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APOLLO FLIGHT MISSION ASSIGNMENTS (U)

SEPTEMBER 10, 1965

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C.
APOLLO FLIGHT MISSION ASSIGNMENTS (U)

Date Effective:
SEPTEMBER 10, 1965

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after 12 years

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

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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 Document NPC C 500-11 dated February 19, 1965, and Change No. 1 to that document dated May 17, 1965, are superseded by this issue.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/ft²·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
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
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
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:

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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 Phonocardio gram
   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
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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.

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
IV. IN-FLIGHT EXPERIMENTS:

None
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.

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.

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

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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.

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  
(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
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
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 sub-systems.
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
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)**

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

**Apollo - Saturn I**

<table>
<thead>
<tr>
<th>Launch Vehicle</th>
<th>Launch Date</th>
<th>Payload</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA-1</td>
<td>Oct. 27, 1961</td>
<td>None</td>
<td>Launch Vehicle Development. Test of the S-I stage propulsion; verification of aerodynamic and structural design of entire Saturn I vehicle.</td>
</tr>
<tr>
<td>SA-2</td>
<td>Apr. 25, 1962</td>
<td>Water (95 tons)</td>
<td>Launch Vehicle Development. Observation of water dispersion at high altitude (&quot;Project High Water&quot;).</td>
</tr>
<tr>
<td>SA-3</td>
<td>Nov. 16, 1962</td>
<td>Water (95 tons)</td>
<td>Launch Vehicle Development. Second test for &quot;Project High Water&quot;.</td>
</tr>
</tbody>
</table>
## Apollo - Saturn I (Cont'd)

<table>
<thead>
<tr>
<th>Launch Vehicle</th>
<th>Launch Date</th>
<th>Payload</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA-5</td>
<td>Jan. 29, 1964</td>
<td>None</td>
<td>Launch Vehicle Development. First flight operation of the S-IV second stage.</td>
</tr>
<tr>
<td>SA-6</td>
<td>May 28, 1964</td>
<td>BP-13</td>
<td>Launch Vehicle Development. Verification of aerodynamic and structural design of Saturn I with Apollo boiler-plate. Successful insertion into orbit following premature cutoff of one first-stage engine.</td>
</tr>
</tbody>
</table>
## APOLLO-LITTLE JOE II FLIGHT MISSIONS

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

**NOTE:** LITTLE JOE II - 6 IS AVAILABLE AS A BACKUP FOR THE INTERMEDIATE ALTITUDE ABORT MISSION.
### Summary of Primary Objectives

<table>
<thead>
<tr>
<th>Mission</th>
<th>L/V Development</th>
<th>L/H2 Experiment</th>
<th>CSM Long Duration Operations</th>
<th>LEM Development</th>
<th>CSM-LEM Operations</th>
<th>CSM-LEM Operations</th>
</tr>
</thead>
</table>

### Spacecraft

<table>
<thead>
<tr>
<th>Spacecraft</th>
<th>CSM</th>
<th>LEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAYLOAD REQUIREMENT (NOTE 1)</td>
<td>37,400 LBS. (NON ORBITAL), 47,600 LBS. (NON ORBITAL)</td>
<td>95,300 LBS.</td>
</tr>
</tbody>
</table>

### Profile


### Launch Complex

<table>
<thead>
<tr>
<th>Launch Complex</th>
<th>34</th>
</tr>
</thead>
</table>

### Flight Azimuth

<table>
<thead>
<tr>
<th>Flight Azimuth</th>
<th>105 Degrees</th>
<th>72 Degrees</th>
<th>72 Degrees</th>
<th>378</th>
</tr>
</thead>
</table>

### Mission Duration

<table>
<thead>
<tr>
<th>Mission Duration</th>
<th>Less Than 1 Orbit</th>
<th>3 Orbits</th>
<th>Up to 1/4 Days</th>
<th>Less Than 1 Day</th>
<th>Up to 3 Days</th>
</tr>
</thead>
</table>

**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.
# Apollo-Saturn Flight Missions

## Saturn IB Alternate Mission Assignments

<table>
<thead>
<tr>
<th>Launch Vehicle</th>
<th>201</th>
<th>202</th>
<th>203</th>
<th>204</th>
<th>205</th>
<th>206</th>
<th>207</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission</td>
<td></td>
<td></td>
<td></td>
<td>LV-CSM Development</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summary of Primary Objectives</th>
<th>103</th>
<th>104</th>
<th>105</th>
<th>106</th>
<th>107</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSM</td>
<td></td>
<td></td>
<td></td>
<td>012 (Block 1)</td>
<td></td>
</tr>
<tr>
<td>LEM</td>
<td></td>
<td></td>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Payload Requirement (Note 1)</td>
<td></td>
<td></td>
<td></td>
<td>35,300 lbs.</td>
<td></td>
</tr>
<tr>
<td>Profile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Launch Complex</td>
<td></td>
<td></td>
<td></td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Flight Azimuth</td>
<td></td>
<td></td>
<td></td>
<td>72 degrees</td>
<td></td>
</tr>
<tr>
<td>Mission Duration</td>
<td></td>
<td></td>
<td></td>
<td>Less than 1 day</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CSM-LEM Operations</th>
<th>101 (Block 1)</th>
<th>101 (Block 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transposition and Dock.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Block I CSM subsystems operation.</td>
<td>38,100 lbs.</td>
<td>38,100 lbs.</td>
</tr>
<tr>
<td>LEM subsystems operation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Redundant and Dock. (CSM active)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crew/LEM/Ground systems operation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Man/system interfaces.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire-in-the-hole abort.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEM Staging Characteristics.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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.

9/10/65
## APOLLO-SATURN FLIGHT MISSIONS

### SATURN V PRIMARY MISSION ASSIGNMENTS

<table>
<thead>
<tr>
<th>LAUNCH VEHICLE</th>
<th>501</th>
<th>502</th>
<th>503</th>
<th>504</th>
<th>505</th>
<th>506</th>
<th>508</th>
<th>510</th>
<th>512</th>
</tr>
</thead>
<tbody>
<tr>
<td>MISSION</td>
<td>L/V &amp; CSM DEVELOPMENT</td>
<td>LUNAR MISSION SIMULATION</td>
<td>LUNAR MISSIONS (NOTE 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUMMARY OF PRIMARY OBJECTIVES</td>
<td>L/V DEVELOPMENT.</td>
<td>CREW/SPACE VEHICLE/GROUND SYSTEMS OPERATIONS DURING SIMULATED LUNAR MISSION.</td>
<td>LUNAR EXPLORATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPACECRAFT CSM</td>
<td>017 (BLOCK I)</td>
<td>020 (BLOCK I)</td>
<td>012 (BLOCK I)</td>
<td>103</td>
<td>105</td>
<td>107</td>
<td>109</td>
<td>1113</td>
<td>115</td>
</tr>
<tr>
<td>LEM</td>
<td>LTA</td>
<td>LTA</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>10</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>PAYLOAD REQUIREMENT (NOTE 1)</td>
<td>85,000 LBS. (NOTE 2)</td>
<td>85,000 LBS. (NOTE 2)</td>
<td>95,000 LBS. (NOTE 2)</td>
<td>95,000 LBS.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROFILE</td>
<td>INSERT INTO 100 N.M.I. CIRCULAR ORBIT.</td>
<td>INSERT INTO 100 N.M.I. CIRCULAR ORBIT.</td>
<td>INSERT INTO 100 N.M.I. CIRCULAR ORBIT.</td>
<td>INSERT INTO 100 N.M.I. CIRCULAR ORBIT.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AFTER ORBITAL CHECKOUT FOR 1-3 ORBITS, INJECT INTO ELLIPTICAL TRAJECTORY.</td>
<td>AFTER ORBITAL CHECKOUT FOR 1-3 ORBITS, INJECT INTO SIMULATED TRANSLUNAR TRAJECTORY.</td>
<td>AFTER ORBITAL CHECKOUT OF 1-3 ORBITS, INJECT INTO TRANSLUNAR TRAJECTORY.</td>
<td>AFTER ORBITAL CHECKOUT OF 1-3 ORBITS, INJECT INTO TRANSLUNAR TRAJECTORY.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSM/S-IVB SEPARATION.</td>
<td>USE SPS TO REDUCE APOGEE.</td>
<td>TRANPOSITION AND DOCK. SPACECRAFT/S-IVB SEPARATION.</td>
<td>TRANPOSITION AND DOCK. SPACECRAFT/S-IVB SEPARATION.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>USE SPS TO ACHIEVE DESIRED ENTRY CONDITIONS.</td>
<td>USE SPS TO ACHIEVE DESIRED ENTRY CONDITIONS.</td>
<td>CIRCULARIZE AT 100-300 N.M.I. USING SPS.</td>
<td>CIRCULARIZE AT 100-300 N.M.I. USING SPS.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLIGHT AZIMUTH</td>
<td>72 DEGREES</td>
<td>72 DEGREES</td>
<td>72 DEGREES</td>
<td>72 TO 108 DEGREES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MISSION DURATION</td>
<td>APPROX. 12 HOURS</td>
<td>APPROX. 12 HOURS</td>
<td>UP TO 14 DAYS</td>
<td>7-10 DAYS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Launch Vehicle</th>
<th>501</th>
<th>502</th>
<th>503</th>
<th>504</th>
<th>505</th>
<th>504</th>
<th>505</th>
<th>506</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mission</strong></td>
<td>L/V-Development</td>
<td>L/V-Development</td>
<td>Lunar Mission Simulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spacecraft</strong></td>
<td>CSM</td>
<td>LEM</td>
<td>102</td>
<td>103 (Note 2)</td>
<td>105 (Note 2)</td>
<td>103</td>
<td>105</td>
<td>107</td>
</tr>
<tr>
<td><strong>Payload Requirement (Note 1)</strong></td>
<td>85,000 lbs. (Note 3)</td>
<td>95,000 lbs.</td>
<td>95,000 lbs.</td>
<td>95,000 lbs.</td>
<td>95,000 lbs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Profile</strong></td>
<td>Insert into 100 n.m.i. circular orbit. After orbital checkout for 1-5 orbits, inject into elliptical trajectory. CSM/S-IVB Separation. Use SPS to achieve desired entry conditions.</td>
<td>Profile to be developed</td>
<td>Profile to be developed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Launch Complex</strong></td>
<td>398</td>
<td>39A</td>
<td>39B</td>
<td>39A</td>
<td>39B</td>
<td>39A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Flight Azimuth</strong></td>
<td>72 degrees</td>
<td>72 to 108 degrees</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mission Duration</strong></td>
<td>Approx. 12 hours</td>
<td>Up to 10 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Note 1:** Weight of adapter and spacecraft (CSM and LEM), including propellants loaded for the specified mission, at the time of L/V/SC separation.

**Note 2:** In lieu of the spacecraft listed, dummy (boilerplate) spacecraft may be required.

**Note 3:** Under study.
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.