



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

# *FINAL EXPERIMENTS MISSION RULES*

*APOLLO 16*

*ALSEP 3/P&FS 2*

*DECEMBER 15, 1971*

*PREPARED BY*

*FLIGHT CONTROL DIVISION*

MANNED SPACECRAFT CENTER  
HOUSTON, TEXAS

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\*

## FINAL EXPERIMENTS MISSION RULES

APOLLO 16

ALSEP 3/P&FS 2

REV A

PREFACE

THIS DOCUMENT CONTAINS REVISION A TO THE EXPERIMENTS MISSION RULES FOR ALSEP 3 AND P&FS 2 AS OF MARCH 1, 1972. ALL SUBSEQUENT REVISIONS TO THIS DOCUMENT WILL BE PRINTED ON DIFFERENT COLORED PAPER FOR EASY RECOGNITION.

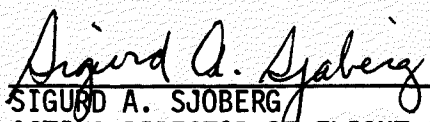
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# FINAL EXPERIMENTS MISSION RULES

APOLLO 16

ALSEP 3/P&FS 2

REV A

## REVISION INSTRUCTION SHEET

UPDATE YOUR BOOK ACCORDING TO THE FOLLOWING INSTRUCTIONS:

REMOVE AND REPLACE THE FOLLOWING PAGES:

|     |      |      |
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IIA

## MISSION RULES

TSG 291A

**1 INTRODUCTION  
AND PURPOSE**

# NASA - Manned Spacecraft Center

## MISSION RULES

### SECTION 1 - INTRODUCTION AND PURPOSE

| R | ITEM |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |          |                          |       |      |
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|   |      | <u>INTRODUCTION AND PURPOSE</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |          |                          |       |      |
|   |      | <p>MISSION RULES ARE PROCEDURAL STATEMENTS THAT PROVIDE FLIGHT CONTROL PERSONNEL WITH GUIDELINES TO EXPEDITE THE DECISION-MAKING PROCESS. THE RULES ARE BASED ON AN ANALYSIS OF MISSION EQUIPMENT CONFIGURATION, SYSTEMS OPERATIONS AND CONSTRAINTS, AND MISSION OBJECTIVES. THE DIRECTOR OF FLIGHT OPERATIONS, MANNED SPACECRAFT CENTER, HOUSTON, TEXAS, HAS THE OVERALL RESPONSIBILITY FOR THE PREPARATION, CONTENTS, AND CONTROL OF THE EXPERIMENT MISSION RULES FOR ALSEP AND P&amp;FS.</p> <p>THE ALSEP AND P&amp;FS MISSION RULES ARE PUBLISHED UNDER SEPARATE COVER FROM THE FLIGHT MISSION RULES BECAUSE OF THE DIFFERENCE IN LIFETIME OF THESE EXPERIMENT OPERATIONS AND SPECIFIC MISSION-ORIENTATED ACTIVITIES. THE EXPERIMENT MISSION RULES DOCUMENT CONTAINS ALL ALSEP AND P&amp;FS MISSION RULES INCLUDING:</p> <p>A. ALL MISSION RULES AFFECTING CREW INTERFACE WITH THE ALSEP AND P&amp;FS</p> <p>B. ALL MISSION RULES AFFECTING MCC INTERFACE WITH THE ALSEP AND P&amp;FS THROUGH SYSTEMS LIFETIME</p> <p>THE FLIGHT MISSION RULES DOCUMENT ALSO CONTAINS ALL ALSEP AND P&amp;FS RULES INVOLVING FLIGHT CREW INTERFACE. ALSEP RULES IN THE FLIGHT MISSION RULES AND THE EXPERIMENT MISSION RULES DOCUMENT ARE ASSIGNED THE SAME NUMBERS FOR EASE OF CROSSREFERENCE. THE FLIGHT MISSION RULES WILL TAKE PRECEDENCE SHOULD ANY CONFLICTS EXIST BETWEEN THIS DOCUMENT AND THE FLIGHT MISSION RULES BECAUSE OF REVISION CYCLES.</p> <p>MISSION RULES CAN BE CATEGORIZED AS GENERAL AND SPECIFIC. GENERAL MISSION RULES CONTAIN THE BASIC PHILOSOPHIES USED IN THE DEVELOPMENT OF THE EXPERIMENT MISSION RULES. SPECIFIC MISSION RULES PROVIDE THE BASIC CRITERIA FROM WHICH REAL-TIME DECISIONS ARE MADE AND ARE FORMATTED AS FOLLOWS:</p> <p>A. THE "CONDITION/MALFUNCTION" COLUMN DEFINES THE FAILURE.</p> <p>B. THE "PHASE" COLUMN IDENTIFIES THE TIME INTERVAL IN WHICH THE CONDITION/MALFUNCTION OCCURS.</p> <p>C. THE "RULING" COLUMN DEFINES FLIGHT CONTROLLER ACTION AND/OR PROCEDURES THAT MUST BE ACCOMPLISHED AS A RESULT OF THE CONDITION.</p> <p>D. THE "CUES/NOTES/COMMENTS" COLUMN PROVIDES THE FLIGHT CONTROLLER WITH ADDITIONAL INFORMATION CONCERNING THE CONDITION/MALFUNCTION AND/OR RULING.</p> <p>THERE WILL BE A SEPARATE SET OF MISSION RULES FOR THE EXPERIMENT PACKAGES FOR EACH MISSION.</p> |     |          |                          |       |      |
|   |      | MISSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | REV | DATE     | SECTION                  | GROUP | PAGE |
|   |      | APOLLO 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | FNL | 12/15/71 | INTRODUCTION AND PURPOSE |       | 1-1  |

**2 GENERAL RULES  
AND SOP'S**

# NASA - Manned Spacecraft Center

## MISSION RULES

### SECTION 2 - GENERAL RULES AND SOP'S

| R   | ITEM                                                                                                                                                                                                                                              |                    |     |          |                         |         |      |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----|----------|-------------------------|---------|------|
|     |                                                                                                                                                                                                                                                   | <div>GENERAL</div> |     |          |                         |         |      |
| 2-1 | THE EXPERIMENT MISSION RULES OUTLINE PREPLANNED DECISIONS DESIGNED TO MINIMIZE THE AMOUNT OF REAL-TIME RATIONALIZATION REQUIRED WHEN NON-NOMINAL SITUATIONS OCCUR DURING AND AFTER CREW ACTIVATION OF THE ALSEP OR DEPLOYMENT OF THE P&FS.        |                    |     |          |                         |         |      |
| 2-2 | WHEN A CONFLICT OF PLANNED EXPERIMENT PACKAGE ACTIVITIES OCCUR, THE LUNAR EXPERIMENTS OFFICER WILL DETERMINE THE PRIORITY OF ACTIVITIES, WITH CONCURRENCE OF THE SCIENCE TEAM LEADER.                                                             |                    |     |          |                         |         |      |
| 2-3 | IN SOME INSTANCES, THE SPECIFIC MISSION RULES MAY DEVIATE FROM THE GENERAL GUIDELINES OR FROM THESE GENERAL RULES. THE SPECIFIC MISSION RULE WILL APPLY IN ALL CASES, AND THE DEVIATIONS FROM THE GENERAL GUIDELINES WILL BE NOTED.               |                    |     |          |                         |         |      |
| 2-4 | THE ALSEP SENIOR ENGINEER OR SATELLITE COMMUNICATIONS ENGINEER MAY, AFTER ANALYSIS OF THE OPERATION, CHOOSE TO TAKE ANY NECESSARY ACTION REQUIRED FOR SUCCESSFUL COMPLETION OF EXPERIMENT TEST OBJECTIVES.                                        |                    |     |          |                         |         |      |
| 2-5 | MISSION RULE LIMITS THAT ARE CONSIDERED TO BE INTERIM OR UNCONFIRMED NUMBERS WILL BE UNDERLINED IN THIS PUBLICATION AND ALL SUBSEQUENT REVISIONS UNTIL THE NUMBERS ARE CONFIRMED BY THE RESPONSIBLE NASA AGENCY.                                  |                    |     |          |                         |         |      |
| 2-6 | THE SYSTEMS LIMITS LISTED IN THESE RULES ARE THE ACTUAL VEHICLE LIMITS (AS WELL AS THEY ARE KNOWN AND UNDERSTOOD) AND ARE NOT BIASED TO COMPENSATE FOR TIME DELAYS OR INSTRUMENTATION ERRORS WITHIN THE EXPERIMENT AND MSFN DATA/DISPLAY SYSTEMS. |                    |     |          |                         |         |      |
|     |                                                                                                                                                                                                                                                   | MISSION            | REV | DATE     | SECTION                 | GROUP   | PAGE |
|     |                                                                                                                                                                                                                                                   | APOLLO 16          | FNL | 12/15/71 | GENERAL RULES AND SOP'S | GENERAL | 2-1  |
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**3 ALSEP  
OPERATIONAL  
GUIDELINES**

# NASA - Manned Spacecraft Center

## MISSION RULES

### SECTION 3 - ALSEP OPERATIONAL GUIDELINES

| R        | ITEM      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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|          |           | <div>ALSEP OPERATIONAL GUIDELINES</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|          | 32-1      | <p>GENERAL</p> <p>A. THESE ALSEP GENERAL OPERATIONAL GUIDELINES ARE BASED ON OBJECTIVES IN THE FOLLOWING PRIORITIES:</p> <ol style="list-style-type: none"> <li>1. HFE</li> <li>2. LSM</li> <li>3. PSE</li> <li>4. ASE</li> </ol> <p style="text-align: center;">NOTE<br/>RIPPLE-OFF SEQUENCE IS:</p> <ol style="list-style-type: none"> <li>1. HFE</li> <li>2. LSM</li> <li>3. PSE</li> </ol> <p>B. THE GATHERING OF SCIENTIFIC DATA WILL NOT BE COMPROMISED FOR ENGINEERING OR TEST PURPOSES.</p> <p>C. REDUNDANT OR BACKUP SYSTEMS WILL NOT BE SELECTED UNLESS A FAILURE WARRANTS SUCH ACTION. SWITCHING TO REDUNDANT SYSTEMS WILL NOT BE ACCOMPLISHED TO SATISFY ENGINEERING TESTS UNLESS ALL SCIENTIFIC MISSION OBJECTIVES HAVE BEEN COMPLETED.</p> <p>D. DELETE.</p> <p>E. BEFORE IMPLEMENTING ANY MISSION RULE ACTION BASED ON AN APPARENT ALSEP MALFUNCTION, IT WILL BE ASCERTAINED THAT THERE IS NO PROBLEM WITH THE MSFN SUPPORTING SITE.</p> <p>F. THE TIMER INHIBIT COMMAND WILL NOT BE SENT PRIOR TO ALL EXPERIMENTS BEING ON.</p> <p>G. THE ASE WILL BE COMMANDED TO STANDBY IF "THUMPER ARM" OR "GRENADE ARM" STATE IS INDICATED WITHOUT GROUND COMMAND OR CREW ACTION.</p> <p>H. THE RESETTABLE TIMER WILL NORMALLY BE RESET TO ZERO DURING SUNRISE TERMINATOR SUPPORT PERIODS.</p> <p>I. ALSEP EXPERIMENTS WILL NOT BE COMMANDED TO "STANDBY OFF" UNLESS THE ACTION IS JUSTIFIED BY AN ANOMALY.</p> <p>J. ANYTIME THERE IS AN AUTOMATIC SWITCHOVER TO PCU 2 NOT IDENTIFIABLE TO A FAILURE IN PCU 1, A ONE-TIME COMMAND WILL BE ATTEMPTED TO RETURN TO PCU 1 IF THE +12 VDC BUS IS GREATER THAN 11.8 VDC.</p> <p>K. NO COMMAND FUNCTION CAN BE EXECUTED (OTHER THAN "STANDBY OFF," "STANDBY SELECT," OR "OPERATE SELECT") IN AN EXPERIMENT, BY GROUND COMMAND OR BY ONBOARD TIMER, UNLESS THE EXPERIMENT IS IN THE "OPERATE" MODE.</p> <p>L. THE ALSEP SHORTING PLUG SWITCH AND THE ASTRONAUT SWITCH 1 WILL BE ACTIVATED IN THIS ORDER ASAP AFTER DEPLOYMENT.</p> <p>M. IF THE GROUND IS UNABLE TO COMMAND TRANSMITTER A "ON" AND/OR EXPERIMENTS "ON," THE GROUND WILL REQUEST THE ASTRONAUT TO TURN ON ASTRONAUT SWITCHES 2 AND/OR 3.</p> <p>N. THE CENTRAL STATION HEATERS AND PDR WILL BE USED TO MAINTAIN AN AVERAGE INTERNAL THERMAL PLATE TEMPERATURE GREATER THAN 20° F AND LESS THAN 125° F UNLESS THERE IS AN ANOMALY REQUIRING THE CS HEATERS TO BE OFF AND/OR THE POWER IS REQUIRED TO MAINTAIN EXPERIMENT INTEGRITY.</p> |
| A        |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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|          | MISSION   | REV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|          | APOLLO 16 | A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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|          | 3/1/72    | ALSEP OPS GUIDELINES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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|          | GENERAL   | 3-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Tape 1-4 |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## MISSION RULES

| R    |      | ITEM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| 32-1 | CONT | <p>O. A SINGLE COMMAND CARRIER WILL BE MAINTAINED "ON" AND IN THE SAFED CONFIGURATION, EXCEPT TO SEND COMMANDS AND REMOTE SITE HANDOVERS FROM DEPLOYMENT INITIATION UNTIL AFTER LM LIFT-OFF IN ORDER TO PROVIDE ADDITIONAL PROTECTION AGAINST THE GENERATION OF SPURIOUS COMMANDS.</p> <p>P. THE HFE BORE HOLES WILL HAVE PRIORITY OVER THE DRILL CORE STEM. THE HFE BORE HOLES WILL BE ATTEMPTED FIRST. IF PROBLEMS ARE ENCOUNTERED, EFFORTS ON BORE HOLES WILL BE TERMINATED AFTER A TOTAL OF 20 MINUTES ACCUMULATED DRILL ON TIME.</p> <p>Q. IF A HARD OBJECT IS ENCOUNTERED THAT REDUCES DRILL RATE TO LESS THAN APPROXIMATELY 5 INCHES PER MINUTE ON EITHER HFE PROBE HOLE, THE FOLLOWING WILL BE ACCOMPLISHED:</p> <ol style="list-style-type: none"> <li>1. IF THE SECOND STEM SECTION IS NOT ATTACHED, WITHDRAW AND START AT A DIFFERENT LOCATION FOR MAXIMUM OF TWO WITHDRAWALS.</li> <li>2. IF THE SECOND STEM IS ATTACHED, CONTINUE UNTIL APPROXIMATELY 10 MINUTES OF POWER ON TIME FOR THE DRILL STRING HAS ELAPSED.</li> </ol> <p>R. HFE CONDUCTIVITY MEASUREMENTS IN MODE II AND MODE III WILL BE COMPLETED PRIOR TO TEMINATION OF CONTINUOUS REAL-TIME SUPPORT.</p> <p>S. IF THE CREW MUST RETURN TO THE LM PRIOR TO COMPLETE ALSEP DEPLOYMENT, THE SHORTING PLUG SWITCH AND THE ASTRONAUT SWITCH 1 WILL BE ACTIVATED "ON" IF THE ANTENNA IS EMPLACED. IF THE ANTENNA IS NOT EMPLACED, THESE SWITCHES WILL NOT BE ACTIVATED (PICK UP HERE ON EVA 2).</p> <p>T. WHENEVER CMD 003 (HBR ON) IS USED TO GO TO HIGH BIT RATE, CMD 005 (HBR OFF) WILL BE USED TO RETURN TO NORMAL BIT RATE (TO PREVENT LOSS OF CVW'S)</p> <p>U. THE ASE IS THE ONLY EXPERIMENT THAT WILL BE COMMANDED WHILE IN HIGH BIT RATE.</p> <p>V. THE PSE WILL NOT BE ACTIVATED BY GROUND COMMAND UNTIL THE ASE THUMPER ACTIVITY HAS BEEN COMPLETED.</p> <p>W. THE ALSEP WILL BE IN HIGH BIT RATE DURING LM LIFT-OFF (-5 MINUTES TO NOMINAL +15 MINUTES).</p> <p>X. FOR ANY MALFUNCTION DURING A SURFACE TASK, A MAXIMUM OF 10 MINUTES WILL BE SPENT ON THE CONTINGENCY PROCEDURE BEFORE THE TASK IS ABANDONED, WITH THE FOLLOWING EXCEPTIONS:</p> <ol style="list-style-type: none"> <li>1. RTG FUELING - UP TO 20 MINUTES WILL BE ALLOWED IN EXERCISING RTG FUELING CONTINGENCY PROCEDURES.</li> <li>2. ALSEP PACKAGE 1 TO PACKAGE 2 CABLE CONNECTIONS - UP TO 20 MINUTES WILL BE ALLOWED FOR MAKING THE CABLE CONNECTION.</li> <li>3. ALSEP ANTENNA - UP TO 30 MINUTES WILL BE ALLOWED FOR ANTENNA ERECTION AND ALIGNMENT.</li> <li>4. ALSEP DEPLOYMENT MAY BE CONTINUED ON A LATER EVA IF ADDITIONAL TIME TO SPEND ON CONTINGENCY PROCEDURES IS REQUIRED TO ATTAIN AN OPERATIONAL ALSEP.</li> </ol> |
|      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

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# NASA - Manned Spacecraft Center

## MISSION RULES

### SECTION 3 - ALSEP OPERATIONAL GUIDELINES - CONTINUED

| R         | ITEM         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                      |         |          |         |       |      |           |   |        |                      |         |     |
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| A         | 32-1<br>CONT | <p>Y. FOR EVA TERMINATION OR OTHER INTERRUPTIONS DURING ALSEP DEPLOYMENT, THE FOLLOWING DEPLOYMENT INTERRUPTION POINTS WILL BE OBSERVED IF PERMITTED BY CREW SAFETY CONSIDERATION:</p> <p>1. REMOVE ALSEP PACKAGES 1 AND 2. CLOSE SEQ BAY DOOR. REPLACE ALSEP PACKAGES WITH HANDLES UP AND WITH EXPERIMENTS FACING THE SUN WITHIN <math>\pm 15^\circ</math>.</p> <p>2. TILT FUEL CASK (DOME NOT REMOVED).</p> <p>3. TILT FUEL CASK. REMOVE DOME. DO NOT DEFUEL.</p> <p>4. FUEL RTG. THEN CARRY ALSEP TO DEPLOYMENT SITE. REMOVE ALL COMPONENTS FROM PACKAGE 2. CARRY PACKAGE 1 TO EMPLACEMENT SITE. DO NOT CONNECT RTG CABLE TO CS UNLESS SUFFICIENT TIME IS AVAILABLE TO ERECT THE CS SUNSHIELD.</p> <p>5. CONNECT HFE CABLE TO CS. REMOVE PSE, ASE, AND LSM FROM SUBPACKAGE 1. ALIGN CS AND RAISE SUNSHIELD. MOUNT ANTENNA MAST, GIMBAL, AND ANTENNA. LEVEL AND ALIGN ANTENNA. DEPRESS SHORTING PLUG AND ROTATE ASTRONAUT SWITCH 1 CLOCKWISE ON WAY BACK TO LM.</p> <p>6. THE HFE CAN BE INTERRUPTED AFTER COMPLETION OF THE FIRST PROBE HOLE.</p> <p>7. DEPLOY ALSEP EXPERIMENTS AND COMPLETE TASKS. A HOLD POINT EXISTS AFTER EACH TASK IS COMPLETED. DEPRESS SHORTING PLUG SWITCH AND ROTATE ASTRONAUT SWITCH 1 CLOCKWISE ON WAY BACK TO LM. (SEE CONTINGENCY PROCEDURES FOR HOLD POINTS.)</p> <p>Z. IF ALL DOTS ON TEMPERATURE LABLE ON HORSE COLLAR ARE BLACK AFTER FUELING RTG, CREW MUST NOT TOUCH SHORTING PLUG UNTIL IT HAS COOLED SUFFICIENTLY (10 MINUTES ON PACKAGE 1).</p> <p>AA. ALSEP DEPLOYMENT WILL NOT BE STARTED IF IT IS KNOWN THAT LESS THAN 1 HOUR 30 MINUTES REMAIN IN EVA 1.</p> <p>AB. TRAVERSES IN FRONT (<math>\pm 30^\circ</math> OF THE MORTAR FIRE LINE) OF THE GLA WILL BE ALLOWED IF GLA ENABLE AND ACTIVATION SWITCHES ARE DISABLED AND ASTRONAUT SWITCH 5 IS CLOCKWISE (SAFED).</p> |                      |         |          |         |       |      |           |   |        |                      |         |     |
|           | 32-2         | <p>PSE</p> <p>A. THE PSE WILL BE UNCAGED ASAP AFTER THE PSE IS COMMANDED TO "OPERATE SELECT".</p> <p>B. THE HEATERS WILL NOT BE TURNED OFF PRIOR TO LEVELING OPERATIONS, WITH THE FOLLOWING EXCEPTIONS:</p> <p>1. DURING INITIAL LEVELING OPERATIONS</p> <p>2. WHEN PSE IS CURRENT LIMITED</p> <p>C. THE PSE LEVELING MOTORS WILL NOT BE ACTIVATED PRIOR TO UNCAGING.</p> <p>D. AFTER PSE LEVELING OF THE HORIZONTAL COMPONENTS (LPX AND LPY) HAS BEEN COMPLETED, THE COARSE LEVEL SENSORS WILL BE GROUND COMMANDED OUT (VIA CMD 102).</p> <p>E. FOR PROPER OPERATION OF THE PSE, THE FEEDBACK FILTER MUST BE OUT DURING LEVELING OPERATIONS.</p> <p>F. FOR INITIAL LEVELING, THE X-AXIS AND Y-AXIS MASSES OF THE PSE SHOULD BE LEVEL BEFORE LEVELING THE Z-AXIS MASS.</p> <p>G. THE PSE WILL BE RELEVELLED AS INFREQUENTLY AS POSSIBLE.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                      |         |          |         |       |      |           |   |        |                      |         |     |
|           |              | <table><tr><th>MISSION</th><th>REV</th><th>DATE</th><th>SECTION</th><th>GROUP</th><th>PAGE</th></tr><tr><td>APOLLO 16</td><td>A</td><td>3/1/72</td><td>ALSEP OPS GUIDELINES</td><td>GENERAL</td><td>3-3</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | MISSION              | REV     | DATE     | SECTION | GROUP | PAGE | APOLLO 16 | A | 3/1/72 | ALSEP OPS GUIDELINES | GENERAL | 3-3 |
| MISSION   | REV          | DATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SECTION              | GROUP   | PAGE     |         |       |      |           |   |        |                      |         |     |
| APOLLO 16 | A            | 3/1/72                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ALSEP OPS GUIDELINES | GENERAL | 3-3      |         |       |      |           |   |        |                      |         |     |
|           |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                      |         | Tape 1-6 |         |       |      |           |   |        |                      |         |     |

# NASA - Manned Spacecraft Center

## MISSION RULES

### SECTION 3 - ALSEP OPERATIONAL GUIDELINES - CONTINUED

| R         | ITEM         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
|-----------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------|------|----------|-------|------|--|-----------|---|--------|----------------------|---------|-----|----------|
|           | 32-2<br>CONT | <p>H. DURING FORCED LEVELING OPERATIONS, CAUTION SHALL BE EXERCISED PRIOR TO INITIATING LEVELING MOTOR OPERATION TO INSURE THAT PROPER MODE, DIRECTION, AND SPEED HAVE BEEN SELECTED.</p> <p>I. THE PSE WILL BE COMMANDED TO STANDBY PRIOR TO ASE MORTAR FIRINGS. THE COMMAND WILL BE SENT PRIOR TO HIGH BIT RATE.</p>                                                                                                                                                                                                                                                   |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
|           | 32-3         | ASE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
| A         |              | <p>A. OPERATION OF THE ASE, IN ANY MODE, WILL BE PERFORMED ONLY WHEN AS-1 (CENTRAL STATION PACKAGE TEMPERATURE) IS ABOVE <math>-20^{\circ}</math> C, AS-2 (MORTAR BOX TEMPERATURE) IS ABOVE <math>-60^{\circ}</math> C, AND AS-3 (GRENADE LAUNCHER ASSEMBLY TEMPERATURE) IS ABOVE <math>-60^{\circ}</math> C BEFORE MORTAR FIRING.</p>                                                                                                                                                                                                                                   |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
| A         |              | <p>B. OPERATION OF THE ASE IN THE MORTAR MODE WILL BE PERFORMED ONLY WHEN AS-2 (MORTAR BOX TEMPERATURE) AND AS-3 (GRENADE LAUNCHER ASSEMBLY TEMPERATURE) ARE ABOVE <math>-20^{\circ}</math> C AND BELOW <math>+85^{\circ}</math> C AT START OF LAUNCHING.</p>                                                                                                                                                                                                                                                                                                            |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
| A         |              | <p>C. FOR OPERATION OF THE ASE IN THE THUMPER MODE, ADEQUATE TIME WILL BE ALLOWED AFTER ASE ACTIVATION TO PERMIT GEOPHONE AMPLIFIER TEMPERATURES TO STABILIZE. (SEE SODB, VOL. IV, P. E-4-11.)</p>                                                                                                                                                                                                                                                                                                                                                                       |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
|           |              | <p>D. A MINIMUM WAITING PERIOD OF 60 SECONDS WILL BE ALLOWED BETWEEN ARMING AND FIRING OF THE MORTARS (FOR CHARGING OF CAPACITORS).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
|           |              | <p>E. THE INDIVIDUAL FIRE COMMANDS WILL BE THE NOMINAL MODE OF FIRING THE ASE MORTARS.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
|           |              | <p>F. ONCE MORTAR FIRING HAS COMMENCED, ALL MORTARS WILL BE FIRED WITHIN THAT LUNATION (BECAUSE OF THE LOSS OF THERMAL INTEGRITY CAUSED BY THE FIRING OF THE FIRST MORTAR).</p>                                                                                                                                                                                                                                                                                                                                                                                          |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
| A         |              | <p>G. THE ASE MORTARS WILL BE FIRED ON THE THIRD LUNAR DAY FOLLOWING DEPLOYMENT, AFTER THE FOLLOWING CONDITIONS HAVE BEEN MET:</p> <p>1. TWO 85-FOOT SITES ARE SCHEDULED FOR NOT LESS THAN 3 HOURS OF SIMULTANEOUS ALSEP SUPPORT.</p> <p>2. THE NORMALIZED SUN ANGLES ARE BETWEEN <math>15^{\circ}</math> AND <math>75^{\circ}</math>.</p> <p>3. THE GLA AND MORTAR BOX TEMPERATURES ARE BETWEEN <math>+85^{\circ}</math> AND <math>-20^{\circ}</math> C.</p>                                                                                                            |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
| A         |              | <p>H. IF THE MORTAR PACKAGE IS DEPLOYED OFF NOMINAL, THEN GRENADE FIRING WILL BE DELAYED UNTIL THE PROBABLE EFFECTS OF FIRING HAVE BEEN STUDIED.</p>                                                                                                                                                                                                                                                                                                                                                                                                                     |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
|           |              | <p>I. THE ASE WILL BE TURNED TO "STANDBY OFF" EXCEPT DURING LISTENING MODES AFTER ASE MORTARS HAVE BEEN FIRED.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
|           |              | <p>J. THE ASE GRENADE LAUNCHING WILL BE CONSIDERED PRIOR TO THE SCHEDULED TIME IF THE ALSEP IS IN DANGER OF IMMINENT TOTAL OR PARTIAL FAILURE. THE CONDITIONS OF IMMINENT TOTAL FAILURE ARE:</p> <p>1. LOSS OF ONE TRANSMITTER</p> <p>2. LOSS OF ONE PCU</p> <p>3. EXTENDED, INCREASING, ERRATIC PERFORMANCE OF UPLINK</p> <p>4. LOSS OF DATA PROCESSOR</p> <p>5. LOW RESERVE POWER INSUFFICIENT TO MAINTAIN PSE OPERATION, ASE STANDBY MODE, AND HFE OR LSM.</p> <p>THE CONDITION OF PARTIAL FAILURE IS COMPLETE FAILURE OF ANY TWO OF THE OTHER THREE EXPERIMENTS.</p> |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
|           |              | <table><tr><th>MISSION</th><th>REV</th><th>DATE</th><th>SECTION</th><th>GROUP</th><th>PAGE</th><th></th></tr><tr><td>APOLLO 16</td><td>A</td><td>3/1/72</td><td>ALSEP OPS GUIDELINES</td><td>GENERAL</td><td>3-4</td><td>Tape 1-7</td></tr></table>                                                                                                                                                                                                                                                                                                                      | MISSION              | REV     | DATE | SECTION  | GROUP | PAGE |  | APOLLO 16 | A | 3/1/72 | ALSEP OPS GUIDELINES | GENERAL | 3-4 | Tape 1-7 |
| MISSION   | REV          | DATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | SECTION              | GROUP   | PAGE |          |       |      |  |           |   |        |                      |         |     |          |
| APOLLO 16 | A            | 3/1/72                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ALSEP OPS GUIDELINES | GENERAL | 3-4  | Tape 1-7 |       |      |  |           |   |        |                      |         |     |          |

# NASA - Manned Spacecraft Center

## MISSION RULES

### SECTION 3 - ALSEP OPERATIONAL GUIDELINES - CONTINUED

| R         | ITEM         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
|-----------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------|------|----------|-------|------|--|-----------|---|--------|----------------------|---------|-----|----------|
| A         | 32-3<br>CONT | <p>K. THE ASE WILL BE OPERATED IN THE LISTENING MODE FOR A MINIMUM OF 30 MINUTES EACH WEEK, PROVIDED AS 02 AND 03 REMAIN ABOVE <math>-60^{\circ}</math> C PRIOR TO MORTAR FIRING.</p> <p>L. THE ASE GRENADES WILL NOT BE LAUNCHED WITHOUT THE PRIOR APPROVAL OF THE MANAGER, APOLLO SPACECRAFT PROGRAM OFFICE, AND THE APOLLO PROGRAM DIRECTOR. IF THE GRENADES ARE APPROVED TO BE LAUNCHED, THEN THE FOLLOWING CONDITIONS MUST BE MET:</p> <ol style="list-style-type: none"><li>1. LUNAR SCIENCE ACTIVITY IS NEAR A MINIMUM.</li><li>2. TWO 85-FOOT SITES ARE SCHEDULED FOR NOT LESS THAN 3 HOURS OF SIMULTANEOUS ALSEP SUPPORT.</li><li>3. THE ALSEP EXPERIMENTS ARE NOT PICKING UP TERMINATOR CROSSING ACTIVITY (WITHIN 2 DAYS OF TERMINATOR).</li><li>4. THE GLA AND MORTAR BOX TEMPERATURES ARE BETWEEN <math>15.5^{\circ}</math> AND <math>26.6^{\circ}</math> C.</li><li>5. ALL MORTARS WILL BE FIRED AND IN THE FOLLOWING ORDER: -2, -4, -1, -3.</li></ol> <p style="text-align: center;">NOTE<br/>SEQUENTIAL FIRE ORDER<br/>IS -2, -4, -3, -1.</p> <p>ASE GRENADE LAUNCHING APPROVAL WILL BE REQUESTED IF THE ALSEP IS IN DANGER OF IMMINENT TOTAL OR PARTIAL FAILURE. THE CONDITIONS OF IMMINENT TOTAL FAILURE ARE:</p> <ol style="list-style-type: none"><li>1. LOSS OF ONE TRANSMITTER AND ERRATIC PERFORMANCE IN THE SECOND</li><li>2. LOSS OF ONE PCU AND ERRATIC PERFORMANCE OF SECOND PCU</li><li>3. EXTENDED, INCREASING, ERRATIC PERFORMANCE OF UPLINK</li><li>4. LOSS OF DATA PROCESSOR AND POOR PERFORMANCE OF SECOND UNIT</li><li>5. LOW RESERVE POWER INSUFFICIENT TO MAINTAIN PSE OPERATION, ASE STANDBY MODE, AND ANY OF THE FOLLOWING:<br/>SIDE/CCIG OR CPLEE</li></ol> <p>THE CONDITIONS OF PARTIAL FAILURE ARE:</p> <ol style="list-style-type: none"><li>1. COMPLETE FAILURE OF THE PSE AND SIDE/CCIG</li><li>2. COMPLETE FAILURE OF THE PSE AND CPLEE</li></ol> <p>THE ASE MORTARS WILL NOT BE LAUNCHED IF THE APOLLO 14 PSE EXPERIMENT EXISTS AS ONE OF TWO REMAINING PAIRS OF OPERATING PSE EXPERIMENTS.</p> |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
| A         |              | M. IF THE GROUND IS UNABLE TO COMMAND THE ASE "ON" AND/OR "HBR", THEN THE GROUND WILL REQUEST THE ASTRONAUT TO TURN ON ASTRONAUT SWITCHES 4 AND 5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
| A         |              | N. IF THE CREW DOES NOT HAVE TIME TO COMPLETE THE THUMPER ACTIVITY AND ARM THE GLA, THUMPER ACTIVITY TIME WILL BE REDUCED TO ALLOW 5 MINUTES FOR GLA ARMING.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
| A         |              | O. IF AN ASI FAILS TO DETONATE, ONE REPEAT ATTEMPT WILL BE MADE TO FIRE THE ASI. IF A SECOND NO-FIRE OCCURS, WALK TO NEXT FIRING LOCATION AND SELECT THE NEXT ASI.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
| A         |              | P. IF INSUFFICIENT TIME IS AVAILABLE FOR COMPLETE THUMPER ACTIVITY, THE FOLLOWING POSITIONS WILL BE USED:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
|           |              | <ol style="list-style-type: none"><li>1. FIVE MINUTES - 1, 6, 11, 16, 21</li><li>2. TEN MINUTES - 1, 3, 6, 9, 11, 13, 16, 18, 21</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                      |         |      |          |       |      |  |           |   |        |                      |         |     |          |
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## MISSION RULES

| R | ITEM |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | 32-4 | <p>LSM</p> <p>A. A SITE SURVEY WILL NOT BE PERFORMED UNTIL THE FUNCTIONAL VERIFICATION OF EXACTLY FOUR FLIP/CALS IS COMPLETE. NO FLIP/CAL WILL BE ALLOWED BETWEEN THE X-, Y-, AND Z-SITE SURVEYS. TIMER-INITIATED FLIP/CALS SHALL BE INHIBITED (BY LSM FLIP/CAL INHIBIT) UNTIL COMPLETION OF THE SITE SURVEY.</p> <p>B. OPERATIONAL POWER WILL NOT BE REMOVED FROM THE LSM DURING THE LUNAR NIGHT PERIODS, EXCEPT AS NOTED IN RULE 32-62.</p> <p>C. SITE SURVEY WILL NOT BE PLANNED UNTIL AFTER LM ASCENT AND FOUR FLIP/CALS HAVE BEEN SENT.</p> <p>D. ONE FLIP/CAL WILL BE PLANNED PRIOR TO LM ASCENT.</p> <p>E. THE LSM WILL BE ON DURING LPM OPERATIONS.</p> |
| A | 32-5 | <p>HFE</p> <p>A. SEQUENTIAL COMMAND UPLINKED TO THE HFE WILL BE SEPARATED BY AT LEAST 54 SECONDS IN NORMAL BIT RATE AND 108 SECONDS IN LOW BIT RATE.</p> <p>B. A CONDUCTIVITY MEASUREMENT WILL NOT BE INITIATED UNLESS THERE WILL BE SUFFICIENT POWER TO COMPLETE THE MEASUREMENT WITHOUT INTERRUPTION. ONCE A PROBE HEATER IS TURNED ON FOR AN EXPERIMENT, IT WILL NOT BE TURNED OFF UNLESS THE CONDUCTIVITY MEASUREMENT IS TO BE TERMINATED, OR OTHER ALSEP CONTINGENCIES ARE TO BE CORRECTED.</p> <p>C. THE HFE WILL BE COMMANDED TO STANDBY PRIOR TO ASE MORTAR FIRING.</p>                                                                                 |
| A | 32-6 | <p>INSUFFICIENT POWER FOR SIMULTANEOUS SUPPORT OF ALL EXPERIMENTS</p> <p>AUTO THERMAL CONTROL OF THE CENTRAL STATION AND AUTO THERMAL CONTROL OF THE EXPERIMENTS WILL BE INHIBITED IF ADEQUATE POWER IS NOT AVAILABLE. THERMAL CONTROL WILL BE MANUALLY MANAGED TO PRECLUDE RIPPLE-OFF OF EXPERIMENTS. INDIVIDUAL EXPERIMENT COMMANDS THAT REQUIRE CENTRAL STATION HEATER POWER WILL BE HELD TO A MINIMUM. CENTRAL STATION AVERAGE TEMPERATURES WILL BE ALLOWED TO GO AS LOW AS -20° F IF THE HEATER POWER IS REQUIRED FOR OPERATION OF AN EXPERIMENT.</p>                                                                                                      |
|   | 32-7 | <p>EXPERIMENT INTERFERES WITH ANOTHER EXPERIMENT OR THE CENTRAL STATION</p> <p>IF IT IS DETERMINED THAT ANY EXPERIMENT IS A STEADY SOURCE OF INTERFERENCE TO ANOTHER EXPERIMENT, OPERATION OF THE INTERFERING EXPERIMENT WILL BE CURTAILED (BUT NOT TERMINATED) AS LONG AS THAT EXPERIMENT IS STILL RETURNING DATA. IN NO CASE, HOWEVER, WILL ANY EXPERIMENT BE REMOVED FROM ITS DESIRED OPERATIONAL CONFIGURATION FOR MORE THAN 80 PERCENT OF ANY LUNAR DAY (29.5 EARTH DAYS).</p>                                                                                                                                                                             |
| A |      | <p>RULE NUMBERS 32-8 THROUGH 32-10 ARE RESERVED.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|  | MISSION   | REV | DATE   | SECTION              | GROUP   | PAGE |  |
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Tape 1-9

4 ALSEP SPECIFIC  
RULES



# NASA - Manned Spacecraft Center

## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES

| SECTION 4 - ALSEP SPECIFIC RULES |       |                                                      |       |                         |                         |                                                                                    |      |           |  |
|----------------------------------|-------|------------------------------------------------------|-------|-------------------------|-------------------------|------------------------------------------------------------------------------------|------|-----------|--|
| R                                | RULE  | CONDITION/MALFUNCTION                                | PHASE | RULING                  |                         | CUES/NOTES/COMMENTS                                                                |      |           |  |
| A                                | 32-11 | CENTRAL STATION<br>THERMOSTAT ST-01 FAILED<br>CLOSED |       | A. DSS 3 HTR (10 W) OFF |                         | A. DSS 3 HTR OFF - CMD 025<br><u>CUE</u><br>UNEXPLAINED 10 W DROP IN RESERVE POWER |      |           |  |
|                                  |       | RULE NUMBERS 32-12<br>THROUGH 32-20 ARE<br>RESERVED. |       |                         |                         |                                                                                    |      |           |  |
|                                  |       | MISSION                                              | REV   | DATE                    | SECTION                 | GROUP                                                                              | PAGE |           |  |
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## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED

| SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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|                                              | 32-21   | FAILURE OF AUTO SWITCHOVER TO PCU 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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FOLLOWING TM WILL BE OUT-OF-LIMITS:<br><table><tr><th>TM</th><th>NOMINAL</th><th>HI</th><th>LO</th></tr><tr><td>AE-9</td><td>+12</td><td>+13.0</td><td>+11.0</td></tr><tr><td>AE-7</td><td>+29</td><td>+31.3</td><td>+25.7</td></tr><tr><td>AE-8</td><td>+15</td><td>+16.2</td><td>+13.8</td></tr><tr><td>AE-10</td><td>+5</td><td>+ 5.4</td><td>+ 4.6</td></tr><tr><td>AE-11</td><td>-12</td><td>-11.0</td><td>-13.0</td></tr><tr><td>AE-12</td><td>- 6</td><td>- 5.5</td><td>- 6.5</td></tr></table><br>VERIFY AE-02 CAL VOLTAGES ARE WITHIN LIMITS. |  |  |  | TM | NOMINAL | HI | LO | AE-9 | +12 | +13.0 | +11.0 | AE-7 | +29 | +31.3 | +25.7 | AE-8 | +15 | +16.2 | +13.8 | AE-10 | +5 | + 5.4 | + 4.6 | AE-11 | -12 | -11.0 | -13.0 | AE-12 | - 6 | - 5.5 | - 6.5 |
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| AE-9                                         | +12     | +13.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| AE-7                                         | +29     | +31.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| AE-8                                         | +15     | +16.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| AE-10                                        | +5      | + 5.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| AE-11                                        | -12     | -11.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| AE-12                                        | - 6     | - 5.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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|                                              | 32-22   | RESERVE POWER LESS THAN 2.0 W<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br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# NASA - Manned Spacecraft Center

## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED

| R | RULE  | CONDITION/MALFUNCTION                      | PHASE | RULING                                                                                                                                                                                                                                                                                                                                                                                                                                                              | CUES/NOTES/COMMENTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---|-------|--------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | 32-31 | ALSEP FAILS TO RESPOND TO A COMMAND        |       | A. REINITIATE THE COMMAND<br><br>B. IF UNSUCCESSFUL, SELECT OTHER DECODER AND REINITIATE THE COMMAND                                                                                                                                                                                                                                                                                                                                                                | <u>CUE</u><br><br>NO FUNCTIONAL VERIFICATION AND NO COMMAND VERIFICATION WORD (CVW)                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|   | 32-32 | FAILURE OF 18-HR TIMER                     |       | A.1. INITIAL CONTINUOUS SUPPORT:<br><br>IF ANY TWO OF THE FOLLOWING TEMPS ARE BETWEEN -20° AND +155° F, CONTINUE REAL-TIME SUPPORT THROUGH 45 DAYS:<br><br>AT-31, CMD DEC BASE T<br>AT-32, CMD DEC INT T<br>AT-33, CMD DEC VCO T<br><br>2. AFTER THE INITIAL CONTINUOUS SUPPORT, THE XMTR WILL BE LEFT ON, PROVIDING THE ALSEP IS:<br><br>(A) RETURNING VALID SCIENTIFIC DATA<br><br>(B) THERE IS NO INDICATION OF FAILURE OR IMINENT FAILURE IN THE COMMAND SYSTEM | A.1. THE TIMER WILL BE DEEMED FAILED AFTER NOT RECEIVING 10 CONSECUTIVE 18-HR PULSES (SEE AZ-1).<br><br>A.2.(B) THE FOLLOWING WILL BE GIVEN CONSIDERATION IN PREDICTING THE IMMINENT FAILURE OF THE COMMAND SYSTEM:<br><br>1. ARE THE COMMAND SYSTEM TEMPS (AT-31, AT-32, AT-33) CONSISTENT WITHIN ±5° F OF THEIR VALUES AT THE SAME SUN ANGLE DURING THE PREVIOUS LUNAR DAY.<br><br>2. IS THE ALSEP RESPONDING NORMALLY TO ALL COMMANDS.<br><br>3. IS A CVW BEING RECEIVED AFTER A MINIMUM OF 90 PERCENT OF THE COMMANDS TRANSMITTED. |
|   |       | RULE NUMBERS 32-33 AND 32-34 ARE RESERVED. |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

|  |           |     |          |                      |         |      |  |
|--|-----------|-----|----------|----------------------|---------|------|--|
|  | MISSION   | REV | DATE     | SECTION              | GROUP   | PAGE |  |
|  | APOLLO 16 | FNL | 12/15/71 | ALSEP SPECIFIC RULES | COMMAND | 4-3  |  |

Tape 2-1

# NASA - Manned Spacecraft Center

## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED

| SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED |       |                                                                                                      |       |                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                    |           |      |  |
|----------------------------------------------|-------|------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|--|
| R                                            | RULE  | CONDITION/MALFUNCTION                                                                                | PHASE | RULING                                                                                                                                                                                                                   | CUES/NOTES/COMMENTS                                                                                                                                                                                                                                                                                |           |      |  |
|                                              | 32-35 | WEAK TM SIGNAL                                                                                       |       | A. SELECT REDUNDANT XMTR<br><br>B. SELECT LOW BIT RATE                                                                                                                                                                   | A. XMTR A SEL - CMD 012<br>XMTR B SEL - CMD 015<br><br>B. LOW BIT RATE SEL - CMD 007                                                                                                                                                                                                               |           |      |  |
|                                              | 32-36 | LOSS OF SYNC OR BAD DECOMMED DATA                                                                    |       | A. SELECT REDUNDANT PROCESSOR<br><br>B. SELECT LOW BIT RATE                                                                                                                                                              | A. PROC X SEL - CMD 034<br>PROC Y SEL - CMD 035<br>AB-6 - D/P X ON/OFF STATUS<br><br>B. LOW BIT RATE SEL - CMD 007                                                                                                                                                                                 |           |      |  |
| A<br>A<br>A                                  | 32-37 | LOSS OF TM SIGNAL                                                                                    |       | A. IF IN HBR, SELECT NBR<br>B. SEND TM ON<br>C. SELECT REDUNDANT PCU<br><br>D. SELECT REDUNDANT XMTR                                                                                                                     | A. HBR OFF - CMD 005<br>B. TM ON - CMD 013<br>C. PCU 2 SEL - CMD 062 (GROUP 2)<br>PCU 1 SEL - CMD 060<br>D. XMTR A SEL - CMD 012<br>XMTR B SEL - CMD 015<br><br><u>NOTE</u><br><br>IF PSE LEVELING IS IN PROGRESS, SEND PSE STBY SEL - CMD 037. IF HFE IS IN MODE II OR III, CMD MODE I (CMD 135). |           |      |  |
| A                                            | 32-38 | DATA DEMAND SIGNAL FROM DATA PROCESSOR FAILS HIGH                                                    |       | SELECT REDUNDANT PROCESSOR USING THE OTHER DECODER. DO NOT RETURN TO FAILED PROCESSOR.                                                                                                                                   | <u>CUE</u><br><br>CVW IS STEADILY INDICATING AN ERRONEOUS PATTERN OTHER THAN ALL ZEROS (CVW LIGHT ON EVERY 0.6 SEC) AFTER A COMMAND HAS BEEN SENT. DISABLE COMMAND TO FAILED PROCESSOR.<br><br>PROC X SEL - CMD 034<br>PROC Y SEL - CMD 035                                                        |           |      |  |
| A<br>A<br>A                                  | 32-39 | GROUND UNABLE TO COMMAND HIGH BIT RATE OFF<br><br><br>RULE NUMBERS 32-40 THROUGH 32-45 ARE RESERVED. |       | A. SEE RULE 32-31<br><br>B. CMD 3A-005 (HBR OFF)<br>C. CMD 3A-011 (NBR RESET)<br>D. CMD 3B-011 (HBR RESET)<br>E. CMD 3A-035 (OR 3A-034)<br>F. CMD 3B-035 (OR 3B-034)<br>G. IF CREW IS AVAILABLE, HAVE SW NO. 5 TURNED CW | DSS/PROC Y SEL - CMD 035<br>DSS/PROC X SEL - CMD 034<br><br>G. SW NO. 5 WILL BE TURNED CCW PRIOR TO CREW LEAVING THE ALSEP AREA FOR THE FINAL TIME.                                                                                                                                                |           |      |  |
|                                              |       | MISSION                                                                                              | REV   | DATE                                                                                                                                                                                                                     | SECTION                                                                                                                                                                                                                                                                                            | GROUP     | PAGE |  |
|                                              |       | APOLLO 16                                                                                            | A     | 3/1/72                                                                                                                                                                                                                   | ALSEP SPECIFIC RULES                                                                                                                                                                                                                                                                               | TELEMETRY | 4-4  |  |
|                                              |       |                                                                                                      |       |                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                    |           |      |  |
| Tape 2-2                                     |       |                                                                                                      |       |                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                    |           |      |  |

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## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED

| SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED |       |                                    |       |                                                                                                                                                                                                  |                      |                                                                                                                                                                                                                                                                                                                        |      |  |  |
|----------------------------------------------|-------|------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--|--|
| R                                            | RULE  | CONDITION/MALFUNCTION              | PHASE | RULING                                                                                                                                                                                           |                      | CUES/NOTES/COMMENTS                                                                                                                                                                                                                                                                                                    |      |  |  |
|                                              | 32-46 | FAILURE OF AUTOMATIC LEVELING MODE |       | PERFORM FORCED LEVELING BY GROUND COMMANDS                                                                                                                                                       |                      | PSE ACTIVATION PRESETS LEVELING MODE TO AUTOMATIC. CMD 103 WILL SWITCH TO FORCED MODE. CMD 103 IS A TWO-STATE COMMAND - PSE LEVELING MODE AUTO/FORCED.                                                                                                                                                                 |      |  |  |
|                                              | 32-47 | PSE LEVELING MOTOR FAILS ON        |       | GROUND COMMAND PSE TO STANDBY SELECT AND THEN TO OPERATE SELECT                                                                                                                                  |                      | <u>CUE</u><br><br>LEVELING MOTOR WILL DRAW 3 W FROM RESERVE POWER.<br><br>PSE STBY SEL - CMD 037<br><br>PSE OPER SEL - CMD 036                                                                                                                                                                                         |      |  |  |
|                                              | 32-48 | PSE LEVELING MOTOR FAILS OFF       |       | NO ACTION TO BE TAKEN                                                                                                                                                                            |                      | <u>CUE</u><br><br>NO DROP IN RESERVE POWER (NORMALLY 3 W) WHEN REPEATED EFFORTS ARE MADE TO TURN MOTOR ON, AND NO ACTIVITY ON SHORT-PERIOD Z-DATA CHANNEL.                                                                                                                                                             |      |  |  |
|                                              | 32-49 | FAILURE OF MECHANICAL LEVEL DRIVE  |       | SELECT LOW SPEED AND HIGH SPEED AND DIRECTION REVERSALS ALTERNATELY                                                                                                                              |                      | <u>CUE</u><br><br>NO MOTION OF THE PLATFORM CAN BE DETECTED ON THE LP HORIZONTAL OR LP-Z COMPONENT TIDAL OUTPUT.<br><br>X-MTR ON/OFF - CMD 070<br><br>Y-MTR ON/OFF - CMD 071<br><br>Z-MTR ON/OFF - CMD 072<br><br>DIRECTION PLUS/MINUS - CMD 074<br><br>SPEED LOW/HIGH - CMD 075                                       |      |  |  |
|                                              | 32-50 | MISALIGNED COARSE SENSOR           |       | A. COMMAND COARSE SENSOR OUT WHEN CORRESPONDING MOTOR IS IN LEVELING OPERATION<br><br>B. PERFORM FORCED LEVELING OF THE PSE BY GROUND COMMAND                                                    |                      | WHILE IN FINAL LEVELING PHASE (LOW STEPPING RATE), THE MOTOR REVERTS TO A HIGH STEPPING RATE REPEATEDLY WITHOUT ACHIEVING CENTERING. COARSE LEVEL SENSOR AND GIMBAL WILL NEVER ALIGN, AND THE MOTOR WILL CONTINUE TO DRIVE BEYOND LEVEL. COARSE SENSOR OUT - CMD 102.                                                  |      |  |  |
|                                              | 32-51 | FAILURE OF COARSE LEVEL            |       | A. SELECT FORCED PSE LEVELING MODE<br><br>B. GROUND COMMAND COARSE LEVEL SENSOR OUT<br><br>1. PROCEED WITH INITIAL FORCED LEVELING FOR COARSE LEVELING<br><br>2. USE AUTO MODE FOR FINE LEVELING |                      | A. PSE LEVELING MODE AUTO/FORCED - CMD 103<br><br>B. COARSE LEVEL SENSOR OUT - CMD 102<br><br><u>CUE</u><br><br>NO HIGH SPEED MOTOR OPERATION IS NOTICED DURING INITIAL LEVELING PHASE, AND COMPONENT DOES NOT CENTER WITHIN EXPECTED TIME (35 MIN MAXIMUM IN AUTO MODE). USE HIGH SPEED LEVELING FOR COARSE LEVELING. |      |  |  |
|                                              |       | MISSION                            | REV   | DATE                                                                                                                                                                                             | SECTION              | GROUP                                                                                                                                                                                                                                                                                                                  | PAGE |  |  |
|                                              |       | APOLLO 16                          | FNL   | 12/15/71                                                                                                                                                                                         | ALSEP SPECIFIC RULES | PSE                                                                                                                                                                                                                                                                                                                    | 4-5  |  |  |
| Tape 2-3                                     |       |                                    |       |                                                                                                                                                                                                  |                      |                                                                                                                                                                                                                                                                                                                        |      |  |  |

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## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED

| SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED |       |                                             |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |      |  |  |
|----------------------------------------------|-------|---------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--|--|
| R                                            | RULE  | CONDITION/MALFUNCTION                       | PHASE | RULING                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CUES/NOTES/COMMENTS                                                                                                                                                                                                                                                                                                                                                                                                                    |       |      |  |  |
|                                              | 32-52 | LONG-PERIOD COMPONENT STICKS                |       | A. USE HIGH SPEED, FORCED LEVELING IN DIRECTION THAT PULLS MASS AWAY FROM STOP<br><br>B. IF UNSUCCESSFUL, SELECT LOW SPEED AND HIGH SPEED AND DIRECTION REVERSALS ALTERNATELY                                                                                                                                                                                                                                                                                                   | <u>CUE</u><br><br>FAILURE TO CENTER WITHIN EXPECTED TIME (35 MIN MAXIMUM IN AUTO MODE).<br><br><u>NOTE</u><br><br>DO NOT EXCEED 5 MIN 30 SEC IN HIGH SPEED.<br><br>X-MTR ON/OFF - CMD 070<br><br>Y-MTR ON/OFF - CMD 071<br><br>Z-MTR ON/OFF - CMD 072<br><br>DIRECTION PLUS/MINUS - CMD 074<br><br>SPEED HIGH/LOW - CMD 075                                                                                                            |       |      |  |  |
|                                              | 32-53 | ELECTRICAL FAILURE OF LONG-PERIOD COMPONENT |       | TERMINATE LEVELING OF THE AFFECTED AXIS AFTER COARSE SENSOR PHASE IS COMPLETED                                                                                                                                                                                                                                                                                                                                                                                                  | <u>CUE</u><br><br>TIDAL OUTPUT IS WITHIN RANGE, BUT IS NOT AFFECTED BY LEVELING OR CENTERING DRIVE.                                                                                                                                                                                                                                                                                                                                    |       |      |  |  |
|                                              | 32-54 | AUTOMATIC SWITCHOVER OF PSE TO STANDBY      |       | COMMAND PSE TO OPERATE SELECT                                                                                                                                                                                                                                                                                                                                                                                                                                                   | CHECK RESERVE POWER. IF CIRCUIT BREAKER CB-06 HAS OPENED FROM OVERCURRENT (500 MA $\pm$ 10%), STANDBY MODE WILL BE SELECTED, AND THE CB WILL BE RESET AUTOMATICALLY.<br><br>PSE OPER SEL - CMD 036                                                                                                                                                                                                                                     |       |      |  |  |
|                                              | 32-55 | FAILURE OF PSE UNCAGE SEQUENCE              |       | A. TO UNCAGE ARM:<br><br>1. SEND UNCAGE ARM/FIRE<br><br>2. IF UNSUCCESSFUL, FIRST 18-HR TIMER PULSE WILL ARM ACTUATOR<br><br>3. IF UNSUCCESSFUL, 144 HR $\pm$ 2 MIN PULSE FROM DELAYED COMMAND SEQUENCER WILL ARM ACTUATOR<br><br>B. TO UNCAGE FIRE (AFTER ACTUATOR HAS BEEN ARMED):<br><br>1. SEND UNCAGE ARM/FIRE<br><br>2. IF UNSUCCESSFUL, SEND PSE STBY SEL (CMD 037), THEN PSE OPER SEL (CMD 036)<br><br>3. IF UNSUCCESSFUL, NEXT 18-HR TIMER PULSE MAY FIRE THE ACTUATOR | NORMAL UNCAGING IS ACCOMPLISHED BY SENDING CMD 073, UNCAGE ARM/FIRE, TWICE: ONCE TO ARM AND ONCE TO FIRE THE ACTUATOR.<br><br><u>NOTE</u><br><br>UNCAGING MAY NOT BE POSSIBLE UNLESS AT-05 THERMAL PLATE 3 TEMP IS ABOVE $+25^{\circ}$ F.<br><br><u>NOTE</u><br><br>SELECTING PSE STANDBY MAY FIRE ACTUATOR IF IT HAS BEEN ARMED AND NOT FIRED.<br><br><u>NOTE</u><br><br>30 SEC IS REQUIRED BETWEEN ARM AND FIRE TO CHARGE CAPACITOR. |       |      |  |  |
|                                              |       | MISSION                                     | REV   | DATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | SECTION                                                                                                                                                                                                                                                                                                                                                                                                                                | GROUP | PAGE |  |  |
|                                              |       | APOLLO 16                                   | FNL   | 12/15/71                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ALSEP SPECIFIC RULES                                                                                                                                                                                                                                                                                                                                                                                                                   | PSE   | 4-6  |  |  |
| Tape 2-4                                     |       |                                             |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |      |  |  |

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## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED

| SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED |       |                                                                                        |       |                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                  |       |      |  |  |
|----------------------------------------------|-------|----------------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--|--|
| R                                            | RULE  | CONDITION/MALFUNCTION                                                                  | PHASE | RULING                                                                                                                 | CUES/NOTES/COMMENTS                                                                                                                                                                                                                                                                                                                              |       |      |  |  |
| A                                            | 32-56 | PSE GOES OFF WHILE IN STANDBY MODE                                                     |       | DURING NORMAL OPERATIONS, COMMAND PSE TO STANDBY SELECT                                                                | <u>CUE</u><br><br>EXPERIMENT 1 STANDBY DISCRETE EXTINGUISHED, AND RESERVE POWER INCREASED SINCE POWER IS REMOVED FROM THE HEATERS. IF FUSE (F-03) HAS BEEN BLOWN BY OVERCURRENT (500 MA), CAPABILITY TO SELECT PSE STANDBY MODE IS LOST.<br><br>PSE STBY SEL - CMD 037                                                                           |       |      |  |  |
|                                              | 32-57 | PSE TEMPERATURE LOW AND AUTO THERMAL CONTROL FAILS                                     |       | COMMAND HEATER TO FORCED ON                                                                                            | ASSUME AUTOMATIC THERMOSTAT CONTROL FAILED. CMD 076 IS A FOUR-STATE COMMAND, WHICH CAN SEQUENTIALLY STEP THROUGH THE FOLLOWING MODES TO CONTROL THE PSE SENSOR HEATER:<br><br>1. AUTO OFF<br>2. FORCED HTR ON<br>3. FORCED OFF<br>4. AUTO ON<br><br>DL-07 PSE INSTRUMENT TEMP LOW LIMIT IS +125° F. MINIMUM OF 8 W OF RESERVE POWER IS REQUIRED. |       |      |  |  |
|                                              | 32-58 | PSE TEMPERATURE HIGH AND AUTO THERMAL CONTROL FAILS.                                   |       | A. COMMAND HEATER TO FORCED OR AUTO OFF<br><br><br>B. IF UNSUCCESSFUL, COMMAND PSE TO STANDBY, THEN TO OPERATE STANDBY | A. CMD 076 IS A FOUR-STATE COMMAND:<br><br>1. AUTO OFF<br>2. FORCED HTR ON<br>3. FORCED OFF<br>4. AUTO ON<br><br>DL-07 PSE INSTRUMENT TEMP HIGH LIMIT IS +127° F.<br><br>B. SELECTING PSE TO STANDBY WILL REINITIATE TO AUTOMATIC THERMOSTAT CONTROL.                                                                                            |       |      |  |  |
|                                              | 32-59 | LOSS OF DOWNLINK DURING LEVELING MOTOR OPERATION<br><br>RULE NUMBER 32-60 IS RESERVED. |       | SEND PSE STBY SEL                                                                                                      | <u>NOTE</u><br><br>PSE STBY SEL WILL STOP MOTORS.                                                                                                                                                                                                                                                                                                |       |      |  |  |
|                                              |       | MISSION                                                                                | REV   | DATE                                                                                                                   | SECTION                                                                                                                                                                                                                                                                                                                                          | GROUP | PAGE |  |  |
|                                              |       | APOLLO 16                                                                              | A     | 3/1/72                                                                                                                 | ALSEP SPECIFIC RULES                                                                                                                                                                                                                                                                                                                             | PSE   | 4-7  |  |  |
| Tape 2-5                                     |       |                                                                                        |       |                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                  |       |      |  |  |

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### SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED

| SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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| R                                            | RULE  | CONDITION/MALFUNCTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | PHASE  | RULING                                                                                                                                                                                                                                                              |  | CUES/NOTES/COMMENTS                                                                                                                                                                                        |  |  |  |
| A<br>A<br><br>A<br>A                         | 32-61 | CANNOT MAINTAIN LSM<br>SENSOR TEMPERATURE AT 40°<br>± 10° C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | SELECT | SELECT ALTERNATE SENSOR                                                                                                                                                                                                                                             |  | <u>CUES</u><br><br>DM-1 FOR X-AXIS<br><br>DM-2 FOR Y-AXIS<br><br>CMD 134 IS A THREE-STATE COMMAND:<br><br>1. X-SENSOR THERMOSTAT SEL (PRESET)<br><br>2. Y-SENSOR THERMOSTAT SEL<br><br>3. ALL HTR'S OFF    |  |  |  |
|                                              | 32-62 | FAILURE OF FLIP/CAL TO<br>STOP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        | COMMAND THE FOLLOWING SEQUENCE:<br><br>A. SEND FLIP/CAL INHIBIT<br><br>B. LSM STBY (CMD 046)                                                                                                                                                                        |  | <u>NOTE</u><br><br>NORMAL FLIP/CAL SEQUENCE IS 350 SEC.<br><br>DURING LUNAR NIGHT, RETURN TO OPERATE<br>WITHIN 1 MIN AFTER STANDBY.<br><br>SEND STANDBY COMMAND ONLY AT THE END OF A<br>FLIP/CAL SEQUENCE. |  |  |  |
|                                              | 32-63 | FLIP/CAL SEQUENCE NOT<br>INITIATED BY TIMER AT<br>18-HR INTERVALS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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VERIFY FLIP/CAL INHIBIT<br>OFF<br><br>B. COMMAND FLIP/CAL GO<br><br>C. IF UNSUCCESSFUL, SEND<br>FOLLOWING COMMAND SEQUENCE:<br><br>1. STBY SEL (CMD 046)<br><br>2. OPER ON (CMD 045)<br><br>3. FLIP/CAL INHIBIT OFF<br>(CMD 127)<br><br>4. FLIP/CAL GO (CMD 131) |  | <u>CUE</u><br><br>DM-23 IS A ZERO - CMD 127<br><br>B. CMD 131<br><br>C. REINITIALIZE LOGIC                                                                                                                 |  |  |  |
|                                              | 32-64 | FAILURE OF HEADS TO<br>MAINTAIN SAME DIRECTION<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br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# NASA - Manned Spacecraft Center

## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED

| R | RULE  | CONDITION/MALFUNCTION                                                                | PHASE | RULING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | CUES/NOTES/COMMENTS                                                                                                                                                                                                                             |       |      |  |
|---|-------|--------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--|
|   | 32-71 | IT IS NECESSARY TO DISARM A GRENADE                                                  |       | TRANSMIT CMD 043 TO TURN ASE TO STANDBY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | LEAVE IN STANDBY FOR AT LEAST 3 MIN.                                                                                                                                                                                                            |       |      |  |
|   | 32-72 | GRENADE FIRE COMMAND FAILS TO FIRE A GRENADE                                         |       | A. SEE RULE 32-31<br>B. USE CMD 162 (ASE SEQ FIRE)                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | B. WHEN USING CMD 162 TO FIRE GRENADE, THE SEQUENCE IS 2, 4, 3, 1.                                                                                                                                                                              |       |      |  |
|   | 32-73 | DURING DEPLOYMENT, GROUND IS UNABLE TO COMMAND TO HIGH BIT RATE (HBR)                |       | A. SEE RULE 32-31<br>B.1. HAVE THE CREW ACTIVATE SW NO. 4 AND COMPLETE THUMPER ACTIVITY<br><br>2. AT COMPLETION OF THUMPER ACTIVITY, COMMAND HBR OFF (CMD 005) PRIOR TO CREW TURNING SW NO. 5 CW. COMPLETE NORMAL GLA DEPLOYMENT.<br><br>3. DURING FINAL EVA, HAVE CREW TURN SW NO. 5 CCW AND ACTIVATE SW NO. 4<br><br>4. CONDUCT MORTAR EXPERIMENT AFTER LIFT-OFF AND PRIOR TO LM ASCENT STAGE IMPACT<br><br>5. GROUND COMMAND TO NBR FOR LM ASCENT STAGE IMPACT                                                          | SW NO. 4 WILL TURN THE ASE TO ON AND SELECT HBR.<br><br>B.5. THERE ARE THREE COMMAND ROUTES TO RETURN TO NBR: 005, 011, AND 034/035.                                                                                                            |       |      |  |
|   | 32-74 | DURING DEPLOYMENT, GROUND IS UNABLE TO COMMAND FROM HIGH BIT RATE TO NORMAL BIT RATE |       | A. SEE RULE 32-31<br>B.1. IF DURING THUMPER ACTIVITIES, FIRST COMPLETE THE THUMPER MODE IN HBR<br><br>2. AT COMPLETION OF THUMPING MODE, HAVE CREW STANDBY PRIOR TO TURNING SW NO. 5 CW WHILE ALTERNATE COMMANDS ARE CHECKED<br><br>3. COMMAND NBR RESET (CMD 011)<br><br>4. IF 3 IS UNSUCCESSFUL, COMMAND PROCESSOR SELECT (CMD 035)<br><br>5. IF EITHER 3 OR 4 IS SUCCESSFUL, CONTINUE NORMAL MISSION<br><br>6. IF 4 IS UNSUCCESSFUL, HAVE CREW TURN SW NO. 5 CW AND CONTINUE NORMAL EVA<br><br>7. DO NOT COMMAND HBR ON | B.1. SUCCESSFUL THUMPING REQUIRES HBR.<br><br>B.5. DISABLE CMD 003 IN THE R/S RTC INVENTORY.<br><br>B.6. GRENADE FIRING MODE WILL BE CONDUCTED PER MISSION RULE GUIDELINE 32-3, EXCEPT FIRING WILL BE CONDUCTED USING PSE AS THE SENSOR IN NBR. |       |      |  |
|   |       | MISSION                                                                              | REV   | DATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | SECTION                                                                                                                                                                                                                                         | GROUP | PAGE |  |
|   |       | APOLLO 16                                                                            | FNL   | 12/15/71                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ALSEP SPECIFIC RULES                                                                                                                                                                                                                            | ASE   | 4-9  |  |

Tape 2-7

# NASA - Manned Spacecraft Center

## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED

| SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED |       |                                                                                                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                             |       |      |
|----------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| R                                            | RULE  | CONDITION/MALFUNCTION                                                                                                           | PHASE | RULING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | CUES/NOTES/COMMENTS                                                                                                                                                                                                                                                                                                                                         |       |      |
|                                              | 32-75 | DURING DEPLOYMENT, GROUND IS UNABLE TO COMMAND ASE TO OPERATE SELECT                                                            |       | A. SEE RULE 32-31<br>B. PRIOR TO THUMPER MODE:<br><br>1. HAVE CREW ACTIVATE SW NO. 4 AND CONTINUE WITH GEOPHONE DEPLOYMENT.<br><br>2. DURING GEOPHONE DEPLOYMENT, ATTEMPT TO COMMAND TO NBR (CMD 005 - HBR OFF) AND THEN RETURN TO HBR (CMD 003 - HBR ON). IF SUCCESSFUL COMPLETE THUMPER ACTIVITY. IF UNSUCCESSFUL, SEE RULE 32-73 AND 33-74.<br><br>3. COMMAND TO NBR (CMD 005 - HBR OFF) AT COMPLETION OF THUMPER ACTIVITY<br><br>4. HAVE CREW TURN SW NO. 5 CW AS IN NOMINAL DEPLOYMENT SEQUENCE<br><br>5. AFTER GLA ARMING AND SAFING PIN REMOVAL, TURN SW NO. 5 CCW AND ACTIVATE SW NO. 4.<br><br>6. COMMAND TO NBR (CMD 005 - HBR OFF) | B.2. SINCE UNABLE TO COMMAND TO ASE OPER SEL, IT IS ESSENTIAL TO ESTABLISH, PRIOR TO COMPLETION OF THUMPER ACTIVITY, WHETHER COMMAND CAPABILITY FOR HBR AND NBR SELECT EXISTS.<br><br>B.6. STEPS 5 AND 6 LEAVE ASE IN OPERATE SELECT, ALSEP IN NBR. (ASE WILL NOT SURVIVE LUNAR NIGHT IN OPERATE SELECT.) CONDUCT MORTAR FIRING MODE PRIOR TO LUNAR SUNSET. |       |      |
|                                              | 32-76 | GROUND UNABLE TO COMMAND ASE TO STANDBY                                                                                         |       | CONTINUE MISSION WITH ASE IN OPERATE MODE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                             |       |      |
| A                                            | 32-77 | ASI FAILS TO FIRE                                                                                                               |       | ATTEMPT ONCE TO FIRE ASI AGAIN AT THE SAME LOCATION. IF A SECOND NO-FIRE OCCURS, WALK TO NEXT FIRING LOCATION AND SELECT THE NEXT ASE.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                             |       |      |
| A                                            | 32-78 | AFTER THE FIRING OF ONLY ONE OR ANY COMBINATION OF MORTARS, ASE PITCH (DS-7) OR ASE ROLL (DS-6) HAVE CHANGED BY $\pm 5^{\circ}$ |       | DISCONTINUE MORTAR LAUNCHING SEQUENCE UNTIL DATA CAN BE EVALUATED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                             |       |      |
| A                                            |       |                                                                                                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                             |       |      |
|                                              |       | MISSION                                                                                                                         | REV   | DATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SECTION                                                                                                                                                                                                                                                                                                                                                     | GROUP | PAGE |
|                                              |       | APOLLO 16                                                                                                                       | A     | 3/1/72                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ALSEP SPECIFIC RULES                                                                                                                                                                                                                                                                                                                                        | ASE   | 4-10 |
| Tape 2-8                                     |       |                                                                                                                                 |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                             |       |      |

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## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED

| SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED |       |                                                                                                        |       |                                                                                                                                                                         |                      |                                                                                                                                                                                                                                 |      |          |  |
|----------------------------------------------|-------|--------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|--|
| R                                            | RULE  | CONDITION/MALFUNCTION                                                                                  | PHASE | RULING                                                                                                                                                                  |                      | CUES/NOTES/COMMENTS                                                                                                                                                                                                             |      |          |  |
| A                                            | 32-79 | PRIOR TO ANY MORTAR FIRING, ASE ROLL (DS-6) AND/OR ASE PITCH (DS-7) PARAMETERS INDICATE SENSOR FAILURE |       | A. FIRE FIRST MORTAR, DISREGARDING SENSOR INDICATION<br><br>B. CONTINUE WITH REMAINING MORTARS AFTER ASSURING FROM RT DATA THAT OTHER INDICATIONS ARE NOMINAL           |                      |                                                                                                                                                                                                                                 |      |          |  |
| A                                            | 32-80 | UNEXPLAINED LOSS OF LOCK ON HIGH BIT RATE                                                              |       | A. COMMAND ASE TO STANDBY SELECT (CMD 043) THEN TO OPERATE SELECT (CMD 042)<br><br>B. SELECT ALTERNATE PROCESSOR:<br>1. PROC X SEL (CMD 034)<br>2. PROC Y SEL (CMD 035) |                      | A. ASSUMES RF CARRIER WITH MODULATION STILL PRESENT. COMMANDING ASE TO STANDBY WILL RESET CIRCUIT BREAKERS THAT PROVIDE POWER TO THE ASE 16-CHANNEL MULTIPLEXER.<br><br>B. DO NOT APPLY IF MISSION RULE 32-59 HAS BEEN INVOKED. |      |          |  |
| A                                            |       | RULE NUMBERS 32-81 THROUGH 32-100 ARE RESERVED.                                                        |       |                                                                                                                                                                         |                      |                                                                                                                                                                                                                                 |      |          |  |
|                                              |       | MISSION                                                                                                | REV   | DATE                                                                                                                                                                    | SECTION              | GROUP                                                                                                                                                                                                                           | PAGE |          |  |
|                                              |       | APOLLO 16                                                                                              | A     | 3/1/72                                                                                                                                                                  | ALSEP SPECIFIC RULES | ASE                                                                                                                                                                                                                             | 4-11 | Tape 2-9 |  |

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## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES - CONTINUED

| R | RULE   | CONDITION/MALFUNCTION                                                                                                                             | PHASE | RULING                                                                                                                                                                                                                                                                                                                                                                             | CUES/NOTES/COMMENTS                |
|---|--------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| A | 32-101 | UNABLE TO DRILL NORMAL HFE EMPLACEMENT HOLES<br><br>A. IF THE HOLE IS LESS THAN 24 IN. DEEP<br><br>B. IF THE HOLE IS NOT NORMAL DEPTH             |       | A. DIG TRENCH APPROXIMATELY 4 FT LONG, SLOPING FROM 1 IN. DEEP AT ONE END TO APPROXIMATELY 18 IN. DEEP AT THE OTHER END. PLACE PROBE IN TRENCH WITH CABLE AT SHALLOW END. COVER PROBE AND FIRST 6 FT OF CABLE WITH AS MUCH SOIL AS POSSIBLE.<br><br>B. PLACE PROBE IN HOLE AS FAR AS IT WILL GO. EMPLACE LOWER RADIATION SHIELD ON THE TOP OF THE PROBE REGARDLESS OF PROBE DEPTH. |                                    |
|   | 32-102 | HAVE CHOICE OF DRILLING 2ND HFE HOLE OR CORE SAMPLE HOLE                                                                                          |       | DRILL 2ND HFE PROBE EMPLACEMENT HOLE                                                                                                                                                                                                                                                                                                                                               | HFE HAS PRIORITY OVER CORE SAMPLE. |
|   | 32-103 | DRILL RATE REDUCED TO LESS THAN 5 IN./MIN                                                                                                         |       | A. IF LESS THAN TWO STEM SECTIONS ARE ATTACHED TO THE POWER HEAD, WITHDRAW AND START AT NEW LOCATION FOR MAXIMUM OF TWO WITHDRAWALS<br><br>B. IF TWO OR MORE STEM SECTIONS ARE ATTACHED TO THE POWER HEAD, CONTINUE UNTIL 10 MIN OF POWER-ON TIME FOR THE DRILL STRING HAS ELAPSED                                                                                                 |                                    |
| A | 32-104 | HFE INTERRUPTED DURING CONDUCTIVITY MEASUREMENT (HEATER ON)<br><br>A. DURING MODE II:<br><br>1. HEATER GOES OFF<br><br>2. HEATER GOES TO MODE III |       | A.1. GO TO NEXT CONDUCTIVITY MEASUREMENT<br><br>2. TURN HEATER OFF AND RETURN TO MODE II AND GO TO NEXT HFE CONDUCTIVITY MEASUREMENT<br><br>IF ON TIME IS MORE THAN 6 HR, GO TO DECAY MODE. IF ON TIME IS LESS THAN 6 HR, GO TO NEXT CONDUCTIVITY MEASUREMENT.                                                                                                                     | A.2. HFE HTR - CMD 152             |
| A |        |                                                                                                                                                   |       |                                                                                                                                                                                                                                                                                                                                                                                    |                                    |

|           |  |     |        |                      |       |      |  |
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| MISSION   |  | REV | DATE   | SECTION              | GROUP | PAGE |  |
| APOLLO 16 |  | A   | 3/1/72 | ALSEP SPECIFIC RULES | HFE   | 4-12 |  |

Tape 2-10

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## MISSION RULES

### SECTION 4 - ALSEP SPECIFIC RULES - CONCLUDED

| SECTION 4 - ALSEP SPECIFIC RULES - CONCLUDED |        |                                                           |       |                                                                                                                                                                                                                                                            |                                                                                                                         |       |      |  |
|----------------------------------------------|--------|-----------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------|------|--|
| R                                            | RULE   | CONDITION/MALFUNCTION                                     | PHASE | RULING                                                                                                                                                                                                                                                     | CUES/NOTES/COMMENTS                                                                                                     |       |      |  |
|                                              | 32-105 | HFE DOWNLINK DATA LOSES SYNC                              |       | A. IF RULE 32-38 HAS NOT BEEN INVOKED AND CONDUCTIVITY MEASUREMENT IS IN PROGRESS, SWITCH DATA PROCESSOR:<br><br>1. DATA PROC X SEL (CMD 034)<br><br>2. DATA PROC Y SEL (CMD 035)<br><br>B. IF BETWEEN HEATER ON MODE, SEND HFE STBY, THEN HFE ON COMMANDS | B. HFE STBY - CMD 053<br><br>HFE ON - CMD 052                                                                           |       |      |  |
| A                                            | 32-106 | HFE ELECTRONICS REFERENCE TEMPERATURE GREATER THAN 333° K |       | GO TO STBY OFF FOR 12 HR                                                                                                                                                                                                                                   | CUES:<br><br>DH-13 T <sub>1</sub> REF<br><br>DH-15 T <sub>2</sub> REF<br><br>HFE STBY - CMD 053<br><br>HFE ON - CMD 052 |       |      |  |
| A                                            |        | RULE NUMBERS 32-107 THROUGH 32-110 ARE RESERVED.          |       |                                                                                                                                                                                                                                                            |                                                                                                                         |       |      |  |
|                                              |        | MISSION                                                   | REV   | DATE                                                                                                                                                                                                                                                       | SECTION                                                                                                                 | GROUP | PAGE |  |
|                                              |        | APOLLO 16                                                 | A     | 3/1/72                                                                                                                                                                                                                                                     | ALSEP SPECIFIC RULES                                                                                                    | HFE   | 4-13 |  |
| Tape 3-1                                     |        |                                                           |       |                                                                                                                                                                                                                                                            |                                                                                                                         |       |      |  |



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## MISSION RULES

### SECTION 5 P&FS OPERATIONAL GUIDELINES

| R         | ITEM |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |         |      |          |       |      |  |           |   |        |                     |         |     |          |
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|           |      | <div>P&amp;FS OPERATIONAL GUIDELINES</div> <p>FOR P&amp;FS MANAGEMENT RULES AND GUIDELINES PRIOR TO DEPLOYMENT, REFERENCE THE OSO - SPECTROMETERS GO CHART IN SECTION 3 OF THE APOLLO 16 FMR DOCUMENT.</p> <p>RULE NUMBERS 33-1 THROUGH 33-8 ARE RESERVED.</p> <p>33-9 WATER AND URINE DUMPS WILL BE INHIBITED FROM 1 HOUR BEFORE UNTIL IMMEDIATELY AFTER THE P&amp;FS LAUNCH.</p> <p>RULE NUMBERS 33-10 THROUGH 33-12 ARE RESERVED.</p> <p>A 33-13 ONE EVA FOR FILM RETRIEVAL WILL BE CONSIDERED IN THE EVENT THE SUBSATELLITE FAILS TO COMPLETE A SUCCESSFUL LAUNCH SEQUENCE.</p> <p>RULE NUMBERS 33-14 THROUGH 33-17 ARE RESERVED.</p> <p>A 33-18 FOR A NONLANDING MISSION, THE SUBSATELLITE DESIRED TRAJECTORIES ARE LISTED BELOW IN THEIR ORDER OF SCIENCE PRIORITY:</p> <p>A. ELLIPTICAL (LUNAR)<br/>B. ELLIPTICAL (EARTH)<br/>C. SOLAR ORBIT</p> <p>33-19 THE P&amp;FS OPERATIONAL GUIDELINES ARE BASED ON THE FOLLOWING OBJECTIVES, WHICH ARE LISTED IN THEIR ORDER OF PRIORITY:</p> <p>A. PARTICLES EXPERIMENT S-173<br/>B. FIELD EXPERIMENT S-174<br/>C. S-BAND TRACK S-164</p> <p>33-20 HARDWARE REDLINES WILL NOT BE VIOLATED IN THE PURSUIT OF SCIENCE DATA UNLESS THE DATA BEING COLLECTED ARE JUDGED TO BE MORE IMPORTANT THAN ALL SUBSEQUENT DATA.</p> |                     |         |      |          |       |      |  |           |   |        |                     |         |     |          |
|           |      | <table><tr><th>MISSION</th><th>REV</th><th>DATE</th><th>SECTION</th><th>GROUP</th><th>PAGE</th><th></th></tr><tr><td>APOLLO 16</td><td>A</td><td>3/1/72</td><td>P&amp;FS OPS GUIDELINES</td><td>GENERAL</td><td>5-1</td><td>Tape 3-2</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | MISSION             | REV     | DATE | SECTION  | GROUP | PAGE |  | APOLLO 16 | A | 3/1/72 | P&FS OPS GUIDELINES | GENERAL | 5-1 | Tape 3-2 |
| MISSION   | REV  | DATE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SECTION             | GROUP   | PAGE |          |       |      |  |           |   |        |                     |         |     |          |
| APOLLO 16 | A    | 3/1/72                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | P&FS OPS GUIDELINES | GENERAL | 5-1  | Tape 3-2 |       |      |  |           |   |        |                     |         |     |          |

## MISSION RULES

## SECTION 5 - P&amp;FS OPERATIONAL GUIDELINES - CONTINUED

| SECTION 5 - P&FS OPERATIONAL GUIDELINES - CONTINUED |                                                                                                                                                          |           |     |          |                     |         |      |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----|----------|---------------------|---------|------|
| R                                                   | ITEM                                                                                                                                                     |           |     |          |                     |         |      |
| 33-21                                               | THE GATHERING OF SCIENTIFIC DATA WILL NOT BE COMPROMISED FOR ENGINEERING/TEST PURPOSE UNLESS SPECIFICALLY DIRECTED BY THE WORK SCHEDULE.                 |           |     |          |                     |         |      |
| 33-22                                               | NO MISSION RULE BASED UPON A P&FS MALFUNCTION WILL BE IMPLEMENTED UNTIL IT HAS BEEN ASCERTAINED THAT NO PROBLEM EXISTS WITH SUPPORTING GROUND EQUIPMENT. |           |     |          |                     |         |      |
|                                                     |                                                                                                                                                          | MISSION   | REV | DATE     | SECTION             | GROUP   | PAGE |
|                                                     |                                                                                                                                                          | APOLLO 16 | FNL | 12/15/71 | P&FS OPS GUIDELINES | GENERAL | 5-2  |

Tape 3-3



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## MISSION RULES

### SECTION 5 - P&FS OPERATIONAL GUIDELINES - CONTINUED

| SECTION 3 - P&FS OPERATIONAL GUIDELINES - CONTINUED |       |                                                                                                                                                                                                                                                             |  |  |  |  |  |
|-----------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| R                                                   | ITEM  |                                                                                                                                                                                                                                                             |  |  |  |  |  |
|                                                     |       | <u>P&amp;FS MANAGEMENT</u>                                                                                                                                                                                                                                  |  |  |  |  |  |
|                                                     | 32-23 | THE INITIAL P&FS ACTIVATION WILL BE PERFORMED IN SUNLIGHT.                                                                                                                                                                                                  |  |  |  |  |  |
| A                                                   | 33-24 | THE P&FS HIGH VOLTAGE WILL NOT BE ACTIVATED UNTIL P&FS LAUNCH + 48 HOURS.                                                                                                                                                                                   |  |  |  |  |  |
|                                                     | 33-25 | THE EXPERIMENT/DATA OFF COMMAND WILL NOT BE TRANSMITTED UNLESS THE ACTION IS REQUIRED TO ENHANCE P&FS OPERATIONS OR IS JUSTIFIED BY AN ANOMALY AFFECTING THE ACCOMPLISHMENT OF THE MISSION.                                                                 |  |  |  |  |  |
|                                                     | 33-26 | THE P&FS BATTERY WILL NOT NORMALLY BE DEPLETED BELOW 5.0 AMPERE-HOURS, BUT A DEPLETION OF 75 PERCENT APPROXIMATELY ONCE PER MONTH WILL BE ALLOWABLE.                                                                                                        |  |  |  |  |  |
|                                                     | 33-27 | THE UNDERVOLTAGE PROTECTION CIRCUIT (UVP) WILL BE DISABLED IF THE BATTERY VOLTAGE IS LESS THAN 11 VDC AND THE REMAINING LIFE OF THE SATELLITE IS PREDICATABLY LIMITED OR BELIEVED TO BE IN JEOPARDY, OR IF A UVP MALFUNCTION IS SUSPECTED TO HAVE OCCURRED. |  |  |  |  |  |
|                                                     | 33-28 | IN NO INSTANCE WILL P&FS OPERATION BE PERMITTED TO INTERFERE WITH THE LM OPERATION.                                                                                                                                                                         |  |  |  |  |  |
| A                                                   | 33-29 | THE SATELLITE WILL BE COMMANDED OFF PRIOR TO APOLLO LAUNCHES. IF THE COMMAND FUNCTION FAILS, THE AUTO KILL CIRCUIT WILL BE ALLOWED TO DEACTIVATE THE SATELLITE.                                                                                             |  |  |  |  |  |
|                                                     |       | RULE NUMBERS 33-30 THROUGH 33-94 ARE RESERVED.                                                                                                                                                                                                              |  |  |  |  |  |
|                                                     | 33-95 | THE P&FS WILL BE LAUNCHED NORTHWARD PERPENDICULAR TO THE ECLIPTIC PLANE.                                                                                                                                                                                    |  |  |  |  |  |
|                                                     | 33-96 | THE P&FS WILL BE LAUNCHED INTO AN ORBIT WITH A REVOLUTION PERIOD OF 7134 ± 30 SECONDS.                                                                                                                                                                      |  |  |  |  |  |
|                                                     | 33-97 | SUBSATELLITE LAUNCH WILL NOT BE ATTEMPTED WITH THE GRS BOOM EXTENDED.                                                                                                                                                                                       |  |  |  |  |  |
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## MISSION RULES

### SECTION 5 - P&FS OPERATIONAL GUIDELINES - CONCLUDED

| R | ITEM      |                                                                                                                                                                                           |
|---|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | 33-98     | SUBSATELLITE LAUNCH WILL NOT BE CONSTRAINED BY THE FAILURE OF EXPERIMENT COVERS.                                                                                                          |
| A | 33-99     | EFFLUENT DUMPS WILL BE AVOIDED FOR 1 HOUR PRIOR TO P&FS LAUNCH AND ALL RCS JETS WILL BE INHIBITED (CMC FREE) FROM THE START OF THE P&FS LAUNCH SEQUENCE UNTIL AFTER P&FS LAUNCH.          |
|   | 33-100    | IMMEDIATELY BEFORE AND AFTER ENTERING INTO A FLIGHT MODE THAT WILL RESULT IN A DEPLETION OF THE BATTERY TO BELOW 5.0 AMPERE-HOURS, THE BATTERY WILL BE RETURNED TO A FULLY CHARGED STATE. |
|   |           | RULE NUMBERS 33-101 THROUGH 33-199 ARE RESERVED.                                                                                                                                          |
|   |           |                                                                                                                                                                                           |
|   | MISSION   | REV                                                                                                                                                                                       |
|   | APOLLO 16 | A                                                                                                                                                                                         |
|   | DATE      | SECTION                                                                                                                                                                                   |
|   | 3/1/72    | P&FS OPS GUIDELINES                                                                                                                                                                       |
|   | GROUP     | PAGE                                                                                                                                                                                      |
|   | GENERAL   | 5-4                                                                                                                                                                                       |
|   |           | Tape 3-5                                                                                                                                                                                  |

**6 P&FS SPECIFIC  
RULES**

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## MISSION RULES

### SECTION 6 - P&FS SPECIFIC RULES

SECTION 6 - P&FS SPECIFIC RULES

| R | RULE   | CONDITION/MALFUNCTION                                                                    | PHASE | RULING                                        | CUES/NOTES/COMMENTS                                                                        |
|---|--------|------------------------------------------------------------------------------------------|-------|-----------------------------------------------|--------------------------------------------------------------------------------------------|
|   | 33-200 | TRANSPONDER ON LOGIC FAILURE                                                             | LO    | CONTINUE MISSION                              | TRACKING LIMITED TO RT AND MRO OPERATIONAL MODES                                           |
|   | 33-201 | REDUCED TRANSMITTER OUTPUT<br><br>A. IF UPLINK ON<br>B. IF UPLINK OFF                    | LO    | A. TURN OFF UPLINK<br>B. TURN ON UPLINK       | A. SELECTS TX 95.1 MHZ L.O.<br>B. SELECTS RX 95.1 MHZ L.O.<br>REF MALF PROCEDURE           |
|   | 33-202 | DOWNLINK CARRIER FREQUENCY DEVIATION<br><br>A. IF UPLINK ON<br>B. IF UPLINK OFF          | LO    | A. TURN OFF UPLINK<br>B. TURN ON UPLINK       | A. SELECTS TX 95.1 MHZ L.O.<br>B. SELECTS RX 95.1 MHZ L.O.<br>REF MALF PROCEDURE           |
|   | 33-203 | LOSS OF DOWNLINK CARRIER<br><br>A. IF UPLINK ON<br>B. IF UPLINK OFF                      | LO    | A. TURN OFF UPLINK<br>B. TURN ON UPLINK       | A. SELECTS TX 95.1 MHZ L.O.<br>B. SELECTS RX 95.1 MHZ L.O.<br>REF MALF PROCEDURE           |
|   | 33-204 | LOSS OF MESSAGE ACCEPTANCE PULSE<br><br>RULE NUMBERS 33-205 THROUGH 33-210 ARE RESERVED. | LO    | CONTINUE MISSION, USING MAP OVERRIDE FUNCTION | SATELLITE LIFE MAY BE LIMITED DUE TO POSSIBLE POSSIBLE FAILURE TO RESET AUTO KILL CIRCUIT. |

| MISSION   | REV | DATE     | SECTION             | GROUP     | PAGE |
|-----------|-----|----------|---------------------|-----------|------|
| APOLLO 16 | FNL | 12/15/71 | P&FS SPECIFIC RULES | COMM/INST | 6-1  |

Tape 3-6

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## MISSION RULES

### SECTION 6 - P&FS SPECIFIC RULES - CONTINUED

| SECTION 6 - P&FS SPECIFIC RULES - CONTINUED |        |                                                                                                                                                                   |       |                                                                     |                        |       |                                                                                                                                                          |  |  |
|---------------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------|------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| R                                           | RULE   | CONDITION/MALFUNCTION                                                                                                                                             | PHASE | RULING                                                              |                        |       | CUES/NOTES/COMMENTS                                                                                                                                      |  |  |
|                                             | 33-211 | BATTERY TEMPERATURE<br>>90° OR <10° F                                                                                                                             | LO    | MANAGE POWER TO MINIMIZE<br>PROBLEM                                 |                        |       |                                                                                                                                                          |  |  |
|                                             | 33-212 | EXCESSIVE BATTERY<br>CURRENT DUE TO TRANS-<br>MITTER MALFUNCTION                                                                                                  | LO    | REDUCE USE OF TX                                                    |                        |       |                                                                                                                                                          |  |  |
|                                             | 33-213 | EXCESSIVE BATTERY<br>CURRENT DUE TO ELECTRO-<br>STATIC ANALYZERS (EA)<br>HV MALFUNCTION                                                                           | LO    | TURN OFF HVPS                                                       |                        |       |                                                                                                                                                          |  |  |
|                                             | 33-214 | EXCESSIVE CURRENT DUE<br>TO OTHER THAN THE ABOVE<br>(RULES 33-212 AND<br>33-213)                                                                                  | LO    | CONTINUE MISSION WITH POSSIBLE<br>RESCHEDULING                      |                        |       |                                                                                                                                                          |  |  |
|                                             | 33-215 | BATTERY VOLTAGE BELOW<br>11.2 V WHILE DIS-<br>CHARGING                                                                                                            | LO    | CONTINUE MISSION WITH POSSIBLE<br>RESCHEDULING                      |                        |       | MAY EFFECT MISSION CAPABILITIES, DEPENDING<br>UPON DEGREE OF FAILURE                                                                                     |  |  |
|                                             | 33-216 | LOSS OF OUTPUT FROM A<br>SOLAR CELL STRING                                                                                                                        | LO    | CONTINUE MISSION WITH POSSIBLE<br>RESCHEDULING                      |                        |       | POWER AVAILABLE FROM SOLAR CELLS REDUCED<br>BY 2.5 PERCENT                                                                                               |  |  |
|                                             | 33-217 | BATTERY SHUNT FAILS<br>OPEN                                                                                                                                       | LO    | CONTINUE MISSION                                                    |                        |       | BATTERY CELL OVERCHARGE PROTECTION CIRCUITS<br>WILL PROTECT BATTERY.                                                                                     |  |  |
|                                             | 33-218 | BATTERY CHARGE CONTROL<br>(BCC) REGULATOR SWITCH<br>LOGIC FAILURE<br><br>A. FAILS IN 15.5 V<br>REGULATOR POSITION<br><br>B. FAILS IN 16.9 V<br>REGULATOR POSITION | LO    | A. CONTINUE MISSION WITH<br>RESCHEDULING<br><br>B. CONTINUE MISSION |                        |       | A. CHARGE RATE WILL BE REDUCED DUE TO LOW<br>CHARGE VOLTAGE.<br><br>B. BATTERY WILL TEND TO OVERCHARGE, BUT IS<br>PROTECTED BY CELL OVERCHARGE CIRCUITS. |  |  |
|                                             |        | MISSION                                                                                                                                                           | REV   | DATE                                                                | SECTION                | GROUP | PAGE                                                                                                                                                     |  |  |
|                                             |        | APOLLO 16                                                                                                                                                         | FNL   | 12/15/71                                                            | P&FS SPECIFIC<br>RULES | EPS   | 6-2                                                                                                                                                      |  |  |
| Tape 3-7                                    |        |                                                                                                                                                                   |       |                                                                     |                        |       |                                                                                                                                                          |  |  |

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## MISSION RULES

### SECTION 6 - P&FS SPECIFIC RULES - CONTINUED

SECTION 6 - P&FS SPECIFIC RULES - CONTINUED

| R | RULE                                             | CONDITION/MALFUNCTION                       | PHASE | RULING           |                     | CUES/NOTES/COMMENTS                                                             |      |
|---|--------------------------------------------------|---------------------------------------------|-------|------------------|---------------------|---------------------------------------------------------------------------------|------|
|   | 33-219                                           | BCC 15.5 V REGULATOR FAILS TO REGULATE      | LO    | CONTINUE MISSION |                     | BATTERY VOLTAGE WILL BE REGULATED TO HIGHER VOLTAGE LEVEL, DEPENDING UPON LOAD. |      |
|   | 33-220                                           | BCC 16.9 V REGULATOR FAILS TO REGULATE      | LO    | CONTINUE MISSION |                     | BATTERY VOLTAGE WILL BE REGULATED TO HIGHER VOLTAGE LEVEL, DEPENDING UPON LOAD. |      |
|   | 33-221                                           | INVALID DETECTION OF UNDERVOLTAGE CONDITION | LO    | CONTINUE MISSION |                     | REESTABLISH NORMAL OPERATION, DEPENDING UPON FREQUENCY OF OCCURRENCE.           |      |
|   | RULE NUMBERS 33-222 THROUGH 33-225 ARE RESERVED. |                                             |       |                  |                     |                                                                                 |      |
|   |                                                  | MISSION                                     | REV   | DATE             | SECTION             | GROUP                                                                           | PAGE |
|   |                                                  | APOLLO 16                                   | FNL   | 12/15/71         | P&FS SPECIFIC RULES | EPS                                                                             | 6-3  |

Tape 3-8

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## MISSION RULES

### SECTION 6 - P&FS SPECIFIC RULES - CONTINUED

| SECTION 6 - P&FS SPECIFIC RULES - CONTINUED |        |                                                         |       |                                                            |                        |                                                                        |      |
|---------------------------------------------|--------|---------------------------------------------------------|-------|------------------------------------------------------------|------------------------|------------------------------------------------------------------------|------|
| R                                           | RULE   | CONDITION/MALFUNCTION                                   | PHASE | RULING                                                     |                        | CUES/NOTES/COMMENTS                                                    |      |
|                                             | 33-226 | ANALOG-TO-DIGITAL<br>CONVERTER 2.5 V<br>REFERENCE ERROR | LO    | CONTINUE MISSION                                           |                        | ANALOG DATA WILL REQUIRE CORRECTION.                                   |      |
|                                             | 33-227 | FAILURE OF SUN SENSOR                                   | LO    | CONTINUE MISSION WITH POSSIBLE<br>RESCHEDULING             |                        | SECTORING GATES AND B-FIELD CALCULATIONS<br>WILL BE INACCURATE.        |      |
|                                             | 33-228 | FAILURE OF BIT RATE<br>INDICATOR                        | LO    | CONTINUE MISSION                                           |                        | TSN (8 BPS) OR TSF (16 BPS) MUST BE MANUALLY<br>SPECIFIED TO THE ALCS. |      |
|                                             | 33-229 | FAILURE OF FORMAT ID<br>INDICATOR                       | LO    | CONTINUE MISSION                                           |                        | RT OR MRO FORMAT MUST BE MANUALLY SPECIFIED<br>TO THE ALCS.            |      |
|                                             | 33-230 | DATA STORAGE UNIT<br>FAILURE                            | LO    | CONTINUE MISSION                                           |                        | LOSS OF TS CAPABILITY. DATA MAY BE OBTAINED<br>IN RT MODE ONLY.        |      |
|                                             | 33-231 | LOSS OF TS MODE                                         | LO    | CONTINUE MISSION, USING NON-<br>FAILED TS MODE AND RT MODE |                        | THIS MAY PRECLUDE USE OF AUTO MODE IF TSN<br>MODE FAILED.              |      |
|                                             | 33-232 | LOSS OF RT MODE                                         | LO    | CONTINUE MISSION, USING TS, MRO,<br>AND AUTO MODES         |                        | SOME LOSS OF MRO DATA WILL OCCUR DUE TO MSFN<br>SITE LOCK-UP DELAYS.   |      |
|                                             | 33-233 | FAILURE TO ACHIEVE<br>12 ± 2 RPM SPIN RATE              | LO    | CONTINUE MISSION WITH POSSIBLE<br>RESCHEDULING             |                        |                                                                        |      |
|                                             |        | RULE NUMBERS 33-234<br>THROUGH 33-240 ARE<br>RESERVED.  |       |                                                            |                        |                                                                        |      |
|                                             |        | MISSION                                                 | REV   | DATE                                                       | SECTION                | GROUP                                                                  | PAGE |
|                                             |        | APOLLO 16                                               | FNL   | 12/15/71                                                   | P&FS SPECIFIC<br>RULES | DATA                                                                   | 6-4  |
| Tape 3-4                                    |        |                                                         |       |                                                            |                        |                                                                        |      |

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## MISSION RULES

### SECTION 6 - P&FS SPECIFIC RULES - CONTINUED

| R | RULE   | CONDITION/MALFUNCTION                                                                              | PHASE | RULING                                                                                                                                                                                                                                                                                                             | CUES/NOTES/COMMENTS                     |                    |      |  |
|---|--------|----------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------|------|--|
|   | 33-241 | CORONA<br><br>A. EA<br><br><br><br><br><br><br><br><br><br>B. TRANSPONDER                          | LO    | A. ATTEMPT TO REDUCE BY OUTGASSING<br><br>B. IF A IS UNSUCCESSFUL:<br><br>1. RESCHEDULE TO OPTIMIZE DATA BEING OBTAINED<br><br>2. TURN OFF HVPS IF NO VALID SCIENTIFIC DATA IS BEING OBTAINED<br><br>A. ATTEMPT TO REDUCE BY OUTGASSING<br><br>B. IF A IS UNSUCCESSFUL, RESCHEDULE TO OPTIMIZE DATA BEING OBTAINED |                                         |                    |      |  |
|   | 33-242 | EA HV INCORRECT                                                                                    | LO    | CONTINUE MISSION                                                                                                                                                                                                                                                                                                   | ENERGY RANGE OF EA'S WILL CHANGE.       |                    |      |  |
|   | 33-243 | EXCESSIVE EA VETO ACTION                                                                           | LO    | CONTINUE MISSION                                                                                                                                                                                                                                                                                                   | INCREASE FREQUENCY OF CALIBRATION.      |                    |      |  |
|   | 33-244 | FAILURE TO TELESCOPE A/B SEL LOGIC<br><br><br><br>RULE NUMBERS 33-245 THROUGH 33-250 ARE RESERVED. | LO    | CONTINUE MISSION                                                                                                                                                                                                                                                                                                   | LOSS OF DATA FROM UNSELECTED TELESCOPES |                    |      |  |
|   |        | MISSION                                                                                            | REV   | DATE                                                                                                                                                                                                                                                                                                               | SECTION                                 | GROUP              | PAGE |  |
|   |        | APOLLO 16                                                                                          | FNL   | 12/15/71                                                                                                                                                                                                                                                                                                           | P&FS SPECIFIC RULES                     | PARTICLE DETECTORS | 6-5  |  |

Tape 3-10



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## MISSION RULES

### SECTION 6 - P&FS SPECIFIC RULES - CONCLUDED

SECTION 6 - P&FS SPECIFIC RULES - CONCLUDED

| R | RULE   | CONDITION/MALFUNCTION                                  | PHASE | RULING           | CUES/NOTES/COMMENTS                                                                                                        |              |      |           |
|---|--------|--------------------------------------------------------|-------|------------------|----------------------------------------------------------------------------------------------------------------------------|--------------|------|-----------|
|   | 33-251 | EXPERIMENT CALIBRATION<br>COMMAND FAILS IN ON<br>STATE | LO    | CONTINUE MISSION | SOME DATA LOSS PRIMARILY IN MAGNETOMETER AND<br>TELESCOPES                                                                 |              |      |           |
|   | 33-252 | MAGNETOMETER 2.5 V<br>REFERENCE ERROR                  | LO    | CONTINUE MISSION | MAGNETOMETER DATA WILL REQUIRE CORRECTION.                                                                                 |              |      |           |
|   | 33-253 | MAGNETOMETER TEMPERATURE<br>TOO HIGH OR LOW            | LO    | CONTINUE MISSION | DATA MAY REQUIRE CORRECTION.                                                                                               |              |      |           |
|   | 33-254 | LOSS OF MAGNETIC ZERO<br>CROSSING                      | LO    | CONTINUE MISSION | THE MAGNETIC PHASE COUNTER AND SECTOR<br>GENERATORS WILL BE INOPERATIVE, INHIBITING<br>DATA FROM EA A-4 WHILE IN TS MODES. |              |      |           |
|   |        | MISSION                                                | REV   | DATE             | SECTION                                                                                                                    | GROUP        | PAGE |           |
|   |        | APOLLO 16                                              | FNL   | 12/15/71         | P&FS SPECIFIC<br>RULES                                                                                                     | MAGNETOMETER | 6-6  | Tape 3-11 |

**A ABBREVIATIONS  
AND  
ACRONYMS**

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## MISSION RULES

### APPENDIX A - ABBREVIATIONS AND ACRONYMS

| R | ITEM | ABBREVIATIONS AND ACRONYMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |          |                            |       |      |
|---|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------|----------------------------|-------|------|
|   |      | <p>AC ALTERNATING CURRENT</p> <p>A/DC ANALOG-TO-DIGITAL CONVERTER</p> <p>ADC AMPERES DC</p> <p>ADD ADDRESS</p> <p>ALCS ALSEP COMPUTER SYSTEM</p> <p>ALIGN ALIGNMENT</p> <p>ALSEP APOLLO LUNAR SURFACE EXPERIMENTS PACKAGE</p> <p>A/F AUTOMATIC/FORCED</p> <p>AMPS AMPERES</p> <p>ANT ANTENNA</p> <p>ASE ACTIVE SEISMIC EXPERIMENT</p> <p>AUTO AUTOMATIC</p> <p>AZ AZIMUTH</p><br><p>BCC BATTERY CHARGE CONTROL</p> <p>BL BOTTOM LOCATION OF STRUCTURE TEMPERATURE</p> <p>BAS BASE</p> <p>BER BIT ERROR RATE</p> <p>BPS BITS PER SECOND</p><br><p>CAL CALIBRATE</p> <p>CB CIRCUIT BREAKER</p> <p>CCGE COLD CATHODE GAGE EXPERIMENT (PART OF SIDE ON ALSEP 1 AND 4, SEPARATE MSC EXPERIMENT ON ALSEP 3)</p> <p>CCGE/A } ANALOG AND DIGITAL ID READOUT FROM CCGE</p> <p>CCGE/D } COLD CATHODE ION GAGE (INSTRUMENT PORTION OF CCGE)</p> <p>CCIG COUNTERCLOCKWISE</p> <p>COW CHANNEL</p> <p>CH CHANNELTRON - USED IN CPE AS:</p> <p>CHAN CHAN/1 CHANNELTRON P/S NO. 1</p> <p>CHAN/2 CHANNELTRON P/S NO. 2</p> <p>CHAN/H1 CHANNELTRON VOLTAGE INCREASES OFF</p> <p>CHAN/LO CHANNELTRON VOLTAGE INCREASES OFF</p><br><p>CMD COMMAND</p> <p>CNT COUNT</p> <p>CNTR COUNTER</p> <p>COMM COMMUNICATION</p> <p>CONV CONVERTER</p> <p>CPLLE } CHARGED-PARTICLE EXPERIMENT (FULL NAME IS CHARGED-PARTICLE LUNAR ENVIRONMENT EXPERIMENT)</p> <p>CPE } CYCLES PER SECOND</p> <p>CPS CENTRAL STATION</p> <p>CS CONTROL</p> <p>CTL COVER</p> <p>CVR COMMAND VERIFICATION WORD</p> <p>CW CLOCKWISE</p><br><p>DB DECIBELS</p> <p>DBM DECIBELS WITH RESPECT TO ONE MILLIWATT</p> <p>DC DIRECT CURRENT</p> <p>DEC DECODER</p> <p>DET DETECTOR</p> <p>DIG DIGITAL</p> <p>DIR/V DIRECTION AND SPEED (USED ON PSE)</p> <p>DISSIP DISSIPATION</p> <p>DLAY DELAY</p> <p>D/P DATA PROCESSOR</p> <p>DPLY DEPLOY</p> <p>DRT DOME REMOVAL TOOL</p> <p>DSS DATA SUBSYSTEM - COMPONENTS INCLUDE:</p> <p>DSS/A ANALOG DATA PROCESSOR</p> <p>DSS/D DIGITAL DATA PROCESSOR</p> <p>DSS/PROC COMPLETE DATA PROCESSOR (REDUNDANT)</p> |     |          |                            |       |      |
|   |      | MISSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | REV | DATE     | SECTION                    | GROUP | PAGE |
|   |      | APOLLO 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | FNL | 12/15/71 | ABBREVIATIONS AND ACRONYMS |       | A-1  |

Tape 4-1

## MISSION RULES

## APPENDIX A - ABBREVIATIONS AND ACRONYMS - CONTINUED

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## MISSION RULES

## APPENDIX A - ABBREVIATIONS AND ACRONYMS - CONTINUED

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## MISSION RULES

APPENDIX A - ABBREVIATIONS AND ACRONYMS - CONCLUDED

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**B DISTRIBUTION  
LIST**

## MISSION RULES

| R                     | ITEM                                                                                                                                                                                                                                                                                |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       | <u>DISTRIBUTION LIST</u>                                                                                                                                                                                                                                                            |
| A                     | <u>DEPUTY DIRECTOR</u><br>AA/KRAFT, JR., C.C.                                                                                                                                                                                                                                       |
|                       | <u>DIRECTOR OF FLIGHT OPERATIONS</u><br>FA/SJOBERG, S. A.                                                                                                                                                                                                                           |
| A<br>A<br>A<br>A<br>A | <u>FLIGHT CONTROL DIVISION</u><br>FC/KRANZ, E. F.<br>ROACH, J. W.<br>FRANK, M. P.<br>GRIFFIN, G. D.<br>WINDLER, M. L.<br>FC2/HARLAN, C. S. (6), PLUS SEND ALL EXTRAS TO HARLAN/FC2<br>FC6/HOOVER, R. A. (3)<br>FC9/SAULTZ, J. E. (30)<br>FC12/TECHNICAL SUPPORT GROUP (3)           |
|                       | <u>FLIGHT SUPPORT DIVISION</u><br>FS2/SATTERFIELD, J. M.<br>FS4/SANBORN, S. D.<br>FS5/ROUNDTREE, J. R.                                                                                                                                                                              |
|                       | <u>MISSION PLANNING AND ANALYSIS DIVISION</u><br>FM/MAYER, J. P.<br>HUSS, C. R.<br>FM4/WOLLENHAUPT, W. R.                                                                                                                                                                           |
|                       | <u>DIRECTOR OF FLIGHT CREW OPERATIONS</u><br>CA/SLAYTON, D. K.<br>CB/ASTRONAUT OFFICE                                                                                                                                                                                               |
|                       | <u>FLIGHT CREW SUPPORT DIVISION</u><br>CA/NORTH, W. J.<br>CD/ALLEN, L. D. (2)<br>CD3/RICHARD, L. G.<br>CG5/O'NEILL, J. W.<br>CEK/THOMPSON, L. E. (4)                                                                                                                                |
|                       | <u>APOLLO SPACECRAFT PROGRAM OFFICE</u><br>PA/MCDIVITT, J. A.,<br>MORRIS, O.<br>KUBICKI, R.<br>PA2/ASPO FILES<br>PA231/TASH, H. (3)<br>PD4/SEVIER, J. (2)<br>PD7/KOHR'S, R. H. (2)<br>PD9/CRAIG, J. W.<br>PE/(2)<br>PG/<br>COULTAS, G. A.<br>PT/ARABIAN, D.<br>PT3/DATA LIBRARY (8) |
|                       | <u>DIRECTOR OF ENGINEERING AND DEVELOPMENT</u><br>EA311/GARDINER, R. A.<br>EE/JOHNSTON, J. H.<br>EF/JONES, E. M.<br>EH/WISEMAN, D. (4)                                                                                                                                              |



## MISSION RULES

APPENDIX B - DISTRIBUTION LIST - CONCLUDED

**TSG 291A**

C CHANGE  
CONTROL

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## MISSION RULES

### APPENDIX C - CHANGE CONTROL

| R | ITEM  |                                                                                                                                                                                                                                                                                                                                                       |     |          |                |       |          |
|---|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------|----------------|-------|----------|
|   |       | <u>CHANGE CONTROL</u>                                                                                                                                                                                                                                                                                                                                 |     |          |                |       |          |
|   | 1.0   | <u>INTRODUCTION</u>                                                                                                                                                                                                                                                                                                                                   |     |          |                |       |          |
|   | 1.1   | PURPOSE<br>THE PURPOSE OF THIS APPENDIX IS TO DELINEATE CHANGE CONTROL PROCEDURES FOR THE ALSEP MISSION RULES. THIS WILL INSURE THE PROPER COORDINATION OF CHANGES, PROVIDE A RECORD OF PROPOSED CHANGES (INCLUDING THE RATIONALE FOR MAKING THEM), AND PROVIDE A MEANS FOR PROMULGATING INDIVIDUAL RULE UPDATES BETWEEN REVISIONS (INTERIM CHANGES). |     |          |                |       |          |
|   | 1.2   | EFFECTIVITY<br>JUNE 17, 1971                                                                                                                                                                                                                                                                                                                          |     |          |                |       |          |
|   | 2.0   | <u>CHANGE PROCEDURES</u>                                                                                                                                                                                                                                                                                                                              |     |          |                |       |          |
|   | 2.1   | SUBMISSION OF CHANGES<br>PROPOSED CHANGES ARE SOLICITED FROM ANY INDIVIDUAL OR ORGANIZATION HAVING A VALID INPUT. ALL CHANGES WILL BE SUBMITTED DIRECTLY TO THE CHIEF, FLIGHT CONTROL OPERATIONS BRANCH (FCOB), FCD.                                                                                                                                  |     |          |                |       |          |
|   | 2.1.1 | FORMAT<br>PERSONS DESIRING TO SUBMIT A PROPOSED CHANGE WILL REDLINE A PAGE FROM THIS DOCUMENT OR REWRITE THE RULE, USING THE STANDARD MISSION RULE FORMAT. ALL PROPOSED CHANGES WILL BE SUPPORTED BY RATIONALE. TWO COPIES WILL THEN BE FORWARDED TO FCOB.                                                                                            |     |          |                |       |          |
|   | 2.2   | <u>APPROVAL</u>                                                                                                                                                                                                                                                                                                                                       |     |          |                |       |          |
|   | 2.2.1 | COORDINATION<br>THE ORIGINATOR OF THE CHANGE MAY OBTAIN PRELIMINARY CONCURRENCES. FCOB WILL OBTAIN FORMAL CONCURRENCES FROM THE CHIEF, LUNAR EARTH/EXPERIMENTS BRANCH AND THE CHIEF, FLIGHT CONTROL DIVISION.                                                                                                                                         |     |          |                |       |          |
|   | 2.2.3 | DISAPPROVED CHANGES<br>IF A CHANGE IS DISAPPROVED, FCOB WILL RETURN THE COPY TO THE ORIGINATOR. A COPY OF THE REQUESTED CHANGE WILL BE RETAINED FOR FUTURE REFERENCE.                                                                                                                                                                                 |     |          |                |       |          |
|   | 2.3   | PUBLICATION AND DISTRIBUTION OF INTERIM CHANGES<br>INTERIM CHANGES WILL BE DISTRIBUTED BIA AN ABBREVIATED DISTRIBUTION LIST CONSISTING OF THE MISSION CONTROL TEAM, PERTINENT NASA ORGANIZATIONS, AND THE APPROPRIATE CONTRACTOR(S).                                                                                                                  |     |          |                |       |          |
|   |       | MISSION                                                                                                                                                                                                                                                                                                                                               | REV | DATE     | SECTION        | GROUP | PAGE     |
|   |       | APOLLO 16                                                                                                                                                                                                                                                                                                                                             | FNL | 12/15/71 | CHANGE CONTROL |       | C-1      |
|   |       |                                                                                                                                                                                                                                                                                                                                                       |     |          |                |       | Tape 4-7 |

## MISSION RULES

## APPENDIX C - CHANGE CONTROL - CONCLUDED

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