

APOLLO-SATURN FLIGHT MISSIONS
SATURN IB ALTERNATE MISSION ASSIGNMENTS

LAUNCH VEHICLE	201	202	203	204	205	206	207
MISSION	NO ALTERNATE ASSIGNMENT	NO ALTERNATE ASSIGNMENT	NO ALTERNATE ASSIGNMENT	L/V-CSM DEVELOPMENT	NO ALTERNATE ASSIGNMENT	CSM-LEM OPERATIONS	
SUMMARY OF PRIMARY OBJECTIVES				L/V DEVELOPMENT COMPATIBILITY AND STRUCTURAL INTEGRITY OF CSM-SATURN IB. CSM SUBSYSTEMS DEVELOPMENT. HEAT SHIELD PERFORMANCE. MISSION SUPPORT FACILITIES OPERATION.		TRANSPOSITION AND DOCK. BLOCK II CSM SUBSYSTEMS OPERATION LEM SUBSYSTEMS OPERATION. RENDEZVOUS AND DOCK. (CSM ACTIVE) CREW/LEM/GROUND SYSTEMS OPERATION. MAN/SYSTEM INTERFACES. FIRE-IN-THE-HOLE ABORT. LEM STAGING CHARACTERISTICS.	
SPACECRAFT CSM				012 (BLOCK I)		101 (BLOCK II)	101 (BLOCK II)
SPACECRAFT LEM				NONE		1	2
PAYLOAD REQUIREMENT (NOTE 1)				35,300 LBS.		38,100 LBS.	38,100 LBS.
PROFILE				INSERT INTO 85/130 N.MI. ELLIPTIC ORBIT. CSM/S-IVB SEPARATION AFTER APPROX. ONE ORBIT. DE-ORBIT WITH SPS. ENTRY.		INSERT INTO 81/107 N.MI. ELLIPTIC ORBIT. TRANSPOSITION AND DOCK. SPACECRAFT/S-IVB SEPARATION AFTER APPROX. ONE ORBIT. SUBSYSTEM OPERATIONS IN ORBIT. DE-ORBIT WITH SPS. ENTRY.	
LAUNCH COMPLEX				34		37B	
FLIGHT AZIMUTH				72 DEGREES		72 DEGREES	
MISSION DURATION				LESS THAN 1 DAY		UP TO 3 DAYS	

9/10/65

NOTE 1: WEIGHT OF ADAPTER AND SPACECRAFT (CSM, OR CSM AND LEM), INCLUDING PROPELLANTS LOADED FOR THE SPECIFIED MISSION, AT THE TIME OF LV/SC SEPARATION.

APOLLO-SATURN FLIGHT MISSIONS
SATURN V PRIMARY MISSION ASSIGNMENTS

LAUNCH VEHICLE		501	502	503	504	505	506	508	510	512
MISSION		L/V & CSM DEVELOPMENT		LUNAR MISSION SIMULATION	LUNAR MISSIONS (NOTE 3)					
SUMMARY OF PRIMARY OBJECTIVES		L/V DEVELOPMENT. COMPATIBILITY AND STRUCTURAL INTEGRITY OF SPACECRAFT-SATURN V. HEAT SHIELD PERFORMANCE AT LUNAR RETURN CONDITIONS. MISSION SUPPORT FACILITIES OPERATION.		CREW/SPACE VEHICLE/GROUND SYSTEMS OPERATION DURING SIMULATED LUNAR MISSION.	LUNAR EXPLORATION					
SPACECRAFT	CSM	017 (BLOCK I)	020 (BLOCK I)	102 (BLOCK II)	103	105	107	109 (BLOCK II)	113	115
	LEM	LTA	LTA	3	4	6	7	10	13	15
PAYLOAD REQUIREMENT (NOTE 1)		85,000 LBS. (NOTE 2)	85,000 LBS. (NOTE 2)	95,000 LBS. (NOTE 2)	95,000 LBS.					
PROFILE		INSERT INTO 100 N.MI. CIRCULAR ORBIT. AFTER ORBITAL CHECKOUT FOR 1-3 ORBITS, INJECT INTO ELLIPTICAL TRAJECTORY OF APPROX. 9,000 N.MI. APOGEE. CSM/S-IVB SEPARATION. USE SPS TO ACHIEVE DESIRED ENTRY CONDITIONS.	INSERT INTO 100 N.MI. CIRCULAR ORBIT. AFTER ORBITAL CHECKOUT FOR 1-3 ORBITS, INJECT INTO SIMULATED TRANSLUNAR TRAJECTORY. CSM/S-IVB SEPARATION. USE SPS TO REDUCE APOGEE. USE SPS TO ACHIEVE DESIRED ENTRY CONDITIONS.	INSERT INTO 100 N.MI. CIRCULAR ORBIT. AFTER ORBITAL CHECKOUT OF 1-3 ORBITS, INJECT INTO ELLIPTICAL TRAJECTORY. TRANSPOSITION AND DOCK. SPACECRAFT/S-IVB SEPARATION. CIRCULARIZE AT 100-300 N.MI. USING SPS. LEM SEPARATION, POWERED MANEUVERS, RENDEZVOUS AND DOCK. (NOTE 4) DE-ORBIT WITH SPS. ENTRY.	INSERT INTO 100 N.MI. CIRCULAR ORBIT AFTER ORBITAL CHECKOUT OF 1-3 ORBITS, INJECT INTO TRANSLUNAR TRAJECTORY. TRANSPOSITION AND DOCK. SPACECRAFT/S-IVB SEPARATION. MIDCOURSE CORRECTIONS AND DEBOOST INTO LUNAR ORBIT BY SPS. LEM SEPARATION, DESCENT AND TOUCHDOWN. LUNAR LAUNCH, RENDEZVOUS AND DOCK. LEM SEPARATION. USE SPS FOR BOOST OUT OF LUNAR ORBIT AND MIDCOURSE CORRECTIONS. ENTRY.					
LAUNCH COMPLEX		39A	39A	39B	39A	39B	39A	39A	39A	39A
FLIGHT AZIMUTH		72 DEGREES	72 DEGREES	72 DEGREES	72 TO 108 DEGREES					
MISSION DURATION		APPROX. 12 HOURS	APPROX. 12 HOURS	UP TO 14 DAYS	7-10 DAYS					

NOTE 1: WEIGHT OF ADAPTER AND SPACECRAFT (CSM AND LEM), INCLUDING PROPELLANTS LOADED FOR THE SPECIFIED MISSION, AT THE TIME OF LV/SC SEPARATION.

NOTE 2: UNDER STUDY.

NOTE 3: FIRST PRIORITY USE OF LAUNCH VEHICLES 507, 509, 511 AND 513 THROUGH 515 IS FOR SUPPORT OF THE LUNAR LANDING OBJECTIVE. ALTERNATE MISSIONS FOR THESE VEHICLES ARE BEING CONSIDERED. SPACECRAFT ASSIGNMENTS FOR VEHICLES 505 AND SUBSEQUENT ARE SHOWN FOR PLANNING PURPOSES ONLY.

NOTE 4: LEM OPERATIONS MAY BE PERFORMED PRIOR TO CIRCULARIZATION PENDING FURTHER STUDY.

9/10/65

APOLLO-SATURN FLIGHT MISSIONS
SATURN V ALTERNATE MISSION ASSIGNMENTS

LAUNCH VEHICLE		501	502	503	504	505	504	505	506
MISSION		NO ALTERNATE ASSIGNMENT	NO ALTERNATE ASSIGNMENT	L/V-CSM DEVELOPMENT			LUNAR MISSION SIMULATION		
SUMMARY OF PRIMARY OBJECTIVES				L/V DEVELOPMENT. COMPATIBILITY AND STRUCTURAL INTEGRITY OF SPACECRAFT-SATURN V. HEAT SHIELD PERFORMANCE AT LUNAR RETURN CONDITIONS. MISSION SUPPORT FACILITIES OPERATION.	L/V DEVELOPMENT. COMPATIBILITY AND STRUCTURAL INTEGRITY OF SPACECRAFT-SATURN V. MISSION SUPPORT FACILITIES OPERATION.		CREW/SPACE VEHICLE/GROUND SYSTEMS OPERATION DURING SIMULATED LUNAR MISSION.	
SPACECRAFT	CSM			102	103 (NOTE 2)	105 (NOTE 2)	103	105	107
	LEM			3 (NOTE 2)	4 (NOTE 2)	6 (NOTE 2)	4	6	7
PAYLOAD REQUIREMENT (NOTE 1)				85,000 LBS. (NOTE 3)	95,000 LBS.	95,000 LBS.	95,000 LBS.	95,000 LBS.	95,000 LBS.
PROFILE				INSERT INTO 100 N.MI. CIRCULAR ORBIT. AFTER ORBITAL CHECKOUT FOR 1-3 ORBITS, INJECT INTO ELLIPTICAL TRAJECTORY. CSM/S-IVB SEPARATION. USE SPS TO ACHIEVE DESIRED ENTRY CONDITIONS.	PROFILE TO BE DEVELOPED		PROFILE TO BE DEVELOPED		
LAUNCH COMPLEX				39B	39A	39B	39A	39B	39A
FLIGHT AZIMUTH				72 DEGREES			72 TO 108 DEGREES		
MISSION DURATION				APPROX. 12 HOURS			UP TO 10 DAYS		

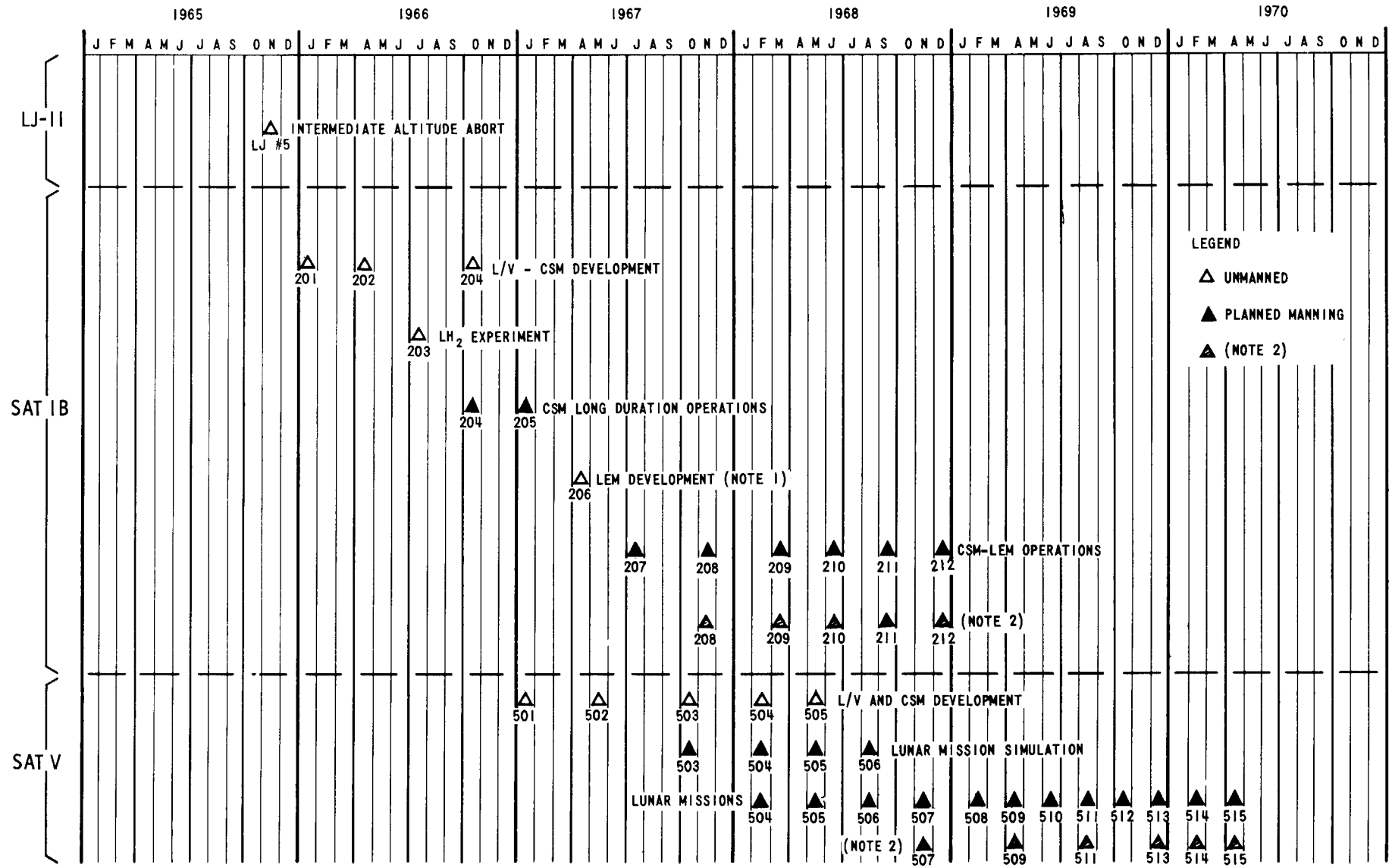
9/10/65

NOTE 1: WEIGHT OF ADAPTER AND SPACECRAFT (CSM AND LEM), INCLUDING PROPELLANTS LOADED FOR THE SPECIFIED MISSION, AT THE TIME OF LV/SC SEPARATION.

NOTE 2: IN LIEU OF THE SPACECRAFT LISTED, DUMMY (BOILERPLATE) SPACECRAFT MAY BE REQUIRED.

NOTE 3: UNDER STUDY.

APOLLO FLIGHT MISSIONS-LAUNCH SCHEDULE



NOTE 1: A "CSM-LEM OPERATIONS" MISSION MAY BE FLOWN ON VEHICLE 206 RATHER THAN THE "LEM DEVELOPMENT" MISSION. PLANNING FOR SUCH AN ALTERNATE MISSION NEED NOT CONSIDER FLIGHT EARLIER THAN THE CURRENT 207 SCHEDULE.

NOTE 2: FIRST PRIORITY USE OF THESE LAUNCH VEHICLES IS FOR SUPPORT OF THE LUNAR LANDING OBJECTIVE. ALTERNATE MISSIONS FOR THESE VEHICLES ARE BEING CONSIDERED.

9/10/65