



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

# FINAL SYSTEMS MISSION RULES FOR APOLLO LUNAR SURFACE EXPERIMENTS PACKAGE

ALSEP 4

DECEMBER 18, 1970

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AND PURPOSE

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RULES AND  
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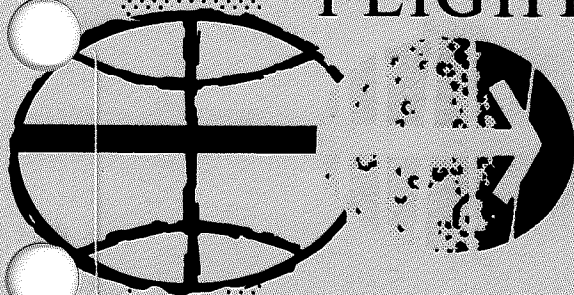
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ALSEP 4

FINAL SYSTEMS MISSION RULES FOR ALSEP 4

PREFACE

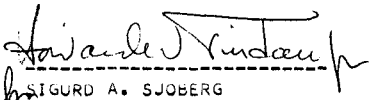
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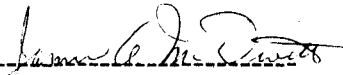
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## MISSION RULES

### SECTION 1 - INTRODUCTION AND PURPOSE

| R       | ITEM  |          |                          |       |         |       |      |         |     |          |                          |  |     |
|---------|---|----------|--------------------------|-------|---------|-------|------|---------|-----|----------|--------------------------|--|-----|
|         | <p style="text-align: center;">-----<br/>' INTRODUCTION &amp; PURPOSE '<br/>-----</p> <p>MISSION RULES ARE PROCEDURAL STATEMENTS WHICH 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 SYSTEMS MISSION RULES FOR ALSEP.</p> <p>THE ALSEP MISSION RULES ARE PUBLISHED UNDER SEPARATE COVER FROM THE FLIGHT MISSION RULES BECAUSE OF THE DIFFERENCE IN LIFETIME OF THE ALSEP OPERATION AND SPECIFIC MISSION ORIENTATED ACTIVITIES. THE ALSEP MISSION RULES DOCUMENT WILL CONTAIN ALL ALSEP MISSION RULES INCLUDING---</p> <p>A. ALL MISSION RULES AFFECTING CREW INTERFACE WITH THE ALSEP AND</p> <p>B. ALL MISSION RULES AFFECTING MCC INTERFACE WITH THE ALSEP, THROUGH ALSEP SYSTEMS LIFETIME.</p> <p>THE FLIGHT MISSION RULES ALSO WILL CONTAIN ALL ALSEP RULES INVOLVING FLIGHT CREW INTERFACE.</p> <p>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 ALSEP MISSION RULES. SPECIFIC MISSION RULES PROVIDE THE BASIC CRITERIA FROM WHICH REAL-TIME DECISIONS ARE MADE AND WILL BE 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 EACH ALSEP PACKAGE.</p> |          |                          |       |         |       |      |         |     |          |                          |  |     |
|         | <table border="1"> <thead> <tr> <th>MISSION</th> <th>REV</th> <th>DATE</th> <th>SECTION</th> <th>GROUP</th> <th>PAGE</th> </tr> </thead> <tbody> <tr> <td>ALSEP 4</td> <td>FNL</td> <td>12/18/70</td> <td>INTRODUCTION AND PURPOSE</td> <td></td> <td>1-1</td> </tr> </tbody> </table>  | MISSION  | REV                      | DATE  | SECTION | GROUP | PAGE | ALSEP 4 | FNL | 12/18/70 | INTRODUCTION AND PURPOSE |  | 1-1 |
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## MISSION RULES

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

| R | ITEM                    |  |
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|   |                         | <div data-bbox="795 336 925 388"> <p>-----<br/> GENERAL<br/> -----</p> </div> <div data-bbox="292 420 1494 1113"> <p>2-1 THE ALSEP MISSION RULES OUTLINE PREPLANNED DECISIONS DESIGNED TO MINIMIZE THE AMOUNT OF REAL-TIME RATIONALIZATION REQUIRED WHEN NON-NOMINAL SITUATIONS OCCUR AFTER CREW ACTIVATION.</p> <p>2-2 WHEN A CONFLICT OF PLANNED ACTIVITIES OCCURS, THE ALSEP SENIOR ENGINEER WILL DETERMINE THE PRIORITY OF ACTIVITIES.</p> <p>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.</p> <p>2-4 THE ALSEP SENIOR ENGINEER MAY, AFTER ANALYSIS OF THE OPERATION, CHOOSE TO TAKE ANY NECESSARY ACTION REQUIRED FOR SUCCESSFUL COMPLETION OF ALSEP TEST OBJECTIVES.</p> <p>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.</p> <p>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 ALSEP AND MSFN DATA/DISPLAY SYSTEMS.</p> </div> |
|   | MISSION                 | REV  |
|   | ALSEP 4                 | FNL  |
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## MISSION RULES

### SECTION 3 - ALSEP OPERATIONAL GUIDELINES

|         |         |   |                      |         |      |         |       |      |         |     |          |                      |         |     |
|---------|---------|---|----------------------|---------|------|---------|-------|------|---------|-----|----------|----------------------|---------|-----|
| R       | ITEM    |   |                      |         |      |         |       |      |         |     |          |                      |         |     |
|         |         | <div>' ALSEP OPERATIONAL GUIDELINE '</div>  |                      |         |      |         |       |      |         |     |          |                      |         |     |
| 31-71   | GENERAL | <p>A. THESE ALSEP GENERAL OPERATIONAL GUIDELINES ARE BASED ON OBJECTIVES IN THE FOLLOWING PRIORITIES---</p> <div><div>(1) PSE</div><div>(2) ASE</div><div>(3) SIDE/CCIG</div><div>(4) CPLEE</div><div>(5) DTREM (MS15)</div><div>(6) ENGINEERING</div></div> <p>NOTE - RIPPLE-OFF SEQUENCE--- 1) CPLEE, 2) SIDE, AND 3) PSE.</p> <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. BIT RATES WILL NOT BE CHANGED ON THE ALSEP UNLESS THIS ACTION WILL CORRECT CERTAIN SYNC PROBLEMS (FROM THAT OPERATIONAL MSFN SITE) OR UNLESS A CHANGE OF BIT RATE IS NECESSARY TO SATISFY CERTAIN SCIENTIFIC OBJECTIVES. IF THE BIT RATE IS CHANGED FROM THE NORM BECAUSE OF A MSFN PROBLEM, THE ALSEP WILL BE CONFIGURED BACK TO NORMAL (1.06 KBPS) PRIOR TO TERMINATION OF SUPPORT FROM THAT SITE.</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 AND PROPERLY ADJUSTED FOR OPTIMUM SCIENTIFIC DATA RETURN.</p> <p>G. THE TIMER WILL NEVER BE INHIBITED WHILE THE ALSEP TRANSMITTER IS OFF, AND THE ALSEP TRANSMITTER WILL NEVER BE COMMANDED OFF WHILE THE TIMER IS INHIBITED. DURING NORMAL OPERATION THE TIMER WILL NOT BE INHIBITED AND THE TRANSMITTER WILL NOT BE COMMANDED OFF.</p> <p>H. THE TIMER WILL NOT BE INHIBITED WHILE ALSEP IS IN HIGH BIT RATE.</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 NO. 2 NOT IDENTIFIABLE TO A FAILURE IN PCU NO. 1, A ONE-TIME COMMAND WILL BE ATTEMPTED TO RETURN TO PCU NO. 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 TURN-ON SEQUENCE IS---</p> <div><div>(1) ASTRONAUT ACTIVATES SHORTING PLUG SWITCH ASAP AFTER DEPLOYMENT.</div><div>(2) CREW WILL ACTIVATE ASTRO SWITCH NO. 1 AND NO. 5 PER DIRECTION FROM THE GROUND. SWITCHES NO. 1 AND NO.5 WILL BE ACTIVATED BASED ON PREDICTED AVAILABILITY OF 38.2 WATTS FROM THE RTG (SEE FIGURE 3.2-2, ALSEP SODS).</div></div> <p>M. IF THE GROUND IS UNABLE TO COMMAND A TRANSMITTER ON AND/OR EXPERIMENTS ON, THE ASTRONAUT WILL TURN ON ASTRO SWITCHES NO. 2 AND/OR NO. 3 AND/OR NO. 4 DURING EVA NO. 1 WHEN REQUESTED FROM THE GROUND. THE TRANSMITTER WILL NOMINALLY BE INITIATED BY THE TRIPPING OF THE HOLD OFF CIRCUIT. THE ASE THUMPER ACTIVITY WILL BE PERFORMED REGARDLESS OF GROUND COMMAND CAPABILITY.</p> <p>N. THE CENTRAL STATION HEATERS AND PDR'S WILL BE UTILIZED TO MAINTAIN AN AVERAGE INTERNAL THERMAL PLATE TEMPERATURE WITH THE LOWEST TEMPERATURE GREATER THAN 20 DEG F. AND THE HIGHEST TEMPERATURE LESS THAN 125 DEG F. UNLESS THERE IS AN ANOMALY REQUIRING THE C/S HEATERS TO BE OFF.</p> |                      |         |      |         |       |      |         |     |          |                      |         |     |
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## MISSION RULES

### SECTION 3 - ALSEP OPERATIONAL GUIDELINES

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|   | <p>O. IF ALSEP DEPLOYMENT TIME BECOMES CONSTRAINED AND THE CREW MUST RETURN TO THE LM, THE RTG SHORTING SWITCH AND ASTRONAUT SWITCH NO. 1 SHALL BE ACTUATED BY THE CREW IF THE ANTENNA IS LEVELED AND ALIGNED. IF THE ANTENNA IS NOT LEVEL AND ALIGNED, THESE SWITCHES SHALL NOT BE ACTUATED. (PICK UP HERE ON EVA NO. 2).</p> <p>P. 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>Q. THE ASE IS THE ONLY EXPERIMENT THAT WILL BE COMMANDED WHILE IN HIGH BIT RATE.</p> <p>R. 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 TO PROVIDE ADDITIONED PROTECTION AGAINST THE GENERATION OF SPURIOUS COMMANDS.</p> <p>S. THE PSE WILL NOT BE ACTIVATED BY GROUND COMMAND UNTIL THE ASC THUMPER ACTIVITY HAS BEEN COMPLETED.</p> <p>T. THE ASE WILL BE COMMANDED TO STAND-BY SELECT IF THE THUMPER ARM OR GRENADE ARM WARNINGS OCCUR WITHOUT GROUND COMMAND OR CREW ACTION.</p> <p>U. THE ALSEP WILL BE IN NORMAL BIT RATE DURING LM LIFT-OFF.</p> |
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## MISSION RULES

### SECTION 3 - ALSEP OPERATIONAL GUIDELINES

| R | ITEM |  |
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## MISSION RULES

### SECTION 3 - ALSEP OPERATIONAL GUIDELINES

|       |      |   |     |          |                      |         |      |
|-------|------|---|-----|----------|----------------------|---------|------|
| R     | ITEM |   |     |          |                      |         |      |
|       |      | <div>-----<br/>ALSEP OPERATIONAL GUIDELINES (CONT)<br/>-----</div>  |     |          |                      |         |      |
| 31-73 | ASE  | <p>A. OPERATION OF THE ASE, IN ANY MODE, WILL BE PERFORMED ONLY WHEN AS-1 (CENTRAL STATION PACKAGE TEMP.) IS ABOVE -20 DEG. C, AS-2 (MORTAR BOX TEMP) IS ABOVE -30 DEG. C, AND AS-3 (GRENADE LAUNCHER ASSEMBLY TEMP) IS ABOVE -30 DEG. C.</p> <p>B. OPERATION OF THE ASE IN THE MORTAR MODE WILL BE PERFORMED ONLY WHEN AS-2 (MORTAR BOX TEMP.) AND AS-3 ( GRENADE LAUNCHER ASSEMBLY TEMP.) ARE ABOVE -20 DEG. C.</p> <p>C. FOR OPERATION OF THE ASE IN THE THUMPER OR MORTAR MODES, EIGHT MINUTES TIME WILL BE ALLOWED AFTER ASE ACTIVATION TO PERMIT GEOPHONE AMPLIFIER TEMPERATURES TO STABILIZE.</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> <p>G. IF THE CREW DOES NOT HAVE TIME TO COMPLETE THE THUMPER ACTIVITY AND ARM THE GLA, THUMPER ACTIVITY TIME WILL BE REDUCED SO AS TO ALLOW 5 MINUTES FOR GLA ARMING.</p> <p>H. THE ASE WILL BE FIRED <u>3 MONTHS</u> AFTER ALSEP 4 DEPLOYMENT AFTER THE FOLLOWING CONDITIONS HAVE BEEN 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 15.5 DEG. C AND 26.6 DEG. C.</li></ol> <p>THE ASE MORTARS MAY BE FIRED WITHOUT THESE CONDITONS, IF ANY OF THE FOLLOWING OCCUR---</p> <ol style="list-style-type: none"><li>1. THE ALSEP IS IN DANGER OF AN IMMINENT TOTAL FAILURE.</li><li>2. THE ASE OPERATION INDICATES THAT THE EXPERIMENT WILL PROBABLY LOSE ITS CAPABILITY TO OPERATE IN THE MORTAR MODE.</li><li>3. THE COMMAND SYSTEM IS OPERATING IN A DEGRADED MODE OR INDICATES THAT DEGRADATION IS OCCURRING (SEE MISSION RULE 31-102).</li><li>4. ONE OF THE TWO ALSEP TRANSMITTERS HAS FAILED.</li></ol> <p>I. THE ASE WILL BE OPERATED IN THE LISTENING MODE FOR A MINIMUM OF 30 MINUTES EACH WEEK.</p> <p>J. THE ASE WILL BE TURNED TO STANDBY OFF EXCEPT DURING LISTENING MODES AFTER ASE MORTARS HAVE BEEN FIRED.</p> |     |          |                      |         |      |
|       |      | MISSION   | REV | DATE     | SECTION              | GROUP   | PAGE |
|       |      | ALSEP 4   | FNL | 12/18/70 | ALSEP OPS GUIDELINES | GENERAL | 3-4  |



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## MISSION RULES

### SECTION 3 - ALSEP OPERATIONAL GUIDELINES

| R     | ITEM      |   |     |          |           |                        |      |
|-------|-----------|---|-----|----------|-----------|------------------------|------|
|       |           | <div>-----</div> <div>ALSEP OPERATIONAL GUIDELINES (CONT)</div> <div>-----</div>  |     |          |           |                        |      |
| 31-74 | SIDE/CCIG | <p>A. THE SIDE/CCIG WILL BE TURNED ON ASAP AFTER DEPLOYMENT.</p> <p>B. THE SIDE DUST COVER WILL BE REMOVED BY GROUND COMMAND AFTER LM ASCENT.</p> <p>C. THE CCIG SEAL WILL BE REMOVED BY GROUND COMMAND 10 MINUTES AFTER TURN ON.</p> <p>D. THE SIDE/CCIG WILL BE CYCLED ON AND OFF TO KEEP TEMP. 2 BELOW 40 DEG. C. UNTIL LM IMPACT.</p> <p>E. THE SIDE/CCIG WILL REMAIN IN OPERATE DURING LM ASCENT.</p> <p>F. THE SIDE/CCIG WILL BE COMMANDED TO STBY DURING ASE MORTAR FIRINGS. COMMAND WILL BE SENT PRIOR TO HIGH BIT RATE.</p>  |     |          |           |                        |      |
| 31-75 | CPLLE     | <p>A. THE CPLLE WILL BE GROUND COMMANDED TO OPERATE FOR A BRIEF FUNCTIONAL CHECK ASAP AFTER DEPLOYMENT.</p> <p>B. THE CPLLE DUST COVER WILL BE REMOVED AFTER LM ASCENT.</p> <p>C. THE CPLLE WILL BE TURNED TO STANDBY 10 MINUTES PRIOR TO LM ASCENT, CABIN VENTING, MORTAR FIRING, EVA AND ENGINE FIRINGS. IT WILL BE TURNED TO ON 10 MINUTES AFTER THE INTERRUPTING ACTIVITY IS COMPLETE.</p> <p>D. THE CPLLE WILL BE COMMANDED TO STBY DURING ASE MORTAR FIRINGS. COMMAND WILL BE SENT PRIOR TO HIGH BIT RATE</p> <p>E. THE CPLLE CHECKOUT WILL BE PERFORMED AFTER EVA 1 AND WILL BE COMPLETED PRIOR TO INITIATION OF CABIN DEPRESSURIZATION FOR EVA 2.</p> |     |          |           |                        |      |
|       |           | MISSION   | REV | DATE     | SECTION   | GROUP                  | PAGE |
|       |           | ALSEP 4<br>GUIDELINES   | FNL | 12/18/70 | ALSEP OPS | ASE/CPLLE<br>SIDE/CCIG | 3-5  |

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## MISSION RULES

### SECTION 3 - ALSEP OPERATIONAL GUIDELINES

| R     | ITEM   |  |     |          |                      |                     |      |
|-------|--|--|-----|----------|----------------------|---------------------|------|
|       |  | <div>-----</div> <div>ALSEP OPERATIONAL GUIDELINES (CONT)</div> <div>-----</div>   |     |          |                      |                     |      |
| 31-76 | INSUFFICIENT POWER FOR SIMULTANEOUS SUPPORT OF ALL EXPERIMENTS       | <p>IN GENERAL, AUTO THERMAL CONTROL OF THE CENTRAL STATION AND THE EXPERIMENTS WILL BE INHIBITED IF ADEQUATE POWER IS NOT AVAILABLE. THERMAL CONTROL WILL BE MANUALLY MANAGED TO PRECLUDE RIPPLE OFF OF EXPERIMENTS. CENTRAL STATION AVERAGE TEMPERATURES WILL BE ALLOWED TO GO AS LOW AS -20 DEG F. IF THE HEATER POWER IS REQUIRED FOR OPERATION OF AN EXPERIMENT. EXPERIMENT COMMANDS, REQUIRING CENTRAL STATION HEATER POWER, THAT WOULD CAUSE THE CENTRAL STATION AVERAGE TEMPERATURE TO GO BELOW 0 DEG F. WILL BE HELD TO A MINIMUM.</p> |     |          |                      |                     |      |
| 31-77 | EXPERIMENT INTERFERES WITH ANOTHER EXPERIMENT OR THE CENTRAL STATION | <p>IF ANY EXPERIMENT IS DETERMINED TO BE A STEADY SOURCE OF INTERFERENCE TO ANOTHER EXPERIMENT, OPERATION OF THE INTERFERING EXPERIMENT WILL BE CURTAILED (BUT NOT TERMINATED) FOR AS LONG AS THE INTERFERING EXPERIMENT IS STILL RETURNING DATA. IN NO CASE WILL ANY EXPERIMENT BE REMOVED FROM ITS DESIRED OPERATIONAL CONFIGURATION FOR MORE THAN 80 PERCENT OF ANY LUNAR DAY (29.5 EARTH DAYS).</p>  |     |          |                      |                     |      |
|       |  | MISSION  | REV | DATE     | SECTION              | GROUP               | PAGE |
|       |  | ALSEP 4  | FNL | 12/18/70 | ALSEP OPS GUIDELINES | EXPERIMENT PRIORITY | 3-6  |

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## MISSION RULES

### SECTION 4 - SPECIFIC RULES

| R | RULE  | CONDITION/MALFUNCTION   | PHASE | RULING                  | CUES/NOTES/COMMENTS  |
|---|-------|---|-------|-------------------------|--|
|   | 31-81 | A. ST-01 FAILED<br>CLOSED<br><br>31-82 THROUGH<br>31-90 ARE<br>RESERVED |       | A. DSS 3 HTR (10W)--OFF | A. DSS 3 HTR OFF--CMD 025<br><br>CUE---<br><br>UNEXPLAINED 10W DROP IN RESERVE<br>POWER AND AN UNEXPLAINED RISE IN<br>TEMPERATURE. |

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|  | MISSION | REV | DATE     | SECTION  | GROUP   | PAGE |  |
|  | ALSEP 4 | FNL | 12/18/70 | SPECIFIC | THERMAL | 4-1  |  |

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## MISSION RULES

### SECTION 4 - SPECIFIC RULES

| R | RULE              | CONDITION/MALFUNCTION               | PHASE | RULING   | CUES/NOTES/COMMENTS  |
|---|-------------------|-------------------------------------|-------|--|--|
|   | 31-91             | FAILURE OF AUTO SWITCHOVER TO PCU 2 |       | SELECT PCU 2   | PCU 2 SEL---CMD 062 AUTO SWITCHOVER TO PCU 2 SHOULD OCCUR AT +12 VDC OUT OF LIMITS (LESS THAN 11 VDC/GREATER THAN 13 VDC)<br><br>CUE---<br><br>THE FOLLOWING TM WILL BE OUT-OF-LIMITS---<br><br>TM            NOMINAL            HI            LO<br>AE-9           +12           +13.0   +11.0<br>AE-7           +29           +31.3   +25.7<br>AE-6           +15           +16.2   +13.8<br>AE-10           +5           +5.4   +4.6<br>AE-11           -12           -11.0   -13.0<br>AE-12           -6           -5.5   -6.5<br><br>VERIFY AE-02 CAL VOLTAGES ARE WITHIN LIMITS. |
|   | 31-92             | RESERVE POWER LESS THAN 2.0W        |       | COMMAND EXPERIMENTS TO LOWER POWER MODES, BEGINNING WITH THE LAST PRIORITY EXPERIMENT. | CUE---<br><br>CS2 FOR PCU 1<br><br>CS4 FOR PCU 2   |
|   | 31-93 THRU 31-100 | RESERVED                            |       |  |  |

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|  | ALSEP 4 | FNL | 12/18/70 | SPECIFIC | ELECTRICAL | 4-2  |  |

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## MISSION RULES

### SECTION 4 - SPECIFIC RULES

| R | RULE  | CONDITION/MALFUNCTION               | PHASE | RULING   | CUES/NOTES/COMMENTS  |         |      |  |
|---|-------|-------------------------------------|-------|--|--|---------|------|--|
|   | 31-10 | ALSEP FAILS TO RESPOND TO A COMMAND |       | A. REINITIATE THE COMMAND  | CUE---   |         |      |  |
|   |       |                                     |       | B. IF UNSUCCESSFUL, SELECT OTHER DECODER (ALSEP 4A OR 4B) AND REINITIATE THE COMMAND.                              | NO FUNCTIONAL VERIFICATION AND NO CMD VERIFICATION WORD (CVW)  |         |      |  |
|   | 31-10 | FAILURE OF 12 HOUR TIMER            |       | A.1. INITIAL CONTINUOUS SUPPORT---   | THE TIMER WILL BE DEEMED FAILED AFTER NOT RECEIVING A SPECIFIED NUMBER OF CONSECUTIVE 12 HOUR PULSES AS A FUNCTION OF AT07, THERMAL PLATE TEMP.5.        |         |      |  |
|   |       |                                     |       | IF ANY TWO OF THE FOLLOWING TEMPS ARE BETWEEN -20 DEG F AND +155 DEG F, CONTINUE REAL TIME SUPPORT THRU 45 DAYS--- |  |         |      |  |
|   |       |                                     |       | AT31, CMD DEC BASE T<br>AT32, CMD DEC INT T<br>AT33, CMD DEC VCO T   | AT07<br>NUMBER OF CONSECUTIVE MISSED 12 HR PULSES  |         |      |  |
|   |       |                                     |       |  | GREATER THAN -20 DEG F OR LESS THAN +155 DEG F 10  |         |      |  |
|   |       |                                     |       |  | LESS THAN -20 DEG F 2  |         |      |  |
|   |       |                                     |       |  | GREATER THAN +155 DEG F 5  |         |      |  |
|   |       |                                     |       | 2. AFTER THE INITIAL CONTINUOUS SUPPORT, THE TRANSMITTER WILL BE LEFT ON PROVIDING THE ALSEP IS---                 | THE FOLLOWING WILL BE GIVEN CONSIDERATION IN PREDICTING THE IMMINENT FAILURE OF THE COMMAND SYSTEM---  |         |      |  |
|   |       |                                     |       | (A) RETURNING VALID SCIENTIFIC DATA AND  | 1. ARE THE COMMAND SYTEM TEMPS. (AT-31, AT-32, AT-33) CONSISTENT WITHIN +/-5 DEG. F OF THEIR VALUES AT THE SAME SUN ANGLE DURING, THE PREVIOUS LUNAR DAY |         |      |  |
|   |       |                                     |       | (B) THERE IS NO INDICATION OF FAILURE OR IMMINENT FAILURE IN THE COMMAND SYSTEM                                    | 2. IS THE ALSEP RESPONDING NORMALLY TO ALL COMMANDS  |         |      |  |
|   |       |                                     |       |  | 3. IS A CVW BEING RECEIVED AFTER A MINIMUM OF 90 PERCENT OF THE COMMANDS TRANSMITTED   |         |      |  |
|   |       | 31-103 TO 31-104 RESERVED           |       |  |  |         |      |  |
|   |       |                                     |       |  |  |         |      |  |
|   |       | MISSION                             | REV   | DATE   | SECTION  | GROUP   | PAGE |  |
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## MISSION RULES

### SECTION 4 - SPECIFIC RULES

| SECTION 4 - SPECIFIC RULES |        |  |       |   |   |           |      |  |
|----------------------------|--------|--|-------|---|---|-----------|------|--|
| R                          | RULE   | CONDITION/MALFUNCTION  | PHASE | RULING  | CUES/NOTES/COMMENTS   |           |      |  |
|                            | 31-105 | WEAK TM SIGNAL   |       | A. SELECT REDUNDANT XMTR  | A. XMTR A SEL---CMD 012<br>XMTR B SEL---CMD 015   |           |      |  |
|                            |        |  |       | B. SELECT LOW BIT RATE  | B. LOW BIT RATE SEL---CMD 007   |           |      |  |
|                            | 31-106 | LOSS OF SYNC OR<br>BAD DECOMM DATA   |       | A. SELECT REDUNDANT<br>PROCESSOR  | A. PROC 'X' SEL---CMD 034<br>PROC 'Y' SEL---CMD 035   |           |      |  |
|                            |        |  |       | B. SELECT LOW BIT RATE  | B. LOW BIT RATE SELECT---CMD 007  |           |      |  |
|                            | 31-107 | LOSS OF TM SIGNAL  |       | A. IF IN HIGH BIT<br>RATE, COMMAND TO<br>NORMAL BIT RATE.                                       | A. ASE HBR OFF---CMD 005  |           |      |  |
|                            |        |  |       | B. SEND TM ON.  | B. TM ON---CMD 013  |           |      |  |
|                            |        |  |       | C. SELECT REDUNDANT XMTR  | C. XMTR A SEL---CMD 012<br>XMTR B SEL---CMD 015   |           |      |  |
|                            |        |  |       | D. AFTER NEXT 12 HR<br>PULSE---   | D. IF RCVR CB (CB-01) OPEN, NEXT<br>12 HR PULSE WILL RESET IT.  |           |      |  |
|                            |        |  |       | REPEAT B AND C.   | NOTE---   |           |      |  |
|                            |        |  |       |   | IF PSE LEVELING IS IN PROGRESS, SEND<br>PSE STBY SEL--- CMD 037   |           |      |  |
|                            | 31-108 | DATA DEMAND SIGNAL<br>FROM DATA PROCESSOR<br>FAILS HIGH                          |       | SELECT REDUNDANT PROCESSOR<br>USING THE OTHER DECODER. DO<br>NOT RETURN TO FAILED<br>PROCESSOR. | CUE---  |           |      |  |
|                            |        |  |       |   | CVW IS STEADILY INDICATING AN<br>ERRONEOUS PATTERN OTHER THAN ALL<br>ZEROS (CVW LIGHT ON EVERY 0.6<br>SECONDS) AFTER A CMD HAS BEEN SENT.<br>DISABLE CMD TO FAILED PROCESSOR. |           |      |  |
|                            |        |  |       |   | PROC 'X' SEL---CMD 034  |           |      |  |
|                            |        |  |       |   | PROC 'Y' SEL---CMD 035  |           |      |  |
|                            | 31-109 | LOSS OF ANY TM<br>PARAMETER IN FIRST<br>15 CHANNELS OF 90<br>CHANNEL MULTIPLEXER |       | SELECT REDUNDANT PROCESSOR  | DO NOT APPLY IF MISSION RULE 31-108<br>HAS BEEN INVOKED.  |           |      |  |
|                            | 31-110 | GROUND UNABLE TO<br>COMMAND HIGH BIT<br>RATE OFF                                 |       | A. SEE RULE 31-101  |   |           |      |  |
|                            |        |  |       | B. CMD 4B 005 (HBR OFF)   |   |           |      |  |
|                            |        |  |       | C. CMD 4A 011 (NBR RESET)   |   |           |      |  |
|                            |        |  |       | D. CMD 4B 011 (NBR RESET)   |   |           |      |  |
|                            |        |  |       | E. CMD 4A 035<br>(OR 4A 034)  | CMD 034-DSS/PROC X SEL  |           |      |  |
|                            |        |  |       | F. CMD 4B 035<br>(OR 4B 034)  | CMD 035-DSS/PROC Y SEL  |           |      |  |
|                            |        |  |       | G. IF CREW IS AVAILABLE<br>HAVE SW NO 5 TURNED CW   | SW NO 5 WILL BE TURNED CCW PRIOR TO<br>CREW LEAVING THE ALSEP AREA FOR THE<br>FINAL TIME.   |           |      |  |
|                            |        |  |       |   |   |           |      |  |
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## MISSION RULES

### SECTION 4 - SPECIFIC RULES

| SECTION 4 - SPECIFIC RULES |        |                                    |       |  |  |       |      |  |
|----------------------------|--------|------------------------------------|-------|--|--|-------|------|--|
| R                          | RULE   | CONDITION/MALFUNCTION              | PHASE | RULING   | CUES/NOTES/COMMENTS  |       |      |  |
|                            | 31-111 | 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 CMD. PSE LEVELING MODE AUTO/FORCED.  |       |      |  |
|                            | 31-112 | PSE LEVELING MOTOR FAILS ON        |       | GND CMD PSE TO STANDBY SELECT AND THEN TO OPERATE SELECT   | CUE---<br>LEVELING MOTOR WILL DRAW 3 WATTS FROM RESERVE POWER.<br>PSE STBY SEL--CMD 037<br>PSE OPER. SEL--CMD 036  |       |      |  |
|                            | 31-113 | PSE LEVELING MOTOR FAILS OFF       |       | NO ACTION TO BE TAKEN  | CUE---<br>NO DROP IN RESERVE POWER (NORMALLY 3 WATTS) WHEN REPEATED EFFORTS ARE MADE TO TURN MOTOR ON, AND NO ACTIVITY ON SHORT PERIOD Z-DATA CHANNEL.   |       |      |  |
|                            | 31-114 | FAILURE OF MECHANICAL LEVEL DRIVE  |       | SELECT LOW SPEED AND HIGH SPEED AND DIRECTION REVERSALS ALTERNATELY.   | CUE---<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>Y-MTR ON/OFF--CMD 071<br>Z-MTR ON/OFF--CMD 072<br>DIRECTION PLUS/MINUS--CMD 074<br>SPEED LOW/HIGH--CMD 075  |       |      |  |
|                            | 31-115 | MISALIGNED COARSE SENSOR           |       | A. COMMAND COARSE SENSOR OUT WHEN CORRESPONDING MOTOR IS IN LEVELING OPERATION.<br>B. PERFORM FORCED LEVELING OF THE PSE BY GND CMD.   | 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                                |       |      |  |
|                            | 31-116 | FAILURE OF COARSE LEVEL SENSOR     |       | A. SELECT FORCED PSE LEVELING MODE.<br>B. GROUND COMMAND COARSE LEVEL SENSOR OUT.<br>1. PROCEED WITH INITIAL FORCED LEVELING FOR COARSE LEVELING.<br>2. USE AUTO MODE FOR FINE LEVELING. | CUE---<br>NO HIGH SPEED MOTOR OPERATION IS NOTICED DURING INITIAL LEVELING PHASE AND COMPONENT DOES NOT CENTER WITHIN EXPECTED TIME (35 MINUTES MAXIMUM IN AUTO MODE). USE HIGH SPEED LEVELING FOR COARSE LEVELING.<br>CMD 103--PSE LEVELING MODE AUTO/FORCED.<br>CMD 102--COARSE LEVEL SENSOR OUT |       |      |  |
|                            |        | MISSION                            | REV   | DATE   | SECTION  | GROUP | PAGE |  |
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## MISSION RULES

### SECTION 4 - SPECIFIC RULES

| R | RULE   | CONDITION/MALFUNCTION                             | PHASE | RULING  | CUES/NOTES/COMMENTS   |       |      |  |
|---|--------|---|-------|---|---|-------|------|--|
|   | 31-117 | LONG PERIOD<br>COMPONENT STICKS                   |       | A. USE HIGH SPEED, FORCED<br>LEVELING IN DIRECTION<br>WHICH PULLS MASS AWAY<br>FROM STOP.<br><br>B. IF UNSUCCESSFUL, SELECT<br>LOW SPEED AND HIGH<br>SPEED AND DIRECTION<br>REVERSALS ALTERNATELY.  | CUE---<br><br>FAILURE TO CENTER WITHIN EXPECTED<br>TIME (35 MINUTES MAXIMUM IN AUTO<br>MODE). IF STEPS A AND B FAIL, LP<br>COMPONENT IS DEFECTIVE.<br><br>NOTE---<br><br>DO NOT EXCEED 5 MIN 30 SEC IN HIGH<br>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  |       |      |  |
|   | 31-118 | ELECTRICAL FAILURE<br>OF LONG PERIOD<br>COMPONENT |       | TERMINATE LEVELING OF THE<br>AFFECTED AXIS AFTER COARSE<br>SENSOR PHASE IS COMPLETED  | CUE---<br><br>TIDAL OUTPUT IS WITHIN RANGE, BUT IS<br>NOT AFFECTED BY LEVELING OR<br>CENTERING DRIVE.   |       |      |  |
|   | 31-119 | AUTOMATIC SWITCHOVER<br>OF PSE TO STANDBY         |       | CMD PSE TO OPERATE SELECT   | CHECK RESERVE POWER IF CIRCUIT<br>BREAKER CB-06 HAS OPENED FROM<br>OVERCURRENT (500 MA +/- 10 PERCENT).<br>STANDBY MODE WILL BE SELECTED AND<br>THE CB WILL BE RESET AUTOMATICALLY.<br><br>PSE OPER SEL--CMD 036  |       |      |  |
|   | 31-120 | FAILURE OF PSE<br>UNCAGE SEQUENCE                 |       | A. TO UNCAGE ARM---<br><br>1. SEND UNCAGE ARM/FIRE.<br><br>2. IF UNSUCCESSFUL,<br>FIRST 12 HR TIMER<br>PULSE WILL ARM<br>ACTUATOR.<br><br>3. IF UNSUCCESSFUL,<br>96 HR +2 MIN PULSE<br>FROM DELAYED CMD<br>SEQUENCER WILL ARM<br>ACTUATOR.<br><br>B. TO UNCAGE FIRE (AFTER<br>ACTUATOR HAS BEEN<br>ARMED).<br><br>1. SEND UNCAGE ARM/FIRE<br><br>2. IF UNSUCCESSFUL,<br>SEND CMD 037 PSE<br>STANDBY SEL, THEN CMD<br>036 PSE OPERATE SEL.<br><br>3. IF UNSUCCESSFUL,<br>NEXT 12-HR TIMER<br>PULSE MAY FIRE THE<br>ACTUATOR. | NORMAL UNCAGING IS ACCOMPLISHED BY<br>SENDING CMD 073-- UNCAGE<br>ARM/FIRE--TWICE, ONCE TO ARM AND<br>ONCE TO FIRE THE ACTUATOR.<br><br>NOTE---<br><br>UNCAGING MAY NOT BE POSSIBLE UNLESS<br>ATSD THERMAL PLATE 3 TEMP IS ABOVE<br>+25 DEG F.<br><br>NOTE---<br><br>SELECTING PSE STANDBY MAY FIRE<br>ACTUATOR IF IT HAVE BEEN ARMED AND<br>NOT FIRED.<br><br>NOTE---<br><br>30 SEC IS REQUIRED BETWEEN ARM AND<br>FIRE TO CHARGE CAPACITOR. |       |      |  |
|   |        | MISSION   | REV   | DATE  | SECTION   | GROUP | PAGE |  |
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## MISSION RULES

### SECTION 4 - SPECIFIC RULES

| R | RULE   | CONDITION/MALFUNCTION                                  | PHASE | RULING   | CUES/NOTES/COMMENTS   |       |      |  |
|---|--------|--|-------|--|---|-------|------|--|
|   | 31-121 | PSE GOES OFF WHILE<br>IN STANDBY MODE                  |       | DURING NORMAL OPERATIONS,<br>CMD PSE TO STBY SEL   | CUE---<br><br>EXP 1 STBY DISCRETE EXTINGUISHED,<br>AND RESERVE POWER INCREASES SINCE<br>POWER IS REMOVED FROM THE HEATERS.<br>IF FUSE (F-03) HAS BEEN BLOWN BY<br>OVERCURRENT (500MA), CAPABILITY TO<br>SELECT PSE STBY MODE IS LOST.<br><br>CMD 037--PSE STBY SEL  |       |      |  |
|   | 31-122 | PSE TEMP LOW AND<br>AUTO THERMAL<br>CONTROL FAILS      |       | A. COMMAND HEATER TO FORCED<br>ON<br><br>B. CMD Z DRIVE MOTOR<br>TO ON IN AUTO<br>MODE.                                      | ASSUME AUTOMATIC THERMOSTAT CONTROL<br>FAILED. CMD 076 IS A 4-STATE CMD,<br>WHICH CAN SEQUENTIALLY STEP THRU THE<br>FOLLOWING MODES TO CONTROL THE PSE<br>SENSOR HEATER.<br><br>1. AUTO OFF<br><br>2. FORCED HTR ON<br><br>3. FORCED OFF<br><br>4. AUTO ON<br><br>DL-07 PSE INSTRUMENT TEMP LOW LIMIT<br>IS 125 DEG F. MINIMUM OF 8 WATTS<br>RESERVE POWER IS REQUIRED. |       |      |  |
|   | 31-123 | PSE TEMP HIGH AND<br>AUTO THERMAL<br>CONTROL FAILS     |       | A. COMMAND HEATER TO<br>FORCED OR AUTO OFF<br><br><br><br><br><br>B. IF UNSUCCESSFUL, CMD<br>PSE TO STBY, THEN TO<br>OPERATE | A. CMD 076 IS 4-STATE CMD.<br><br>1. AUTO OFF<br><br>2. FORCED HTR ON<br><br>3. FORCED OFF<br><br>4. AUTO ON<br><br>DL-07 PSE INSTRUMENT TEMP HIGH LIMIT<br>IS +127 DEG. F.<br><br>B. SELECTING PSE TO STBY WILL<br>REINITIALIZE TO AUTOMATIC THERMOSTAT<br>CONTROL.  |       |      |  |
|   | 31-124 | LOSS OF DOWNLINK<br>DURING LEVELING<br>MOTOR OPERATION |       | SEND PSE STBY SEL  | NOTE---<br><br>PSE STBY SEL WILL STOP MOTORS.   |       |      |  |
|   |        | 31-125 TO<br>31-130<br>RESERVED                        |       |  |   |       |      |  |
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## MISSION RULES

| R      | RULE | CONDITION/MALFUNCTION   | PHASE | RULING   | CUES/NOTES/COMMENTS   |
|--------|------|---|-------|--|---|
| 31-131 |      | IT IS NECESSARY TO DISARM A GRENADE                                   |       | TRANSMIT CMD 043 TO TURN ASE TO STBY.  | LEAVE IN STBY FOR AT LEAST 3 MIN.   |
| 31-132 |      | GRENADE FIRE COMMAND FAILS TO FIRE A GRENADE.                         |       | A. SEE RULE 31-101<br>B. USE CMD 162 (ASE SEQ FIRE)  | WHEN USING CMD 162 TO FIRE GRENADE THE SEQUENCE IS---<br>2,4,3,1.   |
| 31-133 |      | DURING DEPLOYMENT GROUND IS UNABLE TO COMMAND TO HIGH BIT RATE. (HBR) |       | A. SEE RULE 31-101<br>B. (1) HAVE THE CREW ACTIVATE SWITCH NO.4, AND COMPLETE THUMPER ACTIVITY<br>(2) AT COMPLETION OF THUMPER ACTIVITY, COMMAND HBR OFF (CMD 005) PRIOR TO CREW TURNING SWITCH NO. 5 CW. COMPLETE NORMAL GLA DEVELOPMENT.<br>(3) DURING EVA 2 HAVE CREW TURN SW NO. 5 CCW AND ACTIVATE SW NO. 4<br>(4) CONDUCT MORTAR EXPERIMENT AFTER LIFT OFF AND PRIOR TO LM ASCENT STAGE IMPACT.<br>(5) GROUND CMD TO NORMAL BIT RATE FOR LM ASCENT STAGE IMPACT. | SWITCH NO. 4 WILL TURN THE ASE TO 'ON' AND SELECT HBR.<br><br>NOTE---THERE ARE 3 CMD ROUTES TO RETURN TO NORMAL BIT RATE. 005, 011 AND 034/035. |

|  |         |     |          |          |       |      |
|--|---------|-----|----------|----------|-------|------|
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### SECTION 4 - SPECIFIC RULES

| R | RULE   | CONDITION/MALFUNCTION   | PHASE | RULING   | CUES/NOTES/COMMENTS  |
|---|--------|---|-------|--|--|
|   | 31-134 | DURING DEPLOYMENT<br>GROUND IS UNABLE<br>TO COMMAND<br>FROM HBR TO NBR. |       | A. SEE RULE 31-101<br>B. (1) IF DURING<br>THUMPER ACTIVITIES,<br>FIRST COMPLETE<br>THE THUMPER<br>MODE IN HBR.<br><br>(2) AT COMPLETION OF<br>THUMPING MODE HAVE<br>CREW STANDBY PRIOR<br>TO TURNING SWITCH<br>NO 5 CW WHILE<br>ALTERNATE CMDS<br>ARE CHECKED.<br><br>(3) CMD NORMAL BIT<br>RATE RESET<br>(CMD 011).<br><br>(4) IF (3) IS<br>UNSUCCESSFUL CMD Y<br>PROCESSOR SELECT<br>(CMD 035).<br><br>(5) IF EITHER 3 OR 4<br>ABOVE IS SUCCESSFUL<br>CONTINUE NORMAL<br>MISSION.<br><br>(6) IF (4) IS<br>UNSUCCESSFUL HAVE<br>CREW TURN SWITCH<br>NO. 5 CW AND<br>CONTINUE NORMAL<br>EVA<br><br>(7) DO NOT COMMAND HBR<br>ON. | SUCCESSFUL THUMPING REQUIRES HBR.<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><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 - SPECIFIC RULES

| R | RULE   | CONDITION/MALFUNCTION  | PHASE | RULING   | CUES/NOTES/COMMENTS  |       |      |  |
|---|--------|--|-------|--|--|-------|------|--|
|   | 31-132 | GROUND UNABLE TO COMMAND ASE TO STBY.  |       | FIRE THE MORTARS BEFORE THE TEMPERATURES DROP BELOW OPERATIONAL LIMITS.  | AS-1, AS-2, OR AS-3 BELOW -20 DEG. C.  |       |      |  |
|   | 31-137 | ASI FAILS TO DETONATE  |       | A. ATTEMPT TO FIRE AGAIN BUT ONLY ONCE.<br>B. GO TO NEXT ASI AND POSITION  |  |       |      |  |
|   | 31-138 | AFTER THE FIRING OF ANY ONE OR COMBINATION OF MORTARS, IF DS-07 (ASE PITCH) OR DS-06 (ASE ROLL) HAVE CHANGED TO OFF SCALE READING. |       | DISCONTINUE MORTAR MODE ACTIVITY. FURTHER MORTAR FIRING WILL BE DONE ONLY UPON THREAT OF IMMINENT ALSEP TOTAL FAILURE OR UPON COMPLETION OF ALL OTHER SCIENTIFIC OBJECTIVES.     |  |       |      |  |
|   | 31-139 | PRIOR TO MORTAR FIRING DS-06 (ASE ROLL ON DS-07 (ASE PITCH) READ OFF SCALE.  |       | DO NOT FIRE MORTARS UNTIL ONE YEAR AFTER DEPLOYMENT  |  |       |      |  |
|   | 31-140 | UNEXPLAINED LOSS OF LOCK ON HBR  |       | 1. CMD ASE TO STANDBY<br>SEL THEN TO OPER<br>SELECT<br>ASE STBY 043<br>ASE OPER SEL 042<br><br>2. SELECT ALTERNATE PROCESSOR<br>PROC 'IX' SEL--CMD 034<br>PROC 'IY' SEL--CMD 035 | ASSUMES RF CARRIER WITH MODULATION STILL PRESENT. COMMANDING ASE TO STANDBY WILL RESET CIRCUIT BREAKERS THAT PROVIDE POWER TO THE ASE 15-CHANNEL MULTIPLEXER.<br><br>DO NOT APPLY IF MISSION RULE 31-108 HAS BEEN INVOKED. |       |      |  |
|   |        | MISSION  | REV   | DATE   | SECTION  | GROUP | PAGE |  |
|   |        | ALSEP 4  | FNL   | 12/18/70   | SPECIFIC   | ASE   | 4-10 |  |

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## MISSION RULES

### SECTION 4 - SPECIFIC RULES

| R | RULE                           | CONDITION/MALFUNCTION   | PHASE | RULING  | CUES/NOTES/COMMENTS  |           |      |  |
|---|--------------------------------|---|-------|---|--|-----------|------|--|
|   | 31-141                         | UNABLE TO BREAK CCIG SEAL AND/OR UNABLE TO REMOVE SIDE DUST COVERS. |       | WAIT FOR DELAYED TIMER TO INITIATE CMDS. EXP. MUST BE IN OPERATE SELECT AT TIME OF PULSE. | 8 12-HOUR PULSES + 2 MIN-BREAK SEAL<br>8 12-HOUR PULSES + 3 MIN-EXECUTE<br>8 12-HOUR PULSES + 4 MIN-REMOVE DUST COVERS<br>8 12-HOUR PULSES + 5 MIN EXECUTE<br>NOTE---CONSIDERATION MAY BE GIVEN TO ADVANCING THE TIMER BY TIMER INHIBIT AND ACCEPT COMMANDS. |           |      |  |
|   | 31-142                         | CMD REGISTER DOES NOT AGREE WITH UPLINK CMD.                        |       | CLEAR LOAD REGISTER   | CUE---DI-64. CLEAR REGISTER BY UPLINKING CMDS 104, 105, 106, AND 107--- THEN EXECUTE WITH 110 UNLESS SIDE DUST COVER AND CCIG SEAL HAVE NOT BEEN REMOVED. IF DUST COVER AND SEAL HAVE NOT BEEN REMOVED, CLEAR REGISTER BY CMD 046 (EXP 5 STEP SELECT)        |           |      |  |
|   | 31-143                         | UNEXPLAINED CHANGE IN SIDE/CCIG MODE OR SEQUENCE                    |       | CMD HIGH VOLTAGE OFF.   | CUE---DI-1 (FRAME COUNTER) ERRATIC<br>NOTE---SERIOUS CVM CMDS ARE CONSIDERED EXPLAINED   |           |      |  |
|   | 31-144                         | SIDE DUST COVER COMES OFF DURING DEPLOYMENT                         |       | DON'T REINSTALL INSURE DUST COVER IS COMPLETELY OFF                                       | CONTINUE DEPLOYMENT  |           |      |  |
|   | 31-145 THRU<br>31-150 RESERVED |   |       |   |  |           |      |  |
|   |                                | MISSION   | REV   | DATE  | SECTION  | GROUP     | PAGE |  |
|   |                                | RESUP 4   | RNL   | 12/18/78  | SPECIFIC   | SIDE/CCIG | 4-11 |  |

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## MISSION RULES

### SECTION 4 - SPECIFIC RULES

| R | RULE   | CONDITION/MALFUNCTION                                  | PHASE | RULING  | CUES/NOTES/COMMENTS   |       |      |  |
|---|--------|--|-------|---|---|-------|------|--|
|   | 31-151 | CPLER DUST COVER COMES OFF DURING DEPLOYMENT.          |       | DO NOT REINSTALL  | CONTINUE DEPLOYMENT.  |       |      |  |
|   | 31-152 | UNABLE TO REMOVE CPLER DUST COVER BY GROUND COMMAND    |       | WAIT FOR DELAYED TIMER TO INITIATE COMMAND. ASSURE THAT THE CPLER IS IN OPERATE AT THE TIME OF COMMAND.   | THE TIMER WILL INITIATE CPLER DUST COVER REMOVAL AT THE 8TH (OR 7TH) 12-HR PULSE + 2 MIN. CONSIDERATION MAY BE GIVEN TO ADVANCING THE TIMER BY TIMER INHIBIT AND TIMER ACCEPT COMMANDING. |       |      |  |
|   | 31-153 | UNABLE TO MAINTAIN AUTOMATIC THERMAL CONTROL OF CPLER. |       | (1) IF INTERNAL TEMPERATURE IS LESS THAN -10 DEG C, CMD HTR ON IN FORCED MODE (CMD 111).<br>(2) IF IN FORCED MODE AND INTERNAL TEMPERATURE GREATER THAN +10 DEG C, CMD HTR OFF (CMD 112). | THERMOSTAT IS SET 0 DEG +/- 10 DEG. C.  |       |      |  |
|   |        | MISSION  | REV   | DATE  | SECTION   | GROUP | PAGE |  |
|   |        | ALSEP 4  | FNL   | 12/18/70  | SPECIFIC  | CPLER | 4-12 |  |

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## MISSION RULES

### SECTION 4 - SPECIFIC RULES

| R | RULE   | CONDITION/MALFUNCTION   | PHASE | RULING   | CUES/NOTES/COMMENTS  |
|---|--------|---|-------|--|--|
|   | 31-154 | THERMOSTAT FAILED<br>A. CLOSED (HTR ON)<br>TEMP GREATER<br>THAN + 10 DEG C<br><br>B. OPEN (HTR OFF)<br>TEMP LESS THAN<br>- 10 DEG C   |       | A. REVERT TO FORCED HTR<br>CONTROL AS IN MR 31-153<br><br>B. REVERT TO FORCED HTR<br>CONTROL AS IN MR 31-153   | USE AC-6 AS TEMP REFERENCE   |
|   | 31-155 | UNEXPLAINED CHANGE<br>IN CPLEE MODE OR<br>SEQUENCE.   |       | CMD HIGH VOLTAGE OFF<br>(1) IF CPLEE TEMP. IS<br>DECREASING, WAIT FOR<br>A PERIOD SUFFICIENT<br>TO PERMIT A DELTA TEMP.<br>OF 1 DEG AND RESET THE<br>EXP.<br><br>(2) IF CPLEE TEMP. IS<br>INCREASING, WAIT UNTIL<br>IT HAS DECREASED TO 1<br>DEG BELOW THE TEMP. AT<br>WHICH THE UNEXPLAINED<br>CHANGES OCCURRED AND<br>RESET THE EXP. | WHEN COMMANDED BACK TO OPERATE,<br>CPLEE WILL COME UP IN 2800 V.<br><br>USE AC-05 AS TEMP. REFERENCE.<br>NOTE---SPURIOUS CVR EXECUTES ARE<br>CONSIDERED EXPLAINED. |
|   | 31-156 | CPLEE INTERNAL<br>TEMPERATURE GREATER<br>THAN + 66 DEG C<br>WITH DUST COVER ON<br>IN OPER. SEL.<br><br>31-157 THRU<br>31-160 RESERVED |       | CMD TO STBY SEL.   | USE AC-06 AS TEMPERATURE REFERENCE.  |
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# NASA - Manned Spacecraft Center

## MISSION RULES

### APPENDIX A - ACRONYMS AND SYMBOLS

| R | ITEM  |
|---|---|
|   | AC ALTERNATING CURRENT  |
|   | A/DC ANALOG-TO-DIGITAL CONVERTER  |
|   | ADC AMPERES DC  |
|   | ADD ADDRESS   |
|   | ALIGN ALIGNMENT   |
|   | ALSEP APOLLO LUNAR SURFACE EXPERIMENTS PACKAGE  |
|   | A/F AUTOMATIC/FORCED  |
|   | AMPS AMPERES  |
|   | ANT ANTENNA   |
|   | ASE ACTIVE SEISMIC EXPERIMENT   |
|   | AUTO AUTOMATIC  |
|   | AZ AZIMUTH  |
|   | BL BOTTOM LOCATION OF STRUCTURE TEMPERATURE   |
|   | BAS BASE  |
|   | BER BIT ERROR RATE  |
|   | BPS BITS PER SECOND   |
|   | CAL CALIBRATE   |
|   | CB CIRCUIT BREAKER  |
|   | CCGE COLD CATHODE GAGE EXPERIMENT (PART OF SIDE ON ALSEP 1 AND 4, SEPARATE MSC EXPERIMENT ON ALSEP 3) |
|   | CCGE/A ANALOG AND DIGITAL ID READOUT FROM CCGE  |
|   | CCGE/D  |
|   | CCIG COLD CATHODE ION GAGE (INSTRUMENT PORTION OF CCGE)   |
|   | CCW COUNTERCLOCKWISE  |
|   | CH CHANNEL  |
|   | CHAN CHANNELTRON-- USED IN CPE AS---  |
|   | CHAN/1 CHANNELTRON P/S NO. 1  |
|   | CHAN/2 CHANNELTRON P/S NO. 2  |
|   | CHAN/HI CHANNELTRON VOLTAGE INCREASES OFF   |
|   | CHAN/LO CHANNELTRON VOLTAGE INCREASES OFF   |
|   | CMD COMMAND   |
|   | CNT COUNT   |
|   | CNTR COUNTER  |
|   | CONV CONVERTER  |
|   | CPLER OR CHARGED-PARTICLE EXPERIMENT (FULL NAME IS CHARGED-PARTICLE LUNAR ENVIRONMENT EXPERIMENT)     |
|   | CPE   |
|   | CPS CYCLES PER SECOND   |
|   | CS CENTRAL STATION  |
|   | CTL CONTROL   |
|   | CVR COVER   |
|   | CVW COMMAND VERIFICATION WORD   |
|   | DB DECIBELS   |
|   | DBM DECIBELS WITH RESPECT TO ONE MILLIWATT  |
|   | DC DIRECT CURRENT   |
|   | DEC DECODER   |
|   | DET DETECTOR  |
|   | DIG DIGITAL   |
|   | DIR/V DIRECTION AND SPEED (USED ON PSE)   |
|   | DISSIP DISSIPATION  |
|   | DLAY DELAY  |
|   | D/P DATA PROCESSOR  |
|   | DPLY DEPLOY   |
|   | DRT DOME REMOVAL TOOL   |
|   | DSS DATA SUBSYSTEM-- COMPONENTS INCLUDE   |
|   | DSS/A ANALOG DATA PROCESSOR   |
|   | DSS/D DIGITAL DATA PROCESSOR  |
|   | DSS/PROC COMPLETE DATA PROCESSOR (REDUNDANT)  |
|   | EPS ELECTRICAL POWER SYSTEM   |
|   | EXP EXPERIMENT  |
|   | F FAHRENHEIT  |
|   | FET FIELD EFFECT TRANSISTOR   |
|   | FLD FIELD   |
|   | FREQ FREQUENCY  |
|   | FTT FUEL TRANSFER TOOL  |
|   | GDT GRADIENT SENSOR DELTA TEMPERATURE (HFE)   |
|   | GEO GEOPHONE  |
|   | GMBL GIMBAL   |
|   | GND GROUND  |
|   | GT GRADIENT SENSOR AMBIENT TEMPERATURES (HFE)   |

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|--|---------|-----|----------|----------------------|-------|------|--|
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# NASA - Manned Spacecraft Center

## MISSION RULES

### APPENDIX A - ACRONYMS AND SYMBOLS

| R | ITEM    |   |          |                         |       |      |  |
|---|---------|---|----------|-------------------------|-------|------|--|
|   |         | HBR HIGH BIT RATE<br>HFE HEAT FLOW EXPERIMENT<br>HTR HEATER--- ON HFE THERE ARE TWO CASES---<br>HTR/HK HIGH CONDUCTIVITY HEATER<br>HTR/LK LOW CONDUCTIVITY HEATER<br>HT/S HEAT SINK<br>HV HIGH VOLTAGE<br>HZ HERTZ<br><br>INST INSTRUMENT<br>INSUL INSULATION<br>INT INTERNAL<br><br>K KELVIN<br>KC KILOCYCLES<br>KHZ KILOHERTZ<br>KV KILOVOLTS<br><br>LAT LATITUDE<br>LBR LOW BIT RATE<br>LM LUNAR MODULE<br>LONG LONGITUDE<br>L/O LOCAL OSCILLATOR<br>LOS LOSS OF SIGNAL<br>LP LONG PERIOD (PSE SENSORS)<br>LSB LEAST SIGNIFICANT BIT<br>LSD LEAST SIGNIFICANT DATA<br>LSM LUNAR SURFACE MAGNETOMETER<br>LVL LEVEL<br><br>MA MILLIAMPERE<br>MADC MILLIAMPERES DC<br>MAP MESSAGE ACCEPTABLE PULSE<br>MC MEGACYCLE<br>MCC MISSION CONTROL CENTER<br>MDE MODE<br>MEV MILLION ELECTRON VOLTS<br>MHZ MEGAHERTZ<br>MOCR MISSION OPERATIONS CONTROL ROOM<br>MOD MODULE<br>MODE OPERATING MODES ARE DIFINED AS FOLLOWS---<br>FOR HFE<br>MODE/G GRADIENT MODE<br>MODE/HK HIGH CONDUCTIVITY MODE<br>MODE/LK LOW CONDUCTIVITY MODE<br>MS MILLISECOND<br>MSB MOST SIGNIFICANT BIT<br>MSD MOST SIGNIFICANT DATA<br>MSFN MANNED SPACE FLIGHT NETWORK<br>MTR MOTOR-- ON PSE, THE THREE MOTORS ARE MTRX, MTRY, AND MTRZ<br>MUX MULTIPLEX<br>MV MILLIVOLTS<br>MW/CM2 MILLIWATTS PER SQUARE CENTIMETER<br><br>NA NANOAMPERS<br><br>OSC OSCILLATOR<br><br>PA POWER AMPLIFIER<br>PA PICOAMPERS<br>PCM PULSE CODE MODULATION<br>PCU POWER CONDITIONING UNIT<br>PDR POWER DISSIPATION RESISTOR<br>PDU POWER DISTRIBUTION UNIT<br>PET PACKAGE ELAPSED TIME<br>PHYS PHYSICAL-- ON CPE USED AS FOLLOWS--<br>PHYS/AN PHYSICAL ANALYZER (SENSOR ASSEMBLY)<br>PLT PLATE<br>PM PHASE MODULATION<br>PRE/LIM PRE-LIMITING<br>P/S POWER SUPPLY<br>PSE PASSIVE SEISMIC EXPERIMENT-- ALSO--<br>PSE/LP LONG PERIOD SENSORS<br>PSE/SP SHORT PERIOD SENSORS<br>PSE/LP/SP LONG AND SHORT PERIOD SENSORS<br>LONG PERIOD SENSORS ARE FURTHER DEFINED AS PSE/X, PSE/Y, AND PSE/Z WHILE PSE/XY<br>DENOTES THE TWO HORIZONTAL LONG PERIOD SENSORS<br><br>R RESISTOR (USED AS R1 AND R2)<br>RCVR RECEIVER |          |                         |       |      |  |
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|   | ALSEP 4 | FNL   | 12/18/70 | ACRONYMS AND<br>SYMBOLS |       | A-2  |  |

| R | ITEM   |
|---|--|
|   | RDT RING SENSOR DELTA TEMPERATURE (HFE)  |
|   | RF RADIO FREQUENCY   |
|   | RST RESET  |
|   | RT RING SENSOR AMBIENT TEMPERATURE (HFE)   |
|   | RTC REAL-TIME COMMAND  |
|   | RTG RADIOISOTOPE THERMOELECTRIC GENERATOR  |
|   | SCI SCIENTIFIC   |
|   | SEQ SEQUENCE, SEQUENTIAL-- USED ON HFE AS---                                     |
|   | SEQ/FUL FULL SEQUENCE  |
|   | SEQ/P1 PROBE 1 SEQUENCE  |
|   | SEQ/P2 PROBE 2 SEQUENCE  |
|   | USED ON ASE AS---  |
|   | SEQ/S SEQUENTIAL SINGLE  |
|   | SEW SCIENTIFIC EQUIPMENT   |
|   | SIDE SUPRATHERMAL ION DETECTOR EXPERIMENT  |
|   | SNSR SENSOR  |
|   | SP SHORT PERIOD (PSE SENSOR)   |
|   | SPST SINGLE POLE SINGLE THROW  |
|   | S/S SAMPLES PER SECOND, SIGNAL STRENGTH  |
|   | SWS SOLAR WIND SPECTROMETER  |
|   | SYNC SYNCHRONIZATION   |
|   | TC THERMOCOUPLE (ON HFE, FOUR CABLE AMBIENT TEMPERATURES ARE READ ON EACH PROBE) |
|   | TM TELEMETRY   |
|   | USB UNIFIED S-BAND   |
|   | V VELOCITY, (USED TO INDICATE "SPEED" ON PSE IN "LVL DIR/V")                     |
|   | VCO VOLTAGE CONTROLLED OSCILLATOR  |
|   | V/FILT VELOCITY FILTER, A COMPONENT OF SIDE                                      |
|   | W WATTS  |
|   | W1, W2 WALL LOCATIONS OF STRUCTURE TEMPERATURE SENSORS                           |
|   | W3   |
|   | XMTR TRANSMITTER   |
|   | XTAL CRYSTAL   |
|   | XYZ AXES OF LSM, WHERE XYO INDICATES   |
|   | XYO X, OR Y, OR NEITHER  |

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# NASA - Manned Spacecraft Center

## MISSION RULES

### APPENDIX B - DISTRIBUTION LIST

| R | ITEM                                    |  |         |     |          |                             |       |      |
|---|---|--|---------|-----|----------|-----------------------------|-------|------|
|   | DEPUTY                                  | DIRECTOR<br>AB/KRAFT, JR. C.C.   |         |     |          |                             |       |      |
|   | DIRECTOR OF FLIGHT OPERATIONS           | FA/SJOBERG, S.A.   |         |     |          |                             |       |      |
|   | FLIGHT                                  | CONTROL DIVISION<br>FC/KRANZ, E.F.<br>FC/ROACH, J.W.<br>FC2/HARLAN, C.S. (6)<br>FC8/SAULTZ, J.E. (15)<br>FC6/SHELLEY, C.B. (2)<br>FC9/BRADFORD, R. (BDX) (4)   |         |     |          |                             |       |      |
|   | FLIGHT                                  | SUPPORT DIVISION<br>FS5/ROUNDTREE, J.R.<br>FS2/SATTERFIELD, J.M.   |         |     |          |                             |       |      |
|   | MISSION PLANNING AND ANALYSIS DIVISION  | FM/MAYER, J.P.<br>FM/HUSS, C.R.  |         |     |          |                             |       |      |
|   | DIRECTOR OF FLIGHT CREW OPERATIONS      | AC/SLAYTON, D.K.<br>AB/ASTRONAUT OFFICE  |         |     |          |                             |       |      |
|   | FLIGHT                                  | CREW SUPPORT DIVISION<br>CF/NORTH, W.J.<br>CF3/ALLEN, L.D. (2)<br>CF5/RICHARD, L.G.<br>CF6/O'NEILL, J.W.<br>CFK/MCCAFFERY, R.D. (4)  |         |     |          |                             |       |      |
|   | APOLLO                                  | SPACECRAFT PROGRAM OFFICE<br>PA/COL. MCDIVITT<br>PA/MORRIS, O.<br>PA/JOHNSTON, R.S.<br>PA/KUBICKI, R.<br>PA2/ASPO FILES<br>PD4/SEVIER, J. (2)<br>PD7/KOHR, R.H. (2)<br>PD9/CRAIG, J.W.<br>PE (2)<br>PG<br>PP7/STEWART, B.<br>PP12/TASH, H. (3)<br>PT/ARABIAN, D.<br>PT3/DATA LIBRARY (8) |         |     |          |                             |       |      |
|   | DIRECTOR OF ENGINEERING AND DEVELOPMENT | EA2/GARDINER, R.A.<br>EH/WISEMAN, D. (4)   |         |     |          |                             |       |      |
|   | FLIGHT                                  | SAFETY OFFICE<br>SA/FRENCH, J.C.   |         |     |          |                             |       |      |
|   | DIRECTOR OF SCIENCE AND APPLICATIONS    | TM/LUNAR MISSIONS OFFICE (3)<br>TMS/STEPHENSON, B. (15)  |         |     |          |                             |       |      |
|   | OFFICE MANNED SPACEFLIGHT               | MAO/LAND, E.W. (20)  |         |     |          |                             |       |      |
|   | ATOMIC ENERGY COMMISSION                | ZS5/REMINI, W.C. (2)   |         |     |          |                             |       |      |
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# NASA - Manned Spacecraft Center

## MISSION RULES

### APPENDIX C - CHANGE CONTROL

| R       | ITEM   |          |                                |       |         |       |      |         |     |          |                                |  |     |
|---------|--|----------|--------------------------------|-------|---------|-------|------|---------|-----|----------|--------------------------------|--|-----|
|         | <p style="text-align: center;">-----<br/>' CHANGE CONTROL '<br/>-----</p>  |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 1.0     | INTRODUCTION   |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 1.1     | PURPOSE<br><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 WILL PROVIDE A MEANS FOR PROMULGATING INDIVIDUAL RULE UPDATES BETWEEN REVISIONS (INTERIM CHANGES). |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 1.2     | EFFECTIVITY<br><br>MARCH 23, 1970.   |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 2.0     | CHANGE PROCEDURES  |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 2.1     | SUBMISSION OF CHANGES<br><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><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     | APPROVAL   |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 2.2.1   | COORDINATION<br><br>THE ORIGINATOR OF THE CHANGE MAY OBTAIN PRELIMINARY CONCURRENCES. FCOB WILL OBTAIN FORMAL CONCURRENCES FROM THE CHIEF EXPERIMENTS SYSTEMS BRANCH, CHIEF FLIGHT CONTROL DIVISION.   |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 2.2.3   | DISAPPROVED CHANGES<br><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><br>INTERIM CHANGES WILL BE DISTRIBUTED VIA AN ABBREVIATED DISTRIBUTION LIST CONSISTING OF THE MISSION CONTROL TEAM, PERTINENT NASA ORGANIZATIONS, AND THE APPROPRIATE CONTRACTOR(S).   |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 3.0     | REVISIONS  |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 3.1     | DEVELOPMENT<br><br>FCOB WILL COMPILE THE EFFECTIVE INTERIM CHANGES AND CORRECTIONS OF MINOR TYPOGRAPHICAL ERRORS INTO COMPLETE PAGE CHANGES TO THE BASIC DOCUMENT. ('PEN AND INK' CHANGES MAY BE USED TO CORRECT TYPOGRAPHICAL ERRORS IF THERE ARE NO OTHER CHANGES ON THE PAGE CONCERNED.)  |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 3.2     | APPROVAL<br><br>ALL REVISIONS WILL BE APPROVED BY THE DIRECTOR OF FLIGHT OPERATIONS AND THE MANAGER, APCLO SPACECRAFT PROGRAM.   |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 3.3     | PUBLICATION  |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 3.3.1   | SCHEDULE<br><br>REVISIONS WILL BE MADE ON AN 'AS REQUIRED' BASIS.  |          |                                |       |         |       |      |         |     |          |                                |  |     |
| 3.3.2   | DISTRIBUTION<br><br>REVISIONS WILL BE PRINTED AND DISTRIBUTED ACCORDING TO APPENDIX B.   |          |                                |       |         |       |      |         |     |          |                                |  |     |
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