

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FINAL FLIGHT MISSION RULES



APOLLO 17 (AS-514/114/LM-12)

(NASA-TM-X-68972) FINAL FLIGHT MISSION
RULES. APOLLO 17 (AS-514/114/LM-12)
(NASA) 1 Sep. 1972 391 p

672-75938

Unclass

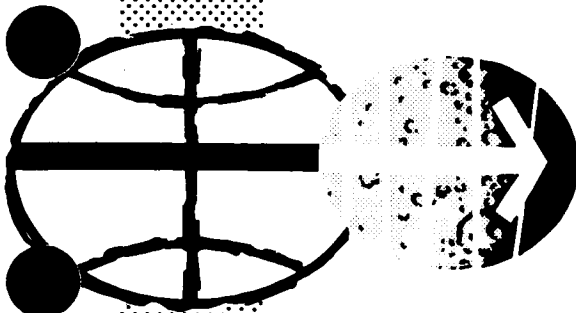
09/99 48226

SEPTEMBER 1, 1972

PREPARED
FLIGHT CONTROL DIVISION

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FOR NASA/DOD INTERNAL USE ONLY
INCLUDING APPROPRIATE CONTRACTORS



APOLLO 17

FINAL FLIGHT MISSION RULES

PREFACE

THIS DOCUMENT CONTAINS THE FINAL FLIGHT MISSION RULES FOR APOLLO 17 AS OF SEPTEMBER 1, 1972. ALL SUBSEQUENT REVISIONS TO THIS DOCUMENT WILL BE PRINTED ON DIFFERENT COLORED PAGES FOR EASY RECOGNITION.

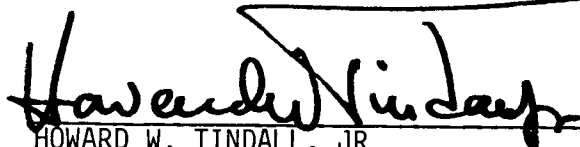
IT IS REQUESTED THAT ANY ORGANIZATION HAVING COMMENTS, QUESTIONS, OR SUGGESTIONS CONCERNING THESE MISSION RULES CONTACT MR. JOHN H. TEMPLE, FLIGHT OPERATIONS AND RECOVERY BRANCH, BUILDING 30, ROOM 2058, PHONE 713-483-4126.

ANY REQUESTS FOR ADDITIONAL COPIES OR CHANGES TO THE DISTRIBUTION LIST IN APPENDIX B OF THIS DOCUMENT MUST BE MADE IN WRITING TO MR. HOWARD W. TINDALL, JR., DIRECTOR OF FLIGHT OPERATIONS, MANNED SPACECRAFT CENTER, HOUSTON, TEXAS.

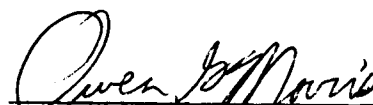
THIS IS A CONTROL DOCUMENT AND ANY CHANGES ARE SUBJECT TO THE CHANGE CONTROL PROCEDURES DELINEATED IN APPENDIX C. THIS DOCUMENT IS NOT TO BE REPRODUCED WITHOUT THE WRITTEN APPROVAL OF THE CHIEF, FLIGHT CONTROL DIVISION, MANNED SPACECRAFT CENTER, HOUSTON, TEXAS.

APPROVED BY:

CONCURRED BY:



HOWARD W. TINDALL, JR.
DIRECTOR OF FLIGHT OPERATIONS



OWEN G. MORRIS
MANAGER
APOLLO SPACECRAFT PROGRAM



R. SCOTT HAMNER
MSFC FLIGHT CONTROL OFFICE

MISSION RULES

NASA — MSC

MISSION RULES

TSG 291A

NASA - Manned Spacecraft Center

MISSION RULES

I - GENERAL GUIDELINES

| R | ITEM | OMSF GENERAL RULES | | | | | | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|--------------------|--------------------|------|----------|
| | I-1 | MISSION RULES ARE EFFECTIVE DURING THE LAUNCH COUNTDOWN, FLIGHT, RECOVERY, AND DURING PRELAUNCH TESTS WHEN APPLICABLE. WHEN POST MISSION QUARANTINE IS IMPOSED, RULES WILL BE APPLICABLE UNTIL DELIVERY OF THE FLIGHT CREW, FLIGHT HARDWARE, AND LUNAR SAMPLES TO THE LUNAR RECEIVING LABORATORY. | | | | | | |
| | I-2 | DURING THE CONDUCT OF THE MISSION, THE MISSION DIRECTOR WILL BE ADVISED OF ALL RECOMMENDATIONS THAT INVOLVE CHANGES TO PRIMARY OBJECTIVES, MISSION RULES, FLIGHT PLAN CONTENT, OR LAUNCH/FLIGHT SAFETY. | | | | | | |
| | I-3 | WITHIN THEIR RESPECTIVE AREAS OF RESPONSIBILITY, THE SPACECRAFT COMMANDER, THE LAUNCH DIRECTOR, FLIGHT DIRECTOR, DOD MANAGER FOR MSF SUPPORT OPERATIONS, AND THE MISSION DIRECTOR MAY TAKE OR RECOMMEND ANY ACTION REQUIRED FOR OPTIMUM CONDUCT OF THE MISSION. | | | | | | |
| | I-4 | THE SPACECRAFT COMMANDER, SPACECRAFT TEST CONDUCTOR, LAUNCH VEHICLE TEST CONDUCTOR, SPACE VEHICLE TEST SUPERVISOR, LAUNCH OPERATIONS MANAGER, LAUNCH DIRECTOR, FLIGHT DIRECTOR, DOD MANAGER FOR MSF SUPPORT OPERATIONS, OR THE MISSION DIRECTOR MAY REQUEST A HOLD FOR CONDITIONS WITHIN THEIR RESPECTIVE AREAS OF RESPONSIBILITY. | | | | | | |
| | I-5 | DURING THE COUNTDOWN, THE LAUNCH VEHICLE AND SPACECRAFT PROGRAM MANAGERS AND RESPECTIVE CENTER OPERATIONS MANAGERS WILL PROVIDE TECHNICAL ADVICE AND SUPPORT DIRECTLY TO THE LAUNCH OPERATIONS MANAGER AND LAUNCH DIRECTOR. THE LATTER TWO WILL KEEP THE MISSION DIRECTOR FULLY INFORMED OF PROBLEMS AND PROPOSED SOLUTIONS. DURING THE FLIGHT PHASE OF OPERATIONS, SIMILAR SUPPORT AS REQUIRED WILL BE PROVIDED TO THE FLIGHT DIRECTOR AND THE MSC DIRECTOR OF FLIGHT OPERATIONS. THE MISSION DIRECTOR WILL BE KEPT FULLY INFORMED BY THESE INDIVIDUALS OF PROBLEMS AND PROPOSED SOLUTIONS DURING THE APPLICABLE PHASES OF THE MISSION. | | | | | | |
| | I-6 | WHEN TIME PERMITS, THE FAILURE OF A MANDATORY OR HIGHLY DESIRABLE ITEM WILL BE REPORTED TO THE MISSION DIRECTOR BY THE LAUNCH DIRECTOR OR THE FLIGHT DIRECTOR. THE INITIAL REPORT WILL INCLUDE THE POSITION OR FACILITY THAT DETECTED THE MALFUNCTION. SUBSEQUENTLY, THE MISSION DIRECTOR WILL BE INFORMED OF ESTIMATED TIME TO REPAIR AND RECOMMENDED "PROCEED, HOLD, RECYCLE," OR "SCRUB" ACTION AS IT DEVELOPS. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GENERAL GUIDELINES | OMSF GENERAL RULES | I-1 | Tape 1.3 |

NASA - Manned Spacecraft Center

MISSION RULES

I - GENERAL GUIDELINES - CONTINUED

| R | ITEM | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | I-7 | IF A MANDATORY ITEM FAILS DURING THE COUNTDOWN, IT WILL BE CORRECTED PRIOR TO LAUNCH, HOLDING OR RECYCLING THE COUNTDOWN AS NECESSARY. IF A MANDATORY ITEM CANNOT BE CORRECTED TO PERMIT LIFTOFF WITHIN THE LAUNCH WINDOW, THE MISSION DIRECTOR MAY PROCEED WITH THE LAUNCH AFTER APPROPRIATE COORDINATION WITH THE APPROPRIATE OPERATIONS AND PROGRAM MANAGERS. GENERALLY THE LOSS OF A MANDATORY ITEM WILL RESULT IN A SCRUB. |
| | I-8 | AS THE DESIGNATED REPRESENTATIVE OF THE PROGRAM DIRECTOR, ONLY THE MISSION DIRECTOR MAY SCRUB THE MISSION. FURTHER, THE MISSION DIRECTOR RETAINS THE PRIMARY AUTHORITY TO DOWNGRADE A MANDATORY CATEGORY. THIS AUTHORITY WILL BE EXERCISED AS CIRCUMSTANCES DICTATE AND AFTER APPROPRIATE RECOMMENDATIONS FROM THE DIRECTOR OF FLIGHT OPERATIONS, PROGRAM MANAGERS, LAUNCH DIRECTOR, AND FLIGHT DIRECTOR. |
| | I-9 | CONSIDERATION WILL BE GIVEN TO THE REPAIR OF ANY HIGHLY DESIRABLE ITEM, BUT IN NO CASE WILL THE LAUNCH BE SCRUBBED FOR ANY SINGLE HIGHLY DESIRABLE ITEM. IF TWO OR MORE HIGHLY DESIRABLE ITEMS FAIL AND/OR OTHER AGGRAVATING CIRCUMSTANCES OCCUR, THE MISSION DIRECTOR MAY SCRUB THE MISSION AFTER COORDINATION WITH THE APPROPRIATE OPERATIONS AND PROGRAM MANAGERS. |
| | I-10 | WHENEVER POSSIBLE, THE LAUNCH SITE AND MCC WILL VERIFY TELEMETRY READOUT DISCREPANCIES OCCURRING PRIOR TO LIFTOFF. IF THE MCC LOSES A PARAMETER BUT THE LAUNCH SITE HAS A VALID READOUT, THE MCC WILL CONTINUE ON THE LAUNCH SITE READOUT. THIS IS TRUE EXCEPT FOR THOSE MANDATORY PARAMETERS (LISTED IN THE FLIGHT MISSION RULES) UPON WHICH MISSION RULES ACTION IS TAKEN. IN THIS CASE, A HOLD MAY BE CALLED TO EVALUATE THE PROBLEM. |
| | I-11 | THE COUNTDOWN WILL CONTINUE, WHERE POSSIBLE, CONCURRENTLY WITH CORRECTION OF AN EXISTING PROBLEM. |
| | I-12 | THE LAUNCH DIRECTOR WILL BE RESPONSIBLE FOR ALL ACTIONS IN THE EVENT OF LAUNCH SITE EMERGENCIES EXCEPT FOR RECOVERY OPERATIONS OF THE FLIGHT CREW AND SPACECRAFT RESULTING FROM A PAD ABORT. |
| | I-13 | THE LAUNCH OPERATIONS MANAGER MAY SEND AN ABORT REQUEST FROM THE TIME THE LAUNCH ESCAPE SYSTEM IS ARMED UNTIL THE SPACE VEHICLE REACHES SUFFICIENT ALTITUDE TO CLEAR THE TOP OF THE UMBILICAL TOWER. THE CRITERIA FOR SENDING AN ABORT REQUEST WILL BE ESTABLISHED IN THE LAUNCH MISSION RULES. |
| | | |
| | | MISSION REV DATE SECTION GROUP PAGE |
| | | APOLLO 17 FNL 9/1/72 GENERAL GUIDELINES OMSF GENERAL RULES I-2 Tape 1.4 |

NASA - Manned Spacecraft Center

MISSION RULES

I - GENERAL GUIDELINES - CONTINUED

| R | ITEM | |
|---|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | I-14 | FROM LIFTOFF TO UMBILICAL TOWER CLEARANCE, THE LAUNCH OPERATIONS MANAGER AND FLIGHT DIRECTOR WILL HAVE CONCURRENT RESPONSIBILITY FOR SENDING AN ABORT REQUEST. THE CRITERIA FOR SENDING AN ABORT REQUEST DURING THIS PERIOD WILL BE ESTABLISHED IN THE LAUNCH AND FLIGHT MISSION RULES RESPECTIVELY. |
| | I-15 | WHERE POSSIBLE, ALL MANUAL ABORT COMMAND/REQUESTS FROM THE GROUND DURING FLIGHT WILL BE BASED ON TWO INDEPENDENT INDICATIONS OF THE FAILURE. CREW ABORT ACTION WILL NORMALLY BE BASED UPON TWO CUES. |
| | I-16 | THE LAUNCH OPERATIONS MANAGER WILL INFORM THE MCC WHEN THE SPACE VEHICLE REACHES SUFFICIENT ALTITUDE TO CLEAR THE TOP OF THE UMBILICAL TOWER BY STATING "CLEAR TOWER" OVER ONE OF THE LOOPS FOR KSC TO MCC. |
| | I-17 | IN THE EVENT OF NON-CATASTROPHIC SPACE VEHICLE COLLISION WITH THE UMBILICAL TOWER OR OTHER CONTINGENCIES WHICH DO NOT REQUIRE IMMEDIATE ACTION, THE LAUNCH OPERATIONS MANAGER WILL CONTINUE TO EVALUATE THE EXTENT OF DAMAGE AND WILL PROVIDE INFORMATION TO THE FLIGHT DIRECTOR FOR ANY ACTION NECESSARY AFTER UMBILICAL TOWER CLEARANCE. |
| | I-18 | COMPLETE GROUND CONTROL OF THE SPACE VEHICLE PASSES FROM THE LAUNCH DIRECTOR TO THE FLIGHT DIRECTOR WHEN THE SPACE VEHICLE REACHES SUFFICIENT ALTITUDE TO CLEAR THE TOP OF THE UMBILICAL TOWER. |
| | I-19 | IN THE MCC, THE FLIGHT DIRECTOR, FLIGHT DYNAMICS OFFICER AND BOOSTER SYSTEMS ENGINEER WILL HAVE THE CAPABILITY TO SEND AN ABORT REQUEST. THE CRITERIA FOR SENDING AN ABORT REQUEST WILL BE ESTABLISHED IN THE FLIGHT RULES. |
| | I-20 | THE SPACECRAFT COMMANDER MAY INITIATE SUCH INFLIGHT ACTION AS HE DEEMS ESSENTIAL FOR CREW SAFETY. |
| | I-21 | <u>FLIGHT CREW SAFETY SHALL TAKE PRECEDENCE OVER THE ACCOMPLISHMENT OF MISSION OBJECTIVES.</u> |
| | I-22 | IN THE EVENT OF COMMUNICATIONS LOSS BETWEEN THE MANNED SPACE FLIGHT NETWORK AND THE SPACECRAFT, THE SPACECRAFT COMMANDER WILL ASSUME RESPONSIBILITY FOR MISSION CONDUCT AS DESCRIBED WITHIN THE FLIGHT MISSION RULES. |
| | I-23 | THE FLIGHT DIRECTOR, THROUGH THE RECOVERY COORDINATOR, WILL PROVIDE THE DOD MANAGER FOR MANNED SPACE FLIGHT SUPPORT OPERATIONS THE PREDICTED LOCATION AND TIME OF SPLASHDOWN. |
| | | MISSION |
| | | REV |
| | | DATE |
| | | SECTION |
| | | GROUP |
| | | PAGE |
| | | APOLLO 17 |
| | | FNL |
| | | 9/1/72 |
| | | GENERAL |
| | | GUIDELINES |
| | | OMSF GENERAL |
| | | RULES |
| | | I-3 |
| | | Tape 1.5 |

MISSION RULES

PART I - GENERAL GUIDELINES - CONTINUED

TSG 291A

NASA - Manned Spacecraft Center

MISSION RULES

PART I - GENERAL GUIDELINES - CONTINUED

| R | ITEM | | | | | | |
|------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|--------------------|--------------------|----------|
| | | <u>DEFINITIONS</u> | | | | | |
| I-36 | | <p><u>PRIMARY OBJECTIVE</u> - A STATEMENT OF THE PRIMARY PURPOSE OF THE FLIGHT. WHEN USED IN CENTER CONTROL DOCUMENTATION, THE PRIMARY OBJECTIVE(S) MAY NOT BE MODIFIED BUT MAY BE AMPLIFIED BY DETAILED OBJECTIVES.</p> | | | | | |
| I-37 | | <p><u>DETAILED OBJECTIVE</u> - A SCIENTIFIC, ENGINEERING, MEDICAL, OR OPERATIONAL INVESTIGATION THAT PROVIDES IMPORTANT DATA AND EXPERIENCE FOR USE IN DEVELOPMENT OF HARDWARE AND/OR PROCEDURES FOR APPLICATION TO APOLLO MISSIONS. CSM ORBITAL PHOTOGRAPHIC TASKS, THOUGH REVIEWED BY THE MANNED SPACE FLIGHT EXPERIMENTS BOARD, ARE NOT ASSIGNED AS FORMAL EXPERIMENTS AND WILL BE PROCESSED AS A SINGLE DETAILED OBJECTIVE.</p> | | | | | |
| I-38 | | <p><u>CATEGORY</u> - A CATEGORY IS A DEGREE OF IMPORTANCE ASSIGNED TO SPACE VEHICLE AND OPERATIONAL SUPPORT ELEMENTS. SPECIFIC CATEGORIES APPLICABLE TO MISSION RULES ARE MANDATORY AND HIGHLY DESIRABLE.</p> | | | | | |
| I-39 | | <p><u>MANDATORY (M)</u> - A MANDATORY ITEM IS A SPACE VEHICLE ELEMENT OR OPERATIONAL SUPPORT ELEMENT THAT IS ESSENTIAL FOR ACCOMPLISHMENT OF THE MISSION, WHICH INCLUDES PRELAUNCH, FLIGHT, AND RECOVERY OPERATIONS THAT ENSURE CREW SAFETY AND EFFECTIVE OPERATIONAL CONTROL AS WELL AS THE ATTAINMENT OF THE PRIMARY OBJECTIVES.</p> | | | | | |
| I-40 | | <p><u>HIGHLY DESIRABLE (HD)</u> - A HIGHLY DESIRABLE ITEM IS A SPACE VEHICLE ELEMENT OR OPERATIONAL SUPPORT ELEMENT THAT SUPPORTS AND ENHANCES THE ACCOMPLISHMENT OF THE MISSION AND IS ESSENTIAL FOR THE ACCOMPLISHMENT OF THE DETAILED OBJECTIVES.</p> | | | | | |
| I-41 | | <p><u>SPACE VEHICLE ELEMENT</u> - A PART OF ANY LAUNCH VEHICLE OR SPACECRAFT SYSTEM.</p> | | | | | |
| I-42 | | <p><u>OPERATIONAL SUPPORT ELEMENT</u> - A PART OF ANY SYSTEM OR ACTIVITY THAT IS INVOLVED IN THE COUNTDOWN, LAUNCH, FLIGHT, OR RECOVERY OPERATIONS OTHER THAN THOSE ELEMENTS WHICH ARE A PART OF THE SPACE VEHICLE ITSELF.</p> | | | | | |
| I-43 | | <p><u>REDLINE</u> - A REDLINE VALUE IS A MAXIMUM AND/OR MINIMUM LIMIT OF A CRITICAL PARAMETER NECESSARY TO IDENTIFY VEHICLE, SYSTEM, AND COMPONENT PERFORMANCE AND OPERATION. REDLINE VALUES WILL BE ESTABLISHED SUCH THAT FURTHER DEGRADATIONS OF THE SYSTEM OR COMPONENT COULD LEAD TO A FAILURE TO ACCOMPLISH THE PRIMARY OBJECTIVES.</p> | | | | | |
| I-44 | | <p><u>REDLINE FUNCTION</u> - A REDLINE FUNCTION IS A PARAMETER THAT HAS BEEN IDENTIFIED TO MONITOR THE FUNCTIONING OF A UNIT TO ENSURE THAT THE OPERATIONAL PERFORMANCE OF THE UNIT IS ACCEPTABLE TO MEET THE PRIMARY OBJECTIVES. REDLINE FUNCTIONS ARE MANDATORY.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | GENERAL GUIDELINES | OMSF GENERAL RULES | I-5 |
| | | | | | | | Tape 2.1 |

NASA - Manned Spacecraft Center

MISSION RULES

PART I - GENERAL GUIDELINES - CONTINUED

| R | ITEM | |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I-45 | <u>MEASUREMENT</u> - A MEASUREMENT IS A SPECIFIC DATA CHANNEL OF INSTRUMENTATION MONITORING A SINGLE FUNCTION. | |
| I-46 | <u>INSTRUMENTATION</u> - INSTRUMENTATION IS THE EQUIPMENT THAT ACQUIRES, TRANSMITS, AND MONITORS DATA FOR PERFORMANCE EVALUATION OF SPACE VEHICLE AND OPERATIONAL SUPPORT ITEMS. | |
| I-47 | <u>COUNTDOWN</u> - THE PERIOD OF TIME COMMENCING WITH START OF THE OFFICIAL COUNTDOWN CLOCK. DURING THE INTERVAL OF TIME PRIOR TO THIS PERIOD, TASK ACCOMPLISHMENT IS NOT STRICTLY TIME-RELATED AND A HOLD IS A MEANINGLESS TERM. THE OFFICIAL COUNTDOWN CLOCK STARTS AT THE BEGINNING OF LAUNCH VEHICLE BATTERY INSTALLATION. | |
| I-48 | <u>PROCEED</u> - CONTINUE IN ACCORDANCE WITH PRESCRIBED COUNTDOWN PROCEDURES. | |
| I-49 | <u>HOLD</u> - INTERRUPTION OR DELAY OF THE COUNTDOWN FOR ANY REASON SUCH AS UNFAVORABLE WEATHER, REPAIR OF HARDWARE OR CORRECTION OF CONDITIONS UNSATISFACTORY FOR LAUNCH OR FLIGHT. | |
| I-50 | <u>HOLD-POINT</u> - A PREDETERMINED POINT WHERE THE COUNTDOWN MAY BE CONVENIENTLY INTERRUPTED. | |
| I-51 | <u>SCRUB</u> - THE LAUNCH IS TERMINATED TO BE RESCHEDULED. | |
| I-52 | <u>RECYCLE</u> - THE COUNTDOWN IS STOPPED AND RETURNED TO A DESIGNATED POINT OR AS SPECIFIED IN THE LAUNCH MISSION RULES. | |
| I-53 | <u>TURNAROUND TIME</u> - TURNAROUND TIME IS THE TOTAL TIME REQUIRED FROM A SCRUB TO THE NEXT SCHEDULED LIFTOFF TIME (T-0) INCLUDING RECYCLE AND COUNTDOWN. | |
| I-54 | <u>CUTOFF</u> - THE AUTOMATIC OR MANUAL COMMAND TO STOP THE LAUNCH SEQUENCE AFTER INITIATION OF THE AUTOMATIC LAUNCH SEQUENCE. | |
| I-55 | <u>LIFTOFF</u> - THE EVENT DETERMINED BY THE INSTRUMENTATION UNIT UMBILICAL DISCONNECT SIGNAL. IT IS THAT POINT IN TIME WHEN PLUS TIME COMMENCES. | |
| | | MISSION |
| | | REV |
| | | DATE |
| | | SECTION |
| | | GROUP |
| | | PAGE |
| | | APOLLO 17 |
| | | FNL |
| | | 9/1/72 |
| | | GENERAL GUIDELINES |
| | | OMSF GENERAL RULES |
| | | I-6 |
| | | Tape 2.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S

| R | ITEM | |
|-----|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <u>GENERAL</u> |
| 1-1 | | THE FLIGHT MISSION RULES OUTLINE PREPLANNED DECISIONS DESIGNED TO MINIMIZE THE AMOUNT OF REAL-TIME RATIONALIZATION REQUIRED WHEN NON-NOMINAL SITUATIONS OCCUR DURING THE TERMINAL COUNTDOWN, THE FLIGHT PHASE, AND RECOVERY OPERATIONS. |
| 1-2 | | WHENEVER POSSIBLE, THE CREW AND GROUND WILL VERIFY ALL MALFUNCTIONS. WHENEVER THERE IS A CONFLICT BETWEEN SPACECRAFT AND GROUND TELEMETRY READOUTS, THE SPACECRAFT READOUTS ARE PRIME (ASSUMING THE SPACECRAFT HAS ADEQUATE INSTRUMENTATION AND THAT APPLICABLE SPACECRAFT COCKPIT READOUTS ARE OPERATIONAL). |
| 1-3 | | SPACECRAFT LAUNCH WILL NOT BE ATTEMPTED IF KNOWN SPACECRAFT SYSTEMS MALFUNCTIONS WILL LIMIT THE MISSION DURATION SUCH THAT ACCOMPLISHMENT OF THE PRIMARY DETAILED OBJECTIVES WILL BE COMPROMISED. |
| 1-4 | | WHEN A CONFLICT OF FLIGHT PLAN ACTIVITIES OCCURS, THE FLIGHT DIRECTOR WILL DETERMINE THE PRIORITY OF ACTIVITIES. |
| 1-5 | | IN SOME INSTANCES THE SPECIFIC MISSION RULES MAY DEViate FROM THE GENERAL GUIDELINES CONTAINED IN PART I OR FROM THESE GENERAL RULES. THE SPECIFIC MISSION RULE WILL APPLY IN ALL CASES, AND THE DEVIATIONS FROM THE GENERAL GUIDELINES WILL BE NOTED. |
| 1-6 | | THE FLIGHT DIRECTOR MAY, AFTER ANALYSIS OF THE FLIGHT, CHOOSE TO TAKE ANY NECESSARY ACTION REQUIRED FOR THE SUCCESSFUL COMPLETION OF THE MISSION. |
| 1-7 | | MISSION RULE LIMITS THAT ARE CONSIDERED TO BE INTERIM OR UNCONFIRMED NUMBERS WILL BE UNDERLINED IN THIS PUBLICATION AND IN ALL SUBSEQUENT REVISIONS UNTIL THE NUMBERS ARE CONFIRMED BY THE RESPONSIBLE NASA AGENCY. |
| 1-8 | | 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 SPACECRAFT AND MSFN DATA/DISPLAY SYSTEMS. |
| 1-9 | | UNLESS STATED OTHERWISE, MANDATORY AND HIGHLY DESIRABLE INSTRUMENTATION REQUIREMENTS ARE SATISFIED BY EITHER ONBOARD OR PCM CAPABILITY. |
| | | |
| | MISSION | REV |
| | APOLLO 17 | FNL |
| | DATE | 9/1/72 |
| | SECTION | GENERAL RULES AND SOP'S |
| | GROUP | GENERAL |
| | PAGE | 1-1 |
| | | Tape 3.1 |

MISSION RULES

| R | ITEM |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-10 | <p>MANDATORY SPACE VEHICLE INSTRUMENTATION FOR THE PURPOSES OF FLIGHT MISSION RULES MUST BE IN ACCORD WITH THE FOLLOWING CRITERIA (REFERENCE OMSF GENERAL RULE 1-39):</p> <ul style="list-style-type: none"> A. REQUIRED TO INSURE FLIGHT CREW SAFETY B. REQUIRED TO IMPLEMENT RULES RESULTING IN LAUNCH ABORTS C. REQUIRED TO IMPLEMENT RULES RESULTING IN EARLY MISSION TERMINATION D. REQUIRED TO MAKE DECISION TO CONTINUE TO THE NEXT MISSION PHASE <p>USING THE ABOVE CRITERIA, THE MANDATORY INSTRUMENTATION LISTINGS IN THIS DOCUMENT WILL BE CROSS-REFERENCED TO THE APPROPRIATE MISSION RULE.</p> |
| 1-11 | <p>THE CRITERION FOR CATEGORIZING INSTRUMENTATION AS HIGHLY DESIRABLE IN THE FLIGHT MISSION RULES IS ANY INSTRUMENTATION REQUIRED FOR NORMAL SYSTEMS MANAGEMENT OR REQUIRED FOR FLIGHT CONTROL DECISIONS NOT IN THE MANDATORY CATEGORY.</p> |
| 1-12 | <p>RF COMMANDS WILL NOT BE TRANSMITTED TO THE SPACECRAFT OR LAUNCH VEHICLE DURING THE LAUNCH PHASE UNLESS SPECIFIC MISSION RULES ARE INVOKED WHICH REQUIRE COMMAND ACTIVITY.</p> |
| 1-13 | <p>THE LAUNCH OPERATIONS MANAGER WILL INFORM THE FLIGHT DIRECTOR WHEN THE SPACE VEHICLE HAS CLEARED THE UMBILICAL TOWER BY STATING "CLEAR TOWER" OVER CHANNEL 111.</p> |
| 1-14 | <p>THE COMMAND PILOT MAY INITIATE SUCH INFLIGHT ACTION AS HE DEEMS ESSENTIAL FOR CREW SAFETY.</p> |
| 1-15 | <p>IN THE EVENT OF LOSS OF COMMUNICATIONS BETWEEN THE MSFN AND THE S/C, THE COMMAND PILOT WILL ASSUME RESPONSIBILITY OF MISSION DIRECTION WITHIN THE FRAMEWORK OF THE MISSION RULES.</p> <p>RULE NUMBERS 1-16 THROUGH 1-23 ARE RESERVED.</p> |

| MISSION | REV | DATE | SECTION | GROUP | PAGE | |
|-----------|-----|--------|----------------------------|---------|------|-----------|
| APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | GENERAL | 1-2 | Tape 50.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------|------|----------|-------|------|--|-----------|-----|--------|-------------------------|-------------|-----|----------|
| | | <div>DEFINITIONS</div> | | | | | | | | | | | | | | |
| 1-24 | | <u>ASAP</u> - AS SOON AS PRACTICABLE (I.E., AS SOON AS POSSIBLE AND REASONABLE). | | | | | | | | | | | | | | |
| 1-25 | | <u>PTP</u> - A PREFERRED TARGET POINT IS A STRATEGICALLY LOCATED SET OF COORDINATES FOR WHICH THE SPACECRAFT SHOULD BE TARGETED IF IT BECOMES NECESSARY TO LAND ON THAT REVOLUTION. | | | | | | | | | | | | | | |
| 1-26 | | <u>ATP</u> - AN ALTERNATE TARGET POINT IS A STRATEGICALLY LOCATED SET OF COORDINATES CHOSEN TO PROVIDE A SPACECRAFT TARGET POINT MIDWAY BETWEEN PTP'S. | | | | | | | | | | | | | | |
| 1-27 | | <u>NEXT BEST PTP</u> - A PREFERRED TARGET POINT WHICH CAN BE REACHED BY THE SPACECRAFT WITHIN THE CONSTRAINTS IMPOSED BY THE SPACECRAFT PROBLEM CAUSING AN EARLY MISSION TERMINATION AND ALLOWING THE BEST POSSIBLE REENTRY AND LANDING AREA CONDITIONS. THE MISSION WILL NOT PROCEED TO THE NEXT PHASE UNLESS SPECIFICALLY NOTED. | | | | | | | | | | | | | | |
| 1-28 | | <u>REENTER ASAP</u> - REENTER AS SOON AS PRACTICABLE (I.E., AS SOON AS POSSIBLE AND REASONABLE). | | | | | | | | | | | | | | |
| 1-29 | | <u>TERMINATE ASAP</u> - REENTER WITH THE MINIMUM TRIP TIME TO AN UNSPECIFIED LANDING AREA. | | | | | | | | | | | | | | |
| 1-30 | | <u>CRITICAL MANEUVERS:</u> A. ANY BURN REQUIRED TO EFFECT CREW RECOVERY WHEN THERE IS NO ALTERNATIVE METHOD FOR OBTAINING THE NECESSARY ΔV OR B. ANY REQUIRED BURN WHERE THE USE OF A DEGRADED SPS IS PREFERABLE TO THE USE OF ANY AVAILABLE ALTERNATIVE METHOD. THE MANEUVERS TABULATED ON MR 3-86 HAVING SPS LIMITS OF "NONE" OR "LOOSE" ARE GENERALLY CATEGORIZED AS CRITICAL BURNS WITH THE DEGREE OF CRITICALITY INDICATED BY THE ENGINE LIMITS AND CREW ACTIONS SPECIFIED IN THAT TABLE. | | | | | | | | | | | | | | |
| 1-31 | | <u>NON-CRITICAL BURN</u> - A NON-CRITICAL BURN IS ANY OTHER BURN AND INCLUDES THOSE CHARACTERIZED BY "TIGHT" LIMITS IN MR 3-86. BECAUSE OF TRAJECTORY CONSIDERATIONS OR OTHER REASONS A NON-CRITICAL BURN MAY, ONCE INITIATED, <u>CHANGE CLASSIFICATION</u> . ALSO, A BURN CONSIDERED AS NON-CRITICAL MAY BE RECLASSIFIED IF, IN THE EXISTING MISSION SITUATION, THE FLIGHT DIRECTOR JUDGES ITS VALUE TO BE COMMENSURATE WITH ANY INCREASED RISK. | | | | | | | | | | | | | | |
| 1-32 | | <u>EARLY STAGING</u> - UNSCHEDULED SEPARATION OF THE S-IVB STAGE FROM THE S-II STAGE. | | | | | | | | | | | | | | |
| | | <table><tr><td>MISSION</td><td>REV</td><td>DATE</td><td>SECTION</td><td>GROUP</td><td>DATE</td><td></td></tr><tr><td>APOLLO 17</td><td>FNL</td><td>9/1/72</td><td>GENERAL RULES AND SOP'S</td><td>DEFINITIONS</td><td>1-3</td><td>Tape 3.3</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | DATE | | APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | DEFINITIONS | 1-3 | Tape 3.3 |
| MISSION | REV | DATE | SECTION | GROUP | DATE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | DEFINITIONS | 1-3 | Tape 3.3 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------|------|----------|-------|------|--|-----------|-----|--------|-------------------------|-------------|-----|----------|
| 1-33 | | <u>CONTINGENCY ORBIT INSERTION (COI)</u> - AN SPS PROPULSIVE MANEUVER WHICH WILL PROVIDE CSM INSERTION INTO A SAFE ORBIT ($H_p \geq 70$ NM) IN THE EVENT OF AN SLV FAILURE OCCURRING IMMEDIATELY PRIOR TO INSERTION, OR IN THE EVENT OF DEGRADED SLV PERFORMANCE. | | | | | | | | | | | | | | |
| 1-34 | | <u>S-IVB DESTRUCT PACKAGE SAFING</u> - THE EMERGENCY DESTRUCT PACKAGE IS SAFED BY THE RSO TRANSMITTING A COMMAND WHICH PERMANENTLY REMOVES POWER FROM THE RANGE SAFETY RECEIVERS. | | | | | | | | | | | | | | |
| 1-35 | | <u>S-IVB SAFING</u> - A PASSIVATION SEQUENCE IN WHICH S-IVB LOX, LH ₂ , AND HIGH PRESSURE SPHERES ARE DEPLETED. | | | | | | | | | | | | | | |
| 1-36 | | <u>PRELAUNCH PHASE (PRELN)</u> - THE TIME INTERVAL FROM THE COMPLETION OF THE FLIGHT READINESS REVIEW TO LIFTOFF. | | | | | | | | | | | | | | |
| 1-37 | | <u>FLIGHT PHASE</u> - THE INTERVAL FROM LIFTOFF THROUGH SPLASHDOWN. FOR MISSION RULE PURPOSES THE FLIGHT PHASE IS FURTHER SUBDIVIDED AS SHOWN BELOW: A. <u>LAUNCH PHASE</u> - FROM LIFTOFF THROUGH INSERTION (TB1 THROUGH TB4) B. <u>EARTH ORBIT PHASE</u> - FROM INSERTION THROUGH S-IVB CUTOFF FOR TRANSLUNAR INJECTION (TLI) C. <u>TD&E PHASE</u> - FROM CSM/S-IVB SEPARATION THROUGH LM EJECTION FROM SLA D. <u>TRANSLUNAR COAST PHASE</u> - FROM S-IVB CUTOFF FOR TLI THROUGH LOI 1 CUTOFF E. <u>DOCKED PHASE</u> - THE TIME INTERVALS DURING WHICH THE LM AND CSM ARE DOCKED F. <u>LUNAR ORBIT PHASE</u> - FROM LOI CUTOFF TO UNDOCKING AND FROM REDOCKING TO TEI CUTOFF G. <u>UNDOCKED PHASE</u> - FROM UNDOCKING TO CSM CIRCULARIZATION H. <u>PRE-PDI PHASE</u> - FROM CIRCULARIZATION TO PDI I. <u>POWERED DESCENT</u> - THE TIME INTERVAL FROM THE INITIATION OF THE PDI MANEUVER TO TOUCHDOWN 1. <u>PDI TO PDI + 6:10</u> - DURING THIS TIME PERIOD, THE LM CAN ABORT THE POWERED DESCENT AND GET INTO ORBIT USING THE DPS ONLY AND RETAIN THE DESCENT STAGE AFTER INSERTION. 2. <u>PDI + 6:10 TO HIGH GATE</u> - THIS PERIOD ENDS WHEN THE MANEUVER IS MADE TO VISUALLY ACQUIRE THE LANDING SITE. 3. <u>HIGH GATE TO TOUCHDOWN</u> - LANDING SITE VISABILITY TO TOUCHDOWN. J. <u>LUNAR STAY PHASE</u> - THE TIME INTERVAL FROM TOUCHDOWN UNTIL LIFTOFF K. <u>EVA</u> - THE TIME INTERVAL FROM LM DEPRESSURIZATION (3.5 PSIA AND DECREASING) UNTIL LM REPRESSURIZATION (3.5 PSIA AND INCREASING) L. <u>ASCENT PHASE</u> - THE TIME INTERVAL FROM LIFTOFF TO LM INSERTION INTO LUNAR ORBIT M. <u>RENDEZVOUS</u> - THE TIME INTERVAL FROM INSERTION INTO LUNAR ORBIT AFTER ASCENT OR AFTER AN ABORTED DESCENT UNTIL CSM/LM DOCKING N. <u>TRANSEARTH COAST PHASE</u> - FROM TEI CUTOFF TO CM/SM SEPARATION O. <u>ENTRY PHASE</u> - FROM CM/SM SEPARATION TO SPLASHDOWN | | | | | | | | | | | | | | |
| | | <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 17</td><td>FNL</td><td>9/1/72</td><td>GENERAL RULES AND SOP'S</td><td>DEFINITIONS</td><td>1-4</td><td>Tape 3.4</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | DEFINITIONS | 1-4 | Tape 3.4 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | DEFINITIONS | 1-4 | Tape 3.4 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------|------|----------|-------|------|--|-----------|-----|--------|-------------------------|-------------|-----|----------|
| | 1-38 | <u>RECOVERY PHASE</u> - THE TIME INTERVAL FROM SPLASHDOWN TO DELIVERY OF THE FLIGHT CREW AND SPACECRAFT TO DESIGNATED LAND BASED INSTALLATIONS. | | | | | | | | | | | | | | |
| | 1-39 | <p>REENTRY DEFINITIONS:</p> <p>A. <u>AUTOMATIC</u> - REENTRY CONTROLLED BY CMC WHICH OUTPUTS BANK ANGLE COMMAND TO THE RCS.</p> <p>B. <u>CLOSED LOOP</u> - REENTRY CONTROLLED BY THE CREW MANUALLY FLYING BANK ANGLE MODULATION USING CMC ENTRY PROGRAM OUTPUTS.</p> <p>C. <u>OPEN LOOP REENTRY</u> - REENTRY CONTROLLED BY THE CREW USING SPACECRAFT DISPLAYS AND FLYING:</p> <ol style="list-style-type: none"> 1. BANK ANGLE (RR 0-90) AND RETRB (RL 0-90). 2. CONSTANT BANK ANGLE - CREW ESTABLISHES AND MAINTAINS A CONSTANT BANK ANGLE. (CONSTANT BANK ANGLES GREATER THAN 90 DEGREES WILL NOT BE FLOWN EXCEPT WHEN SKIP-OUT RULE IS VIOLATED.) 3. ROLLING REENTRY - MAINTAIN CONSTANT 18 DEGREES PER SECOND ROLL RATE. 4. EMS RANGING - CONSTANT BANK ANGLE IS HELD TO 1G. THEN THE RANGE-TO-GO DISPLAY AND THE RANGE POTENTIAL LINES ARE COMPARED TO MODULATE THE BANK ANGLE. AT RETRB, THE PRESENT BANK ANGLE IS REVERSED. <p>D. <u>CONSTANT G ENTRY</u> - CREW CONTROLS THE BANK ANGLE TO MAINTAIN A SPECIFIED G LEVEL.</p> <p>E. <u>EMS REENTRY</u> - CREW CONTROLS THE BANK ANGLE TO MAINTAIN A CONSTANT G UNTIL VELOCITY LESS THAN 25,500 FPS. THE EMS IS THEN USED TO CONTROL RANGE BY NULLING THE DIFFERENCE BETWEEN THE RANGE-TO-GO COUNTER AND THE RANGE POTENTIAL GUIDELINES. ALL MANEUVERS ARE OVERRIDDEN AS NECESSARY TO PREVENT AN ONSET OR OFFSET VIOLATION.</p> | | | | | | | | | | | | | | |
| | 1-40 | <u>OPERATIONAL FOOTPRINT</u> - THE AREA THAT IS OPERATIONALLY ACCESSIBLE USING THE G&N, EMS, AND CONSTANT 4G ENTRY MODES AND ALLOWING FOR THEIR ASSOCIATED DISPERSIONS. THE G&N PORTION IS AN AREA ± 70 NM TO EITHER SIDE OF THE GROUND TRACK AND EXTENDING FROM 915 NM FROM EI TO 2000 NM FROM EI. THE EMS AREA IS THE AREA FROM 61 NM UPRANGE TO 91 NM DOWNRANGE AND ± 52 NM IN CROSSRANGE ABOUT THE CONSTANT 4G TARGET POINTS. THE CONSTANT 4G AREA IS THE AREA 110 NM UPRANGE TO 140 NM DOWNRANGE AND ± 27 NM CROSSRANGE ABOUT THE CONSTANT 4G TARGET POINTS. | | | | | | | | | | | | | | |
| | 1-41 | <u>ALTERNATE MISSION</u> - ANY DEVIATION FROM THE NOMINAL MISSION TIMELINE WHERE FURTHER MISSION OBJECTIVES ARE CONSIDERED BEFORE THE END OF THE MISSION. | | | | | | | | | | | | | | |
| | 1-42 | <u>CONTINUE MISSION</u> - THE CONTINUE MISSION RULING FOR MALFUNCTIONS INDICATES THAT THE MISSION WILL BE CONTINUED IN ACCORDANCE WITH PRESENT PLANS UNLESS OVERRIDING FACTORS ARE PRESENT WHICH WOULD CAUSE SELECTION OF AN ALTERNATE CHOICE. | | | | | | | | | | | | | | |
| | 1-43 | <p><u>EVASIVE MANEUVER</u> - USE OF RESIDUAL S-IVB PROPELLANTS TO ACHIEVE THE FOLLOWING IN ORDER OF PRIORITY:</p> <ol style="list-style-type: none"> 1. A REDUCTION IN THE PROBABILITY OF S-IVB AND SPACECRAFT RECONTACT 2. A REDUCTION IN THE PROBABILITY OF S-IVB EARTH IMPACT 3. AN INCREASE IN THE PROBABILITY OF S-IVB LUNAR IMPACT | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>MISSION</th> <th>REV</th> <th>DATE</th> <th>SECTION</th> <th>GROUP</th> <th>PAGE</th> <th></th> </tr> </thead> <tbody> <tr> <td>APOLLO 17</td> <td>FNL</td> <td>9/1/72</td> <td>GENERAL RULES AND SOP'S</td> <td>DEFINITIONS</td> <td>1-5</td> <td>Tape 3.5</td> </tr> </tbody> </table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | DEFINITIONS | 1-5 | Tape 3.5 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | DEFINITIONS | 1-5 | Tape 3.5 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------|------------------------------|-----|------------------------------------------|------|-----|----------------------------------------------------------------------------------------|------|-----|------------------------------------------------------------------------|------|-----|-------------------------------------------|------|-----|---------------------------------------------------------------------------------------------|-------|-----|-----------------------------------------------------------------|---------|-----|-------------------------------------------------------------------|---------|-----|-------------------------------------------------------|----------------------------|
| | 1-44 | <p>LUNAR ABORT MODES AFTER EARLY LOI SHUTOFF (REFERENCE RULE 5-61 FOR ABORT MANEUVER DEFINITION) DPS:</p> <p>A. MODE I - 0 TO 613 FPS (IGN TO 1 + 31)</p> <p>B. MODE II - 613 TO 1200 FPS (1 + 31 TO 2:54)</p> <p>C. MODE III - 1200 TO 2980 (2 + 54 TO C/O)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1-45 | <p>SATURN L/V TIME BASES</p> <table> <tr> <th><u>TIME BASE</u></th><th><u>DEFINITION</u></th><th><u>NOMINAL INITIATE TIME</u></th></tr> <tr> <td>TB1</td><td>LIFTOFF TO S-IC INBOARD ENGINE CUTOFF</td><td>0:00</td></tr> <tr> <td>TB2</td><td>S-IC INBOARD ENGINE CUTOFF TO S-IC OUTBOARD ENGINE CUTOFF (S-IC/S-II STAGING)</td><td>2:17</td></tr> <tr> <td>TB3</td><td>S-IC OUTBOARD ENGINES CUTOFF TO S-II CUTOFF (S-II/S-IVB STAGING)</td><td>2:40</td></tr> <tr> <td>TB4</td><td>S-II CUTOFF TO S-IVB FIRST BURN CUTOFF</td><td>9:17</td></tr> <tr> <td>TB5</td><td>S-IVB FIRST BURN CUTOFF TO S-IVB RESTART PREPARATIONS (RESTART MINUS 9 MIN 38 SEC)</td><td>11:46</td></tr> <tr> <td>TB6</td><td>S-IVB RESTART MINUS 9 MIN 38 SEC TO S-IVB SECOND BURN CUTOFF</td><td>2:20:48</td></tr> <tr> <td>TB7</td><td>S-IVB SECOND CUTOFF TO START OF S-IVB EVASIVE MANEUVER BURN</td><td>2:36:22</td></tr> <tr> <td>TB8</td><td>START EVASIVE BURN TO END OF S-IVB/IC LIFETIME.</td><td>4:14:22 (BY GROUND CMD)</td></tr> </table> <p>RULE NUMBERS 1-45 THROUGH 1-47 ARE RESERVED.</p> | <u>TIME BASE</u> | <u>DEFINITION</u> | <u>NOMINAL INITIATE TIME</u> | TB1 | LIFTOFF TO S-IC INBOARD ENGINE CUTOFF | 0:00 | TB2 | S-IC INBOARD ENGINE CUTOFF TO S-IC OUTBOARD ENGINE CUTOFF (S-IC/S-II STAGING) | 2:17 | TB3 | S-IC OUTBOARD ENGINES CUTOFF TO S-II CUTOFF (S-II/S-IVB STAGING) | 2:40 | TB4 | S-II CUTOFF TO S-IVB FIRST BURN CUTOFF | 9:17 | TB5 | S-IVB FIRST BURN CUTOFF TO S-IVB RESTART PREPARATIONS (RESTART MINUS 9 MIN 38 SEC) | 11:46 | TB6 | S-IVB RESTART MINUS 9 MIN 38 SEC TO S-IVB SECOND BURN CUTOFF | 2:20:48 | TB7 | S-IVB SECOND CUTOFF TO START OF S-IVB EVASIVE MANEUVER BURN | 2:36:22 | TB8 | START EVASIVE BURN TO END OF S-IVB/IC LIFETIME. | 4:14:22 (BY GROUND CMD) |
| <u>TIME BASE</u> | <u>DEFINITION</u> | <u>NOMINAL INITIATE TIME</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TB1 | LIFTOFF TO S-IC INBOARD ENGINE CUTOFF | 0:00 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TB2 | S-IC INBOARD ENGINE CUTOFF TO S-IC OUTBOARD ENGINE CUTOFF (S-IC/S-II STAGING) | 2:17 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TB3 | S-IC OUTBOARD ENGINES CUTOFF TO S-II CUTOFF (S-II/S-IVB STAGING) | 2:40 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TB4 | S-II CUTOFF TO S-IVB FIRST BURN CUTOFF | 9:17 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TB5 | S-IVB FIRST BURN CUTOFF TO S-IVB RESTART PREPARATIONS (RESTART MINUS 9 MIN 38 SEC) | 11:46 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TB6 | S-IVB RESTART MINUS 9 MIN 38 SEC TO S-IVB SECOND BURN CUTOFF | 2:20:48 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TB7 | S-IVB SECOND CUTOFF TO START OF S-IVB EVASIVE MANEUVER BURN | 2:36:22 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TB8 | START EVASIVE BURN TO END OF S-IVB/IC LIFETIME. | 4:14:22 (BY GROUND CMD) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | MISSION | REV | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | APOLLO 17 | FNL | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | DATE | 9/1/72 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | SECTION | GENERAL RULES AND SOP'S | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | GROUP | DEFINITIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | PAGE | 1-6 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Tape 55.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S - CONTINUED

| R | ITEM | CRITERIA FOR TARGET POINT SELECTION | | | | | |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----|--------|-------------------------|----------------------------|----------|
| 1-48 | THE CRITERIA LISTED BELOW WILL BE USED WHEN CHOOSING BETWEEN TWO OR MORE TARGET POINTS. THE CRITICALITY OF THE MISSION SITUATION WILL AFFECT THE APPLICATION OF THESE CRITERIA. | | | | | | |
| | | | | | | PRIORITY | |
| | | ACCEPTABLE LAND MASS CLEARANCE | | | | 1 | |
| | | ACCEPTABLE WEATHER CONDITIONS FOR RECOVERY OPERATIONS AND CM STRUCTURAL INTEGRITY | | | | 2 | |
| | | CAPABILITY OF RECOVERY FORCES | | | | 3 | |
| | | COMMUNICATION WITH THE SPACECRAFT FROM A GROUND STATION AT LEAST 40 MINUTES PRIOR TO DEORBIT BURN* | | | | 4 | |
| | | SUFFICIENT DAYLIGHT FOR RECOVERY OPERATIONS | | | | 5 | |
| | | A GROUND STATION FOR POST-DEORBIT BURN* TRACKING | | | | 6 | |
| | | VOICE CONTACT PRIOR TO AND DURING DEORBIT BURN* | | | | 7 | |
| | | POST-BLACKOUT TRACKING DATA AVAILABLE FOR REENTRY (ASSUMES PRE-BLACKOUT ACQUISITIONS) | | | | 8 | |
| | | GROUND STATIONS AVAILABLE TO OBTAIN ΔV_C READOUTS AND TO PASS CREW BACKUP GUIDANCE QUANTITIES | | | | 9 | |
| | | *OR FINAL MCC MANEUVER | | | | | |
| 1-49 | LUNAR RETURN ENTRY RANGE PRIORITY - THE RELATIVE ENTRY RANGE AT A -6.5 DEG FLIGHTPATH ANGLE (400,000 FEET TO SPLASH) PRIORITY IS AS FOLLOWS: | | | | | | |
| | A. 1070-1215 NM (NOMINAL) | | | | | | |
| | B. 1455-1565 NM (USED TO AVOID WEATHER VIOLATIONS IN PRIORITY A.) | | | | | | |
| | C. 1800-2500 NM (USED TO AVOID EXTREME WEATHER VIOLATIONS IN PRIORITES A AND B.) | | | | | | |
| | RULE NUMBERS 1-50 THROUGH 1-55 ARE RESERVED. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | TARGET POINT SEL. CRITERIA | 1-7 |
| | | | | | | | Tape 4.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S - CONTINUED

| R | ITEM | | | | | | |
|------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-------------------------|--------------|----------|
| | | <u>PRELAUNCH RULES</u> | | | | | |
| 1-56 | | <p><u>MANDATORY</u> - THE COGNIZANT FLIGHT CONTROLLER WILL REQUEST A HOLD OR A CUTOFF FROM THE FLIGHT DIRECTOR IN CASE OF A LOSS OR FAILURE OF A MANDATORY ITEM. PRIOR TO T-1 MIN, FAILURES OF MANDATORY ITEMS WILL BE CONFIRMED PRIOR TO REQUESTING A HOLD OR A CUTOFF. AFTER T-1 MIN, CUTOFF WILL BE REQUESTED FOR MANDATORY ITEMS WITHOUT VERIFICATION DUE TO THE LIMITED TIME REMAINING. AT T-20 SEC, ALL MANDATORY ITEMS WILL REVERT TO HIGHLY DESIRABLE UNLESS SPECIFICALLY DESIGNATED AS MANDATORY TO L/O. REFERENCE THE LAUNCH MISSION RULES DOCUMENT FOR SPECIFIC PROCEDURES.</p> | | | | | |
| 1-57 | | <p><u>HIGHLY DESIRABLE</u> - THE COGNIZANT FLIGHT CONTROLLER WILL NOTIFY THE FLIGHT DIRECTOR IN CASE OF A LOSS OR A FAILURE OF A HIGHLY DESIRABLE ITEM(S). A HOLD MAY BE CALLED BY THE FLIGHT DIRECTOR TO REPAIR THIS ITEM(S) WHEN IT IS CONVENIENT AND IF THE ESTIMATED TIME TO REPAIR OR REPLACE THE ITEMS(S) IS ACCEPTABLE. ALL HIGHLY DESIRABLE ITEMS REVERT TO DESIRABLE AFTER AUTO SEQUENCE START.</p> | | | | | |
| 1-58 | | <p><u>DESIRABLE</u> - FLIGHT CONTROLLERS WILL NOT CALL HOLDS FOR THE LOSS OF DESIRABLE ITEMS AS THEY ARE PLACED IN THIS CATEGORY BECAUSE THEY ARE ITEMS OF SUPPORT WHICH ARE OF MINOR IMPORTANCE TO FLIGHT OPERATIONS.</p> | | | | | |
| 1-59 | | <p>MANUAL CUTOFF WILL NOT BE ATTEMPTED FROM T-11 SECONDS (ENGINE IGNITION) TO T-0.</p> | | | | | |
| | | <p>RULE NUMBERS 1-60 THROUGH 1-65 ARE RESERVED.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | LAUNCH RULES | 1-8 |
| | | | | | | | Tape 4.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------|------|----------|-------|------|--|-----------|-----|--------|-------------------------|--------------|-----|----------|
| | | <div>LAUNCH ABORTS</div> | | | | | | | | | | | | | | |
| 1-66 | | ABORT REQUEST COMMANDS ARE COMMANDS TRANSMITTED FROM THE MCC OR LCC WHICH ILLUMINATE THE ABORT REQUEST LIGHT ON THE COMMAND PILOT'S PANEL. THE "ABORT LIGHT" AND A VOICE REPORT "ABORT" OVER A/G ARE CONSIDERED TWO CUES FOR THE CREW TO TAKE THE NECESSARY ACTION TO ABORT THE MISSION. THE GROUND WILL USE TWO INDEPENDENT CUES PRIOR TO TRANSMITTING "ABORT REQUEST." ADDITIONAL CUES FOR THE CREW WILL COME FROM ONBOARD INDICATIONS. | | | | | | | | | | | | | | |
| 1-67 | | ABORT ACTION CAN BE INITIATED ONLY BY THE CREW OR THE EDS. | | | | | | | | | | | | | | |
| 1-68 | | WHENEVER POSSIBLE, ALL ABORTS AND EARLY MISSION TERMINATIONS WILL BE TIMED FOR A WATER LANDING. | | | | | | | | | | | | | | |
| 1-69 | | THE FLIGHT DIRECTOR WILL INITIATE THE ABORT REQUEST FOR SPACECRAFT SYSTEM MALFUNCTIONS. | | | | | | | | | | | | | | |
| 1-70 | | THE FLIGHT DYNAMICS OFFICER WILL INITIATE THE ABORT REQUEST COMMAND DURING THE FLIGHT PHASE IF THE SPACE VEHICLE EXCEEDS THE FLIGHT DYNAMICS ENVELOPE. | | | | | | | | | | | | | | |
| 1-71 | | THE BOOSTER SYSTEMS ENGINEER WILL INITIATE THE ABORT REQUEST COMMAND BASED UPON LAUNCH VEHICLE TIME-CRITICAL SYSTEMS MALFUNCTIONS THAT WOULD NOT ALLOW A SAFE INSERTION OR CONTINUATION TO A FLIGHT DYNAMICS LIMIT LINE. | | | | | | | | | | | | | | |
| 1-72 | | <p>THE ONLY KSC POSITION THAT WILL HAVE ABORT REQUEST CAPABILITY IS THE LAUNCH OPERATIONS MANAGER. THE LAUNCH OPERATIONS MANAGER MAY SEND AN ABORT REQUEST FROM THE TIME THE LAUNCH ESCAPE SYSTEM IS ARMED UNTIL THE SPACE VEHICLE REACHES SUFFICIENT ALTITUDE TO CLEAR THE TOP OF THE UMBILICAL TOWER. PRIOR TO TRANSFER OF CONTROL TO THE FLIGHT DIRECTOR, THE LAUNCH OPERATIONS MANAGER WILL INITIATE THE ABORT REQUEST COMMAND FROM KSC BASED ON THE CRITERIA DEFINED IN THE LMRD. THESE INCLUDE:</p> <p>A. MAJOR STRUCTURAL FAILURE OR EXPLOSION B. NEGATIVE VERTICAL MOTION C. UNCONTROLLABLE VEHICLE TILTING D. CATASTROPHIC FIRES PRIOR TO LIFTOFF</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 17</td><td>FNL</td><td>9/1/72</td><td>GENERAL RULES AND SOP'S</td><td>LAUNCH RULES</td><td>1-9</td><td>Tape 4.3</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | LAUNCH RULES | 1-9 | Tape 4.3 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | LAUNCH RULES | 1-9 | Tape 4.3 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | | | | | | | |
|-----------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------|-------|------------|-----------|---------------|-------------------------|-----------------------------|-----------|------------------------------------------|----------------------------|---------------------------|------|------------------|-------------------------|------------------------|-----|---------------------------|------|----------------------------------------------|
| | 1-73 | THE RSO CAN SHUT DOWN THE SLV BY TRANSMITTING THE MFCO COMMAND WHICH ALSO LIGHTS THE ABORT REQUEST LIGHT IN THE SPACECRAFT. THE MFCO WILL INITIATE AN AUTO-ABORT IF TRANSMITTED PRIOR TO EDS DISABLE. THE MFCO COMMAND INITIATES A 4.1-SEC TIMER ON THE GROUND (CAPE RSO CONSOLE ONLY), WHICH IN TURN ENABLES DESTRUCT CAPABILITY IF TRANSMITTED. THE BRSO INSERTS A TIME DELAY MANUALLY. THE RSO DESTRUCT COMMAND CAN THEN DESTROY THE SLV. THE RSO WILL ALWAYS SAFE THE S-IVB AFTER TRANSMITTING MFCO UPON VERIFICATION OF CUTOFF IF THE DESTRUCT COMMAND IS NOT TO BE TRANSMITTED. | | | | | | | | | | | | | | | | | | | | |
| | 1-74 | THE RSO WILL SAFE THE S-IVB DESTRUCT SYSTEM AFTER CONFIRMATION OF S-IVB C/O FROM THE FLIGHT DYNAMICS OFFICER. IF COMMUNICATIONS ARE LOST WITH THE FIDO, THE S-IVB DESTRUCT SYSTEM WILL BE SAFED, BASED ON THE RSO'S VERIFICATION OF S-IVB CUTOFF. ONCE SAFED, THE S-IVB DESTRUCT SYSTEM CANNOT BE REINITIATED. IF THE RSO INITIATES MFCO, THE RSO WILL INITIATE SAFING AFTER VERIFICATION OF S-IVB CUTOFF. | | | | | | | | | | | | | | | | | | | | |
| | 1-75 | <p>EMERGENCY ENGINE SHUTDOWN METHODS:</p> <table><thead><tr><th>INITIATOR</th><th>METHOD</th><th>STAGE</th><th>TIME FRAME</th></tr></thead><tbody><tr><td>ASTRONAUT</td><td>CCW ON THC</td><td>S-IC, S-II, S-IVB</td><td>T+30 SEC TO S-IVB CUTOFF</td></tr><tr><td>ASTRONAUT</td><td>S-II/ S-IVB L/V STAGE SWITCH</td><td>S-II, S-IVB</td><td>T+2:43 TO S-IVB CUTOFF</td></tr><tr><td>RSO</td><td>RF CMD (MFCO)</td><td>S-IC, S-II, S-IVB</td><td>T-0 TO S-IVB CUTOFF</td></tr><tr><td>EDS</td><td>2 OF 3 VOTING LOGIC</td><td>S-IC</td><td>T+30 SEC TO EDS AUTO OFF AT T+2:00 MIN</td></tr></tbody></table> <p>NOTE: EDS WILL INITIATE ABORT FROM T-0 TO T+30 SEC. HOWEVER, S-IC ENGINES WILL NOT BE SHUT DOWN.</p> | INITIATOR | METHOD | STAGE | TIME FRAME | ASTRONAUT | CCW ON THC | S-IC, S-II, S-IVB | T+30 SEC TO S-IVB CUTOFF | ASTRONAUT | S-II/ S-IVB L/V STAGE SWITCH | S-II, S-IVB | T+2:43 TO S-IVB CUTOFF | RSO | RF CMD (MFCO) | S-IC, S-II, S-IVB | T-0 TO S-IVB CUTOFF | EDS | 2 OF 3 VOTING LOGIC | S-IC | T+30 SEC TO EDS AUTO OFF AT T+2:00 MIN |
| INITIATOR | METHOD | STAGE | TIME FRAME | | | | | | | | | | | | | | | | | | | |
| ASTRONAUT | CCW ON THC | S-IC, S-II, S-IVB | T+30 SEC TO S-IVB CUTOFF | | | | | | | | | | | | | | | | | | | |
| ASTRONAUT | S-II/ S-IVB L/V STAGE SWITCH | S-II, S-IVB | T+2:43 TO S-IVB CUTOFF | | | | | | | | | | | | | | | | | | | |
| RSO | RF CMD (MFCO) | S-IC, S-II, S-IVB | T-0 TO S-IVB CUTOFF | | | | | | | | | | | | | | | | | | | |
| EDS | 2 OF 3 VOTING LOGIC | S-IC | T+30 SEC TO EDS AUTO OFF AT T+2:00 MIN | | | | | | | | | | | | | | | | | | | |
| | 1-76 | <p>THE AUTOMATIC EDS (TWO ENGINE OUT AND OVERRATE AUTO-ABORT CAPABILITIES) WILL BE FLOWN CLOSED LOOP UNTIL T+02:00. DURING LAUNCH, MALFUNCTIONS AFFECTING EDS OPERATION WILL BE MANAGED AS FOLLOWS:</p> <p>THE EDS AUTO SWITCH WILL BE TURNED OFF WHENEVER ANY TWO CSM ENTRY BATTERIES ARE TIED TO THE SAME MAIN BUS OR FOR CONFIRMED LOSS OF ANY CSM ENTRY BATTERY.</p> | | | | | | | | | | | | | | | | | | | | |
| | | <table><tr><td>MISSION</td><td>REV</td><td>DATE</td><td>SECTION</td><td>GROUP</td><td>PAGE</td><td></td></tr><tr><td>APOLLO 17</td><td>FNL</td><td>9/1/72</td><td>GENERAL RULES AND SOP'S</td><td>LAUNCH RULES</td><td>1-10</td><td>Tape 4.4</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | LAUNCH RULES | 1-10 | Tape 4.4 | | | | | | |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | LAUNCH RULES | 1-10 | Tape 4.4 | | | | | | | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S - CONTINUED

| R | ITEM | | | | | | |
|---|------|--------------------|-----|----------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------|------|
| | 1-77 | <u>ABORT MODES</u> | | | | | |
| | | <u>MODE I</u> | | <u>BOUNDARY OF APPLICATION</u> | | | |
| | | IA | | LES ABORT ENABLE (APPROX T-45 MIN) TO GET 61 SEC (22.1K FT) | | | |
| | | IB | | GET 61 SEC TO 100K FEET ALTITUDE (GET APPROX 1:50) | | | |
| | | IC | | 100K FEET ALTITUDE TO TOWER JETTISON (GET APPROX 3:15) | | | |
| | 1-78 | <u>MODE II</u> | | <u>BOUNDARY OF APPLICATION</u> | | <u>PROCEDURES</u> | |
| | | | | TOWER JETTISON (GET APPROX 3:15) UNTIL FULL LIFT SPLASH POINT IS 3200 NM DOWNRANGE (GET APPROX 10:13) | | A. MCC PROVIDES: 1. GET OF 300K 2. PITCH AT .05G 3. GET DROGUE B. ENTRY IS FULL LIFT | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | LAUNCH RULES | 1-11 |
| | | Tape 4.5 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S - CONTINUED

| R | ITEM | CREW ABORT LIMITS | | | | | |
|---|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------|----------------------------|----------------------|------|
| | 1-87 | <p><u>MAX Q REGION</u></p> <p>(00:50 TO 02:00) AOA GREATER THAN OR EQUAL TO 100 PCT AND ROLL, PITCH, OR YAW ERROR GREATER THAN OR EQUAL TO 5 DEGREES (NOT APPLICABLE TO ANY ENGINE OUT PRIOR TO 50 SEC)</p> | <p><u>PROCEDURES</u></p> <p>ABORT MODE I (ACTION ONLY AFTER BOTH HAVE REACHED THRESHOLD)</p> | | | | |
| | 1-88 | <p><u>RATES AND ATTITUDE</u></p> <p>A. PITCH AND YAW</p> <p>1. L/O TO 2 MIN - 4 DEG/SEC 2. 2 MIN TO S-IVB CUTOFF - 10 DEG/SEC 3. YAW DEVIATION GREATER THAN 20 DEG (S-II AND S-IVB BURN ONLY) (WITH ALL ENGINES OPERATING)</p> <p>B. ROLL</p> <p>L/O TO S-IVB CUTOFF - 20 DEG/SEC</p> | <p><u>PROCEDURES</u></p> <p>ABORT MODE I, MODE II, MODE III, OR MODE IV</p> <p>ABORT MODE I, MODE II, MODE III, OR MODE IV</p> | | | | |
| | 1-89 | <p><u>EDS AUTOMATIC ABORT LIMITS</u> (UNTIL MANUAL DEACTIVATION OF TWO ENGINES OUT AUTO AND LV RATES AT 2:00 MIN)</p> <p><u>BOUNDARY OF APPLICATION</u></p> <p>A. RATES</p> <p>PITCH AND YAW 4.0 ± 0.5 DEG/SEC ROLL 20.0 ± 0.5 DEG/SEC</p> <p>B. ANY TWO ENGINES OUT</p> <p>C. CM TO IU BREAKUP</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | CREW ABORT LIMITS | 1-13 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 - GENERAL RULES AND SOP'S - CONCLUDED

| R | ITEM | | | | | | |
|---|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-------------------------|-------------------|------|
| | 1-90 | <u>S-IVB TANK PRESSURE LIMITS</u> A. BULKHEAD ΔP (FIRST S-IVB C/O TO S/C L/V SEP) FUEL GREATER THAN OXID = 26 PSID OXID GREATER THAN FUEL = 36 PSID B. LOX TANK PRESS GREATER THAN OR EQUAL TO 50 PSIA (L/O TO S/C L/V SEP) | | | | | |
| | 1-91 | <u>ENGINE FAILURES</u> LOSS OF THREE OR MORE S-II ENGINES PRIOR TO S-IVB TO COI CAPABILITY | | | | | |
| | | <u>PROCEDURES</u> ABORT MODE I OR MODE II | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | GENERAL RULES AND SOP'S | CREW ABORT LIMITS | 1-14 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 - FLIGHT OPERATIONS RULES

| R | ITEM | GENERAL | | | | | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|------------------|---------|------|
| | 2-1 | <p><u>PRELAUNCH</u></p> <p>A. LAUNCH AZIMUTH LIMITATIONS RESTRICT LAUNCHES TO OCCUR BETWEEN 72 DEGREES AND 100 DEGREES.</p> <p>B. THE FLIGHT DIRECTOR WILL EVALUATE WIND SIMULATIONS ALONG THE MODE I (TOWER) ABORT TRACK PRIOR TO THE START OF CRITICAL COUNTDOWN ACTIVITIES AND WILL ADVISE THE LAUNCH DIRECTOR OF ANY PREDICTED PERIODS OF LAND LANDING. IF THE FLIGHT DIRECTOR IS UNABLE TO PROVIDE THIS EVALUATION, A LAND LANDING WILL BE ASSUMED AND THE SPACECRAFT WIND CONSTRAINTS FOR LAND IP'S WILL BE APPLIED. THESE CONSTRAINTS REQUIRE THAT THE SPACECRAFT NOT BE LAUNCHED OR REMAIN IN A TOWER ABORT MODE IF A TOWER ABORT WOULD RESULT IN A LAND LANDING WITH A HORIZONTAL VELOCITY COMPONENT OF GREATER THAN 54 FEET PER SECOND AT IMPACT. IN ALL CASES, THE LAUNCH DIRECTOR WILL BE PRIME FOR CALLING HOLDS FOR LAND LANDING LAUNCH WIND VIOLATIONS.</p> <p>C. THE LAUNCH WILL NOT BE ATTEMPTED IF THE MINIMUM GROUND INSTRUMENTATION CAPABILITY IS COMPROMISED. CONTINUOUS TRACKING COVERAGE IS REQUIRED FROM LIFTOFF THROUGH LIFTOFF PLUS 10 MIN. CONTINUOUS TM AND VOICE ARE REQUIRED FROM LIFTOFF THROUGH INSERTION.</p> | | | | | |
| | 2-2 | <p><u>LAUNCH</u></p> <p>IT IS PREFERABLE TO GO INTO ORBIT RATHER THAN PERFORM A LAUNCH ABORT. THEREFORE, THE LAUNCH WILL BE CONTINUED AS LONG AS THE CREW CONDITION IS SATISFACTORY, NO S/C OR SLV PROBLEMS EXIST WHICH JEOPARDIZE CREW SAFETY, AND SUFFICIENT CONSUMABLES, COOLANT, AND ELECTRICAL ENERGY REMAIN FOR AT LEAST ONE REVOLUTION PLUS ENTRY.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | FLIGHT OPS RULES | GENERAL | 2-1 |
| | | Tape 11.1 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 - FLIGHT OPERATIONS RULES - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------|------|----------|-------|------|--|-----------|-----|--------|------------------|---------|-----|----------|
| | 2-3 | <p><u>EARTH ORBIT</u></p> <p>A. ENTRY WILL BE MADE AT THE NEXT BEST PTP WHEN ONE MORE CSM FAILURE WILL RESULT IN AN ASAP ENTRY OR UNCONTROLLABLE CONDITIONS.</p> <p>B. ADEQUATE CONSUMABLES WILL BE MAINTAINED FOR ENTRY IN THE NEXT PTP, MAKING ALLOWANCES FOR SETUP AND ENTRY.</p> <p>C. THE DEORBIT CAPABILITIES REQUIRED FOR EARTH ORBIT ARE:</p> <ol style="list-style-type: none">1. TWO METHODS OF DEORBIT ARE REQUIRED.2. IF A SUBSEQUENT SINGLE FAILURE WOULD PRECLUDE DEORBIT BY EITHER METHOD REMAINING, THE CSM WILL DEORBIT.3. SPS IS THE PRIME METHOD OF DEORBIT AND SUFFICIENT ΔV WILL BE RESERVED FOR THIS MANEUVER.4. SM-RCS (4 QUAD) AND SM-CM/RCS HYBRID WILL BE CONSIDERED AS INDEPENDENT DEORBIT METHODS AS LONG AS INDIVIDUAL SM-RCS QUAD AND GNCS INTEGRITY IS MAINTAINED AND SUFFICIENT RCS PROPELLANT IS AVAILABLE.5. THE LM PROPULSION SYSTEM (DPS OR RCS) MAY BE USED TO PLACE THE CSM IN AN ORBIT ($H_p \geq 80$ NM) FROM WHICH A SM-RCS OR SM-CM/RCS HYBRID DEORBIT CAN BE CONDUCTED.6. UTILIZATION OF BACKUP DEORBIT METHODS WILL BE BASED ON THE FOLLOWING PRIORITIES:<ol style="list-style-type: none">(A) SM-RCS(B) LM PROP PLUS SM-RCS(C) SM-CM/RCS HYBRID(D) LM PROP PLUS SM-CM/RCS HYBRID <p>RULE NUMBERS 2-4 THROUGH 2-10 ARE RESERVED.</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 17</td><td>FNL</td><td>9/1/72</td><td>FLIGHT OPS RULES</td><td>GENERAL</td><td>2-2</td><td>Tape 6.2</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | FLIGHT OPS RULES | GENERAL | 2-2 | Tape 6.2 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | FLIGHT OPS RULES | GENERAL | 2-2 | Tape 6.2 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 - FLIGHT OPERATIONS RULES - CONTINUED

SECTION 2 - FLIGHT OPERATIONS RULES - CONTINUED

R ITEM

2-11

TRANSLUNAR INJECTION

A. THE TLI WILL BE GO IF THE S/C AND L/V SATISFY THE FOLLOWING CRITERIA:

1. THERE HAVE BEEN NO FAILURES IN THE LAUNCH VEHICLE WHICH RESULT IN A CATASTROPHIC HAZARD.
2. A "GO FOR TLI" RECOMMENDATION WILL BE GIVEN IF ENOUGH PROPELLANT IS AVAILABLE AND THE SLV HARDWARE STATUS IS DEEMED ADEQUATE FOR A REASONABLE PROBABILITY OF REACHING A 28,000 NM APOGEE. THE FINAL DECISION RESTS WITH THE FLIGHT DIRECTOR FOR DETERMINING A REASONABLE PROBABILITY.
3. THE CSM HAS TOTAL SYSTEMS CAPABILITY WITH REDUNDANCY. REDUNDANCY VERIFICATION IS SUBJECT TO THE NUMBER AND TYPE OF REDUNDANT COMPONENT CHECKS WHICH CAN BE PERFORMED IN EARTH ORBIT.

B. THE TLI MANEUVER WILL BE DELAYED UNTIL THE SECOND OPPORTUNITY FOR SUSPECTED FAILURE OF A CRITICAL SYSTEM (PRIME OR BACKUP - MANEUVER, LIFE SUPPORT, COOLING, POWER SEQUENTIAL, COMMUNICATIONS) WHICH REQUIRES TIME FOR EVALUATION.

C. TLI TARGETING WILL BE SUCH THAT A SAFE CIRCUMLUNAR RETURN TO EARTH CAN BE RE-ESTABLISHED WITHIN LM DPS CAPABILITY AS LATE AS PC + 2 HRS. THE CAPABILITY WILL EXIST TO ESTABLISH A SAFE CIRCUMLUNAR RETURN TO EARTH WITH THE SM-RCS UNTIL TLI + 5 HRS.

2-12

TRANSPOSITION, DOCKING AND EJECTION (TD&E)

A. THE NORMAL MINIMUM CABIN PRESSURE REDLINE OF 4.0 PSIA FOR TUNNEL/LM PRESSURIZATION SEQUENCES MAY BE WAIVED DURING TD&E. THE CM WILL BE DEPRESSURIZED AS REQUIRED TO ACCOMPLISH HATCH REMOVAL FOR UMBILICAL HOOKUP OR DOCKING INTERFACE INSPECTION.

B. IF NORMAL LM EJECTION IS NOT SUCCESSFUL, NO ATTEMPT WILL BE MADE TO MAN THE LM AND "STAGE" TO RECOVER THE ASCENT STAGE.

MISSION

REV

DATE

SECTION

GROUP

PAGE

APOLLO 17

FNL

9/1/72

FLIGHT OPS RULES

GENERAL

2-3

Tape 50.2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 - FLIGHT OPERATIONS RULES - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------|------|-----------|-------|------|--|-----------|-----|--------|------------------|---------|-----|-----------|
| | 2-13 | <p><u>TRANSLUNAR COAST</u></p> <p>A. NO MCC WILL BE PERFORMED IF LOI CAN BE TARGETED WITHIN OPERATIONAL CONSTRAINTS.</p> <p>B. TRANSLUNAR COAST WILL BE TERMINATED IF ADEQUATE CONSUMABLES (CSM AND/OR LM) ARE NOT AVAILABLE FOR A CIRCUMLUNAR EARTH RETURN + 12 HRS AND A TLC DIRECT ABORT PROVIDES AN EARLIER LANDING TIME.</p> <p>C. THE CREW WILL MAN THE LM FOR BACKUP COMMUNICATIONS (VOICE, TM, TRACK) IF CSM COMMUNICATIONS ARE LOST WITH THE MSFN. WITH LOSS OF CSM COMMUNICATIONS, A LUNAR ORBIT MISSION WILL BE FLOWN UTILIZING THE LM COMMUNICATIONS SYSTEMS.</p> <p>D. MCC'S WILL BE DESIGNED TO MEET LOI TARGETING CONSTRAINTS WHILE RESERVING A CAPABILITY TO PERFORM A RETURN TO EARTH MANEUVER WITH DPS ENGINE AS LATE AS 2 HOURS AFTER PERILUNE ON THE CIRCUMLUNAR TRAJECTORY.</p> <p>E. FOR A CSM SOLO MISSION, MCC'S WILL BE TARGETED SO A SAFE CIRCUMLUNAR RETURN TO EARTH CAN BE ESTABLISHED WITHIN RCS CAPABILITY.</p> <p>F. SIM BAY EXPERIMENT OPERATION DURING TLC</p> <p>1. ALL CREWMEN WILL BE IN THE CSM FOR SIM BAY DOOR JETTISON.</p> <p>2. A NO-GO FOR LOI WILL NOT PRECLUDE SIM BAY DOOR JETTISON.</p> | | | | | | | | | | | | | | |
| | 2-14 | <p><u>LUNAR ORBIT INSERTION</u></p> <p>A. LOI WILL BE INHIBITED AND A LUNAR FLYBY PERFORMED IF THE CSM DOES NOT SATISFY ANY OF THE FOLLOWING CONDITIONS:</p> <p>1. FULL CRITICAL SYSTEMS REDUNDANCY</p> <p>2. ADEQUATE CONSUMABLES FOR MINIMUM LUNAR ORBIT OPERATIONS WITH CAPABILITY TO SUSTAIN A CRYO TANK LOSS AND RETURN TO EARTH WITH AN AVERAGE POWER LEVEL OF 40 AMPS</p> <p>3. SPS PROPELLANT RESERVE CAPABILITY FOR TEI AND TRANSEARTH MCC'S</p> <p>4. RCS PROPELLANT RESERVE TO ACCOMPLISH TEI CONTROL, TRANSEARTH MCC CONTROL, PTC, MINIMUM TRANSEARTH AND LUNAR ORBIT OPERATIONS</p> <p>B. A DPS LOI MAY BE PERFORMED IF REQUIRED TO ACCOMPLISH A LUNAR ORBIT MISSION.</p> <p>C. FOR A CSM SOLO MISSION, THE SIM BAY DOOR MUST BE JETTISONED (ALLOWING SIM BAY SCIENCE OPERATIONS) TO BE GO FOR LOI.</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 17</td><td>FNL</td><td>9/1/72</td><td>FLIGHT OPS RULES</td><td>GENERAL</td><td>2-4</td><td>Tape 55.2</td></tr> </table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | FLIGHT OPS RULES | GENERAL | 2-4 | Tape 55.2 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | FLIGHT OPS RULES | GENERAL | 2-4 | Tape 55.2 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 - FLIGHT OPERATIONS RULES - CONTINUED

| R | ITEM | | | | | | |
|---|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|------------------|---------|-----------|
| | 2-15 | <p><u>LUNAR ORBIT</u></p> <p>A. FOR LOI DISPERSIONS, IF A STABLE ORBIT HAS NOT BEEN ACHIEVED, A DPS 30-MINUTE ABORT OR A DPS 2-HOUR ABORT WILL BE EXECUTED FOLLOWED BY A SUBSEQUENT DPS (OR APS) MANEUVER IF REQUIRED.</p> <p>B. DESIGNED REDUNDANT CAPABILITY MUST BE MAINTAINED IN ALL CSM SYSTEMS CRITICAL FOR TEI AND LIFE SUPPORT.</p> <p>C. SUFFICIENT CONSUMABLES MUST REMAIN TO COMPLETE THE NEXT MISSION PHASE WITH CAPABILITY TO SUSTAIN A CRYO TANK LOSS DURING THE PHASE AND RETURN TO EARTH WITH AN AVERAGE POWER LEVEL OF 40 AMPS.</p> <p>D. THE CSM MUST MAINTAIN AN SPS FUEL RESERVE CAPABILITY FOR THE TEI MANEUVERS AND TRANSEARTH MCC'S.</p> <p>E. THE CSM MUST MAINTAIN RCS PROPELLANT RESERVE TO ACCOMPLISH TEI CONTROL, TEC MCC CONTROL, PTC, AND MINIMAL TRANSEARTH OPERATIONS.</p> <p>F. IF A LANDING MISSION IS NOT POSSIBLE, THE ALTERNATE MISSION WILL NOT BE SHORTENED SOLELY TO ALLOW DPS TEI CAPABILITY. IF THE DPS IS AVAILABLE AT THE TEI TIME, IT WILL BE USED FOR TEI.</p> <p>G. LUNAR ORBIT SCIENCE OPERATIONS</p> <p>1. NO EVA WILL BE PERFORMED FOR SYSTEMS TROUBLE SHOOTING ON AN INDIVIDUAL SIM BAY MALFUNCTION.</p> <p>2. DURING LUNAR SOUNDERS OPERATIONS, IF EMI RESULTS IN DEGRADATION OR LOSS OF TM, THE LUNAR SOUNDER OPERATION MAY BE CONTINUED DEPENDING ON THE STATUS OF CSM SYSTEMS.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | FLIGHT OPS RULES | GENERAL | 2-5 |
| | | | | | | | Tape 53.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 - FLIGHT OPERATIONS RULES - CONTINUED

SECTION 2 - FLIGHT OPERATIONS RULES - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------|------|-----------|-------|------|--|-----------|-----|--------|------------------|---------|-----|-----------|
| | 2-16 | <p><u>DESCENT ORBIT INSERTION (DOI)</u></p> <p>DOI₁ WILL BE PERFORMED ONLY IF A LUNAR LANDING MISSION CAN BE ACCOMPLISHED, OTHERWISE AN LOI-2 MANEUVER WILL BE PERFORMED TO ATTAIN APPROXIMATELY A 60 NM CIRCULAR ORBIT.</p> | | | | | | | | | | | | | | |
| | 2-17 | <p><u>INTRAVEHICULAR TRANSFER</u></p> <p>ONE HARDSUIT IVT FROM THE CSM TO THE LM WILL BE ACCOMPLISHED IF A REASONABLE CHANCE EXISTS THAT CORRECTIVE ACTION CAN BE TAKEN FOR A LM/TUNNEL PRESSURIZATION.</p> | | | | | | | | | | | | | | |
| | 2-18 | <p><u>DOCKED LM OPERATIONS</u></p> <p>FOR AN IMPENDING HAZARDOUS SITUATION RESULTING FROM A DESCENT STAGE PROBLEM, THE STAGE WILL BE JETTISONED AND ASCENT STAGE OPERATIONS WILL CONTINUE AFTER THE VEHICLE HAS MOVED TO A SAFE DISTANCE.</p> <p>RULES NUMBERS 2-19 AND 2-20 ARE RESERVED.</p> | | | | | | | | | | | | | | |
| | 2-21 | <p><u>CSM/LM UNDOCKING AND SEPARATION</u></p> <p>A. A MANNED LM WILL NOT BE UNDOCKED FROM THE CSM WITHOUT INDEPENDENT MANEUVER CAPABILITY OF BOTH VEHICLES TO RENDEZVOUS.</p> <p>B. EVT CAPABILITY IS REQUIRED FOR MANNED UNDOCKING.</p> <p>C. VHF COMMUNICATIONS ARE MANDATORY FOR SEPARATION.</p> | | | | | | | | | | | | | | |
| | 2-22 | <p><u>CSM LUNAR ORBIT UNDOCKED</u></p> <p>A. UNDOCKING TO PDI</p> <p>1. LOSS OF REDUNDANT CAPABILITY IN CRITICAL SYSTEMS WILL BE CAUSE TO TERMINATE THE LANDING MISSION. LM SYSTEMS MAY BE UTILIZED TO PROVIDE SYSTEMS REDUNDANCY FOR CONTINUATION OF AN ALTERNATE MISSION.</p> <p>2. LOSS OF CSM RESCUE CAPABILITY WILL BE CAUSE FOR TERMINATING THE MISSION AND PERFORMING A LM ACTIVE RENDEZVOUS ASAP.</p> <p>B. PDI TO LANDING</p> <p>NO CSM FAILURES WILL BE CAUSE FOR ABORT DURING POWERED DESCENT EXCEPT THOSE CONFIRMED SPS FAILURES REQUIRING RETENTION OF LM PROPULSION CAPABILITY.</p> <p>C. LUNAR STAY</p> <p>FAILURE TO MAINTAIN REDUNDANT CAPABILITY IN SYSTEMS REQUIRED FOR TEI OR LIFE SUPPORT WILL BE CAUSE FOR TERMINATION OF LUNAR STAY.</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 17</td><td>FNL</td><td>9/1/72</td><td>FLIGHT OPS RULES</td><td>GENERAL</td><td>2-6</td><td>Tape 50.3</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | FLIGHT OPS RULES | GENERAL | 2-6 | Tape 50.3 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | FLIGHT OPS RULES | GENERAL | 2-6 | Tape 50.3 | | | | | | | | | | |

SECTION 2 - FLIGHT OPERATIONS RULES - CONTINUED

NASA — MSC

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 - FLIGHT OPERATIONS RULES - CONTINUED

| R | ITEM | |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 2-27 | LUNAR SURFACE EVA'S | |
| | A. FOR THE NOMINAL (TWO-MAN) EVA, TOTAL EMU LIFE SUPPORT SYSTEMS CAPABILITY AND CRITICAL INSTRUMENTATION FOR BOTH ASTRONAUTS ARE REQUIRED. | |
| | B. A ONE-MAN EVA MAY BE INITIATED. | |
| | C. THE ACTIVATION OF THE OPS IN THE MAKEUP MODE WILL REQUIRE EXPEDITIOUS COMPLETION OF THE SPECIFIC ACTIVITY BEING PERFORMED, FOLLOWED BY IMMEDIATE RETURN TO THE LM. ACTIVATION OF THE OPS HIGH OR LOW PURGE MODE WILL REQUIRE IMMEDIATE RETURN TO THE LM. | |
| | D. THE OPERATIONAL EVA PLAN WILL BE CONSTRAINED TO A MAXIMUM DURATION OF 7 HOURS. | |
| | E. AN EVA TRAVERSE LIMIT WILL BE APPLIED ALLOWING ONE FAILURE (LRV OR PLSS) WITH THE CAPABILITY TO RETURN TO THE LM. THE MAXIMUM ACCEPTABLE CREW HEAT STORAGE IS 300 BTU'S. | |
| | F. ALL PLANNED EVA'S WILL INCLUDE A 30-MINUTE, POST-EVA RESERVE ON EMU CONSUMABLES. | |
| | 1. TWO-MAN EVA | |
| | <u>OPERATIONAL LRV</u> | |
| | (A) EVA EXCURSIONS WILL BE LIMITED TO ALLOW PLSS WALKBACK ASSUMING NO PLSS FAILURES. | |
| | (B) EVA EXCURSIONS WILL BE LIMITED TO SUPPORT RIDEBACK WITH A FAILED PLSS, USING BSLSS AND THE OPS IN LOW PURGE FLOW. WITH NO BSLSS, A COMBINATION OF HI AND LO PURGE FLOW WILL BE USED FOR RETURN AND INGRESS WITH A PAD ADDED TO THE LO PURGE FLOW PHASE. | |
| | <u>NO LRV AVAILABLE</u> | |
| | (A) EVA EXCURSIONS WILL BE LIMITED TO A BSLSS WALKBACK CAPABILITY USING THE OPS IN LOW PURGE FLOW. | |
| | (B) WITH NO BSLSS, THE EVA EXCURSIONS WILL BE LIMITED, ALLOWING LM RETURN USING THE OPS IN HIGH PURGE FLOW. | |
| | 2. ONE-MAN EVA | |
| | <u>OPERATIONAL LRV</u> | |
| | (A) EVA EXCURSIONS WILL BE LIMITED TO PLSS WALKBACK CAPABILITY ASSUMING NO PLSS FAILURES. | |
| | (B) EVA EXCURSIONS WILL BE LIMITED, ALLOWING DRIVEBACK AND INGRESS USING THE OPS IN A COMBINATION OF LO AND HI PURGE FLOW WITH A PAD ADDED TO THE LO PURGE FLOW PHASE. | |
| | <u>NO LRV AVAILABLE</u> | |
| | (A) EVA EXCURSIONS WILL BE LIMITED TO ALLOW WALKBACK TO THE LM, USING THE OPS IN HIGH PURGE FLOW. | |
| | G. COMMUNICATIONS | |
| | 1. FOR THE NORMAL (TWO-MAN) EVA, MSFN UPLINK VOICE AND DOWNLINK VOICE FROM ONE CREWMAN (OR TV DOWNLINK) ARE THE MINIMUM COMMUNICATION REQUIREMENTS. | |
| | 2. FOR NORMAL OPERATIONS, BOTH EVA CREWMEN WILL NOT REMAIN OUTSIDE OF MSFN COVERAGE FOR A PERIOD EXCEEDING 5 MINUTES. WITH LCRU/ANTENNA PROBLEMS PREVENTING COMM DURING A TRAVERSE, THE SURFACE OPERATIONS WILL CONTINUE IF MINIMUM COMM CAN BE RE-ESTABLISHED AT THE END OF EACH TRAVERSE. | |
| | 3. WITH THE LOSS OF TOTAL LCRU COMM CAPABILITY, THE CREW WILL RETURN TO THE VICINITY OF THE LM AND RE-ESTABLISH COMM WITH THE MCC VIA LM RELAY. | |
| | 4. WITH LOSS OF LM VHF COMMUNICATIONS THE CREW WILL EGRESS, ACTIVATE THE LCRU, AND CONTINUE NORMAL SURFACE OPERATIONS. | |
| | 5. THE LCRU MAY BE HAND CARRIED TO EXTEND THE ALLOWABLE TRAVERSE DISTANCES FROM THE LM OR THE LRV (AS REQUIRED) TO MAINTAIN COMMUNICATIONS. | |
| | MISSION | REV |
| | APOLLO 17 | FNL |
| | DATE | 9/1/72 |
| | SECTION | FLIGHT OPS RULES |
| | GROUP | GENERAL |
| | PAGE | 2-8 |
| | | Tape 50.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 - FLIGHT OPERATIONS RULES - CONTINUED

| R | ITEM | |
|--------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2-27 CONT | | <p>H. A VACUUM TRANSFER WILL ONLY BE ATTEMPTED IN AN EMERGENCY.</p> <p>I. THE LM WILL NOT BE PRESSURIZED WITH A CREWMAN ON THE LUNAR SURFACE.</p> <p>J. BOTH PLSS'S AND BOTH OPS WILL BE RETAINED UNTIL TWO LIFE SUPPORT UNITS (TWO OPS, TWO PLSS, OR ONE PLSS PLUS ONE OPS) HAVE BEEN VERIFIED TO HAVE SUFFICIENT CONSUMABLES TO SUPPORT CEVA.</p> <p>K. FOR THE TWO-MAN EVA, THE CDR WILL ALWAYS EGRESS FIRST AND INGRESS LAST UNLESS THE CDR HAS INITIATED AN OPS PURGE. THIS WILL INSURE THAT THE CDR IS IN THE LEFT PILOT POSITION SHOULD ASCENT BE REQUIRED WITHOUT AN OPPORTUNITY TO DOFF THE EMU'S.</p> |
| 2-28 | | <p><u>ASCENT</u></p> <p>IN THE EVENT OF PROCEDURAL ERRORS OR SYSTEMS PROBLEMS WHICH RESULT IN LOSS OF SOME CAPABILITY USED FOR ASCENT OR FOR RENDEZVOUS AND WHICH CAN BE CORRECTED IN ONE REV, IT IS BETTER TO DELAY ASCENT FOR ONE REV AND CORRECT THE SITUATION THAN IT IS TO LIFT OFF ON TIME.</p> |
| 2-29 | | <p><u>RENDEZVOUS</u></p> <p>A. SELECTION OF THE ACTIVE VEHICLE FOR RENDEZVOUS AND DOCKING WILL BE DETERMINED BY THE FLIGHT DIRECTOR AND THE FLIGHT CREW BASED UPON CONSUMABLES AND SYSTEMS PERFORMANCE. THE TOTAL LM CAPABILITY WILL BE DEDICATED TO ACCOMPLISHING THE RENDEZVOUS.</p> <p>B. THE DIRECT RNDZ PROFILE WILL BE PERFORMED IF THE MANDATORY CSM AND LM SYSTEM CONSTRAINTS CAN BE MET AND ALL PLANE ERROR CAN BE CORRECTED WITH ASCENT YAW STEERING. FOR ANY OTHER CASE, THE COELLIPTIC RENDEZVOUS WILL BE EXECUTED.</p> |
| 2-30 | | <p><u>RETENTION OF THE LM ASC STAGE</u></p> <p>CONSIDERATION WILL BE GIVEN TO RETAINING THE LM ASC STAGE TO PROVIDE REDUNDANT CAPABILITY AFTER CSM SYSTEM FAILURES. IF THE ASC STAGE MUST BE RETAINED FOR TEI, THE ΔV RESERVED FOR WEATHER AVOIDANCE MAY BE TRADED OFF TO ACCOMPLISH A FASTER EARTH RETURN TIME.</p> |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 - FLIGHT OPERATIONS RULES - CONCLUDED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------|------|-----------|-------|------|--|-----------|-----|--------|------------------|---------|------|-----------|
| | 2-31 | <p><u>TRANSEARTH COAST</u></p> <p>A. THE STEEP TARGET LINE WILL BE USED FOR ALL MCC'S EXCEPT WHEN BOTH THE VELOCITY AT ENTRY INTERFACE IS LESS THAN 31,000 FPS AND THE G&N IS "GO" - THEN THE SHALLOW TARGET LINE WILL BE USED.</p> <p>B. MCC'S MAY BE USED FOR LANDING AREA CONTROL PRIOR TO ENTRY INTERFACE MINUS 24 HOURS FOR RECOVERY ACCESS VIOLATIONS, UNACCEPTABLE WEATHER, OR LAND MASSES IN ANY PART OF THE OPERATIONAL FOOTPRINT.</p> <p>C. IF THE FLIGHTPATH ANGLE IS OUTSIDE THE ENTRY CORRIDOR, AN MCC WILL BE EXECUTED AS SOON AS PRACTICAL.</p> <p>D. MCC'S WILL BE ACCOMPLISHED BY THE SPS IF NECESSARY TO MAINTAIN RCS REDLINES.</p> | | | | | | | | | | | | | | |
| | 2-32 | <p><u>TRANSEARTH COAST EVA</u></p> <p>A. THE TEC EVA WILL BE INITIATED ONLY FOR RETRIEVAL OF FILM FROM THE PAN CAMERA, MAPPING CAMERA, OR LUNAR SOUNDER.</p> <p>B. THE CSM OXYGEN SUPPLY, AND CRITICAL INSTRUMENTATION MUST ALL BE GO FOR EVA.</p> <p>C. ALL RCS THRUSTER FIRE IN THE VICINITY OF THE TRANSFER PATH MUST BE INHIBITED.</p> <p>D. SPACECRAFT ATTITUDE AND ATTITUDE RATES MUST BE WITHIN LIMITS THAT ALLOW SAFE EVA OPERATIONS WITH SUFFICIENT SUNLIGHT THROUGHOUT THE PLANNED EVA PERIOD.</p> <p>E. A VACUUM TRANSFER WILL ONLY BE ATTEMPTED IN AN EMERGENCY.</p> <p>F. ALL SIM BAY POWER WILL BE DISABLED FOR THE EVA.</p> | | | | | | | | | | | | | | |
| | 2-33 | <p><u>ALTERNATE MISSION</u></p> <p>A. EARTH ORBIT</p> <p>1. <u>CSM ONLY</u> - EO SCIENCE, SPS INCLINATION CHANGE. ORBIT FOR SCIENCE OPERATIONS WILL BE A TRADE-OFF TO PROVIDE MOST OPTIMUM SIM BAY PHOTOGRAPHY AND LUNAR SOUNDER CONDITIONS YET REMAIN WITHIN RCS DEORBIT CAPABILITY.</p> <p>2. <u>CSM/LM</u> - EO SCIENCE, INCLINATION CHANGE, ESTABLISH ORBIT FOR OPTIMUM SIM BAY PHOTOGRAPHY AND LUNAR SOUNDER CONDITIONS.</p> <p>B. LUNAR ORBIT</p> <p>1. <u>CSM ONLY</u> - SIM BAY EXPERIMENTS. APPROXIMATELY 6-DAY STAY, LOI TARGETED FOR EASTERN NODAL LOCATION 60 NM CIRCULAR ORBIT.</p> <p>2. <u>CSM/LM</u> (NO LANDING CAPABILITY) - SIM BAY EXPERIMENTS. APPROXIMATELY 6-DAY STAY, 60 NM CIRCULAR ORBIT.</p> <p>C. IN ANY ALTERNATE MISSION WITHIN THE CONSTRAINTS OF PROPELLANT REMAINING AND OTHER OPERATIONAL CONSIDERATIONS SUCH AS CREW SAFETY AND SYSTEMS LIFETIME, THE COMBINED LM ASC/DES STAGES WILL BE DISPOSED OF IN THE FOLLOWING ORDER OF DESCENDING PRIORITY:</p> <p>1. LUNAR IMPACT</p> <p>2. OCEAN IMPACT</p> <p>3. LUNAR ORBIT</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 17</td><td>FNL</td><td>9/1/72</td><td>FLIGHT OPS RULES</td><td>GENERAL</td><td>2-10</td><td>Tape 55.3</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | FLIGHT OPS RULES | GENERAL | 2-10 | Tape 55.3 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | FLIGHT OPS RULES | GENERAL | 2-10 | Tape 55.3 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------|------|-----------|-------|------|--|-----------|-----|--------|----------------------|--------------|-----|-----------|
| | | <p>THIS SECTION IS A SUMMARY OF THE DATA PRIORITY GUIDELINES BY MISSION PHASE, SLV RULES BY MISSION PHASE, AND SYSTEMS GO/NO-GO CRITERIA ON CHARTS BY MISSION PHASE.</p> <p>THE SUMMARY RULES PLUS THE CHART ARE REQUIRED TO ENCOMPASS EACH PHASE.</p> <p>THE CAPABILITY LISTED IN THE CHARTS ARE THE REQUIREMENTS FOR INITIATION OR CONTINUATION OF A MISSION PHASE OR EVENT. MISSION EVENTS FROM UNDOCKING TO PDI IGNITION REQUIRE THAT THE VEHICLES MEET THE LUNAR STAY WITH EVA CRITERIA AND HAVE THE CAPABILITY TO LAND, ASCEND, AND RENDEZVOUS.</p> <div><div>LAUNCH PHASE</div></div> <p>3-1 THE LAUNCH WILL BE ABORTED FOR THE FOLLOWING REASONS:</p> <p>A. SLV</p> <ul style="list-style-type: none">S-IC ADJACENT ENGINES OUT (TIME DEPENDENT)S-II GIMBAL ACTUATOR HARDOVER INBOARD PRIOR TO "S-IVB TO COI" CAPABILITY VIOLATION OF AUTO/MANUAL EDS LIMITSS-II ENGINE FAILURES (TIME DEPENDENT)S-II LOSS OF CONTROL (TIME DEPENDENT)FAILURE OF SECOND PLANE SEPARATIONS-IVB LOSS OF HYDRAULIC FLUID (PRIOR TO S-IVB IGNITION)S-IVB LOSS OF THRUST (TIME DEPENDENT) (POSSIBLE COI CAPABILITY)S-IVB COLD He SHUTOFF VALVE(S) FAILED OPENS-IVB LOX CRYO REPRESS VLV(S) FAILS OPEN (REF. RULE 6-5) <p>B. CSM</p> <p>1. ENVIRONMENTAL</p> <ul style="list-style-type: none">LOSS OF CABIN AND SUIT PRESSURELOSS OF CABIN PRESSURE AND SUIT CIRCULATIONFIRE/SMOKE IN CMLOSS OF CABIN PRESSURE AND O₂ MANIFOLD LEAK <p>2. ELECTRICAL</p> <p>THE FOLLOWING POWER SOURCES ARE REQUIRED TO CONTINUE LAUNCH:</p> <ul style="list-style-type: none">(A) ONE F/C OR AUX BAT PLUS ONE ENTRY BAT, OR(B) THREE ENTRY BATSUNCONTROLLABLE SHORTED MAIN BUSLOSS OF BOTH AC BUSES DURING MODE I OR MODE II <p>3. PROPULSION</p> <ul style="list-style-type: none">SUSTAINED LEAK OR LOSS OF He MANIFOLD PRESSURE IN BOTH CM-RCS RINGS (MODE I ONLY) <p>C. VIOLATION OF TRAJECTORY LIMIT LINES</p> <p>D. TEAM DISCRETION WILL BE USED FOR:</p> <ul style="list-style-type: none">1. SUIT/CABIN CONTAMINATION2. MEDICAL PROBLEMS | | | | | | | | | | | | | | |
| | | <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 17</td><td>FNL</td><td>9/1/72</td><td>MISSION RULE SUMMARY</td><td>LAUNCH PHASE</td><td>3-1</td><td>Tape 55.4</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | LAUNCH PHASE | 3-1 | Tape 55.4 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | LAUNCH PHASE | 3-1 | Tape 55.4 | | | | | | | | | | |

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

NASA — MSC

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------|------|-----------|-------|------|--|-----------|-----|--------|----------------------|-------------|-----|-----------|
| | | <div>EARTH ORBIT</div> | | | | | | | | | | | | | | |
| 3-11 | | <p>CSM SEPARATION FROM THE S-IVB (WITHOUT LM EXTRACTION) WILL BE PERFORMED EARLY FOR THE FOLLOWING SLV CONDITIONS (CONSIDERATION WILL BE GIVEN TO EXTRACTING THE LM LATER IF THE CONDITION CAN BE CORRECTED);</p> <p>A. S-IVB RANGE SAFETY PROPELLANT DISPERSAL SYSTEM ARMS INADVERTENTLY AFTER INSERTION AND PRIOR TO SAFING*</p> <p>B. S-IVB LOX TANK PRESS IS GREATER THAN 50 PSI* (REFERENCE RULES 6-5 AND 7-6)</p> <p>C. LOSS OF ATTITUDE CONTROL DURING TB5 (CREW DISCRETION)</p> <p>D. S-IVB COMMON BULKHEAD DELTA PRESSURE EXCEEDS LIMITS*</p> <p>E. START BOTTLE GREATER THAN 1800 PSIA*</p> <p>*PERFORM SPS MANEUVER TO A SAFE DISTANCE. .</p> | | | | | | | | | | | | | | |
| 3-12 | | <p>CSM SEPARATION FROM THE S-IVB (WITH LM EXTRACTION) WILL BE PERFORMED FOR:</p> <p>A. S-IVB NO-GO FOR TLI</p> <p>B. CSM NO-GO FOR TLI BUT GO FOR EARTH ORBIT MISSION</p> | | | | | | | | | | | | | | |
| 3-13 | | <p>TLI WILL BE INHIBITED FOR:</p> <p>A. INSUFFICIENT PROPELLANT REMAINS FOR ACHIEVING A 28K NM APOGEE ELLIPSE</p> <p>B. S-IVB ENGINE MAIN LOX VALVE FAILS TO CLOSE AT CUTOFF</p> <p>C. LOSS OF ATTITUDE CONTROL</p> <p>D. CONFIRMED ACTUATOR HARDOVER</p> <p>E. LOSS OF ENGINE HYDRAULIC FLUID</p> <p>F. MISALIGNMENT RATE BETWEEN THE IU AND IMU IS OUTSIDE LIMITS</p> <p>G. UNACCEPTABLE DIFFERENCES BETWEEN CMC AND IU PLATFORM VELOCITY COMPONENTS OR TOTAL VELOCITY AT INSERTION</p> <p>H. UNACCEPTABLE DIFFERENCE BETWEEN MSFN AND IU ORBITAL DECISION PARAMETERS</p> | | | | | | | | | | | | | | |
| 3-14 | | <p>TLI WILL BE TERMINATED FOR:</p> <p>A. PITCH OR YAW BODY RATES GREATER THAN 10 DEG/SEC</p> <p>B. ROLL BODY RATE GREATER THAN 20 DEG/SEC</p> <p>C. PITCH OR YAW ATTITUDE DEVIATIONS FROM NOMINAL PROFILES IN EXCESS OF 45 DEG</p> <p>D. OVERBURN WHERE T_{GO} (CMC) EQUALS ZERO PLUS 1 SECOND</p> | | | | | | | | | | | | | | |
| | | <table><tr><td>MISSION</td><td>REV</td><td>DATE</td><td>SECTION</td><td>GROUP</td><td>PAGE</td><td></td></tr><tr><td>APOLLO 17</td><td>FNL</td><td>9/1/72</td><td>MISSION RULE SUMMARY</td><td>EARTH ORBIT</td><td>3-3</td><td>Tape 55.5</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | EARTH ORBIT | 3-3 | Tape 55.5 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | EARTH ORBIT | 3-3 | Tape 55.5 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | TD&E | | | | | |
|------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------------|-------|------|
| | | | | | | | |
| 3-21 | | <p>TD&E WILL NOT BE PERFORMED FOR:</p> <p>A. PILOT'S EVALUATION OF RATES AND ATTITUDES, AND SLA CONFIGURATION NOT ACCEPTABLE.</p> <p>B. THE SLV IS NO-GO FOR:</p> <ol style="list-style-type: none"> 1. VIOLATION OF S-IVB BULKHEAD ΔP LIMITS 2. LOX TANK PRESSURE GREATER THAN 50 PSI <p>RULE NUMBERS 3-22 THROUGH 3-29 ARE RESERVED.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | TD&E | 3-5 |

Tape 8.5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | | |
|------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------------|------------------|------|-----------|
| | | <div>TRANSLUNAR COAST</div> | | | | | | |
| 3-30 | | THE G&N WILL BE THE PRIMARY MODE OF EXECUTING TRANSLUNAR MCC. | | | | | | |
| 3-31 | | MIDCOURSE CORRECTION NOMINAL EXECUTION POINTS WILL BE AT THE FOLLOWING: A. TLI C/O + 9 HOURS B. TLI C/O + 28 HOURS C. LOI - 22 HOURS D. LOI - 5 HOURS | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | TRANSLUNAR COAST | 3-6 | Tape 55.6 |

Tape 55.6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|-----------|
| | 3-32 | DURING THE LOI BURN, THE FLIGHT CREW WILL TAKE THE FOLLOWING ACTION: | | | | | | |
| | | <u>LOI ABORT MODES</u> | | | | | | |
| | | <u>MODE</u> | <u>TIME</u> | <u>DELTA VM</u> | <u>TYPE ABORT</u> | | | |
| | | I | 0 TO 0:32 0:32 TO 0:53 0:53 TO 1:31 | 0 TO 207 207 TO 348 348 TO 613 | DPS 2-HR DIRECT ABORT DPS 30-MIN DIRECT ABORT DPS TO DEPLETION 30-MIN DIRECT ABORT FOLLOWED BY AN APS BURN 2 HOURS LATER | | | |
| | | II | 1:31 TO 2:03 2:03 TO 2:54 | 613 TO 833 833 TO 1200 | DPS + APS 2-IMPULSE CIRCUMLUNAR ABORT WITH APS BURN TO SUPPLEMENT DPS BURN TO DEPLETION DURING SECOND IMPULSE (APS BURN IS 2 HRS AFTER DPS BURN) DPS 2-IMPULSE CIRCUMLUNAR ABORT | | | |
| | | III | 2:54 TO 6:35 | 1200 TO 2980 | EXECUTE TEI (SPS OR DPS) AT NEXT OPPORTUNITY OR INITIATE ALTERNATE MISSION | | | |
| | | (FOR APOLLO 17 APS IS REQUIRED TO SUPPLEMENT DPS FOR LOI BURN TIME FROM 4:30 TO 6:35) | | | | | | |
| | | A. ALL ABORT MANEUVERS ARE MCC TARGETED EXCEPT THE DPS 30-MIN ABORT WHICH IS TAKEN FROM THE CREW CHART. | | | | | | |
| | | B. CONTROL LIMITS APPLY AS FOLLOWS: | | | | | | |
| | | <u>LOI DELTA T</u> | <u>LOI DELTA V</u> | <u>LIMITS</u> | | | | |
| | | 0 TO 0:53 0:53 TO 3:40 3:40 TO 6:35 | 0 TO 348 348 TO 1543 1543 TO 2980 | TIGHT LOOSE TIGHT | | | | |
| | | <u>NOTE</u> IF ANY BALL VALVE CLOSURES PREMATURELY, SHUT DOWN GOOD BANK 10 SEC PRIOR TO CUTOFF FOR VERIFICATION OF THE FAILURE. | | | | | | |
| | | <u>NOTE</u> REFERENCE RULE 3-86 FOR DEFINITION OF TIGHT AND LOOSE LIMITS. | | | | | | |
| | | RULE NUMBERS 3-33 THROUGH 3-37 ARE RESERVED. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | TRANSLUNAR COAST | 3-7 | Tape 55.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------|------|-----------|-------|------|--|-----------|-----|--------|----------------------|-------------|-----|-----------|
| | | <div>LUNAR ORBIT</div> | | | | | | | | | | | | | | |
| 3-38 | | <p>PRIOR TO UNDOCKING, CSM MANEUVERS WILL BE SCHEDULED WHEN REQUIRED TO CORRECT THE FOLLOWING SITUATIONS:</p> <p>A. MISS DISTANCE OVER THE LLS GREATER THAN 0.5 DEG OUT OF PLANE</p> <p>B. DEVIATION IN APPROACH AZIMUTH GREATER THAN ±10 DEG FROM THE NOMINAL</p> <p>C. CURRENT PERICYNTHION ALTITUDE LESS THAN 30,000 FT</p> | | | | | | | | | | | | | | |
| 3-39 | | <p><u>DOI, RESIDUALS</u></p> <p>A. TRIM G&N X AXIS TO WITHIN 1 FPS.</p> <p>1. FOR OVERBURNS LESS THAN 2.2 FPS, TRIM TO -1 FPS WITH THE -X SM RCS THRUSTERS.</p> <p>2. FOR OVERBURNS GREATER THAN 2.2 FPS BUT LESS THAN 10 FPS, PITCH 180 DEGREES AND TRIM TO 1 FPS USING +X SM RCS THRUSTERS.</p> <p>3. RESIDUALS GREATER THAN 10 FPS WILL BE TRIMMED USING SPS.</p> <p>B. IF THE G&N HAS OBVIOUSLY MALFUNCTIONED, THE NEGATIVE RESIDUAL INDICATED BY THE EMS WILL BE TRIMMED.</p> | | | | | | | | | | | | | | |
| 3-40 | | RESERVED | | | | | | | | | | | | | | |
| | | <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 17</td><td>FNL</td><td>9/1/72</td><td>MISSION RULE SUMMARY</td><td>LUNAR ORBIT</td><td>3-8</td><td>Tape 55.8</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | LUNAR ORBIT | 3-8 | Tape 55.8 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | LUNAR ORBIT | 3-8 | Tape 55.8 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 3-41 | <p>AT AOS AFTER DOI₁, THE REQUIREMENT FOR THE BAILOUT MANEUVER WILL BE DETERMINED BY EVALUATION OF THE THREE TRAJECTORY MONITORING SOURCES. THESE SOURCES - G&N, EMS, AND MSFN - WILL BE EXAMINED WITH THE FOLLOWING CRITERIA:</p> <p>A. IF MSFN RADAR DATA IS VALID AND REASONABLE, A STAY VOTE FROM MSFN IS REQUIRED TO REMAIN IN THE LOW ORBIT.</p> <p>B. IF MSFN RADAR DATA IS INVALID OR UNAVAILABLE, THE FOLLOWING CRITERIA APPLY:</p> <p>1. IF THE G&N AND EMS ARE AVAILABLE, BOTH SOURCES MUST INDICATE STAY TO REMAIN IN THE LOW ORBIT.</p> <p>2. IF ONLY ONE OF THE ONBOARD SOURCES (G&N, EMS) IS AVAILABLE, BOTH THAT SYSTEM AND BURN TIME MUST INDICATE STAY TO REMAIN IN THE LOW ORBIT.</p> <p style="text-align: center;"><u>NOTES</u></p> <p>1. THE EMS VOTE IS NO STAY IF THE EMS INDICATES A <u>10</u>-FPS OVERSPEED AFTER TRIMMING THE G&N.</p> <p>2. THE MSFN VOTE IS NO STAY IF THE INCOMING RADAR DATA INDICATES A CLOSEST APPROACH ALTITUDE OF EQUAL TO OR LESS THAN 1.0 NM ABOVE THE ACTUAL LUNAR TERRAIN. THIS ALTITUDE CORRESPONDS TO A PERICYNTHION ALTITUDE OF <u>3.38</u> NM. THE CORRESPONDING DOPPLER RESIDUALS ARE APPROXIMATELY <u>-106</u> CYCLES PER SEC. BUT THE ACTUAL NUMBER WILL BE DETERMINED REAL TIME.</p> <p>3. BURN TIME IS NO STAY IF AN OVERBURN OF <u>1.8</u> SECONDS IS INDICATED.</p> |
| | 3-42 | <p>THE FOLLOWING CRITERION APPLY TO DOI₂:</p> <p>A. VOICE CONFIRMATION OF CIRC IS REQUIRED FOR EXECUTION.</p> <p>B. DOI₂ WILL BE SCHEDULED AT LEAST 2 MIN AFTER CIRC.</p> <p>C. LM RCS BURN TIME WILL BE \leq 30 SEC.</p> <p>D. TARGETED PERILUNE AT PDI WILL BE NO LESS THAN 40K FT.</p> |
| | 3-43 | <p>THE FOLLOWING RNDZ/RESCUE OPTIONS WILL BE UTILIZED AS NECESSARY FOR FAILURES REQUIRING TERMINATION OF LUNAR LANDING:</p> <p>A. FOR FAILURES FROM SEPARATION TO CIRCULARIZATION, THE NOMINAL RNDZ IS A P34 PROFILE WITH DOCKING OCCURRING 2 HRS AFTER SEP.</p> <p>B. FOR FAILURES FROM CIRCULARIZATION TO PDI, EXECUTE THE NO PDI +12 ABORT SEQUENCE WITH DOCKING IN ABOUT 3-1/4 HR.</p> <p>C. ABORT DURING POWERED DESCENT WILL INSERT THE LM INTO ORBIT UTILIZING THE ONBOARD VARIABLE ABORT TARGETING. FOR ABORTS DURING THE FIRST 11 MIN, DOCKING SHOULD OCCUR WITHIN 3-1/4 HR. FOR ABORTS AFTER 11 MIN, DOCKING WILL OCCUR WITHIN 5-1/4 HR.</p> <p>D. FOR COMPLETE LM FAILURES PRIOR TO PDI, THE CSM WILL EXECUTE A 5-IMPULSE RESCUE WITH DOCKING IN ABOUT 7-1/4 HR FROM PDI.</p> <p>RULE NUMBERS 3-44 THROUGH 3-48 ARE RESERVED.</p> |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | |
|---|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------------|---------------------|------|
| | | <u>POWERED DESCENT PHASE</u> | | | | | |
| | 3-49 | <p><u>PDI IGNITION</u> - THE FOLLOWING ACTION WILL BE TAKEN:</p> <p>A. AUTO ULLAGE GOOD -IF NO AUTO DPS IGN, FLIGHT CREW PERFORM MANUAL DPS IGNITION</p> <p>B. NO AUTO ULLAGE -FLIGHT CREW BACK UP THE ULLAGE MANEUVER -IF NO AUTO DPS IGN FLIGHT CREW WILL NO-GO PDI</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | LUNAR ORBIT DESCENT | 3-10 |
| | | | | | | | |

Tape 55.10

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | |
|---|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 3-50 | <p>LR DATA IS REQUIRED FOR LANDING</p> <p>A. LOCK ON</p> <p>1. LR DATA ACCEPTED AND CONVERGED CONTINUOUS TO P64 - <u>CONTINUE MISSION</u> IF LOSS OF LOCK OCCURS IN P64.</p> <p>2. LR DATA ACCEPTED AND CONVERGED WITH SUBSEQUENT DROPOUT - <u>CONTINUE INTO P64</u>.</p> <p>(A) LANDING RADAR REGAINED IN P64</p> <p>(1) DATA ACCEPTED BY LGC - <u>CONTINUE MISSION</u></p> <p>(2) DATA NOT ACCEPTED BY LGC - <u>ATTEMPT MANUAL LANDING</u> IF LR/PGNS $\Delta H < 1500$ FT</p> <p>(B) LANDING RADAR NOT REGAINED IN P64 - <u>ABORT</u></p> <p>3. LATE LR LOCK-ON WITH DATA BEING INCORPORATED AND CONVERGING - <u>CONTINUE INTO P64</u>.</p> <p>(A) DATA ACCEPTED BY LGC - <u>CONTINUE MISSION</u></p> <p>(B) DATA NOT ACCEPTED BY LGC - <u>ATTEMPT MANUAL LANDING</u></p> <p>B. MINIMUM ALTITUDE WITHOUT LR ALTITUDE INCORPORATION</p> <p>1. PGNS ALTITUDE LESS THAN 22,000 FEET AND PGNS NAVIGATION ERRORS, CONFIRMED BY MSFN OR DOPPLER RESIDUALS, THAT CAUSE THE AGS-PGNS RADIAL VELOCITY DIFFERENCE</p> <p>(A) RADIAL N69 NOT INCORPORATED AND DIFFERENCE EXCEEDS -10 FPS - <u>ABORT</u></p> <p>(B) RADIAL N69 INCORPORATED AND DIFFERENCE EXCEEDS -20 FPS - <u>ABORT</u></p> <p>2. PGNS ALTITUDE LESS THAN 18,000 FEET AND PGNS NAVIGATION ERRORS, CONFIRMED BY DOPPLER BUT NOT BY AGS, THAT CAUSE THE MSFN-PGNS RADIAL VELOCITY DIFFERENCE TO EXCEED -20 FPS - <u>ABORT</u></p> <p>3. PGNS ALTITUDE LESS THAN 10,000 FEET</p> <p>(A) RADIAL N69 NOT INCORPORATED - <u>ABORT</u></p> <p>(B) LOSS OF WORKING PGNS (AS DEFINED BY RULE 5-91) - <u>ABORT</u></p> <p>4. PGNS ALTITUDE LESS THAN 6,000 FEET - <u>ABORT</u></p> <p style="text-align: center;"><u>NOTE</u> FOR FAILURES IN THE PGNS/LR INTERFACES, INCORPORATION MAY BE SATISFIED BY A PGNS/LR COMPARISON RESULTING IN A $\Delta H < 1500$ FT.</p> <p>C. MINIMUM ALTITUDE WITHOUT LR VELOCITY INCORPORATION</p> <p>1. PGNS ALTITUDE LESS THAN 10,000 FEET WITH LANDMARK TRACKING OBTAINED AND PGNS NAVIGATION ERRORS CONFIRMED BY AGS OR DOPPLER THAT CAUSE MSFN - PGNS DOWNRANGE OR CROSSRANGE VELOCITY DIFFERENCES</p> <p>(A) NAV N69 INCORPORATED AND $\Delta \dot{X}$ EXCEEDS +50 OR -35 FPS OR $\Delta \dot{Y}$ EXCEEDS +90 OR -70 FPS - <u>ABORT</u></p> <p>(B) NAV N69 NOT INCORPORATED AND $\Delta \dot{X}$ EXCEEDS ± 20 FPS OR $\Delta \dot{Y}$ EXCEEDS +45 OR -25 FPS - <u>ABORT</u></p> <p>2. PGNS ALTITUDE LESS THAN 10,000 FEET WITHOUT LANDMARK TRACKING OBTAINED AND PGNS NAVIGATION ERRORS CONFIRMED BY AGS OR DOPPLER THAT CAUSE MSFN - PGNS DOWNRANGE OR CROSSRANGE VELOCITY DIFFERENCES</p> <p>(A) NAV N69 INCORPORATED AND $\Delta \dot{X}$ EXCEEDS ± 35 FPS OR $\Delta \dot{Y}$ EXCEEDS +70 OR -25 FPS - <u>ABORT</u></p> <p>(B) NAV N69 NOT INCORPORATED AND $\Delta \dot{X}$ EXCEEDS ± 15 FPS OR $\Delta \dot{Y}$ EXCEEDS +30 OR -10 FPS - <u>ABORT</u>.</p> |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------|------|-----------|-------|------|--|-----------|-----|--------|----------------------|-----------------|------|-----------|
| | 3-51 | <p>POWERED DESCENT WILL BE TERMINATED FOR THE FOLLOWING:</p> <p>A. PGNS NAVIGATION ERRORS, CONFIRMED BY MSFN OR DOPPLER RESIDUALS, THAT RESULT IN THE FOLLOWING AGS-PGNS VELOCITY DIFFERENCES:</p> <p style="padding-left: 40px;">$\Delta\dot{X}$ (DOWNRANGE) GREATER THAN +90 OR -35 FPS $\Delta\dot{Y}$ (CROSSRANGE) GREATER THAN ± 90 FPS $\Delta\dot{Z}$ (RADIAL) GREATER THAN +60 OR -35 FPS</p> <p>B. PGNS NAVIGATION ERRORS, CONFIRMED BY DOPPLER RESIDUAL BUT NOT BY AGS, THAT RESULT IN THE FOLLOWING MSFN-PGNS VELOCITY DIFFERENCES:</p> <p style="padding-left: 40px;">$\Delta\dot{Y}$ (CROSSRANGE) GREATER THAN ± 200 FPS $\Delta\dot{Z}$ (RADIAL) GREATER THAN <u>+45</u> OR -35 FPS</p> <p>C. COMMANDED THRUST INCREASING PRIOR TO THROTTLE-DOWN OR P63 TGO = 80 SEC</p> <p>D. GTC GREATER THAN 57 PERCENT BY P63/64 PROGRAM SWITCH PLUS 15 SEC</p> <p>E. FAILURE TO ACHIEVE FTP (AUTO OR MANUAL) BY NOMINAL TIG PLUS 31 SEC. (ABORT AT GTC DIVERGENCE.)</p> <p>F. THE FOLLOWING PGNS ALARMS: 20105, 00214, 20430, 20607, 21103, 20607, 21103, 01107, 21204, 21302, 21501, 00402 (CONTINUING)</p> <p>G. VIOLATION OF THE TIME BIASED DPS ABORT BOUNDARY</p> <p>H. NO THROTTLE RECOVERY (AUTO OR MANUAL) WITHIN 40 SEC AFTER GTC EQUALS 57 PERCENT</p> | | | | | | | | | | | | | | |
| | 3-52 | <p>AN ABORT WILL NOT BE PERFORMED FOR PGNS FAILURE AFTER OBTAINING PITCHOVER IN THE APPROACH PHASE.</p> | | | | | | | | | | | | | | |
| | 3-53 | <p>THE DESCENT TARGET POINT WILL BE SHIFTED DOWNTRACK IF GTC INDICATES NO THROTTLEDOWN BY P63/64 PROGRAM SWITCH. THE MAXIMUM SHIFT IS AS FOLLOWS:</p> <p>A. 20,000 FT DOWNTRACK IF VALID LANDMARK SIGHTINGS WERE OBTAINED.</p> <p>B. 10,000 FT DOWNTRACK IF NO VALID LANDMARK SIGHTINGS WERE OBTAINED.</p> <p>C. NO DOWNTRACK SHIFT WILL BE ALLOWED IF THE APPROACH AZIMUTH IS BETWEEN 95 AND 100 DEGREES.</p> <p style="text-align: center;"><u>NOTE</u></p> <p style="text-align: center;">ONE MINUTE OF RCS WILL BE USED TO ALLOW LANDING WITHIN THE ABOVE LIMITS.</p> | | | | | | | | | | | | | | |
| | 3-54 | <p>IN THE EVENT MSFN AND DOPPLER DATA ARE NOT AVAILABLE FOR CONFIRMATION OF PGNS/AGS ERRORS, POWERED DESCENT WILL BE TERMINATED FOR THE FOLLOWING AGS-PGNS VELOCITY DIFFERENCES:</p> <p style="padding-left: 40px;">$\Delta\dot{X} > -35$ FPS $\Delta\dot{Z} > +60$ OR -35 FPS</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 17</td><td>FNL</td><td>9/1/72</td><td>MISSION RULE SUMMARY</td><td>POWERED DESCENT</td><td>3-12</td><td>Tape 50.7</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | POWERED DESCENT | 3-12 | Tape 50.7 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | POWERED DESCENT | 3-12 | Tape 50.7 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------------|-----------------|------|
| | 3-55 | <p>IN THE EVENT MSFN, DOPPLER, AND AGS NAV DATA ARE NOT AVAILABLE FOR MONITORING OF POWERED DESCENT, AN ABORT WILL BE PERFORMED IF LR DATA IS NOT INCORPORATED INTO THE PGNS BY PDI + 7 MIN.</p> <p>RULE NUMBERS 3-56 THROUGH 3-61 ARE RESERVED.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | POWERED DESCENT | 3-13 |
| | | Tape 50.8 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | |
|---|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------------|-------------------------|------|
| | | <u>LUNAR SURFACE EVA PHASE</u> | | | | | |
| | 3-62 | <p>INITIATION/TERMINATION/CURTAILMENT</p> <p>A. AFTER START OF A DRIVING TRAVERSE, THE TIMELINE WILL BE OPTIMIZED TO REMAIN WITHIN THE LRV DRIVING CAPABILITY TO RETURN TO THE LM.</p> <p>B. IF LRV MOBILITY IS DEGRADED, THE FOLLOWING WILL BE EVALUATED TO ACCOMPLISH MAXIMUM SCIENTIFIC RETURN:</p> <ol style="list-style-type: none"> 1. TRAVERSE DISTANCE 2. TIME AT EACH STOP 3. DELETION OF STOPS <p>C. THE LRV WILL BE UTILIZED BECAUSE OF ITS SCIENCE AND EQUIPMENT PAYLOAD CAPABILITY AND ITS ABILITY TO REDUCE METABOLIC RATES IF ITS SPEED IS APPROXIMATELY THE AVERAGE WALKING SPEED.</p> <p>D. FOR EVA TERMINATION OR OTHER INTERRUPTIONS DURING ALSEP DEPLOYMENT, THE FOLLOWING PREFERRED DEPLOYMENT INTERRUPTION POINTS WILL BE OBSERVED IF PERMITTED BY CREW SAFETY CONSIDERATION:</p> <ol style="list-style-type: none"> 1. REMOVE ALSEP PACKAGES 1 AND 2. CLOSE SEQ BAY DOOR. EMPLACE ALSEP PACKAGES WITH HANDLES UP AND EXPERIMENTS IN AND FACING THE SUN WITHIN $\pm 15^\circ$. 2. TILT FUEL CASK. DOME NOT REMOVED. 3. TILT FUEL CASK. REMOVE DOME. DO NOT DEFUEL. 4. FUEL RTG. CARRY ALSEP TO DEPLOYMENT SITE. REMOVE ALL COMPONENTS FROM PACKAGE 2. CARRY PACKAGE 1 TO EMPLACEMENT SITE. DO NOT CONNECT RTG CABLE TO C/S UNLESS SUFFICIENT TIME IS AVAILABLE TO ERECT THE CS SUNSHIELD. 5. CONNECT HFE AND LEAM CABLES TO C/S. REMOVE LSP, LSG, AND LMS FROM SUBPACKAGE 1. ALIGN C/S AND RAISE SUNSHIELD. MOUNT ANTENNA MAST, GIMBAL, AND ANTENNA. LEVEL AND ALIGN ANTENNA. DEPRESS SHORTING PLUG ON WAY BACK TO LM. 6. THE HFE CAN BE INTERRUPTED AFTER COMPLETION OF THE FIRST PROBE HOLE. 7. DEPLOY ALSEP EXPERIMENTS AND COMPLETE TASKS. A HOLD POINT EXISTS AFTER EACH TASK IS COMPLETED. DEPRESS SHORTING PLUG SWITCH ON WAY BACK TO LM (SEE CONTINGENCY PROCEDURES FOR HOLD POINTS). <p>E. IN REPLANNING THE LRV TRAVERSES BETWEEN EVA'S, BATTERY THERMAL MANAGEMENT TECHNIQUES WILL BE SCHEDULED AS NECESSARY TO KEEP THE PREDICTED LRV BATTERY TEMPS BETWEEN 40° F AND 125° F ON EVA'S 1 AND 2, AND BETWEEN 40° F AND 140° F ON EVA 3.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | LUNAR SURFACE EVA PHASE | 3-14 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------|------|-----------|-------|------|--|-----------|-----|--------|----------------------|-------------------------|------|-----------|
| | 3-63 | <p>PRECEDENCE/SCHEDULING GUIDELINES</p> <p>A. FOR ANY MALFUNCTION ON 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">1. RTG FUELING - UP TO 20 MINUTES WILL BE ALLOWED IN EXERCISING RTG FUELING CONTINGENCY PROCEDURES.2. ALSEP PACKAGE 1 TO PACKAGE 2 CABLE CONNECTIONS - UP TO 20 MINUTES WILL BE ALLOWED FOR MAKING THE CABLE CONNECTION.3. ALSEP ANTENNA - UP TO 30 MINUTES WILL BE ALLOWED FOR ANTENNA ERECTION AND ALIGNMENT.4. LRV ANOMALIES - UP TO 10 MINUTES WILL BE ALLOWED FOR ISOLATING MALFUNCTIONS. UP TO 30 MINUTES WILL BE ALLOWED TO RECOVER UTILIZATION OF THE VEHICLE.5. ALSEP DEPLOYMENT MAY BE CONTINUED ON A LATER EVA IF ADDITIONAL TIME TO SPEND ON CONTINGENCY PROCEDURES IS REQUIRED TO ATTAIN AN OPERATIONAL ALSEP. <p>B. IF A TASK IS NOT ABANDONED AND IS LEFT INCOMPLETE AT THE END OF AN EVA, IT WILL BE SCHEDULED DURING A SUBSEQUENT EVA CONSISTENT WITH ITS RANK WITHIN THE PRIORITIES DEFINED.</p> <p>C. ALSEP DEPLOYMENT WILL NOT BE STARTED IF IT IS KNOWN THAT LESS THAN <u>1 HR 30 MIN</u> IS AVAILABLE FOR ALSEP IN EVA 1.</p> | | | | | | | | | | | | | | |
| | 3-64 | <p>LRV SYSTEMS/NAVIGATION</p> <p>A. THERE ARE NO MINIMUM LRV SYSTEMS REQUIREMENTS WHICH WOULD CAUSE ABANDONMENT OF THE LRV IF THE CREW EVALUATES THE FOLLOWING AS ACCEPTABLE:</p> <ol style="list-style-type: none">1. MOBILITY AND CONTROL2. TRAVERSE RATE IS AT LEAST APPROXIMATELY EQUAL TO WALKING RATE3. REDUNDANT LIFE SUPPORT CAPABILITY FOR LM RETURN <p>B. WITH A NONOPERATIONAL LRV NAVIGATION SYSTEM, ONE OF THE FOLLOWING RETURN TRAVERSE CAPABILITIES IS REQUIRED TO INITIATE OR CONTINUE A TRAVERSE:</p> <ol style="list-style-type: none">1. REASONABLE VISUAL ACCESS OF THE LM2. REASONABLE VISUAL ACCESS OF THE OUTBOUND TRAVERSE PATH3. SUN RELATIVE BEARING TO THE LM <p>C. CONTINGENCY POWER/THERMAL MANAGEMENT AND/OR TRAVERSE ADJUSTMENT MUST BE EXERCISED TO KEEP THE LRV BATTERY TEMPERATURE BELOW 125° F ON EVA'S 1 AND 2 AND 140° F ON EVA 3. EXCEEDING THIS LIMIT WILL RESULT IN AN UNPREDICTABLE DEGRADATION OF BATTERY PERFORMANCE AND NAVIGATION ELECTRONICS.</p> <p>D. THE LRV WILL NOT BE ABANDONED BECAUSE OF EXCESSIVE BATTERY TEMPERATURE(S).</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 17</td><td>FNL</td><td>9/1/72</td><td>MISSION RULE SUMMARY</td><td>LUNAR SURFACE EVA PHASE</td><td>3-15</td><td>Tape 60.5</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | LUNAR SURFACE EVA PHASE | 3-15 | Tape 60.5 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | LUNAR SURFACE EVA PHASE | 3-15 | Tape 60.5 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------|------|------------|-------|------|--|-----------|-----|--------|----------------------|-------------------------|------|------------|
| | 3-65 | <p>COMMUNICATIONS/TV</p> <p>A. THE FOLLOWING COMM CAPABILITY IS REQUIRED TO START AND CONTINUE A TRAVERSE:</p> <ol style="list-style-type: none">1. MSFN VOICE UPLINK TO ONE CREWMAN, AND VOICE DOWNLINK FROM ONE CREWMAN OR TV (FOR MONITORING CREW RESPONSE).2. MONITOR STATUS OF EMU CRITICAL PARAMETERS (MSFN OR CREW).3. LOSS OF COMM WILL BE ACCEPTABLE DURING LRV MOVING OPERATIONS IF MINIMUM COMM REQUIREMENTS CAN BE MET AT THE NEXT STOP. THE MAXIMUM ALLOWABLE CONTINUOUS LOSS OF COMM WOULD BE APPROXIMATELY 30 MIN. <p>B. IF LCRU PROBLEMS OCCUR, VOICE AND TM HAVE PRIORITY OVER TV.</p> <p style="text-align: center;"><u>NOTE</u> GCTA TV IS NOT AVAILABLE IN THE HAND-CARRY MODE.</p> <p>C. GCTA OPERATIONS</p> <ol style="list-style-type: none">1. THE COLOR TV CAMERA WILL NOT BE POINTED SUCH THAT THE SUN WILL BE IN THE FIELD OF VIEW. THE CAMERA MAY BE POINTED NEAR THE SUN. HOWEVER, IF OBJECTIONABLE FLARE OCCURS, THE GROUND WILL REQUEST THE CAMERA BE MOVED OR WILL MOVE THE CAMERA VIA GROUND COMMANDS.2. THE GROUND WILL MONITOR THE TV PICTURE AND RECOMMEND OR COMMAND CAMERA MOVEMENT TO PREVENT IRREVERSIBLE VIDICON TUBE BURNS FROM REFLECTIVE OBJECTS.3. BETWEEN EVA'S, THE TV CAMERA WILL BE LOCATED IN THE SUN AND WILL BE OFF TO MAINTAIN THERMAL BALANCE.4. WHEN A BRIGHT OBJECT WITH A CONTRASTING DARK BACKGROUND IS IN THE FIELD OF VIEW, THE GROUND WILL RECOMMEND OR COMMAND AN ALC SWITCH SETTING TO GET THE BEST PICTURE. THE ALC-PEAK WILL GIVE THE BEST PICTURE OF THE BRIGHT OBJECT, AND THE ALC-AVERAGE WILL GIVE THE BEST PICTURE OF THE DARK BACKGROUND. | | | | | | | | | | | | | | |
| | | <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 17</td><td>FNL</td><td>9/1/72</td><td>MISSION RULE SUMMARY</td><td>LUNAR SURFACE EVA PHASE</td><td>3-16</td><td>Tape 55.12</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | LUNAR SURFACE EVA PHASE | 3-16 | Tape 55.12 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | LUNAR SURFACE EVA PHASE | 3-16 | Tape 55.12 | | | | | | | | | | |

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

NASA — MSC

MISSION RULES

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------|------|-----------|-------|------|--|-----------|-----|--------|----------------------|------------------|------|-----------|
| | | <div> <div>ASCENT</div> <div> <div>3-80</div> <div> <div>ASCENT</div> <div> <div>A. GUIDANCE SWITCHOVER TO AGS WILL BE PERFORMED FOR:</div> <div> <div>1. THE FOLLOWING PGNS ALARMS: 20105, 00214, 20430, 20607, 21103, 01107, 21204, 21302, AND 21501.</div> <div>2. CONFIRMED PGNS NAVIGATION ERRORS (DURING ASCENT OR FOLLOWING DESCENT ABORT) THAT RESULT IN ANY OF THE FOLLOWING CONDITIONS:</div> <div> <div>(A) AGS PREDICTED H_p AT INSERTION LESS THAN 40,000 FT</div> <div>(B) AGS PREDICTED H_a AT INSERTION GREATER THAN TARGET VALUE PLUS 40 NM</div> <div>(C) AGS PREDICTED INSERTION WEDGE ANGLES GREATER THAN 1.0 DEG (DESCENT ABORT CASE OR COELLIPTIC SEQ RNDZ) OR GREATER THAN 0.5 DEG (DIRECT RNDZ)</div> </div> <div>3. CONFIRMED PGNS NAVIGATION ERRORS THAT RESULT IN THE FOLLOWING MSFN PGNS VELOCITY DIFFERENCES:</div> <div> <div>(A) DELTA V_x (DOWN RANGE) GREATER THAN ± 24 FPS</div> <div>(B) DELTA V_y (CROSS RANGE) GREATER THAN ± 90 FPS (COELLIPTIC SEQ RNDZ) OR GREATER THAN ± 45 FPS (DIRECT RNDZ)</div> <div>(C) DELTA V_z (RADIAL) GREATER THAN ± 37 FPS</div> </div> </div> <div>B. THE GROUND WILL NOT REQUEST SWITCHOVER AFTER AGS TGO LESS THAN 30 SECONDS.</div> <div>C. DURING ASCENT, THE AGS WILL BE DECLARED NO-GO IF CONFIRMED AGS NAVIGATION ERRORS RESULT IN:</div> <div> <div>1. PGNS PREDICTED INSERTION H_p LESS THAN 30,000 FT</div> <div>2. PGNS PREDICTED INSERTION H_a GREATER THAN TARGET VALUE PLUS 40 NM</div> <div>3. PGNS PREDICTED INSERTION WEDGE ANGLE GREATER THAN 1.0 DEG (COELLIPTIC SEQ RNDZ) OR GREATER THAN 0.5 DEG (DIRECT RNDZ)</div> </div> </div> </div> </div> </div> | | | | | | | | | | | | | | |
| | | <div> <div>3-81</div> <div> <div>REQUIREMENTS TO COMMIT TO THE SHORT RNDZ</div> <div> <div>A. PRIOR TO L/O THE FOLLOWING IS REQUIRED:</div> <div> <div>1. ONE OPERATIONAL LM NAVIGATION SYSTEM</div> <div>2. PREDICTED WEDGE ANGLE AT INSERTION EQUALS ZERO DEGREES.</div> <div>3. NO VIOLATION OF THE NAVIGATION REQUIREMENTS (REFERENCE MATRIX PAGE 3-20)</div> </div> <div>B. AT INSERTION (PRE-TWEAK) THE FOLLOWING IS REQUIRED:</div> <div> <div>1. TWEAK ΔV LESS THAN 60 FPS</div> <div>2. POST-TWEAK H_p GREATER THAN 5 NM</div> <div>3. NO VIOLATION OF THE NAVIGATION REQUIREMENTS (REFERENCE MATRIX PAGE 3-20)</div> </div> </div> </div> </div> | | | | | | | | | | | | | | |
| | | <div> <div>NOTE</div> <div> <div>WITH THE EXCEPTION OF LM COMPUTERS AND INERTIAL REFERENCES,</div> <div>NO ONBOARD NAVIGATION SYSTEMS ARE VERIFIED AFTER LIFT-OFF.</div> </div> </div> | | | | | | | | | | | | | | |
| | | <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 17</td><td>FNL</td><td>9/1/72</td><td>MISSION RULE SUMMARY</td><td>ASCENT EVA PHASE</td><td>3-19</td><td>Tape 51.3</td></tr> </table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | ASCENT EVA PHASE | 3-19 | Tape 51.3 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | ASCENT EVA PHASE | 3-19 | Tape 51.3 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------|---------------------|----------|-------|------|-----------|---------------|-------------------------------------|-------------------------|---------------------|--------|-----|------------|------------------------------------------------|--|-----|--------|-----|-----------------------|---------------------------------|-----|-----|---------|-----|----------------|-------------------------------|----|-----|
| | <p>REQUIRED G&N SYSTEMS NEEDED FOR DIRECT RNDZ</p> <table border="1"> <thead> <tr> <th rowspan="2">PRIMARY RNDZ NAVIGATION TECHNIQUE</th> <th colspan="5">SYSTEM REQUIREMENTS</th> </tr> <tr> <th>COMPUTER</th> <th>SENSOR/OPTICS</th> <th>SENSOR/COMPUTER INTERFACE SUPPLYING</th> <th>TRACKER LIGHT</th> <th>PLATFORM</th> </tr> </thead> <tbody> <tr> <td>LGC/RR</td> <td>LGC</td> <td>RNDZ RADAR</td> <td>RANGE, RANGE RATE, SHAFT AND TRUNION ANGLES</td> <td></td> <td>IMU</td> </tr> <tr> <td>AGS/RR</td> <td>AEA</td> <td>RNDZ RADAR LM COAS</td> <td>TAPEMETER: RANGE AND RANGE RATE</td> <td>CSM</td> <td>ASA</td> </tr> <tr> <td>CMC/SXT</td> <td>CMC</td> <td>USEABLE SXT</td> <td>SXT SHAFT AND TRUNNION ANGLES</td> <td>LM</td> <td>IMU</td> </tr> </tbody> </table> <ol style="list-style-type: none"> DIRECT RNDZ IS GO AS LONG AS ANY ONE OF THESE TECHNIQUES REMAINS AVAILABLE. LOSS OF ALL THREE OF THESE TECHNIQUES WILL RESULT IN EXECUTION OF THE COELLIPTIC SEQUENCE RNDZ. | PRIMARY RNDZ NAVIGATION TECHNIQUE | SYSTEM REQUIREMENTS | | | | | COMPUTER | SENSOR/OPTICS | SENSOR/COMPUTER INTERFACE SUPPLYING | TRACKER LIGHT | PLATFORM | LGC/RR | LGC | RNDZ RADAR | RANGE, RANGE RATE, SHAFT AND TRUNION ANGLES | | IMU | AGS/RR | AEA | RNDZ RADAR LM COAS | TAPEMETER: RANGE AND RANGE RATE | CSM | ASA | CMC/SXT | CMC | USEABLE SXT | SXT SHAFT AND TRUNNION ANGLES | LM | IMU |
| PRIMARY RNDZ NAVIGATION TECHNIQUE | SYSTEM REQUIREMENTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | COMPUTER | SENSOR/OPTICS | SENSOR/COMPUTER INTERFACE SUPPLYING | TRACKER LIGHT | PLATFORM | | | | | | | | | | | | | | | | | | | | | | | | | |
| LGC/RR | LGC | RNDZ RADAR | RANGE, RANGE RATE, SHAFT AND TRUNION ANGLES | | IMU | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGS/RR | AEA | RNDZ RADAR LM COAS | TAPEMETER: RANGE AND RANGE RATE | CSM | ASA | | | | | | | | | | | | | | | | | | | | | | | | | |
| CMC/SXT | CMC | USEABLE SXT | SXT SHAFT AND TRUNNION ANGLES | LM | IMU | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <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>APOLLO 17</td> <td>FNL</td> <td>9/1/72</td> <td>MISSION RULE SUMMARY</td> <td>ASCENT EVA PHASE</td> <td>3-20</td> </tr> </tbody> </table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | ASCENT EVA PHASE | 3-20 | | | | | | | | | | | | | | | | | |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | | | | | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | ASCENT EVA PHASE | 3-20 | | | | | | | | | | | | | | | | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | | |
|------|------|--------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------------|------------------|------|-----------|
| | | <div>TRANSEARTH COAST</div> | | | | | | |
| 3-82 | | TRANSEARTH MCC NOMINAL EXECUTION POINTS WILL BE AT THE FOLLOWING: A. TEI + 17 HOURS B. EI - 22 HOURS C. EI - 3 HOURS | | | | | | |
| 3-83 | | TRANSEARTH MCC PHILOSOPHY: THE G&N IS THE PRIMARY MODE OF EXECUTION FOR ALL TEC MCC'S. | | | | | | |
| 3-84 | | CSM EVA ATTITUDE/RATES CONSTRAINTS: THE SUN LOOK ANGLES WILL BE MAINTAINED AT THETA 145 DEGREES, PHI 315 DEGREES ±5 DEGREES. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | ASCENT EVA PHASE | 3-21 | Tape 10.4 |

Tape 10.4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|------|-----------|-------|------|--|-----------|-----|--------|----------------------|---------------------|------|-----------|
| | | <div>MANEUVERS</div> | | | | | | | | | | | | | | |
| 3-85 | | <p>THE FOLLOWING GUIDELINES WILL APPLY TO LM MANEUVERS:</p> <p>A. TRIMMING</p> <p>1. DESCENT ABORTS/ASCENTS</p> <p>(A) WITH COMM - TRIM CONTROLLING SYSTEM UNLESS GROUND ADVISES DIFFERENTLY.</p> <p>(B) WITHOUT COMM - TRIM CONTROLLING SYSTEM UNLESS PGNS/AGS V_X DIFFERENCE IS GREATER THAN 10 FPS. IF SO, DETERMINE CORRECT SYSTEM USING RENDEZVOUS RADAR.</p> <p>2. ALL RENDEZVOUS MANEUVERS WILL BE NULLED.</p> <p>3. DOCKED DPS MANEUVERS WILL NOT BE TRIMMED.</p> <p>B. ALTERNATE MISSION DOCKED DPS MANEUVERS WILL BE COMPLETED VIA AGS TAKEOVER FOR VIOLATION OF THE FOLLOWING LIMITS:</p> <p>1. ATTITUDE RATES - 10 DEG/SEC</p> <p>2. ATTITUDE ERRORS - 10 DEG</p> <p>3. ATTITUDE EXCURSIONS - 10 DEG</p> <p>C. ALTERNATE MISSION DOCKED DPS MANEUVERS WILL BE TERMINATED AFTER VIOLATION OF THESE OVERBURN CRITERIA:</p> <p>1. DPS LOI - 10 SEC AND ΔV AGS GREATER THAN 10 FPS</p> <p>2. DPS TEI - 10 SEC AND ΔV AGS GREATER THAN 2 FPS</p> <p>3. DPS LOI ABORTS - 10 SEC AND ΔV AGS GREATER THAN 2 FPS</p> <p><u>NOTE</u></p> <p>A CMC ΔV OF 2 FPS (OVERSPEED) AND 10-SEC OVERBURN IS ALSO A VALID CUE FOR SHUTDOWN.</p> | | | | | | | | | | | | | | |
| 3-86 | | <p>THE TABLE ON THE NEXT PAGE, INCLUDING NOTES AND REFERENCES, SUMMARIZES THE TAKEOVER, RESTART, SHUTDOWN, AND TRIMMING REQUIREMENTS, AND SPS ENGINE LIMITS FOR ALL SPS MANEUVERS.</p> <p>RULE NUMBERS 3-87 THROUGH 3-89 ARE RESERVED.</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 17</td><td>FNL</td><td>9/1/72</td><td>MISSION RULE SUMMARY</td><td>MANEUVERS EVA PHASE</td><td>3-22</td><td>Tape 10.5</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | MANEUVERS EVA PHASE | 3-22 | Tape 10.5 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | MANEUVERS EVA PHASE | 3-22 | Tape 10.5 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

| R | ITEM | | | | | | | | | | |
|---|------|-------------------------|--------------------|--------------------|--------|--------------------|-------------------|-------------------------------------------------|------------------------------------------------------------|----------------------|--|
| | | ENGINE LIMITS | | RATES/ERRORS FOR | | MANUAL | OVERBURN | EARLY C/O | RCS | | |
| | | INHIBIT | TERMINATE | TAKEOVER | ACTION | START ACTION | SHUTDOWN CRITERIA | RESTART CRITERIA | TRIM GUIDELINES | | |
| | | MODE III | NONE | ERRATIC ENG | 5/5 | COMPLETE | START | g | Hp > 40 | N/A | |
| | | MODE IV | NONE | ERRATIC ENG | 5/5 | COMPLETE | START | g | Hp < 95 IF G&N GO ΔVTG > 60 OR C/O > 6 SEC EARLY | N/A | |
| | | APOGEE KICK | NONE | ERRATIC ENG | 5/5 | COMPLETE | START | g | Hp < 95 IF G&N GO ΔVTG > 60 OR C/O > 6 SEC EARLY | N/A | |
| | | TLC MCC | TIGHT ⁱ | TIGHT ⁱ | 10/10 | TERMINATE | DELAY | 1 SEC | NO | X = 0.2 ^b | |
| | | LOI | TIGHT ^h | | | START ⁱ | | | | NO | |
| | | MODE I | | | | | | | | | |
| | | 0 TO 0 + 53 | | TIGHT | 10/10 | COMPLETE | | | YES | | |
| | | 0 + 53 TO 1 + 31 | | LOOSE | 10/10 | COMPLETE | | | YES | | |
| | | MODE II | | | | | | | | | |
| | | 1 + 31 TO 2 + 54 | | LOOSE | 10/10 | COMPLETE | | | YES | | |
| | | MODE III ^c | | | | | | | | | |
| | | 2 + 54 TO 3 + 40 | | LOOSE | 10/10 | COMPLETE | | | YES | | |
| | | 3 + 40 TO C/O | | TIGHT ^h | 10/10 | COMPLETE | | 10 SEC | VGO > 50 AND G&N GO | | |
| | | DOI ₁ | TIGHT ⁱ | TIGHT ⁱ | 10/10 | TERMINATE | DELAY | BT | NO | J | |
| | | CIRC | TIGHT ⁱ | TIGHT | 10/10 | TERMINATE | START | 1 SEC | ΔV TO GO > 20 | ALL = 0.2 | |
| | | RESCUE | LOOSE | LOOSE | 10/10 | COMPLETE | START | 1 SEC | ΔV TO GO > 12 | ALL = 0.2 | |
| | | LOPC | TIGHT ⁱ | TIGHT | 10/10 | TERMINATE | DELAY | 1 SEC | NO | Y = 0.2 | |
| | | TEI (G&N) | NONE | NONE | 10/10 | COMPLETE | DELAY | 2 SEC AND ΔV _C = -40 ^c | C/O > 3 SEC EARLY AND ΔV _C > 50 ^c | X AND Z = 0.2 | |
| | | TEI (SCS) | NONE | NONE | 10/10 | COMPLETE | START | 2 SEC | ΔV _C > 50 OR C/O > 5 SEC EARLY | NO | |
| | | TEC MCC | | | | | | | | | |
| | | CORRIDOR | LOOSE | LOOSE | 10/10 | COMPLETE | DELAY | 1 SEC AND ΔV _C = 0 | NO | X = 0.2 | |
| | | IP CONTROL ^b | TIGHT | TIGHT | 10/10 | TERMINATE | DELAY | 1 SEC AND ΔV _C = 0 | NO | X AND Z = 0.2 | |
| | | TLC ABORT | TIGHT | LOOSE | 10/10 | COMPLETE | START | 10 SEC AND ΔV _C = -70 | C/O > 10 SEC EARLY AND ΔV _C > 70 | NO | |
| | | EARTH DEOB | TIGHT ^d | LOOSE | 10/10 | COMPLETE | START | 1 SEC AND ΔV _C = 0 | ΔV TO GO > 30 AND C/O > 3 SEC EARLY ^e | ALL = 0.2 | |

TIGHT LIMITS: Fuel Ox ΔP > 20 and low P_C; either prop tank press < 160 psi and low P_C; P_C < 80 or decays 10 psi and V_M vs BT low; inhibit burn for any leak in He or prop tank. (Certain burns may be allowed with He tank leak if blowdown ΔV exceeds remaining mission requirements)^f; GN₂ A or B < 400 psi (for LOI only, GN₂ A and B < 400 psi).
LOOSE LIMITS: P_C < 70 psi and other cues; either prop tank < 115 psi and low P_C; erratic engine (popping, vibration, etc.)^f.

NOTES: a. Reserved.
 b. Trim all MCC (except MCC4) only if X ≤ 2 fps.
 c. See Rule 5-131.
 d. If SM RCS deorbit not available, use loose limits.
 e. See Rule 5-27.
 f. Some limits may be downgraded if warranted by mission circumstance.
 g. See Rule 5-3.
 h. If indication of ball valve failure, start on good bank (with LM available). If thrusting, shut down good bank 10 sec prior to nominal cutoff to verify indication.
 i. If indication of ball valve failure, start on suspect bank. For dual bank burns, if indication of ball valve failure while thrusting, shut down good bank to verify failure. If thrusting continues, reenable good bank.
 j. See Rule 3-39.
 k. Reserved.
 l. Ignition may be delayed up to but no more than 120 sec.

SATURN LAUNCH VEHICLE GO/NO-GO CRITERIA
9/1/72

9/1/72

| GO/NO-GO ITEM CONDITION | LAUNCH | | EARTH PARKING ORBIT | | |
|-------------------------------|------------------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------|----------------------------------------------------|-------------------------------------|
| | ABORT/SEPARATION | S-II/S-IVB EARLY STAGE | GUIDANCE TAKEOVER | RESTART/TLI INHIBIT | RESTART/TLI TERMINATE |
| S-IC | LOSS OF THRUST ANY 2 ENG | PRIOR TO TB1 + 2:00 - AUTO ABORT | | | |
| | LOSS OF THRUST 2 ADJ ENG | BETWEEN TB1 +2:00 AND TB2 +0:08 SEC-MANUAL ABORT | | | |
| | Q BALL + 5° ATT ERROR | MANUAL ABORT | | | |
| | 4°/SEC P AND Y, 20°/SEC R | AUTO ABORT TO 2 + 00 | | | |
| | 10°/SEC P AND Y, 20°/SEC R | MANUAL ABORT AFTER 2 + 00 | | | |
| IU | LOSS OF ATTITUDE CONTROL | ABORT (LAUNCH) | IF SMALL RATES UPSTAGE | ATTEMPT S/C CONTROL TB5 AND TB7 TO TB7 + 15 MIN | DURING TB6 TO TB6 + 9 MIN 20 SEC |
| | INERTIAL ATTITUDE REFERENCE FAIL | | | LAUNCH, EPO TLI | |
| | | | | | |
| S-II | LOSS OF THRUST (2 ENG). | | | | |
| | LOSS OF THRUST (3 OR MORE ENG) ABORT IF PRIOR TO S-IVB TO COI | ABORT | AFTER S-IVB TO COI | | |
| | ACTUATOR HARDOVER INBOARD | PRIOR TO S-IVB TO COI - ABORT | AFTER S-IVB TO COI AND BEFORE S-II C/O MINUS 30 SEC | | |
| | 2ND PLANE SEPARATION FAIL | BEFORE TB3 + 1 MIN 45 SEC - ABORT | | | |
| | Y DEVIATION > 20° | ABORT | | | |
| S-IVB | LOSS OF THRUST | PRIOR TO EPO - SEPARATE | | | |
| | LOSS OF HYDRAULIC FLUID PRIOR TO START | INHIBIT START | | | |
| | COLD HE FAIL OPEN | ABORT PRIOR TO S-II IGN | AFTER S-II IGN | | |
| | INSUFFICIENT PROPELLANT | | | INHIBIT RESTART | |
| | LOX VLV FAILS TO CLOSE AT 1ST C/O | | | INHIBIT RESTART | |
| | DESTRUCT SYSTEM ARMS INADVERTANTLY | SEP TO 7000 FT MINIMUM | | | |
| | FU/OX BULKHEAD ΔP EXCEEDS LIMITS | -26 OR + 36 PSID (ANY TIME) | SEP TO 7000 FT MINIMUM | | |
| | START BOTTLE PRESS OUTSIDE RESTART LIMITS | SEP > 1800 PSIA | | | |
| | LOX CHILLDOWN FAIL | | | | |
| | S-IVB ACTUATOR HARDOVER | NO START | | | |
| | Y DEVIATION > 20° | ABORT | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

① DISREGARD Q BALL FOR ENGINE OUT PRIOR TO 75 SEC.

LEGEND:

NO REQUIREMENT

REV

| | EARTH ORBIT | | TLC | | UNDOCK AND SEP | | POWERED DESCENT | | LUNAR STAY | | LUNAR ORBIT | | TEC |
|---------------------------|-------------|---------|--------|----------|----------------|-------------|-----------------|-----|------------|----------------|-------------|---------|-----|
| | CONT BOOST | CONT EO | TD & E | CONT TLC | LOI | CONT LO/DOI | CIRC/DOI 2 | PDI | PDI TO T/D | PAST T3 & SUBS | POST RNDZ | LM JETT | |
| ECS | | | | | | | | | | | | | |
| CABIN INTEGRITY | 7 | 7 | | | | | | | | | | | |
| NO FIRE OR SMOKE IN CABIN | 7 | 7 | | | | | | | | | | | |
| NO O2 MANIFOLD LEAKS | 7 | 7 | | | | | | | | | | | |
| NO O2 MFLD LEAKS | 7 | 7 | | | | | | | | | | | |
| MAIN O2 REGULATORS | 7 | 7 | | | | | | | | | | | |
| ECS COOLANT LOOPS | 7 | 7 | | | | | | | | | | | |
| ECS RADIATORS | 7 | 7 | | | | | | | | | | | |
| ECS GLYCOL EVAPS | 7 | 7 | | | | | | | | | | | |
| SUIT INTEGRITY | 7 | 7 | | | | | | | | | | | |
| NO GLYCOL LEAK | 7 | 7 | | | | | | | | | | | |
| NO EXCESS HUMIDITY | 7 | 7 | | | | | | | | | | | |
| POTABLE & WASTE H2O TK | 7 | 7 | | | | | | | | | | | |
| SURGE TK/REPRESS PACKAGE | 7 | 7 | | | | | | | | | | | |
| SUIT COMPRESSORS | 7 | 7 | | | | | | | | | | | |
| SUIT CIRCUIT | 7 | 7 | | | | | | | | | | | |
| OVBID DUMPS | 7 | 7 | | | | | | | | | | | |
| CRYO | 7 | 7 | | | | | | | | | | | |
| O2 TANKS | 7 | 7 | | | | | | | | | | | |
| H2 TANKS | 7 | 7 | | | | | | | | | | | |
| EPS | 7 | 7 | | | | | | | | | | | |
| FUEL CELLS | 7 | 7 | | | | | | | | | | | |
| AUX BATTERY | 7 | 7 | | | | | | | | | | | |
| ENTRY BATTERIES | 7 | 7 | | | | | | | | | | | |
| MAIN BUSES | 7 | 7 | | | | | | | | | | | |
| BATTERY BUSES | 7 | 7 | | | | | | | | | | | |
| AC BUSES | 7 | 7 | | | | | | | | | | | |
| BAT RELAY BUS | 7 | 7 | | | | | | | | | | | |
| INVERTERS | 7 | 7 | | | | | | | | | | | |
| AC 9A (1 AND 2) | 7 | 7 | | | | | | | | | | | |
| DOCKING | 7 | 7 | | | | | | | | | | | |
| DOCKING LATCHES | 7 | 7 | | | | | | | | | | | |
| GA2 BOTTLES | 7 | 7 | | | | | | | | | | | |
| SEQ | 7 | 7 | | | | | | | | | | | |
| SEQUENTIAL SYSTEMS | 7 | 7 | | | | | | | | | | | |

1. BASED ON AMOUNT OF WATER AVAILABLE, CONSIDERATION WILL BE GIVEN TO CONTINUING THE MISSION ON SECONDARY LOOP
2. IF POSSIBLE LM DESCENT STAGE WILL BE RETAINED FOR TEI IF CONDITION NOT MET
3. CONSIDERATION WILL BE GIVEN TO PERFORMING EVA IF TKS 1 & 2 OR 1 & 3 REMAIN AND QUANTITY IN 2 OR 3 IS LESS THAN 60%
4. NO REQUIREMENT IS SOURCE OF ACTIVATION CAN BE ISOLATED
5. MUST HAVE EITHER PRIMARY OR SECONDARY SYSTEM COMPOSED OF FUNCTIONING LOOP AND CORRESPONDING RADIATORS
6. CONSIDERATION WILL BE GIVEN TO CONTINUING WITH TWO REMAINING
7. MUST HAVE CABIN INTEGRITY OR SUIT LOOP CAPABLE OF SUPPORTING LIFE, ITEMS MARKED BY * ARE REQUIRED TO MAINTAIN SUIT LOOP
8. 1 OF 2 REQUIRED IF OPS AVAILABLE FOR USE BY LMP OR CDR
9. MODE I AND II REGIONS ONLY, 0 THEREAFTER
10. CONSIDERATION WILL BE GIVEN TO CONTINUING AFTER LOSS OF A TANK
11. BASED ON FAILURE MODE CONSIDERATION WILL BE GIVEN TO JETT LM WITH 1 REMAINING
12. 1 OF 2 SUIT COMPRESSORS OR VACUUM CLEANER
13. CONSIDERATION WILL BE GIVEN TO UNDOCKING IF MAIN REG FAILED CLOSED
- LEGEND: ■ NO REQUIREMENTS
14. TEI MAY BE PERFORMED WITH 1 OF 2 PRIMARY RADIATOR PANELS AND THE SECONDARY LOOP

CSM GNC GO CRITERIA

9/1/72

REV

| GO/NO-GO ITEM | EARTH ORBIT | | TLC | | LUNAR ORBIT (BEFORE UNDOCKING) | | CIRC/DOI ₂ | | POWERED DESCENT | | LUNAR STAY | | LUNAR ORBIT (P-RNDZ) | | POST DOCK | |
|-----------------------|-------------|---------|-----|------|--------------------------------|-----|-----------------------|-----------------------|-----------------|-----|------------|---------|----------------------|-----------|-----------|-----|
| | CONT BOOST | CONT EO | TLI | TD&E | CONT TLC | LOI | CONT LOI | CONT DOI ₁ | UNDOCK | PDI | PDI TO TD | PAST T1 | PAST T3 & SUBS | CONT L.O. | LM JETT | TEC |
| GNC/SCS | | | | | | | | | | | | | | | | |
| DEORBIT CAPABILITY | | | | | | | | | | | | | | | | |
| AUTO ATTITUDE CONTROL | | | | | | | | | | | | | | | | |
| RATE DAMPING | | | | | | | | | | | | | | | | |
| DIRECT RCS | | | | | | | | | | | | | | | | |
| BMAGS P.Y | | | | | | | | | | | | | | | | |
| BMAGS R | | | | | | | | | | | | | | | | |
| FDAI | | | | | | | | | | | | | | | | |
| THC | | | | | | | | | | | | | | | | |
| RHC | | | | | | | | | | | | | | | | |
| EMS | | | | | | | | | | | | | | | | |
| CMC | | | | | | | | | | | | | | | | |
| ISS | | | | | | | | | | | | | | | | |
| OSS | | | | | | | | | | | | | | | | |
| OPTICS DAC | | | | | | | | | | | | | | | | |
| NO SOLENOID DR GND | | | | | | | | | | | | | | | | |
| TVC SERVO LOOP | | | | | | | | | | | | | | | | |
| DSKY | | | | | | | | | | | | | | | | |
| FU/OX TANK (W/O LEAK) | | | | | | | | | | | | | | | | |
| GN2 TANK (W/O LEAK) | | | | | | | | | | | | | | | | |
| BALL VALVE BANK | | | | | | | | | | | | | | | | |
| FEEDLINE TEMP > 40° F | | | | | | | | | | | | | | | | |
| FU/OX AP < 20 PSI | | | | | | | | | | | | | | | | |
| Pt > 70 PSI | | | | | | | | | | | | | | | | |
| FLANGE TEMP < 480° | | | | | | | | | | | | | | | | |
| HE TANK (W/O LEAK) | | | | | | | | | | | | | | | | |
| SM RCS | | | | | | | | | | | | | | | | |
| HE TANK (W/O LEAK) | | | | | | | | | | | | | | | | |
| NO LEAK BELOW ISO VLV | | | | | | | | | | | | | | | | |
| PKG TEMP > 55° | | | | | | | | | | | | | | | | |
| THRUSTERS | | | | | | | | | | | | | | | | |
| CM RCS | | | | | | | | | | | | | | | | |
| HE TANK (W/O LEAK) | | | | | | | | | | | | | | | | |
| MANIFOLD (W/O LEAK) | | | | | | | | | | | | | | | | |
| NOT ARMED | | | | | | | | | | | | | | | | |

LEGEND:

CONSIDERATION WILL BE GIVEN TO PERFORMING THE EVA WITH A PROPELLANT LEAK

⑦

NOTE
1 T₂ NO STAY CONDITIONS
2 NONE

⑧

① REQUIRES 3 AXIS ATTITUDE CONTROL AND TRANSLATION 3 AXIS (ONE LATERAL AXIS MAY BE DEGRADED)
② MUST HAVE SUFFICIENT BLOWDOWN FOR DEORBIT
③ AUTO OR MANUAL IN 3 AXIS
④ REQUIRES C1 OR D1, C2 OR D2, C3, C4, D3, D4 THRUSTERS
⑤ 3 AXIS ATT. CONTROL AND ± X TRANSLATION
⑥ 3 OF 4 TOTAL REQUIRED, ROLL 90° IF NECESSARY TO KEEP REDUNDANCY IN YAW

NEITHER TANK REQUIRED IF SUFFICIENT BLOWDOWN EXISTS IN EACH RING FOR ENTRY. ARMING SYSTEM WITH SOURCE PRESS > 1250 PSI WILL PROVIDE > 60 LBS BLOWDOWN IN EACH RING

③

⑧

⑨

⑩

SINGLE POINT FAILURES WHICH CAN ONLY BE CONFIRMED BY BURNING ENGINE

⑨

⑩

⑪

CONSIDERATION WILL BE GIVEN TO COMPLETING THE LUNAR STAY PHASE

CONSIDERATION WILL BE GIVEN TO PERFORMING THE EVA WITH A PROPELLANT LEAK

⑦

NOTE
1 T₂ NO STAY CONDITIONS
2 NONE

⑧

① REQUIRES 3 AXIS ATTITUDE CONTROL AND TRANSLATION 3 AXIS (ONE LATERAL AXIS MAY BE DEGRADED)
② MUST HAVE SUFFICIENT BLOWDOWN FOR DEORBIT
③ AUTO OR MANUAL IN 3 AXIS
④ REQUIRES C1 OR D1, C2 OR D2, C3, C4, D3, D4 THRUSTERS
⑤ 3 AXIS ATT. CONTROL AND ± X TRANSLATION
⑥ 3 OF 4 TOTAL REQUIRED, ROLL 90° IF NECESSARY TO KEEP REDUNDANCY IN YAW

DEFINITIONS

GUIDANCE AND CONTROL

- 3-AXIS ATTITUDE CONTROL--THE ABILITY TO CHANGE THE EXISTING VEHICLE ATTITUDE PLUS AND MINUS ABOUT EACH AXIS. TO HAVE THIS CAPABILITY, THE LM REQUIRES AN OPERATIONAL MANUAL OR AUTOMATIC CONTROL SYSTEM.
- REDUNDANT 3-AXIS ATTITUDE CONTROL--TWO AUTONOMOUS 3-AXIS ATTITUDE CONTROL SYSTEMS INDEPENDENT OF SECONDARY COILS, I.E., NO SINGLE FAILURE WILL CAUSE LOSS OF BOTH AUTONOMOUS SYSTEMS.
- GUIDANCE STEERING--ABILITY TO CALCULATE AND STEER THE LM ALONG THE DESIRED THRUST VECTOR DURING A POWERED MANEUVER. THIS CAPABILITY REQUIRES AN OPERATIONAL PGNS OR AGS INCLUDING A 3-AXIS ATTITUDE CONTROL SYSTEM.
- OPERATIONAL PGNS--A PGNS WITHOUT AN LGC, ISS, DSKY OR CES FAILURE(S) PREVENTING PGNS 3-AXIS ATTITUDE CONTROL.
- OPERATIONAL AGS--AN AGS WITHOUT AN AEA, ASA, DEDA OR CES FAILURE(S) PREVENTING AGS 3-AXIS ATTITUDE CONTROL.
- 3-AXIS TRANSLATION--ONE TTCA AND AN OPERATIONAL PGNS OR MANUAL (AGS MODE) TRANSLATION CAPABILITY.

DPS PROPULSION

- OPERATIONAL DPS PRIOR TO PDI IGNITION
 - FUEL AND/OR OXID ENGINE INLET PRESSURE GREATER THAN 30 PSIA.
 - FUEL AND OXID BULK TEMPERATURES GREATER THAN 50° F AND LESS THAN 90° F.
 - Δ TEMP BETWEEN FUEL AND OXID LESS THAN 10° F.
 - Δ PRESSURE (FUEL HIGH) LESS THAN 50 PSID.
 - PROPELLANT AND SUPERCRITICAL HELIUM ADEQUATE TO COMPLETE MISSION.

AFTER PDI IGNITION

- FUEL AND/OR OXID ENGINE INLET PRESSURES GREATER THAN 150 PSIA (ULLAGE PRESSURES GREATER THAN 160 PSIA).
 - THROAT AREA INCREASE LESS THAN 52 PERCENT.
 - ADEQUATE PROPELLANT AND SUPERCRITICAL HELIUM TO COMPLETE MISSION.
- DPS INSERTION CAPABILITY--THE ABILITY TO OBTAIN A SAFE INSERTION USING ONLY THE DPS.

APS PROPULSION

OPERATIONAL APS

- PREPRESSURIZATION
 - Δ PRESSURE BETWEEN APS FUEL AND OXID ENGINE INLET PRESSURES LESS THAN 90 PSID.
 - Δ TEMP BETWEEN APS FUEL AND OXID LESS THAN 10° F.
 - APS FUEL AND/OR OXID TEMP GREATER THAN 50° F AND LESS THAN 90° F.
 - APS FUEL OR OXID INLET PRESSURE GREATER THAN 62 PSIA AND LESS THAN 220 PSIA.
 - REDUNDANT PRESSURIZATION PATHS AND NO HELIUM TANK/LINE LEAKS.
- POST-PRESSURIZATION
 - Δ PRESSURE BETWEEN FUEL AND OXID INLET PRESSURES LESS THAN OR EQUAL TO 15 PSID.
 - FUEL AND/OR OXID INLET PRESSURES GREATER THAN 105 PSIA. (ULLAGE PRESSURE GREATER THAN 110 PSIA).
 - ADEQUATE PROPELLANT AND SOURCE PRESSURE TO COMPLETE MISSION.

REACTION CONTROL

OPERATIONAL RCS

- AN RCS CONTAINING 8 OPERATIONAL THRUSTERS SUPPLIED BY ITS OWN PRESSURIZATION AND PROPELLANT FEED SYSTEM INDEPENDENT OF ASCENT FEED AND CROSSFEED.
- FUEL AND/OR OXID MANIFOLD PRESSURES GREATER THAN OR EQUAL TO 100 PSIA.
- FUEL TEMP GREATER THAN OR EQUAL TO 40° F AND LESS THAN OR EQUAL TO 100° F.
- QUAD TEMPS GREATER THAN 119° F.

REV

GO/NO-GO CRITERIA

| GO/NO-GO ITEM | UNDOCK TO PDI | POWERED DESCENT | | LUNAR STAY W/EVA | LM ACTIVE RNDZ |
|-------------------------------------|---------------|-----------------|-----------------|------------------|----------------|
| | | PDI TO 6+10 | 6+10 TO HI GATE | | |
| GNC | | 1 | 3 | 2 | POIS OR AGS |
| | | | | | |
| | | | | | |
| | | | | | |
| 1. GUIDANCE STEERING | | | | | |
| 2. 3-AXIS ATT CONT | | | | | |
| 3. 3-AXIS TRANS | | | | | |
| 4. FDI-ATT/RATES/ERR | | | | | |
| 5. T/D 40 SEC OF 57 PERCENT GTC | | | | | |
| 6. VHF RING/CSH OPTICS | | | | | |
| 7. RR | | | | | |
| 8. AOT | | | | | |
| 9. LR | | | | | |
| 10. DPS AUTO ON | | | | | |
| 11. REDNT APS ON | | | | | |
| 12. PGR GDA TRIM | | | | | |
| 13. HAN THTL | | | | | |
| 14. AUTO THTL | | | | | |
| DPS | | 9 | 11 | 13 | 15 |
| | | | | | |
| | | | | | |
| 1. OPERATIONAL APS | | | | | |
| 2. NO PROP LEAKS | | | | | |
| 3. NO HE LEAKS/REDUNDANT PRESS PATH | | | | | |
| RCS | | 16 | 18 | 20 | 22 |
| | | | | | |
| | | | | | |

GENERAL NOTES

- LOSS OF AGS GUIDANCE STEERING IS ACCEPTABLE PROVIDED RNDZ 3-AXIS ATT CONT EXISTS
- LOSS OF PGNS OR AGS GUIDANCE STEERING IS ACCEPTABLE PROVIDED RNDZ 3-AXIS CONT EXISTS
- FOR SINGLE CONTROL MODE, LANDING IS CREW OPTION
- AGS RATE CMD MAY CONSIST OF 2 AXIS RATE CMD AND ONE DIRECT, I.E. ONE RATE GYRO FAILED
- NO AUTO ULLAGE PLUS NO AUTO START--PDI NO GO
- MANUAL IS MANDATORY PLUS EITHER PGNS AUTO OR AGS AUTO
- GDA WILL BE COMMANDED OFF--ABORT STAGE IF IMPINGEMENT LIMITS VIOLATED
- WORK-AROUND PROCEDURE EXISTS FOR MAXIMUM THRUST
- INHIBIT DPS BURSTS
- ASCEND NEXT BEST OPPORTUNITY
- ABORT STAGE PRIOR TO INLET PRESSURES REACHING 150 PSIA

LEGEND

- ABORT, THEN ABORT STAGE AT DPS DEPLETION IF:
 - LOW LEVEL CONFIRMS INSUFFICIENT PROPELLANT TO LAND
 - Δ BETWEEN FUEL AND OXIDIZER QUANTITY IS GREATER THAN 10 PERCENT
 - PGNS READING 2 PERCENT AND NO VALID TIME ESTIMATE FROM LOW LEVEL
 - DPS PROPELLANT MARGIN PREDICTED LESS THAN MINUS 0.2 PERCENT AFTER ENTRY INTO P6A (CONFIRMED BY OTHER CUES)
- APS HELIUM SOURCE LEAK AFTER PRESSURIZATION REQUIRES IMMEDIATE LIFTOFF
- IF MANIFOLD PRESSURE LESS THAN 100 PSIA, AND LEAK UPSTREAM OF MAIN SOV, CROSSFEED FROM GOOD SYSTEM
- CONTINUE MISSION ONLY IF RCS BLONDOWN CAPABILITY EXISTS TO MEET CONSUMABLE REDLINES
- ABORT STAGE AS SOON AS POSSIBLE
- CONTINUE MISSION AFTER CIRG
- LOSS OF SOME TRANSLATIONAL CAPABILITY REQUIRES HYBRID LM/CSM MANEUVERS DURING DOCKING PHASE

NOTE

- T₁ NO STAY CONDITIONS:
APS PROP LEAK
RCS PROP LEAK (BOTH SYS)
- T₂ NO STAY CONDITIONS:
APS PROP LEAK
RCS LEAK (BOTH SYS)

SPECIFIC RULES

- IF NO-GO AT UNDOCKING
DO NOT UNDOCK
IF NO-GO UNDOCKED
NO GO FOR CIRG/DOCK
- IF NO-GO AT CIRG OR PRE-PDI
NO GO FOR PDI/DOCK
IF NO-GO DURING POWERED DESCENT
ABORT
ABORT STAGE AT LOSS OF DPS CAPABILITY
- IF NO-GO LUNAR STAY
L/O NEXT BEST OPPORTUNITY
IF NO-GO RENDEZVOUS
CSM ACTIVE RENDEZVOUS

GUIDANCE AND CONTROL

- IMU
 - IRIG BIAS UPDATES WILL BE ACCOMPLISHED WHEN GYRO DRIFT IS GREATER THAN THE TWO SIGMA DRIFT MEASUREMENT ACCURACY AND UPON CONTROL/GUIDANCE CONCURRENCE. NO UPDATES WILL BE MADE FOR GYRO DRIFTS LESS THAN 0.075 DEG/HR (5 MERU).
 - THE PGNS WILL BE CONSIDERED NO GO WITH A GYRO DRIFT GREATER THAN OR EQUAL TO ±1.5 DEG/HR (100 MERU). THE MAXIMUM ALLOWABLE VALUE WITHIN THE LGC IS ±1.93 DEG/HR (128 MERU).
 - PIPA BIAS UPDATES WILL BE ACCOMPLISHED AS FOLLOWS:
 - NO BIAS UPDATES WILL BE ACCOMPLISHED PRIOR TO 30 MINUTES OF IMU OPERATION.
 - THE INITIAL BIAS UPDATE WILL NOT BE PERFORMED IF THE Δ BIAS IS LESS THAN ±0.03 CM/SEC/SEC. SUBSEQUENT UPDATES WILL ONLY BE PERFORMED IF THE Δ BIAS IS GREATER THAN ±0.1 CM/SEC/SEC.
 - IF LOSS OF IMU COOLING OCCURS, TURN-ON/OPERATION TIMES WILL BE DETERMINED BY REAL-TIME FLIGHT PLANNING REQUIREMENTS.
- RENDEZVOUS RADAR
THE RR ANTENNA WILL BE POSITIONED AFTER LUNAR T/D TO PRECLUDE REPOSITIONING DUE TO ANTENNA HEATING ON THE LUNAR SURFACE.
- LANDING RADAR
 - THE LR SHOULD NOT NORMALLY BE OPERATED AT AN ANTENNA TEMP LESS THAN +50° F; HOWEVER, THE LUNAR LANDING MISSION WILL BE ATTEMPTED IF THE ANTENNA TEMP IS ABOVE THE CRITICAL LIMIT OF -15° F (HARDWARE DAMAGE).
 - LR ACTIVATION WILL BE DELAYED SO THAT THE PREDICTED LR TEMP WILL BE NO GREATER THAN 145° F AT HI-GATE.
- AGS
 - THE AGS IS DECLARED NO GO DURING A GYRO AND ACCELEROMETER CALIBRATION IF THE GYRO DRIFT CHANGE IS GREATER THAN 2.00 DEG/HR AND IF THE ACCELEROMETER BIAS CHANGE IS GREATER THAN 0.039 FT/SEC/SEC FROM THE VALUE AT THE START OF THE CALIBRATION.
 - IF LOSS OF ASA COOLING OCCURS, TURN ON/OPERATION TIMES WILL BE DETERMINED BY REAL-TIME FLIGHT PLANNING REQUIREMENTS.
- CES
LOSS OF INVERTER ONE/AC BUS A REQUIRES A MANUAL ENGINE ON SIGNAL TO MAINTAIN DPS ENGINE ELECTRICAL "ON" REDUNDANCY.

DPS PROPULSION

- FROM A SAFETY STANDPOINT, SUPERCRITICAL HELIUM BURST DISC RUPTURE DURING POWERED OPERATION IS AN ALLOWABLE EVENT.
 - IF POWERED DESCENT IS ABORTED DURING DPS INSERTION CAPABILITY OR IF A VOKED DPS CONTINGENCY IS REQUIRED AND PGNS LESS THAN 86 PERCENT, THE DES HELIUM REG 1 AND REG 2 VALVES SHOULD BE CLOSED 10 SECONDS PRIOR TO ENGINE CUTOFF TO PREVENT POSSIBLE FUEL/HELIUM HEAT EXCHANGER FREEZING.
 - THE DPS PRESSURIZATION SYSTEM MAY BE OPENED TO A START TANK LEAK. IF DONE, THE PRIMARY HELIUM REG SOV SHOULD BE CLOSED AFTER EACH BURN AND REOPENED PRIOR TO ANY SUBSEQUENT BURN.
 - THE START TANK SOUBS WILL NOT BE BLOWN IF A LEAK EXISTS IN THE TANK PRIOR TO PRESSURIZATION UNLESS THE FUEL OR OXIDIZER ENGINE INLET PRESSURES ARE LESS THAN 30 PSIA.
 - 91 SEC AFTER LOW LEVEL THE CREW WILL EVALUATE WHETHER TO LAND OR ABORT. (BINGO CALL WHEN 5 SEC AT FTP OR 20 SEC AT 27.5% REMAINING)
- APS PROPULSION
- ASCENT FEED WILL NOT BE UTILIZED IF AN APS HELIUM/PROPELLANT LEAK OR VALID APS LO-LEVEL EXISTS DURING ANY PHASE OF THE MISSION.
 - OPTIMIZATION OF APS HELIUM (ISOLATION OF LEAKING SOURCE, BLOW DOWN, ETC.) SHOULD BE ACCOMPLISHED IF POSSIBLE FOR HELIUM LEAKS.
 - ONE HELIUM BOTTLE IS CONSIDERED SUFFICIENT TO SUPPLY APS ΔV FOR NON-LANDING ALTERNATE MISSIONS.
 - WITH AN APS PROPELLANT VALVE MISMATCH INDICATION DURING A BURN, FUTURE APS BURNS ARE POSSIBLE ONLY IF THE MISMATCH IS NOT PRESENT FOLLOWING THE BURN.

REACTION CONTROL

- ASCENT FEED WILL NOT BE UTILIZED IF AN RCS PROPELLANT LEAK EXISTS DOWNSTREAM OF THE MAIN SOV'S.

EVA MISSION RULES

| LUNAR SURFACE EVA (CONTINUED) | | GO/NO-GO CRITERIA/SPECIFIC RULES | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------------------------------|--|
| REV | 9/1/72 | REV | |
| LUNAR SURFACE EVA | | LUNAR SURFACE EVA | |
| 9. OPERATIONAL PGA | | A | |
| MUST PASS EMU INTEGRITY CHECK AND HAVE ALL CONNECTORS LOCKED AND ALL RESTRAINTS CABLES EXCEPT GLOVE OR NECK CABLES INTACT. NOTE ONLY A SINGLE LOCKING MECHANISM IS REQUIRED FOR EACH CONNECTOR. | | | |
| 10. TERMINATE EVA--THE CREW WILL BE ALLOWED SUFFICIENT TIME TO CLOSE OUT THE ACTIVITY IN WHICH THEY ARE ENGAGED (5 TO 10 MINUTES) AND WILL THEN RETURN TO THE LM AND EXPEDITIOUSLY COMPLETE CLOSEOUT ACTIVITIES AS REQUIRED. | | | |
| 11. TERMINATE EVA IMMEDIATELY--THE CREW WILL CEASE THEIR SURFACE ACTIVITIES AND IMMEDIATELY RETURN TO THE LM, INGRESS, AND REPRESSURIZE. | | | |
| 12. CRITICAL INSTRUMENTATION | | | |
| MEAS DESCRIPTION PAM F11/FM ONBOARD | | | |
| PGA PRESS GAGE GT8168P/GT8268P | | CUFF GAGE 1 OF 3 | |
| LOW PGA PRESS TONE | | TONE M | |
| LOW VENT FLOW TONE | | TONE 1 OF 2 | |
| PLSS BAT CURRENT | | GT8140C/GT8240C M | |
| CMP EVA | | | |
| 1. CMP EMU PRESSURE INTEGRITY | | | |
| A. ABLE TO MEET MAX 0.8 PSID/MIN DECAY CRITERIA DURING EMU PRESSURE INTEGRITY CHECK. | | | |
| B. CMP EMU REGULATED PRESSURE NOT LESS THAN 3.70 PSID (CREWMAN) AND DECREASING OR GREATER THAN 4.0 PSID (CREWMAN) AND INCREASING DURING CMP EVA. | | | |
| 2. ADEQUATE O ₂ FLOW FROM SCU | | | |
| CMP EMU O ₂ FLOW INTO SUIT GREATER THAN 6.0 LBS/HR (60 TO 65 PSI UMBILICAL PRESS) | | | |
| 3. TERMINATE CMP EVA--THE CREWMAN WILL CEASE PLANNED EVA ACTIVITIES, TRANSFER TO THE CM, INGRESS AND REPRESSURIZE. | | | |
| 4. CRITICAL INSTRUMENTATION | | | |
| PGA PRESS GAGE CUFF GAGE 1 OF 2 | | ONBOARD (CMP ONLY) M | |
| LOW PRESS WARNING SWITCH | | | |
| LOW FLOW WARNING SWITCH | | ONBOARD (CMP ONLY) 1 OF 2 | |
| CM PRESS GAGE | | ONBOARD M | |
| LUNAR SURFACE EVA | | | |
| EMU PRESSURE INTEGRITY | | | |
| A. ABLE TO PASS EMU PRESSURE INTEGRITY CHECK (HIGH O ₂ FLOW FLAG CLEARS AFTER INITIAL PRESSURIZATION). | | | |
| B. PROPER PRESSURE REGULATION [LOST IF REGULATED PRESSURE LESS THAN 3.75 PSID (TM) AND DECREASING OR LUNAR SURFACE]. | | | |
| OPERATIONAL PRIMARY OXYGEN SUBSYSTEM (POS) | | | |
| A. SOURCE PRESSURE GREATER THAN 220 PSIA OR 5 PERCENT (INDICATOR). | | | |
| B. ABLE TO SUPPLY OXYGEN TO OXYGEN VENTILATION LOOP. | | | |
| C. PROPER PLSS PRESSURE REGULATION [NOT LESS THAN 3.75 PSID (TM) AND DECREASING OR GREATER THAN 4.05 PSID (TM) AND INCREASING]. | | | |
| OPERATIONAL PLSS POWER SUPPLY | | | |
| A. PLSS BATTERY VOLTAGE GREATER THAN OR EQUAL TO 16.0 VDC AND STABLE | | | |
| B. PLSS BATTERY CURRENT DRAIN GREATER THAN 2.0 AMPS | | | |
| PLSS & BSLSS THERMAL CONTROL CAPABILITY | | | |
| LIQUID COOLED GARMENT/LIQUID TRANSPORT LOOP CIRCULATION. | | | |
| PLSS THERMAL CONTROL CAPABILITY | | | |
| A. LCG H ₂ O INLET TEMPERATURE AND SUBLIMATOR O ₂ OUTLET TEMPERATURE LESS THAN 50° F AND LCG H ₂ O IT GREATER THAN 5° F WITH DIVERTER VALVE IN MAX POSITION. | | | |
| B. FEEDWATER RESERVOIR INTEGRITY AND THE ABILITY TO SUPPLY H ₂ O TO SUBLIMATOR. | | | |
| VENTILATION CAPABILITY--OPERATIONAL FAN (BAT CURRENT GREATER THAN 2.0 AMPS) | | | |
| CONTAMINATION CONTROL CAPABILITY | | | |
| A. VENTILATION CAPABILITY | | | |
| B. PLSS CO ₂ PARTIAL PRESSURE LESS THAN 15.0 MM OF HG | | | |
| C. INSUFFICIENT CONTAMINATION (LICH AND BY-PRODUCTS) IN THE VENTILATION LOOP TO RESULT IN CREWMAN DISCOMFORT | | | |
| OPERATIONAL OXYGEN PURGE SYSTEM (OPS) | | | |
| A. 15 MINUTES HI PURGE CAPABILITY AT THE END OF A PLANNED EVA. | | | |
| OPS RESIDUALS ARE: | | | |
| 1. GREATER THAN 240 PSIA AT HIGH PURGE | | | |
| 2. GREATER THAN 90 PSIA AT LOW PURGE | | | |
| 3. GREATER THAN 100 PSIA AT MAKEUP | | | |
| B. OPS O ₂ REGULATED PRESSURE GREATER THAN 3.4 AND LESS THAN 4.0 PSID, OR OPS O ₂ REGULATED PRESSURE DOES NOT GO FROM 4.0 TO 5.0 PSID IN LESS THAN 1 SEC. THE OPS WILL BE CONSIDERED UNACCEPTABLE FOR MAKEUP MODE OPERATIONS IF THE OPS O ₂ REGULATED PRESSURE EXCEEDS 4.0 PSID. | | | |
| C. PURGE VALVE (REDUNDANT LOCKING PIN NOT REQUIRED) | | | |
| LUNAR SURFACE EVA | | | |
| 1. THE BSLSS WILL BE CARRIED ON ALL TWO-MAN EVA TRAVERSES. | | | |
| IF ITS USE IS REQUIRED, THE TETHER WILL BE ATTACHED FOR ALL OPERATIONS EXCEPT GETTING ON AND OFF THE LRV AND INGRESSING LM. FOR THESE ACTIONS, THE BSLSS WILL BE DISCONNECTED FROM THE CREWMAN WITH THE FAILED PLSS. | | | |
| 2. INTERMITTENT OPS PURGING FOR DECONTAMINATION OR ADDITIONAL COOLING REQUIRES THE PRIMARY O ₂ SHUTOFF VALVE BE TURNED OFF FOLLOWING OPS ACTIVATION, BUT PRIOR TO PURGING. THE PURGE VALVE SHOULD BE CLOSED PRIOR TO REOPENING THE PRIMARY O ₂ SHUTOFF VALVE AND DEACTIVATION OF THE OPS. | | | |
| 3. CREWMAN MAY ATTEMPT A WET SUBLIMATOR RESTART IF BREAKTHROUGH OCCURS. | | | |
| 4. VACUUM TRANSFERS WILL BE USED ONLY IN SUPPORT OF: | | | |
| A. CONTINGENCY INTRAVEHICULAR TRANSFERS OR CONTINGENCY EXTRAVEHICULAR ACTIVITIES | | | |
| B. A LM CABIN REPRESS FAILURE | | | |
| 5. AN EMU/LM ECS HYBRID LIFE SUPPORT AND COMM CONFIGURATION IS ACCEPTABLE IF WITHIN SYSTEMS CAPABILITIES AND IF REQUIRED TO PRECLUDE TIMELINE IMPACT. | | | |
| 6. BOTH PLSS'S AND OPS'S WILL BE RETAINED UNTIL TWO LIFE SUPPORT UNITS (2 OPS, 2 PLSS, OR 1 PLSS + 1 OPS) HAVE BEEN VERIFIED TO HAVE SUFFICIENT CONSUMABLES TO SUPPORT CONTINGENCY EXTRAVEHICULAR ACTIVITIES. | | | |
| 7. THE LM WILL NOT BE PRESSURIZED WITH A CREWMAN ON THE LUNAR SURFACE. | | | |
| 8. FOR THE 2 MAN EVA, THE CDR WILL ALWAYS EGRESS FIRST AND INGRESS LAST UNLESS THE CDR HAS INITIATED AN OPS PURGE. THIS WILL ENSURE THAT THE CDR IS IN THE LEFT PILOT POSITION SHOULD ASCENT BE REQUIRED WITHOUT AN OPPORTUNITY TO DOFF THE EMU'S. | | | |

COMMUNICATIONS/INSTRUMENTATION GO CRITERIA
9/1/72

FCD 5-69.25.58

| GO/NO-GO ITEM | EARTH ORBIT | | TLC | | LUNAR ORBIT (BEFORE UNDOCKING) | | UNDOCKING | | CIRC/DOI ₂ | | POWERED DESCENT | | LUNAR STAY | | | RENDZVOUS LM ACTIVE | LUNAR ORBIT POST TEND | POST DOCK | TEC |
|--------------------------|-------------|-----------|-----|------|--------------------------------|----------|-----------|---------------|-----------------------|-----------------|-----------------------|--------------------|--------------|-----------|-----------|---------------------|-----------------------|-----------|---------|
| | CONT BOOST | CONT E.O. | TLI | TD&E | CONT TLC | LOI | CONT LOI | CONT L.O./DOI | CSM & LM | NOMINAL MISSION | POI TO POI +4:10 GATE | HI GATE TO HI GATE | STAY W/O EVA | 2-MAN EVA | 1-MAN EVA | | | | |
| USB 2-WAY VOICE COMM | 1 | | CSM | | | CSM & LM | CSM & LM | CSM & LM | CSM & LM | CSM & LM | | | CSM & LM | CSM & LM | CSM & LM | | CSM | LM JETT | CSM EVA |
| VHF COMM LM/CSM | | | | | | CSM & LM | CSM & LM | CSM & LM | CSM & LM | CSM & LM | | | CSM & LM | CSM & LM | CSM & LM | | CSM | LM JETT | CSM EVA |
| VHF COMM LM/LCRU/EVA | | | | | | CSM & LM | CSM & LM | CSM & LM | CSM & LM | CSM & LM | | | CSM & LM | CSM & LM | CSM & LM | | CSM | LM JETT | CSM EVA |
| VHF COMM EVA/EVA | | | | | | CSM & LM | CSM & LM | CSM & LM | CSM & LM | CSM & LM | | | CSM & LM | CSM & LM | CSM & LM | | CSM | LM JETT | CSM EVA |
| MSFN/EVA VOICE | | | | | | CSM & LM | CSM & LM | CSM & LM | CSM & LM | CSM & LM | | | CSM & LM | CSM & LM | CSM & LM | | CSM | LM JETT | CSM EVA |
| CRITICAL INSTRUMENTATION | | | | | | CSM & LM | CSM & LM | CSM & LM | CSM & LM | CSM & LM | | | CSM & LM | CSM & LM | CSM & LM | | CSM | LM JETT | CSM EVA |
| LM TELEMETRY | | | | | | CSM & LM | CSM & LM | CSM & LM | CSM & LM | CSM & LM | | | CSM & LM | CSM & LM | CSM & LM | | CSM | LM JETT | CSM EVA |
| CSM TELEMETRY | | | | | | CSM & LM | CSM & LM | CSM & LM | CSM & LM | CSM & LM | | | CSM & LM | CSM & LM | CSM & LM | | CSM | LM JETT | CSM EVA |
| CSM SCE | | | | | | CSM & LM | CSM & LM | CSM & LM | CSM & LM | CSM & LM | | | CSM & LM | CSM & LM | CSM & LM | | CSM | LM JETT | CSM EVA |

LEGEND: NO REQUIREMENT

- VHF IS ACCEPTABLE
- RESERVED
- LM RELAY TO CSM IS ACCEPTABLE
- ADUATE DATA TO MAKE FINAL GO/NO-GO TO CONTINUE POWERED DESCENT (TM OR ONBOARD DISPLAY)
- CSM AND LM COMM IS REQUIRED FOR DOI
- IF LM PROBLEM IS DEFINED, CONTINUE EVA PREP AND ACTIVATE LCRU ASAP
- CSM AND LM CRITICAL INST REQUIRED FOR DOI
- VOICE UPLINK TO EITHER CREWMAN, VOICE DOWNLINK FROM ONE CREWMAN OR TV
- VOICE CONFIRMATION OF CIRC MNVR IS MANDATORY FOR DOI₂

OSO MISSION RULES - OPTICS: ICS

SPECIFIC MISSION RULES

9/1/72

| PANORAMIC CAMERA | | | |
|--------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--|
| CONDITION/MALFUNCTION | TLC | LUNAR ORBIT | |
| 1. SIM TEMP SL1211T ≤ 45° F OR ≥ 105° F | ① ② | TURN 64K BIT DATA SYSTEM ON AND APPLY POWER TO THE CAMERA | |
| 2. FORWARD LENS TEMP (SL1040T) | NONOPERATE ≤ 45° F OPERATE ≥ 120° F ③ ≥ 75° F ≥ 105° F | LEAVE HEATERS ENABLED DISABLE HEATERS. GO TO COLD SOAK LEAVE HEATERS ENABLED TERMINATE PHOTO PASS ③ CONTINUE OPERATION ④ | |
| 3. CAPPING SHUTTER FAILS OPEN OR CLOSED | | | |
| 4. TEST CYCLE FAILS | | OPER CAMERA FOR 1 MIN | |
| 5. STEREO MODE FAILS | | OPER CAMERA IN MONO MODE | |
| 6. TB REMAINS GREY AT TURN-ON | | CYCLE OPER/STBY SWITCH TO STBY FOR 30 SEC THEN BACK TO OPERATE. REMAIN IN OPERATE FOR GROUND ANALYSIS | |
| 7. TB - BP DURING OPERATE | ⑤ | CYCLE OPER/STBY SWITCH TO STBY FOR 30 SEC THEN BACK TO OPERATE. IF TB RETURNS TO TB - BP, GO TO STBY AND WAIT FOR GROUND ANALYSIS | |
| 8. FORWARD MOTION COMPENSATION FAILS | | CONTINUE OPERATION | |
| 9. LOSS OF DOWNLINK DATA | | CONTINUE OPERATION | |

| MAPPING CAMERA | | | |
|--------------------------------------------|----------------------------------------------|-----------------------------------------------------------|--|
| CONDITION/MALFUNCTION | TLC | LUNAR ORBIT | |
| 1. SIM TEMP SL1211T ≤ 40° F OR ≥ 105° F | ② | TURN 64K BIT DATA SYSTEM ON AND APPLY POWER TO THE CAMERA | |
| 2. FORWARD LENS TEMP (SL1040T) | NONOPERATE ≤ 40° F OPERATE ≥ 100° F | REMAIN IN STBY TURN CAMERA OFF | |
| 3. TB - BP | | TERMINATE PHOTO PASS | |
| 4. FORWARD MOTION COMPENSATION FAILS | ⑥ | CONFIGURE FOR STBY MODE AND WAIT FOR GROUND ANALYSIS | |
| 5. DEPLOYMENT MECHANISM | ⑦ RETRACTED EXTENDED | CONTINUE OPERATION | |
| 6. LOSS OF DOWNLINK DATA | | INHIBIT SM RCS JETS A2, A4, B1, B4 CONTINUE OPERATION | |

| LASER ALTIMETER | | | |
|-----------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------|--|
| CONDITION/MALFUNCTION | TLC | LUNAR ORBIT | |
| 1. SIM TEMP SL1211T ≤ 30° F OR ≥ 150° F | ② | SCHEDULE SIM BAY HOT/COLD SOAK AS REQUIRED | |
| 2. CAVITY TEMP SL1094T | ≤ -10° F ≥ 131° F AND INTER- FERENCE RANGE READOUT OP > 1400° F | LEAVE LASER ALTIMETER POWERED POWER DOWN LASER | |
| 3. LOSS OF AUTO MODE | | LIMIT OPER TO NOMINAL CAMERA MODE SEQUENCES | |
| 4. LOSS OF VALID RANGE DATA IN CAMERA MODE | | LIMIT OPER TO NOMINAL AUTO MODE SEQUENCES | |
| 5. PFN VOLTAGE > 2900V | | POWER DOWN LASER | |
| 6. LOSS OF DOWNLINK DATA | | LIMIT OPER TO NOMINAL CAMERA MODE SEQUENCES | |

| MC/LA DOOR | | TLC | |
|-----------------------|---|--------|---|
| CONDITION/MALFUNCTION | | | |
| 1. FAILS | ⑩ | CLOSED | ⑨ |
| | | OPEN | |

| GN2 | | TLC | |
|---------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| CONDITION/MALFUNCTION | | | |
| 1. EXCESSIVE GN2 USAGE | | MECHANICAL FAILURE | ⑪ |
| | | ELECTRICAL FAILURE | |
| 2. GN2 DEPLETED | | SCHEDULE PC OPERATION TO EXHAUST FILM PRIOR TO GN2 DEPLETION RESTRICT PC OPERATION TO HIGHEST PRIORITY TARGETS WITHIN GN2 REMAINING OPER MAPPING CAMERA AND ATTEMPT OPER OF PAN CAMERA ⑫ | |

NOTES

- ① AFTER FILM ADVANCE AVERAGE EITHER 1201T, 1204T, OR 120 AT 5° F
- ② THIS RULE ONLY APPLICABLE PRE SIM DOOR JETT
- ③ SEE OPTICS MGMT RULE 11
- ④ INSUFFICIENT DATA TO DISTINGUISH BETWEEN A FAILED CAPP A FAILED TM POINT
- ⑤ A NO-GO INDICATION WILL BE RECEIVED IF ANY OF THE FOLLOWING CONDITIONS:
A. STEREO MALFUNCTION
B. CAPPING SHUTTER NOT ACTIVATED
C. LENS ROTATION SIGNAL LOST
D. OUT OF FILM SIGNAL
E. OUT OF FILM SIGNAL
F. NO-GO INDICATION WILL BE RECEIVED IF ANY ONE OF THE PARAMETERS IS IN THE IMPROPER STATE.
G. NO FRONT LENS TEMP
H. STEREO ELEMENT TEMP
I. SUPPLY CASSETTE TEMP
J. REFERENCE MALFUNCTION PROCEDURE X.X.
- ⑥ THIS RULE ALSO APPLICABLE TO THE TEC PHASE
- ⑦ CONSIDERATION WILL BE GIVEN TO OPENING THE DOOR DURING THE TEC EVA
- ⑧ REFERENCE MALFUNCTION PROCEDURE X.X.
- ⑨ CUE:
FOR MECHANICAL FAILURE, SL1031T READS "ON", CONTINUOUSLY IS IN STBY. GN2 FLOW RATE OF 1.58 LB/HR. GN2 WOULD BE DEPLETED IN 1.5 HOURS.
FOR ELECTRICAL FAILURE, SL1031T READS "ON", CONTINUOUSLY DURING PC OPERATION.
CUE:
FOR MECHANICAL FAILURE, SL1031T READS "ON", CONTINUOUSLY IS IN STBY. GN2 FLOW RATE OF 1.58 LB/HR. GN2 WOULD BE DEPLETED IN 1.5 HOURS.
FOR ELECTRICAL FAILURE, SL1031T READS "ON", CONTINUOUSLY DURING PC OPERATION.
- ⑩ CUE:
SL1031T READS "OFF", CONTINUOUSLY DURING PC OPERATION. JETT IF GN2 IS NOT SUPPLIED TO AIR BARS
BA WILL BE ENABLED FOR TRANSLATION MANEUVERS. FOR RESCUE DURING LM DESCENT AND LM ASCENT AND FROM 8 HOURS BEFORE ENTRY INTERFACE TO PROVIDE COUPLED ATTITUDE CONTROL WHEN FLYING RCS THRUSTERS ARE REQUIRED.
- ⑪ PRIOR TO SIM DOOR JETT, THE UPPER NONOPERATING LIMIT IS 100° F.

GENERAL

- PRIOR TO SIM DOOR JETTISON THE SIM EXPERIMENTS AND SCIENTIFIC DATA SYSTEM (SDS) WILL BE POWERED AS REQUIRED TO SUPPORT THE FOLLOWING FUNCTIONS:
A. THERMAL MONITORING AND THERMAL MANAGEMENT OF THE SIM BAY.
B. PERIODIC ADVANCEMENT OF THE PANORAMIC AND MAPPING CAMERA FILM.
C. SCHEDULING OF EXPERIMENT OPERATION IF REQUIRED DUE TO EXCESSIVE CONSUMPTION OF GN2.
D. SCHEDULING OF EXPERIMENT OPERATION WILL BE ACCORDING TO THE GUIDELINES OF THE EXPERIMENT PRIORITIES.
E. LUNAR ORBIT SIM BAY EXPERIMENTS ARE LISTED BELOW IN THEIR ORDER OF PRIORITY.
F. LUNAR ORBIT
G. LUNAR ORBIT
H. LUNAR ORBIT
I. LUNAR ORBIT
J. LUNAR ORBIT
K. LUNAR ORBIT
L. LUNAR ORBIT
M. LUNAR ORBIT
N. LUNAR ORBIT
O. LUNAR ORBIT
P. LUNAR ORBIT
Q. LUNAR ORBIT
R. LUNAR ORBIT
S. LUNAR ORBIT
T. LUNAR ORBIT
U. LUNAR ORBIT
V. LUNAR ORBIT
W. LUNAR ORBIT
X. LUNAR ORBIT
Y. LUNAR ORBIT
Z. LUNAR ORBIT
AA. LUNAR ORBIT
AB. LUNAR ORBIT
AC. LUNAR ORBIT
AD. LUNAR ORBIT
AE. LUNAR ORBIT
AF. LUNAR ORBIT
AG. LUNAR ORBIT
AH. LUNAR ORBIT
AI. LUNAR ORBIT
AJ. LUNAR ORBIT
AK. LUNAR ORBIT
AL. LUNAR ORBIT
AM. LUNAR ORBIT
AN. LUNAR ORBIT
AO. LUNAR ORBIT
AP. LUNAR ORBIT
AQ. LUNAR ORBIT
AR. LUNAR ORBIT
AS. LUNAR ORBIT
AT. LUNAR ORBIT
AU. LUNAR ORBIT
AV. LUNAR ORBIT
AW. LUNAR ORBIT
AX. LUNAR ORBIT
AY. LUNAR ORBIT
AZ. LUNAR ORBIT
BA. LUNAR ORBIT
BB. LUNAR ORBIT
BC. LUNAR ORBIT
BD. LUNAR ORBIT
BE. LUNAR ORBIT
BF. LUNAR ORBIT
BG. LUNAR ORBIT
BH. LUNAR ORBIT
BI. LUNAR ORBIT
BJ. LUNAR ORBIT
BK. LUNAR ORBIT
BL. LUNAR ORBIT
BM. LUNAR ORBIT
BN. LUNAR ORBIT
BO. LUNAR ORBIT
BP. LUNAR ORBIT
BQ. LUNAR ORBIT
BR. LUNAR ORBIT
BS. LUNAR ORBIT
BT. LUNAR ORBIT
BU. LUNAR ORBIT
BV. LUNAR ORBIT
BW. LUNAR ORBIT
BX. LUNAR ORBIT
BY. LUNAR ORBIT
BZ. LUNAR ORBIT
CA. LUNAR ORBIT
CB. LUNAR ORBIT
CC. LUNAR ORBIT
CD. LUNAR ORBIT
CE. LUNAR ORBIT
CF. LUNAR ORBIT
CG. LUNAR ORBIT
CH. LUNAR ORBIT
CI. LUNAR ORBIT
CJ. LUNAR ORBIT
CK. LUNAR ORBIT
CL. LUNAR ORBIT
CM. LUNAR ORBIT
CN. LUNAR ORBIT
CO. LUNAR ORBIT
CP. LUNAR ORBIT
CQ. LUNAR ORBIT
CR. LUNAR ORBIT
CS. LUNAR ORBIT
CT. LUNAR ORBIT
CU. LUNAR ORBIT
CV. LUNAR ORBIT
CW. LUNAR ORBIT
CX. LUNAR ORBIT
CY. LUNAR ORBIT
CZ. LUNAR ORBIT
DA. LUNAR ORBIT
DB. LUNAR ORBIT
DC. LUNAR ORBIT
DD. LUNAR ORBIT
DE. LUNAR ORBIT
DF. LUNAR ORBIT
DG. LUNAR ORBIT
DH. LUNAR ORBIT
DI. LUNAR ORBIT
DJ. LUNAR ORBIT
DK. LUNAR ORBIT
DL. LUNAR ORBIT
DM. LUNAR ORBIT
DN. LUNAR ORBIT
DO. LUNAR ORBIT
DP. LUNAR ORBIT
DQ. LUNAR ORBIT
DR. LUNAR ORBIT
DS. LUNAR ORBIT
DT. LUNAR ORBIT
DU. LUNAR ORBIT
DV. LUNAR ORBIT
DW. LUNAR ORBIT
DX. LUNAR ORBIT
DY. LUNAR ORBIT
DZ. LUNAR ORBIT
EA. LUNAR ORBIT
EB. LUNAR ORBIT
EC. LUNAR ORBIT
ED. LUNAR ORBIT
EE. LUNAR ORBIT
EF. LUNAR ORBIT
EG. LUNAR ORBIT
EH. LUNAR ORBIT
EI. LUNAR ORBIT
EJ. LUNAR ORBIT
EK. LUNAR ORBIT
EL. LUNAR ORBIT
EM. LUNAR ORBIT
EN. LUNAR ORBIT
EO. LUNAR ORBIT
EP. LUNAR ORBIT
EQ. LUNAR ORBIT
ER. LUNAR ORBIT
ES. LUNAR ORBIT
ET. LUNAR ORBIT
EU. LUNAR ORBIT
EV. LUNAR ORBIT
EW. LUNAR ORBIT
EX. LUNAR ORBIT
EY. LUNAR ORBIT
EZ. LUNAR ORBIT
FA. LUNAR ORBIT
FB. LUNAR ORBIT
FC. LUNAR ORBIT
FD. LUNAR ORBIT
FE. LUNAR ORBIT
FF. LUNAR ORBIT
FG. LUNAR ORBIT
FH. LUNAR ORBIT
FI. LUNAR ORBIT
FJ. LUNAR ORBIT
FK. LUNAR ORBIT
FL. LUNAR ORBIT
FM. LUNAR ORBIT
FN. LUNAR ORBIT
FO. LUNAR ORBIT
FP. LUNAR ORBIT
FQ. LUNAR ORBIT
FR. LUNAR ORBIT
FS. LUNAR ORBIT
FT. LUNAR ORBIT
FU. LUNAR ORBIT
FV. LUNAR ORBIT
FW. LUNAR ORBIT
FX. LUNAR ORBIT
FY. LUNAR ORBIT
FZ. LUNAR ORBIT
GA. LUNAR ORBIT
GB. LUNAR ORBIT
GC. LUNAR ORBIT
GD. LUNAR ORBIT
GE. LUNAR ORBIT
GF. LUNAR ORBIT
GG. LUNAR ORBIT
GH. LUNAR ORBIT
GI. LUNAR ORBIT
GJ. LUNAR ORBIT
GK. LUNAR ORBIT
GL. LUNAR ORBIT
GM. LUNAR ORBIT
GN. LUNAR ORBIT
GO. LUNAR ORBIT
GP. LUNAR ORBIT
GQ. LUNAR ORBIT
GR. LUNAR ORBIT
GS. LUNAR ORBIT
GT. LUNAR ORBIT
GU. LUNAR ORBIT
GV. LUNAR ORBIT
GW. LUNAR ORBIT
GX. LUNAR ORBIT
GY. LUNAR ORBIT
GZ. LUNAR ORBIT
HA. LUNAR ORBIT
HB. LUNAR ORBIT
HC. LUNAR ORBIT
HD. LUNAR ORBIT
HE. LUNAR ORBIT
HF. LUNAR ORBIT
HG. LUNAR ORBIT
HH. LUNAR ORBIT
HI. LUNAR ORBIT
HJ. LUNAR ORBIT
HK. LUNAR ORBIT
HL. LUNAR ORBIT
HM. LUNAR ORBIT
HN. LUNAR ORBIT
HO. LUNAR ORBIT
HP. LUNAR ORBIT
HQ. LUNAR ORBIT
HR. LUNAR ORBIT
HS. LUNAR ORBIT
HT. LUNAR ORBIT
HU. LUNAR ORBIT
HV. LUNAR ORBIT
HW. LUNAR ORBIT
HX. LUNAR ORBIT
HY. LUNAR ORBIT
HZ. LUNAR ORBIT
IA. LUNAR ORBIT
IB. LUNAR ORBIT
IC. LUNAR ORBIT
ID. LUNAR ORBIT
IE. LUNAR ORBIT
IF. LUNAR ORBIT
IG. LUNAR ORBIT
IH. LUNAR ORBIT
II. LUNAR ORBIT
IJ. LUNAR ORBIT
IK. LUNAR ORBIT
IL. LUNAR ORBIT
IM. LUNAR ORBIT
IN. LUNAR ORBIT
IO. LUNAR ORBIT
IP. LUNAR ORBIT
IQ. LUNAR ORBIT
IR. LUNAR ORBIT
IS. LUNAR ORBIT
IT. LUNAR ORBIT
IU. LUNAR ORBIT
IV. LUNAR ORBIT
IW. LUNAR ORBIT
IX. LUNAR ORBIT
IY. LUNAR ORBIT
IZ. LUNAR ORBIT
JA. LUNAR ORBIT
JB. LUNAR ORBIT
JC. LUNAR ORBIT
JD. LUNAR ORBIT
JE. LUNAR ORBIT
JF. LUNAR ORBIT
JG. LUNAR ORBIT
JH. LUNAR ORBIT
JI. LUNAR ORBIT
JJ. LUNAR ORBIT
JK. LUNAR ORBIT
JL. LUNAR ORBIT
JM. LUNAR ORBIT
JN. LUNAR ORBIT
JO. LUNAR ORBIT
JP. LUNAR ORBIT
JQ. LUNAR ORBIT
JR. LUNAR ORBIT
JS. LUNAR ORBIT
JT. LUNAR ORBIT
JU. LUNAR ORBIT
JV. LUNAR ORBIT
JW. LUNAR ORBIT
JX. LUNAR ORBIT
JY. LUNAR ORBIT
JZ. LUNAR ORBIT
KA. LUNAR ORBIT
KB. LUNAR ORBIT
KC. LUNAR ORBIT
KD. LUNAR ORBIT
KE. LUNAR ORBIT
KF. LUNAR ORBIT
KG. LUNAR ORBIT
KH. LUNAR ORBIT
KI. LUNAR ORBIT
KJ. LUNAR ORBIT
KL. LUNAR ORBIT
KM. LUNAR ORBIT
KN. LUNAR ORBIT
KO. LUNAR ORBIT
KP. LUNAR ORBIT
KQ. LUNAR ORBIT
KR. LUNAR ORBIT
KS. LUNAR ORBIT
KT. LUNAR ORBIT
KU. LUNAR ORBIT
KV. LUNAR ORBIT
KW. LUNAR ORBIT
KX. LUNAR ORBIT
KY. LUNAR ORBIT
KZ. LUNAR ORBIT
LA. LUNAR ORBIT
LB. LUNAR ORBIT
LC. LUNAR ORBIT
LD. LUNAR ORBIT
LE. LUNAR ORBIT
LF. LUNAR ORBIT
LG. LUNAR ORBIT
LH. LUNAR ORBIT
LI. LUNAR ORBIT
LJ. LUNAR ORBIT
LK. LUNAR ORBIT
LL. LUNAR ORBIT
LM. LUNAR ORBIT
LN. LUNAR ORBIT
LO. LUNAR ORBIT
LP. LUNAR ORBIT
LQ. LUNAR ORBIT
LR. LUNAR ORBIT
LS. LUNAR ORBIT
LT. LUNAR ORBIT
LU. LUNAR ORBIT
LV. LUNAR ORBIT
LW. LUNAR ORBIT
LX. LUNAR ORBIT
LY. LUNAR ORBIT
LZ. LUNAR ORBIT
MA. LUNAR ORBIT
MB. LUNAR ORBIT
MC. LUNAR ORBIT
MD. LUNAR ORBIT
ME. LUNAR ORBIT
MF. LUNAR ORBIT
MG. LUNAR ORBIT
MH. LUNAR ORBIT
MI. LUNAR ORBIT
MJ. LUNAR ORBIT
MK. LUNAR ORBIT
ML. LUNAR ORBIT
MN. LUNAR ORBIT
MO. LUNAR ORBIT
MP. LUNAR ORBIT
MQ. LUNAR ORBIT
MR. LUNAR ORBIT
MS. LUNAR ORBIT
MT. LUNAR ORBIT
MU. LUNAR ORBIT
MV. LUNAR ORBIT
MW. LUNAR ORBIT
MX. LUNAR ORBIT
MY. LUNAR ORBIT
MZ. LUNAR ORBIT
NA. LUNAR ORBIT
NB. LUNAR ORBIT
NC. LUNAR ORBIT
ND. LUNAR ORBIT
NE. LUNAR ORBIT
NF. LUNAR ORBIT
NG. LUNAR ORBIT
NH. LUNAR ORBIT
NI. LUNAR ORBIT
NJ. LUNAR ORBIT
NK. LUNAR ORBIT
NL. LUNAR ORBIT
NM. LUNAR ORBIT
NO. LUNAR ORBIT
NP. LUNAR ORBIT
NQ. LUNAR ORBIT
NR. LUNAR ORBIT
NS. LUNAR ORBIT
NT. LUNAR ORBIT
NU. LUNAR ORBIT
NV. LUNAR ORBIT
NW. LUNAR ORBIT
NX. LUNAR ORBIT
NY. LUNAR ORBIT
NZ. LUNAR ORBIT
OA. LUNAR ORBIT
OB. LUNAR ORBIT
OC. LUNAR ORBIT
OD. LUNAR ORBIT
OE. LUNAR ORBIT
OF. LUNAR ORBIT
OG. LUNAR ORBIT
OH. LUNAR ORBIT
OI. LUNAR ORBIT
OJ. LUNAR ORBIT
OK. LUNAR ORBIT
OL. LUNAR ORBIT
OM. LUNAR ORBIT
ON. LUNAR ORBIT
OO. LUNAR ORBIT
OP. LUNAR ORBIT
OQ. LUNAR ORBIT
OR. LUNAR ORBIT
OS. LUNAR ORBIT
OT. LUNAR ORBIT
OU. LUNAR ORBIT
OV. LUNAR ORBIT
OW. LUNAR ORBIT
OX. LUNAR ORBIT
OY. LUNAR ORBIT
OZ. LUNAR ORBIT
PA. LUNAR ORBIT
PB. LUNAR ORBIT
PC. LUNAR ORBIT
PD. LUNAR ORBIT
PE. LUNAR ORBIT
PF. LUNAR ORBIT
PG. LUNAR ORBIT
PH. LUNAR ORBIT
PI. LUNAR ORBIT
PJ. LUNAR ORBIT
PK. LUNAR ORBIT
PL. LUNAR ORBIT
PM. LUNAR ORBIT
PN. LUNAR ORBIT
PO. LUNAR ORBIT
PP. LUNAR ORBIT
PQ. LUNAR ORBIT
PR. LUNAR ORBIT
PS. LUNAR ORBIT
PT. LUNAR ORBIT
PU. LUNAR ORBIT
PV. LUNAR ORBIT
PW. LUNAR ORBIT
PX. LUNAR ORBIT
PY. LUNAR ORBIT
PZ. LUNAR ORBIT
QA. LUNAR ORBIT
QB. LUNAR ORBIT
QC. LUNAR ORBIT
QD. LUNAR ORBIT
QE. LUNAR ORBIT
QF. LUNAR ORBIT
QG. LUNAR ORBIT
QH. LUNAR ORBIT
QI. LUNAR ORBIT
QJ. LUNAR ORBIT
QK. LUNAR ORBIT
QL. LUNAR ORBIT
QM. LUNAR ORBIT
QN. LUNAR ORBIT
QO. LUNAR ORBIT
QP. LUNAR ORBIT
QQ. LUNAR ORBIT
QR. LUNAR ORBIT
QS. LUNAR ORBIT
QT. LUNAR ORBIT
QU. LUNAR ORBIT
QV. LUNAR ORBIT
QW. LUNAR ORBIT
QX. LUNAR ORBIT
QY. LUNAR ORBIT
QZ. LUNAR ORBIT
RA. LUNAR ORBIT
RB. LUNAR ORBIT
RC. LUNAR ORBIT
RD. LUNAR ORBIT
RE. LUNAR ORBIT
RF. LUNAR ORBIT
RG. LUNAR ORBIT
RH. LUNAR ORBIT
RI. LUNAR ORBIT
RJ. LUNAR ORBIT
RK. LUNAR ORBIT
RL. LUNAR ORBIT
RM. LUNAR ORBIT
RN. LUNAR ORBIT
RO. LUNAR ORBIT
RP. LUNAR ORBIT
RQ. LUNAR ORBIT
RR. LUNAR ORBIT
RS. LUNAR ORBIT
RT. LUNAR ORBIT
RU. LUNAR ORBIT
RV. LUNAR ORBIT
RW. LUNAR ORBIT
RX. LUNAR ORBIT
RY. LUNAR ORBIT
RZ. LUNAR ORBIT
SA. LUNAR ORBIT
SB. LUNAR ORBIT
SC. LUNAR ORBIT
SD. LUNAR ORBIT
SE. LUNAR ORBIT
SF. LUNAR ORBIT
SG. LUNAR ORBIT
SH. LUNAR ORBIT
SI. LUNAR ORBIT
SJ. LUNAR ORBIT
SK. LUNAR ORBIT
SL. LUNAR ORBIT
SM. LUNAR ORBIT
SN. LUNAR ORBIT
SO. LUNAR ORBIT
SP. LUNAR ORBIT
SQ. LUNAR ORBIT
SR. LUNAR ORBIT
SS. LUNAR ORBIT
ST. LUNAR ORBIT
SU. LUNAR ORBIT
SV. LUNAR ORBIT
SW. LUNAR ORBIT
SX. LUNAR ORBIT
SY. LUNAR ORBIT
SZ. LUNAR ORBIT
TA. LUNAR ORBIT
TB. LUNAR ORBIT
TC. LUNAR ORBIT
TD. LUNAR ORBIT
TE. LUNAR ORBIT
TF. LUNAR ORBIT
TG. LUNAR ORBIT
TH. LUNAR ORBIT
TI. LUNAR ORBIT
TJ. LUNAR ORBIT
TK. LUNAR ORBIT
TL. LUNAR ORBIT
TM. LUNAR ORBIT
TN. LUNAR ORBIT
TO. LUNAR ORBIT
TP. LUNAR ORBIT
TQ. LUNAR ORBIT
TR. LUNAR ORBIT
TS. LUNAR ORBIT
TT. LUNAR ORBIT
TU. LUNAR ORBIT
TV. LUNAR ORBIT
TW. LUNAR ORBIT
TX. LUNAR ORBIT
TY. LUNAR ORBIT
TZ. LUNAR ORBIT
UA. LUNAR ORBIT
UB. LUNAR ORBIT
UC. LUNAR ORBIT
UD. LUNAR ORBIT
UE. LUNAR ORBIT
UF. LUNAR ORBIT
UG. LUNAR ORBIT
UH. LUNAR ORBIT
UI. LUNAR ORBIT
UJ. LUNAR ORBIT
UK. LUNAR ORBIT
UL. LUNAR ORBIT
UM. LUNAR ORBIT
UN. LUNAR ORBIT
UO. LUNAR ORBIT
UP. LUNAR ORBIT
UQ. LUNAR ORBIT
UR. LUNAR ORBIT
US. LUNAR ORBIT
UT. LUNAR ORBIT
UU. LUNAR ORBIT
UV. LUNAR ORBIT
UW. LUNAR ORBIT
UX. LUNAR ORBIT
UY. LUNAR ORBIT
UZ. LUNAR ORBIT
VA. LUNAR ORBIT
VB. LUNAR ORBIT
VC. LUNAR ORBIT
VD. LUNAR ORBIT
VE. LUNAR ORBIT
VF. LUNAR ORBIT
VG. LUNAR ORBIT
VH. LUNAR ORBIT
VI. LUNAR ORBIT
VJ. LUNAR ORBIT
VK. LUNAR ORBIT
VL. LUNAR ORBIT
VM. LUNAR ORBIT
VN. LUNAR ORBIT
VO. LUNAR ORBIT
VP. LUNAR ORBIT
VQ. LUNAR ORBIT
VR. LUNAR ORBIT
VS. LUNAR ORBIT
VT. LUNAR ORBIT
VU. LUNAR ORBIT
VV. LUNAR ORBIT
VW. LUNAR ORBIT
VX. LUNAR ORBIT
VY. LUNAR ORBIT
VZ. LUNAR ORBIT
WA. LUNAR ORBIT
WB. LUNAR ORBIT
WC. LUNAR ORBIT
WD. LUNAR ORBIT
WE. LUNAR ORBIT
WF. LUNAR ORBIT
WG. LUNAR ORBIT
WH. LUNAR ORBIT
WI. LUNAR ORBIT
WJ. LUNAR ORBIT
WK. LUNAR ORBIT
WL. LUNAR ORBIT
WM. LUNAR ORBIT
WN. LUNAR ORBIT
WO. LUNAR ORBIT
WP. LUNAR ORBIT
WQ. LUNAR ORBIT
WR. LUNAR ORBIT
WS. LUNAR ORBIT
WT. LUNAR ORBIT
WU. LUNAR ORBIT
WV. LUNAR ORBIT
WW. LUNAR ORBIT
WX. LUNAR ORBIT
WY. LUNAR ORBIT
WZ. LUNAR ORBIT
XA. LUNAR ORBIT
XB. LUNAR ORBIT
XC. LUNAR ORBIT
XD. LUNAR ORBIT
XE. LUNAR ORBIT
XF. LUNAR ORBIT
XG. LUNAR ORBIT
XH. LUNAR ORBIT
XI. LUNAR ORBIT
XJ. LUNAR ORBIT
XK. LUNAR ORBIT
XL. LUNAR ORBIT
XM. LUNAR ORBIT
XN. LUNAR ORBIT
XO. LUNAR ORBIT
XP. LUNAR ORBIT
XQ. LUNAR ORBIT
XR. LUNAR ORBIT
XS. LUNAR ORBIT
XT. LUNAR ORBIT
XU. LUNAR ORBIT
XV. LUNAR ORBIT
XW. LUNAR ORBIT
XX. LUNAR ORBIT
XY. LUNAR ORBIT
XZ. LUNAR ORBIT
YA. LUNAR ORBIT
YB. LUNAR ORBIT
YC. LUNAR ORBIT
YD. LUNAR ORBIT
YE. LUNAR ORBIT
YF. LUNAR ORBIT
YG. LUNAR ORBIT
YH. LUNAR ORBIT
YI. LUNAR ORBIT
YJ. LUNAR ORBIT
YK. LUNAR ORBIT
YL. LUNAR ORBIT
YM. LUNAR ORBIT
YN. LUNAR ORBIT
YO. LUNAR ORBIT
YP. LUNAR ORBIT
YQ. LUNAR ORBIT
YR. LUNAR ORBIT
YS. LUNAR ORBIT
YT. LUNAR ORBIT
YU. LUNAR ORBIT
YV. LUNAR ORBIT
YW. LUNAR ORBIT
YX. LUNAR ORBIT
YY. LUNAR ORBIT
YZ. LUNAR ORBIT
ZA. LUNAR ORBIT
ZB. LUNAR ORBIT
ZC. LUNAR ORBIT
ZD. LUNAR ORBIT
ZE. LUNAR ORBIT
ZF. LUNAR ORBIT
ZG. LUNAR ORBIT
ZH. LUNAR ORBIT
ZI. LUNAR ORBIT
ZJ. LUNAR ORBIT
ZK. LUNAR ORBIT
ZL. LUNAR ORBIT
ZM. LUNAR ORBIT
ZN. LUNAR ORBIT
ZO. LUNAR ORBIT
ZP. LUNAR ORBIT
ZQ. LUNAR ORBIT
ZR. LUNAR ORBIT
ZS. LUNAR ORBIT
ZT. LUNAR ORBIT
ZU. LUNAR ORBIT
ZV. LUNAR ORBIT
ZW. LUNAR ORBIT
ZX. LUNAR ORBIT
ZY. LUNAR ORBIT
ZZ. LUNAR ORBIT

OPTICS MANAGEMENT

- THE FILM IN THE PANORAMIC AND MAPPING CAMERAS (PC AND MC) WILL BE CYCLED AND INTERCHANGED AS REQUIRED TO SUPPORT THE FOLLOWING FUNCTIONS:
A. THERMAL MONITORING AND THERMAL MANAGEMENT OF THE SIM BAY.
B. PERIODIC ADVANCEMENT OF THE PANORAMIC AND MAPPING CAMERA FILM.
C. SCHEDULING OF EXPERIMENT OPERATION IF REQUIRED DUE TO EXCESSIVE CONSUMPTION OF GN2.
D. SCHEDULING OF EXPERIMENT OPERATION WILL BE ACCORDING TO THE GUIDELINES OF THE EXPERIMENT PRIORITIES.
E. LUNAR ORBIT SIM BAY EXPERIMENTS ARE LISTED BELOW IN THEIR ORDER OF PRIORITY.
F. LUNAR ORBIT
G. LUNAR ORBIT
H. LUNAR ORBIT
I. LUNAR ORBIT
J. LUNAR ORBIT
K. LUNAR ORBIT
L. LUNAR ORBIT
M. LUNAR ORBIT
N. LUNAR ORBIT
O. LUNAR ORBIT
P. LUNAR ORBIT
Q. LUNAR ORBIT
R. LUNAR ORBIT
S. LUNAR ORBIT
T. LUNAR ORBIT
U. LUNAR ORBIT
V. LUNAR ORBIT
W. LUNAR ORBIT
X. LUNAR ORBIT
Y. LUNAR ORBIT
Z. LUNAR ORBIT
AA. LUNAR ORBIT
AB. LUNAR ORBIT
AC. LUNAR ORBIT
AD. LUNAR ORBIT
AE. LUNAR ORBIT
AF. LUNAR ORBIT
AG. LUNAR ORBIT
AH. LUNAR ORBIT
AI. LUNAR ORBIT
AJ. LUNAR ORBIT
AK. LUNAR ORBIT
AL. LUNAR ORBIT
AM. LUNAR ORBIT
AN. LUNAR ORBIT
AO. LUNAR ORBIT
AP. LUNAR ORBIT
AQ. LUNAR ORBIT
AR. LUNAR ORBIT
AS. LUNAR ORBIT
AT. LUNAR ORBIT
AU. LUNAR ORBIT
AV. LUNAR ORBIT
AW. LUNAR ORBIT
AX. LUNAR ORBIT
AY. LUNAR ORBIT
AZ. LUNAR ORBIT
BA. LUNAR ORBIT
BB. LUNAR ORBIT
BC. LUNAR ORBIT
BD. LUNAR ORBIT
BE. LUNAR ORBIT
BF. LUNAR ORBIT
BG. LUNAR ORBIT
BH. LUNAR ORBIT
BI. LUNAR ORBIT
BJ. LUNAR ORBIT
BK. LUNAR ORBIT
BL. LUNAR ORBIT
BM. LUNAR ORBIT
BN. LUNAR ORBIT
BO. LUNAR ORBIT
BP. LUNAR ORBIT
BQ. LUNAR ORBIT
BR. LUNAR ORBIT
BS. LUNAR ORBIT
BT. LUNAR ORBIT
BU. LUNAR ORBIT
BV. LUNAR ORBIT
BW. LUNAR ORBIT
BX. LUNAR ORBIT
BY. LUNAR ORBIT
BZ. LUNAR ORBIT
CA. LUNAR ORBIT
CB. LUNAR ORBIT
CC. LUNAR ORBIT
CD. LUNAR ORBIT
CE. LUNAR ORBIT
CF. LUNAR ORBIT
CG. LUNAR ORBIT
CH. LUNAR ORBIT
CI. LUNAR ORBIT
CJ. LUNAR ORBIT
CK. LUNAR ORBIT
CL. LUNAR ORBIT
CM. LUNAR ORBIT
CN. LUNAR ORBIT
CO. LUNAR ORBIT
CP. LUNAR ORBIT
CQ. LUNAR ORBIT
CR. LUNAR ORBIT
CS. LUNAR ORBIT
CT. LUNAR ORBIT
CU. LUNAR ORBIT
CV. LUNAR ORBIT
CW. LUNAR ORBIT
CX. LUNAR ORBIT
CY. LUNAR ORBIT
CZ. LUNAR ORBIT
DA. LUNAR ORBIT
DB. LUNAR ORBIT
DC. LUNAR ORBIT
DD. LUNAR ORBIT
DE. LUNAR ORBIT
DF. LUNAR ORBIT
DG. LUNAR ORBIT
DH. LUNAR ORBIT
DI. LUNAR ORBIT
DJ. LUNAR ORBIT
DK. LUNAR ORBIT
DL. LUNAR ORBIT
DM. LUNAR ORBIT
DN. LUNAR ORBIT
DO. LUNAR ORBIT
DP. LUNAR ORBIT
DQ. LUNAR ORBIT
DR. LUNAR ORBIT
DS. LUNAR ORBIT
DT. LUNAR ORBIT
DU. LUNAR ORBIT
DV. LUNAR ORBIT
DW. LUNAR ORBIT
DX. LUNAR ORBIT
DY. LUNAR ORBIT
DZ. LUNAR ORBIT
EA. LUNAR ORBIT
EB. LUNAR ORBIT
EC. LUNAR ORBIT
ED. LUNAR ORBIT
EE. LUNAR ORBIT
EF. LUNAR ORBIT
EG. LUNAR ORBIT
EH. LUNAR ORBIT
EI. LUNAR ORBIT
EJ. LUNAR ORBIT
EK. LUNAR ORBIT
EL. LUNAR ORBIT
EM. LUNAR ORBIT
EN. LUNAR ORBIT
EO. LUNAR ORBIT
EP. LUNAR ORBIT
EQ. LUNAR ORBIT
ER. LUNAR ORBIT
ES. LUNAR ORBIT
ET. LUNAR ORBIT
EU. LUNAR ORBIT
EV. LUNAR ORBIT
EW. LUNAR ORBIT
EX. LUNAR ORBIT
EY. LUNAR ORBIT
EZ. LUNAR ORBIT
FA. LUNAR ORBIT
FB. LUNAR ORBIT
FC. LUNAR ORBIT
FD. LUNAR ORBIT
FE. LUNAR ORBIT
FF. LUNAR ORBIT
FG. LUNAR ORBIT
FH. LUNAR ORBIT
FI. LUNAR ORBIT
FJ. LUNAR ORBIT
FK. LUNAR ORBIT
FL. LUNAR ORBIT
FM. LUNAR ORBIT
FN. LUNAR ORBIT
FO. LUNAR ORBIT
FP. LUNAR ORBIT
FQ. LUNAR ORBIT
FR. LUNAR ORBIT
FS. LUNAR ORBIT
FT. LUNAR ORBIT
FU. LUNAR ORBIT
FV. LUNAR ORBIT
FW. LUNAR ORBIT
FX. LUNAR ORBIT
FY. LUNAR ORBIT
FZ. LUNAR ORBIT
GA. LUNAR ORBIT
GB. LUNAR ORBIT
GC. LUNAR ORBIT
GD. LUNAR ORBIT
GE. LUNAR ORBIT
GF. LUNAR ORBIT
GG. LUNAR ORBIT
GH. LUNAR ORBIT
GI. LUNAR ORBIT
GJ. LUNAR ORBIT
GK. LUNAR ORBIT
GL. LUNAR ORBIT
GM. LUNAR ORBIT
GN. LUNAR ORBIT
GO. LUNAR ORBIT
GP. LUNAR ORBIT
GQ. LUNAR ORBIT
GR. LUNAR ORBIT
GS. LUNAR ORBIT
GT. LUNAR ORBIT
GU. LUNAR ORBIT
GV. LUNAR ORBIT
GW. LUNAR ORBIT
GX. LUNAR ORBIT
GY. LUNAR ORBIT
GZ. LUNAR ORBIT
HA. LUNAR ORBIT
HB. LUNAR ORBIT
HC. LUNAR ORBIT
HD. LUNAR ORBIT
HE. LUNAR ORBIT
HF. LUNAR ORBIT
HG. LUNAR ORBIT
HH. LUNAR ORBIT
HI. LUNAR ORBIT
HJ. LUNAR ORBIT
HK. LUNAR ORBIT
HL. LUNAR ORBIT
HM. LUNAR ORBIT
HN. LUNAR ORBIT
HO. LUNAR ORBIT
HP. LUNAR ORBIT
HQ. LUNAR ORBIT
HR. LUNAR ORBIT
HS. LUNAR ORBIT
HT. LUNAR ORBIT
HU. LUNAR ORBIT
HV. LUNAR ORBIT
HW. LUNAR ORBIT
HX. LUNAR ORBIT
HY. LUNAR ORBIT
HZ. LUNAR ORBIT
IA. LUNAR ORBIT
IB. LUNAR ORBIT
IC. LUNAR ORBIT
ID. LUNAR ORBIT
IE. LUNAR ORBIT
IF. LUNAR ORBIT
IG. LUNAR ORBIT
IH. LUNAR ORBIT
II. LUNAR ORBIT
IJ. LUNAR ORBIT
IK. LUNAR ORBIT
IL. LUNAR ORBIT
IM. LUNAR ORBIT
IN. LUNAR ORBIT
IO. LUNAR ORBIT
IP. LUNAR ORBIT
IQ. LUNAR ORBIT
IR. LUNAR ORBIT
IS. LUNAR ORBIT
IT. LUNAR ORBIT
IU. LUNAR ORBIT
IV. LUNAR ORBIT
IW. LUNAR ORBIT
IX. LUNAR ORBIT
IY. LUNAR ORBIT
IZ. LUNAR ORBIT
JA. LUNAR ORBIT
JB. LUNAR ORBIT
JC. LUNAR ORBIT
JD. LUNAR ORBIT
JE. LUNAR ORBIT
JF. LUNAR ORBIT
JG. LUNAR ORBIT
JH. LUNAR ORBIT
JI. LUNAR ORBIT
JJ. LUNAR ORBIT
JK. LUNAR ORBIT
JL. LUNAR ORBIT
JM. LUNAR ORBIT
JN. LUNAR ORBIT
JO. L

OSO MISSION RULES - SPECTROMETER

SPECIFIC MISSION RULES

9/1/77

| REV | REV |
|-----|-----|
| | |

NOTES

- 1 THIS RULE ONLY APPLIES TO PRE SIM DOOR JETTISON PHASE
- 2 THE SPECTROMETER WILL BE POWERED DOWN IF THE TEMPS GET ABOVE 125° F AND VALID DATA IS NOT BEING COLLECTED.
- 3 THE RADIOMETER WILL BE POWERED DOWN IF THE TEMPS GET ABOVE 100° F AND VALID DATA IS NOT BEING COLLECTED.
- 4 IF TEMP CONTINUES TO INCREASE, COLD SOAK WILL BE REQUIRED.
- 5 OPERATING MODE WILL BE LIMITED TO RECEIVE-ONLY MODE.

| FAR ULTRAVIOLET SPECTROMETER | | | |
|------------------------------------------|--------------------------|---|--------------------------------------------|
| CONDITION/MALFUNCTION | TLC | | LUNAR ORBIT/TEC |
| 1. SIM TEMP SL12XX | <180° F >180° F | 1 | |
| | GO TO COLD SOAK ATTITUDE | | |
| 2. SPECTROMETER TEMPS SL1101T OR SL1102T | <- 35° F >180° F | | POWER DOWN SPECTROMETER 2 |
| | | | LEAVE SPECTROMETER POWERED |
| 3. CORONA IN THE UVS | | | TURN OFF SPECTROMETER |
| | | | ENHANCE OPERATING ENVIRONMENT |
| 4. SUN APPROACHING FIELD-OF-VIEW | | | CLOSE SPECTROMETER COVER |
| | | | OPERATE TO OBTAIN ENGINEERING DATA |
| 5. COVER FAILS | CLOSED OPEN | | MINIMIZE DUMPS, PURGES, AND JET FIRINGS |

| INFRARED SCANNING RADIOMETER | | | |
|----------------------------------|--------------------------|---|-----------------------------------------|
| CONDITION/MALFUNCTION | TLC | | LUNAR ORBIT/TEC |
| 1. SIM TEMP SLXXXT | <180° F >180° F | 1 | |
| | GO TO COLD SOAK ATTITUDE | | |
| 2. PRIMARY MIRROR TEMP SL1129T | <15° F >122° F | | LEAVE RADIOMETER POWERED 3 |
| | | | POWER DOWN RADIOMETER |
| 3. SUN APPROACHING FIELD-OF-VIEW | | | CLOSE RADIOMETER COVER |
| | | | OPERATE TO OBTAIN ENGINEERING DATA |
| 4. COVER FAILS | CLOSED OPEN | | MINIMIZE DUMPS, PURGES, AND JET FIRINGS |

| LUNAR SOUNDER | | | |
|-------------------------------------------|--------------------------|--|---------------------------------------------|
| CONDITION/MALFUNCTION | TLC | | LUNAR ORBIT/TEC |
| 1. SIM TEMP SL1206 | <180° F >180° F | | |
| | GO TO COLD SOAK ATTITUDE | | |
| 2. FILM CASSETTE TEMP SL1275T | <180° F >180° F | | ENABLE OPTICAL RECORDER HTRS |
| | | | REMOVE PWR FROM OPTICAL RECORDER HTRS 4 |
| 3. CSAR INTERNAL TEMP SL1256T | <180° F >180° F | | GO TO COLD SOAK ATTITUDE |
| | | | APPLY STBY PWR TO CSAR |
| 4. FILM MOTION FAILURE | | | GO TO COLD SOAK ATTITUDE |
| | | | REMOVE PWR FROM CSAR |
| 5. LOSS OF PRF-1 AND PRF-2 | | | TERMINATE ACTIVE SOUNDER OPERATIONS 5 |
| | | | TERMINATE SOUNDER OPERATION IN THE HF MODE |
| 6. LOSS OF PRF-3 | | | TERMINATE SOUNDER OPERATION IN THE VHF MODE |
| | | | TERMINATE ACTIVE SOUNDER OPERATION 5 |
| 7. CLOCK FAILURE | | | TERMINATE ACTIVE SOUNDER OPERATION 5 |
| | | | TERMINATE ACTIVE SOUNDER OPERATION 5 |
| 8. LOSS OF OSC FREQ LOCK | | | TERMINATE ACTIVE SOUNDER OPERATION 5 |
| | | | TERMINATE ACTIVE SOUNDER OPERATION 5 |
| 9. LOSS OF VIDEO | | | TERMINATE SOUNDER OPERATION IN HF MODE |
| | | | TERMINATE SOUNDER OPERATION IN VHF MODE |
| 10. HF RF PWR OUTPUT <TBD | | | RE SCHEDULE VHF OPERATIONS |
| 11. VHF RF PWR OUTPUT <TBD | | | PERFORM FLIGHT PLAN ON LBR |
| 12. EMI INTO LS ISOLATED TO HGA HBR TM | | | |

| HF ANTENNAS | | | |
|-------------------------------------|-----|--|---------------------------------|
| CONDITION/MALFUNCTION | TLC | | LUNAR ORBIT/TEC |
| 1. FAILURE TO FULLY EXTEND | | | OPERATE IN DEGRADED MODE |
| 2. FAILURE TO RETRACT SAFE DISTANCE | | | JETTISON PRIOR TO NEXT SPS BURN |

GENERAL

| REV | REV |
|-----|-----|
| | |

1. PRIOR TO SIM DOOR JETTISON THE SIM EXPERIMENTS AND SCIENTIFIC DATA SYSTEMS SHOULD BE POWERED AS REQUIRED TO SUPPORT THE FOLLOWING FUNCTIONS:
 - A. THERMAL MONITORING AND THERMAL MANAGEMENT OF THE SIM BAY.
 - B. PERIODIC ADVANCEMENT OF THE PANORAMIC AND MAPPING CAMERA FILM.
2. RESCHEDULING OF EXPERIMENT OPERATION IF REQUIRED DUE TO EXCESSIVE CONSUMABLES USAGE (RCS, PWR, ETC.) OR ANOMALOUS EXPERIMENT OPERATION WILL BE ACCOMPLISHED WITHIN THE OUTLINES OF THE EXPERIMENT PRIORITIES.
3. LUNAR ORBIT SIM BAY EXPERIMENTS ARE LISTED BELOW IN THEIR ORDER OF PRIORITY.
 - A. LUNAR SOUNDER
 - B. SIM ORBITAL PHOTOGRAPHIC TASKS
 - C. IR SCANNING RADIOMETER (ISR)
 - D. FAR UV SPECTROMETER (FVS)
4. IF CORONA IS DETECTED IN AN EXPERIMENT AND IS DEGRADING ONLY THAT EXPERIMENT, THE EXPERIMENT WILL BE RESCHEDULED TO MAXIMIZE THE SCIENTIFIC RETURN.
5. ALL EXPERIMENT COVERS WILL NORMALLY BE CLOSED FOR THE FOLLOWING CONDITIONS AFTER SIM DOOR JETTISON:
 - A. ACTIVATION OF SIM RCS JETS A2, A4, B1, OR B4
 - B. SPS BURNS
 - C. WATER AND URINE DUMPS*
 - D. FUEL CELL PURGES*
 - E. VIOLATION OF THE SUN-AVOIDANCE CONSTRAINTS
 - F. CSAR EVAPORATOR OR LM SUBLIMATOR OPERATION**N/A TO UVS COVER AFTER 2 DAYS IN CIRCULAR LUNAR ORBIT.
6. SIM RCS THRUSTERS A2, A4, B1, AND B4 WILL BE DISABLED DURING ALL EXPERIMENT OPERATIONS.
7. WATER AND URINE DUMPS WILL BE INHIBITED FROM 3 HOURS BEFORE UNTIL IMMEDIATELY AFTER PC AND MC OPERATIONS.
8. A FAILURE OF ANY EXPERIMENT COVER OR EXTENSION MECHANISM WILL NOT PRECLUDE AN EVA FOR FILM RETRIEVAL.
9. THERE ARE THREE ACCEPTABLE CUES ON ANTENNA POSITION. THESE ARE THE APPROPRIATE TACHOMETER SIGNALS, THE ANTENNA TELEMETRY, AND THE ANTENNA SIGNAL ON TELEMETRY. ANY ANTENNA THAT CANNOT BE VERIFIED AS RETRACTED BY ONE OF THESE MEANS WILL BE ASSUMED TO BE EXTENDED BEYOND THE SPS BURN LIMIT.
10. SIM BAY HARDWARE REDLINES WILL NOT BE VIOLATED IN THE PURSUIT OF EXPERIMENTATION. LESS DATA BEING COLLECTED IS JUDGED TO BE MORE IMPORTANT THAN ALL SUBSEQUENT DATA.
11. A "NO-GO" FOR LOI WILL NOT PRECLUDE SIM BAY DOOR JETTISON.
12. AN ATTITUDE DEADBAND OF 0.5° WILL BE USED DURING THE FOLLOWING OPERATIONS:
 - A. ALL CAMERA OPERATIONS
 - B. MANDATORY LASER ALTIMETER OPERATION
 - C. HF AND VHF ACTIVE SOUNDING MODES
 - D. UVS INERTIAL ATTITUDE HOLD TARGETSA DEADBAND OF 3.0 DEGREES MAXIMUM WILL BE USED FOR ALL OTHER EXPERIMENT OPERATION.

- FAR UV SPECTROMETER MANAGEMENT
1. UNTIL THE COMPLETION OF TWO DAYS IN CIRCULAR ORBIT, THE EXPERIMENT COVER WILL BE CLOSED FOR DUMPS AND PURGES. DUMPS AND PURGES WILL NOT BE SCHEDULED WITHIN 15 MINUTES OF THE START OF A DATA TAKE.
 2. THE FVS FRONT COVER WILL BE CLOSED FOR THE ACTIVATION OF RCS JETS A2, A4, B1 AND B4 OR WHENEVER THE SUN ENTERS THE SPECTROMETER FOV.
- INFRARED SCANNING RADIOMETER
1. THE EXPERIMENT COVER WILL REMAIN CLOSED FOR TWO MINUTES FOLLOWING A DUMP OR PURGE.
 2. THE ISR SCAN DRIVE MOTOR WILL BE POWERED FOR SIM DOOR JETT.
- LUNAR SOUNDER
1. A MINIMUM OF 2 MINUTES OF HBR/HF MODE DATA WILL BE COLLECTED BEFORE AND AFTER THE 2 RE-HE ACTIVE MODE.
 2. SIM BAY JET CONFIGURATION WILL BE INITIATED A MINIMUM OF 30 MINUTES PRIOR TO OPTICAL RECORDER OPERATION.
 3. THE SOUNDER ROR AND OPTICAL ROR WILL BE THERMALLY PRECONDITIONED PRIOR TO DATA COLLECTION.
 4. ALL OTHER SIM BAY EXPERIMENTS AND THE SDS WILL BE POWERED DOWN DURING SOUNDER OPERATIONS.
 5. THE HGA WILL BE POWERED DOWN DURING THE HF AND RECEIVE ONLY MODES.
 6. THE LS TRANSMITTERS WILL NOT BE OPERATED WITHIN 100 FEET OF AN UNSTAGED L/M.
 7. FAILURE OF THE HF ANTENNAS TO FULLY EXTEND WILL NOT PRECLUDE SOUNDER OPERATION IN THE HF AND LISTEN MODES.
 8. THE OPTICAL RECORDER FILM WILL NOT BE TRANSPORTED WITH LESS THAN 10 FEET OF FILM REMAINING.
 9. A CSAR CONFIGURATION WILL BE ESTABLISHED FOR THE EVA TEST AND LS OPERATION. NO CONFIGURATION CHANGES WILL BE MADE TO RESOLVE EMI EXCEPT FOR POSSIBLE DOWNGRADING OF THE TELECOMMUNICATIONS SYSTEMS.

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

R ITEM

CONSUMABLES

3-90

SPS (APOLLO 16 DATA)

A. THE SPS REDLINE WILL GUARANTEE SUFFICIENT PROPELLANT TO ACHIEVE A NOMINAL LUNAR ORBIT, LANDING, LM RESCUE AND A SAFE RETURN TO EARTH. VIOLATION OF THE SPS REDLINE WILL REQUIRE MNVR TRADE-OFFS AS SHOWN IN FMR 5-34. THE SPS REDLINE INCLUDES:

| | | |
|----------|-----------|-----------------------------------|
| LOI | 24184 LBS | 2807 FPS |
| DOI | 1522 LBS | 206 FPS |
| CIRC | 370 LBS | 100 FPS |
| LOPC 1 | 576 LBS | 159 FPS |
| RESCUE | 1108 LBS | 300 FPS |
| TEI | 9542 LBS | 3212 FPS (NOMINAL RETURN, 67 HRS) |
| TEC MCC | 415 LBS | 160 FPS (3 SIGMA SCS C/O ON TEI) |
| UNUSABLE | 400 LBS | 0 FPS |

B. THE MINIMUM SPS REQUIREMENTS FOR A LUNAR ORBIT MISSION ARE BASED ON A MINIMUM SOLO MISSION. THE SEQUENCE OF MANEUVERS WOULD BE LOI 1 (60 X 170), LOI 2 (60 X 60), TEI AND TEMC'S. THE FOLLOWING NUMBERS REPRESENT MINIMUMS WITHOUT RESPECT TO TRAJECTORIES OR OTHER VARIABLES AND SHOULD BE USED AS BASELINE DATA ONLY.

| | | |
|----------|-----------|----------|
| LOI 1 | 11267 LBS | 2775 FPS |
| LOI 2 | 539 LBS | 150 FPS |
| TEI | 8108 LBS | 2650 FPS |
| TEMC'S | 1318 LBS | 500 FPS |
| UNUSABLE | 400 LBS | 0 FPS |

3-91

SM RCS (APOLLO 16 DATA)

A. THE SM RCS REDLINE INCLUDES:

1. NOMINAL USAGE FROM LAUNCH THRU TD&E (75 LBS)
2. POST TD&E TO MCC-2. INCLUDES ALLOWANCE FOR ONE PTC, MANEUVER, TRIM & DAMPING FOR MCC-2. (26 LBS)
3. MCC-2 TO MCC-4. INCLUDES ALLOWANCE FOR TWO PTC'S, MANEUVER, TRIM AND DAMPING FOR MCC-4. (25 LBS)
4. MCC-4 THRU LM UNDOCKING NOMINAL USAGE (174 LBS)
5. CSM SOLO ATTITUDE HOLD FROM POST UNDOCKING THRU LM LIFT-OFF. INCLUDES ULLAGES AND TRIMS FOR CIRC AND PC-1. NO ALLOWANCE FOR SOLO EXPERIMENTS OR PHOTOGRAPHY THAT REQUIRES ADDITIONAL PROPELLANT (117 LBS)
6. NOMINAL BUDGETED USAGE FROM LM LIFT-OFF TO DOCKING. ALSO INCLUDED ARE FOUR 10 SECOND 4 JET ULLAGES, 1 FPS TRIMS AND CSM ACTIVE BRAKING, LM JETTISON AND SEPARATION (349 LBS)
7. TWO REVS ATTITUDE HOLD PLUS TEI. INCLUDES ALLOWANCE FOR ONE P52, ULLAGE AND DAMPING (30 LBS)
8. SEVEN FPS MCC (1 SIGMA G&N TEI CUTOFF) (22 LBS)
9. PTC ALLOWANCE (20 LBS)
10. NOMINAL USAGE FROM MCC 7 TO CM/SM SEP (39 LBS)

B. THE LUNAR ORBIT REDLINE REPRESENTS THE MINIMUM SMRCS PROPELLANT REQUIRED TO LEAVE LUNAR ORBIT AND PROVIDE A NOMINAL TRANSEARTH RETURN. VIOLATION OF THE LUNAR ORBIT REDLINE WILL RESULT IN TERMINATION OF LUNAR ORBIT ACTIVITIES. THE LO REDLINE INCLUDES:

| | |
|---------|--------------------------------------------------------|
| 110 LBS | 2 REVS LO, TEI ULLAGE AND DAMPING, NOMINAL TEC BUDGET. |
| 64 LBS | 20 FPS MCC (3 SIGMA G&N TEI CUTOFF) |
| 174 LBS | TOTAL |

RULE NUMBERS 3-92 THROUGH 3-100 ARE RESERVED.

MISSION

REV

DATE

SECTION

GROUP

PAGE

APOLLO 17

FNL

9/1/72

MISSION RULE
SUMMARY

CONSUMABLES

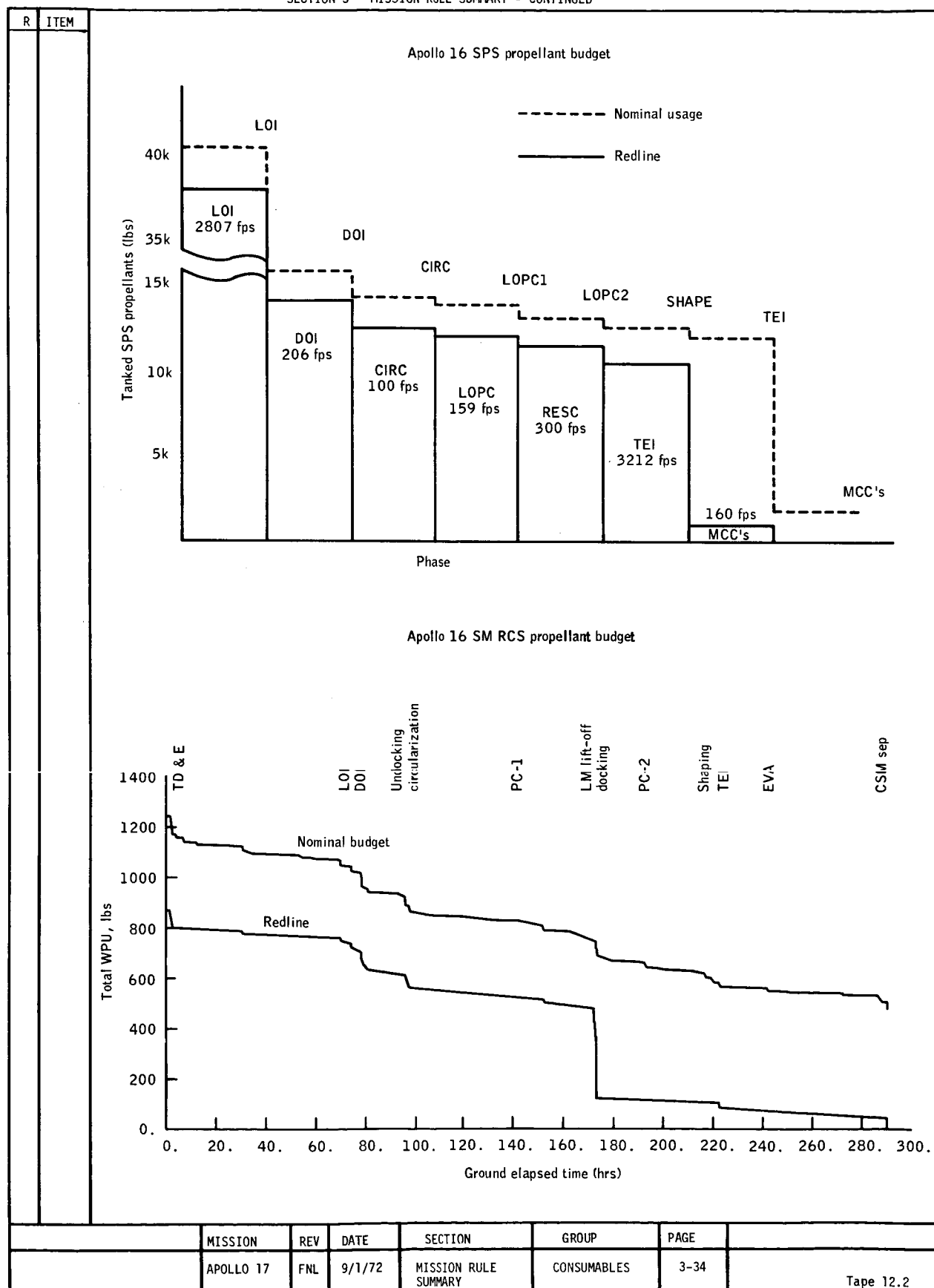
3-33

Tape 51.4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED



Tape 12.2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

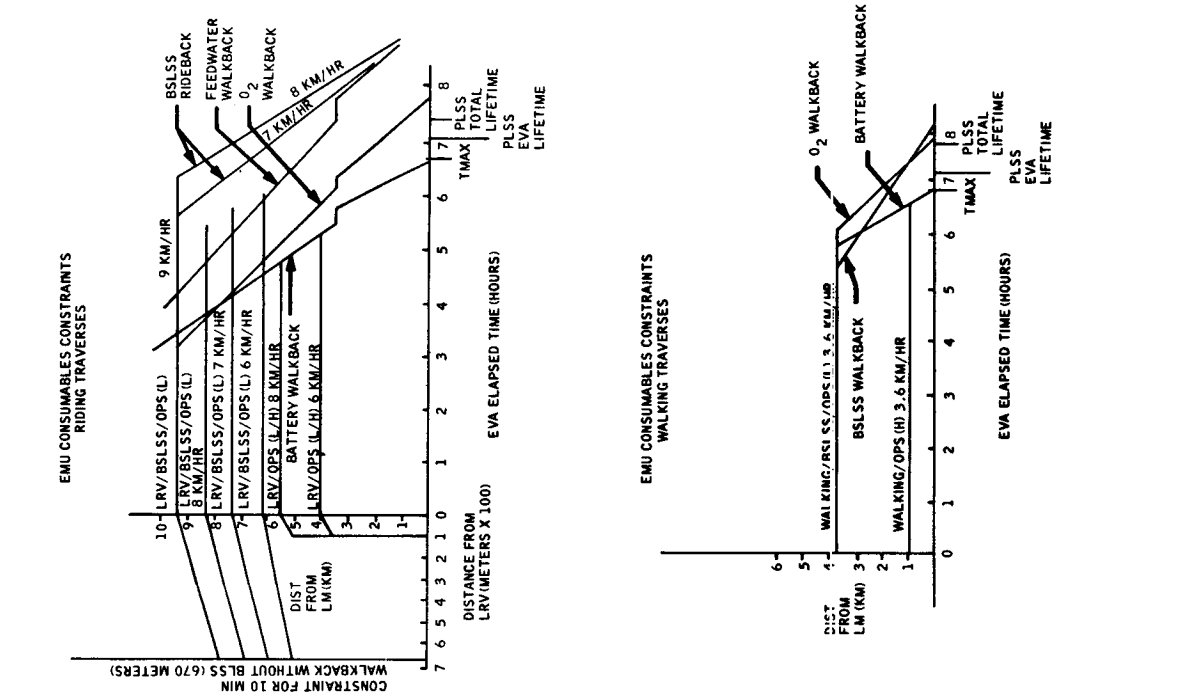
| R | ITEM | | | | | | | |
|---|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------|----------------------|-------------|------|------------|
| | 3-101 | CSM BATTERY ENERGY AND CRYOGENIC O ₂ AND H ₂ (APOLLO 16 DATA) | | | | | | |
| | | THE FOLLOWING MINIMUM USABLE ENERGY/QUANTITIES MUST BE AVAILABLE TO INITIATE THE SPECIFIC PHASES. | | | | | | |
| | | | LAUNCH | LOI | UNDOCK | LOPC | | SHAPE MNVR |
| | | | | | | 1 | 2 | |
| | | BAT AMP-HOURS REMAINING | 3 BAT 90.8 ^① | 80.8 | 72.7 | 68.4 | 64.6 | 58.2 |
| | | | 2 BAT 56.1 | 47.1 | 43.4 | 42.2 | 41.0 | 38.1 |
| | | O ₂ TOTAL LBS | 3 TANKS 782 | 631 | 584 | 477 | 398 | 352 |
| | | H ₂ TOTAL LBS | 3 TANKS 64.9 | 50.3 | 45.7 | 33.4 | 24.5 | 18.9 |
| | | ^① ENERGY REQUIREMENT TO PERFORM NOMINAL MISSION WITHOUT CHARGER. REDLINE DOES NOT ALLOW PRE-LOI GIMBAL DRIVE CHECK OR BACKUP SPS BURN PREPS AND REQUIRES POWER DOWN OF ECS RADIATOR HEATERS OVERLOAD SENSING. | | | | | | |
| | | NOTES (A) PRELAUNCH BATTERY REDLINES ARE BASED ON FAILURE OF THE BATTERY CHARGER BEFORE ACCOMPLISHING ANY CHARGING. (B) THE TWO BATTERY REDLINES REFLECT THE ENERGY REQUIRED IN THE TWO LOWEST BATTERIES TO PROVIDE CAPABILITY FOR A SAFE RETURN FROM ANY POINT IN THE MISSION. THE REDLINES ARE BASED ON LOSS OF THE HIGHEST BATTERY SUBSEQUENT TO LOSS OF THE BATTERY CHARGER WITH A TWO-BATTERY ENTRY (WITH G&N) AND 12 HOURS OF POSTLANDING TIME. (C) IF RESCUE IS REQUIRED, THE THREE-BATTERY ENERGY REQUIREMENTS WILL BE RECOVERED BY POWERING DOWN TO A TWO-BATTERY G&N ENTRY. (D) AUX BAT ENERGY IS NOT INCLUDED IN BAT REDLINES. (E) CONSIDERATION WILL BE GIVEN TO PERFORMING SPS BURNS WITHOUT BATTERY SUPPLEMENT IF REDLINE NOT MET. (F) CRYOGENIC REDLINES ARE BASED ON CAPABILITY TO PERFORM NOMINAL MISSION WITH CAPABILITY TO RETURN TO EARTH AT A 40 AMP AVERAGE POWER LEVEL AFTER LOSS OF ANY CRYO TANK AT THE WORST CASE TIME FOR FAILURE. (G) THREE-TANK CRYOGENIC REDLINE IS BASED ON THE TOTAL QUANTITY REQUIRED TO PERFORM NOMINAL LENGTH MISSION. | | | | | | |
| | | RULE NUMBERS 3-102 THROUGH 3-110 ARE RESERVED. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | MISSION RULE SUMMARY | CONSUMABLES | 3-35 | Tape 51.5 |

LM CONSUMABLE REQUIREMENTS / MANAGEMENT
TELMU
9/1/72

| REV | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | EPS AND ECS MINIMUM CONSUMABLE REQUIREMENTS |
| A. | FROM UNDOCKING TO TOUCHDOWN, THE MINIMUM REQUIREMENTS ARE BASED ON THE TIME TO COMPLETE A LANDING, A 24.5-HR STAY WITH ONE EVA, ASCENT, AND A 2.0-HR RENDEZVOUS THROUGH CREW TRANSFER, A 2-HR ORBITAL CONTINGENCY, AND REDUNDANT ASCENT EPS SOURCES FOR THE RENDEZVOUS. |
| | THE TIME TO COMPLETE A LANDING AND THE 24.5-HR LUNAR STAY MAY BE SUPPORTED BY ANY COMBINATION OF DESCENT AND ASCENT CONSUMABLES. IN ADDITION, EACH ASCENT BATTERY, ONE H ₂ O TANK AND ONE ASCENT O ₂ TANK (THE LM CABIN IS CONSIDERED A REDUNDANT O ₂ SOURCE) MUST CONTAIN THE CONSUMABLES REQUIRED FOR LIFTOFF AND A 2.0-HR RENDEZVOUS THROUGH CREW TRANSFER. THE 2-HR ORBITAL CONTINGENCY, INsofar AS ASCENT O ₂ AND ELECTRICAL POWER ARE CONCERNED, IS CONSIDERED TO BE SATISFIED BY THE REDUNDANCY REQUIREMENT. SHOULD TWO ASCENT H ₂ O TANKS BE AVAILABLE, THE REQUIREMENT FOR LIFTOFF THROUGH CREW TRANSFER CAPABILITY IN EACH TANK WILL SATISFY THE 2-HR ORBITAL CONTINGENCY. IF ONLY ONE TANK IS AVAILABLE, IT MUST ALSO INCLUDE THE 2-HR CONTINGENCY. |
| B. | FOR THE REMAINDER OF THE LUNAR STAY, THE MINIMUM DESCENT STAGE REQUIREMENTS ARE BASED ON THOSE CONSUMABLES REQUIRED FOR THE SCHEDULED ACTIVITIES DURING EACH DEFINED PHASE, AN ASCENT PREPARATION, AND A 2-HR SURFACE RESERVE. THE LAST 4 HOURS OF THIS REQUIREMENT FOR EPS MUST BE SPLIT-BUS OPERATION. ASCENT STAGE MINIMUM REQUIREMENTS ARE AS STATED ABOVE. |
| C. | FOR THE RENDEZVOUS, THE MINIMUM REQUIREMENTS ARE THOSE CONSUMABLES NECESSARY TO SUPPORT A LM-ACTIVE RENDEZVOUS THROUGH CREW TRANSFER. SHOULD THESE MINIMUM REQUIREMENTS BE VIOLATED, THE LM WILL BE POWERED DOWN WHILE THE CSM BECOMES THE ACTIVE VEHICLE. HOWEVER, THE LM WILL BE POWERED UP TO PERFORM BRAKING WITH SUFFICIENT CONSUMABLES BEING RETAINED FOR THIS PURPOSE. |
| D. | TWO POUNDS OF OXYGEN CONTAINED IN THE LM CABIN AT 5.3 PSIA WILL BE CONSIDERED AVAILABLE IN CALCULATING MINIMUM O ₂ REQUIREMENTS. THE CABIN CAN BE CONSIDERED, WHEN DISCUSSING FUNCTIONAL PRESSURE VESSEL REQUIREMENTS, AS A BACKUP TO THE ASCENT O ₂ TANKS. |
| II. | EMU CONSUMABLE REQUIREMENTS |
| A. | GO/NO-GO'S |
| 1. | NOMINAL AND ALTERNATE EVA'S AMP-HRS, O ₂ , LION AND H ₂ O QUANTITIES REQUIRED TO COMPLETE EVA PREP, EVA, PLUS THE VALUES REQUIRED FOR 30 MINUTES OF POST EVA RESERVE. |
| 2. | CEVA BOTH PLSS'S AND OPS WILL BE RETAINED UNTIL TWO LIFE SUPPORT UNITS (2 OPS, 2 PLSS'S OR 1 PLSS AND 1 OPS) HAVE BEEN VERIFIED TO HAVE SUFFICIENT CONSUMABLES TO SUPPORT CEVA (MINIMUM OF 15 MIN LIFETIME; OPS IN HI FLOW) |

| REV | |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B. | RED LINES NOMINAL AND ALTERNATE EVA'S-PLSS AMP-HOURS, O ₂ , LION, AND H ₂ O REQUIRED FOR 30 MINUTES OF POST EVA RESERVE. |
| C. | EXCURSION CONSTRAINTS EVA EXCURSION LIMITATIONS ARE A FUNCTION OF TRAVERSE MODES (RIDING OR WALKING), NUMBER OF EVA CREWMAN, EVA EQUIPMENTS AVAILABLE, AND PLSS CONSUMABLES REMAINING. FOR A TWO-MAN RIDING TRAVERSE THE FOLLOWING WILL APPLY: (A) EVA EXCURSIONS WILL BE LIMITED TO ALLOW WALKBACK FROM A FAILED LRV ASSUMING NO PLSS FAILURES. (B) EVA EXCURSIONS WILL BE LIMITED TO ALLOW RIDEBACK WITH A FAILED PLSS, USING BSLS AND OPS IN LOW PURGE FLOW. (C) EVA EXCURSIONS WITHOUT THE BSLS (OR IF THE BSLS IS BEING USED) WILL BE LIMITED ALLOWING WALKBACK TO THE LRV (≤ 100 METERS) AND RIDING ON LRV USING OPS LOW PURGE FLOW AND ALLOWING 13 MIN AT HIGH PURGE FLOW FOR INGRESS. AN ARBITRARY 10 MIN PAD WILL BE IMPOSED FOR THE LOW PURGE FLOW PHASE. |
| 2. | FOR A TWO-MAN WALKING TRAVERSE THE FOLLOWING WILL APPLY: (A) EVA EXCURSIONS WILL BE LIMITED TO A BSLS WALKBACK CAPABILITY USING THE OPS IN LOW PURGE FLOW. (B) WITH NO BSLS, THE EVA EXCURSIONS WILL BE LIMITED, ALLOWING LM RETURN USING THE OPS IN HIGH PURGE FLOW. 3. FOR A ONE-MAN RIDING TRAVERSE THE FOLLOWING WILL APPLY: (A) EVA EXCURSIONS WILL BE LIMITED TO WALKBACK FROM A FAILED LRV ASSUMING NO PLSS FAILURES. (B) EVA EXCURSIONS WILL BE LIMITED TO ALLOW WALKBACK TO LRV (≤ 100 METERS) AND RIDING ON THE LRV USING OPS LOW PURGE FLOW AND ALLOWING 13 MIN AT HI PURGE FLOW FOR INGRESS. AN ARBITRARY 10 MIN PAD WILL BE IMPOSED FOR THE LOW PURGE FLOW PHASE. 4. FOR A ONE-MAN WALKING TRAVERSE THE FOLLOWING WILL APPLY: EVA EXCURSIONS WILL BE LIMITED TO ALLOW WALKBACK TO THE LM, UTILIZING THE OPS IN HIGH PURGE FLOW. 5. ALL EMERGENCY RETURNS ARE CONSTRAINED BY THE 300 BTU MAXIMUM CREWMAN HEAT STORAGE AND THE 13 MINUTES REQUIRED FOR TERMINATION AND INGRESS. ALL RIDING AND WALKING RATES ARE UNCORRECTED MAP RATES. |

| REV | |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (A) RIDING TRAVERSES | (1) THE LRV/BSLS/OPS (L) RETURN TRAVERSE CAPABILITY REPRESENTS AN OPS LOW PURGE FLOW RATE OF 4.0 LBS/HR, TIME REQUIRED FOR BSLS WALKBACK TO THE LRV AT 4.0 KM/HR, 5 MINUTES FOR BSLS ACTIVATION, AND THE TIME REQUIRED FOR LRV RETURN TRAVERSE AT 7.3 KM/HR. (2) THE LRV/OPS (L/H) RETURN TRAVERSE CAPABILITY REPRESENTS AN OPS LOW PURGE FLOW RATE OF 4.0 LBS/HR FOR WALKBACK TO THE LRV (≤ 100 METERS) AT 4.0 KM/HR, AND THE LRV RETURN TRAVERSE AT 7.3 KM/HR, AND AN OPS HI PURGE FLOW RATE OF 7.8 LBS/HR FOR INGRESS. AN ARBITRARY 10 MIN PAD WILL BE IMPOSED DURING THE LOW PURGE FLOW PHASE. (3) THE WALKBACK RETURN TRAVERSE CAPABILITY REPRESENTS A PARTICULAR CONSUMABLE CONSIDERING A WALKBACK RETURN RATE OF 3.6 KM/HR FOR DISTANCES ≤ 3.6 KM AND 2.7 KM/HR FOR DISTANCES > 3.6 KM. THE BSLS RIDEBACK RETURN TRAVERSE CAPABILITY REPRESENTS 5 MIN FOR BSLS ACTIVATION AND AN LRV RATE OF 7.3 KM/HR. (B) WALKING TRAVERSES (1) THE WALKING/BSLS/OPS (L) RETURN TRAVERSE CAPABILITY REPRESENTS AN OPS LOW PURGE FLOW RATE OF 4.0 LBS/HR, 5 MIN FOR BSLS ACTIVATION, AND THE TIME REQUIRED FOR THE WALKING RETURN TRAVERSE. (2) THE WALKING/OPS (H) RETURN TRAVERSE CAPABILITY REPRESENTS AN OPS HIGH PURGE FLOW RATE OF 2.8 LBS/HR FOR THE TIME REQUIRED FOR THE WALKING RETURN TRAVERSE. (3) THE WALKBACK RETURN TRAVERSE CAPABILITY REPRESENTS THE PARTICULAR CONSUMABLE USED AT A CONTINGENCY RATE AT THE 3.6 KM/HR RETURN WALKING RATE. 6. THE PREMISSION ESTIMATES USED IN DEFINING THE OPERATIONAL ENVELOPE, BSLS RIDEBACK AND NORMAL RIDEBACK LIMITS, WILL BE UPDATED AS NECESSARY DURING THE TRAVERSE BASED ON A REAL-TIME ASSESSMENT OF MOBILITY AND CONSUMABLES. 7. PLSS TOTAL LIFETIME - THE MAXIMUM PLSS LIFETIME AVAILABLE AS AFFORDED BY THE MOST CONSTRAINING CONSUMABLE. IT IS DETERMINED BY DIVIDING THE CONSUMABLE QUANTITY MINUS RESIDUAL BY THE PREDICTED CONSUMABLE USE RATE. PLSS EVA LIFETIME - THE MAXIMUM POSSIBLE EVA TIME AS AFFORDED BY THE MOST CONSTRAINING PLSS CONSUMABLE. IT IS DETERMINED BY SUBTRACTING 30 MINUTES (POST-EVA RESERVE) FROM THE TOTAL PLSS LIFETIME. TMAX - THE EVA TIME AT WHICH THE CREWMAN MUST BE AT THE LM AS LIMITED BY THE MOST CONSTRAINING PLSS CONSUMABLE. FOR A RIDING TRAVERSE, IT IS DETERMINED BY SUBTRACTING 10 MINUTES (LRV EQUIPMENT ASSEMBLY TIME) AND 13 MINUTES (LM INGRESS TIME) FROM THE PLSS EVA LIFETIME. FOR A WALKING TRAVERSE, IT IS DETERMINED BY SUBTRACTING 13 MINUTES (LM INGRESS TIME) AND 5 MINUTES (BSLS HOOKUP TIME) FROM THE PLSS EVA LIFETIME. |



LM CONSUMABLE REQUIREMENTS/ MANAGEMENT CONTROL

9/1/72

REV

I. RCS CONSUMABLE REQUIREMENTS

A. GO/NO-GO'S

THE GO/NO-GO FOR EACH MISSION PHASE IS DEFINED AT THE QUANTITY REQUIRED FOR COMPLETION OF THE NOMINAL MISSION TO DOCKING PLUS OPS RESERVE. ALL GO/NO-GO'S ARE THE AVERAGE OF SYSTEM A AND B.

B. REDLINES (AN "X" INDICATES THAT PROPELLANT IS REQUIRED FOR THE FUNCTION LISTED)

| REDLINES | DOCKING | LONGEST ABORT RNDZ (DPS) | STAGING | BRAKING | ASCENT | LONGEST LOS FOR CSM RESCUE | TWEAK | 1 REV CSM RNDZ | OPS RESERVE |
|------------------|---------|--------------------------------|---------|---------|--------|----------------------------------|-------|-------------------|----------------|
| UNDocking TO CIR | X | | | | | | | | X |
| CIRC TO PDI | X | X | X | X | | | | | X |
| PDI TO T/D | X | | | X | X | X | | | X |
| LUNAR STAY | X | | | X | X | X | | | X |
| ASC TO TWEAK | X | | | | X | | X | X | X |
| TWEAK TO TPF | X | | | | | | | X | X |
| TPF TO DOCKING | | | | | | | | | X |

ALL REDLINES REQUIRE A PERCENT READING ON EACH INDIVIDUAL SYSTEMS GAGE (OR AN EQUIVALENT OF PROPELLANT IF THE GAGE HAS FAILED) EQUAL TO OR GREATER THAN THE REDLINE VALUE.

C. OPS RESERVE

1. AFTER COMMITTING TO A RENDEZVOUS BUT PRIOR TO TPF, THE OPS RESERVE IS THAT QUANTITY OF RCS PROPELLANT REQUIRED FOR ONE REV OF LOS TRACKING OF THE CSM (LM STAGED) OR 2.5 PERCENT.

2. AFTER TPF, THE OPS RESERVE IS THAT QUANTITY OF RCS PROPELLANT REQUIRED FOR A CSM ACTIVE DOCKING OR 1.0 PERCENT.

II. PROPULSION PROPELLANT GAGING

A. DPS

1. PRIME METHOD--PQGS TM AND ONBOARD (1.3 PERCENT).

2. BACKUP METHOD--GROUND MASS CALCULATION (3 PERCENT)

B. APS

1. PRIME METHOD--APS QUANTITY FROM LGC MASS CALCULATION (3 PERCENT)

2. BACKUP METHOD-- FLOW RATE TIMES ELAPSED TIME (5 PERCENT)

C. RCS

1. PRIME METHOD--GROUND RCS PROGRAM (6 PERCENT)

2. BACKUP METHOD--PQMD (ONBOARD READOUT 13 PERCENT, GROUND READOUT 10 PERCENT)

III. CONSUMABLES MANAGEMENT

A. RCS

THE RCS SYSTEM SHOULD BE CROSSFED WHEN NECESSARY TO INSURE NEITHER SYSTEM EXCEEDS ITS RCS CONSUMABLE REDLINE.

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 - GROUND INSTRUMENTATION REQUIREMENTS

| R | ITEM | | | | | | |
|---|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|---------------------------|---------|------|
| | | <div>GENERAL</div> | | | | | |
| | 4-1 | <div>GENERAL</div> <div>A. THE FOLLOWING PRELAUNCH REQUIREMENTS DEFINE THE MCC/MSFN REQUIREMENTS WHICH MUST BE MET BEFORE A "GO" IS GIVEN FOR LAUNCH. ALL RANGE SAFETY OFFICER REQUIREMENTS ARE CONTAINED IN SECTION 5.</div> <div>B. WHEN A SPECIFIC HARDWARE ITEM OR OPERATIONAL CAPABILITY IS DEFINED AS A MANDATORY ITEM, THE HARDWARE AND/OR SOFTWARE INTERFACE REQUIRED TO PROVIDE THE MANDATORY FUNCTIONS OF THAT HARDWARE ITEM OR OPERATIONAL CAPABILITY ARE TO ASSUME A MANDATORY STATUS ALSO.</div> <div>C. WHERE REDUNDANCY EXISTS FOR MANDATORY ITEMS, A BACKUP CAPABILITY IS CONSIDERED HIGHLY DESIRABLE.</div> <div><div>NOTE</div><div>THE VARIOUS EQUIPMENT LISTINGS IN THIS SECTION ARE TO BE UTILIZED AS A GUIDE ONLY. IT IS MANDATORY, PRIOR TO COMMITTING THE MISSION TO LAUNCH, TO BE ABLE TO:</div><div>A. RECEIVE AND DISPLAY TELEMETRY AND TRACKING DATA</div><div>B. MAINTAIN VOICE COMMUNICATIONS WITH THE CREW</div></div> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | GROUND INSTR REQUIREMENTS | GENERAL | 4-1 |
| | | Tape 13.1 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 - GROUND INSTRUMENTATION REQUIREMENTS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | | | | <div>MCC</div> | | | | |
| | 4-2 | <u>TELEMETRY</u> A. CONSOLE DISPLAY (D/TV, EVENTS, ANALOGS) B. PCM GROUND STATIONS (4) C. RECORDING AND PLAYBACK 1. ALDS 2. MSFN | PRELAUNCH PRELAUNCH PRELAUNCH | MANDATORY 2 OF 4 MANDATORY, 2 HIGHLY DESIRABLE DESIRABLE | A. FOR DISPLAY OF MANDATORY S/V PARAMETERS B. FOR DISPLAY OF MANDATORY S/V EVENTS AND ANALOGS | | | |
| | 4-3 | <u>COMMAND</u> A. MOCR TOGGLE SWITCHES (BOTH A AND B) 1. BSE ABORT REQUEST 2. FIDO ABORT REQUEST 3. FD ABORT REQUEST B. COMMAND PANELS: INCO, GUIDO, BSE, CCATS C. MOCR CONSOLE/SITE SELECT CAPABILITY 1. RTC CONSOLE (CCATS) 2. CCATS CMD CONSOLE MED D. FC/M&O SWITCHING CAPABILITY 1. CCATS 2. CCATS CMD MED E. ABORT/CCATS TEST SWITCHING CAPABILITY 1. FD CONSOLE 2. CCATS CMD MED | PRELAUNCH PRELAUNCH PRELAUNCH PRELAUNCH PRELAUNCH | HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE | A. FOR LAUNCH PHASE ABORT REQUEST | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GROUND INSTR REQUIREMENTS | MCC | 4-2 | Tape 13.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 - GROUND INSTRUMENTATION REQUIREMENTS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 4-4 | <u>TRAJECTORY</u> A. TRAJECTORY DATA PROCESSING 1. AVAILABILITY OF ONE INDEPENDENT TRACKING SOURCE (IPR, USB) FROM LIFTOFF TO T+10 MINUTES 2. IU AND CMC TM VECTORS FROM LIFTOFF TO INSERTION B. RTCC - DATA SELECT CAPABILITY | PRELAUNCH PRELAUNCH PRELAUNCH | 1 MANDATORY BOTH MANDATORY MANDATORY | A. THE TRAJECTORY DATA SOURCES ARE UTILIZED AS FOLLOWS: 1. (A) INDEPENDENT VERIFICATION OF L/V NAVIGATION (B) PROTECTION AGAINST VIOLATION OF LAUNCH ENVELOPE A. 2. REQUIRED FOR ORBIT GO/NO-GO B. TO SELECT BEST AVAILABLE DATA SOURCE | | | |
| | 4-5 | <u>COMMUNICATIONS</u> A. MOCR: AFD CONF LOOP FD LOOP MOCR DYN MOCR SYS 1 & 2 A/G 1 LOOP A/G 2 LOOP B. MCC/LAUNCH COMPLEX: 121 CLTC 111 CVTS 212 MSTC C. MCC/RSO: FD LINE TO RSO RSO PRIVATE LINE CAPE 111 RSO LOOP D. MCC/REMOVED SITES: ONE A/G PATH | PRELAUNCH PRELAUNCH PRELAUNCH PRELAUNCH PRELAUNCH | 1 OF 2 MANDATORY ALL HIGHLY DESIRABLE 1 OF 3 MANDATORY 1 OF 3 MANDATORY MANDATORY | A. FOR MISSION CONTROL B. FOR TERMINAL COUNT COORDINATION OF MCC-PAD ACTIVITIES C. FOR TRAJECTORY VERIFICATION AND BOOSTER SAFING D. USED FOR COMMUNICATION WITH CREW | | | |
| | 4-6 | <u>COMPUTER</u> A. MOC (IBM 360/75) B. DSC (IBM 360/75) C. CCATS (UNIVAC 494)-ONLINE CCATS (UNIVAC 494)-STANDBY | PRELAUNCH PRELAUNCH PRELAUNCH | MANDATORY HIGHLY DESIRABLE 1 MANDATORY AND 1 HIGHLY DESIRABLE | TO PROCESS MANDATORY S/V PARAMETERS AND TRAJECTORY DATA AN SSC (IBM 360/75) IS AVAILABLE AS BACKUP TO THE MOC OR DSC. TO THROUGH PROCESS MANDATORY S/V PARAMETERS TO MOC | | | |
| | 4-7 | <u>TIMING</u> MITE (2) | PRELAUNCH | 1 MANDATORY | MCC TIMING STANDARD TO SUPPORT MANDATORY RTCC/CCATS COMPUTERS | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GROUND INSTR REQUIREMENTS | MCC | 4-3 | Tape 13.3 |

MISSION RULES

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|-----|---------------------------------------------|-----------------------------|-----------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| 4-8 | <u>MCC POWER</u> | | | | | | | |
| | A. BUS A1 | | PRELAUNCH | MANDATORY | A. UNINTERRUPTABLE POWER FOR D/TV | | | |
| | B. BUS A2 | | PRELAUNCH | HIGHLY DESIRABLE | B. POWERS ADEG NO VSM ON A2. | | | |
| | C. BUS B1 | | PRELAUNCH | HIGHLY DESIRABLE | C. 20 SECONDS INTERRUPTABLE POWER FOR THE FOLLOWING HIGHLY DESIRABLE ITEMS: - ONE-HALF MOCR CONSOLE POWER - FLT DYN SSR CONSOLES AND PLOTBOARDS - RTCC CONSOLES (EXCEPT COMP SUP) - PSDDD - TTY | | | |
| | D. BUS B2 | | PRELAUNCH | MANDATORY | D. 20 SECONDS INTERRUPTABLE POWER FOR ONE-HALF OF THE MOCR CONSOLE POWER, ALL SSR CONSOLE POWER, AND ALL MOC DDD'S | | | |
| 4-9 | <u>DISPLAY</u> | | | | | | | |
| | A. MOCR D/TV CHANNELS | | PRELAUNCH | 7 OF 40 MANDATORY | A. FOR DISPLAY OF MANDATORY S/V PARAMETERS IF DISPLAY SWITCHING CAPABILITY IS ALSO LOST: 1. FIDO WILL REQUIRE 2 CHANNELS AND GAMMA VS V AND GAMMA (EI) VS V (EI) ON PLOT-BOARDS 2. BSE WILL REQUIRE 3 CHANNELS | | | |
| | | NO. OF POSITION CHANNELS | | | | | | |
| | RETRO | 1 | | | | | | |
| | FIDO | 1 | | | | | | |
| | GUIDO | 1 | | | | | | |
| | EEDCOM | 1 | | | | | | |
| | GNC | 1 | | | | | | |
| | RTCC | 1 | | | | | | |
| | BOOSTER | 1 | | | | | | |
| | B. TRAJECTORY DISPLAY | | | | | | | |
| | 1. FDO LAUNCH DIGITALS | | PRELAUNCH | MANDATORY ON D/TV | B. 1. FOR CONTINGENCY ORBIT INSERTION MANEUVER DATA AND T _{FF} LIMITS | | | |
| | 2. GAMMA VS V | | PRELAUNCH | MANDATORY ON 1 OF 4: (A) 10 X 20 SCRIBER PLOTTER (B) D/TV (C) RTCC PLOTBOARD (D) SSR PLOTBOARD | 2. FROM SELECTED TRACKING DATA SOURCE | | | |
| | 3. RFO LAUNCH DIGITALS | | PRELAUNCH | MANDATORY ON D/TV | 3. MONITOR FOR MODES III AND IB MANEUVER DATA | | | |
| | 4. GAMMA(EI) VS V(EI) | | PRELAUNCH | MANDATORY ON 1 OF 2: (A) D/TV (B) SSR PLOTBOARD | 4. MONITOR FOR G-LIMIT VIOLATION | | | |
| | 5. PHI VS LAMBDA | | PRELAUNCH | HIGHLY DESIRABLE ON 1 OF 2: (A) RTCC PLOTBOARD (B) SSR PLOTBOARD | 5. MONITOR FOR CROSS-RANGE LIMITS | | | |
| | 6. T _{FF} VS R _{IP} | | PRELAUNCH | HIGHLY DESIRABLE ON 1 OF 2: (A) D/TV (B) SSR PLOTBOARD | 6. MONITOR FOR ABORT MODES II, III, AND IB. | | | |
| | 7. H VS D | | PRELAUNCH | HIGHLY DESIRABLE ON 10 X 20 SCRIBER PLOTTER | | | | |
| | 8. GAMMA(I) VS V(I) (CMC DYNAMIC STATUS) | | PRELAUNCH | HIGHLY DESIRABLE ON 10 X 10 SCRIBER PLOTTER | 8. MONITOR FOR L/V AND S/C NAVIGATION PERFORMANCE (GUIDANCE SYSTEM ANALYSIS - COMPARES CMC WITH TRACKING). | | | |
| | 9. WEDGE ANGLE MONITOR | | PRELAUNCH | HIGHLY DESIRABLE ON D/TV | 9. MONITOR FOR L/V AND S/C NAVIGATION PERFORMANCE | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GROUND INSTR REQUIREMENTS | MCC | 4-4 | Tape 13.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 - GROUND INSTRUMENTATION REQUIREMENTS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 4-9 (CONT) | 10. GUIDO ANALOG CHART RECORDERS ONE AND TWO 11. INSERTION/INJECTION DIGITALS C. ADEG CHANNELS 90-93 D. VSM E. AUX VSM F. EIDOPHORS (3) NOTE: INDIVIDUAL FLIGHT CONTROLLERS WILL BE RESPONSIBLE FOR REPORT- ING LOSS OF DISPLAY CAPABILITY OF MANDATORY PARAMETERS TO THE FLIGHT DIRECTOR. | PRELAUNCH PRELAUNCH PRELAUNCH PRELAUNCH PRELAUNCH | HIGHLY DESIRABLE ON TV MANDATORY ON D/TV HIGHLY DESIRABLE MANDATORY HIGHLY DESIRABLE 2 HIGHLY DESIRABLE | 11. FOR G&N GO/NO-GO C. FOR DSC DISPLAYS D. FOR D/TV. IF MANDATORY CHANNELS CAN BE DISPLAYED, THE VSM IS HD FOR LAUNCH PRO- VIDED THE ETO IS LESS THAN 1 HOUR | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GROUND INSTR REQUIREMENTS | MCC | 4-5 | Tape 13.5 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 - GROUND INSTRUMENTATION REQUIREMENTS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | CUES/NOTES/COMMENTS | |
|---|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------|
| | | | | <u>GSFC/KSC/MSFN</u> | | | |
| | 4-10 | <u>GSFC</u> A. GSFC UNIVAC-494 (2) COMMUNICATIONS PROCESSOR B. WBD (50.0 KBPS) LINES (2) BETWEEN MCC AND GSFC C. TTY CIRCUITS BETWEEN MCC AND GSFC 1. OUTGOING 2. INCOMING (JJ) | PRELAUNCH PRELAUNCH PRELAUNCH PRELAUNCH | 1 MANDATORY 1 MANDATORY 1 OF 32 CIRCUITS HIGHLY DESIRABLE 1 OF 32 CIRCUITS MANDATORY | A. ONE UNIVAC-494 CAN PERFORM ALL NECESSARY FUNCTIONS, THE SECOND ONE IS BACKUP. B. EITHER LINE CAN BE SWITCHED TO EITHER UNIVAC-494. C. VFTG PROVIDES TWO REDUNDANT 16 CIRCUIT TTY CHANNELS. 1. FOR ACQ MSG, LS CMD 2. FOR RECEPTION OF LOWSPEED RADAR DATA. | | |
| | 4-11 | <u>KSC</u> TELEMETRY: A. VHF TM FROM THE FOLLOWING FOR S-II, S-IVB, AND IU: 1. CIF ANTENNA 2. MILA VHF ANTENNA B. USB TM FROM THE FOLLOWING: 1. MILA USB 2. CIF USB COMMAND: THIS CAPABILITY IS DEFINED UNDER GSFC/KSC/MSFN COMMAND RULE 4-12 FOR LAUNCH COVERAGE. TRACKING: THAT CAPABILITY REQUIRED TO SATISFY RULE 4-4 (TRAJECTORY) IS MANDATORY. VOICE COMMUNICATIONS: THIS KSC CAPABILITY IS DEFINED UNDER MCC RULE 4-5 (COMMUNICATIONS). | PRELAUNCH PRELAUNCH | 1 HIGHLY DESIRABLE 1 MANDATORY | A. THESE ANTENNAS CAN BE SWITCHED TO MILA OR CIF FACILITIES B. USB IS THE CSM'S ONLY SOURCE OF DATA. | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | GROUND INSTR REQUIREMENTS | GSFC/KSC/MSFN | 4-6 |
| | | | | | | | Tape 14.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 - GROUND INSTRUMENTATION REQUIREMENTS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------|-----------|
| | 4-12 | <p><u>LAUNCH COVERAGE</u></p> <p>KSC/MSFN SITES (SITES NOT LISTED DUE TO VARIABLE LAUNCH AZIMUTH) MUST PROVIDE THE FOLLOWING CAPABILITIES FROM LIFTOFF THROUGH S-IVB CUTOFF. REFER TO DECISION MATRIX (RULE 4-17) TO DETERMINE CAPABILITY</p> <p>A. CMD</p> <p>CCS</p> <p>B. TELEMETRY</p> <p>S-IC (VHF)</p> <p>S-II (VHF)</p> <p>S-IVB VHF (CP-1)</p> <p>IU CCS (DP-1B)</p> <p>IU VHF (DP-1)</p> <p>CSM (USB)</p> <p>C. TRACKING</p> <p>THAT CAPABILITY REQUIRED TO SATISFY RULE 4-4 (TRAJECTORY) IS MANDATORY</p> <p>D. A/G COMMUNICATIONS</p> <p>1. MILA</p> <p>VHF</p> <p>USB</p> <p>2. MSFN</p> <p>VHF</p> <p>USB</p> | <p>PRELAUNCH</p> <p>PRELAUNCH</p> <p>PRELAUNCH</p> <p>PRELAUNCH</p> <p>PRELAUNCH</p> <p>PRELAUNCH</p> <p>PRELAUNCH</p> <p>PRELAUNCH</p> <p>PRELAUNCH</p> | <p>HIGHLY DESIRABLE</p> <p>HIGHLY DESIRABLE</p> <p>HIGHLY DESIRABLE FROM LIFTOFF TO S-II CUTOFF (APPROX 9:17 SEC)</p> <p>HIGHLY DESIRABLE</p> <p>1 OF 2 MANDATORY</p> <p>MANDATORY FROM LIFTOFF THROUGH S-IVB CUTOFF</p> <p>1 OF 2 MANDATORY</p> <p>1 OF 2 MANDATORY</p> | <p>S-IC DATA IS ONLY HIGHLY DESIRABLE SINCE THE MCC IS NOT PRIME FOR REQUESTING AN ABORT FOR S-IC MALFUNCTIONS.</p> <p>FOR ABORT CUES FROM MCC</p> <p>FOR ABORT CUES FROM MCC</p> <p>FOR ABORT CUES FROM MCC</p> | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GROUND INSTR REQUIREMENTS | GSFC/KSC/MSFN | 4-7 | Tape 14.2 |

MISSION RULES

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------|--------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4-13 | <p><u>GENERAL ORBITAL COVERAGE</u></p> <p>IT IS REQUIRED THE MSFN HAVE THE CAPABILITY OF PROVIDING THE MCC THE MINIMUM MISSION CONTROL SUPPORT LISTED BELOW OF TWO MSFN USB SITES PER REVOLUTION THROUGH REVOLUTION 3.</p> <p>A. CMD</p> <p>CCS PRELAUNCH HIGHLY DESIRABLE</p> <p>CSM USB PRELAUNCH HIGHLY DESIRABLE</p> <p>B. TELEMETRY</p> <p>S-IVB VHF (CP-1) PRELAUNCH HIGHLY DESIRABLE</p> <p>IU CCS (DP-1B) PRELAUNCH 1 OF 2 MANDATORY</p> <p>IU VHF (DP-1) PRELAUNCH MANDATORY</p> <p>CSM USB PRELAUNCH MANDATORY</p> <p>C. TRACK</p> <p>C-BAND PRELAUNCH HIGHLY DESIRABLE</p> <p>USB PRELAUNCH MANDATORY</p> <p>D. A/G COMMUNICATIONS</p> <p>VHF PRELAUNCH 1 OF 2 MANDATORY</p> <p>USB</p> | | | | | <p>DOWNLINKS REQUIRED TO RECOVER S-IVB DATA.</p> <p>USB MANDATORY AT LEAST ONE STATION PRIOR TO TLI TO CONFIRM ONBOARD CSM USB A/G CAPABILITY.</p> |
| 4-14 | <p><u>POST S/C SEPARATION</u></p> <p>IT IS MANDATORY THAT 1 SITE PROVIDE THE FOLLOWING CAPABILITIES:</p> <p>A. TLM - CCS PRELAUNCH MANDATORY</p> <p>B. CMD - CCS PRELAUNCH MANDATORY</p> | | | | | <p>A. TO PROVIDE TM FOR DETERMINING S-IVB STATUS BEYOND VHF RANGE.</p> <p>B. TO PROVIDE CORRECTIVE COMMAND CAPABILITY FOR S-IVB BULKHEAD DELTA PROBLEMS.</p> <p>C. BOTH OF THE ABOVE ARE REQUIRED TO INSURE CREW SAFETY AND LM EXTRACTION.</p> |

MISSION

REV

DATE

SECTION

GROUP

PAGE

APOLLO 17

FNL

9/1/72

GROUND INSTR REQUIREMENTS

GSFC/KSC/MSFN

4-8

Tape 14.3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 - GROUND INSTRUMENTATION REQUIREMENTS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------|---------------|------|-----------|
| | 4-15 | <u>HSK, GDS, MAD</u> IT IS MANDATORY 2 OF 3 OF THESE SITES PROVIDE THE FOLLOWING CAPABILITIES: A. TM USB B. TRACK USB C. VOICE USB D. CMD USB | PRELAUNCH PRELAUNCH PRELAUNCH PRELAUNCH | MANDATORY MANDATORY MANDATORY HIGHLY DESIRABLE | A. TO COVER TRANSLUNAR COAST AND LPO | | | |
| | 4-16 | <u>RIOMETER NETWORK SITES</u> GWM.IMA | PRELAUNCH | HIGHLY DESIRABLE | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GROUND INSTR REQUIREMENTS | GSFC/KSC/MSFN | 4-9 | Tape 14.4 |

MISSION RULES

| R | ITEM |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4-17 | <p><u>INTRODUCTION TO SITE FAILURE DECISION MATRIX</u></p> <p>FOR PRELAUNCH FAILURES OF LAUNCH PHASE SITE CAPABILITY, THE FOLLOWING DECISION MATRIX APPLIES THE LAUNCH PHASE GROUND INSTRUMENTATION REQUIREMENTS TO THE RESULTING DEGRADED COVERAGE.</p> <p>THIS MATRIX POINTS OUT THE LOSS OF CONTINUOUS COVERAGE BETWEEN LIFTOFF AND INSERTION PLUS 60 SECONDS FOR VARIOUS SITE FAILURES. IF SITE FAILURES OCCUR PRIOR TO LAUNCH, THE MATRIX WILL BE USED TO DETERMINE WHETHER MANDATORY CONTINUOUS COVERAGE HAS BEEN LOST.</p> <p>(NOMINAL INSERTION IS 11:55)</p> <p>TO USE THE MATRIX:</p> <p>A. LOOK FOR AN X UNDER THE COLUMN FOR SITE WHERE THE FAILURE OCCURRED.</p> <p>B. GO ACROSS TO THE COLUMN FOR THE CAPABILITY THAT WAS LOST AND READ THE DECISION.</p> <p>C. THE COVERAGE THAT WAS LOST IS IN THE COLUMN LABELED "APPROXIMATE MANDATORY COVERAGE LOST."</p> <p>D. MORE THAN ONE X IN A ROW SPECIFIES A FAILURE OF THE SAME CAPABILITY AT MORE THAN ONE SITE.</p> |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 - GROUND INSTRUMENTATION REQUIREMENTS - CONCLUDED

| R | ITEM | | | | | | | | | | |
|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------|----------------------|----------------------|------------------------------|--------------------------------------------------------------------------------------------------|--------------------------|-------------------|-------------------------|-------------------|--|
| | | SITES FAILED | | | | APPROXIMATE MANDATORY COVERAGE LOST FOR NO-GO ITEMS FOR ALL LAUNCH AZIMUTHS | CAPABILITY LOST | | | | |
| | | ALDS TM | MIL/ CAPE | BDA | VAN | | TM | CMD | TRACK | A/G | |
| | | 00:00 TO 08:49 | 00:00 TO 08:49 | 04:10 TO 12:40 | 09:10 TO 16:05 | | USB OR CCS AND VHF | USB AND CCS | BOTH S AND C BAND | USB AND VHF | |
| | S I N G L E S I T E F A I L U R E | X | | | | NONE SEE NOTE 1 | GO | N/A | N/A | N/A | |
| | | | X | | | 00:00 TO 04:10 SEE NOTE 2 | GO | GO | NO-GO | NO-GO | |
| | | | | X | | 08:49 TO 09:10 SEE NOTE 3 | GO | GO | GO | GO | |
| | | | | | X | NONE | GO | GO | GO | GO | |
| | M U L T I P L E S I T E F A I L U R E S | X | X | | | 00:00 TO 04:10 | NO-GO | GO | NO-GO | NO-GO | |
| | | | X | X | | 00:00 TO 09:10 SEE NOTE 2 | GO | GO | NO-GO | NO-GO | |
| | | | X | | X | 00:00 TO 04:10 SEE NOTE 2 | GO | GO | NO-GO | NO-GO | |
| | | | | X | X | 08:49 TO 16:05 | NO-GO | GO | NO-GO | NO-GO | |
| | | X | | X | | 08:49 TO 09:10 SEE NOTE 3 | GO | GO | GO | GO | |
| | | X | | | X | NONE | GO | GO | GO | GO | |
| | | X | X | X | | 00:00 TO 09:10 | NO-GO | GO | NO-GO | NO-GO | |
| NOTES: 1. LOSS OF ALDS RESULTS IN LOSS OF S-IC TM. HOWEVER, IT IS NOT MANDATORY FOR LAUNCH. | | | | | | | | | | | |
| 2. GO ON TM BECAUSE OF ALDS DATA UNTIL 08:49. | | | | | | | | | | | |
| 3. LOSS OF COVERAGE IS NOT SEVERE ENOUGH FOR A NO-GO CONDITION. | | | | | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | |
| | | APOLLO 17 | FNL | 9/1/72 | GROUND INSTR REQUIREMENTS | GSFC/KSC/MSFN | 4-11 | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE

| R | ITEM | <u>LAUNCH/TRANSEARTH</u> | | | | | |
|-----|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-------------------------|-------------------|-----------|
| 5-1 | THE LAUNCH PHASE WILL BE TERMINATED FOR ANY OF THE FOLLOWING CONDITIONS: | <p>A. VIOLATION OF THE VEHICLE BREAKUP LINE</p> <p>B. $T_{FF} \leq 1:40$ AND DECREASING AFTER TOWER JETTISON</p> <p>C. VIOLATION OF ENTRY "G" LIMIT</p> <p>D. V_S INCREASING</p> <p>E. OVERSPEED CONDITIONS AT INSERTION</p> <p>F. VIOLATION OF EXIT HEATING LINE</p> <p>G. IF $H \leq 75$ NM AND DECREASING BEFORE ACHIEVING MODE IV CAPABILITY</p> | | | | | |
| 5-2 | THE LES WILL NOT BE JETTISONED UNTIL MODE II CAPABILITY IS ESTABLISHED BY $T_{FF} \geq 1:20$ AND INCREASING. | | | | | | |
| 5-3 | MODE II, III, IV, AND APOGEE KICK | <p>A. THE GROUND IS PRIME FOR ABORT MODE DETERMINATION AND MODE III MANEUVER COMPUTATION. THE CREW USING THE G&N, WILL BE PRIME FOR MODE IV, APOGEE KICK MANEUVERS, AND DETERMINATION OF S-IVB OVERSPEED CONDITIONS.</p> <p>B. MODE III MANEUVERS WILL BE INTERRUPTED WHEN $T_{FF} = 1:00$ AND DECREASING.</p> <p>C. MODE IV MANEUVERS AND APOGEE KICK MANEUVERS WILL BE INTERRUPTED WHEN $T_{FF} = 1:40$ AND DECREASING.</p> <p>D. MODE IV MANEUVERS WILL BE INTERRUPTED IF THE CURRENT ALTITUDE IS 70 NM, DECREASING, AND $H_p < 300K$ FT.</p> <p>E. IF ENTERING, UTILIZE LIFT TO AVOID LAND. UNAVOIDABLE LAND LANDING USE RL 90 DEG.</p> <p>F. IF NO SLA SEP OR IF SPS FAILS:</p> <ol style="list-style-type: none"> $H_p < 40$ - EXECUTE CM/SM SEP BY $T_{FF} = 1:40$. $40 < H_p < 70$ - GROUND WILL DECIDE TO USE CM RCS ASAP OR AT APOGEE TO REDUCE H_p TO 40 NM | | | | | |
| 5-4 | MODE III ABORTS | <p>A. PREDICTED T_{FF} AFTER SPS C/O $< 1:00$.</p> <ol style="list-style-type: none"> FULL LIFT IP ON WATER - DO NOT UBURN. G&N GO AND FULL LIFT IP ON LAND - BURN TO $T_{FF} = 1:00$, RL 90 DEG. G&N NO-GO AND FULL LIFT IP ON LAND - BURN A REDUCED ΔV TO MAINTAIN T_{FF} AFTER C/O AND RL 90 DEG. <p>B. IF $\Delta TB \leq 2$ SEC, DO NOT BURN.</p> <p>C. IF IGNITION OCCURS AFTER GETI + 10 SEC, BURN UNTIL G&N $\Delta R = 0$, RL 55 DEG. (IF UNABLE TO BURN $\Delta R = 0$, RL 90 DEG.)</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | LAUNCH TRANSEARTH | 5-1 |
| | | | | | | | Tape 51.6 |

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

TSG 291A

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | |
|------|---------------------------------------------------------------------------------------------------------------------|----------------------------|
| | | <u>EARTH ORBIT AND TLI</u> |
| 5-20 | EARTH ORBITAL ALTITUDE CONSTRAINTS: | |
| | A. REAL-TIME MISSION PLANNING | |
| | PERIGEE - 85 NM MINIMUM. MAXIMUM Hp IS DETERMINED BY SM RCS AVAILABLE FOR HYBRID DEORBIT. | |
| | B. CONTINGENCY | |
| | PERIGEE - 70 NM MINIMUM (VIOLATIONS WILL BE CORRECTED ASAP) IF Hp < 70 NM AND MANEUVER TO RAISE Hp IS NOT POSSIBLE: | |
| | 1. 40 < Hp < 70 - EXECUTE SPS RETROGRADE ASAP UNTIL Hp < 40. IF NO SPS, LSE SM-RCS. | |
| | 2. Hp < 40 - CM/SM SEP - RETRO WILL RECOMMEND ENTRY PROFILE. | |
| 5-21 | RESERVED | |
| 5-22 | S/C L/O TIME (GRR) WILL BE UPDATED WITH SRC L/U TIME IF THE TWO ARE DIFFERENT BY 10 SEC. | |
| 5-23 | TIME BETWEEN EPO RETROFIRE GETI AND 400K MUST BE >9 MIN. IF NOT, RETARGET FOR NEXT PTP. | |
| 5-24 | RESERVED | |
| 5-25 | PLANNED G&N AND SCS RETROFIRE MANEUVERS WILL BE UPDATED IF: | |
| | A. THE COMPUTED RETROFIRE POSITION CHANGES BY >0.5° LONGITUDE PRIOR TO GETI - 30 MIN. | |
| | B. THE COMPUTED RETROFIRE POSITION CHANGES >2° LONGITUDE AFTER GETI - 30 MIN. | |
| 5-26 | RESERVED | |
| | | |
| | MISSION | REV |
| | APOLLO 17 | FNL |
| | DATE | 9/1/72 |
| | SECTION | TRAJECTORY AND GUIDANCE |
| | GROUP | EARTH ORBIT AND TLI |
| | PAGE | 5-3 |
| | | Tape 16.3 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 5-27 | IF SPS FAILS AFTER EPO RETROFIRE IGNITION OR NO SLA SEP: | |
| | A. $H_p > 70$ NM - RETARGET FOR NEXT BEST PTP USING RCS. | |
| | B. $40 < H_p < 70$ - PITCH UP TO LOCAL HORIZONTAL ATTITUDE AND BURN SM RCS USING FOLLOWING PRIORITIES: | |
| | 1. BURN H_p TO PAD VALUE | |
| | 2. BURN MAXIMUM SM RCS ΔV AVAILABLE | |
| | 3. BURN CM RCS TO $H_p = 40$ NM IF SM RCS ΔV NOT SUFFICIENT TO OBTAIN $H_p = 40$ NM. IF $H_p \leq 40$ NM, TERMINATE ALL THRUSTING AT $T_{FF} = 7$ MIN. | |
| | C. $H_p < 40$ NM - REMAIN IN RETRO ATTITUDE AND BURN SM RCS USING THE FOLLOWING PRIORITY: | |
| | 1. BURN ΔV RESIDUALS. | |
| | 2. BURN MAXIMUM SM ΔV AVAILABLE. | |
| | <div style="text-align: center;"><u>NOTE</u> THE S-IVB LOX DUMP CAPABILITY MAY BE USED TO SHAPE THE ORBIT FOR RETROFIRE MANEUVER OR TO REDUCE THE S-IVB WEIGHT TO OBTAIN MORE SM RCS ΔV.</div> | |
| 5-28 | THE G&N IS NO-GO FOR ENTRY IF: | |
| | A. THE CMC VALUE OF DOWNRANGE ERROR (RP- RT) AT .2G DIFFERS $> \pm 100$ NM FROM GROUND VALUE. CREW B. V AND VTY. | |
| | B. V AND GAMMA AT 400K ARE OUTSIDE THE CORRIDOR. GROUND WILL PROVIDE ENTRY PROFILE. | |
| 5-29 | BOOSTER NAVIGATION AND TARGET UPDATES FOR TLI: | |
| | A. AN IU NAVIGATION UPDATE WILL BE PERFORMED (AND TIME TAGGED TO INSURE INCORPORATION OVER A MSFN STATION PRIOR TO TB6 INITIATION) FOR THE FOLLOWING SITUATIONS: | |
| | 1. WHERE AN IU ACCELEROMETER FAIL OCCURRED PRIOR TO EARTH ORBIT INSERTION. | |
| | 2. FOR A FIRST OR SECOND TLI OPPORTUNITY WHERE MSFN VERSUS IU DIFFERENCE VIOLATES ANY OF THE FOLLOWING: | |
| | AT GET = 56 MIN: DOWNRANGE POSITION $\geq 33,101$ FT SEMI-MAJOR ≥ 1.1 NM CROSSRANGE VELOCITY (MAXIMUM) ≥ 9 FPS | |
| | AT GET = 1 HR 45 MIN: DOWNRANGE POSITION $\geq 56,894$ FT SEMI-MAJOR AXIS ≥ 1.21 NM CROSSRANGE VELOCITY (MAXIMUM) ≥ 9 FPS | |
| | B. THERE WILL BE NO IU TARGET UPDATES FOR EITHER TLI OPPORTUNITY. | |
| | | |
| | MISSION | REV |
| | APOLLO 17 | FNL |
| | DATE | 9/1/72 |
| | SECTION | TRAJECTORY AND GUIDANCE |
| | GROUP | EARTH ORBIT AND TLI |
| | PAGE | 5-4 |
| | Tape 11A.2 | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | |
|----|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 5-30 | RESERVED |
| | 5-31 | RESERVED |
| | 5-32 | THE MAXIMUM ALLOWABLE MISALIGNMENT RATES BETWEEN THE IU AND IMU ARE 0.6 DEG/HR (IU) AND 1.5 DEG/HR (IMU). |
| | 5-33 | RESERVED |
| | 5-34 | TLI UNDERBURNS |
| | | A. FOR APOGEE ALTITUDES ABOVE <u>100K</u> NM, A LUNAR LANDING MISSION IS AVAILABLE. THE TRADEOFFS THAT WILL BE MADE TO ACHIEVE THIS MISSION ARE, IN ORDER OF PRIORITY: (ITEMS ARE ADDITIVE) |
| | | 1. PROVIDE ADDITIONAL ΔV FOR MCC BY FOREGOINT ANY NOMINAL CONSTRAINTS ON TEC RETURN INCLINATION. |
| | | 2. EXECUTE MCC 1 AT TLI + 3 HRS |
| | | 3. PROVIDE ADDITIONAL ΔV FOR MCC 1 BY: |
| | | (A) UTILIZE THE LM YAW STEERING BUDGET DURING ASCENT |
| | | (B) GIVE UP LOPC 2 |
| | | (C) ADD 24 HRS TO TEC |
| | | (D) REOPTIMIZE THE DESCENT APPROACH AZ |
| | | 4. EXECUTE MCC 1 AT TLI + 1 HR |
| | | 5. PROVIDE ADDITIONAL ΔV FOR MCC 1 BY: |
| | | (A) REOPTIMIZE TLC (INCREASE DESCENT SEA) |
| | | (B) SCHEDULE TEI SHORTLY AFTER RNDZ |
| | | (C) ADD 24 HRS TO TEC (MAINTAIN MISSION DURATION <300 HRS) |
| | | (D) SHORTEN THE PLANNED LUNAR STAY TIME TO ELIMINATE LOPC 1. |
| | | <p style="text-align: center;"><u>NOTE</u> THE ADDITIONAL CAPABILITY ACHIEVED BY EACH ITEM IS HIGHLY MISSION DEPENDENT.</p> |
| | | B. FOR APOGEE ALTITUDES BETWEEN <u>100K</u> NM AND 28,000 NM, A LUNAR ORBIT ALTERNATE MISSION IS AVAILABLE. THE NOMINAL PLAN FOR THIS MISSION IS: |
| | | 1. EXECUTE MCC 1 ASAP (BETWEEN TLI + 1 AND TLI + 3 HRS) |
| | | 2. EXECUTE A DPS LOI |
| | | 3. EXECUTE ALL REMAINING MANEUVERS (CIRC, LOPC, TEI) WITH THE SPS |
| | | C. FOR APOGEE ALTITUDES BELOW 28,000 NM, AN EARTH ORBIT ALTERNATE MISSION WILL BE PERFORMED. |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| </ | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | SECTION 5 TRAJECTORY AND GUIDANCE - CONTINUED | | | | | |
|------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------|------------------|-------------------------|-----------------|-----------|
| | | <u>MANEUVERS/COAST</u> | | | | | |
| 5-46 | THE CMC OR LGC WILL BE TEMPORARILY NO-GO FOR MANEUVER CONTROL FOR ANY OF THE FOLLOWING: | | | | | | |
| | A. COMPUTER PROGRAM ALARMS: | | | | | | |
| | SINGLE OCCURRENCE - 00205, 00214, 00777, 01107, 01407, 03777, 04777, 07777, 10/77, 13777, 14777 | | | | | | |
| | CONTINUOUS OCCURRENCE - 20430, 20607, 20610, 21204, 21206, 21210, 21302, 21501, 21502, 21521, 31104, 31201, 31202, 31203, 31211 | | | | | | |
| | B. CMC/IMU ALIGNMENT DISCREPANCY (FOR MANEUVER EXECUTION, MONITORING, AND ORBIT DETERMINATION): | | | | | | |
| | 1. SEXTANT STAR CHECK - AUTO OPTICS POSITIONING DOES NOT PLACE SELECTED STAR IN FIELD OF VISION OF SXT. | | | | | | |
| | 2. HORIZON CHECK ERROR >4 DEG FOR RETROFIRE FROM EPO. | | | | | | |
| | C. LGC/IMU ALIGNMENT DISCREPANCY INDICATE BY >2 DEG FROM PREDICTED COAS COORDINATES. | | | | | | |
| | D. DIFFERENCE BETWEEN CMC/LGC GROUND NAV CHECK AFTER A NAV UPDATE FROM GROUND IS: | | | | | | |
| | 1. LATITUDE > 0.02° | | | | | | |
| | 2. LONGITUDE > 0.02° | | | | | | |
| | 3. H > 0.2 NM | | | | | | |
| 5-47 | SPACECRAFT TIMING MUST BE MAINTAINED WITHIN THE FOLLOWING LIMITS: | | | | | | |
| | | <u>CMC (SEC)</u> | <u>LGC (SEC)</u> | <u>AGS (SEC)</u> | | | |
| | A. RETROFIRE | 2 | --- | --- | | | |
| | B. ENTRY | 2 | --- | --- | | | |
| | C. TLI | 2 | --- | --- | | | |
| | D. MCC'S | 2 | --- | --- | | | |
| | E. LOI/DOI/CIRC/LOPC | 2 | 2 | --- | | | |
| | F. TEI | 2 | 2 | --- | | | |
| | G. DESCENT | 0.5 | 0.3 | 0.3 | | | |
| | H. ASCENT | 0.5 | 0.3 | 0.3 | | | |
| | I. RENDEZVOUS | 0.5 | 0.5 | 0.5 | | | |
| | J. SXT TRACKING | 0.5 | --- | --- | | | |
| | RULES 5-48 THROUGH 5-55 ARE RESERVED. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | MANEUVERS COAST | 5-7 |
| | | | | | | | Tape 51.9 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | |
|---|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 5-56 | RESERVED |
| | 5-57 | TRANSLUNAR MCC EXECUTION CRITERIA A. MCC'S 2 AND 4 ARE PREFERRED EXECUTION POINTS. THE FIRST MIDCOURSE WILL BE DELAYED UNTIL MCC2 IF THE COST IS NOT PROHIBITIVE. B. MIDCOURSE CORRECTIONS WILL BE COMPUTED TO UTILIZE THE PREFERRED PROPULSION SYSTEM. THIS MAY INCLUDE NON-FREE RETURN MANEUVERS OFF OF A NOMINAL FREE RETURN TRAJECTORY. |
| | 5-58 | RESERVED |
| | 5-59 | LOI SHALL BE TARGETED WITHIN THESE CONSTRAINTS: A. THE PERICYNTHION OF THE APPROACH HYPERBOLA WILL BE MAINTAINED WITHIN ± 10 NM OF H_p TARGET. B. THE ALTITUDE OF THE NODE (BETWEEN THE APPROACH HYPERBOLA AND THE DESIRED LPO) WILL BE MAINTAINED BETWEEN -10 AND +15 NM OF H_p TARGET. |
| | 5-60 | A "GO" FOR LOI REQUIRES THE FOLLOWING: A. COMMITMENT TO AT LEAST 4 HRS IN LPO (PROVIDES ONE REV OF TRACK AFTER LOI FOR CALCULATION OF TEI). B. ADEQUATE FUEL REMAINING FOR SUBSEQUENT LUNAR ORBIT OPERATIONS (MINIMUM IS TEI AND TEC MCC'S) |

| MISSION | REV | DATE | SECTION | GROUP | PAGE | |
|-----------|-----|--------|-------------------------|-----------------|------|-----------|
| APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | MANEUVERS COAST | 5-8 | Tape 17.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

R ITEM

5-61

PREMATURE LOI SHUTDOWN FOR SPS PROBLEMS (LOI ABORT MODES)

A. SHUTDOWN IN MODE I REGION -

EXECUTE A DPS 2-HR DIRECT ABORT FOR:

LOI BURN TIME FROM 0 TO 0:32

LOI ΔV_M FROM 0 TO 207

EXECUTE A DPS 30-MIN DIRECT ABORT FOR:

LOI BURN TIME FROM 0:32 TO 0:53

LOI ΔV_M FROM 207 TO 3 + 48

EXECUTE A DPS TO DEPLETION 30-MIN DIRECT ABORT FOLLOWED BY A SUPPLEMENTARY APS BURN 2 HRS LATER:

LOI BURN TIME FROM 0:53 TO 1:31

LOI ΔV_M FROM 348 TO 613

B. SHUTDOWN IN MODE II REGION -

EXECUTE A DPS + APS 2-IMPULSE CIRCULUNAR ABORT WITH APS BURN TO SUPPLEMENT DPS BURN TO DEPLETION DURING SECOND IMPULSE (APS BURN IS TWO HOURS AFTER DPS BURN) FOR:

LOI BURN TIME FROM 1:31 TO 2:03

LOI ΔV_M FROM 613 TO 833

EXECUTE A DPS 2-IMPULSE CIRCULUNAR ORBIT:

LOI BURN TIME FROM 2:03 TO 2:54

LOI ΔV_M FROM 833 TO 1200

C. SHUTDOWN IN MODE III REGION -

EXECUTE TEI (SPS OR DPS) AT NEXT OPPORTUNITY OR INITIATE AN ALTERNATE MISSION:

LOI BURN TIME FROM 2:54 TO 6:35

LOI ΔV_M FROM 1200 TO 2980

(FOR APOLLO 17 APS IS REQUIRED TO SUPPLEMENT DPS FOR LOI BURN TIME FROM 4:30 TO 6:35)

NOTES

1. ALL ABORT MANEUVERS ARE MCC-H TARGETED
EXCEPT FOR THE DPS 30-MIN ABORT WHICH IS
TAKEN FROM THE CREW CHART

2. CONTROL LIMITS APPLY AS FOLLOWS:

| <u>LOI BURN TIME</u> | <u>LOI DELTA VM</u> | <u>LIMITS</u> |
|----------------------|---------------------|---------------|
| 0 TO 0:53 | 0 TO 348 | TIGHT |
| 0:53 TO 3:40 | 348 TO 1543 | LOOSE |
| 3:40 TO 6:35 | 1543 TO 2980 | TIGHT |

RULES 5-62 THROUGH 5-75 ARE RESERVED.

MISSION

REV

DATE

SECTION

GROUP

PAGE

APOLLO 17

FNL

9/1/72

TRAJECTORY
AND GUIDANCE

MANEUVERS
COAST

5-9

Tape 17.2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------|------|-----------|-------|------|--|-----------|-----|--------|-------------------------|-------------|------|-----------|
| | | <div>LUNAR ORBIT</div> | | | | | | | | | | | | | | |
| 5-76 | | <p>THE DOI₁ MANEUVER WILL BE TARGETED TO OPTIMIZE THE GROUND TRACK FOR LUNAR LANDING.</p> <p><u>NOTE</u> THE TARGETED H_p IN REV 12 IS 80K FT.</p> | | | | | | | | | | | | | | |
| 5-77 | | <p>A "GO" FOR DOI REQUIRES COMMITMENT TO AT LEAST 4 HRS IN LUNAR ORBIT.</p> <p><u>NOTE</u> THIS PROVIDES ONE FULL REV OF TRACK AFTER DOI FOR CALCULATION OF TEI</p> | | | | | | | | | | | | | | |
| 5-78 | | <p>AFTER AOS FOLLOWING DOI₁, EXECUTION OF THE BAILOUT ABORT MANEUVER WILL BE RECOMMENDED IF INCOMING MSFN RADAR DATA INDICATES A CLOSEST APPROACH ALTITUDE OF EQUAL TO OR LESS THAN 1.0 NM ABOVE THE LUNAR TERRAIN.</p> <p><u>NOTES</u></p> <p>1. THE PERICYNTHION ALTITUDE WHICH CORRESPONDS TO 1.0 NM CLOSEST APPROACH IS <u>3.38 NM</u>.</p> <p>2. THE VALUE OF DOPPLER RESIDUALS AT AOS WHICH CORRESPONDS TO THIS PERICYNTHION IS APPROXIMATELY <u>-106</u> CYCLES PER SEC BUT THE ACTUAL VALUE WILL BE DETERMINED IN REAL TIME.</p> | | | | | | | | | | | | | | |
| 5-79 | | <p>PRIOR TO UNDOCKING, CSM MANEUVERS WILL BE SCHEDULED ASAP TO CORRECT THE FOLLOWING SITUATIONS:</p> <p>A. MISS DISTANCE OVER THE LLS GREATER THAN 0.5 DEG OUT OF PLANE B. DEVIATION IN APPROACH AZIMUTH GREATER THAN ±10 DEG FROM THE NOMINAL C. CURRENT PERICYNTHION ALTITUDE LESS THAN 30,000 FT</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 17</td><td>FNL</td><td>9/1/72</td><td>TRAJECTORY AND GUIDANCE</td><td>LUNAR ORBIT</td><td>5-10</td><td>Tape 57.2</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | LUNAR ORBIT | 5-10 | Tape 57.2 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | LUNAR ORBIT | 5-10 | Tape 57.2 | | | | | | | | | | |

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

TSG 291A

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----|--------|-------------------------|-------------|------|
| 5-85 | <p>A. THE LLS LANDMARK SIGHTINGS WILL BE CONSIDERED ACCEPTABLE IF THE PREMISSION LLS POSITION IS CHANGED BY LESS THAN:</p> <p>$\phi \leq 7,900$ FT (CROSSTRACK LIMIT MAY BE UPDATED IN FLIGHT BASED ON QUALITY OF TRACKING DATA.)</p> <p>$\lambda \leq 3,800$ FT</p> <p>$R \leq 4,350$ FT</p> <p>B. POWERED DESCENT WILL NOT BE SLIPPED TO ACHIEVE AN ACCEPTABLE SET OF LANDMARK SIGHTINGS.</p> | | | | | | |
| 5-86 | <p>ALLOWABLE MISALIGNMENT AT PDI IS 0.6 DEG ABOUT THE Y AXIS. IF THE SECOND P52 ALIGNMENT DETECTS DRIFT RATES INDICATIVE OF GREATER MISALIGNMENT, PDI WILL BE SLIPPED ONE REV IF NEW COMPENSATION CANNOT BE IMMEDIATELY APPLIED.</p> <p>RULES 5-87 THROUGH 5-89 ARE RESERVED.</p> | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | LUNAR ORBIT | 5-12 |

MISSION RULES

| R | | ITEM |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------|
| SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED | | |
| RULES 5-85 THROUGH 5-89 ARE RESERVED. | | |
| 5-90 | | |
| LR DATA IS REQUIRED FOR LANDING. | | |
| A. LOCK-ON | | |
| 1. LR DATA ACCEPTED AND CONVERGED CONTINUOUS TO P64 - <u>CONTINUE MISSION IF LOSS OF LOCK OCCURS IN P64.</u> | | |
| 2. LR DATA ACCEPTED AND CONVERGED WITH SUBSEQUENT DROPOUT - <u>CONTINUE TO P64.</u> | | |
| (A) LANDING RADAR REGAINED IN P64. | | |
| (1) DATA ACCEPTED BY LGC - <u>CONTINUE MISSION</u> | | |
| (2) DATA NOT ACCEPTED BY LGC - <u>ATTEMPT MANUAL LANDING IF LR/PGNS $\Delta H < 1500$ FT</u> | | |
| (B) LANDING RADAR NOT REGAINED AT P64 - <u>ABORT</u> | | |
| 3. LATE LR LOCK-ON WITH DATA BEING INCORPORATED AND CONVERGING - <u>CONTINUE TO P64</u> | | |
| (A) DATA ACCEPTED BY LGC - <u>CONTINUE MISSION</u> | | |
| (B) DATA NOT ACCEPTED BY LGC - <u>ATTEMPT MANUAL LANDING</u> | | |
| B. MINIMUM ALTITUDE WITHOUT LR ALTITUDE INCORPORATION | | |
| 1. PGNS ALTITUDE LESS THAN 22,000 FEET AND PGNS NAVIGATION ERRORS, CONFIRMED BY MSFN OR DOPPLER RESIDUALS, THAT CAUSE AN AGS-PGNS RADIAL VELOCITY DIFFERENCE | | |
| (A) RADIAL N69 NOT INCORPORATED AND DIFFERENCE EXCEEDS 10 FPS - ABORT | | |
| (B) RADIAL N69 INCORPORATED AND DIFFERENCE EXCEEDS 20 FPS - ABORT | | |
| 2. PGNS ALTITUDE LESS THAN 18,000 FEET AND PGNS NAVIGATION ERRORS, CONFIRMED BY DOPPLER BUT NOT BY AGS, CAUSE THE MSFN-PGNS RADIAL VELOCITY DIFFERENCE TO EXCEED -20 FPS - <u>ABORT</u> | | |
| 3. PGNS ALTITUDE LESS THAN 10,000 FT | | |
| (A) RADIAL N69 NOT INCORPORATED - <u>ABORT</u> | | |
| (B) LOSS OF WORKING PGNS (AS DEFINED BY RULE 5-91) - <u>ABORT</u> | | |
| 4. PGNS ALTITUDE LESS THAN 6000 FT - <u>ABORT</u> | | |
| NOTE | | |
| FOR FAILURES IN THE PGNS/LR INTERFACES, INCORPORATION MAY BE SATISFIED BY A PGNS/LR COMPARISON RESULTING IN $\Delta H < 1500$ FT. | | |
| C. MINIMUM ALTITUDE WITHOUT LR VELOCITY INCORPORATION | | |
| 1. PGNS ALTITUDE LESS THAN 10,000 FEET WITH LANDMARK TRACKING OBTAINED AND PGNS NAVIGATION ERRORS CONFIRMED BY AGS OR DOPPLER THAT CAUSE MSFN - PGNS DOWNRANGE OR CROSSRANGE VELOCITY DIFFERENCES | | |
| (A) NAV N69 INCORPORATED AND $\Delta \dot{X}$ EXCEEDS +50 OR -35 FPS OR $\Delta \dot{Y}$ EXCEEDS +90 OR -70 FPS - ABORT | | |
| (B) NAV N69 NOT INCORPORATED AND $\Delta \dot{X}$ EXCEEDS ± 20 FPS OR $\Delta \dot{Y}$ EXCEEDS +45 OR -25 FPS - ABORT | | |
| 2. PGNS ALTITUDE LESS THAN 10,000 FEET WITHOUT LANDMARK TRACKING OBTAINED AND PGNS NAVIGATION ERRORS CONFIRMED BY AGS OR DOPPLER THAT CAUSE MSFN - PGNS DOWNRANGE OR CROSSRANGE VELOCITY DIFFERENCES | | |
| (A) NAV N69 INCORPORATED AND $\Delta \dot{X}$ EXCEEDS ± 35 FPS OR $\Delta \dot{Y}$ EXCEEDS +70 OR -25 FPS - ABORT | | |
| (B) NAV N69 NOT INCORPORATED AND $\Delta \dot{X}$ EXCEEDS ± 15 FPS OR $\Delta \dot{Y}$ EXCEEDS +30 OR -10 FPS - ABORT. | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------|------|-----------|-------|------|--|-----------|-----|--------|----------------------------|-------------|------|-----------|
| | 5-91 | <p>POWERED DESCENT WILL BE TERMINATED FOR THE FOLLOWING:</p> <p>A. PGNS NAVIGATION ERRORS, CONFIRMED BY MSFN OR DOPPLER RESIDUALS, THAT RESULT IN THE FOLLOWING AGS-PGNS DIFFERENCES:</p> <p>$\Delta \dot{X}$ (DOWNRANGE) > +90 OR -35 FPS</p> <p>$\Delta \dot{Y}$ (CROSSRANGE) > ± 90 FPS</p> <p>$\Delta \dot{Z}$ (RADIAL) > +60 OR -35 FPS</p> <p>B. PGNS NAVIGATION ERRORS, CONFIRMED BY DOPPLER RESIDUAL BUT NOT BY AGS, THAT RESULT IN THE FOLLOWING MSFN-PGNS VELOCITY DIFFERENCES:</p> <p>$\Delta \dot{Y}$ (CROSSRANGE) > ± 200 FPS</p> <p>$\Delta \dot{Z}$ (RADIAL) > <u>+45</u> OR -35 FPS</p> <p>C. COMMANDED THRUST INCREASING PRIOR TO THROTTLEDOWN OR P63 T_{G0} = 80 SECONDS</p> <p>D. GTC GREATER THAN 57 PERCENT BY P63/P64 PROGRAM SWITCH PLUS 15 SECONDS</p> <p>E. FAILURE TO ACHIEVE FTP (AUTO OR MANUAL) BY NOMINAL T_{IG} + 31 SECONDS (ABORT AT GTC DIVERGENCE)</p> <p>F. THE FOLLOWING PGNS ALARMS: 20105, 00214, 20430, 20607, 21103, 01107, 21204, 21302, 21501, 00402 (CONTINUING)</p> <p>G. CONSIDERATION WILL BE GIVEN TO ABORTING FOR VIOLATION OF THE TIME BAISED DPS ABORT BOUNDARY.</p> | | | | | | | | | | | | | | |
| | 5-92 | <p>THE DESCENT TARGET POINT WILL BE SHIFTED DOWNTRACK IF GTC INDICATES NO THROTTLEDOWN BY P63/64 PROGRAM SWITCH - THE MAXIMUM SHIFT IS AS FOLLOWS:</p> <p>A. 20,000 FT DOWNTRACK IF VALID LANDMARK SIGHTINGS WERE OBTAINED.</p> <p>B. 10,000 FT DOWNTRACK IF NO VALID LAND</p> <p>C. NO DOWNTRACK SHIFT WILL BE ALLOWED IF THE APPROACH AZIMUTH IS BETWEEN 95 AND 100 DEG</p> <p style="text-align: center;"><u>NOTE</u></p> <p style="text-align: center;">ONE MINUTE OF RCS WILL BE USED TO ALLOW LANDING WITHIN THE ABOVE LIMITS.</p> | | | | | | | | | | | | | | |
| | 5-93 | <p>AN ABORT WILL NOT BE REQUESTED FOR A PGNS FAILURE AFTER PITCHOVER IN THE APPROACH PHASE.</p> | | | | | | | | | | | | | | |
| | 5-94 | <p>IN THE EVENT MSFN AND DOPPLER DATA ARE NOT AVAILABLE FOR CONFIRMATION OF PGNS/AGS ERRORS, POWERED DESCENT WILL BE TERMINATED FOR THE FOLLOWING AGS-PGNS VELOCITY DIFFERENCES:</p> <p>$\Delta \dot{X}$ > -35 FPS</p> <p>$\Delta \dot{Z}$ > +60 FPS OR -35 FPS</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 17</td><td>FNL</td><td>9/1/72</td><td>TRAJECTORY AND GUIDANCE</td><td>LUNAR ORBIT</td><td>5-14</td><td>Tape 52.4</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | LUNAR ORBIT | 5-14 | Tape 52.4 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | LUNAR ORBIT | 5-14 | Tape 52.4 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-------------------------|-------------|------|
| | 5-95 | <p>IN THE EVENT MSFN, DOPPLER, AND AGS NAV DATA ARE NOT AVAILABLE FOR MONITORING OF POWERED DESCENT, AN ABORT WILL BE PERFORMED IF LR DATA IS NOT INCORPORATED INTO THE PGNS BY 7 MIN.</p> <p>RULES 5-96 THROUGH 5-100 ARE RESERVED.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | LUNAR ORBIT | 5-15 |
| | | Tape 52.5 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | | |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----|--------|-------------------------|--------|------|------------|
| | | <div>ASCENT</div> | | | | | | |
| 5-101 | LM LIFTOFF WILL BE DELAYED ONE REVOLUTION RATHER THAN ACCEPTING A SLIP IN NOMINAL LIFTOFF TIME GREATER THAN | | | | | | | |
| | A. 10 SECONDS FOR THE DIRECT RNDZ TECHNIQUE | | | | | | | |
| | B. 90 SECONDS FOR THE COELLIPTIC SEQUENCE RNDZ | | | | | | | |
| 5-102 | FOLLOWING A DESCENT ABORT, GUIDANCE SWITCHOVER TO AGS WILL BE PERFORMED FOR | | | | | | | |
| | A. THE FOLLOWING PGNS ALARMS: 20105, 00214, 20430, 20607, 21103, 01107, 21204, 21302, AND 21501 | | | | | | | |
| | B. PGNS NAVIGATION ERRORS THAT RESULT IN: | | | | | | | |
| | 1. AGS PREDICTED INSERTION H_p < 40,000 FEET. | | | | | | | |
| | 2. AGS PREDICTED INSERTION H_a GREATER THAN TARGET VALUE PLUS 40 NAUTICAL MILES. | | | | | | | |
| | 3. AGS PREDICTED INSERTION WEDGE ANGLE GREATER THAN 1.0 DEGREE. | | | | | | | |
| 5-103 | DURING ASCENT, GUIDANCE SWITCHOVER TO AGS WILL BE PERFORMED FOR | | | | | | | |
| | A. THE FOLLOWING PGNS ALARMS: 20105, 00214, 20430, 20607, 21103, 01107, 21204, 21302, AND 21501 | | | | | | | |
| | B. PGNS NAVIGATION ERRORS, CONFIRMED BY AGS RESIDUALS, THAT RESULT IN THE FOLLOWING MSFN-PGNS VELOCITY DIFFERENCES: | | | | | | | |
| | $\Delta \dot{X}$ (DOWNRANGE) > ± 24 FPS | | | | | | | |
| | $\Delta \dot{Y}$ (CROSSRANGE) > ± 90 FPS (COELLIPTIC SEQUENCE RENDEZVOUS), > ± 45 FPS (DIRECT RENDEZVOUS) | | | | | | | |
| | $\Delta \dot{Z}$ (RADIAL) > ± 37 FPS | | | | | | | |
| | C. PGNS NAVIGATION ERRORS THAT RESULT IN | | | | | | | |
| | 1. AGS PREDICTED INSERTION H_p < 40,000 FEET. | | | | | | | |
| | 2. AGS PREDICTED INSERTION H_a GREATER THAN TARGET VALUE PLUS 40 NAUTICAL MILES. | | | | | | | |
| | 3. AGS PREDICTED INSERTION WEDGE ANGLES GREATER THAN 1.0 DEGREE (COELLIPTIC SEQUENCE RENDEZVOUS), GREATER THAN 0.5 DEG (DIRECT RENDEZVOUS) | | | | | | | |
| | D. IF MSFN NOT VALID DURING ASCENT THE FOLLOWING DOPPLER RESIDUALS WILL BE USED TO CONFIRM SWITCHOVER: | | | | | | | |
| | 1.(A). AGS-PGNS $\Delta \dot{Y}$ (CROSSRANGE) > ± 45 FPS AND DOPPLER-PGNS RESIDUAL > ± 8.0 FPS FOR THE DIRECT RNDZ | | | | | | | |
| | (B). AGS-PGNS $\Delta \dot{Y}$ (CROSSRANGE) > ± 90 FPS AND DOPPLER-PGNS RESIDUAL > ± 16.0 FPS FOR THE COELLIPTIC RNDZ | | | | | | | |
| | 2. AGS-PGNS $\Delta \dot{Z}$ (RADIAL) > ± 37 FPS AND DOPPLER-PGNS RESIDUAL > ± 32.0 FPS | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | ASCENT | 5-16 | Tape 11D.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | |
|---|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 5-104 | <p>DURING ASCENT, THE AGS WILL BE DECLARED NO-GO FOR CONFIRMED AGS NAVIGATION ERRORS THAT RESULT IN</p> <p>A. PGNS PREDICTED INSERTION $H_p < 30,000$ FT.</p> <p>B. PGNS PREDICTED INSERTION H_a GREATER THAN TARGET VALUE PLUS 40 NM</p> <p>C. PGNS PREDICTED INSERTION WEDGE ANGLE GREATER THAN 1.0 DEGREE (COELLIPTIC SEQUENCE RENDEZVOUS), GREATER THAN 0.5 DEG (DIRECT RENDEZVOUS)</p> |
| | 5-105 | <p>THE GROUND WILL NOT REQUEST SWITCHOVER AFTER AGS $T_{60} < 30$ SEC.</p> <p>RULE NUMBERS 5-106 THROUGH 5-110 ARE RESERVED</p> |
| | | |
| | MISSION | REV |
| | APOLLO 17 | FNL |
| | DATE | SECTION |
| | 9/1/72 | TRAJECTORY AND GUIDANCE |
| | GROUP | PAGE |
| | ASCENT | 5-17 |
| | | Tape 18.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | | | |
|---|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------------------|------------------|------|-----------|-------|------|--|--|-----------|-----|--------|-------------------------|------------------|------|-----------|
| | | <div>TRANSEARTH ENTRY</div> | | | | | | | | | | | | | | | | |
| | 5-121 | <p>TRANSEARTH MCC WILL BE TARGETED TO ACHIEVE ENTRY CONDITIONS AS FOLLOWS:</p> <p>A. IF $V_{EI} > 31000$ FPS OR G&N NO-GO, USE STEEP TARGET LINE.</p> <p>B. IF $V_{EI} < 31000$ FPS AND G&N GO, USE SHALLOW TARGET LINE.</p> | | | | | | | | | | | | | | | | |
| | 5-122 | <p>TRANSEARTH MCC PHILOSOPHY</p> <p>A. TEC MCC WILL NOT USE LANDING POINT CONTROL UNLESS THE LANDING POINT IS UNACCEPTABLE.</p> <p>B. IF GAMMA EI IS OUTSIDE THE ENTRY CORRIDOR.</p> <p>1. PRIOR TO GET OF NOMINAL MCC 5 - EXECUTE MCC ASAP IF PREDICTED ΔV AT MCC 5 IS > 20 FPS</p> <p>2. AFTER MCC 5 - EXECUTE MCC ASAP</p> <p>C. MCC GREATER THAN MINIMUM IMPULSE CAPABILITY WILL USE THE SPS IF PRACTICAL.</p> | | | | | | | | | | | | | | | | |
| | 5-123 | <p>TEC MCC FOR LANDING AREA CONTROL</p> <p>A. PRIOR TO EI MINUS 24 HRS - WILL BE EXECUTED FOR RECOVERY ACCESS VIOLATIONS, UNACCEPTABLE WEATHER AT IP, OR IF THERE IS ANY LAND MASS IN THE G&N EMS, OR CONSTANT G LANDING AREAS OR IF A SIGNIFICANT LAND MASS IS IN ANY OTHER PORTION OF THE OPERATIONAL FOOTPRINT.</p> <p>B. AFTER EI MINUS 24 HRS - WILL NOT BE EXECUTED.</p> | | | | | | | | | | | | | | | | |
| | 5-124 | RESERVED | | | | | | | | | | | | | | | | |
| | 5-125 | <p>BACKUP ENTRY IS CONSTRAINED AS FOLLOWS:</p> <p>A. THE CONSTANT G ENTRY MUST FALL BETWEEN 3 AND 5 G'S.</p> <p>B. EMS RANGING WILL NOT BE ATTEMPTED UNTIL V IS LESS THAN 25500 FPS.</p> | | | | | | | | | | | | | | | | |
| | 5-126 | WEATHER AVOIDANCE WITH AERODYNAMIC LIFT WILL NOT BE ATTEMPTED UNLESS THE G&N IS OPERATIONAL, OR EMS-INDICATED VELOCITY IS LESS THAN 25500 FPS. | | | | | | | | | | | | | | | | |
| | 5-127 | <p>PREDICTED ENTRY CORRIDOR VIOLATION AFTER THE LAST MCC OPPORTUNITY</p> <p>A. UNDERSHOOT LINE EXCEED - GROUND ADVISE CREW TO FLY FULL LIFT UNTIL PEAK G IS PASSED, THEN FLY G&N.</p> <p>B. OVERSHOOT LINE EXCEED - GROUND ADVISE CREW TO FLY NEGATIVE LIFT TO 2 G'S FOLLOWED BY 4-G CONSTANT ENTRY.</p> | | | | | | | | | | | | | | | | |
| | | <table><tr><td></td><td>MISSION</td><td>REV</td><td>DATE</td><td>SECTION</td><td>GROUP</td><td>PAGE</td><td></td></tr><tr><td></td><td>APOLLO 17</td><td>FNL</td><td>9/1/72</td><td>TRAJECTORY AND GUIDANCE</td><td>TRANSEARTH ENTRY</td><td>5-20</td><td>Tape 57.5</td></tr></table> | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | TRANSEARTH ENTRY | 5-20 | Tape 57.5 |
| | MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | | |
| | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | TRANSEARTH ENTRY | 5-20 | Tape 57.5 | | | | | | | | | | | |

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

TSG 291

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | | | | | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------|---------------------|---------|-----------|------|--|-----------|-----|--------|----------------------------|---------------------|------|-----------|
| 5-131 | <p>TEI ABORTS AND RESIDUAL TRIMMING PHILOSOPHY</p> <p>A. IN GENERAL, ONCE THE SPS HAS BEEN IGNITED, THE MANEUVER WILL BE COMPLETED WITH THE SPS ENGINE. THIS IMPLIES THAT THERE WILL BE NO MANUAL SHUTDOWNS AND AS MANY RESTARTS AS NECESSARY TO COMPLETE THE TEI MANEUVER. QUANTITIES FOR THE ΔV RULES LISTED BELOW FOR PREMATURE SHUTDOWNS ARE GUIDELINES FOR USE OF RCS PROPELLANT.</p> <ol style="list-style-type: none">1. NO SPS IGNITION - DO NOT ATTEMPT A MANUAL RESTART. SLIP 1 REV AND DO MALFUNCTION PROCEDURES.2. AFTER SPS IGNITION, THERE WILL BE NO MANUAL SPS SHUTDOWN.3. FOR PREMATURE SHUTDOWN:<ol style="list-style-type: none">(A) TEI ΔV REMAINING GREATER THAN THE RCS ΔV CAPABILITY MINUS 20 FPS - RESTART SPS AND COMPLETE THE TARGETED BURN. NO TRIM.(B) TEI ΔV REMAINING LESS THAN THE RCS ΔV CAPABILITY MINUS 20 FPS, BUT GREATER THAN 5 FPS - RCS +X OR SPS MAY BE USED TO COMPLETE THE TARGETED BURN BASED UPON CREW JUDGEMENT. NO TRIM.(C) RESIDUAL LESS THAN 5 FPS - TRIM X AND Z. <p style="text-align: center;"><u>NOTE</u> THIS RULE ALSO APPLIES FOR A DPS TEI WITH NO OPERATIONAL SPS FOR BACKUP.</p> <p>B. PREMATURE DPS TEI SHUTDOWN WITH AN OPERATIONAL SPS AS BACKUP</p> <ol style="list-style-type: none">1. NO DPS IGNITION - SLIP 1 REV AND DO MALFUNCTION PROCEDURES AND RETARGET USING DPS OR SPS.2. FOR A PREMATURE SHUTDOWN IN THE MODE III REGION (ACHIEVED TEI $\Delta V < 1700$ FPS/PRE-ABORT PERIOD LESS THAN 15 HR) - TARGET THE SPS FOR THE NEXT TEI.3. FOR A PREMATURE SHUTDOWN IN THE MODE I REGION (ACHIEVED TEI $\Delta V > 1700$ FPS) - TARGET THE SPS AT TEI +2 HR. <p>RULES 5-132 THROUGH 5-139 ARE RESERVED.</p> | | | | | | | | | | | | | | |
| <table><tr><td>MISSION</td><td>REV</td><td>DATE</td><td>SECTION</td><td>GROUP</td><td>PAGE</td><td></td></tr><tr><td>APOLLO 17</td><td>FNL</td><td>9/1/72</td><td>TRAJECTORY AND GUIDANCE</td><td>TRANSEARTH ENTRY</td><td>5-22</td><td>Tape 18.7</td></tr></table> | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | TRANSEARTH ENTRY | 5-22 | Tape 18.7 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | TRANSEARTH ENTRY | 5-22 | Tape 18.7 | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | | |
|---|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-------------------------|--------------|------|-----------|
| | | <div style="text-align: center;"> <u>RANGE SAFETY RULES AND AGREEMENTS</u> <u>GENERAL</u> </div> | | | | | | |
| | 5-140 | RANGE SAFETY POLICIES AND CRITERIA ARE SPECIFIED IN AFETR MANUAL (AFETRM) 127-1 DATED 1 JANUARY 1969. THE FOLLOWING MISSION RULES CONCERNING SPECIFIC AFETR/NASA INTERFACE SUPPLEMENT AFETRM 127-1. | | | | | | |
| | 5-141 | THE RSO WILL ACCOMPLISH THE PAD EMERGENCY RANGE CUTOFF PROCEDURE IF THE SPACE VEHICLE WILL NOT LIFT OFF AFTER IGNITION AND NASA IS UNABLE TO ACCOMPLISH CUTOFF. THE RSO WILL SEND "ARM/MFCO" ONLY IN RESPONSE TO A CODED VERBAL REQUEST FROM THE NASA LAUNCH VEHICLE TEST CONDUCTOR (CLTC). THE CLTC WILL CALL THE RSO ON THE CLTC-RSO DIRECT LINE TO TRANSMIT THIS REQUEST. THE RSO WILL NOT EXECUTE THIS PROCEDURE IF HE HAS A LIFTOFF INDICATION. | | | | | | |
| | 5-142 | THE FLIGHT DIRECTOR (FD) WILL INITIATE ABORT IN RESPONSE TO A CODED VERBAL REQUEST FROM THE RSO. THIS PROCEDURE WILL BE EXECUTED IF RANGE SAFETY FLIGHT TERMINATION CRITERIA HAVE BEEN VIOLATED AND RSO EFFORTS TO TERMINATE THRUST HAVE FAILED. THE REQUEST FROM RSO TO FD WILL BE TRANSMITTED ON THE FLIGHT DIRECTOR LOOP WITH THE FIDO-RSO PRIVATE LINE AS BACKUP. | | | | | | |
| | 5-143 | THE RSO WILL SEND "ARM/MFCO" IN RESPONSE TO A CODED VERBAL REQUEST FROM THE FLIGHT DIRECTOR (FD) OR THE FLIGHT DYNAMICS OFFICER (FIDO). THIS PROCEDURE WILL BE EXECUTED IF ABORT LIMITS HAVE BEEN EXCEEDED AND ABORT ACTION HAS BEEN UNSUCCESSFUL. THE REQUEST FROM FD/FIDO TO THE RSO WILL BE TRANSMITTED ON THE RSO LOOP (CAPE 111) WITH THE FIDO-RSO PRIVATE LINE AS BACKUP. | | | | | | |
| | 5-144 | THE FD WILL INFORM THE RSO WHEN THE S-IC NO. 3 OR NO. 4 ENGINE HAS SHUT DOWN BY STATING "RSO, NO. 3 OUT" OR "NO. 4 OUT" ON THE RSO LOOP (CAPE 111) AND/OR ACTIVATE THE ENGINE OUT LIGHT ON THE RSO CONSOLE. THE NO. 3 ENGINE OUT LIGHT CIRCUIT FOR FD TO RSO IS HIGHLY DESIRABLE. | | | | | | |
| | 5-145 | IF RANGE SAFETY DESTRUCT LINES ARE VIOLATED, THE RSO WILL SEND "ARM/MFCO" AND NOTIFY THE FD/FIDO. NO SPS THRUSTING WILL BE INITIATED FOLLOWING SUCH RANGE SAFETY ACTION EXCEPT TO PROVIDE CREW SAFETY AS DETERMINED BY THE FD. | | | | | | |
| | 5-146 | IF AN ESTABLISHED IMPACT PREDICTION (IP) POINT IS ON THE CAPE KENNEDY LAND AREA, "DESTRUCT/PD" WILL BE TRANSMITTED. | | | | | | |
| | 5-147 | IF AN ATTEMPT TO TERMINATE THRUST BY "ARM/MFCO" IS UNSUCCESSFUL WHILE THE IP IS ON THE CAPE KENNEDY LAND AREA, "DESTRUCT/PD" WILL BE SENT. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | RANGE SAFETY | 5-23 | Tape 19.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | |
|---|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 5-148 | WHEN THE IP HAS MOVED OFF THE CAPE, FLIGHT TERMINATION ACTION WILL BE LIMITED TO "ARM/MFCO" OR CREW INITIATED ABORT. THE "DESTRUCT/PD" FUNCTION WILL BE SENT ONLY AFTER FD/FIDO CONFIRMATION OF SATISFACTORY SPACECRAFT SEPARATION, AND ONLY IF FUEL DISPERSION IS NECESSARY. |
| | 5-149 | IF AN IP POINT IS ESTABLISHED AND "DESTRUCT/PD" IS DEEMED UNNECESSARY, THE RSO WILL NOTIFY FD/FIDO, "SAFE WILL BE SENT UPON FD/FIDO'S REQUEST, 'RSO SEND SAFE'". |
| | 5-150 | FD/FIDO WILL DECLARE TO THE RSO WHEN THERE IS NO POSSIBILITY OF INSERTING THE SPACECRAFT INTO AN ORBIT, AND THE RSO WILL NOT ALLOW THE AFRICAN GATE TO BE OVERFLOWN. |
| | 5-151 | AN ETR RANGE SAFETY OFFICER (BRSO) IS REQUIRED AT BERMUDA TO MONITOR PRESENT POSITION AND IMPACT PREDICTION CHARTS, TO OBSERVE TELEMETRY DISPLAYS, AND TO TRANSMIT THE RANGE SAFETY FUNCTIONS WHEN COMMANDED TO DO SO BY THE RSO. FOR FLIGHT AZIMUTHS LESS THAN 090 DEGREES, THE BRSO WILL ASSUME PRIMARY RANGE SAFETY RESPONSIBILITY IN THE EVENT OF LOSS OF COMMUNICATIONS BETWEEN THE BRSO AND THE RSO. |
| | 5-152 | SAFING BY THE RSO WILL BE TRANSMITTED AFTER GATE PENETRATION AND FIRST S-IVB CUTOFF WHEN THE FD/FIDO REQUESTS, "RSO SEND SAFE." WHEN SAFING IS CONFIRMED, THE RSO WILL STATE "SAFING CONFIRMED." IN THE EVENT OF LOSS OF COMM WITH FD/FIDO, THE RSO WILL SEND SAFE ONLY IF HE CAN CONFIRM S-IVB CUTOFF. |
| | 5-153 | IF SAFING CANNOT BE CONFIRMED BY THE RSO, ANOTHER SAFING ATTEMPT WILL BE MADE BY THE RSO ON THE FIRST ORBITAL PASS OVER THE CAPE. COORDINATION WILL BE EFFECTED WITH THE SUPERINTENDENT OF RANGE OPERATIONS (SRO) AND FIDO TO ENSURE COMMAND COVERAGE AND TELEMETRY DISPLAY AVAILABILITY. AT THE AGREED TIME, FIDO WILL STATE, "RSO SEND SAFE." UPON CONFIRMATION, THE RSO WILL STATE, "SAFING CONFIRMED". |
| | 5-154 | THE FD/FIDO WILL INFORM THE RSO IMMEDIATELY UPON DETERMINATION OF A SPACECRAFT SEPARATION. THIS NOTIFICATION WILL BE TRANSMITTED ON THE RSO LOOP (CAPE 111) WITH THE FIDO-RSO PRIVATE LINE AS BACKUP. |
| | | MISSION REV DATE SECTION GROUP PAGE |
| | | APOLLO 17 FNL 9/1/72 TRAJECTORY AND GUIDANCE RANGE SAFETY 5-24 |
| | | Tape 19.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----|--------|----------------------------|--------------|------|
| | | <div>TRACKING SOURCES</div> | | | | | |
| 5-155 | AT LEAST TWO (2) VEHICLE POSITION DATA SOURCES ARE MANDATORY TO L/O FOR EACH PHASE OF POWERED FLIGHT PRIOR TO THE AFRICAN GATE TO ENABLE THE RANGE SAFETY OFFICER TO DETERMINE IF THE VEHICLE IS NORMAL OR VIOLATES ESTABLISHED INFLIGHT SAFETY CRITERIA. | | | | | | |
| 5-156 | DATA FROM TWO (2) OF THE FOLLOWING THREE (3) RADARS ARE MANDATORY TO L/O (OTHER HIGHLY DESIRABLE): BERMUDA FPS-16, BERMUDA FPQ-6, AND GRAND TURK TPQ-18. | | | | | | |
| 5-157 | PRESENT POSITION AND IP PLCTS AT BERMUDA (BDA) USING INPUTS FROM EITHER THE BDA FPS-16 OR BDA FPQ-6 RADAR ARE HIGHLY DESIRABLE FOR LAUNCH. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | RANGE SAFETY | 5-25 |
| | | Tape 19.3 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----|--------|-------------------------|--------------|------|
| | | <div>AIRBORNE SYSTEMS</div> | | | | | |
| 5-158 | TWO (2) OPERATIONAL RANGE SAFETY COMMAND RECEIVERS ON EACH LAUNCH VEHICLE STAGE (S-IC, S-II, AND S-IVB) ARE MANDATORY TO L/O. THE RANGE SAFETY SUPERVISOR (CRSS) AT THE LAUNCH CONTROL CENTER WILL DETERMINE IF THE RECEIVERS ARE OPERATING PROPERLY. | | | | | | |
| 5-159 | IU C-BAND BEACON NO. 1 OR NO. 2 IS HIGHLY DESIRABLE FOR LAUNCH. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | RANGE SAFETY | 5-26 |
| | | Tape 19.4 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | |
|---|-------|----------------------------------------------------------------------------------------------------------------------|-----|--------|-------------------------|--------------|------|
| | | <u>COMMAND/CONTROL</u> | | | | | |
| | 5-160 | NASA BERMUDA DRS COMMAND/CONTROL CAPABILITY IS MANDATORY TO L/O FOR FLIGHT AZIMUTHS LESS THAN 90 DEGREES. | | | | | |
| | 5-161 | A 4-SECOND TIME DELAY BETWEEN "ARM/MFCC" AND "DESTRUCT/PD" WILL BE PROVIDED BY TIMERS IN THE RSO CONSOLE IN THE RCC. | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | RANGE SAFETY | 5-27 |

MISSION RULES

| R | ITEM | | | | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------|--------------|------|-----------|-------|------|--|-----------|-----|--------|-------------------------|--------------|------|-----------|
| | | <u>COMMUNICATIONS</u> | | | | | | | | | | | | | | |
| 5-162 | ONE (1) OF TWO (2) PRIVATE, INDEPENDENT, GEOGRAPHICALLY DIVERSIFIED COMMUNICATIONS LINKS BETWEEN THE RSO AND BRSO IS MANDATORY AND THE OTHER IS HIGHLY DESIRABLE. | | | | | | | | | | | | | | | |
| 5-163 | ONE (1) OF THE FOLLOWING THREE (3) COMMUNICATIONS LINKS IS MANDATORY BETWEEN THE RSO AND FD/FIDO AND THE OTHERS ARE HIGHLY DESIRABLE. A. RSO LOOP (CAPE 111) B. RSO PRIVATE LINE C. FLIGHT DIRECTOR LOOP | | | | | | | | | | | | | | | |
| 5-164 | A COMMUNICATIONS LINK BETWEEN THE RSO AND THE RANGE SAFETY SUPERVISOR (CRSS) AT THE LAUNCH CONTROL CENTER IS MANDATORY FOR T-40 MINUTE DESTRUCT CHECKS. | | | | | | | | | | | | | | | |
| 5-165 | A DIRECT LINE COMMUNICATIONS LINK BETWEEN THE RSO AND THE LAUNCH VEHICLE TEST CONDUCTOR (CLTC) IS HIGHLY DESIRABLE. | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>MISSION</th><th>REV</th><th>DATE</th><th>SECTION</th><th>GROUP</th><th>PAGE</th><th></th></tr> </thead> <tbody> <tr> <td>APOLLO 17</td><td>FNL</td><td>9/1/72</td><td>TRAJECTORY AND GUIDANCE</td><td>RANGE SAFETY</td><td>5-28</td><td>Tape 19.6</td></tr> </tbody> </table> | | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | RANGE SAFETY | 5-28 | Tape 19.6 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | RANGE SAFETY | 5-28 | Tape 19.6 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONTINUED

| R | ITEM | | | | | | |
|---|-------|-----------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------------------|--------------|-----------|
| | | <u>TELEMETRY</u> | | | | | |
| | 5-166 | IU TELEMETRY DATA (ONBOARD GUIDANCE PARAMETERS) TO THE RTCS ARE HIGHLY DESIRABLE UNTIL S-IVB CUTOFF FOR IP COMPUTATION AND RSO DISPLAY. | | | | | |
| | 5-167 | TELEMETRY REQUIREMENTS TO BE DISPLAYED FOR THE RSO AND THE BRSO ARE HIGHLY DESIRABLE. | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | RANGE SAFETY | 5-29 |
| | | | | | | | Tape 19.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 - TRAJECTORY AND GUIDANCE - CONCLUDED

| R | ITEM | | | | | | |
|-------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-------------------------|--------------|------|
| | | <u>RANGE SAFETY WEATHER RESTRICTIONS</u> | | | | | |
| 5-168 | WIND RESTRICTIONS | AN ANNUAL PROFILE WIND RESTRICTION OF 1.25 SIGMA (11 PERCENT) WILL BE IN EFFECT FOR LAUNCH. | | | | | |
| 5-169 | CEILING AND VISIBILITY RESTRICTIONS | NO CEILING OR VISIBILITY RESTRICTIONS WILL BE IMPOSED PROVIDING CNV FPS-16 AND MILA TPQ-18 RADARS AND BEACON NO. 1 ARE OPERATIONAL. | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | TRAJECTORY AND GUIDANCE | RANGE SAFETY | 5-30 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TB1 THROUGH TB4/TB4A

| R | ITEM | SUMMARY OF LAUNCH PHASE RULES | | | | | |
|------|-----------------------------------------------------------|---------------------------------------------------------|-----|--------|----------------------------|-------|------|
| 6-1 | S-IC LOSS OF THRUST | | | | | | |
| 6-2 | LOSS OF ATTITUDE CONTROL | | | | | | |
| 6-3 | INERTIAL PLATFORM FAILURE - ACCELEROMETER | | | | | | |
| 6-4 | SLV INERTIAL PLATFORM FAILURE | | | | | | |
| 6-5 | S-IVB CRYO REPRESS VALVES FAIL OPEN | | | | | | |
| 6-6 | EXCESSIVE ATTITUDE ERROR IN PITCH OR YAW DURING S-II BURN | | | | | | |
| 6-7 | S-II LOSS OF THRUST | | | | | | |
| 6-8 | S-II GIMBAL SYSTEM FAILURE | | | | | | |
| 6-9 | S-II SECOND PLANE SEPARATION FAILS | | | | | | |
| 6-10 | S-IVB LOSS OF HYDRAULIC FLUID | | | | | | |
| 6-11 | S-IVB LOSS OF THRUST | | | | | | |
| 6-12 | S-IVB COLD HELIUM SHUTOFF VALVE(S) FAIL OPEN | | | | | | |
| | | THE FOLLOWING MISSION RULES ALSO APPLY TO THIS SECTION: | | | | | |
| | | NONE | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB1 THRU TB4/TB4A | | 6-1 |
| | | Tape 53.4 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TB1 THROUGH TB4/TB4A - CONTINUED

| R | ITEM | | | | | | | | | | | | | | |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------|-------|---------|------------|------|--|-----------|-----|--------|----------------------------|--|-----|------------|
| | <p>A. BSE GENERALIZED SWITCH SELECTOR COMMAND CAPABILITY EXISTS:</p> <p>1. WHEN CREW ENABLES IU COMMAND SYSTEM (EXCEPT AS NOTED BELOW IN ITEM D)</p> <p>2. AFTER TB7 + 20 MIN</p> <p>3. AFTER SPACECRAFT SEPARATION</p> <p>B. BSE MANEUVER UPDATE AND INHIBIT CAPABILITY EXISTS FOR TB7 MANEUVERS ONLY.</p> <p>C. BSE HAS NAVIGATION UPDATE CAPABILITY (FMR 6-3) AND TARGET UPDATE CAPABILITY (NO REQUIREMENT).</p> <p>D. BSE HAS NO COMMAND CAPABILITY DURING POWERED BURN PHASES.</p> <p>E. A SAFE DISTANCE BETWEEN THE SPACECRAFT AND S-IVB/IU IS DEFINED AS 7000 FT.</p> <p>F. BSE WILL RECOMMEND NO S-IVB RESTART FOR ANY CONFIRMED CONDITION/MALFUNCTION IN THE LAUNCH VEHICLE WHICH RESULTS IN:</p> <p>1. A CATASTROPHIC HAZARD</p> <p>2. ACHIEVEMENT OF AN S-IVB ENGINE MAINSTAGE BURN WITH EXPECTED CUTOFF OR SHUTDOWN CONDITIONS DEFINITELY PRECLUDING AN ACCEPTABLE LUNAR MISSION. IN APPLYING THIS CRITERIA TO SPECIFIC MISSION RULES, A GO/NO GO RECOMMENDATION WILL BE REQUIRED IF INSUFFICIENT S-IVB CONSUMABLES OR PROPULSION PERFORMANCE IS AVAILABLE TO ASSURE ANY FINITE PROBABILITY OF ACHIEVING A CUTOFF ORBIT WITH 28K NM APOGEE ALTITUDE (FMR 7-1).</p> <p>G. IN THE EVENT OF NO S-IVB IGNITION AT RESTART OR AN EARLY S-IVB SECOND BURN CUTOFF, THE SPACECRAFT SHOULD REMAIN ATTACHED TO THE S-IVB/IU AND MONITOR LH₂ AND LOX ULLAGE PRESSURES UNTIL THE STAGE STATUS CAN BE ASSESSED BY GROUND. IF EMERGENCY SEPARATION IS REQUIRED IMMEDIATELY AFTER S-IVB CUTOFF, THE SPACECRAFT SHOULD IMMEDIATELY GO TO A SAFE DISTANCE (7000 FT) FROM THE S-IVB/IU.</p> <p>H. ABORT OR SPACECRAFT SEPARATION DURING LAUNCH PHASE WILL BE RECOMMENDED FOR THE FOLLOWING:</p> <p>6-1 S-IC LOSS OF THRUST</p> <p>6-5 S-IVB LOX CRYO REPRESS VALVE(S) FAIL OPEN</p> <p>6-6 EXCESSIVE ATTITUDE ERRORS IN PITCH OR YAW DURING S-II BURN</p> <p>**6-7 S-II LOSS OF THRUST</p> <p>**6-8 S-II ANY SINGLE ACTUATOR HARDOVER INBOARD</p> <p>6-9 S-II SECOND PLANE SEPARATION FAILS TO OCCUR AT TB3 + 31 SEC</p> <p>6-10 S-IVB LOSS OF ENGINE HYDRAULIC FLUID PRIOR TO FIRST S-IVB BURN</p> <p>6-11 S-IVB STAGE LOSS OF THRUST</p> <p>6-12 S-IVB COLD HELIUM SHUTOFF VALVE(S) FAILS OPEN</p> <p>I. SPACECRAFT GUIDANCE TAKEOVER WILL BE RECOMMENDED FOR THE FOLLOWING:</p> <p>6-4 LAUNCH VEHICLE INERTIAL PLATFORM FAILURE-ATTITUDE REFERENCE</p> <p>7-8 LOSS OF ATTITUDE CONTROL DURING TB5, TB7</p> <p>J. S-II/S-IVB EARLY STAGING WILL BE RECOMMENDED FOR THE FOLLOWING:</p> <p>6-5 S-IVB LOX CRYO REPRESS VALVE(S) FAIL OPEN</p> <p>**6-6 EXCESSIVE ATTITUDE ERROR IN PITCH OR YAW DURING S-II BURN</p> <p>**6-7 S-II LOSS OF THRUST</p> <p>**6-8 S-II ANY SINGLE ACTUATOR HARDOVER INBOARD</p> <p>**6-12 S-IVB COLD HELIUM SHUTOFF VALV(S) FAILS OPEN</p> <p>** TIME DEPENDENT</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 17</td><td>FNL</td><td>9/1/72</td><td>SLV - TB1 THRU TB4/TB4A</td><td></td><td>6-2</td><td>Tape 11A.8</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | SLV - TB1 THRU TB4/TB4A | | 6-2 | Tape 11A.8 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | SLV - TB1 THRU TB4/TB4A | | 6-2 | Tape 11A.8 | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TB1 THROUGH TB4/TB4A - CONTINUED

| R | ITEM | | | | | | |
|---|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------------------|-------|------|
| | | <p>K. TLI INHIBIT PRIOR TO RESTART OR SPACECRAFT SEPARATION WILL BE RECOMMENDED FOR THE FOLLOWING:</p> <p>7-1 INSUFFICIENT PROPELLANTS REMAIN FOR ACHIEVEMENT OF ACCEPTABLE ALTERNATE MISSIONS.</p> <p>7-5 FAILURE OF RANGE SAFETY SYSTEM AFTER INSERTION</p> <p>7-8 LOSS OF ATTITUDE CONTROL</p> <p>7-22 S-IVB CONFIRMED LOSS OF HYDRAULIC FLUID</p> <p>8-6 S-IVB ACTUATOR CONFIRMED HARDOVER PRIOR TO IGNITION</p> <p>8-8 LOSS OF ATTITUDE CONTROL DURING S-IVB SECOND BURN</p> <p>L. SPACECRAFT SEPARATION OR TLI INHIBIT WILL BE RECOMMENDED UNLESS COMMAND ACTION IS SUCCESSFUL FOR THE FOLLOWING:</p> <p>7-4 J-2 ENGINE MAIN OXIDIZER VALVE FAILS TO CLOSE AT FIRST S-IVB CUTOFF</p> <p>*7-6 S-IVB COLD HELIUM SHUTOFF VALVES FAIL TO CLOSE</p> <p>7-12 J-2 ENGINE MAIN FUEL VALVE OR MAIN OXIDIZER VALVE LEAKAGE</p> <p>*7-14 S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS +36 OR -26 PSID</p> <p>7-20 J-2 ENGINE START BOTTLE PRESSURE OUTSIDE RESTART LIMITS</p> <p>*EMERGENCY SEPARATION REQUIRED</p> <p>M. BSE WILL INHIBIT TB6 IN THE EVENT A TLI NO-GO DECISION IS MADE IN TB5.</p> <p>N. THERE MUST BE AT LEAST AN 80 MIN COAST PERIOD BETWEEN S-IVB FIRST AND SECOND BURNS.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB1 THRU TB4/TB4A | | 6-3 |

Tape 20.3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TB1 THROUGH TB4/TB4A - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|---|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------|
| | 6-1 | S-IC STAGE LOSS OF THRUST A. ANY SINGLE ENGINE PRIOR TO TB3 B. ANY TWO OR MORE ENGINES PRIOR TO DEACTIVATION OF ENGINE AUTO ABORT C. LOSS OF TWO ADJACENT CONTROL ENGINES AFTER DEACTIVATION OF AUTO ABORT AND BEFORE TB2 + 8 SEC D. LOSS OF TWO ADJACENT CONTROL ENGINES AFTER TB2 + 8 SEC E. LOSS OF THRUST - ENGINE 3 OR 4 (THIS RULE APPLIES ONLY FOR THE UNIQUE CASE OF ENGINE 3 OR 4 THRUST LOSS BETWEEN 0 TO 45 SEC) 1. VOICE COMM WITH RSO 2. NO VOICE COMM WITH RSO | LAUNCH | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TB1 THROUGH TB4/TB4A - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | CUES/NOTES/COMMENTS | | |
|---|------|------------------------------------------------------------|--------|-----------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------|
| | 6-2 | LOSS OF ATTITUDE CONTROL | | | | <u>CUES</u> | | |
| | | A. PRIOR TO DEACTIVATION OF EDS AUTO ABORT | LAUNCH | A. <u>ABORT</u> | BSE TRANSMIT ABORT REQUEST | A.1. ANGULAR RATES - PITCH (R4-602) OR YAW (R5-602) GREATER THAN 2 DEG/SEC AND NOT DECREASING. ROLL (R6-602) GREATER THAN 5 DEG/SEC AND NOT DECREASING. | | |
| | | | | | | 2. ANGULAR RATES - PITCH (R13-602) OR YAW (R8-602) GREATER THAN 2 DEG/SEC AND NOT DECREASING. ROLL (R12-602) GREATER THAN 5 DEG/SEC AND NOT DECREASING (SEE NOTE A.2.) | | |
| | | | | | | 3. LOSS OF ATTITUDE CONTROL ALERT (SEE NOTE A.2.) | | |
| | | | | | | <u>NOTES</u> | | |
| | | | | | | A.1. THESE CUES ARE VALID IF RATE CHANNEL SWITCHOVER HAS NOT OCCURRED. | | |
| | | B. BETWEEN DEACTIVATION OF EDS AUTO ABORT AND TB5 INITIATE | LAUNCH | B. <u>ABORT</u> | BSE TRANSMIT ABORT REQUEST | <u>CUES</u> | | |
| | | | | | | B.1. ANGULAR RATES - PITCH (R4-602), YAW (R5-602), GREATER THAN OR EQUAL TO 10 DEG/SEC, ROLL (R34-602) GREATER THAN OR EQUAL TO 20 DEG/SEC. | | |
| | | | | | | 2. ANGULAR RATES - PITCH (R13-602), YAW (R8-602), GREATER THAN OR EQUAL TO 10 DEG/SEC. | | |
| | | | | | | 3. EDS OVERRATE - PITCH OR YAW (K84-602), ROLL (K83-602). | | |
| | | | | | | <u>NOTES</u> | | |
| | | | | | | B.1. R13-602 AND R8-602 ARE VALID IF RATE CHANNEL SWITCHOVER HAS NOT OCCURRED. | | |
| | | | | | | 2. LOSS OF ATTITUDE CONTROL ALERT WILL BE GIVEN FOR THE FOLLOWING CONDITIONS: | | |
| | | | | | | (A) LVDC/LVDA COMPUTATIONAL FAILURE. | | |
| | | | | | | (B) ATTITUDE ERROR SIGNALS: TB1 + 120 SEC THRU S-II BURN - PITCH, YAW, ROLL, 5 DEG. S-IVB BURN - PITCH AND YAW, 5 DEG; ROLL, 3.5 DEG. | | |
| | | | | | | (C) FAILURE TO INITIATE PROPER GUIDANCE SEQUENCE | | |
| | | | | | | (D) S-IVB ENGINE ACTUATOR HARDOVER GREATER THAN ±5 DEG (S-II BURN ONLY) | | |
| | | | | | | (E) FAILURE OF S-IVB ENGINE HYDRAULICS (S-IVB BURN ONLY) | | |
| | | | | | | 3. ROLL ATTITUDE ERRORS >3.5 DEG. DURING S-IVB BURN MAY BE A RESULT OF LOSS OF BOTH APS MODULES. THE CREW SHOULD ATTEMPT TO CONTROL ROLL WITH RCS. | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB1 THRU TB4/TB4A | | 6-5 | Tape 54.5 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TB1 THROUGH TB4/TB4A - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|---------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|------------|
| | 6-3 | INERTIAL PLATFORM FAILURE - ACCELEROMETER (ONE OR MORE AXIS) | LAUNCH COAST RESTART | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT, FIDO, AND GUIDO CAPCOM ADVISE CREW | <u>CUES</u> 1. GUIDANCE STATUS WORD (MODE CODE 24) (H60-603) BITS D26 AND D25 FOR Z ACCEL SET TO "ONE" BITS D24 AND D23 FOR X ACCEL SET TO "ONE" BITS D22 AND D21 FOR Y ACCEL SET TO "ONE" 2. ACCELEROMETER PICKOFFS (X, Y, OR Z) INDICATE IN EXCESS OF 3 DEG AND NOT DECREASING (H10-603, H11-603, H12-603) <u>NOTES</u> 1. NO EFFECT ON VEHICLE TRAJECTORY DURING S-IC STAGE BURN. 2. LVDC SWITCHES TO A BACKUP MODE AND UTILIZES A PRECOMPUTED F/M PROFILE FOR FAILED AXIS DURING THE S-IC, S-II, AND S-IVB BURNS. THE IU STATE VECTOR THEREAFTER MAY NOT REFLECT THE ACTUAL FLIGHT TRAJECTORY. 3. A NAVIGATION UPDATE WILL BE REQUIRED UNLESS REAL-TIME ANALYSIS INDICATES A NAVIGATION UPDATE IS NOT REQUIRED (SEE FMR 5-29). 4. CREW WILL INITIATE MANUAL CUTOFF FOR AN OVERSPEED CONDITION. 5. THE SECOND BURN PRECOMPUTED F/M PROFILE FOR THE FAILED AXIS ASSUMES NOMINAL PROPULSION PERFORMANCE AND NOMINAL MASS HISTORY. | | | |
| | 6-4 | LAUNCH VEHICLE INERTIAL PLATFORM FAILURE - ATTITUDE REFERENCE | ALL | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND RECOMMEND SPACECRAFT GUIDANCE TAKEOVER | <u>CUES</u> 1. GUIDANCE REFERENCE FAILURE (D04 OR D06) GUID MODE WORD 2 (MODE WORD 26) BIT 8 SET TO ONE (H60-603) 2. GUIDANCE STATUS WORD (MODE CODE 24) (H60-603) BITS D20 AND D19 FOR Z GIMBAL SET TO "ONE" BITS D18 AND D17 FOR X GIMBAL SET TO "ONE" BITS D16 AND D15 FOR Y GIMBAL SET TO "ONE" 3. LADDER OUTPUTS CONSTANT FOR FAILED AXES (H54-603, H55-603, H56-603) 4. ATTITUDE ERROR CONSTANT FOR FAILED AXES (H69-602, H70-602, H71-602) <u>NOTES</u> IN THE EVENT OF THIS FAILURE PRIOR TO TB6, THE CREW WILL HAVE TO INITIATE TB6, AND TLI C/O WILL BE ISSUED BY CMC. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB1 THRU TB4/TB4A | | 6-6 | Tape 11B.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TB1 THROUGH TB4/TB4A - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 6-6 | EXCESSIVE ATTITUDE ERROR IN PITCH OR YAW DURING S-II BURN A. PRIOR TO S-IVB TO COI CAPABILITY B. BETWEEN S-IVB TO COI AND S-II CUTOFF | LAUNCH | ABORT/EARLY STAGE A. <u>ABORT</u> BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST B. <u>EARLY STAGE</u> BSE INFORM FLIGHT AND FIDO AND RECOMMEND EARLY STAGING | <u>CUES</u> 1. GUIDANCE CHI MINUS THETA GIMBAL ANGLE (H60-603) GREATER THAN 85 DEG PITCH, 45 DEG YAW AND DIVERGING. 2. ACTUATORS NOT RESPONDING (G8-201 THRU 204, G9-201 THRU 204, G30-201 THRU 204, G31-201 THRU 204). 3. VERIFIED TRAJECTORY DEVIATION. <u>NOTE</u> THIS RULE DOES NOT APPLY FOR OTHER IDENTIFIED LAUNCH VEHICLE MALFUNCTIONS. SEE FMR 6-2, 6-3, 6-4, 6-7. | | | |
| | 6-7 | S-II LOSS OF THRUST A. ANY SINGLE ENGINE FAILURE TO ATTAIN THRUST OR LOSS OF THRUST PRIOR TO NOMINAL S-II CUTOFF B. ANY TWO ENGINES FAILURE TO ATTAIN THRUST OR LOSS OF THRUST C. THREE OR MORE ENGINES OUT 1. PRIOR TO S-IVB TO COI CAPABILITY 2. AFTER S-IVB TO COI CAPABILITY BUT PRIOR TO LOW LEVEL SENSE ARM 3. AFTER LOW LEVEL SENSE ARM (A) 3 CONTROL ENGINES OUT (B) ALL ENGINES OUT | LAUNCH | A. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND FIDO. B. <u>CONTINUE MISSION</u> CREW WILL ABORT ON ONBOARD LIMITS. C. <u>ABORT/EARLY STAGE/CONTINUE MISSION</u> 1. <u>ABORT</u> BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST. 2. <u>EARLY STAGE</u> BSE INFORM FLIGHT AND RECOMMEND EARLY STAGING 3. <u>EARLY STAGE/CONTINUE MISSION</u> (A) <u>EARLY STAGE</u> BSE INFORM FLIGHT AND RECOMMEND EARLY STAGE (B) <u>CONTINUE MISSION</u> BSE INFORM FLIGHT | <u>CUES</u> A.1. THRUST OK SWITCHES-OFF (K231-201 THRU 205, K232-201 THRU 205). 2. THRUST CHAMBER PRESSURE- ZERO (D13-201 THRU 205). 3. LONGITUDINAL ACCELERATION (A2-603). B.1. THRUST OK SWITCHES OFF (K231-201 THRU 205, K232-201 THRU 205) 2. THRUST CHAMBER PRESSURE ZERO (D13-201 THRU 205) 3. LONGITUDINAL ACCELERATION (A2-603) C.1. THRUST OK SWITCHES OFF (K231-201 THRU 205, K232-201 THRU 205) 2. THRUST CHAMBER PRESSURE ZERO (D13-201 THRU 205) 3. LONGITUDINAL ACCELERATION (A2-603) C. <u>NOTE</u> AFTER PROGRAMED S-II CENTER ENGINE CUTOFF, ENGINES OUT REFERS ONLY TO CONTROL ENGINES. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB1 THRU TB4/TB4A | | 6-8 | Tape 21.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TB1 THROUGH TB4/TB4A - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 6-8 | S-II STAGE ANY SINGLE ACTUATOR HARDOVER INBOARD A. PRIOR TO S-IVB TO COI CAPABILITY B. BETWEEN S-IVB TO COI CAPABILITY AND 30 SEC PRIOR TO S-II CUTOFF C. AFTER S-II CUTOFF MINUS 30 SEC | LAUNCH | ABORT/EARLY STAGE/CONTINUE MISSION A. <u>ABORT</u> BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST B. <u>EARLY STAGE</u> BSE INFORM FLIGHT AND RECOMMEND EARLY STAGING C. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT | <u>CUES</u> 1. YAW ACTUATOR POSITION EXCEEDS +6 DEG (G8-201 THRU 204, G30-201 THRU 204) 2. PITCH ACTUATOR POSITION EXCEEDS +6 DEG (G9-201 THRU 204, G31-201 THRU 204) 3. ADJACENT CONTROL ENGINE ACTUATOR IN SAME PLANE MOVES 4-1/2 DEG INBOARD (SAME MEASUREMENTS AS CUES 1 AND 2) <u>NOTES</u> THE CREW SHOULD ABORT OR EARLY STAGE AS SOON AS POSSIBLE AFTER MALFUNCTION OCCURS TO PRECLUDE EXCESSIVE THERMAL PROBLEM IN AFT INTERSTAGE. | | | |
| | 6-9 | S-II SECOND PLANE SEPARATION FAILS TO OCCUR AT TB3 + 31.7 SEC | LAUNCH | <u>ABORT</u> BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST. CREW ABORT PRIOR TO TB3 + 1 MIN 45 SEC. | <u>CUES</u> 1. SECOND PLANE SEPARATION INDICATION SHOWS NO SEPARATION (M86-206, M87-206) 2. GUIDANCE MODE WORD 1 MODE CODE 25 BIT D15 REMAINS ZERO (H60-603). 3. IGNITION BUS VOLTAGE REMAINS AT APPROXIMATELY 28 VOLTS (M125-207). 4. RECIRCULATION BUS VOLTAGE REMAINS AT APPROXIMATELY 56 VOLTS (M111-207). <u>NOTES</u> THE CREW SHOULD ABORT AS SOON AS POSSIBLE AFTER MALFUNCTION OCCURS TO PRECLUDE EXCESSIVE THERMAL PROBLEMS IN AFT INTERSTAGE. | | | |
| | 6-10 | S-IVB LOSS OF HYDRAULIC FLUID PRIOR TO FIRST S-IVB BURN | LAUNCH | <u>ABORT</u> BSE INFORM FLIGHT AND FIDO AND RECOMMEND NO S-IVB START. BSE TRANSMIT ABORT REQUEST AT S-II CUTOFF. | <u>CUES</u> 1. HYDRAULIC RESERVOIR OIL LEVEL APPROX ZERO PERCENT (L7-403). 2. HYDRAULIC SYSTEM PRESSURE LESS THAN 1700 PSIA (D41-403). 3. HYDRAULIC RESERVOIR PRESSURE APPROX ZERO PSIA (D42-403). <u>NOTES</u> 1. IF L7-403 IS FUNCTIONING PROPERLY, IT IS REQUIRED FOR IMPLEMENTATION OF THIS RULE. 2. SPACECRAFT SHOULD HAVE COI CAPABILITY AT S-II CUTOFF 3. AT S-II CUTOFF, THE CREW SHOULD INHIBIT THE S-IVB START WITH THE TRANSLATION HANDCONTROLLER. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB1 THRU TB4/TB4A | | 6-9 | Tape 54.8 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TB1 THROUGH TB4/TB4A - CONCLUDED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 6-11 | S-IVB STAGE LOSS OF THRUST A. FAILS TO ATTAIN THRUST OR PREMATURE SHUTDOWN PRIOR TO OBTAINING PARKING ORBIT B. SHUTDOWN PRIOR TO ACHIEVING MINIMUM REQUIRED APOGEE ALTITUDE AND ENTRY INTO TB7 FOR REASONS OTHER THAN A PROPELLANT DEPLETION | LAUNCH TLI | A. <u>ABORT</u> BSE TRANSMIT ABORT REQUEST. B. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND COMMAND TO EARTH ORBITAL CONFIGURATION THE SPACECRAFT SHOULD REMAIN ATTACHED TO THE S-IVB/IU AND MONITOR LH2 AND LOX TANK ULLAGE PRESSURES. IF SEPARATION IS REQUIRED, THE SPACECRAFT SHOULD IMMEDIATELY GO TO A SAFE DISTANCE (7000 FT) FROM THE S-IVB/IU. | <u>CUES</u> 1. THRUST CHAMBER PRESSURE - ZERO (D1-401). 2. THRUST OK SWITCHES - OFF (K14-401, K157-401). 3. LONGITUDINAL ACCELERATION - ZERO (A2-603). 4. TB5 IS INITIATED. GUID MODE WORD 1 (MODE CODE 25); BIT D2 SET TO ONE (H60-603). 5. TB7 IS INITIATED. GUID MODE WORD 2 (MODE CODE 26); BIT D20 SET TO ONE (H60-603). <u>NOTES</u> 1. SEPARATION WILL BE REQUIRED FOR VIOLATION OF FMR 7-6 OR FMR 7-14. 2. FOR A FAILURE OF THE S-IVB TO RESTART, THE ONBOARD PROGRAM WILL RECYCLE TO TB5 THROUGH TB6C FOR A SECOND RESTART OPPORTUNITY. | | | |
| | 6-12 | S-IVB COLD HELIUM SHUTOFF VALVES FAIL OPEN A. PRIOR TO S-II ENGINE START. B. BETWEEN S-II ENGINE START AND 30 SEC PRIOR TO S-II CUTOFF C. AFTER S-II CUTOFF MINUS 30 SEC | LAUNCH | A. <u>ABORT</u> BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST B. <u>EARLY STAGE</u> BSE INFORM FLIGHT AND RECOMMEND EARLY STAGING IMMEDIATELY. IF PRIOR TO TOWER JETTISON, THE CREW SHOULD HOLD THE TOWER UNTIL AFTER S-IVB START C. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT | <u>CUES</u> 1. COLD HELIUM REG DISCHARGE PRESSURE REMAINS GREATER THAN 200 PSIA (D105-403) 2. LOX ULLAGE PRESSURE AT RELIEF SETTING (41-44 PSIA) AND RELIEVING (D179-406, D180-406) 3. COLD HELIUM BOTTLE PRESSURE DECAYING (D261-403, D263-403). | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB1 THRU TB4/TB-A | | 6-10 | Tape 54.9 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

| R | ITEM | | | | | | |
|---|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------------|-------|-----------|
| | | SUMMARY OF COAST PHASE RULES | | | | | |
| | | 7-1 INSUFFICIENT PROPELLANT 7-2 LOSS OF ONE APS MODULE 7-3 MAIN FUEL VALVE FAILS TO CLOSE 7-4 MAIN OXIDIZER VALVE FAILS TO CLOSE 7-5 RANGE SAFETY SYSTEM NOT SAFED AFTER INSERTION 7-6 COLD HELIUM SHUTOFF VALVE FAILS OPEN 7-7 AUXILIARY HYDRAULIC PUMP FAILS 7-8 LOSS OF ATTITUDE CONTROL 7-9 CONTINUOUS VENT REGULATOR FAILS TO OPEN 7-10 APS ULLAGE ENGINE FAILS ON 7-11 RESERVED 7-12 J2 ENGINE MAIN FUEL VALVE OR MAIN OXIDIZER VALVE LEAKAGE IN TB5 7-13 IU ENVIRONMENTAL CONTROL SYSTEM FAILS 7-14 COMMON BULKHEAD ΔP 7-15 LOSS OF S-IVB STAGE PNEUMATICS 7-16 RESERVED 7-17 LH ₂ TANK VENT FAILURE OR LEAK 7-18 LOW COLD HELIUM SUPPLY 7-19 LOX TANK ULLAGE PRESSURE IS LESS THAN 31 PSIA 7-20 J-2 ENGINE START BOTTLE PRESSURE OUTSIDE RESTART LIMITS 7-21 PU VALVE FAILURE 7-22 S-IVB CONFIRMED LOSS OF HYDRAULIC FLUID 7-23 RESERVED 7-24 RESERVED 7-25 LOX NON-PROPULSIVE VENT FAILS TO OPEN 7-26 LH ₂ LATCHING VENT VALVE FAILS TO OPEN 7-27 GH ₂ START BOTTLE DUMP FAILS TO OCCUR 7-28 COLD HELIUM DUMP FAILS TO OCCUR 7-29 RESERVED 7-30 RESERVED | | | | | |
| | | THE FOLLOWING MISSION RULES ALSO APPLY TO THIS SECTION: | | | | | |
| | | 6-3 INERTIAL PLATFORM FAILURE - ACCELEROMETER 6-4 LAUNCH VEHICLE INERTIAL PLATFORM FAILURE - ATTITUDE REFERENCE 6-5 SIV B LOX CRYO REPRESS VALVE FAILS OPEN. | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-1 |
| | | | | | | | Tape 57.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 7-1 | <p>PRIOR TO S-IVB RESTART, PROPELLANT QUANTITIES PRECLUDE ACHIEVEMENT OF AN ACCEPTABLE LUNAR MISSION AND:</p> <p>A. NO FAILURES HAVE BEEN IDENTIFIED WHICH RESULTED IN AN EXCESSIVE PROPELLANT IMBALANCE, AND INSUFFICIENT PROPELLANT REMAINS FOR ACHIEVEMENT OF AN ACCEPTABLE ALT MISSION</p> <p>B. FAILURES HAVE BEEN IDENTIFIED WHICH RESULTED IN AN EXCESSIVE IMBALANCE OF PROPELLANTS</p> <p>1. LOX DUMP WOULD SIGNIFICANTLY IMPROVE THE PROBABILITY OF A MINIMUM LUNAR LANDING OR A MINIMUM LO MISSION.</p> <p>2. LOX DUMP WOULD NOT SIGNIFICANTLY IMPROVE THE PROBABILITY OF A MINIMUM LO MISSION.</p> | EARTH ORBIT | <p><u>NO S-IVB RESTART/CONTINUE MISSION</u></p> <p>A. <u>NO S-IVB RESTART</u></p> <p>BSE INFORM FLT OF PREDICTED CAPABILITY</p> <p>B. <u>CONTINUE MISSION/NO S-IVB RESTART</u></p> <p>1. <u>CONTINUE MISSION</u></p> <p>BSE INFORM FLT AND CMD LOX DUMP TO MAXIMIZE ACCEPTABLE LUNAR MISSION CAPABILITY. IF C199-401 IS EXPECTED TO BE COLDER THAN 3200 R, OR C200-401 IS EXPECTED TO BE COLDER THAN 160° R AT ENGINE START, BSE CMD</p> <p>(A) MAINSTAGE ENABLE NO 2 ON</p> <p>(B) BURN MODE A ON</p> <p>2. <u>NO S-IVB RESTART</u></p> <p>BSE INFORM FLIGHT OF PREDICTED CAPABILITY.</p> | <p><u>CUES</u></p> <p>1. PROPELLANT REMAINING AS ASCERTAINED DURING R/T EVALUATIONS.</p> <p><u>NOTES</u></p> <p>1. FAILURES REQUIRING EVALUATION OF PROPELLANT REMAINING ARE DEFINED BY FMR'S 6-5, 6-7, 6-12, 7-3, 7-4, 7-6, 7-9, 7-12, 7-17, 7-18, 7-19, 7-21, 7-24, 7-30, 8-4.</p> <p>2. FAILURES WHICH RESULT IN A LOX DUMP REQUIREMENT ARE:</p> <p>(A) LOX CRYO REPRESS VALVES FAIL OPEN (FMR 6-5). OTBV FAILS OPEN DURING S-IVB FIRST BURN (FMR 7-30)</p> <p>(B) COLD HELIUM SHUTOFF VALVES FAIL OPEN (FMR 7-6)</p> <p>(C) LOW LOX TANK ULLAGE PRESS (FMR 7-18, 7-19)</p> <p>(D) J-2 ENGINE MAIN FUEL VLV FAILS TO CLOSE (FMR 7-3). DO NOT DUMP LOX IF MFV IS OPEN.</p> <p>(E) MRCV FAILS TO 4.5 POSITION (FMR 7-24)</p> <p>(F) LOX BLEED VLV FAILS OPEN (FMR 7-21)</p> <p>(G) OTBV FAILS OPEN (FMR 7-30)</p> <p>3. IMPLEMENTATION OF A LOX DUMP MAY REQUIRE A STATE VECTOR UPDATE.</p> <p>4. FAILURE MUST BE IDENTIFIED PRIOR TO CYI LOS.</p> <p>5. CORRECTIVE ACTION MUST BE TAKEN ON ITEMS 2(A), 2(B), 2 (C), 2(D), 2(E), 2(F), 2(G), AS NOTED BY THE REFERENCED FMR.</p> | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-2 | Tape 46.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 7-2 | LOSS OF ONE APS MODULE A. TB5 TO TB6+9 MIN 20 SEC B. TB7 TO TB7+15 MIN C. TB7+15 MIN TO LM EJECTION D. LM EJECTION TO YAW MANEUVER COMPLETE E. AFTER YAW ATTITUDE MANEUVER COMPLETE | EARTH ORBIT TLC | A. <u>CONTINUE MISSION</u> 1. BSE INFORM FLIGHT AND COMMAND - S-IVB BURN MODE ON 2. CREW WILL STABILIZE THE VEHICLE WITH CSM RCS B. <u>CONTINUE MISSION</u> 1. BSE INFORM FLIGHT AND COMMAND - FCC POWER OFF 2. CREW WILL STABILIZE VEHICLE WITH CSM RCS C. <u>CONTINUE MISSION</u> 1. BSE INFORM FLIGHT AND COMMAND - FCC POWER OFF 2. CREW DISCRETION FOR DOCKING D. <u>CONTINUE MISSION</u> 1. BSE INFORM FLIGHT AND COMMAND - FCC POWER OFF 2. SPACECRAFT WILL DO EVASIVE MANEUVER 3. DO NOT INITIATE TB8 4. BSE PERFORM NON- PROPULSIVE S-IVB SAFING BY GROUND COMMAND E. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND 1. CMD TB8 ASAP CONSISTENT WITH MISSION CONSTRAINTS 2. AFTER EVASIVE BURN, CMD ULLAGE MOTOR ON OR CMD SHORT LOX DUMPS WITH BURN MODE ON AND ATT ERROR LIMITS OF $\pm 15.3^\circ$, TO MANEUVER VEHICLE TO THE ALTERNATE LOX DUMP ATT 3. ACCOMPLISH LOX DUMP WITH BURN MODE ON 4. AFTER COMPLETION OF LOX DUMP, INITIATE SOLAR HEATING AVOIDANCE MANEUVER IF RULING E.2. IS UNSUCCESS- FUL: 5. CMD ATT ERROR LIMITS OF $\pm 3.5^\circ$ 6. PERFORM LOX DUMP SIMULTANEOUSLY WITH THE MANEUVER TO ALT LOX DUMP ATT WITH BURN MODE ON 7. PERFORM RULING E.4. ABOVE | <u>CUES</u> 1. MANIFOLD PRESSURE MOD. 1 BELOW 100 PSIA (D70-414), (D71-414) 2. MANIFOLD PRESSURE MOD. 2 BELOW 100 PSIA (D72-415), (D73-415) < |

MISSION RULES

[illegible]

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|---|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|---------------------|
| | 7-4 | J-2 ENGINE MAIN OXIDIZER VALVE (MOV) FAILS TO CLOSE AT: A. FIRST S-IVB CUTOFF < | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|---|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 7-5 | RANGE SAFETY SYSTEM NOT SAFED AFTER INSERTION A. PROPELLANT DISPER- SION SYSTEM NOT ARMED B. PROPELLANT DISPER- SION SYSTEM ARMED AND RSO HAS NOT SENT MFCO | EARTH ORBIT | A. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND RE- COMMEND RSO SEND SAFE COMMAND B. <u>EMERGENCY SPACECRAFT SEPARATION</u> BSE INFORM FLIGHT AND RECOMMEND EMERGENCY SPACECRAFT SEPARATION. WHEN SPACECRAFT HAS REACHED A SAFE DISTANCE (7,000 FT) RECOMMEND RSO SEND SAFE COMMAND. | <u>CUES</u> 1. FIRING UNIT 1 RS EBW GREATER THAN OR EQUAL TO 1.6 VOLTS (M30-411). 2. FIRING UNIT 2 RS EBW GREATER THAN OR EQUAL TO 1.6 VOLTS (M31-411). 3. RANGE SAFETY RECEIVER NO. 1 ENABLE (N57-411) BETWEEN 2.4 AND 4.5 VOLTS. 4. RANGE SAFETY RECEIVER NO. 2 ENABLE (N62-411) BETWEEN 2.4 AND 4.5 VOLTS. 5. RSO DISPLAY AND COMMAND SYSTEM STATUS. <u>NOTES</u> 1. RSO SHOULD NOT ATTEMPT TO SAFE THE RANGE SAFETY RECEIVERS UNTIL IT IS CONFIRMED THAT THE PROPELLANT DISPERSION SYSTEM IS NOT ARMED (CONDITION A ONLY). 2. EITHER CUE 1 OR CUE 2 IS SUFFICIENT FOR IMPLEMENTING RULE B. 3. CUES 3 AND 4 ARE VALID ONLY WHEN THE VEHICLE IS RECEIVING 450 MHZ RADIATION. |
| | 7-6 | S-IVB STAGE COLD HELIUM SHUTOFF VALVES FAIL OPEN IN A. TB5 | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 7-7 | <p>S-IVB AUXILIARY HYDRAULIC PUMP FAILS</p> <p>A. TO TURN OFF AS SEQUENCED</p> <p>B. TO TURN ON</p> <p>1. AS SEQUENCED AND THE RESERVOIR OIL TEMP IS BELOW OR PREDICTED TO BE BELOW 35° F BEFORE NEXT STATION AOS</p> <p>2. AT TB6 + 3 MIN 39 SEC</p> <p>C. TO TURN ON FOR LOX DUMP (J-2 ENGINE NOT CENTERED IN PITCH PLANE PRIOR TO LOX DUMP)</p> <p>1. ENGINE GIMBAL ANGLE LESS THAN ±3 DEGREES</p> <p>2. ENGINE GIMBAL ANGLE GREATER THAN ±3 DEGREES</p> <p>3. ATTITUDE ERROR GREATER THAN 10 DEGREES DURING DUMP</p> | <p>EARTH ORBIT</p> <p>TLI</p> <p>TLC</p> | <p>A. <u>CONTINUE MISSION</u></p> <p>BSE INFORM FLIGHT AND</p> <p>ATTEMPT TO TURN OFF AUXILIARY HYDRAULIC PUMP AS SOON AS POSSIBLE</p> <p>B. <u>CONTINUE MISSION</u></p> <p>BSE INFORM FLIGHT AND</p> <p>1. ATTEMPT TO TURN AUXILIARY HYDRAULIC PUMP ON</p> <p>BSE INFORM FLIGHT AND</p> <p>2. COMMAND AUXILIARY HYDRAULIC PUMP OFF</p> <p>C. <u>CONTINUE MISSION</u></p> <p>1. <u>CONTINUE MISSION</u></p> <p>BSE INFORM FLIGHT</p> <p>2. <u>CONTINUE MISSION</u></p> <p>BSE INFORM FLIGHT AND INHIBIT LOX DUMP</p> <p>3. <u>CONTINUE MISSION</u></p> <p>BSE INFORM FLIGHT AND TERMINATE LOX DUMP</p> | <p><u>CUES</u></p> <p>A.1. SYSTEM PRESSURE (D41-403).</p> <p>2. RESERVOIR LEVEL (L7-403).</p> <p>3. AFT BATTERY NO. 2 CURRENT (M22-404).</p> <p>4. HYDRAULIC RESERVOIR OIL PRESSURE (D42-403).</p> <p><u>NOTES</u></p> <p>A. FAILURE TO TURN OFF HYDRAULIC PUMP DEPLETES AFT NO. 2 BATTERY IN APPROXIMATELY 90 MIN AND OVERHEATS HYDRAULIC SYSTEM IN APPROXIMATELY 70 MIN.</p> <p><u>CUES</u></p> <p>B.1. SYSTEM PRESSURE (D41-403).</p> <p>2. RESERVOIR OIL LEVEL (L7-403).</p> <p>3. AFT BAT NO. 2 CURRENT (M22-404).</p> <p>4. RESERVOIR PRESSURE (D42-403).</p> <p>5. HYDRAULIC PUMP INLET OIL TEMP (C50-401).</p> <p>6. RESERVOIR OIL TEMP (C51-403).</p> <p>C.1. ACTUATOR POSITION (G1-403)</p> <p>2. SYSTEM PRESSURE (D41-403)</p> <p>3. CHI MINUS THETA GREATER THAN 10 DEGREES (H60-603)</p> <p><u>NOTES</u></p> <p>1. A PITCH ACTUATOR DEFLECTION IN EXCESS OF ±3 DEGREES IS ONLY EXPECTED FOR THE FOLLOWING CONDITIONS:</p> <p>(A) ERRONEOUS COMMAND SIGNAL</p> <p>(B) ACTUATOR FAILURE</p> <p>2. SINCE TWO APS ENGINES ARE AVAILABLE FOR ATTITUDE CONTROL IN THE YAW PLANE, ATTITUDE CONTROL IN THIS PLANE WILL BE MAINTAINED FOR AN ACTUATOR IN A HARDOVER CONDITION.</p> <p>3. IF APS PROPELLANT IS INSUFFICIENT AND EITHER CONDITION C.2. OR C.3. PRECLUDES LOX DUMP, CONSIDERATION WILL BE GIVEN TO CONDUCTING A CYCLE LOX DUMP TO ATTAIN THE REQUIRED ΔV FOR LUNAR IMPACT BASED ON REAL-TIME DECISION OF LUNAR IMPACT TEAM.</p> <p>4. ANY TIME THE HYDRAULIC OIL TEMP (C51-403) DROPS BELOW 35° F, THE AUX HYDRAULIC PUMP SHOULD BE CYCLED.</p> | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-7 | Tape 22.5 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------------------------------|---------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 7-8 | LOSS OF ATTITUDE CONTROL DURING | | | <u>CUES</u> | | | |
| | A. TB5 | | EARTH ORBIT/TLC | A. <u>SPACECRAFT GUIDANCE TAKEOVER/SPACECRAFT SEPARATION</u> BSE INFORM FLIGHT AND RE-COMMEND SPACECRAFT GUIDANCE TAKEOVER. IF UNSUCCESSFUL, BSE RE-COMMEND SPACECRAFT SEPARATION | A.1. ANGULAR RATES - PITCH (R4-602) OR YAW (R5-602) GREATER THAN 0.3 DEG/SEC AND NOT DECREASING, OR ROLL (R6-602, R12-602), GREATER THAN 0.5 DEG/SEC AND NOT DECREASING | | | |
| | B. TB6 TO TB6 + 9 MIN 20 SEC | | TLI | B. <u>TLI INHIBIT</u> BSE INFORM FLIGHT AND RE-COMMEND TLI INHIBIT | 2. ANGULAR RATE - PITCH (R13-602) OR YAW (R8-602) GREATER THAN 0.3 DEG/SEC AND NOT DECREASING, OR ROLL (R12-602) GREATER THAN 0.5 DEG/SEC AND NOT DECREASING (SEE NOTE 3) 3. LOSS OF ATTITUDE CONTROL ALERT (SEE NOTE 2) | | | |
| | C. TB7 | | TLC | C. <u>CREW DISCRETION</u> BSE INFORM FLIGHT AND FIDO 1. DO NOT START EVASIVE MANEUVER 2. DO NOT INITIATE TB8 3. BSE PERFORM NON-PROPULSIVE S-IVB SAFING BY GROUND COMMAND. | B.1. SAME AS A.1. ABOVE 2. SAME AS A.2. ABOVE 3. LOSS OF ATTITUDE CONTROL ALERT (SEE NOTES 2 AND 4) C.1. SAME AS A.1 ABOVE 2. SAME AS A.2. ABOVE 3. LOSS OF ATTITUDE CONTROL ALERT (SEE NOTES 2 AND 4) | | | |
| | D. TB8 | | TLC | D. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND FIDO AND TERMINATE 1. LOX DUMP 2. ULLAGE ENGINE BURNS 3. LH2 CVS | D.1. SAME AS A.1. ABOVE 2. SAME AS A.2. ABOVE 3. LOSS OF ATTITUDE CONTROL ALERT (SEE NOTES 2 AND 4) <u>NOTES</u> 1. IMMEDIATELY AFTER S-IVB CUTOFF, S/C RETURN OF CONTROL TO SATURN, OR DURING PROGRAMED MANEUVERS THE ABOVE RATE LIMITS ARE NOT APPLICABLE. 2. LOSS OF ATTITUDE CONTROL ALERT WILL BE GIVEN FOR THE FOLLOWING CONDITIONS: (A) LVDC/LVDA COMPUTATIONAL FAILURE (B) ABNORMAL ATTITUDE ERROR SIGNALS (C) FAILURE TO INITIATE PROPER GUIDANCE SEQUENCE 3. THESE CUES ARE VALID IF RATE CHANNEL SWITCHOVER HAS NOT OCCURRED. 4. LOSS OF ATTITUDE CONTROL ALERT IS SUFFICIENT FOR IMPLEMENTING THIS RULE EXCEPT FOR PARTS B AND D. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-8 | Tape 22.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|----------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 7-9 | CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 (TB5 + 59 SEC) | EARTH ORBIT/ TLI | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND 1. ATTEMPT TO OPEN CVS RELIEF OVERRIDE SHUTOFF VALVE IF UNSUCCESSFUL, BSE 2. VENT THE LH2 TANK PRIOR TO TB6 + 8 MIN 40 SEC TO A VALUE BELOW THE PRESSURE REQUIRED FOR S-IVB RESTART. IF THE LH2 BLOWDOWN IS COMPLETED WITHIN 30 MINUTES PRIOR TO TB6 INITIATE, COMMAND 3. ULLAGE ENGINES AFTER 90 SEC OF ULLAGE, SEND 4. ULLAGE ENGINES OFF ULLAGING SHOULD BE COMPLETED PRIOR TO THE AMBIENT REPRESSURIZATION. EARTH ORBIT IF EITHER ACTION 1 OR 2 IS UNSUCCESSFUL, BSE INFORM FLIGHT | <u>CUES</u> 1. CVS NOZZLE PRESSURE (D181-409, D182-409). 2. CVS REGULATOR CLOSED (K154-411). 3. LH2 ULLAGE PRESSURE (D177-408, D178-408). <u>NOTES</u> 1. IF THE CVS REGULATOR FAILS TO OPEN, THE LH2 SATURATION TEMPERATURE WILL INCREASE ABOVE NOMINAL RESTART LIMITS. 2. COMMAND ACTION WILL REQUIRE EVALUATION OF LH2 RESIDUALS TO DETERMINE ADEQUACY FOR TLI VELOCITY CUTOFF. 3. IF THE CVS REGULATOR IS CLOSED DURING ORBIT, THE IU STATE VECTOR WILL BE IN ERROR SINCE THE IU USES A STORED PROGRAM FOR THIS THRUST. A NAVIGATION UPDATE MAY BE REQUIRED (REF FMR 7-11). | | | |
| | 7-10 | APS ULLAGE ENGINE(S) THRUST FAILS TO TERMINATE AT SEQUENCED TIMES | EARTH ORBIT/ TLI/TLC | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND ATTEMPT TO TERMINATE ULLAGE ENGINE THRUST. IF UNSUCCESSFUL, BSE INFORM FLIGHT OF IMPENDING LOSS OF ATTITUDE CONTROL CAPABILITY | <u>CUES</u> 1. ULLAGE ENGINE THRUST CHAMBER PRESSURE (D220-414, D221-415). 2. APS HELIUM SPHERE PRESSURE DECREASING (D35-414, D36-415, D250-414, D251-415). | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-9 | Tape 22.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|------------|
| | 7-11 | IU STATE VECTOR IS IN ERROR WHEN COMPARED TO MSFN STATE VECTOR (I.E., SOME COMPONENT OF IU PLATFORM AND/OR COMPUTER HAS FAILED OR EXHIBITS A LARGE ERROR) | LAUNCH | <u>CONTINUE MISSION</u> BSE XMIT IU NAV UPDATE BASED ON GUIDO RECOMMENDATION PER FMR 5-29 | <u>CUES</u> IF IU AND MSFN ΔA , ΔRV , AND $\Delta \dot{W}$ MAX DIFFER BY THE FOLLOWING AMOUNTS: 1. AT T + 56 MIN (A) ΔA = 1.1 NM (B) ΔRV = 33,101 FT (C) $\Delta \dot{W}$ MAX = 9.0 FPS WHEN ΔW = 2307 FT 2. AT T + 1 HOUR 45 MIN (A) ΔA = 1.21 NM (B) ΔRV = 56,894 FT (C) $\Delta \dot{W}$ MAX = 9.0 FPS WHEN ΔW = 3857 FT <u>NOTES</u> 1. ANY HARDWARE FAILURE OR MALFUNCTION, SUCH AS CVS FAILURE, OR ACCELEROMETER FAILURE MAY BE CAUSE TO PERFORM A NAVIGATION UPDATE. 2. THERE ARE TWO TIMES DURING EPO THAT THESE VECTOR COMPARISONS ARE MADE. THESE TIMES CORRESPOND TO A VECTOR TIME TAGGED AT TL + 56 MIN AND A VECTOR TIME TAGGED AT TL + 1 HR 45 MIN. THE VECTOR COMPARISONS WILL BE MADE ON THE FOLLOWING PARAMETERS: (A) ΔA - BASICALLY, THE DELTA SEMIMAJOR AXIS OF EPO (B) ΔRV - THE LOCAL DELTA DOWNRANGE COMPONENT (C) $\Delta \dot{W}$ MAX - THE LOCAL CROSSRANGE VELOCITY. THIS IS A FUNCTION OF W AND CHANGES AS W CHANGES. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-10 | Tape 11D.6 |

MISSION RULES

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|----------------|--------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------|
| 7-12 (CONT) | C. MOV LEAKING IN TB7 | TLC | C. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND COMMAND IN TB8. 1. ENGINE PUMP PURGE OFF BSE REINITIATE LOX DUMP AFTER SEQUENCED DUMP BY COMMANDING: 2. MAIN LOX VALVE OPEN BSE TERMINATE DUMP AND SECURE SYSTEM 120 SEC AFTER GAS INGESTION OBSERVED BY COMMANDING: 3. MAIN LOX VALVE CLOSED 4. PREVALVES AND RECIRC CLOSED | | |
| | D. MFV LEAKING IN TB7 | | D. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND CMD ASAP IN TB 8: 1. ENGINE PUMP PURGE OFF 2. EDS CUTOFF NO. 2 ENABLE BSE INITIATE LH2 DUMP AFTER NOMINAL LOX DUMP TERMINATION TIME BY COMMANDING: (SEE NOTE 6) 3. EDS CUTOFF NO. 2 DISABLE 4. MAIN FUEL VALVE OPEN AFTER 200 SEC., BSE TERMINATE LH2 DUMP BY COMMANDING: 5. MAIN FUEL VALVE CLOSED 6. PREVALVES AND RECIRC VALVES CLOSED. | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 7-13 | <p>IU ECS WATER VALVE FAILS TO CYCLE OPEN OR CLOSE</p> <p>A. WATER VALVE CLOSED AND COOLANT INLET CONTROL TEMPERATURE IS 64° F OR HIGHER, AND THE INERTIAL GIMBAL TEMPERATURE IS 117° F OR HIGHER, OR THE LVDA MEMORY TEMP NO. 1 OR NO. 2 IS 147° F OR HIGHER, OR THE LVDC MEMORY TEMP IS 115° F OR HIGHER, OR THE LVDC LOGIC TEMP IS 142° F OR HIGHER, OR COOLANT MANIFOLD PUMP INLET PRESS IS 17.5 PSIA OR HIGHER.</p> <p>B. WATER VLV CLOSED AND COOLANT INLET CONTROL TEMP IS 64° F OR HIGHER, AND THE INERTIAL GIMBAL TEMP IS 149° F OR HIGHER, OR THE LVDA TEMP NO. 1 OR NO. 2 IS 147° F OR HIGHER, OR THE LVDC MEMORY TEMP IS 115° F OR HIGHER, OR THE LVDC LOGIC TEMP IS 142° F OR HIGHER, OR COOLANT MANIFOLD PUMP INLET PRESS IS 17.5 PSIA OR HIGHER.</p> <p>C. WATER VLV OPEN AND COOLANT INLET CONTROL TEMP IS 55° F OR LESS, AND THE INERTIAL GIMBAL TEMP IS 102° F OR LESS, OR THE LVDA TEMP NO. 1 OR NO. 2 IS 50° F OR LESS, OR THE LVDC MEMORY OR LOGIC TEMPS ARE 50° F OR LESS.</p> | <p>EARTH ORBIT TLI TO APS BURN NO. 1</p> <p>APS BURN NO. 1 TO EOM</p> <p>EARTH ORBIT TLI TLC</p> | <p>A. <u>CONTINUE MISSION</u></p> <p>BSE INFORM FLIGHT AND SEND</p> <p>1. ECS LOGIC INHIBIT COMMAND</p> <p>2. WATER VALVE OPEN</p> <p>B. <u>CONTINUE MISSION</u></p> <p>BSE INFORM FLT AND SEND:</p> <p>1. WATER VLV OPEN</p> <p>2. WATER VLV CLOSED WHEN THE TEMP WHICH WAS IN VIOLATION DECREASES 27° F OR IF VLV OPENED AS A RESULT OF PRESS VIOLATION, VLV WILL BE CLOSED WHEN PRESS DECREASES TO A NOMINAL LEVEL AND ANY ONE CRITICAL TEMP DECREASES 27° F.</p> <p>C. <u>CONTINUE MISSION</u></p> <p>BSE INFORM FLT AND SEND:</p> <p>1. ECS LOGIC INHIBIT CMD</p> <p>2. WATER VLV CLOSED</p> | <p><u>CUES</u></p> <p>1. WATER VALVE CLOSED/OPEN (G5-601, G6-601)</p> <p>2. COOLANT TEMP (C15-601)</p> <p>3. ST-124 INERTIAL GIMBAL TEMP (C34-603)</p> <p>4. SUBLIMATOR INLET TEMP (C11-601)</p> <p>5. LVDC MEMORY TEMP (C54-603)</p> <p>6. LVDA TEMP NO. 1 (C55-603)</p> <p>7. LVDA TEMP NO. 2 (C46-603)</p> <p>8. LVDC LOGIC TEMP (C53-603)</p> <p>9. COOLANT MANIFOLD INLET PRESS (D24-601)</p> <p><u>NOTE</u></p> <p>1. RULING "B" IS IN EFFECT ONLY IF ECS LOGIC HAS BEEN INHIBITED WITH THE WATER VLV IN THE CLOSED POSITION TO COMPENSATE FOR SUBLIMATOR VENTING FROM 15 MINUTES BEFORE APS BURN NO. 1 TO EOM.</p> | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-13 | Tape 46.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB7 - CONTINUED

| SECTION 7 - SLV - TB7 - CONTINUED | | | | | | | | | |
|-----------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|--|--|---------------------|--|--|
| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | | CUES/NOTES/COMMENTS | | |
| | 7-14 | S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS: A. MINUS 20 PSID OR PLUS 30 PSID < | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|------------|
| | 7-15 | S-IVB STAGE PNEUMATIC SUPPLY PRESSURE DECAY EXCESSIVE IN: A. TB5 B. TB7 | EARTH ORBIT TLC | A. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND 1. ATTEMPT TO TERMINATE PUMP PURGE AND/OR CLOSE AMBIENT HELIUM SUPPLY SHUTOFF VALVE. 2. RE-OPEN AMBIENT HELIUM SUPPLY SHUTOFF VALVE WHEN PNEUMATICS REQUIRED B. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND 1. OPEN PREVALVES AND CHILLDOWN SHUTOFF VALVES IF EXCESSIVE PRESSURE DECAY CONTINUES, BSE 2. CLOSE AMBIENT HELIUM SUPPLY SHUTOFF VALVES 3. REOPEN AMBIENT HELIUM SUPPLY SHUTOFF VALVES WHEN PNEUMATICS REQUIRED. | <u>CUES</u> 1. ENGINE PUMP PURGE PRESSURE (D50-403) 2. AMBIENT HELIUM PNEUMATIC SPHERE PRESSURE (D236-403, D256-403). 3. LOX REPRESS SUPPLY PRESSURE (D88-403, D254-403). <u>NOTE</u> AN EXCESSIVE PNEUMATIC SUPPLY PRESSURE DECAY IS ONE WHICH WILL RESULT IN DEPLETION OF STAGE PNEUMATICS PRIOR TO COMPLETION OF TB8 FUNCTIONS. | | | |
| | 7-16 | CONTROL SIGNAL PROCESSOR NULL SHIFT IN TB7 OR TB8 | TLC | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND COMMAND LADDER LIMITS TO 12.0 DEG | <u>CUES:</u> 1. PRIME RATE GYRO MINUS REFERENCE RATE GYRO GREATER THAN 0.3 DEG/SEC (PITCH, R4-602, R13-602; YAW, R5-602, R8-602; ROLL, R6-602, R12-602) 2. GUIDANCE CHI MINUS THETA GIMBAL ANGLE (H60-603) GREATER THAN 10 DEG AND NOT CONVERGING. 3. LADDER ERRORS GREATER THAN 1.6 DEG(H54-603, H55-603, H56-603) EXCEPT DURING PROGRAMED MANEUVER. <u>NOTES</u> 1. IF BOTH RATE GYRO MEASUREMENTS ARE VALID, CUE 1 MUST BE USED. 2. FOR AS-511 ONLY, IF A NULL SHIFT OCCURS PRIOR TO TB6 - 9 SECONDS, A DCS CMD TO OPEN THE LADDER LIMITS TO 12 DEGREES MUST BE SENT AFTER TB6 - 9 SECONDS TO PREVENT THE LVDC FROM SWITCHING BACK TO THE LOWER LIMITS DURING TB7 AND TB8. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-15 | Tape 11D.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | | CUES/NOTES/COMMENTS | | |
|---|------|---------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--|
| | 7-17 | LH2 TANK ULLAGE PRESSURE LESS THAN 17 PSIA IN TB5 | EARTH ORBIT/TLI | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND COMMAND 1. LH2 TANK VENT VALVES BOOST CLOSE ON AND OFF AND/OR CVS REGULATOR CLOSED (ORIFICE OPEN) (NOTE 1). IF THE CONDITION CANNOT BE CORRECTED AND SUFFICIENT AMBIENT REPRESS HELIUM IS AVAILABLE, BSE 2. INHIBIT O2/H2 BURNER | | | <u>CUES</u> 1. LH2 ULLAGE PRESSURE (D177-408, D178-408). 2. LH2 PUMP INLET PRESSURE (D2-403). 3. LH2 VENT CLOSED DISCRETES (K1-410, K210-410). <u>NOTES</u> 1. IF THE ULLAGE PRESSURE RISES ABOVE 21 PSIA AFTER THE REGULATOR HAS BEEN CLOSED, THE REGULATOR SHOULD BE CYCLED TO MAINTAIN A 17 TO 21 PSIA ULLAGE PRESSURE IN LH2 TANK. 2. IF LH2 TANK ULLAGE PRESSURE IS EXPECTED TO BE LESS THAN 19.5 PSIA AT TB6 INITIATE, RESULTING PROPELLANT LOSSES SHOULD BE INCLUDED IN THE EVALUATION OF CAPABILITY TO ACHIEVE ACCEPTABLE ALTERNATE MISSION PER FMR 7-1. | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-16 | Tape 11D.8 | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB 5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|------------|
| 7-18 | LOW COLD HELIUM SUPPLY PRESSURE | A. PRIOR TO BURNER START B. DURING BURNER OPERATION | EARTH ORBIT | A. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND COMMAND FROM LAST STATION PRIOR TO TB6 BURNER LOX SHUTDOWN VALVE CLOSE ON B. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND CMD LH2 AND LOX REPRESS VALVE CLOSED. | <u>CUE</u> COLD HELIUM SPHERE PRESSURE (D261-403, D263-403). <u>NOTE</u> 1. AN EXCESSIVE COLD HELIUM SUPPLY PRESSURE DECAY IS ONE WHICH WILL RESULT IN A COLD HELIUM BOTTLE PRESSURE OF LESS THAN 1000 PSIA AT TB6 INITIATE OR LESS THAN 450 PSIA AT COMPLETION OF CRYOGENIC REPRESSURIZATION. 2. THIS FAILURE WILL REQUIRE EVALUATION OF RESIDUALS TO DETERMINE ADEQUACY FOR TLI VELOCITY CUTOFF AND LUNAR IMPACT OPERATIONS (FMR 7-1). | | | |
| 7-19 | A. LOX TANK ULLAGE PRESSURE LESS THAN 31 PSIA DURING ORBITAL COAST OR EXPECTED TO BE LESS THAN 31 PSIA BY TB6 INITIATE | EARTH ORBIT | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND COMMAND 1. LOX TANK VENT VALVE BOOST CLOSE IF LOX TANK ULLAGE PRESSURE IS NOT MORE THAN 9 PSI BELOW THE REQUIRED ULLAGE PRESSURE, BSE COMMAND 2. LOX TANK REPRESS CONTROL VALVE OPEN ON UNTIL TANK PRESSURE GREATER THAN REQUIRED, THEN OFF 3. DELETED IF LOX TANK ULLAGE PRESSURE IS GREATER THAN 9 PSI BELOW THE REQUIRED ULLAGE PRESSURE, OR IF THE REQUIRED ULLAGE PRESSURE IS GREATER THAN THE FLIGHT CONTROL PRESSURE SWITCH SETTING, BSE COMMAND 4. BURNER LOX SHUTDOWN VALVE CLOSE 5. AS CLOSE AS POSSIBLE TO TB6 + 7 MIN 30 SEC, LOX AMBIENT REPRESS ON | <u>CUES</u> 1. LOX ULLAGE PRESSURE (D179-406, D180-406) 2. LOX PUMP INLET PRESSURE (D3-403) | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-17 | Tape 11C.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 7-20 | J-2 ENGINE START BOTTLE PRESSURE OUTSIDE RE-START LIMITS A. ABOVE 1450 PSIA DURING ORBITAL COAST FOR FIRST OPPORTUNITY RESTART OR ABOVE 1500 PSIA FOR SECOND OPPORTUNITY RESTART B. ABOVE 1800 PSIA PRIOR TO RESTART C. BELOW 800 PSIA (SEE NOTE) | EARTH ORBIT | A. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND SENT 1. START BOTTLE VENT OPEN FOR 3 SEC 2. REPEAT COMMAND AS NECESSARY TO INSURE A PRESSURE OF LESS THAN 1450 PSIA FOR FIRST OPPORTUNITY RESTART OR 1500 PSIA FOR SECOND OPPORTUNITY RESTART B. <u>EMERGENCY SPACECRAFT SEPARATION</u> BSE TRANSMIT ABORT REQUEST AND RECOMMEND EMERGENCY SPACECRAFT SEPARATION C. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND COMMAND ASAP 1. START TANK RECHARGE ARM ON 2. START TANK VENT OPEN UNTIL TANK PRESSURE LESS THAN 300 PSIA, THEN CLOSE | <u>CUES</u> START BOTTLE PRESSURE (D17-401, D241-401) <u>NOTES</u> 1. EXCESSIVE START BOTTLE DECAY DURING ORBITAL COAST IS DEFINED AS A PRESSURE DECAY WHICH WILL RESULT IN A START BOTTLE PRESSURE BELOW 800 PSIA AT SECOND BURN ENGINE START COMMAND (TB6 + 9 MIN 30 SEC). 2. A START BOTTLE PRESSURE OF 300 PSIA MAXIMUM IS ALLOWABLE AT START BOTTLE RECHARGE COMMAND. | | | |
| | 7-21 | LOX BLEED VLV FAILS OPEN DURING S-IVB FIRST BURN | LAUNCH | <u>CONTINUE MISSION</u> BSE INFORM FLT ASAP AFTER CUTOFF, BSE: 1. CYCLE LOX BLEED VLV; IF 1. IS UNSUCCESSFUL, BETWEEN TB6 + 7 MIN 30 SEC AND TB6 + 9 MIN 30 SEC, BSE: 2. CLOSE MRCV (5.0 POSITION) | <u>CUES:</u> 1. OXIDIZER BLEED VLV CLOSED OFF (K126-401) DURING S-IVB FIRST BURN. 2. REDUCED ENGINE PERFORMANCE (REFER TO REAL-TIME PERFORMANCE RESULTS) <u>NOTES:</u> 1. THIS FAILURE WILL RESULT IN PROPELLANT IMBALANCE AND WILL REQUIRE EVALUATION OF RESIDUALS TO DETERMINE ADEQUACY FOR TLI VELOCITY CUTOFF (REF FMR 7-1) | | | |
| | 7-22 | S-IVB CONFIRMED LOSS OF HYDRAULIC FLUID | EARTH ORBIT/TLI | <u>NO S-IVB RESTART (TB5)/TLI INHIBIT (TB6)</u> BSE INFORM FLIGHT AND RECOM-MEND NO S-IVB RESTART | <u>CUES</u> 1. HYDRAULIC RESERVOIR OIL LEVEL APPROX ZERO PERCENT (L7-403). 2. HYDRAULIC SYSTEM PRESSURE LESS THAN 1700 PSIA (D41-403). 3. HYDRAULIC RESERVOIR PRESSURE APPROXIMATELY ZERO PSIA (D42-403). <u>NOTES</u> IF L7-403 IS FUNCTIONING PROPERLY, IT IS REQUIRED FOR IMPLEMENTATION OF THIS RULE. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-18 | Tape 59.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|------------------------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 7-23 | LOSS OF ECS COOLANT CIRCULATION | EO TLI TLC | <u>CONTINUE MISSION</u> BSE INFORM FLT AND SEND: COOLANT PUMP NO. 1 ON AND PRESSURE SWITCH DEACTIVATE | <u>CUES:</u> 1. FLOW RATE IU EXIT COOLANT (F9-602) APPROXIMATELY 1.5 GPM. 2. FLOW RATE S-IVB INLET COOLANT (F10-601) APPROXIMATELY 1.5 GPM. 3. COOLANT MANIFOLD INLET PRESS. (D17-601) APPROXIMATELY 16 PSIA. 4. COOLANT PUMP NO. 2 POWER ON (K161-601) +28 VDC 5. COOLANT PUMP INLET PRESS (D24-601) APPROXIMATELY 16 PSIA. | | | |
| | 7-24 | MIXTURE RATIO CONTROL VLV (MRCV) FAILS OPEN (4.5 POSITION) DURING S-IVB FIRST BURN | LAUNCH | <u>CONTINUE MISSION</u> BSE INFORM FLT ASAP AFTER FIRST ENGINE CUTOFF, BSE: CYCLE MRCV | <u>CUES:</u> 1. MIXTURE RATIO CONTROL VLV POSITION (G17-401) DOES NOT INDICATE 5.0 POSITION. 2. MRCV OPEN ON (K219-404) (4.5 POSITION). 3. FAILURE VERIFIED BY ENGINE PERFORMANCE (REFER TO REAL-TIME ENGINE PERFORMANCE RESULTS). <u>NOTES:</u> THIS FAILURE WILL RESULT IN PROPELLANT IMBALANCE AND WILL REQUIRE EVALUATION OF RESIDUALS TO DETERMINE ADEQUACY FOR TLI VELOCITY CUTOFF (REF FMR 7-1) | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-19 | Tape 45.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONTINUED

| SECTION 7 - SLV - TB5 AND TB7 - CONTINUED | | | | | | | | | |
|-------------------------------------------|------|----------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--|
| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | | CUES/NOTES/COMMENTS | | |
| | 7-27 | ENGINE START BOTTLE DUMP FAILS TO INITIATE | TLC | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND ATTEMPT TO OPEN THE START BOTTLE VENT VALVE FOR A MINIMUM OF 40 SECONDS | | | <u>CUES</u> GH2 START BOTTLE PRESSURE (D17-401, D241-401). <u>NOTES</u> THE MAXIMUM SAFE PRESSURE LIMIT TO PRECLUDE REACHING BOTTLE PROOF PRESSURE PRIOR TO LUNAR IMPACT IS 615 PSIA. | | |
| | 7-28 | S-IVB STAGE COLD HELIUM DUMP FAILS TO INITIATE | TLC | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND 1. ATTEMPT TO INITIATE THE COLD HELIUM DUMP THROUGH LH2 COIL ON O2/H2 BURNER FOR A MINIMUM OF 45 MINUTES IF UNSUCCESSFUL, BSE INFORM FLIGHT AND, AFTER LOX NPV OPEN IN TB8, COMMAND 2. LOX PRESSURIZATION SHUTOFF VALVES OPEN FOR A MINIMUM OF 30 MINUTES | | | <u>CUE</u> COLD HELIUM BOTTLE PRESSURE (D261-403, D263-403). <u>NOTE</u> THE MAXIMUM SAFE PRESSURE LIMIT TO PRECLUDE REACHING BOTTLE PROOF PRESSURE PRIOR TO LUNAR IMPACT IS <u>100</u> PSIA. | | |
| | 7-29 | ENG HELIUM CONTROL VLV LEAKING AFTER FIRST ENGINE CUTOFF | EO | <u>CONTINUE MISSION</u> BSE INFORM FLT AND: 1. CYCLE ENG HELIUM CONTROL VLV (NOTE 1) IF EITHER BLEED VALVE IS CLOSED, REFER TO FMR 8-3 OR 8-4 | | | <u>CUES:</u> 1. ENG REG OUTLET PRESS (D018-401) 60 PSIA OR GREATER 2. ENG CONTROL HELIUM PRESS (D019-401, D242-401) DECREASING 3. FUEL TK HELIUM REPRESS SPHERE PRESS (D20-403, D249-403) 4. BLEED VLVs CLOSED (K126-401, K127-401) <u>NOTES:</u> 1. RULING 1 MAY BE REPEATED AT DISCRETION OF BSE IN AN EFFORT TO TERMINATE LEAKAGE. 2. RULINGS 1 THROUGH 4 MUST BE TAKEN PRIOR TO LOS AFTER FIRST ENGINE CUTOFF. 3. MOV MUST BE CLOSED PRIOR TO RESTART AS MOV OPEN VIOLATES FMR 7-4. | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-21 | Tape 59.8 | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7 - CONCLUDED

| SECTION 7 - SEV TB5 AND TB7 - CONCLUDED | | | | | | | | | |
|-----------------------------------------|------|-----------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--|
| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | | CUES/NOTES/COMMENTS | | |
| | 7-30 | OXIDIZER TURBINE BYPASS VLV (OTBV) FAILS OPEN DURING S-IVB FIRST BURN | LAUNCH | <u>CONTINUE MISSION</u> BSE INFORM FLT AS SOON AS POSSIBLE AFTER FIRST BURN CUT-OFF, BSE: 1. CLOSE PREVALVES AND RECIRC VALVES 2. DRAIN AND PURGE LOX SYS 3. DRAIN LH2 SYSTEM AND PURGE (SEE NOTE 3) 4. CYCLE OTBV 5. RETURN SYSTEM TO NORMAL IF CYCLE OF OTBV IS UNSUCCESSFUL, BETWEEN TB6 + 7 MIN 30 SEC AND TB6 + 9 MIN 30 SEC, BSE: 6. CLOSE MRCV (5.0 POSITION) | | | <u>CUES:</u> 1. OTBV POSITION (G8-401) INDICATES OPEN DURING S-IVB FIRST BURN. 2. OTBV CLOSED OFF (K125-401) DURING S-IVB FIRST BURN. 3. REDUCED ENG PERFORMANCE (REFER TO R/T ENGINE PERFORMANCE RESULTS). <u>NOTES:</u> 1. THIS FAILURE WILL RESULT IN PROPELLANT IMBALANCE AND WILL REQUIRE EVALUATION OF RESIDUALS TO DETERMINE ADEQUACY FOR TLI VEL. CUTOFF (REF FMR 7-1) 2. THIS RULE MUST BE IMPLEMENTED AS SOON AS POSSIBLE AFTER C/O. 3. THE ENGINE PUMP PURGE MUST BE OFF PRIOR TO CYCLING THE OTBV TO PREVENT BACKFLOW OF GASES TO THE GG WHEN OTBV CYCLED. | | |
| | 7-31 | LOW APS HELIUM SUPPLY SUPPLY PRESSURE | EARTH ORBIT/ TLI | <u>CONTINUE MISSION</u> IF APS HELIUM BOTTLE PRESSURE IS EXPECTED TO BE BELOW 350 PSIA PRIOR TO THE NEXT GROUND STATION, BSE INFORM FLIGHT AND RECHARGE APS HELIUM BOTTLE AS REQUIRED TO MAINTAIN ATTITUDE CONTROL. | | | <u>CUES:</u> 1. HELIUM SUPPLY PRESSURE MODULE 1 (D0035-414; D0250-414); MODULE 2 (D00036-415; D0251-415). | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB5 AND TB7 | | 7-22 | Tape 59.9 | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 8 - SLV - TB6

| R | ITEM | | | | | | |
|---|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-----------|-------|------|
| | | SUMMARY OF RESTART PHASE RULES | | | | | |
| | | <p>8-1 RESERVED</p> <p>8-2 O₂/H₂ BURNER LH₂ VALVE FAILS</p> <p>8-3 LH₂ CHILLDOWN SYSTEMS FAILS</p> <p>8-4 LOX CHILLDOWN SYSTEM FAILS</p> <p>8-5 RESERVED</p> <p>8-6 S-IVB ACTUATOR HARDOVER</p> <p>8-7 CONTINUOUS VENT REGULATOR FAILS TO CLOSE</p> <p>8-8 LOSS OF ATTITUDE CONTROL DURING SECOND BURN</p> <p>THE FOLLOWING MISSION RULES ALSO APPLY TO THIS SECTION:</p> <p>6-3 INERTIAL PLATFORM FAILURE - ACCELEROMETER</p> <p>6-4 LAUNCH VEHICLE INERTIAL PLATFORM FAILURE ATTITUDE REFERENCE</p> <p>6-11 S-IVB STAGE LOSS OF THRUST</p> <p>7-2 LOSS OF ONE APS MODULE</p> <p>7-7 S-IVB AUXILIARY HYDRAULIC PUMP FAILS</p> <p>7-8 LOSS OF ATTITUDE CONTROL DURING TB6 TO TB6 + 9 MIN 10 SEC (CREW IMPLEMENTATION)</p> <p>7-9 CONTINUOUS VENT REGULATOR FAILS TO OPEN</p> <p>7-13 IU ECS WATER VALVE FAILS TO CYCLE OPEN AND CLOSED</p> <p>7-14 S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS -20 PSID OR +36 PSID (CREW IMPLEMENTATION) OR +30 PSID, -26 PSID</p> <p>7-17 LH₂ TANK VENT FAILURE OR LEAK DURING ORBITAL COAST</p> <p>7-18 LOW COLD HELIUM SUPPLY PRESSURE</p> <p>7-19 LOX TANK ULLAGE PRESSURE LOW (CREW IMPLEMENTATION)</p> <p>7-20 J-2 ENGINE START BOTTLE PRESSURE OUTSIDE RESTART LIMITS</p> <p>7-22 S-IVB LOSS OF ENGINE HYDRAULIC FLUID</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB6 | | 8-1 |
| | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 8 - SLV - TB6 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | CUES/NOTES/COMMENTS | |
|---|------|-----------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| | 8-1 | RESERVED | | | | | |
| | 8-2 | <p>S-IVB STAGE O2/H2 BURNER FUEL PROPELLANT VALVE FAILS CLOSED</p> <p>A. PRIOR TO TB6 + 341 SEC</p> <p>B. AFTER TB6 + 341 SEC</p> | TLI | <p>A. <u>CONTINUE MISSION</u></p> <p>BSE INFORM FLIGHT AND COMMAND</p> <ol style="list-style-type: none"> 1. BURNER SHUTDOWN 2. CONTINUOUS VENT SYSTEM ORIFICE OPEN 3. LH2 REPRESSURIZATION CONTROL VALVE CLOSE 4. LOX REPRESSURIZATION CONTROL VALVE CLOSE <p>B. <u>CONTINUE MISSION</u></p> <p>BSE INFORM FLIGHT AND COMMAND</p> <ol style="list-style-type: none"> 1. BURNER SHUTDOWN 2. APSULLAGE ENGINES ON 3. LH2 REPRESSURIZATION CONTROL VALVE CLOSE 4. LOX REPRESSURIZATION CONTROL VALVE CLOSE | | <p><u>CUES</u></p> <p>A AND B</p> <ol style="list-style-type: none"> 1. BURNER CHAMBER DOME TEMPERATURE (C2034-403, C382-403). 2. BURNER PROPELLANT VALVE POSITIONS (K180-404, K192-403, K181-404) 3. AMBIENT REPRESSURIZATION MODE SELECT (K195-404). <p><u>NOTE</u></p> <p>THE O2/H2 BURNER VOTING CIRCUIT WILL NOT DETECT FAILURE OF THE BURNER TO IGNITE OR BURNER FLAME-OUT IN THE EVENT THE FUEL PROPELLANT VALVE FAILS CLOSED.</p> | |
| | 8-3 | LH2 CHILLDOWN SYSTEM FAILS DURING RESTART PREPARATIONS | TLI | <p><u>CONTINUE MISSION</u></p> <p>BSE INFORM FLIGHT AND</p> <ol style="list-style-type: none"> 1. ATTEMPT TO CORRECT SITUATION SPECIFIED IN NOTE A, B, D <p>IF UNSUCCESSFUL, BSE INFORM FLIGHT</p> | | <p><u>CUES</u></p> <ol style="list-style-type: none"> 1. LH2 PUMP INLET TEMP (C3-403). 2. LH2 RECIRC FLOW (F5-404). 3. LH2 PREVALVE DISCRETES (K111-404, K112-404). 4. LH2 BLEED VALVE CLOSE (K127-401). 5. LH2 RECIRC VALVE CLOSE (K136-409). 6. LH2 ULLAGE PRESS TO LH2 PUMP INLET PRESS ΔP (D177-408; D178-408; D2-403). <p><u>NOTE</u></p> <p>LH2 CHILLDOWN WILL NOT BE SATISFACTORY IF</p> <ol style="list-style-type: none"> A. PREVALVE IS OPEN B. RECIRCULATION VALVE IS CLOSED C. BLEED VALVE IS CLOSED D. CHILLDOWN PUMP IS NOT ON | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB6 | | 8-2 |
| | | | | | | | Tape 11C.3 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 8 - SLV - TB6 - CONTINUED

| SECTION 8 - SLV - TB6 - CONTINUED | | | | | | | | | |
|-----------------------------------|------|--------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--|
| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | | CUES/NOTES/COMMENTS | | |
| | 8-4 | S-IVB STAGE LOX CHILLDOWN SYSTEM FAILS DURING RESTART PREPARATIONS | TLI | <u>CONTINUE MISSION/TLI INHIBIT</u> BSE INFORM FLIGHT AND 1. ATTEMPT TO CORRECT SITUATION SPECIFIED IN NOTES 1.A, 1.B, 1.D IF 1 IS UNSUCCESSFUL, BSE INFORM FLIGHT AND BETWEEN TB6 + 4 MIN 10 SEC AND TB6 + 7 MIN 37.8 SEC COMMAND 2. ALTERNATE SEQUENCE 6D IF LOX LEAD EXCEEDS 20 SEC, BSE INFORM FLIGHT AND 3. RECOMMEND TLI INHIBIT | | | <u>CUES FOR CHILLDOWN FAILURE</u> 1. LOX CHILLDOWN FLOW RATE (F4-424). 2. LOX ULLAGE PRESSURE TO LOX DUMP INLET PRESSURE ΔP (D179-406,D180-406,D003-403). 3. LOX PUMP INLET TEMP NOT DECREASING (C4-403). 4. LOX PREVALVE DISCRETES (K109-403, K110-403). 5. LOX BLEED VALVE CLOSED (K126-401). 6. LOX RECIRCULATION VALVE CLOSED (K139-424). <u>CUES FOR MOV FAILURE</u> 1. MOV POSITION INDICATES NOT FULL CLOSED (G3-401). 2. MOV OPEN DISCRETE ON (K120-401). 3. LOX FLOWMETER (F1-401) INDICATES FLOW. 4. LOX INJECTOR PRESSURE (D005-401). <u>NOTES</u> 1. LOX CHILLDOWN WILL NOT BE SATISFACTORY IF (A) PREVALVE IS OPEN (B) RECIRCULATION VALVE IS CLOSED (C) BLEED VALVE IS CLOSED (D) CHILLDOWN PUMP IS NOT ON 2. ALTERNATE SEQ 6D COMMAND WILL ENABLE AN ONBOARD PROGRAMED 8 SEC LOX LEAD BEGINNING AT TB6 + 7 MIN 37.8 SEC. 3. THIS FAILURE WILL REQUIRE EVALUATION OF RESIDUALS TO DETERMINE ADEQUACY FOR TLI VELOCITY CUTOFF AND LUNAR IMPACT OPERATIONS. | | |
| | 8-5 | RESERVED | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB6 | | 8-3 | Tape 27.3 | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 8 - SLV - TB6 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 8-6 | S-IVB ACTUATOR CONFIRMED HARDOVER PRIOR TO TLI IGN AND AUXILIARY HYDRAULIC PUMP IS OPERATING | TLI | CONTINUE MISSION/TLI INHIBIT/CUTOFF A. <u>CONTINUE MISSION</u> IF TIME PERMITS, SET UP FOR THE CREW TO ATTEMPT TO GIMBAL THE ENGINE WITH THE ROTATIONAL HAND CONTROLLER IF THERE IS NOT TIME, OR IF UNSUCCESSFUL, B. <u>TLI INHIBIT/CUTOFF</u> BSE INFORM FLIGHT AND RECOMMEND TLI INHIBIT/ CUTOFF AND IMPLEMENT THE ABOVE PROCEDURE | <u>CUE</u> ACTUATOR POSITIONS ± 5 DEG OR GREATER (G1-400, G1-403, G2-400, G2-403). <u>NOTE</u> BOTH INDIVIDUAL PITCH/YAW ACTUATOR POSITION INDICATORS MUST CONFIRM MALFUNCTION PRIOR TO IMPLEMENTATION OF THE RULE. | | | |
| | 8-7 | S-IVB STAGE CONTINUOUS VENT MODULE A. REGULATOR FAILS TO CLOSE DURING RESTART SEQUENCE B. REGULATOR FAILS TO CLOSE OR ORIFICE SHUTOFF VALVE FAILS TO CLOSE AT TB7 + 2 MIN 30.9 SEC (SEE NOTE) | TLI | A. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND 1. ATTEMPT TO CLOSE THE CVS REGULATOR IF 1 IS UNSUCCESSFUL, BSE INFORM FLIGHT AND COMMAND 2. O2/H2 BURNER SHUTDOWN B. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND 1. ATTEMPT TO CLOSE THE CVS REGULATOR OR THE CVS ORIFICE SHUTOFF VALVE IF 1 IS UNSUCCESSFUL, BSE COMMAND AT TB7 + 15 MIN AND TB7 + 1 HR 15 MIN 2. LH2 LATCHING VENT VALVE OPEN AND LATCH | <u>CUES</u> A.1. CVS NOZZLE PRESSURE REMAINS GREATER THAN 3 PSIA (D181-409 THROUGH D182-409). 2. CVS REGULATOR CLOSED (K154-411). 3. LH2 TANK ULLAGE PRESSURE (D177-408, D178-408). B.1. LH2 TANK CONTINUOUS VENT ORIFICE SHUTOFF VALVE CLOSED (K0155-411). 2. CVS NOZZLE PRESSURE DOES NOT DECREASE TO 0 PSIA AT TB7 + 2 MIN 30.9 SEC (D0181-409, D0182-409). <u>NOTE</u> THIS FAILURE WILL REQUIRE RE-EVALUATION OF ΔV REQUIRED FOR LUNAR IMPACT. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB6 | | 8-4 | Tape 27.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 8 - SLV - TB6 - CONCLUDED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|---------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|------------|
| | 8-8 | LOSS OF ATTITUDE CONTROL DURING S-IVB SECOND BURN | TLI | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND FIDO CREW WILL TAKE ACTION ON LIMITS (NOTE 1) | <u>CUES</u> 1. ANGULAR RATES - PITCH (R4-602), YAW (R5-602), OR ROLL (R6-602) GREATER THAN 5 DEG/SEC AND NOT DECREASING. 2. ANGULAR RATES - PITCH (R13-602), YAW (R8-602), OR ROLL (R12-602) GREATER THAN 5 DEG/SEC AND NOT DECREASING (SEE NOTE 3). 3. LOSS OF ATTITUDE CONTROL ALERT (SEE NOTE 2). <u>NOTES</u> 1. TLI BURN WILL BE TERMINATED FOR (A) PITCH OR YAW BODY RATES GREATER THAN ±10 DEG/SEC (B) ROLL BODY RATE GREATER THAN ±20 DEG/SEC (C) PITCH OR YAW ATTITUDE DEVIATION FROM NOMINAL PROFILES GREATER THAN 45 DEG 2. LOSS OF ATTITUDE CONTROL ALERT WILL BE GIVEN FOR THE FOLLOWING CONDITIONS: (A) LVDC/LVDA COMPUTATIONAL FAILURE. (B) ATTITUDE ERROR SIGNALS-ROLL GREATER THAN ±3.5 DEG, PITCH AND YAW GREATER THAN ±5 DEG. (C) FAILURE TO INITIATE PROPER GUIDANCE SEQUENCE. (D) FAILURE OF S-IVB ENGINE HYDRAULICS. 3. THE CUES ARE VALID IF RATE CHANNEL SWITCHOVER HAS NOT OCCURRED. 4. ROLL ATTITUDE ERRORS >3.5 DEG. MAY BE A RESULT OF LOSS OF BOTH APS MODULES. THE CREW SHOULD ATTEMPT ROLL CONTROL WITH RCS. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB6 | | 8-5 | Tape 11C.4 |

SECTION 9 - SLV - TB8

NASA — MSC

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 9 - SLV - TB8 - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|---|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 9-1 | S-IVB STAGE PNEUMATIC DUMP FAILS TO INITIATE | TLC | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND ATTEMPT TO OPEN THE ENGINE PUMP PURGE CONTROL VALVE | <u>CUES</u> 1. ENGINE PUMP PURGE PRESSURE (D50-403). 2. AMBIENT HELIUM SUPPLY PRESSURE (D236-403, D256-403). <u>NOTES</u> THE STAGE PNEUMATIC BOTTLE WILL BE SAFE AT LIFTOFF AND WILL NOT REACH PROOF PRESSURE PRIOR TO LUNAR IMPACT. |
| | 9-2 | S-IVB LOX DUMP FAILS TO INITIATE | TLC | <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND ATTEMPT TO INITIATE THE THE REQUIRED LOX DUMP | <u>CUES</u> 1. MAIN OXIDIZER VALVE POSITION (G3-401). 2. MAIN OXIDIZER VALVE OPEN DISCRETE (K120-401). 3. LOX PUMP INLET TEMPERATURE (C4-403). 4. LOX FLOW RATE (F1-401). 5. LOX PREVALVE OPEN DISCRETE (K109-403). 6. LOX PREVALVE CLOSE DISCRETE (K110-403). <u>NOTES</u> 1. LOX DUMP WILL FAIL TO INITIATE IF (A) THE MOV REMAINS CLOSED (B) THE LOX PREVALVE REMAINS CLOSED 2. IF A LOX DUMP IS UNSUCCESSFUL, A RE-EVALUATION OF THE LUNAR IMPACT ΔV WILL BE REQUIRED. |
| | 9-3 | ENGINE CONTROL BOTTLE DUMP FAILS TO INITIATE < | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 9 - SLV - TB8 - CONCLUDED

| R | ITEM | | | | | | |
|---|------|---------------------------------------------------------------------------|--------------------|----------------|--------------------|-----------------|----------------------------------------------------|
| | | <u>PRELAUNCH INSTRUMENTATION</u> | | | | | |
| | | STAGE COMMUNICATIONS SYSTEM AND FLIGHT CONTROL MEASUREMENT CATEGORIZATION | | | | | |
| | | <u>MEASUREMENT DESCRIPTION</u> | <u>MEAS NUMBER</u> | <u>ONBOARD</u> | <u>TRANSDUCERS</u> | <u>CATEGORY</u> | <u>MISSION RULE REF</u> |
| | | <u>STAGE COMMUNICATIONS SYSTEM</u> | | | | | |
| | | S-II STAGE | | | | | |
| | | LINK BP1 | | | | HD | |
| | | MUX BP1AO | | | | HD | |
| | | MUX BP1BO | | | | HD | |
| | | MUX CP1AO | | | | HD | |
| | | S-IVB STAGE | | | | | |
| | | LINK CP1 | | | | HD | |
| | | MUX DP1BO (VIA IU) | | | | M | |
| | | MUX CP1BO | | | | HD | |
| | | INSTRUMENT UNIT | | | | | |
| | | LINK DP1 | | | | HD | |
| | | LINK DP1B | | | | M | |
| | | MUX CP1AO (VIA S-IVB) | | | | HD | |
| | | MUX DP1AO | | | | HD | |
| | | EMERGENCY DETECTION SYSTEM (EDS) | | | | | |
| | | | | | | M | |
| | | COMMAND COMMUNICATIONS SYSTEM (CCS) UPLINK | | | | | |
| | | | | | | M | |
| | | <u>FLIGHT CONTROL MEASUREMENTS</u> | | | | | |
| | | S-IVB STAGE | | | | | |
| | | PRESS, FUEL PUMP INLET | D2-403 | | | | 7-14 |
| | | PRESS, FUEL TANK ULLAGE EDS 1 | D177-408 | METER* | COMMON | 2 OF 3 | 7-14 |
| | | PRESS, FUEL TANK ULLAGE EDS 2 | D178-408 | METER* | COMMON | M | 7-14/19 |
| | | PRESS, OXID PUMP INLET | D3-403 | | | | |
| | | PRESS, OXID TANK ULLAGE EDS 1 | D179-406 | METER* | COMMON | 2 OF 3 | 7-14/19,8-5 |
| | | PRESS, OXID TANK ULLAGE EDS 2 | D180-406 | METER* | COMMON | M | 7-14/19,8-5 |
| | | INSTRUMENT UNIT | | | | | |
| | | GUIDANCE COMPUTER OPERATION | H60-603 | | | M | 6-1/4/7/9, 7-8/11,8-1/8 |
| | | COMPUTER RESET PULSE NO. 1-GUIDANCE DECODER | J71-603 | | | | REQUIRED TO COMPLETE MULTIPLE WORD GROUND COMMANDS |
| | | COMPUTER RESET PULSE NO. 2-GUIDANCE DECODER | J72-603 | | | 1 OF 2 M | |
| | | *ONBOARD DISPLAY MANDATORY | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | SLV - TB8 | PRELAUNCH INSTR | 9-3 |
| | | | | | | | Tape 27.8 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM

| R | ITEM | | | | | | |
|---|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|--------------------------------|---------|-----------|
| | | <u>GENERAL</u> | | | | | |
| | 10-1 | <p><u>LAUNCH</u></p> <p>LAUNCH WILL BE CONTINUED AS LONG AS THE SUIT CIRCUIT AND O₂ SUPPLY WILL SUPPORT FLIGHT CREW DEMANDS FOR AT LEAST ONE REV AND ENTRY INTO 2-1. THERE ARE NO COOLANT FAILURES FOR WHICH LAUNCH/INSERTION PHASE WILL BE TERMINATED.</p> <p><u>TLC & TEC</u></p> <p>WATER EVAPORATION WILL BE LIMITED TO COMPONENT TESTING.</p> <p><u>POWERED DESCENT</u></p> <p>THERE ARE NO CSM ENVIRONMENTAL CONTROL SYSTEMS FAILURES FOR WHICH POWERED DESCENT WILL BE TERMINATED.</p> <p><u>ALL PHASES</u></p> <p>A. BACKUP SYSTEMS AND BACKUP COMPONENTS WILL NORMALLY BE USED FOR THE MOST RAPID PRACTICAL RETURN TO EARTH, NOT FOR MISSION CONTINUATION.</p> <p>B. LM SYSTEMS WILL BE USED AS REQUIRED FOR CSM SYSTEMS BACKUP. IF CSM SYSTEMS REQUIRE LM BACKUP, THE DESCENT STAGE WILL BE RETAINED WHERE POSSIBLE.</p> <p>C. TO CONTINUE, WATER QUANTITY PREDICTIONS MUST REFLECT ADEQUATE QUANTITIES TO MEET NORMAL MISSION REQUIREMENTS.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ENVIRONMENT CONTROL SYSTEM | GENERAL | 10-1 |
| | | | | | | | |
| | | | | | | | Tape 33.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM - CONTINUED

| R | ITEM |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| | 10-2 |
| <u>DEFINITIONS</u> | |
| LOSS OF CABIN INTEGRITY: CM PRESSURE VESSEL LEAKAGE SUCH THAT CABIN PRESSURE CANNOT BE MAINTAINED GREATER THAN OR EQUAL TO 4.5 PSIA BY CABIN PRESSURE REGULATORS (1.2 LB/HR TOTAL). | |
| LOSS OF SUIT/SUIT CIRCUIT INTEGRITY: <ul style="list-style-type: none">• PGA CHECK WITH LEAKAGE GREATER THAN 0.5 PSI/MIN DURING PGA CHECK.• TOTAL LOOP CHECK WHICH RESULTS IN ECS O₂ FLOW > 0.9 LB/HR AFTER SUIT TEST PRESSURE STABILIZATION DURING SUIT CIRCUIT INTEGRITY CHECK. | |
| LOSS OF SUIT CIRCUIT: INABILITY OF THE SUIT CIRCUIT TO MAINTAIN ADEQUATE CREW COMFORT AND/OR CO ₂ REMOVAL WITHOUT USING DIRECT O ₂ . | |
| LOSS OF O ₂ MANIFOLD: AN O ₂ MANIFOLD OR REGULATOR FAILURE WITH WHICH THE SUIT CIRCUIT O ₂ DEMANDS CANNOT BE SUPPLIED FOR ENTRY. | |
| LOSS OF PRIMARY LOOP COOLING: LOSS OF ALL FLOW, A LEAK WHICH CANNOT BE ISOLATED, OR COMBINED FAILURES SUCH THAT RADIATORS AND EVAPORATOR PROVIDE NO COOLING. | |
| LOSS OF SECONDARY LOOP COOLING: LOSS OF ALL FLOW, A LEAK WHICH CANNOT BE ISOLATED, OR COMBINED FAILURES SUCH THAT RADIATORS AND EVAPORATOR PROVIDE NO COOLING. | |
| LOSS OF COLLANT LOOP RADIATORS: RADIATOR LEAK, BLOCKAGE OF ALL FLOW THROUGH RADIATORS, OR RADIATOR DEGRADATION SUCH THAT TOTAL LONG-TERM USAGE OF WATER IS MORE THAN IS BEING PRODUCED. | |
| LOSS OF ALL COOLING: LOSS OF PRIMARY AND SECONDARY LOOP COOLING. | |
| LOSS OF SURGE TANK AND/OR REPRESS PACK: SURGE TANK, REPRESS PACK, OR ASSOCIATED ISOLATABLE PLUMBING FAILURES WHICH REQUIRE ISOLATION OF THE SURGE TANK AND/OR REPRESS PACK. | |
| RULE NUMBERS 10-3 THROUGH 10-9 ARE RESERVED. | |

| MISSION | REV | DATE | SECTION | GROUP | PAGE | |
|-----------|-----|--------|--------------------------------|---------|------|-----------|
| APOLLO 17 | FNL | 9/1/72 | CSM ENVIRONMENT CONTROL SYSTEM | GENERAL | 10-2 | Tape 33.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM - CONTINUED

| R | ITEM | SYSTEMS MANAGEMENT | | | | | |
|-------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|--------------------------------|------------|------|
| 10-10 | <u>O₂ SYSTEM</u> | <p>A. SUIT FLOW RELIEF VALVE WILL REMAIN CLOSED FOR DURATION OF FLIGHT.</p> <p>B. NORMAL CM REPRESSURIZATION WILL UTILIZE THE REPRESS PACK.</p> <p>C. THE REPRESS PACK VALVE WILL BE IN OFF POSITION FOR ALL PHASES EXCEPT LAUNCH, CSM EVA, ENTRY, AND TUNNEL/LM PRESSURIZATION AND RECHARGE.</p> <p>D. THE SUIT CIRCUIT MUST BE PURGED OF ACCUMULATED H₂ ONCE EVERY 6 HOURS FOR 1 MINUTE WHEN ALL CREWMEN ARE SUITED AND THE SUIT CIRCUIT IS ISOLATED.</p> <p>E. THE SURGE TANK AND REPRESS PACK WILL NORMALLY BE RECHARGED SIMULTANEOUSLY.</p> <p>F. CM CABIN PRESSURE WILL NOT BE ALLOWED TO DROP BELOW 4.0 PSIA DURING NORMAL LM PRESSURIZATION EXCEPT DURING TD&E.</p> <p>G. THE CM ECS WILL NORMALLY SUPPLY ALL O₂ FOR CONSUMPTION AND LEAKAGE DURING IVT PHASES.</p> <p>H. THE FLIGHT CREW WILL DON SUITS FOR THE FOLLOWING:</p> <ol style="list-style-type: none"> 1. INABILITY TO MAINTAIN CABIN PRESSURE ABOVE 4.5 PSIA 2. TD&E 3. GLYCOL LEAKS IN COMMAND MODULE 4. FIRE, SMOKE, AND/OR CONTAMINATION IN CABIN 5. LM JETT 6. CSM EVA <p>I. THE FLIGHT CREW WILL DOFF SUITS (TIME AND CONDITIONS PERMITTING) FOR THE FOLLOWING:</p> <ol style="list-style-type: none"> 1. LOSS OF SUIT CIRCUIT 2. CONFIRMED LEAK OF GLYCOL IN SUIT CIRCUIT <p><u>COOLANT MANAGEMENT</u></p> <p>A. FOR SIMULTANEOUS PRIMARY AND SECONDARY LOOP OPERATION, EITHER THE PRIMARY OR SECONDARY LOOP RADIATOR WILL NORMALLY BE ISOLATED.</p> <p>B. GLYCOL RESERVOIR WILL BE ON LINE AND RADIATORS WILL BE BYPASSED FOR LAUNCH.</p> <p>C. INDICATED GLYCOL ACCUMULATOR QUANTITY WILL BE MAINTAINED BETWEEN 30 AND 70 PERCENT.</p> <p>D. SECONDARY COOLANT WILL BE OFF FOR LAUNCH.</p> <p>E. ADDITIONAL POWER LOADS WILL BE ADDED AS REQUIRED IN AN ATTEMPT TO MAINTAIN PRIMARY RADIATOR OUTLET TEMPERATURE GREATER THAN -20 DEG.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ENVIRONMENT CONTROL SYSTEM | MANAGEMENT | 10-3 |

Tape 57.8

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM - CONTINUED

| R | ITEM | |
|---|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 10-10 (CONT) | <p><u>WATER SYSTEM</u></p> <p>A. WASTE WATER WILL BE MANUALLY DUMPED OVERBOARD AS REQUIRED TO MAINTAIN INDICATED QUANTITY LESS THAN 85-90 PERCENT. WASTE WATER WILL NORMALLY BE DUMPED TO 15 PERCENT. HOWEVER, IF WASTE WATER QUANTITY INSTRUMENTATION (CF0009) IS LOST, WASTE WATER WILL BE DUMPED UNTIL POTABLE WATER QUANTITY (CF0010) BEGINS TO DECREASE.</p> <p>B. WATER DUMPS WILL BE MANAGED SO THAT:</p> <ol style="list-style-type: none">1. AT LOI, THE WASTE TANK WILL CONTAIN GREATER THAN 75 PERCENT2. AT CM-SM SEPARATION, THE POTABLE TANK WILL BE FULL AND THE WASTE TANK WILL BE 90 PERCENT FULL <p>C. WATER DUMPS AND FUEL CELL PURGES WILL NORMALLY BE SCHEDULED TO OCCUR:</p> <ol style="list-style-type: none">1. IMMEDIATELY AFTER THE SEXTANT STAR CHECK IN MANEUVER PREPARATION - OR CISELUNAR NAVIGATION - OR NO LATER THAN 1 HOUR BEFORE AN OPTICAL SIGHTING2. BEHIND THE MOON, WITH THE COMPLETION OF THE DUMP OR PURGE BEFORE AOS <p>D. IN ORDER TO REDUCE TRAJECTORY CALCULATION PERTUBATIONS, WATER DUMPS AND FUEL CELL PURGES WILL NOT BE SCHEDULED:</p> <ol style="list-style-type: none">1. TEN HOURS BEFORE MCC-4 UNTIL AFTER LOI2. DURING MSFN TRACKING PERIODS3. TEN HOURS BEFORE MCC-7 UNTIL ENTRY <p>E. WATER DUMPS, FUEL CELL PURGES, AND URINE DUMPS WILL BE INHIBITED:</p> <ol style="list-style-type: none">1. THREE HOURS BEFORE AND UNTIL IMMEDIATELY AFTER PAN CAMERA AND MAPPING CAMERA OPERATIONS2. FIFTEEN MIN BEFORE AND UNTIL IMMEDIATELY AFTER FAR UV SPECTROMETER OPERATION (ONLY EFFECTIVE FOR FIRST TWO DAYS AFTER CIRCULUNAR ORBIT).3. BEFORE AND UNTIL IMMEDIATELY AFTER IR OPERATION. <p><u>SYSTEM BACKUP</u></p> <p>LM SYSTEMS WILL BE USED AS REQUIRED FOR CSM SYSTEMS BACKUP. DESCENT AND/OR ASCENT STAGE WILL BE RETAINED IF POSSIBLE.</p> <p>RULE NUMBERS 10-11 THROUGH 10-19 ARE RESERVED.</p> |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|---|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------|
| | | | | <div>SPECIFIC</div> | |
| | 10-20 | CABIN PRESSURE CANNOT BE RELIEVED | LAUNCH | <u>CONTINUE MISSION</u> | NORMAL RELIEF STARTS AT 50 SECONDS |
| | 10-21 | CABIN PRESSURE DECREASING AND/OR LESS THAN 4.5 PSIA AND: A. SUIT PRESSURE GREATER THAN 3.5 PSIA B. SUIT PRESSURE LESS THAN 3.5 PSI C. LOSS OF SUIT CIRCULATION | LAUNCH LAUNCH LAUNCH < | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|--------------------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------|-----------|
| | 10-22 | LOSS OF SUIT CIRCUIT, CABIN STABLE AND GREATER THAN 4.5 PSIA | LAUNCH | A. <u>CONTINUE MISSION</u> OPEN DIRECT O2 VALVE 45 DEG FROM LAUNCH SETTING | LM SYSTEMS (IF AVAILABLE) WILL BE USED FOR CO2 AND H2O REMOVAL. A. CORRESPONDS TO 12.6 LB/HR (APPROX 3 CFM/CREWMAN) | | | |
| | | | PRE-PDI | B. <u>ENTER NEXT BEST PTP</u> NO-GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI IF POSSIBLE | | | | |
| | | | POWERED DESCENT | C. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY | | | | |
| | | | ALL | D. <u>ENTER NEXT BEST PTP</u> 1. DOFF SUITS 2. OPEN WASTE OVERBOARD DRAIN VALVE TO OBTAIN CABIN BLEED FLOW 3. DON FACE MASKS AFTER 1 HR 4. IF VACUUM CLEANER FUNCTIONAL AND TIME PERMITS, USE L10H CANISTER ASSEMBLY SHOWN IN CONTINGENCY CHECKLIST C/2-26(5). | D.2. WASTE OVERBOARD BLEED = 1.0 LB O2/HR 3. TIME REQUIRED FOR CM CO2 PARTIAL PRESSURE TO INCREASE TO 7.6 mm HG: 1 CREWMAN - 4 HR 3 CREWMAN - 80 MIN | | | |
| | 10-23 | LOSS OF SURGE TANK OR REPRESS PACK | TEC | A. NO-GO FOR CSM EVA UNLESS OPS AVAILABLE FOR USE BY CDR AND LMP | FOR LEAK IN SURGE TANK, ISOLATE SURGE TANK AND PLACE REPRESS PKG VALVE TO FILL. | | | |
| | | | ALL | B. <u>CONTINUE MISSION</u> | | | | |
| | 10-24 | LOSS OF SURGE TANK AND REPRESS PACK | LAUNCH | A. <u>CONTINUE MISSION</u> | | | | |
| | | | ALL | B. <u>CONTINUE MISSION</u> PLAN TO RESTORE ENTRY O2 BY STORING OPS IN CM AT FINAL LM EGRESS. | B. OPS O2 QTY - 4 LB/OPS (TWO OPS AVAILABLE) | | | |
| | | | TEC | C. <u>CONTINUE MISSION</u> DOFF SUITS FOR ENTRY. NO-GO FOR CSM EVA | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ENVIRONMENT CONTROL SYSTEM | SUIT/CABIN | 10-6 | Tape 33.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|---------------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------------|------|-----------|
| | 10-25 | FIRE OR SMOKE IN COMMAND MODULE | LAUNCH | A. <u>ABORT</u> 1. DECOMPRESS CABIN 2. TROUBLESHOOT ELECTRICAL SYSTEM PER FLIGHT CREW CHECKLIST BOOST FIRE PROCEDURES. | | | | |
| | | | PRE-PDI | B. <u>ENTER NEXT BEST PTP</u> NO-GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI | | | | |
| | | | POWERED | C. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY | | | | |
| | | | TEC | D. <u>NO-GO FOR CSM EVA</u> | | | | |
| | | | ALL | E.1. TROUBLESHOOT/COMBAT FIRE PER FLIGHT CREW CHECKLIST EMERGENCY PROCEDURES. 2. ASSESS DAMAGE AND REMOVE POWER FROM AFFECTED SYSTEMS 3. <u>ENTER NEXT BEST PTP</u> RETAIN LM, IF POSSIBLE. | | | | |
| | 10-26 | CONTAMINATION IN CABIN | ALL | CREW MAY ELECT TO DECOMPRESS | IF UNABLE TO CLEAR CONTAMINATION, MISSION MAY BE TERMINATED EARLY. | | | |
| | 10-27 | LOSS OF SUIT INTEGRITY | LAUNCH | A. <u>CONTINUE MISSION</u> | | | | |
| | | | ALL | B. <u>CONTINUE MISSION</u> NO-GO FOR UNDOCK | | | | |
| | | | TEC | C. <u>NO-GO FOR CSM EVA</u> | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ENVIRONMENT CONTROL SYSTEM | SUIT/CABIN | 10-7 | Tape 33.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------|-----------|
| | 10-28 | LOSS OF O2 MANIFOLD A. O2 MANIFOLD LEAKS GREATER THAN 4 LB/HR AND CABIN PRESSURE GREATER THAN 4.5 PSIA B. O2 MANIFOLD LEAKS GREATER THAN 4 LB/HR AND CABIN PRESSURE LESS THAN 4.5 PSIA | LAUNCH UNDOCKED PRE-PDI POWERED DESCENT/ LUNAR STAY ALL LAUNCH ALL | A.1. <u>CONTINUE MISSION</u> 2. <u>CONTINUE MISSION</u> 3. <u>ENTER NEXT BEST PTP</u> (A) VERIFY SURGE TANK AND REPRESS PACK ISOLATED UNTIL ENTRY (B) RETRIEVE OPS FROM LM, IF DOCKED (C) NO-GO FRO CSM EVA B.1. <u>ABORT ASAP</u> 2. <u>ENTER ASAP</u> USE OPS IN SUITED MODE FOR ENTRY IF PRACTICAL | LM O2 (IF AVAILABLE) MAY BE USED TO SUPPLE- MENT CSM SUPPLY. A.3. APPROXIMATELY 5 HOURS ARE REQUIRED TO DEplete CABIN O2 FROM 4.8 TO 3.5 PSIA, WITH 0.456 LB/HR USAGE RATE (CREW + CABIN LEAK + TANK PRESS BLEED). A.3.(B) CREW OPTION TO USE LM ENVIRONMENT FOR EARTH RETURN IN LIEU OF MANUAL CABIN PRESSURE REGULATION. | | | |
| | 10-29 | LOSS OF ONE MAIN REGULATOR A. FAILED CLOSED B. FAILED OPEN | TEC/EO UNDOCK ALL ALL | A.1. NO-GO FOR CSM EVA UNLESS OPS AVAILABLE FOR USE BY CDR AND LMP 2. CONSIDERATION WILL BE GIVEN TO UNDOCKING 3. <u>CONTINUE MISSION</u> B. <u>CONTINUE MISSION</u> | | | | |
| | 10-30 | BOTH MAIN REGULATORS FAILED CLOSED | LAUNCH LO UNDOCKED/ PRE-PDI POWERED DESCENT/ LUNAR STAY ALL | A. <u>CONTINUE MISSION</u> B. <u>NO-GO FOR UNDOCKING</u> C. <u>CONTINUE MISSION</u> D. <u>ENTER NEXT BEST PTP</u> NO-GO FOR CSM EVA | LM SYSTEMS (IF AVAILABLE) MAY BE USED IN LIEU OF CSM SYSTEMS. D. SUIT LOOP PRESSURE WILL DROP FROM 3.75 PSIA TO 2.5 PSIA IN APPROXIMATELY 9 MINUTES. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ENVIRONMENT CONTROL SYSTEM | SUIT/CABIN | 10-8 | Tape 34.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|------------------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|------------|------|-----------|
| | 10-31 | LOSS OF ONE SUIT COMPRESSOR | ALL TEC | A. <u>CONTINUE MISSION</u> B. <u>NO-GO FOR CSM EVA</u> | | | | |
| | 10-32 | LOSS OF TWO SUIT COMPRESSORS | LAUNCH EO LO ALL | A. <u>CONTINUE MISSION</u> OPEN DIRECT 02 45 DEG FROM LAUNCH SETTING B. <u>CONTINUE MISSION</u> NO-GO FOR TLI C. <u>NO-GO FOR UNDOCKING</u> D. <u>CONTINUE MISSION</u> NO-GO FOR CSM EVA | VACUUM CLEANER MAY BE CONNECTED TO SUIT LOOP BUT WILL NOT PROVIDE SUIT INTEGRITY. CONSIDERATION WILL BE GIVEN TO RETAINING LM. | | | |
| | | RULE NUMBERS 10-33 THROUGH 10-39 ARE RESERVED. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ENVIRONMENT CONTROL SYSTEM | SUIT/CABIN | 10-9 | Tape 34.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|------------|
| | 10-40 | PRIMARY COOLANT LOOP MALFUNCTIONS | | | | | | |
| | | A. LOSS OF EVAPORATOR | LAUNCH | A.1. <u>CONTINUE MISSION</u> | | | | |
| | | | ALL | 2. <u>CONTINUE MISSION</u> ACTIVATE SECONDARY COOLANT LOOP WITH RADIATORS IN BYPASS AS REQUIRED TO MAINTAIN PRIMARY EVAPORATOR OUT TEMP LESS THAN 90° F OR AS REQUIRED FOR CREW COMFORT. | A.2.(A) MAINTAIN PRI RAD OUT TEMP GREATER THAN -20° F. (B) WATER MANAGEMENT MAY DICTATE ACTIVATION AND DEACTIVATION OF SECONDARY LOOP TO MAINTAIN PRIMARY RAD OUT TEMP BETWEEN 45° AND 90° F. | | | |
| | | B. LOSS OF EITHER RADIATOR PANEL | LAUNCH | B.1. <u>CONTINUE MISSION</u> | B.1. ALTERNATE MISSION MAY BE PERFORMED | | | |
| | | | ALL | 2. BASED ON WATER AVAILABLE FOR EVAPORATIVE COOLING THE MISSION WILL BE CONTINUED USING SECONDARY RADIATORS SUPPLEMENTED BY PRIMARY LOOP EVAPORATOR. | | | | |
| | | C. TOTAL LOSS OF LOOP | LAUNCH | C.1. <u>CONTINUE MISSION</u> ACTIVATE SECONDARY LOOP | | | | |
| | | | EO | 2. <u>CONTINUE MISSION</u> NO-GO FOR TLI. ACTIVATE SECONDARY LOOP | C.2. ALTERNATE MISSION MAY BE PERFORMED. | | | |
| | | | POWERED DESCENT/ LUNAR STAY | 3. <u>CONTINUE MISSION</u> ACTIVATE SECONDARY LOOP. | | | | |
| | | | TEC | 4. <u>NO-GO FOR CSM EVA</u> | | | | |
| | | | ALL | 5. BASED ON AMOUNT OF WATER AVAILABLE, CONSIDERATION WILL BE GIVEN TO CONTINUING MISSION ON SECONDARY LOOP. | | | | |
| | | D. LOSS OF BOTH PRIMARY RADIATOR PANELS | LAUNCH | D.1. CONTINUE MISSION ACTIVATE SECONDARY LOOP | | | | |
| | | | EO | 2. CONTINUE MISSION NO GO FOR TLI, ACTIVATE SECONDARY LOOP | | | | |
| | | | ALL | 3. BASED ON AMOUNT OF WATER AVAILABLE CONSIDERATION WILL BE GIVEN TO CONTINUING MISSION ON SECONDARY LOOP. | | | | |
| | 10-41 | SECONDARY LOOP MALFUNCTIONS | | | | | | |
| | | A. LOSS OF EVAPORATOR | ALL | A. <u>CONTINUE MISSION</u> | | | | |
| | | B. LOSS OF RADIATORS | EO | B. <u>CONTINUE MISSION</u> | B. LOOP IS STILL OPERATIONAL IN EVAPORATIVE MODE. | | | |
| | | C. TOTAL LOSS OF LOOP | ALL | C. <u>CONTINUE MISSION</u> | | | | |
| | 10-42 | LOSS OF PRIMARY AND SECONDARY EVAPORATORS | ALL | <u>CONTINUE MISSION</u> | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ENVIRONMENT CONTROL SYSTEM | COOLANT | 10-10 | Tape 11C.5 |

MISSION RULES

[illegible]

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM - CONCLUDED

| R | ITEM | INSTRUMENTATION REQUIREMENTS | | | | | |
|---|-------|------------------------------|---------|---------|--------------------------------|--------------------|--------------------|
| | 10-60 | MEAS DESCRIPTION | PCM | ONBOARD | TRANSDUCER | CATEGORY | MSN RULE REFERENCE |
| | | CABIN PRESS | CF0001P | METER | COMMON | 1 OF | 10-20 |
| | | SUIT PRESS | CF0012P | METER | COMMON | 3 M | |
| | | TANK BLADDER PRESS | CF0120P | ----- | ----- | | |
| | | SURGE TANK PRESS | CF0006P | METER | COMMON | 1 OF | 10-28 |
| | | OXYGEN REPRESS PRESS | ----- | METER | ----- | 2 M | |
| | | PRIM ACCUM QTY | CF0019Q | METER | COMMON | 1 OF | 10-40, |
| | | PRIM PUMP OUT PRESS | CF0016P | METER | COMMON | 2 M | 10-44 |
| | | POTABLE H2O QTY | CF0010Q | METER | COMMON | HD | 10-53, |
| | | WASTE H2O QTY | CF0009Q | METER | COMMON | HD | 10-52 |
| | | SEC STEAM PRESS | CF0073P | METER | COMMON | HD | 10-41 |
| | | SEC EVAP OUT TEMP | CF0071T | METER | COMMON | HD | |
| | | SEC ACCUM QTY | CF0072Q | METER | COMMON | HD | |
| | | SEC PUMP OUT PRESS | CF0070P | METER | COMMON | HD | |
| | | PRIM EVAP OUT TEMP | CF0018T | METER | COMMON | HD | |
| | | PRIM STEAM PRESS | CF0034 | METER | COMMON | HD | |
| | | ECS O2 FLOW | CF0035R | METER | COMMON | HD | |
| | | O2 MANIFOLD PRESS | CF0036P | ----- | ----- | HD | |
| | | SUIT COMP PRESS | CF0015P | METER | COMMON | HD | |
| | | PRIM RAD OUT TEMP | CF0020T | METER | COMMON | HD | |
| | | PRIM EVAP INLET TEMP | CF0181T | ----- | ----- | HD | |
| | | STEAM DUCT TEMP | CF0017T | ----- | ----- | HD | |
| | | SEC RAD OUT TEMP | SF0263T | METER | ----- | HD | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ENVIRONMENT CONTROL SYSTEM | INSTR REQUIREMENTS | 10-13 |
| | | Tape 53.5 | | | | | |

MISSION RULES

| R | ITEM | | | | | | | | | | | | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------|------|-----------|-------|------|--|-----------|-----|--------|----------------|---------|------|-----------|
| | | <u>GENERAL</u> | | | | | | | | | | | | | | |
| 11-1 | <u>LAUNCH</u> | <p>THERE ARE NO CRYO FAILURES FOR WHICH THE LAUNCH/INSERTION PHASE WILL BE TERMINATED. FOR COMPLETE LOSS OF THE SYSTEM RESULTING IN THREE FUEL CELL FAILURES, ENTRY WILL BE PLANNED INTO PTP 3-1. THREE ENTRY BATTERIES AND THE AUX BAT ARE CAPABLE OF SUPPORTING THE LAUNCH AS LONG AS THREE REVS POWERED DOWN TO 50 AMPS AND ENTRY.</p> | | | | | | | | | | | | | | |
| 11-2 | <u>ALL PHASES</u> | <p>THE CRYOGENICS SYSTEM IS REQUIRED UNTIL CM/SM SEP SO THAT THE ENTRY AND LANDING PHASES WILL BE ENTERED INTO WITH FULL CONSUMABLES POTENTIAL, THAT IS, FULLY CHARGED ENTRY BATTERIES AND ENTRY O₂ TANKS. IF THIS CAPABILITY IS POTENTIALLY JEOPARDIZED BY CRYO SYSTEMS DEPLETION OR MALFUNCTION, MISSION TERMINATION PROCEDURES WILL BE ENACTED IN WHATEVER TIMEFRAME IS APPROPRIATE OR AVAILABLE. ANY ENTRY BATTERY OR ENTRY O₂ USAGE AFTER LOSS OF RECHARGE CAPABILITY FROM THE CRYO SYSTEM WILL REDUCE SUPPLY AVAILABLE FOR ENTRY, LANDING, AND POSTLANDING.</p> | | | | | | | | | | | | | | |
| 11-3 | <u>POWERED DESCENT</u> | <p>THERE ARE NO CRYO SYSTEM FAILURES FOR WHICH POWERED DESCENT WILL BE TERMINATED.</p> | | | | | | | | | | | | | | |
| 11-4 | | <p>LOSS OF CRYOGENIC TANK IS DEFINED AS:</p> <ul style="list-style-type: none"> A. PRESSURE CANNOT BE MAINTAINED ABOVE 150 PSIA FOR O₂ AND 100 PSIA FOR H₂. B. A LEAK WHICH, COMBINED WITH A 40-AMP LOAD FLOW FROM THE TANK, WILL DEplete THE TANK BEFORE CM/SM SEP. C. LOSS OF ALL HEATERS IN AN O₂ TANK, LOSS OF 2 HEATERS AND ONE FAN IN H₂ TANKS 1 AND 2, OR LOSS OF BOTH FANS IN H₂ TANK 3. | | | | | | | | | | | | | | |
| 11-5 | | <p>THE LUNAR MISSION WILL BE CONTINUED IF THE H₂ AND O₂ TANKS MEET REDLINE CRITERIA AND THE LOWEST TWO TANKS ARE CAPABLE OF SUPPORTING AN EARTH RETURN FROM ANY POINT WITH AT LEAST AN AVERAGE POWER LEVEL OF 40 AMPS.</p> | | | | | | | | | | | | | | |
| 11-6 | | <p>EARTH ORBIT MISSION WILL BE CONTINUED AS LONG AS ENOUGH TOTAL CRYO (O₂, H₂) IS AVAILABLE TO PERFORM AN ENTRY INTO THE NEXT DAILY GO/NO-GO AREA.</p> <p>RULE NUMBERS 11-7 THROUGH 11-9 ARE RESERVED.</p> | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">MISSION</th><th style="width: 5%;">REV</th><th style="width: 10%;">DATE</th><th style="width: 20%;">SECTION</th><th style="width: 15%;">GROUP</th><th style="width: 10%;">PAGE</th><th style="width: 25%;"></th></tr> </thead> <tbody> <tr> <td>APOLLO 17</td><td>FNL</td><td>9/1/72</td><td>CSM CRYOGENICS</td><td>GENERAL</td><td>11-1</td><td style="text-align: right;">Tape 35.1</td></tr> </tbody> </table> | | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | CSM CRYOGENICS | GENERAL | 11-1 | Tape 35.1 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | CSM CRYOGENICS | GENERAL | 11-1 | Tape 35.1 | | | | | | | | | | |

SECTION 11 - CSM CRYOGENICS - CONTINUED

NASA — MSC

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 11 - CSM CRYOGENICS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------|------|-----------|
| | | | | <div>SPECIFIC MISSION RULES</div> | | | | |
| | 11-20 | LOSS OF ONE O2 TANK | LAUNCH ALL POST DOCK TEC | A. <u>CONTINUE MISSION</u> B. CONSIDERATION WILL BE GIVEN TO CONTINUING THE MISSION AFTER LOSS OF A TANK C. <u>JETTISON LM</u> D. CONSIDERATION WILL BE GIVEN TO PERFORMING CSM EVA IF TANKS 1 AND 2 OR 1 AND 3 REMAIN AND QUANTITY IN 2 OR 3 IS LESS THAN 60 PERCENT | LM, PLSS, AND OPS O2 WILL BE USED AS REQUIRED TO SUPPLEMENT CSM O2. | | | |
| | 11-21 | LOSS OF TWO O2 TANKS AND/OR TWO H2 TANKS | LAUNCH EO POWERED DESCENT ALL | A. <u>CONTINUE MISSION</u> B. <u>CONTINUE MISSION</u> NO-GO FOR TLI C. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY D. <u>ENTER NEXT BEST PTP</u> RETAIN LM IF POSSIBLE | | | | |
| | 11-22 | LOSS OF ONE H2 TANK | LAUNCH ALL POST DOCK | A. <u>CONTINUE MISSION</u> B. CONSIDERATION WILL BE GIVEN TO CONTINUING THE MISSION AFTER LOSS OF A TANK C. <u>ENTER NEXT BEST PTP</u> JETTISON LM | | | | |
| | 11-23 | LOSS OF THREE O2 TANKS AND/OR THREE H2 TANKS | LAUNCH TLC POWERED DESCENT ALL | A. <u>CONTINUE MISSION</u> ISOLATE SURGE TANK BEFORE 800 PSIA B. <u>ENTER NEXT BEST PTP</u> NO-GO FOR LOI C. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY D. <u>ENTER NEXT BEST PTP</u> RETAIN LM IF POSSIBLE | AUX BATTERY WILL POWER SMC'S. | | | |
| | | RULE NUMBERS 11-24 THROUGH 11-49 ARE RESERVED. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM CRYOGENICS | SPECIFIC | 11-3 | Tape 35.3 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 11 - CSM CRYOGENICS - CONCLUDED

| R | ITEM | INSTRUMENTATION REQUIREMENTS | | | | | |
|--------------------------------------------------------------------|-------|------------------------------|---------|---------|----------------|-----------|--------------------|
| | 11-50 | MEAS DESCRIPTION | PCM | ONBOARD | TRANSDUCERS | CATEGORY | MSN RULE REFERENCE |
| | | 02 TANK 1 QTY | SC0032Q | METER | COMMON | 1 OF 3 | 11-20,21,22 |
| | | 02 TANK 2 QTY | SC0033Q | METER | COMMON | MANDATORY | |
| | | 02 TANK 3 QTY | SC0051Q | METER | COMMON | | |
| | | 02 TANK 1 TEMP | SC0041T | ---- | ----- | HIGHLY | 11-20,21,22 |
| | | 02 TANK 2 TEMP | SC0042T | ---- | ----- | DESIRABLE | |
| | | 02 TANK 3 TEMP | SC0055T | ---- | ----- | | |
| | | H2 TANK 1 QTY | SC0030Q | METER | COMMON | 1 OF 3 | 11-21,22 |
| | | H2 TANK 2 QTY | SC0031Q | METER | COMMON | MANDATORY | |
| | | H2 TANK 3 QTY | SC0050Q | METER | COMMON | | |
| | | H2 TANK 1 TEMP | SC0043T | ---- | ----- | HIGHLY | 11-21,22 |
| | | H2 TANK 2 TEMP | SC0044T | ---- | ----- | DESIRABLE | |
| | | H2 TANK 3 TEMP | SC0054T | ---- | ----- | | |
| | | 02 TANK 1 PRESS | SC0037P | METER | COMMON | 1 OF 3 | 11-20,21,22 |
| | | 02 TANK 2 PRESS | SC0038P | METER | COMMON | MANDATORY | 11-20,21,22 |
| | | 02 TANK 3 PRESS | SC0053P | METER | COMMON | | |
| | | H2 TANK 1 PRESS | SC0039P | METER | COMMON | 1 OF 3 | 11-21,22 |
| | | H2 TANK 2 PRESS | SC0040P | METER | COMMON | MANDATORY | 11-21,22 |
| | | H2 TANK 3 PRESS | SC0052P | METER | COMMON | | |
| | | 02 TANK 2 AND 3 MAN. PRESS | SC0069P | C&W | COMMON | HD | |
| | | 02 TANK 1 HTR TEMP | SC0070T | METER | COMMON | HD | 11-23 |
| | | 02 TANK 2 HTR TEMP | SC0071T | METER | COMMON | HD | 11-23 |
| | | 02 TANK 3 HTR TEMP | SC0072T | METER | COMMON | HD | 11-23 |
| NOTE: PRESSURE OR QUANTITY MEASUREMENT REQUIRED IN EACH CRYO TANK. | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | CSM CRYOGENICS | INSTR REQ | 11-4 |
| | | | | | | Tape 53.6 | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

| R | ITEM | | | | | | | |
|---|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-----------------------------|---------|------|-----------|
| | | <div>GENERAL</div> | | | | | | |
| | 12-1 | <div>LAUNCH</div> <div>A. LAUNCH WILL BE CONTINUED AS LONG AS SUFFICIENT ENERGY IS AVAILABLE TO PERFORM AN ENTRY INTO AT LEAST PTP 2-1. THERE MUST BE AT LEAST ONE MAIN BUS AND ONE AC BUS (THROUGH MODE I AND II REGIONS) OPERATIONAL TO CONTINUE.</div> <div>B. THE LAUNCH PHASE WILL NOT BE TERMINATED AS LONG AS THREE ENTRY BATTERIES REMAIN TO SUPPLY MAIN BUS LOADS OR ONE ENTRY BATTERY AND ONE SM POWER SOURCE REMAIN.</div> | | | | | | |
| | 12-2 | <div>POWERED DESCENT</div> <div>THERE ARE NO EPS FAILURES FOR WHICH POWERED DESCENT WILL BE TERMINATED.</div> | | | | | | |
| | 12-3 | <div>ALL PHASES</div> <div>THE MISSION WILL BE CONTINUED AS LONG AS THE REQUIRED NUMBER OF FUEL CELLS ARE AVAILABLE AND ARE CAPABLE OF SUPPORTING MISSION REQUIREMENTS OF 75 TO 90 AMPS (WITHOUT BATTERY SUPPLEMENT EXCEPT DURING SPS ΔV'S) AND THREE GOOD ENTRY BATTERIES REMAIN.</div> | | | | | | |
| | 12-4 | <div>BATTERY IS CONSIDERED FAILED IF:</div> <div>A. LAUNCH - A BATTERY BUS VOLTAGE IS 0.5 VOLTS LESS THAN THE CORRESPONDING MAIN BUS.</div> <div>B. ORBIT - AN ENTRY BATTERY OUTPUT IS LESS THAN 3 AMPS WHEN CONNECTED TO A MAIN BUS DURING SPS MANEUVERS (NOMINAL TOTAL BATTERY CURRENT FOR SPS MANEUVERS IS 20 ± 2 AMPS).</div> <div>C. SUSTAINED BATTERY CHARGER OUTPUT TO AN ENTRY BATTERY IS GREATER THAN 2.0 AMPS AND ALL LOADS REMOVED.</div> <div>D. THE AUX BATTERY CANNOT SUPPORT REQUIRED MAIN BUS LOADS.</div> | | | | | | |
| | 12-5 | <div>AN AC BUS IS CONSIDERED FAILED IF ANY TWO PHASES CANNOT BE MAINTAINED GREATER THAN 95 VOLTS.</div> | | | | | | |
| | 12-6 | <div>AN INVERTER IS CONSIDERED FAILED IF:</div> <div>A. OUTPUT VOLTAGE ON ANY PHASE IS GREATER THAN 130 VAC.</div> <div>B. OUTPUT VOLTAGE ON ANY TWO PHASES IS LESS THAN 95 VAC.</div> <div>C. INVERTER TEMP >190° F MAY BE USED PERIODICALLY BASED ON TEMP.</div> | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | GENERAL | 12-1 | Tape 43.1 |

MISSION RULES

| R | ITEM |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12-7 | <p>FUEL CELL IS CONSIDERED FAILED FOR MISSION PLANNING IF:</p> <p>A. FUEL CELL CANNOT SUPPLY SUFFICIENT POWER TO MEET ITS OWN PARASITIC LOADS (5 AMPS PLUS INLINE HEATER POWER AS REQUIRED).</p> <p>B. FUEL CELL H₂ LOOP IS CONTAMINATED WITH KOH.</p> <p>C. REGULATED H₂ PRESSURE IS LESS THAN 36.7 PSIA (CORRESPONDS TO N₂ PRESSURE SHIFT DOWN TO 28.2 PSIA FOR CRITICAL OPERATION - LOWER N₂ PRESSURE CAN BE MANAGED BY TURNING OFF H₂O TANK PRESSURE).</p> <p>D. EITHER THE H₂ OR GLYCOL PUMP HAS FAILED.</p> |
| 12-8 | <p>TLI MINIMUM PURGE CAPABILITY IS BOTH OXYGEN AND HYDROGEN ON ONE FUEL CELL AND AT LEAST OXYGEN ON ONE OTHER FUEL CELL.</p> <p>RULE NUMBERS 12-9 THROUGH 12-19 ARE RESERVED.</p> |

| MISSION | REV | DATE | SECTION | GROUP | PAGE | |
|-----------|-----|--------|--------------------------------|---------|------|-----------|
| APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | GENERAL | 12-2 | Tape 31.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | | | |
|---|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------------|------------|------|-----------|-------|------|--|--|-----------|-----|--------|--------------------------------|------------|------|-----------|
| | | <div>SYSTEMS MANAGEMENT</div> | | | | | | | | | | | | | | | | |
| | 12-20 | <div>BUS MANAGEMENT</div> <div>A. MAIN BUSES WILL NORMALLY BE KEPT ISOLATED. BUT WHEN REQUIRED, ONE AND ONLY ONE FUEL CELL WILL BE TIED TO BOTH MAIN BUSES.</div> <div>B. INVERTERS WILL BE CONFIGURED SUCH THAT MAIN BUS A WILL SUPPLY AC BUS 1 AND MAIN BUS B WILL SUPPLY AC BUS 2.</div> <div>C. MAIN BUS VOLTAGE WILL BE MAINTAINED GREATER THAN 26.5 VDC AND LESS THAN 31 VDC. ONE FUEL CELL MAY BE OPEN CIRCUITED FOR OPTIMUM VOLTAGE AND POWER MANAGEMENT.</div> <div>D. THE BATTERY CHARGER WILL BE USED TO CHECK OUT A SUSPECTED SHORTED BUS (EXCEPT MAIN BUSES) AFTER ALL EQUIPMENT AND POWER SOURCES HAVE BEEN REMOVED FROM BUS.</div> <div>E. MINIMUM MAIN BUS VOLTAGE WILL BE MAINTAINED TO BE COMPATIBLE WITH ONLINE OPERATION EQUIPMENT:<div><div>1. SPS24.5</div><div>2. PGNS25.0</div><div>3. AUTO SM-RCS22.0</div><div>4. AUTO CM-RCS21.0</div><div>5. DIRECT SM-RCS21.0</div><div>6. DIRECT CM-RCS17.0</div><div>7. INVERTERS19.0</div></div></div> | | | | | | | | | | | | | | | | |
| | 12-21 | <div>BATTERY MANAGEMENT</div> <div>A. BATTERIES A AND B WILL BE USED TO SUPPLEMENT MAIN BUS LOADS FROM T-75 SECONDS TO INSERTION.</div> <div>B. BATTERIES A AND B WILL BE USED TO SUPPLEMENT MAIN BUS LOADS FOR SPS MANEUVERS. BATTERY C WILL BE ROTATED TO MAINTAIN BATTERY BALANCE IN THE EVENT THE BATTERY CHARGER FAILS.</div> <div>C. BATTERY CHARGING WILL BE TERMINATED FOR ONE OF THE FOLLOWING, WHICHEVER OCCURS FIRST:<div><div>1. INTEGRATED AMP-HOURS INTO BATTERY BY CHARGER EQUALS INTEGRATED AMP-HOURS OUT OF BATTERY BY LOADS</div><div>2. WHEN BATTERY CHARGER CURRENT DECREASES TO 0.62 AMPS (CORRESPONDS TO 39.8 VDC AT THE BATTERY BUS)</div></div></div> <div>D. THREE BATTERIES WILL BE TIED TO THE MAIN BUSES FOR DEORBIT MANEUVER AND ENTRY.</div> <div>E. BATTERIES ARE CONSIDERED TO HAVE 40 AMP-HR CAPABILITY INFIGHT AND 45 AMP-HR CAPABILITY FOR POSTLANDING.</div> <div>F. A SINGLE BATTERY THAT CANNOT BE RECHARGED WILL NOT BE USED EXCEPT DURING DEORBIT, ENTRY, AND POSTLANDING.</div> <div>G. BATTERY VENT VALVE WILL REMAIN CLOSED UNLESS MANIFOLD PRESSURE IS GREATER THAN 6 PSIA. VENTING OPERATION WILL BE ALLOWED TO TROUBLESHOOT A SUSPECTED FROZEN DUMP. VENTING WILL BE CONSTRAINED TO HAVE A MINIMUM EFFECT ON SIM DATA.</div> <div>H. THE AUX BATTERY WILL NOT BE USED FOR NORMAL MISSION OPERATIONS.</div> | | | | | | | | | | | | | | | | |
| | | <table><tr><td></td><td>MISSION</td><td>REV</td><td>DATE</td><td>SECTION</td><td>GROUP</td><td>PAGE</td><td></td></tr><tr><td></td><td>APOLLO 17</td><td>FNL</td><td>9/1/72</td><td>CSM ELECTRICAL POWER SYSTEM</td><td>MANAGEMENT</td><td>12-3</td><td>Tape 31.3</td></tr></table> | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | | APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | MANAGEMENT | 12-3 | Tape 31.3 |
| | MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | | |
| | APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | MANAGEMENT | 12-3 | Tape 31.3 | | | | | | | | | | | |

MISSION RULES

| R | ITEM |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12-22 | <p><u>FUEL CELL MANAGEMENT</u></p> <p>A. FUEL CELL WILL BE "SHUT DOWN" FOR THE FOLLOWING:</p> <ol style="list-style-type: none"> 1. SUSTAINED CURRENT OUTPUT LESS THAN 5 AMPS 2. FUEL CELL H₂ LOOP IS CONTAMINATED WITH KOH 3. REACTANT LEAKAGE JEOPARDIZING MISSION DURATION <p>B. FUEL CELL MAY BE "OPEN CIRCUITED" FOR THE FOLLOWING:</p> <ol style="list-style-type: none"> 1. SKIN TEMP GREATER THAN 475° F. 2. TCE TEMP GREATER THAN 225° F. 3. FAILURE OF H₂ PUMP OR GLYCOL PUMP 4. VOLTAGE MANAGEMENT 5. FUEL CELL CANNOT BE PURGED AND TIME TO GO IS GREATER THAN PREDICTED FUEL CELL LIFETIME 6. CRYO LEAK ISOLATION <p>C. FUEL CELL O₂ AND H₂ PURGES WILL NORMALLY BE PERFORMED AT 24 AND 48 HOUR INTERVALS, RESPECTIVELY. HOWEVER, THE INTERVALS WILL BE FLEXIBLE TO COINCIDE WITH WATER DUMPS (REF. MR 10-10, WATER SYSTEM, "C" AND "D").</p> <p>D. ADDITIONAL PURGES WILL BE INITIATED AS OPERATIONAL CONDITIONS DICTATE.</p> <p>E. FUEL CELLS WILL NOT BE PURGED FOR CONFIRMED HIGH PH INDICATION.</p> <p>F. EACH H₂ PURGE WILL NORMALLY BE PRECEDED BY 20 MINUTES OF H₂ VENT HEATER OPERATION FOLLOWED BY 10 MINUTES OF HEATER OPERATION AFTER PURGE COMPLETION.</p> <p>G. FUEL CELL INLINE HEATERS WILL NORMALLY OPERATE IN "AUTO" CONTINUOUSLY.</p> <p>H. REACTANT VALVES MUST REMAIN OPEN AT ALL TIMES WITH THE FOLLOWING EXCEPTIONS:</p> <ol style="list-style-type: none"> 1. IF THE FUEL CELL IS DECLARED FAILED, OR 2. FOR CRYO LEAK ISOLATION. THE FUEL CELL MUST BE "OPEN CIRCUITED" PRIOR TO REACTANT VALVE CLOSURE. THE REACTANT VALVES MUST BE REOPENED PRIOR TO AUTO INLINE HEATER ACTIVATION TO PRECLUDE FUEL CELL FAILURE. <p>I. ADDITIONAL POWER LOADS WILL BE ADDED AS REQUIRED TO MAINTAIN FC RAD OUT TEMP GREATER THAN -40°. IF CRYO BUDGET JEOPARDIZED OR RAD OUT TEMPS NOT MAINTAINED GREATER THAN -40°, FC RAD WILL BE PLACED IN EMERGENCY BYPASS.</p> <p>J. ONE FUEL CELL MAY BE PURGED TO PRECLUDE VENTING OF CRYO TANKS OR FOR CRYO PRESSURE MANAGEMENT.</p> <p>K. IF IT BECOMES OPERATIONALLY NECESSARY TO SHUT DOWN OR OPEN-CIRCUIT A FUEL CELL, THEN FUEL CELL 2 WILL BE SELECTED.</p> <p>L. LOSS OF EITHER PUMP IN A FUEL CELL WILL BE CONSIDERED LOSS OF BOTH PUMPS, AND EXTENSIVE H₂ PURGES WILL NORMALLY NOT BE PERFORMED FOR THE PURPOSE OF COOLING AND/OR WATER REMOVAL.</p> |

| MISSION | REV | DATE | SECTION | GROUP | PAGE | |
|-----------|-----|--------|-----------------------------|------------|------|-----------|
| APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | MANAGEMENT | 12-4 | Tape 31.4 |

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED

TSG 291A

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------|-----------|
| | | | | <div>SPECIFIC MISSION RULES</div> | | | | |
| | 12-30 | LOSS OF ONE FUEL CELL (OUTPUT LESS THAN 5 AMPS) | LAUNCH | A. <u>CONTINUE MISSION</u> IF LOSS IS FC 3, OPEN CIRCUIT AND CONFIGURE FC 2 TO MAIN BUS B ONLY. | BAT C WILL USED TO SUPPLEMENT MAIN BUSES LOADS DURING SPS BURNS TO BACK UP ANY SUBSEQUENT FUEL CELL FAILURES. BAT C MAY BE TIED TO EITHER OR BOTH BUSES. | | | |
| | | | ALL | B. <u>CONTINUE MISSION</u> 1. OPEN CIRCUIT FUEL CELL. 2. IF LOSS IS FC 3 CONFIGURE FC 2 TO MAIN BUS B ONLY. 3. IF FUEL CELL CANNOT BE RESTORED, PERFORM SHUTDOWN. | | | | |
| | 12-31 | LOSS OF TWO FUEL CELLS (OUTPUT LESS THAN 5 AMPS EACH) | LAUNCH | A. <u>CONTINUE MISSION</u> AFTER 2:00 GET PERFORM 1. EDS AUTO/OFF TO OFF 2. TIE BAT C TO BOTH MAIN BUSES | LM SYSTEMS MAY BE USED TO SUPPLEMENT CSM POWER. A.2. AUX BATTERY MAY BE USED IN LIEU OF BAT C. | | | |
| | | | POWERED DESCENT | B. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY | | | | |
| | | | POST DOCK | C. <u>NO-GO FOR LUNAR STAY</u> RETAIN LM IF POSSIBLE | | | | |
| | | | TEC | D. <u>GO FOR CSM EVA</u> | | | | |
| | | | ALL | E. <u>ENTER NEXT BEST PTP</u> 1. CONNECT REMAINING FUEL CELL TO BOTH MAIN BUSES. 2. PERFORM POWERDOWN TO MAINTAIN MAIN BUS VOLTS GREATER THAN 24.5 VDC. | E. ONE ENTRY BAT OR AUX MAY BE USED TO SUPPLEMENT REMAINING FC FOR G&N ALIGNMENT PRIOR TO DEORBIT. E.2 REF CREW EMERGENCY POWERDOWN PROCEDURE. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | FUEL CELLS | 12-6 | Tape 31.5 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------|-----------|
| | 12-32 | LOSS OF THREE FUEL CELLS (OUTPUT LESS THAN 10 AMPS EACH) | LAUNCH | A. <u>CONTINUE MISSION</u> 1. TIE AUX BAT TO MAIN A 2. AFTER 2:00 EDS AUTO/OFF TO OFF. TIE BAT C TO BOTH MAIN BUSES 3. POWER DOWN TO 50 AMPS AND ENTER NEXT BEST PTP WITHIN 5 HRS IF FUEL CELLS CANNOT BE RESTORED | LM SYSTEMS (IF AVAILABLE) MAY BE USED TO SUPPLEMENT FUEL CELL POWER. A.1 4.75 HOURS LEFT IN ORBIT BEFORE DEORBIT MANEUVER. TIE AUX BAT TO BOTH MAIN BUSES AFTER INSERTION. | | | |
| | | | POWERED DESCENT | B. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY | | | | |
| | | | ALL | C. <u>ENTER NEXT BEST PTP</u> | | | | |
| | 12-33 | LOSS OF ALL SM POWER PLUS ONE ENTRY BATTERY CURRENT LESS THAN 50 PERCENT OF LOAD ON EITHER REMAINING BATTERY | LAUNCH | A. <u>ABORT</u> | USE LM SYSTEMS IF AVAILABLE. RESERVE ENTRY BATTERIES FOR ENTRY. A. ASSUMES ALL THREE FUEL CELL CURRENTS LESS THAN OR EQUAL TO 5 AMPS AND BATTERY C TIED TO BOTH MAINS. | | | |
| | | | EO | B. <u>ENTER NEXT BEST ATP OR PTP</u> PERFORM EMERGENCY POWER DOWN | B. 2.4 HOURS LEFT IN ORBIT BEFORE SPS IGNITION. | | | |
| | | | POWERED DESCENT | C. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY | | | | |
| | | | ALL | D. <u>ENTER NEXT BEST PTP</u> PERFORM EMERGENCY POWER DOWN | | | | |
| | 12-34 | DEGRADED FUEL CELLS (UNABLE TO SUPPORT NORMAL DRIFTING FLIGHT LOADS - SCS AND G&N POWERED DOWN - AND MAINTAIN MN BUS VOLTAGE GREATER THAN 26.5 VDC) | LAUNCH | A. <u>CONTINUE MISSION</u> | | | | |
| | | | POWERED DESCENT | B. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY | | | | |
| | | | ALL | C. <u>ENTER NEXT BEST PTP</u> | | | | |
| | RULE NUMBERS 12-35 THROUGH 12-39 ARE RESERVED. | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | FUEL CELLS | 12-7 | Tape 31.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | | |
|---|-------|---------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------|-------------------|------|-----------|
| | 12-40 | LOSS OF ONE ENTRY BATTERY (OUTPUT LESS THAN 3 AMPS WHEN TIED TO MAIN BUS) | LAUNCH | A. <u>CONTINUE MISSION</u> 1. EDS AUTO/OFF TO OFF. 2. IF LOSS OF BAT A, TIE BAT C TO MAIN A. 3. IF LOSS OF BAT B, TIE BAT C TO MAIN B. | B. IF LOST DURING SPS MANEUVER, CONTINUE ON REMAINING BATTERY. | | | | |
| | | | ALL | B. BASED ON FAILURE MODE, CONSIDERATION WILL BE GIVEN TO CONTINUING NOMINAL MISSION. | | | | | |
| | 12-41 | LOSS OF TWO ENTRY BATTERIES (OUTPUT LESS THAN 3 AMPS EACH WHEN CONNECTED TO MAIN BUS) | LAUNCH | A. CONTINUE MISSION AS LONG AS ONE SM POWER SOURCE REMAINS 1. EDS AUTO/OFF TO OFF 2. ENTER NEXT BEST PTP | | D. IF LOSS DURING SPS MANEUVER, ATTEMPT TO TIE BAT C TO BOTH MAINS. | | | |
| | | | PRE-PDI | B. <u>ENTER NEXT BEST PTP</u> NO-GO FOR PDI | | | | | |
| | | | POWERED DESCENT | C. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY | | | | | |
| | | | ALL | D. <u>ENTER NEXT BEST PTP</u> USE ONE BATTERY ENTRY PROCEDURE. | | | | | |
| | 12-42 | LOSS OF BATTERY CHARGER | EO | A. <u>CONTINUE MISSION</u> ROTATE BATTERY C FOR BURNS TO MAINTAIN BALANCED BATTERIES | | | | | |
| | | | TLC | B. NO-GO FOR LOI IF SUM OF TWO LOWEST ENTRY BATTERIES LESS THAN 45.7 AMP-HRS. | | | | | |
| | | | LO | C. NO-GO FOR UNDOCK IF SUM OF TWO LOWEST ENTRY BATTERIES LESS THAN 41.1 AMP-HRS. | | | | | |
| | 12-43 | LOSS OF AUX BAT | ALL | <u>CONTINUE MISSION</u> | | | | | |
| | | MISSION | REV | DATE | SECTION | | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | | BATTERIES/CHARGER | 12-8 | Tape 31.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | |
|---|-------|--------------------------------------------------------------------------------------------------|-------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------|
| | 12-44 | LOSS OF AUX BAT GROUND TO RESISTOR NETWORK RULE NUMBERS 12-45 THROUGH 12-49 ARE RESERVED. | ALL | <u>CONTINUE MISSION</u> | LOSS OF GROUND WILL RESULT IN LOSS OF THE FOLLOWING PCM MEASUREMENTS: SC2140R FC2 H2 FLOW ST0832K ALPHA CT RATE CHAN 3 (SAME AS LOGIC B IN MR 14-31) | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | BATTERIES/CHARGER | 12-9 |

Tape 31.8

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | CUES/NOTES/COMMENTS | |
|---|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|--|---------------------|--|
| | 12-50 | MAIN BUS TIE MOTOR SWITCH FAILURES A. ONE MOTOR SWITCH FAILS OPEN | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|--------------------------------------------------------------------------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------|-------|------------|
| | 12-51 | A. MAIN BUS A SHORTED GREATER THAN 25 AMPS | LAUNCH | A.1. <u>CONTINUE MISSION</u> (A) EDS AUTO/OFF - OFF (B) FC 2 TO MAIN B ONLY (C) BAT C TO MAIN B (D) INVERTER 3 TO AC 1, MAIN B (E) POWER DOWN MAIN A (F) TVC GIMBAL DRIVE (P, Y) - 2 (G) GIMBAL MOTOR CB'S CONTROL (YAW 2, PITCH 2) BAT B - OPEN AFTER GIMBAL MOTOR TURN ON | | | | |
| | | | PRE-PDI | A.2. <u>ENTER NEXT BEST PTP</u> NO-GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI. | | | | |
| | | | POWERED DESCENT | A.3. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY | | | | |
| | | | ALL | A.4. <u>ENTER NEXT BEST PTP</u> <u>POWER DOWN MAIN A.</u> | | | | |
| | | B. MAIN BUS B SHORTED GREATER THAN 25 AMPS | LAUNCH | B.1. <u>CONTINUE MISSION</u> (A) EDS AUTO/OFF - OFF (B) BAT C TO MAIN A (C) INVERTER 3 TO AC 2, MAIN A (D) POWER DOWN MAIN B | | | | |
| | | | PRE-PDI | B.2. <u>ENTER NEXT BEST PTP</u> NO-GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI. | | | | |
| | | | POWERED DESCENT | B.3. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY | | | | |
| | | | ALL | B.4. <u>ENTER NEXT BEST PTP</u> <u>POWER DOWN MAIN B</u> | | | | |
| | | C. MAIN BUS SHORTED GREATER THAN 25 AMPS AND FUEL CELL(S) CANNOT BE DIS- CONNECTED FROM SHORTED BUS | LAUNCH | C.1. <u>ABORT</u> | C.1. FAILURE OF MOTOR SWITCH TO DISCONNECT FROM SHORTED BUS INDICATED BY FC SHORTED BUS T/B GRAY. | | | |
| | | | PRE-PDI | C.2. ENTER NEXT BEST PTP IF MAIN BUS NOT RESTORED. NO-GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI. | | | | |
| | | | POWERED DESCENT | C.3. <u>CONTINUE MISSION</u> NO-GO FOR LUNAR STAY | | | | |
| | | | ALL | C.4. <u>ENTER NEXT BEST PTP</u> | C.4. IF FUEL CELL FEED CIRCUITRY SHORTED, CLOSE FC REACTANT VALVES. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| - | | APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | DC DISTRIBUTION | 12-11 | Tape 31.10 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|---|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|---------------------|
| | 12-52 | BATTERY BUS SHORTED A. SHORT < | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|---|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|---------------------|
| | 12-54 | A. LOSS OF BAT RELAY BUS OR ONE BATTERY BUS, (UNABLE TO POWER BUS) B. LOSS OF ONE MAIN BUS (UNABLE TO POWER BUS) < | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED

| SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONTINUED | | | | | | | | | |
|------------------------------------------------------|-------|------------------------------------------------|-----------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------|-----------|--|
| R | RULE | CONDITION/MALFUNCTION | PHASE | | RULING | | CUES/NOTES/COMMENTS | | |
| | 12-62 | LOSS OF BOTH AC BUSES | LAUNCH | | A. <u>ABORT MODE I OR MODE II</u> 1. OPEN DIRECT O2 FOR SUIT VENTILATION 2. IF AFTER MODE II, ENTER PTP 2-1 | | A.2. INITIATE CONTINUOUS FC H2 PURGE FOR COOLING. | | |
| | | | POWERED DESCENT | | B. <u>CONTINUE MISSION</u> | | | | |
| | | | ALL | | C. <u>ENTER NEXT BEST PTP OR ATP</u> RETAIN LM. IF SUITED, REMOVE HELMET AND GLOVES. IF TIME PERMITS, REMOVE SUITS. IF CABIN DEPRESSURIZED, USE DIRECT O2 UNTIL CABIN IS REPRESSURIZED | | C. FOR CSM ONLY, ENTER WITHIN 1-1/2 HOURS. INITIATE CONTINUOUS FC H2 PURGE FOR COOLING. | | |
| | | RULE NUMBERS 12-63 THROUGH 12-69 ARE RESERVED. | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | |
| - | | APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | AC DISTRIBUTION | 12-14 | Tape 32.3 | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONCLUDED

| R | ITEM | INSTRUMENTATION REQUIREMENTS | | | | | |
|---|-------|----------------------------------------------------|---------|--------------|-----------------------------|------------------|--------------------|
| | 12-70 | MEAS DESCRIPTION | PCM | ONBOARD | TRANSDUCERS | CATEGORY | MSN RULE REFERENCE |
| | | AC BUS 1 PHASE A VAC | CC0200V | METER | SEPARATE | HIGHLY DESIRABLE | 12-5,6,61 |
| | | AC BUS 1 PHASE B VAC | ----- | METER | ----- | HIGHLY DESIRABLE | |
| | | AC BUS 1 PHASE C VAC | ----- | METER | ----- | HIGHLY DESIRABLE | |
| | | | | COMMON METER | | | |
| | | AC BUS 2 PHASE A VAC | CC0203V | METER | SEPARATE | HIGHLY DESIRABLE | 12-5,6,61 |
| | | AC BUS 2 PHASE B VAC | ----- | METER | ----- | HIGHLY DESIRABLE | |
| | | AC BUS 2 PHASE C VAC | ----- | METER | ----- | HIGHLY DESIRABLE | |
| | | MAIN BUS A VDC | CC0206V | METER | SEPARATE | 1 OF 2 | 12-20C,32,52 |
| | | MAIN BUS B VDC | CC0207V | METER | SEPARATE | MANDATORY | |
| | | BAT BUS A VDC | CC0210V | METER | SEPARATE | HIGHLY DESIRABLE | 12-22 |
| | | BAT BUS B VDC | CC0211V | METER | SEPARATE | HIGHLY DESIRABLE | |
| | | BAT RELAY BUS VDC | CC0232V | METER | SEPARATE | HIGHLY DESIRABLE | |
| | | BAT A CURRENT | CC0222C | METER | COMMON | 2 OF 3 MANDATORY | 12-4,33,40,41 |
| | | BAT B CURRENT | CC0223C | METER | COMMON | | |
| | | BAT C CURRENT | CC0224C | METER | COMMON | | |
| | | FC 1 CURRENT | SC2113C | METER | COMMON | 1 OF 3 MANDATORY | 12-7,31,32,33, 22A |
| | | FC 1 O2 FLO | SC2142R | METER | COMMON | | |
| | | FC 1 H2 FLO | SC2139R | METER | COMMON | | |
| | | FC 2 CURRENT* | SC2114C | METER | COMMON | 1 OF 3 MANDATORY | 12-7,31,32,33, 22A |
| | | FC 2 O2 FLO | SC2143R | METER | COMMON | | |
| | | FC 2 H2 FLO | SC2140R | METER | COMMON | | |
| | | FC 3 CURRENT | SC2115C | METER | COMMON | 1 OF 3 MANDATORY | 12-7,31,32,33, 22A |
| | | FC 3 O2 FLO | SC2144R | METER | COMMON | | |
| | | FC 3 H2 FLO | SC2141R | METER | COMMON | | |
| | | BAT CHARGER CURRENT | CC0215C | METER | COMMON | HIGHLY DESIRABLE | |
| | | FC 1 SKIN TEMP | SC2084T | METER | COMMON | HIGHLY DESIRABLE | 12-22B |
| | | FC 2 SKIN TEMP | SC2085T | METER | COMMON | HIGHLY DESIRABLE | |
| | | FC 3 SKIN TEMP | SC2086T | METER | COMMON | HIGHLY DESIRABLE | |
| | | FC 1 COND TEMP | SC2081T | METER | COMMON | HIGHLY DESIRABLE | 12-22B |
| | | FC 2 COND TEMP | SC2082T | METER | COMMON | HIGHLY DESIRABLE | |
| | | FC 3 COND TEMP | SC2083T | METER | COMMON | HIGHLY DESIRABLE | |
| | | FC 1 RAD OUT TEMP | SC2087T | METER | COMMON | HIGHLY DESIRABLE | 12-22I |
| | | FC 2 RAD OUT TEMP | SC2088T | METER | COMMON | HIGHLY DESIRABLE | |
| | | FC 3 RAD OUT TEMP | SC2089T | METER | COMMON | HIGHLY DESIRABLE | |
| | | BAT MANIFOLD PRESS | ----- | METER | ----- | HIGHLY DESIRABLE | |
| | | INV 1 TEMP | CC0175T | MCWS | COMMON | HIGHLY DESIRABLE | |
| | | INV 2 TEMP | CC0176T | MCWS | COMMON | HIGHLY DESIRABLE | |
| | | INV 3 TEMP | CC0177T | MCWS | COMMON | HIGHLY DESIRABLE | |
| | | FC 1 PH | SC2160X | TALKBACK | COMMON | HIGHLY DESIRABLE | 12-22E |
| | | FC 2 PH | SC2161X | TALKBACK | COMMON | HIGHLY DESIRABLE | |
| | | FC 3 PH | SC2162X | TALKBACK | COMMON | HIGHLY DESIRABLE | |
| | | AUX BAT (SM BAT) | SC0230V | ----- | ----- | HIGHLY DESIRABLE | |
| | | NOTE: USE BAT C IN LIEU OF BATTERY WITH LOST INST. | | | | | |
| | | * COMMON SHUNT FOR FC 2 AND AUX BAT CURRENT. | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | CSM ELECTRICAL POWER SYSTEM | INSTR REQ | 12-15 |
| | | | | | | | Tape 53.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 13 - DOCKING AND UMBILICAL

| R | ITEM | | | | | | |
|---|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-----------------------|---------|-----------|
| | | <u>GENERAL</u> | | | | | |
| | 13-1 | THREE GOOD DOCKING RING LATCHES 120 DEG APART ARE REQUIRED FOR AN IVT. | | | | | |
| | 13-2 | DOCKED SPS OR DPS BURNS REQUIRE AT LEAST NINE GOOD DOCKING RING LATCHES. | | | | | |
| | 13-3 | MANNED UNDOCKING OPERATIONS WILL BE TERMINATED FOR ANY FAILURE OF A DOCKING RING LATCH TO RELEASE. NO ATTEMPT WILL BE MADE TO DISASSEMBLE A DOCKING RING LATCH. | | | | | |
| | 13-4 | WITH FAILURE OF THE CSM FORWARD HATCH PRIMARY LOCK/UNLOCK MECHANISM, THE NOMINAL MISSION WILL BE PERFORMED USING THE SECONDARY LOCK/UNLOCK MECHANISM. | | | | | |
| | 13-5 | LOSS OF VISUAL DOCKING AIDS (COAS AND TARGETS) WILL NOT INHIBIT DOCKING AND UNDOCKING. | | | | | |
| | 13-6 | IF THE DOCKING PROBE FAILS TO INDICATE EXTENSION OR IF BOTH TALKBACK INDICATORS* ARE BARBER POLE, TD&E WILL BE ATTEMPTED. | | | | | |
| | | *NOTE: THE ONLY DOCKING PROBE INSTRUMENTATION CONSISTS OF TWO TALKBACK INDICATORS IN THE CSM | | | | | |
| | | RULE NUMBERS 13-7 THROUGH 13-10 ARE RESERVED. | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| - | | APOLLO 17 | FNL | 9/1/72 | DOCKING AND UMBILICAL | GENERAL | 13-1 |
| | | | | | | | Tape 35.5 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 13 - DOCKING AND UMBILICAL - CONTINUED

| R | ITEM | | | | | | | | | | | | | | |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----|--------|-----------------------|------------|-----------|------------------------------|----------------------------------------|-----------------------|-----------------------------------------|------------------------|---------------------------|--------|---------------------------|
| | | <div>MANAGEMENT</div> | | | | | | | | | | | | | |
| 13-11 | FOR MISFIRE OF A DOCKING RETRACT SQUIB, THE REMAINING SQUIB IN THE SAME SYSTEM WILL BE USED TO ATTEMPT COMPLETION OF DOCKING. TWO NITROGEN BOTTLES REMAINING ARE NORMALLY REQUIRED TO ALLOW UNDOCKING. HOWEVER, BASED ON THE FAILURE MODE, CONSIDERATION WILL BE GIVEN TO UNDOCKING WITH NO NITROGEN BOTTLE REMAINING. | | | | | | | | | | | | | | |
| 13-12 | THE CM FORWARD AND LM UPPER HATCH NORMALLY WILL BE INSTALLED FOR ANY TYPE OF MANEUVER OR DOCKING. | | | | | | | | | | | | | | |
| 13-13 | DURING OPERATIONS WHEN CM/LM DOCKED STATUS IS MAINTAINED BY PROBE PRELOAD ONLY (DOCKING LATCHES COCKED) CM/LM THRUSTER ACTIVITY ABOUT CM/LM X-AXIS IS LIMITED AS FOLLOWS: <table><tr><td><u>TUNNEL PRESSURE, PSIA</u></td><td><u>COMBINED CM/LM ACTIVE THRUSTERS</u></td></tr><tr><td>GREATER THAN 1.5 PSIA</td><td>INHIBIT ALL CSM ROLL AND LM YAW CONTROL</td></tr><tr><td>BETWEEN 0 AND 1.5 PSIA</td><td>NO MORE THAN 2 ROLL JETTS</td></tr><tr><td>0 PSIA</td><td>NO MORE THAN 4 ROLL JETTS</td></tr></table> | | | | | | | <u>TUNNEL PRESSURE, PSIA</u> | <u>COMBINED CM/LM ACTIVE THRUSTERS</u> | GREATER THAN 1.5 PSIA | INHIBIT ALL CSM ROLL AND LM YAW CONTROL | BETWEEN 0 AND 1.5 PSIA | NO MORE THAN 2 ROLL JETTS | 0 PSIA | NO MORE THAN 4 ROLL JETTS |
| <u>TUNNEL PRESSURE, PSIA</u> | <u>COMBINED CM/LM ACTIVE THRUSTERS</u> | | | | | | | | | | | | | | |
| GREATER THAN 1.5 PSIA | INHIBIT ALL CSM ROLL AND LM YAW CONTROL | | | | | | | | | | | | | | |
| BETWEEN 0 AND 1.5 PSIA | NO MORE THAN 2 ROLL JETTS | | | | | | | | | | | | | | |
| 0 PSIA | NO MORE THAN 4 ROLL JETTS | | | | | | | | | | | | | | |
| 13-14 | LOW PROBE TEMPERATURE WILL NOT INHIBIT DOCKING ATTEMPTS. RULE NUMBERS 13-15 THROUGH 13-19 ARE RESERVED. | | | | | | | | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | |
| | | APOLLO 17 | FNL | 9/1/72 | DOCKING AND UMBILICAL | MANAGEMENT | 13-2 | | | | | | | | |
| | | | | | | | Tape 35.6 | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 13 - DOCKING AND UMBILICAL - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|---------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------|-----------|
| | | | | <div>SPECIFIC MISSION RULES</div> | | | | |
| | 13-20 | FAILURE TO ACHIEVE OR MAINTAIN POWER TO X-LUNAR BUS LOADS FROM CSM | DOCKED | <div>CONTINUE MISSION</div> <div>A. OPEN CB (11) LTG: ANUN/DOCK/COMPNT EPS: DES ECA OPEN CB (26) LTG: FLOOD EPS: DES ECA</div> <div>B. ALTERNATE USE OF BATTERIES 1,2,3, AND 4 UNTIL ACTIVATION</div> | <div>1. ANUN/DOCK/COMPNT CB MUST BE OPENED BEFORE 9 HRS AFTER CSM SEPARATION BECAUSE OF THERMAL CONSTRAINTS OF THE LIGHTING CONTROL ASSEMBLY (LCA).</div> <div>2. NOMINAL MISSION MAY BE PERFORMED BECAUSE LCA, ECA, AND BATTERY THERMAL CONSTRAINTS WILL NOT BE VIOLATED.</div> <div>3. OVERCURRENT PROTECTION IS LOST UNTIL A DES ECA CB IS CLOSED.</div> | | | |
| | 13-21 | FAILURE TO ACHIEVE S-IVB/LM SEPARATION OR FAILURE TO MATE LM UMBILICALS (P23 AND P24) | TD&E | <div>PERFORM CSM/LM FINAL SEP</div> | <div>S-IVB/LM SEP CANNOT BE ACHIEVED WITHOUT MATING AT LEAST ONE UMBILICAL.</div> <div>POWER CAN BE SWITCHED AND MAINTAINED WITH EITHER PLUG.</div> | | | |
| | 13-22 | FAILURE TO ACHIEVE CSM/LM FINAL SEPARATION | DOCKED | <div>MUST PERFORM NORMAL UNDOCKING</div> <div>A. RETRIEVE PROBE AND DROGUE AND INSTALL</div> <div>B. AFTER UNDOCKING, DEPRESS CSM AND JETTISON PROBE OVERBOARD</div> | | | | |
| | 13-23 | FAILURE TO INDICATE DOCKING PROBE EXTEND OR BOTH TALKBACK INDICATORS ARE BARBER POLE | TD&E UNDOCKED | <div>A. CONTINUE MISSION ATTEMPT TD&E</div> <div>B. CONTINUE MISSION ATTEMPT DOCKING</div> | <div>DOCKING RING TUNNEL STRUCTURE DAMAGE MAY OCCUR TO THE EXTENT THAT TUNNEL PRESSURE CAN NOT BE MAINTAINED.</div> | | | |
| | 13-24 | CANNOT REMOVE CSM FORWARD HATCH | TD&E DOCKED | <div>A. PERFORM CSM/LM FINAL SEP</div> <div>B. PERFORM CSM/LM FINAL SEP</div> <div>IF LM MANNED, PERFORM EVT TO CSM.</div> | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| - | | APOLLO 17 | FNL | 9/1/72 | DOCKING AND UMBILICAL | SPECIFIC | 13-3 | Tape 35.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 13 - DOCKING AND UMBILICAL - CONCLUDED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-----------------------------------------------------------------------------|-------------|-----------------------------------------------------|-------------------------------------------------------------------------------|----------|------|-----------|
| | 13-25 | CANNOT REMOVE DOCKING PROBE, LM DROGUE, AND/OR LM UPPER HATCH. | DOCKED | <u>CONTINUE MISSION</u> PERFORM EVT IF LM MANNED | SPS AND SM RCS MANEUVERS MAY BE PERFORMED. | | | |
| | 13-26 | FAILURE TO RELEASE CAPTURE LATCHES | DOCKED | <u>REDOCK</u> | | | | |
| | 13-27 | PRIMARY FORWARD HATCH LOCK/UNLOCK MECHANISM INOPERATIVE | ALL | <u>CONTINUE MISSION</u> | | | | |
| | 13-28 | FAILURE TO LOCK CSM FORWARD HATCH | TD&E DOCKED | <u>CONTINUE MISSION</u> ENTER IN SUITS | REF SCP A15 I.A: ASSUMES HATCH CAN BE SEALED AND SECURED WITH CABIN PRESSURE. | | | |
| | 13-29 | FAILURE TO REINSTALL PROBE AND/OR DROGUE OR FAILURE TO CLOSE LM UPPER HATCH | DOCKED | <u>NO UNDOCKING</u> | | | | |
| | 13-30 | LOSS OF PRIMARY AND SECONDARY DOCKING SYSTEM | ALL | <u>CONTINUE MISSION</u> | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| - | | APOLLO 17 | FNL | 9/1/72 | DOCKING AND UMBILICAL | SPECIFIC | 13-4 | Tape 35.8 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 14 - CSM SEQUENTIAL

| R | ITEM | | | | | | |
|---|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------|---------|-----------|
| | | <u>GENERAL</u> | | | | | |
| | 14-1 | <p><u>LAUNCH</u></p> <p>THERE ARE NO SEQUENTIAL MALFUNCTIONS FOR WHICH LAUNCH WILL BE TERMINATED.</p> | | | | | |
| | 14-2 | <p>IF AN ENTRY BATTERY IS LOST, THE EDS WILL BE FLOWN OPEN LOOP.</p> | | | | | |
| | 14-3 | <p><u>ALL MISSION PHASES (EXCEPT LUNAR ORBIT)</u></p> <p>TO CONTINUE THE MISSION, BOTH PYRO BUSES AND BOTH LOGIC BUSES ARE REQUIRED.</p> | | | | | |
| | 14-4 | <p><u>POWERED DESCENT</u></p> <p>THERE ARE NO CSM SEQUENTIAL SYSTEM FAILURES FOR WHICH POWERED DESCENT WILL BE TERMINATED.</p> | | | | | |
| | 14-5 | <p>SEQUENTIAL LOGIC BUS IS CONSIDERED FAILED IF:</p> <p>A. VOLTAGE IS LESS THAN 22 VDC AND UNABLE TO ACTIVATE RCS ENABLE AND/OR SLA SEP RELAYS (CD0170X AND/OR CD0123X SYSTEM A, CD0171X AND/OR CD0124X SYSTEM B).</p> <p>B. LOGIC BUS SHORTED GREATER THAN 10 AMPS.</p> | | | | | |
| | 14-6 | <p>PYRO BUS IS CONSIDERED FAILED IF:</p> <p>A. SHORTED GREATER THAN 10 AMPS</p> <p>B. FAILURE TO PERFORM ANY SEQUENTIAL FUNCTION WITH SUSPECTED FAILED PYRO SYSTEM</p> <p>RULE NUMBERS 14-7 THROUGH 14-9 ARE RESERVED.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | CSM SEQUENTIAL | GENERAL | 14-1 |
| | | | | | | | Tape 36.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 14 - CSM SEQUENTIAL - CONTINUED

| R | ITEM | | | | | | |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----|--------|----------------|------------|------|
| | | <div>MANAGEMENT</div> | | | | | |
| 14-10 | ARMING OF THE SEQUENTIAL SYSTEM WILL BE PERFORMED WHILE IN CONTACT WITH A GROUND TELEMETRY SITE. THE FLIGHT CREW WILL ARM THE LOGIC BUSES AND STAND BY FOR A GO FROM THE GROUND TO PROCEED WITH ARMING THE PYRO BUSES. | | | | | | |
| | RULE NUMBERS 14-11 THROUGH 14-19 ARE RESERVED. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | CSM SEQUENTIAL | MANAGEMENT | 14-2 |
| | | Tape 36.2 | | | | | |

Tape 36.2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 14 - CSM SEQUENTIAL - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------|-----------|
| | | | | <div>SPECIFIC MISSION RULES</div> | | | | |
| | 14-20 | SEQUENTIAL LOGIC BUS A OR B LESS THAN OR EQUAL TO 22 VDC AND UNABLE TO ACTIVATE RCS ENABLE AND/OR SLA SEP RELAYS | LAUNCH EO TLC LUNAR ORBIT/ LUNAR STAY | A. <u>CONTINUE MISSION</u> ENTER 3-1 IF BUS NOT RESTORED B. <u>TERMINATE OPERATIONS</u> ENTER NEXT BEST PTP IF BUS NOT RESTORED C. <u>CONTINUE MISSION</u> | CD0170X AND/OR CD0123X SYSTEM A, CD0171X AND/OR CD0124X SYSTEM B | | | |
| | 14-21 | PYRO BUS A OR B LESS THAN OR EQUAL TO 35 VDC A. SHORTED GREATER THAN 10 AMPS B. SHORTED LESS THAN 10 AMPS C. PYRO BUS TM READS 0 VDC AND PYRO BAT ONBOARD GREATER THAN 35 VDC | LAUNCH EO TLC LUNAR ORBIT/ LUNAR STAY ALL LAUNCH ALL | A.1. <u>CONTINUE MISSION</u> 2. TERMINATE OPERATIONS ENTER NEXT BEST PTP 3. <u>CONTINUE MISSION</u> B. <u>CONTINUE MISSION</u> C.1. <u>CONTINUE MISSION</u> 2. ATTEMPT FUNCTION USING SUSPECTED FAILED BUS ONLY: (A) IF FUNCTION NORMAL, CONTINUE MISSION (B) IF FUNCTION DOES NOT WORK NORMALLY, ENTER NEXT BEST PTP | A.2. USE BATTERY TIE FOR PYRO POWER TO AFFECTED BUS. B. USE BATTERY TIE FOR PYRO POWER TO AFFECTED BUS. C.2. ASSUME PYRO BAT VERIFIED GREATER THAN 35 VDC PRIOR TO ARMING. IF ENTRY BAT USED IN LIEU OF PYRO BAT, VOLTAGE SHOULD BE APPROXIMATELY EQUAL TO BAT BUS VOLTAGE. | | | |
| | 14-22 | TELEMETRY INDICATES AN EDS VOTE INPUT 1, 2, OR 3 | LAUNCH | <u>CONTINUE MISSION</u> A. IF ANY ENTRY BATTERY LESS THAN 22 VDC, EDS AUTO/OFF SWITCH TO OFF B. ALL ENTRY BATTERIES GREATER THAN 22 VDC: CHECK CORRESPONDING EDS CB'S 1, 2, OR 3 CLOSED | PARAMETERS ARE CD0132X, CD0133X, AND CD0134X RESPECTIVELY. A. BAT C VOLTAGE CAN ONLY BE MONITORED ONBOARD. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| - | | APOLLO 17 | FNL | 9/1/72 | CSM SEQUENTIAL | SPECIFIC | 14-3 | Tape 36.3 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 14 - CSM SEQUENTIAL - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|--------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------|------|-----------|
| | 14-23 | LET JETTISON MOTOR DOES NOT FIRE | LAUNCH | <u>CONTINUE MISSION</u> ATTEMPT JETTISON PER CREW CHECKLIST EMERGENCY PROCEDURE | | | | |
| | 14-24 | SMJC ACTIVATES PREMATURELY | EO TLC ALL | CONTINUE MISSION IF SOURCE OF ACTIVATION CAN BE DETERMINED AND ISOLATED. ENTER NEXT BEST PTP IF SOURCE OF ACTIVATION CAN NOT BE ISOLATED <u>CONTINUE MISSION</u> | | | | |
| | 14-25 | ACTIVATED CM RCS PRESS LOGIC RELAYS | ALL | <u>CONTINUE MISSION</u> A. PRIOR TO CM RCS PRESS: DO NOT ARM RESPECTIVE PYRO BUS (FOR BOTH INDICATIONS PERFORM SLA SEP WITH SECS ARM CB'S OPEN.) B. AT CM RCS PRESS: ARM RESPECTIVE PYRO BUS | CD0173X AND/OR CD0174X | | | |
| | 14-26 | ACTIVATED SLA DEPLOY LOGIC RELAYS | ALL | <u>CONTINUE MISSION</u> A. PRIOR TO SLA SEP: DO NOT ARM RESPECTIVE PYRO BUS B. FOR SLA SEP: ARM RESPECTIVE PYRO BUS FIRST | CD0123X AND/OR CD0124X | | | |
| | 14-27 | UNABLE TO PERFORM SLA SEPARATION | TLC | <u>ENTER NEXT BEST PTP</u> | | | | |
| | 14-28 | ACTIVATED APEX JETTISON LOGIC RELAYS | LUNAR ORBIT/ LUNAR STAY ALL | A. <u>CONTINUE MISSION</u> DO NOT ARM PYRO BUSES UNTIL MALFUNCTION HAS BEEN ISOLATED B. <u>ENTER NEXT BEST PTP</u> DO NOT ARM PYRO BUSES UNTIL MALFUNCTION HAS BEEN ISOLATED | DETECTED AT SECS POWER UP (CD0230X AND CD023X) | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| - | | APOLLO 17 | FNL | 9/1/72 | CSM SEQUENTIAL | SPECIFIC | 14-4 | Tape 36.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 14 - CSM SEQUENTIAL - CONCLUDED

| R | ITEM | INSTRUMENTATION REQUIREMENTS | | | | | |
|---|-------|------------------------------|---------|---------|-------------|----------|--------------------|
| | 14-50 | MEAS DESCRIPTION | PCM | ONBOARD | TRANSDUCERS | CATEGORY | MSN RULE REFERENCE |
| | | PYRO BUS A VOLTS | CD0005V | ----- | ----- | 1 OF | 14-21 |
| | | PYRO BUS B VOLTS | CD0006V | ----- | ----- | 2 M | 14-21 |
| | | SEQ LOGIC BUS A VOLTS | CD0200V | ----- | ----- | HD | 14-20 |
| | | SEQ LOGIC BUS B VOLTS | CD0201V | ----- | ----- | HD | 14-20 |
| | | APEX JET A | CD0230X | ----- | ----- | HD | 14-29 |
| | | APEX JET B | CD0231X | ----- | ----- | HD | 14-29 |
| | | DROGUE DEPLOY A | CE0001X | ----- | ----- | HD | 14-30 |
| | | DROGUE DEPLOY B | CE0002X | ----- | ----- | HD | 14-30 |
| | | PILOT CHUTE DEPLOY A | CE0003X | ----- | ----- | HD | 14-31 |
| | | PILOT CHUTE DEPLOY B | CE0004X | ----- | ----- | HD | 14-31 |
| | | SLA SEP RELAY A | CD0123X | ----- | ----- | HD | 14-26 |
| | | RCS/SCS ACTIVATE A | CD0170X | ----- | ----- | HD | ----- |
| | | SLA SEP RELAY B | CD0124X | ----- | ----- | HD | 14-26 |
| | | RCS/SCS ACTIVATE B | CD0171X | ----- | ----- | HD | ----- |
| | | CM RCS PRESS SIG A | CD0173X | ----- | ----- | HD | 14-25 |
| | | CM RCS PRESS SIG B | CD0174X | ----- | ----- | HD | 14-25 |
| | | CM-SM SEP RELAY A | CD0023X | ----- | ----- | HD | ----- |
| | | CM-SM SEP RELAY B | CD0024X | ----- | ----- | HD | ----- |
| | | CREW ABORT A | CD0130X | ----- | ----- | HD | ----- |
| | | CREW ABORT B | CD0131X | ----- | ----- | HD | ----- |
| | | EDS ABORT VOTE 1 | CD0132X | ----- | ----- | HD | 14-22 |
| | | EDS ABORT VOTE 2 | CD0133X | ----- | ----- | HD | 14-22 |
| | | EDS ABORT VOTE 3 | CD0134X | ----- | ----- | HD | 14-22 |
| | | EDS ABORT A | CD0135X | ----- | ----- | HD | ----- |
| | | EDS ABORT B | CD0136X | ----- | ----- | HD | ----- |
| | | MAIN CHUTE DISC A | CE0321X | ----- | ----- | HD | ----- |
| | | MAIN CHUTE DISC B | CE0322X | ----- | ----- | HD | ----- |
| | | EDS ABORT REQ A | BS0080X | ----- | ----- | HD | ----- |
| | | EDS ABORT REQ B | BS0081X | ----- | ----- | HD | ----- |
| | | DOCKING PROBE TEMP | CS0220T | ----- | ----- | HD | ----- |
| | | CSM-LM LOCK RING | CD1154X | ----- | ----- | HD | 13-22 |
| | | SEP RELAY A | ----- | ----- | ----- | ----- | ----- |
| | | CSM-LM LOCK RING | CD1155X | ----- | ----- | HD | 13-22 |
| | | SEP RELAY B | ----- | ----- | ----- | ----- | ----- |
| | | LM CURRENT | CC2962C | METER | COMMON | HD | ----- |

| | | | | | | | |
|-----------|--|-----|--------|----------------|-----------|------|-----------|
| MISSION | | REV | DATE | SECTION | GROUP | PAGE | |
| APOLLO 17 | | FNL | 9/1/72 | CSM SEQUENTIAL | INSTR REQ | 14-6 | Tape 36.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

| R | ITEM | GENERAL | | | | | |
|---|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------------|---------|------|
| | 15-1 | <u>LAUNCH</u> | | | | | |
| | | THERE ARE NO FAILURES OF THE CSM GUIDANCE AND CONTROL SYSTEM WHICH ARE CAUSE FOR ABORT. | | | | | |
| | 15-2 | <u>EARTH ORBIT PHASE</u> | | | | | |
| | | <p>A. IN ORDER TO CONTINUE THE MISSION PAST THE NEXT BEST PTP, THE GUIDANCE AND CONTROL SYSTEMS MUST PROVIDE SPS CRITICAL BURN CAPABILITY AND ONE BACKUP DEORBIT METHOD (SM OR HYBRID). THE FOLLOWING MINIMUM CAPABILITIES MUST BE AVAILABLE:</p> <ol style="list-style-type: none"> 1. ATTITUDE CONTROL: DIRECT RCS, AUTO ATTITUDE CONTROL AND RATE DAMPING IN EACH AXIS. 2. TVC (CRITICAL BURNS): ONE TVC SERVO LOOP IN EACH AXIS AND ONE TVC CONTROL MODE (ACCEL CMD EXCLUDED). 3. BACKUP DEORBIT: AS LONG AS ENOUGH PROPELLANT IS AVAILABLE FOR AN SM DEORBIT, THE G&C SYSTEMS MUST PROVIDE THAT CAPABILITY. IF SM DEORBIT IS NOT POSSIBLE DUE TO LACK OF PROPELLANT OR A SYSTEMS FAILURE, THE G&C SYSTEMS MUST PROVIDE CAPABILITY FOR A HYBRID DEORBIT. <p>(A) SM DEORBIT REQUIREMENTS:</p> <ol style="list-style-type: none"> (1) TRANSLATION CAPABILITY (2) ONE OPERATIONAL FDAI (3) RATE DAMPING IN ALL THREE AXES, DAP OR SCS <p>(B) HYBRID DEORBIT REQUIREMENTS:</p> <ol style="list-style-type: none"> (1) ALL SM DEORBIT REQUIREMENTS (RATE DAMPING MUST BE SCS) (2) OPERATIONAL IMU, CMC, AND MAIN DSKY (3) TWO OPERATIONAL RHC'S <p>B. IN ORDER TO PERFORM A NON-CRITICAL BURN AFTER THE STORAGE TANKS ARE EMPTY, THE G&C SYSTEMS MUST PROVIDE THE CAPABILITY TO EXECUTE AN ULLAGE MANEUVER BY EITHER CMC AUTO (RCS DAP), SCS AUTO, OR DIRECT ULLAGE.</p> <p>C. IN ORDER TO COMMIT TO THE TRANSLUNAR COAST PHASE, THE GUIDANCE AND CONTROL SYSTEMS MUST PROVIDE REDUNDANT SPS BURN CAPABILITY. THE FOLLOWING MINIMUM CAPABILITIES MUST ALSO BE AVAILABLE TO GO FOR TLI:</p> <ol style="list-style-type: none"> 1. ATTITUDE CONTROL: DIRECT RCS, AUTO ATT CONTROL AND RATE DAMPING IN EACH AXIS. 2. TVC: 3 OF 4 SERVO LOOPS AND TWO TVC CONTROL MODES (ACCEL. CMD EXCLUDED). 3. G&N: CMC, IMU, AND ONE DSKY FULLY OPERATIONAL AND OPTICS OR COAS CAPABLE OF ALIGNING PLATFORM. P40 ATTITUDE ERROR DISPLAY REQUIRED. 4. DISPLAYS: ONE OPERATIONAL FDAI. 5. ATTITUDE REFERENCE: REDUNDANT ATTITUDE SOURCES ARE REQUIRED FOR HIGH-SPEED ENTRY | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | GENERAL | 15-1 |
| | | Tape 43B.8 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

SECTION 15 - GUIDANCE AND CONTROL

| R | ITEM | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 15-3 | <p><u>TRANSLUNAR COAST</u></p> <p>IN ORDER TO CONTINUE THE MISSION PAST THE NEXT BEST PTP, THE GUIDANCE AND CONTROL SYSTEMS MUST PROVIDE THE FOLLOWING MINIMUM CAPABILITIES:</p> <p>A. ATTITUDE CONTROL: DIRECT RCS, AUTO ATT CONTROL AND RATE DAMPING IN EACH AXIS.</p> <p>B. RCS TRANSLATION: X-AXIS VIA AUTO COILS OR DIRECT ULLAGE PUSHBUTTON.</p> |
| | 15-4 | <p><u>LOI</u></p> <p>IN ORDER TO COMMIT TO LOI, THE FOLLOWING MINIMUM CAPABILITIES MUST BE AVAILABLE:</p> <p>A. ATTITUDE CONTROL: DIRECT RCS, AUTO ATT CONTROL AND RATE DAMPING IN EACH AXIS</p> <p>B. TVC: BOTH SERVO LOOPS IN INERTIAL YAW, ONE IN PITCH (IF DPS IS AVAILABLE FOR ABORTS AND FOR TEI), AND TWO SCS TVC CONTROL MODES (ACCEL CMD EXCLUDED).</p> <p>C. DELETED</p> <p>D. SPS: NON-CRITICAL BURN CAPABILITY IS REQUIRED.</p> |
| | 15-5 | <p><u>LUNAR ORBIT</u></p> <p>A. LUNAR ORBIT WILL BE TERMINATED EARLY IF EITHER REDUNDANT ATTITUDE CONTROL OR NON-CRITICAL SPS CAPABILITY IS LOST. REDUNDANT SPS CONTROL IS REQUIRED IF LM DPS IS NOT AVAILABLE FOR TEI.</p> <p>B. IN ORDER TO PERFORM A NON-CRITICAL BURN, THE G&C SYSTEMS MUST BE ABLE TO PROVIDE AN ULLAGE MANEUVER BY EITHER CMC AUTO (RCS DAP), SCS AUTO, OR DIRECT ULLAGE.</p> |
| | 15-6 | <p><u>UNDOCKED</u></p> <p>THE UNDOCKED PHASE WILL BE DELETED OR TERMINATED IF THE G&C SYSTEMS CANNOT PROVIDE REDOCKING OR LM RESCUE CAPABILITY. THE G&C SYSTEMS MUST PROVIDE DIRECT RCS AND TRANSLATION CAPABILITY IN EACH AXIS, AND RATE DAMPING IN TWO AXES FOR LINE-OF-SIGHT CONTROL. IN ADDITION, THE FOLLOWING MINIMUM CAPABILITIES FOR LM RESCUE MUST BE AVAILABLE:</p> <p>A. OPERATIONAL OPTICS, OR VHF SUBSYSTEM AND COAS</p> <p>B. ONE DSKY</p> <p>C. TRANSLATION CAPABILITY IN EACH AXIS</p> <p>D. RATE DAMPING IN TWO AXES</p> <p>E. OPERATIONAL IMU AND CMC</p> <p>F. ONE OPERATIONAL RHC</p> <p>G. ONE OPERATIONAL FDAI</p> <p>H. DIRECT RCS IN ALL THREE AXES</p> <p>I. NON-CRITICAL SPS BURN CAPABILITY</p> |

| MISSION | REV | DATE | SECTION | GROUP | PAGE | |
|-----------|-----|--------|----------------------|---------|------|------------|
| APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | GENERAL | 15-2 | Tape 57.10 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------|------|-----------|-------|------|--|-----------|-----|--------|----------------------|--------------------|------|-----------|
| | | <div>SYSTEMS MANAGEMENT</div> | | | | | | | | | | | | | | |
| 15-10 | <u>ATTITUDE CONTROL</u> | <p>CSM IN ACTIVE RCS CONTROL - LM WILL NOT BE IN ACTIVE ATTITUDE HOLD. LM IN ACTIVE RCS CONTROL - CSM WILL NOT BE IN ACTIVE ATTITUDE HOLD. FOR DOCKING ACTIVITIES AFTER OPENING THE APS INTERCONNECT (BOTH VEHICLES IN ACTIVE RCS CONTROL), THE CSM MUST BE IN A TIGHTER DEADBAND THAN THE LM.</p> | | | | | | | | | | | | | | |
| 15-11 | | <p>PIPA BIAS WILL BE UPDATED WHEN ACTUAL BIAS DIFFERS FROM THE VALUE IN CMC ERASABLE BY $\pm 0.003 \text{ FT/SEC}^2$. THE FAILURE LIMIT ON THE CSM ACCELEROMETER IS $\pm 0.164 \text{ FT/SEC}^2$. THE FIRST GYRO BIAS DRIFT WILL BE UPDATED IF THE DRIFT IS $\pm 1 \text{ MERU}$ (0.015 DEG/HR). THEREAFTER, $\pm 3 \text{ MERU}$ ($\pm 0.045 \text{ DEG/HR}$) WILL BE THE UPDATE CRITERIA. THE FAILURE LIMIT ON THE CSM GYRO IS $\pm 100 \text{ MERU}$ ($\pm 1.5 \text{ DEG/HR}$).</p> | | | | | | | | | | | | | | |
| 15-12 | <u>ΔV COUNTER DRIFT</u> | <p>A. FOR SPS BURNS, THE ΔV COUNTER SHOULD BE APPROPRIATELY BIASED FOR DRIFTS OF GREATER THAN 0.015 FT/SEC^2.</p> <p>B. FOR RCS BURNS, THE ΔV COUNTER WILL BE BIASED FOR DRIFTS GREATER THAN OR EQUAL TO 0.01 FT/SEC^2. SHOULD THE DRIFT BE GREATER THAN 0.1 FT/SEC^2, THE EMS WILL BE CONSIDERED FAILED.</p> | | | | | | | | | | | | | | |
| 15-13 | <u>DAP INITIALIZATION</u> | <p>A. GIMBAL TRIMS: WILL BE UPDATED FOR EVERY SPS MANEUVER BASED ON FINAL TRIM POSITIONS OF THE PREVIOUS MANEUVER AS MONITORED ON TELEMETRY, IF THE PREVIOUS MANEUVER WAS SCS CONTROLLED. IF THE PREVIOUS MANEUVER WAS G&N CONTROLLED, THE CMC STORED VALUES WILL BE USED. TRIMS WILL BE REINITIALIZED FROM THE GROUND AFTER EACH VEHICLE CONFIGURATION CHANGE AND AFTER EACH WEIGHT UPDATE. TRIMS MUST BE UPDATED WHEN GROUND COMPUTED VALUES DIFFER FROM CMC STORED VALUES BY 0.5 DEGREE.</p> <p>B. CSM, LM WEIGHT: SHOULD BE UPDATED WHEN GROUND COMPUTED VALUES DIFFER FROM CMC STORED VALUES BY 1.0 PERCENT. WEIGHTS MUST BE UPDATED WHEN GROUND VALUES DIFFER FROM CMC VALUES BY 10.0 PERCENT.</p> | | | | | | | | | | | | | | |
| 15-14 | <u>SPS THRUST CONSTRAINTS</u> | <p>A. ET DECAY WILL BE UPDATED WHEN ACTUAL VALUE DIFFERS FROM LOADED BY $\pm 0.05 \text{ SECONDS}$.</p> <p>B. EFIMP16 WILL BE UPDATED WHEN ACTUAL VALUE DIFFERS FROM LOADED BY 400 LB THRUST.</p> <p>RULE NUMBERS 15-15 THROUGH 15-19 ARE RESERVED.</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 17</td><td>FNL</td><td>9/1/72</td><td>GUIDANCE AND CONTROL</td><td>SYSTEMS MANAGEMENT</td><td>15-4</td><td>Tape 52.6</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | SYSTEMS MANAGEMENT | 15-4 | Tape 52.6 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | SYSTEMS MANAGEMENT | 15-4 | Tape 52.6 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-----------------------------------------------------------|------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | | | | <div>SPECIFIC MISSION RULES</div> | | | | |
| | 15-20 | LOSS OF EITHER BMAG 1 OR 2 IN EITHER PITCH OR YAW CHANNEL | ALL | <u>CONTINUE MISSION</u> | 1. REF MALF PROC: G&C-1, 3, 4, AND 8 SEC-1, 3, 3A, AND 6 2. NO SCS AUTO TVC 3. IF IN YAW CHANNEL, AFTER .05G RSI IS UNABLE IF REMAINING GYRO IS SELECTED FOR RATE. RSI MUST BE REALIGNED, IN ADDITION TO THE ABOVE, FOR YAW FAILURE AFTER .05G. | | | |
| | 15-21 | LOSS OF BOTH BMAG 1 AND 2 IN EITHER PITCH OR YAW CHANNEL | LAUNCH | A. <u>CONTINUE MISSION</u> | A. MTVC ACCEL CMD IS ONLY MODE III OR MODE IV SPS CONTROL MODE. | | | |
| | | | TLC | B. <u>NO-GO FOR LOI</u> | | | | |
| | | | LO | C. <u>NO-GO FOR UNDOCKING</u> ENTER NEXT BEST PTP IF LM DPS NOT AVAILABLE FOR TEI | C. PLAN DPS TEI | | | |
| | | | DESCENT | D. <u>CONTINUE MISSION</u> | | | | |
| | | | CSM EVA | E. <u>CONTINUE MISSION</u> | | | | |
| | | | ALL OTHERS | F. <u>TERMINATE PHASE AND ENTER NEXT BEST PTP</u> | F. IN EARTH ORBIT, LOSS OF PITCH CHANNEL RESULTS IN ALL THREE DEORBIT METHODS BEING SUBJECTED TO SINGLE FAILURES IN THE G&N SYSTEM. THE YAW LOSS PRECLUDES HYBRID DEORBIT AND SUBJECTS BOTH REMAINING DEORBIT METHODS TO SINGLE FAILURES IN THE G&N SYSTEM | | | |
| | | | ENTRY | G. <u>CONTINUE MISSION</u> | G. RSI AND SCS FDAI ROLL UNUSABLE WITH YAW CHANNEL FAILURES. | | | |
| | 15-22 | LOSS OF ROLL BMAG | | | | | | |
| | | A. NUMBER ONE | ALL | A. <u>CONTINUE MISSION</u> | A.1. MANUAL ROLL ATTITUDE CONTROL REQUIRED IN ALL SCS MODES. 2. FOR ENTRY, NO SCS FDAI ROLL. RSI VALID. | | | |
| | | B. NUMBER TWO | ALL | B. <u>CONTINUE MISSION</u> | B.1. USE OF ATT 1/RATE 2 AND LIM CYCLE MAY PROVIDE RATE DAMPED ATTITUDE HOLD WHEN RCS DAP IS NOT USED. GYRO PACKAGE 2 MUST BE POWERED DOWN TO EFFECT ATTITUDE HOLD IF FAILURE IS HARDOVER. 2. SELECTION OF RATE 1 WILL PROVIDE BOTH RSI AND SCS FDAI ROLL FOR ENTRY. RSI MUST BE REALIGNED FOR ROLL FAILURE AFTER .05G. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | SCS | 15-5 | Tape 37.5 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|---------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 15-23 | LOSS OF BOTH ROLL BMAG'S | LAUNCH EO TLC POST RNDZ ALL OTHERS | A. <u>CONTINUE MISSION</u> B.1. <u>NO-GO FOR TLI</u> 2. ENTER NEXT BEST PTP IF SM DEORBIT NOT AVAILABLE C. <u>NO-GO FOR LOI</u> D. ENTER NEXT BEST PTP E. <u>CONTINUE MISSION</u> | C. NO SCS FDAI ROLL OR RSI AVAILABLE FOR ENTRY. | | | |
| | 15-24 | LOSS OF EITHER TVC SERVO LOOP IN EITHER PITCH OR YAW AXIS | LAUNCH/EO TLC LO DESCENT ALL OTHERS | A. <u>CONTINUE MISSION</u> SELECT 1 OR 2 ON TVC GIMBAL DRIVE SWITCH IN APPROPRIATE AXIS B. GO FOR LOI IF REDUNDANCY CAN BE MAINTAINED IN INERTIAL YAW AXIS C. <u>NO-GO FOR UNDOCKING</u> ENTER NEXT BEST PTP IF LM DPS NOT AVAILABLE FOR TEI D. <u>CONTINUE MISSION</u> E. <u>TERMINATE PHASE AND</u> <u>ENTER NEXT BEST PTP</u> | MAINTAIN 20 LBS/QUAD/AXIS FOR HARDOVER RECOVERY FOR UNDOCKED AND TBD LBS/QUAD/AXIS FOR HARDOVER RECOVERY FOR DOCKED SPS MANEUVERS. C. IN LUNAR ORBIT, PLAN DPS TEI. | | | |
| | 15-25 | LOSS OF BOTH TVC SERVO LOOPS | LAUNCH EO TLC DESCENT ALL OTHERS | A. <u>CONTINUE MISSION</u> B. <u>ENTER NEXT BEST PTP</u> RCS DEORBIT C. <u>NO-GO FOR LOI</u> D. <u>CONTINUE MISSION</u> E. <u>TERMINATE PHASE AND</u> <u>ENTER NEXT BEST PTP</u> | A.1. REF MALF PROC G&C-1, G&N-4, SCS-A1 2. NO MODE III OR IV CAPABILITY. LIMITED LANDING POINT CONTROL IN MODE III OR IV WITH SM-RCS. E. IN LUNAR ORBIT, DO DPS TEI. | | | |
| | 15-26 | LOSS OF PROPORTIONAL CONTROL FROM: A. EITHER RHC B. BOTH RHC'S | ALL ALL | A. <u>CONTINUE MISSION</u> USE REMAINING RHC B. <u>CONTINUE MISSION</u> USE DIRECT RCS OR ACCEL CMD FOR MANUAL MANEUVERS | B. NO MTVC RATE OR MTVC ACCEL CMD CAPABILITY | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | SCS | 15-6 | Tape 65.3 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 15-27 | LOSS OF DIRECT RCS CONTROL FROM: A. EITHER RHC, ANY OR ALL AXES B. BOTH RHC'S, SAME AXIS C. BOTH RHC'S, TWO AXES | ALL LAUNCH DESCENT CSM EVA ALL OTHERS LUNAR STAY CSM/EVA | A. <u>CONTINUE MISSION</u> B.1. <u>CONTINUE MISSION</u> 2. <u>CONTINUE MISSION</u> 3. <u>CONTINUE MISSION</u> 4. <u>TERMINATE PHASE AND ENTER NEXT BEST PTP</u> C.1. <u>TERMINATE PHASE AND ENTER NEXT BEST PTP</u> 2. <u>CONTINUE MISSION</u> | REF MALF PROC SCS 5 B.5. FAILURE VIOLATES DIRECT RCS REQUIREMENT. | | | |
| | 15-28 | COMPLETE LOSS OF AUTO ATTITUDE CONTROL IN PITCH AND YAW CHANNELS A. CONTROL IS REGAINED BY OPENING EMS CB'S B. CONTROL IS REGAINED BY PLACING S/C CONTROL SWITCH TO CMC. C. CONTROL IS NOT REGAINED | ALL ALL DESCENT CSM/EVA ALL OTHERS | A. <u>CONTINUE MISSION</u> AFTER SM JETTISON EMS MAY BE REENABLED WITHOUT LOSS OF AUTO RCS B. <u>CONTINUE MISSION</u> C.1. <u>CONTINUE MISSION</u> 2. <u>CONTINUE MISSION</u> 3. <u>TERMINATE PHASE AND ENTER NEXT BEST PTP</u> USE DIRECT ULLAGE AND DIRECT RCS. | REF MALF PROC SCS 1 SUSPECTED FAILURE WOULD BE AUTO INHIBIT CIRCUITRY. B. NO SCS ATTITUDE CONTROL C.3. FAILURE VIOLATES RATE DAMPING REQUIREMENTS. | | | |
| | 15-29 | LOSS OF FLIGHT DIRECTOR ATTITUDE INDICATORS A. ONE B. BOTH | ALL LAUNCH TLC DESCENT LUNAR STAY CSM EVA ALL OTHERS | A. <u>CONTINUE MISSION</u> B. 1. <u>CONTINUE MISSION</u> 2. <u>NO-GO FOR LOI</u> 3. <u>CONTINUE MISSION</u> 4. <u>CONTINUE MISSION</u> 5. <u>CONTINUE MISSION</u> 6. <u>TERMINATE PHASE AND ENTER NEXT BEST PTP</u> | REF MALF PROC G&C-1,2,3,4,5, AND 6 B.5. IN LUNAR ORBIT, DO DPS TEI. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | SCS | 15-7 | Tape 65.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-----------------------|------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-----------|
| | 15-30 | LOSS OF AC1 PHASE A | | | 1. LOSS OF AC1 PHASE A RESULTS IN THE LOSS OF: (A) REDUNDANT SERVO LOOP POWER. BOTH SERVO LOOPS MUST BE POWERED BY THE SAME BUS. (B) PROPORTIONAL ATTITUDE CONTROL FROM BOTH RHC'S. ALL PROPORTIONAL CONTROL FROM RHC NO. 1. (C) FDAI NO. 1 (D) GYRO ASSEMBLY NO. 1 (E) SCS TOTAL ATTITUDE ERROR (F) SCS TOTAL ATTITUDE (G) SCS AUTO TVC CAPABILITY (H) SCS MINIMUM IMPULSE CAPABILITY (I) SCS ATTITUDE CONTROL RATE DAMPING (J) GPI P AND Y DRIVE NO. 1 2. IN EARTH ORBIT, LOSS OF AC1 PRECLUDES HYBRID DEORBIT AND SUBJECTS BOTH REMAINING DEORBIT METHODS TO A SINGLE FAILURE (AC2 PHASE A) | | | |
| | | | LAUNCH | A. <u>CONTINUE MISSION</u> | | | | |
| | | | TLC | B. <u>NO-GO FOR LOI</u> | | | | |
| | | | DESCENT | C. <u>CONTINUE MISSION</u> | | | | |
| | | | CSM EVA | D. <u>CONTINUE MISSION</u> | | | | |
| | | | ALL OTHERS | E. <u>TERMINATE PHASE AND ENTER NEXT BEST PTP</u> | E. IN LUNAR ORBIT DO DPS TEI. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| - | | APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | SCS | 15-8 | Tape 38.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL - CONTINUED

| SECTION 15 - GUIDANCE AND CONTROL - CONTINUED | | | | | | | | | |
|-----------------------------------------------|-------|-------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--|
| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | | CUES/NOTES/COMMENTS | | |
| | 15-31 | LOSS OF AC2 PHASE A | LAUNCH TLC DESCENT CSM EVA ALL OTHERS | A. <u>CONTINUE MISSION</u> B. <u>NO-GO FOR LOI</u> C. <u>CONTINUE MISSION</u> D. <u>CONTINUE MISSION</u> E. <u>TERMINATE PHASE AND</u> <u>ENTER NEXT BEST PTP</u> | | | 1. LOSS OF AC2 PHASE A RESULTS IN THE LOSS OF: (A) REDUNDANT SERVO LOOP POWER (B) ALL PROPORTIONAL CONTROL (C) FDAI NO. 2 (D) GYRO ASSEMBLY NO. 2 (E) SCS PITCH AND YAW TOTAL ATTITUDE (F) ALL SCS TVC CAPABILITY (AUTO, RATE AND ACCEL CMD) (G) RSI (H) GPI P AND Y DRIVE NO. 2 2. IN EARTH ORBIT, LOSS OF AC2 RESULTS IN ALL THREE DEORBIT METHODS BEING SUBJECTED TO A SINGLE FAILURE (AC1 PHASE A). E. IN LUNAR ORBIT, DO DPS TEI. | | |
| | 15-32 | LOSS OF ORBIT RATE DISPLAY (ORDEAL) EARTH AND LUNAR | ALL | <u>CONTINUE MISSION</u> | | | REF MALF PROC G&C-4 AND 5 | | |
| | 15-33 | LOSS OF ENTRY MONITOR SYSTEM | ALL | <u>CONTINUE MISSION</u> | | | REF MALF PROC EMS-1 | | |
| | 15-34 | GROUND AT EITHER SPS SOL DRIVER OUTPUT AND UNABLE TO REMOVE | ALL | <u>CONTINUE MISSION</u> OPEN SPS PILOT VALVE CB'S | | | REF MALF PROC G&C-1 | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | |
| - | | APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | SCS | 15-9 | Tape 38.2 | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-------|-------|-----------|
| | 15-35 | LOSS OF TRANSLATION HAND CONTROLLER | LAUNCH EARTH ORBIT TLC LO UNDOCKED ALL OTHERS | A. <u>CONTINUE MISSION</u> B. <u>ENTER NEXT BEST PTP</u> C. <u>CONTINUE MISSION</u> D. <u>NO-GO FOR UNDOCKING</u> E. <u>DOCK</u> F. <u>CONTINUE MISSION</u> | B. VIOLATES BOTH SM AND HYBRID DEORBIT MINIMUM REQUIREMENTS. D. VIOLATES LM RESCUE MINIMUM REQUIREMENTS. | | | |
| | 15-36 | COMPLETE LOSS OF RHC A. ONE RHC B. BOTH RHC'S | ALL LAUNCH TLC DESCENT LUNAR STAY CSM EVA ALL OTHERS | A. <u>CONTINUE MISSION</u> B.1. <u>CONTINUE MISSION</u> 2. <u>NO-GO FOR LOI</u> 3. <u>CONTINUE MISSION</u> 4. <u>CONTINUE MISSION</u> 5. <u>CONTINUE MISSION</u> 6. <u>ENTER NEXT BEST PTP</u> | | | | |
| | | RULE NUMBERS 15-37 THROUGH 15-49 ARE RESERVED. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | SCS | 15-10 | Tape 38.3 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-----------|
| | 15-50 | LOSS OF COMMAND MODULE COMPUTER | LAUNCH EO TLC LO UNDocked DESCENT POST DOCK CSM EVA ENTRY ALL OTHERS | A. <u>CONTINUE MISSION</u> B. <u>CONTINUE ALTERNATE EO MISSION IF BOTH SPS AND SM DEORBIT CAPABILITY AVAILABLE</u> C. <u>CONTINUE MISSION IF LM DPS AVAILABLE</u> D. <u>NO-GO FOR UNDOCKING</u> ENTER NEXT BEST PTP IF LM DPS NOT AVAILABLE FOR TEI E. <u>DOCK</u> F. <u>CONTINUE MISSION</u> G. <u>RETAIN LM ASCENT STG</u> H. <u>CONTINUE MISSION</u> I. <u>PERFORM BACKUP ENTRY</u> J. <u>TERMINATE PHASE AND ENTER NEXT BEST PTP</u> | REF MALF PROC G&N-5 B. VIOLATES HYBRID DEORBIT MINIMUM REQUIREMENTS D. IN LUNAR ORBIT, PLANS DPS TEI E. VIOLATES LM RESCUE MINIMUM REQUIREMENTS G. USE LM FOR COMM B/U J. CONSIDERATION WILL BE GIVEN TO COMPLETING THE LUNAR STAY PHASE | | | |
| | 15-51 | LOSS OF DSKY A. EITHER MDC OR LEB DSKY B. BOTH MDC AND LEB DSKY | ALL LAUNCH EO TLC LO UNDocked DESCENT POST DOCK ENTRY ALL OTHERS | A. <u>CONTINUE MISSION</u> B.1. <u>CONTINUE MISSION</u> B.2. <u>CONTINUE ALTERNATE EO MISSION IF BOTH SPS AND SM DEORBIT CAPABILITY AVAILABLE</u> 3. <u>CONTINUE MISSION IF LM DPS AVAILABLE</u> 4. <u>NO-GO FOR UNDOCKING</u> ENTER NEXT BEST PTP IF LM DPS NOT AVAILABLE FOR TEI 5. <u>DOCK</u> 6. <u>CONTINUE MISSION</u> 7. <u>RETAIN LM ASCENT STG</u> 8. <u>PERFORM BACKUP ENTRY</u> 9. <u>TERMINATE PHASE AND ENTER NEXT BEST PTP</u> | REF MALF PROC G&N-5 B.2. VIOLATES HYBRID DEORBIT MINIMUM REQUIREMENTS 4. PLAN DPS TEI 5. VIOLATES LM RESCUE MINIMUM REQUIREMENTS 7. USE LM FOR COMM B/U 9. CONSIDERATION WILL BE GIVEN TO COMPLETING THE LUNAR STAY PHASE | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | G&N | 15-11 | Tape 65.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|---|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 15-52 | LOSS OF INERTIAL SUBSYSTEM | LAUNCH EO TLC LO UNDOCKED DESCENT POST DOCK CSM EVA ENTRY ALL OTHERS | A. <u>CONTINUE MISSION</u> B. <u>CONTINUE ALTERNATE EO MISSION IF BOTH SPS AND SM DEORBIT CAPABILITY AVAILABLE</u> C. <u>NO-GO FOR LOI</u> D. <u>ENTER NEXT BEST PTP</u> E. <u>DOCK</u> F. <u>CONTINUE MISSION</u> G. <u>RETAIN LM ASCENT STG</u> H. <u>CONTINUE MISSION</u> I. <u>PERFORM BACKUP ENTRY</u> J. <u>TERMINATE PHASE AND ENTER NEXT BEST PTP</u> | REF MALF PROC G&N-6 B. VIOLATES HYBRID DEORBIT MINIMUM REQUIREMENTS D. IN LUNAR ORBIT, DO DPS TEI E. VIOLATES LM RESCUE REQUIREMENTS G. USE LM G&N TO MONITOR BURNS J. VIOLATES LM RESCUE MINIMUM REQUIREMENTS |
| | 15-53 | LOSS OF OPTICS SUBSYSTEM | ALL | <u>CONTINUE MISSION</u> USE BACKUP ALIGNMENT PROCEDURE (COAS) | REF MALF PROC G&N-5 |
| | 15-54 | LOSS OF OPTICS SUBSYSTEM COUPLING DATA UNIT DIGITAL-TO-ANALOG CONVERTER < | | | |

MISSION RULES

| R | ITEM | INSTRUMENTATION REQUIREMENTS | | | | | MSN RULE REFERENCE |
|-------|------|------------------------------|---------|------------|-------------|---------------------------------|--------------------|
| | | MEAS DESCRIPTION | PCM | ONBOARD | TRANSDUCERS | CATEGORY | |
| 15-60 | | CMC DIGITAL DATA | CG0001V | - | - | MANDATORY | 15-50 |
| | | SPS SOL DRIVER 1 | CH3604X | EMS-SPS-ON | SEPARATE | HIGHLY DESIRABLE | 15-34 |
| | | SPS SOL DRIVER 2 | CH3605X | EMS-SPS-ON | SEPARATE | HIGHLY DESIRABLE | 15-34 |
| | | PITCH GIMBAL POS 1 & 2 | CH3517H | GPI | COMMON | 1 OF 2 MANDATORY ONBOARD/HD-PCM | 15-24,25 |
| | | YAW GIMBAL POS 1 & 2 | CH3518H | GPI | COMMON | 1 OF 2 MANDATORY ONBOARD/HD-PCM | 15-24,25 |
| | | TM BIAS 2.5 VDC | CG1110V | - | - | HIGHLY DESIRABLE | 15-52,53,54 |
| | | PIPA TEMP | CG2300T | - | - | HIGHLY DESIRABLE | 15-52 |
| | | IMU HTR +28 VDC | CH1513X | - | - | HIGHLY DESIRABLE | 15-52 |
| | | CMC OPERATE +28 VDC | CG1523X | - | - | HIGHLY DESIRABLE | 15-50 |
| | | OPTX OPERATE +28 VAC | CG1533X | - | - | HIGHLY DESIRABLE | 15-54 |
| | | IG 1X RSVR OUT SIN | CG2112V | FDAI | COMMON | HIGHLY DESIRABLE | 15-52 |
| | | IG 1X RSVR OUT COS | CG2113V | FDAI | COMMON | HIGHLY DESIRABLE | 15-52 |
| | | MG 1X RSVR OUT SIN | CG2142V | FDAI | COMMON | HIGHLY DESIRABLE | 15-52 |
| | | MG 1X RSVR OUT COS | CG2143V | FDAI | COMMON | HIGHLY DESIRABLE | 15-52 |
| | | OG 1X RSVR OUT SIN | CG2172V | FDAI | COMMON | HIGHLY DESIRABLE | 15-52 |
| | | OG 1X RSVR OUT COS | CG2173V | FDAI | COMMON | HIGHLY DESIRABLE | 15-52 |
| | | SHAFT CDU DAC OUT | CG3721V | - | - | HIGHLY DESIRABLE | 15-54 |
| | | TRUNNION CDU DAC OUT | CG3722V | - | - | HIGHLY DESIRABLE | 15-54 |
| | | CMC WARNING | CG5040X | C&W | COMMON | HIGHLY DESIRABLE | 15-50 |
| | | PITCH ATT ERROR | CH3500H | FDAI | COMMON | HIGHLY DESIRABLE | 15-20,21,22,23 |
| | | YAW ATT ERROR | CH3501H | FDAI | COMMON | HIGHLY DESIRABLE | 15-20,21,22,23 |
| | | ROLL ATT ERROR | CH3502H | FDAI | COMMON | HIGHLY DESIRABLE | 15-20,21,22,23 |
| | | SCS PITCH BODY RATE | CH3503R | FDAI | COMMON | HIGHLY DESIRABLE | 15-20,21,22,23 |
| | | SCS YAW BODY RATE | CH3504R | FDAI | COMMON | HIGHLY DESIRABLE | 15-20,21,22,23 |
| | | SCS ROLL BODY RATE | CH3505R | FDAI | COMMON | HIGHLY DESIRABLE | 15-20,21,22,23 |
| | | SCS TVC PITCH AUTO CMD | CH3582V | - | - | HIGHLY DESIRABLE | 15-24,25 |
| | | SCS TVC YAW AUTO CMD | CH3583V | - | - | HIGHLY DESIRABLE | 15-24,25 |
| | | MTVC PITCH CMD | CH3585H | - | - | HIGHLY DESIRABLE | 15-24,25 |
| | | MTVC YAW CMD | CH3586H | - | - | HIGHLY DESIRABLE | 15-24,25 |
| | | FDAI ERROR 5, RATE 5 | CH3592X | - | - | HIGHLY DESIRABLE | 15-20,21,22,23 |
| | | FDAI ERROR 50/15, RATE 50/10 | CH3593X | - | - | HIGHLY DESIRABLE | 15-20,21,22,23 |
| | | PITCH DIFF CLUTCH CUR | CH3666C | - | - | HIGHLY DESIRABLE | 15-24,25 |
| | | YAW DIFF CLUTCH CUR | CH3667C | - | - | HIGHLY DESIRABLE | 15-24,25 |

| | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
|---|-----------|-----|--------|----------------------|-----------|-------|-----------|
| - | APOLLO 17 | FNL | 9/1/72 | GUIDANCE AND CONTROL | INSTR REQ | 15-13 | Tape 38.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS

| R | ITEM | | | | | | |
|---|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|---------|---------|-----------|
| | | <u>GENERAL</u> | | | | | |
| | 16-1 | <p>A. <u>CATEGORIES OF FAILURES</u></p> <p>FAILURES AFFECTING THE SPS FALL INTO ONE OF THREE CATEGORIES:</p> <ol style="list-style-type: none"> 1. FAILURES WHICH CAUSE THE SPS TO BE UNSAFE: THESE FAILURES RESULT IN MISSION TERMINATION ASAP. 2. FAILURES WHICH CAUSE THE SPS TO BE INOPERABLE OR HAZARDOUS TO OPERATE: THESE FAILURES RESULT IN ALTERATION OF THE MISSION TO MINIMIZE USAGE OF THE SPS. 3. FAILURES SUCH THAT CONTINUED OPERATION WILL RESULT IN SUBSEQUENT DEGRADATION: THESE FAILURES ALLOW PERFORMANCE OF CRITICAL BURNS ONLY. <p>B. <u>ULLAGE REQUIREMENTS</u></p> <p>SUBSEQUENT TO THE DEPLETION OF STORAGE TANK PROPELLANTS, AN ULLAGE MANEUVER WILL NORMALLY BE PERFORMED PRIOR TO ANY BURN. HOWEVER, INABILITY TO PERFORM AN ULLAGE WILL NOT PRECLUDE A CRITICAL BURN.</p> <p>C. <u>PREMATURE TERMINATION OF BURNS</u></p> <p>CRITICAL BURNS WILL NOT BE TERMINATED BECAUSE OF ANOMALIES. NON-CRITICAL BURNS WILL BE TERMINATED UNDER VARIOUS CONDITIONS AS SPECIFIED IN RULE 3-86 AND THE SPECIFIC RULES OF THIS SECTION.</p> <p style="text-align: center;"><u>NOTE</u></p> <p style="text-align: center;">A CRITICAL BURN IS DEFINED AS AN SPS BURN THAT IS REQUIRED FOR THE SAFE RETURN OF THE CREW.</p> | | | | | |
| | 16-2 | <p><u>LAUNCH PHASE</u></p> <p>THERE ARE NO SPS FAILURES WHICH REQUIRE A LAUNCH ABORT.</p> | | | | | |
| | 16-3 | RESERVED | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| - | | APOLLO 17 | FNL | 9/1/72 | CSM SPS | GENERAL | 16-1 |
| | | | | | | | Tape 39.1 |

MISSION RULES

| R | ITEM | |
|------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16-4 | <u>EARTH ORBIT PHASE</u> | <p>A. CRITICAL BURNS IN THIS PHASE ARE MODE IV, APOGEE KICK AND DEORBIT. IF THE SPS IS INCAPABLE OF PERFORMING CRITICAL BURNS, THE MISSION WILL BE TERMINATED BY ENTRY INTO THE NEXT BEST PTP USING SM-RCS OR HYBRID TECHNIQUES.</p> <p>B. IF THE SPS IS INCAPABLE OF PERFORMING NON-CRITICAL BURNS, TLI WILL BE INHIBITED AND A SUITABLE EARTH ORBIT ALTERNATE MISSION WILL BE IMPLEMENTED. THE SPS MAY BE USED FOR DEORBIT ONLY.</p> <p>C. IN ORDER TO PROVIDE THE TOTAL CAPABILITY TO DEORBIT FROM ANY POINT IN THIS PHASE, THE LM DPS AND LM RCS MAY BE USED FOR ORBIT SHAPING.</p> |
| 16-5 | <u>TRANSLUNAR COAST PHASE</u> | <p>A. CRITICAL BURNS IN THIS PHASE ARE TIME-CRITICAL ABORTS, BURNS TO ASSURE FREE RETURN, OR BURNS TO AVOID LUNAR OR LAND IMPACT.</p> <p>B. CERTAIN ABORT BURNS, BURNS TO ASSURE FREE RETURN OR BURNS TO AVOID LUNAR OR LAND IMPACT MAY USE THE LM DPS AND LM RCS.</p> |
| 16-6 | <u>LUNAR ORBIT PHASE</u> | <p>A. TEI IS THE ONLY CRITICAL BURN IN THIS PHASE.</p> <p>B. LM DPS MAY BE USED FOR TEI IF THE CAPABILITY EXISTS.</p> <p>C. TERMINATE PHASE FOR LOSS OF SPS REDUNDANCY WHEN DPS IS NOT AVAILABLE FOR TEI.</p> |
| 16-7 | <u>DESCENT PHASE</u> | <p>THE LM POWERED DESCENT WILL BE ABORTED FOR SPS PROPELLANT LEAKS.</p> |
| 16-8 | <u>UNDOCKED AND LUNAR STAY PHASES</u> | <p>A. THE LUNAR ORBIT PLANE CHANGE IS A CRITICAL BURN IF OUTSIDE TOTAL LM CAPABILITY.</p> <p>B. THESE PHASES WILL BE TERMINATED FOR CONFIRMED LOSS OF SPS REDUNDANCY.</p> <p>C. LUNAR STAY WILL BE ABORTED AT T1 FOR SPS PROPELLANT LEAKS.</p> |

| MISSION | REV | DATE | SECTION | GROUP | PAGE | |
|-----------|-----|--------|---------|---------|------|------------|
| APOLLO 17 | FNL | 9/1/72 | CSM SPS | GENERAL | 16-2 | Tape 57.11 |

MISSION RULES

SECTION 16 - CSM SPS - CONTINUED

TSG 291A

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|------|-----------|-------|------|--|-----------|-----|--------|---------|------------|------|-----------|
| | | <div>SYSTEMS MANAGEMENT</div> | | | | | | | | | | | | | | |
| 16-12 | <u>PROPELLANT GAGING</u> | <p>A. FOR BURNS LESS THAN 25 SECONDS DURATION:</p> <p>1. PRIME METHOD: IMU ΔV OBTAINED</p> <p>2. BACKUP METHOD: FLOW RATE X BURN TIME</p> <p>B. FOR BURNS GREATER THAN 25 SECONDS DURATION:</p> <p>1. PRIME METHOD: IMU ΔV OBTAINED</p> <p>2. BACKUP METHOD: ONBOARD GAGING SYSTEM</p> | | | | | | | | | | | | | | |
| 16-13 | | <p>THE PU VALVE WILL BE USED TO MAINTAIN THE UNBALANCE READING:</p> <p>A. PRIOR TO CROSSOVER: WITHIN ±50 LBS OF THE STABLE VALUE OCCURRING APPROXIMATELY 25 SEC AFTER LOI IGNITION.</p> <p>B. AFTER CROSSOVER: WITH ±100 LBS OF ZERO UNBALANCE.</p> | | | | | | | | | | | | | | |
| 16-14 | <u>DUAL BANK VS SINGLE BANK OPERATION</u> | <p>THE SPS WILL ALWAYS BE STARTED USING A SINGLE BANK. HOWEVER, THE OTHER BANK WILL BE OPENED 2 TO 5 SECONDS AFTER IGNITION FOR BURNS PLANNED TO BE LONGER THAN 10 SECONDS.</p> | | | | | | | | | | | | | | |
| 16-15 | <u>PROPELLANT MANAGEMENT</u> | <p>DELETED</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 17</td><td>FNL</td><td>9/1/72</td><td>CSM SPS</td><td>MANAGEMENT</td><td>16-4</td><td>Tape 52.7</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | CSM SPS | MANAGEMENT | 16-4 | Tape 52.7 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | CSM SPS | MANAGEMENT | 16-4 | Tape 52.7 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS - CONTINUED

| R | ITEM | | | | | | |
|---|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|---------|------------|-----------|
| | 16-16 | <p><u>PROPELLANT FEEDLINE TEMPERATURE MANAGEMENT</u></p> <p>SPS LINE HEATERS WILL BE MANUALLY CYCLED TO MAINTAIN FEEDLINE TEMPERATURES BETWEEN 45° F AND 75° F AND ENGINE VALVE TEMPERATURE ABOVE 45° F.</p> <p>RULE NUMBERS 16-17 THROUGH 16-19 ARE RESERVED.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | CSM SPS | MANAGEMENT | 16-5 |
| | | | | | | | Tape 39.5 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|----------------------------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------|------------|
| | | | | <div><div>SPECIFIC MISSION RULES</div></div> | | | | |
| | 16-20 | SUSTAINED PRESSURE DECAY IN EITHER THE FUEL OR OXIDIZER TANK (COULD BE HELIUM OR FUEL OR OXIDIZER) | LAUNCH | <div><div>CONTINUE MISSION</div><div>PLAN RCS DEORBIT AT NEXT BEST PTP</div><div>IF LAND IMPACT IS IMMINENT AFTER ABORTING, REPRESS MANUALLY AND PERFORM BURN TO AVOID LAND.</div></div> | <div>MALF PROC SPS 1B</div> <div>REF MR 3-86 MANEUVER TABLE</div> <div>MANUAL PRESSURIZATION OF THE TANKS SHOULD BE CONSIDERED PRIOR TO ANY REQUIRED SPS BURN.</div> <div>NOTE:</div> <div>SUSTAINED PRESSURE DECAY IS DEFINED AS A DECREASE OF AT LEAST 4 PSI, NOT ATTRIBUTABLE TO HELIUM ABSORPTION AND/OR THERMAL EFFECTS.</div> | | | |
| | | | EO | <div><div>ENTER NEXT BEST PTP</div><div>RCS DEORBIT</div></div> | | | | |
| | | | TLC | <div><div>NO-GO FOR LOI-</div><div>INHIBIT NON-CRITICAL SPS BURNS</div></div> | | | | |
| | | | LO | <div><div>ENTER NEXT BEST PTP</div><div>USE DPS IF CAPABILITY EXISTS</div></div> | | | | |
| | | | UNDOCKED | <div><div>DOCK ASAP</div></div> | <div>DO NOT STAGE LM</div> | | | |
| | | | DESCENT | <div><div>ABORT</div></div> | | | | |
| | | | LUNAR STAY | <div><div>RETURN TO CSM ASAP</div></div> | | | | |
| | | | TEC | <div><div>CONTINUE MISSION</div><div>INHIBIT NON-CRITICAL BURNS</div></div> | | | | |
| | | | CSM EVA | <div><div>CONTINUE MISSION</div></div> | <div>CONSIDERATION WILL BE GIVEN TO CONTINUING BASED ON AMOUNT OF CONTAMINANTS</div> | | | |
| | | A. DURING NON-CRITICAL BURN (PRESS LESS THAN OR EQUAL TO 160 PSIA) | ALL | <div><div>A. <u>TERMINATE BURN</u></div></div> | | | | |
| | | B. DURING CRITICAL BURN | ALL | <div><div>B. <u>CONTINUE BURN</u></div></div> | | | | |
| | 16-21 | LOSS OF ONE GN2 TANK PRESSURE (LESS THAN 400 PSI) | EO | <div><div>A. <u>CONTINUE MISSION</u></div></div> | <div>MALF PROC SPS 9</div> | | | |
| | | | ALL OTHERS | <div><div>B.1. VERIFY OPERATION OF SUS-ON SUSPECT BANK</div><div>2. IF LOSS CONFIRMED BY ENGINE OPERATION, REF MR 16-22.</div></div> | <div>TRANSDUCER INDICATION CANNOT BE VERIFIED WITHOUT ENGINE OPERATION.</div> | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM SPS | SPECIFIC | 16-6 | Tape 65.10 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|------|-----------|
| | 16-22 | LOSS OF ONE BANK OF BALL VALVES | LAUNCH/EO TLC LO UNDOCKED/DESCENT LUNAR STAY | A. <u>CONTINUE MISSION</u> B. <u>CONTINUE MISSION IF DPS AVAILABLE</u> C. <u>NO-GO FOR UNDOCKING</u> ENTER NEXT BEST PTP IF LM DPS NOT AVAILABLE FOR TEI D. N/A E. <u>ENTER NEXT BEST PTP</u> | MALF PROC SPS-9 C. PLAN DPS TEI | | | |
| | 16-23 | LOSS OF BOTH GN2 TANK PRESSURE (LESS THAN 400 PSIA) | LAUNCH EO TLC LO UNDOCKED DESCENT LUNAR STAY TEC | A. <u>CONTINUE MISSION</u> B. <u>ENTER NEXT BEST PTP</u> RCS DEORBIT C. <u>NO-GO FOR LOI</u> D. <u>ENTER NEXT BEST PTP</u> E. <u>DOCK ASAP</u> F. <u>CONTINUE MISSION</u> G. <u>RETURN TO CSM AND PERFORM TEI ASAP</u> H. <u>CONTINUE MISSION</u> | MALF PROC SPS 9 TRANSDUCER INDICATION CANNOT BE VERIFIED WITHOUT ENGINE OPERATION. D. DO DPS TEI. E. DO NOT STAGE LM | | | |
| | 16-24 | FUEL FEEDLINE AND/OR OXIDIZER FEEDLINE TEMP LESS THAN 40° F AND UNABLE TO INCREASE. | LAUNCH EO TLC LO UNDOCKED DESCENT LUNAR STAY TEC | A. <u>CONTINUE MISSION</u> B. <u>ENTER NEXT BEST PTP</u> RCS DEORBIT C. <u>NO-GO FOR LOI/DOI</u> D. <u>ENTER NEXT BEST PTP</u> E. <u>DOCK ASAP</u> F. <u>CONTINUE MISSION</u> G. <u>RETURN TO CSM ASAP</u> H. <u>CONTINUE MISSION</u> | MALF PROC SPS 11 LIMITATION FOR CRITICAL BURNS IS 25° F. D. DO DPS TEI. F. DO NOT STAGE LM | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM SPS | SPECIFIC | 16-7 | Tape 65.5 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-----------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------|-----------|
| | 16-25 | ENGINE FLANGE TEMP GOES HIGHER THAN 480° F DURING AN SPS BURN | LAUNCH EO TLC LO | NOT APPLICABLE <u>ENTER NEXT BEST PTP</u> RCS DEORBIT <u>NO-GO FOR LOI/DOI/PDI</u> <u>ENTER NEXT BEST PTP</u> USE DPS IF AVAILABLE | | | | |
| | | A. DURING NON-CRITICAL BURN | ALL | A. <u>TERMINATE BURN</u> INHIBIT FURTHER NON-CRITICAL BURNS | | | | |
| | | B. DURING CRITICAL BURN | ALL | B. <u>CONTINUE BURN</u> INHIBIT FURTHER NON-CRITICAL BURNS | | | | |
| | 16-26 | THRUST CHAMBER PRESSURE LESS THAN 70 PSI CONFIRMED BY OTHER INSTRUMENTATION | LAUNCH EO TLC LO UNDOCKED ALL OTHERS | A. NOT APPLICABLE B. <u>ENTER NEXT BEST PTP</u> RCS DEORBIT C. <u>NO-GO FOR LOI/DOI/PDI</u> D. <u>ENTER NEXT BEST PTP</u> E. <u>DOCK</u> F. <u>CONTINUE MISSION</u> <u>--TERMINATE BURN</u> INHIBIT FURTHER NON-CRITICAL BURNS <u>--CONTINUE BURN</u> INHIBIT FURTHER NON-CRITICAL BURNS | MALF PROC SPS 6 CONFIRMING INSTRUMENTATION INCLUDES ONBOARD PC METER, CREW, DEGRADED THRUST, FU AND OX INTERFACE PRESSURES, F/O VALVE POSITIONS, FU AND OX TANK PRESSURES. D. DO DPS TEI. F. DO DPS TEI IF AVAILABLE. | | | |
| | | A. DURING NON-CRITICAL BURN | | | | | | |
| | | B. DURING CRITICAL BURN | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| - | | APOLLO 17 | FNL | 9/1/72 | CSM SPS | SPECIFIC | 16-8 | Tape 39.8 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|----------|------|-----------|
| | 16-27 | RESERVED | | | | | | |
| | 16-28 | <p>ΔP BETWEEN FUEL AND OX TANK PRESSURES GREATER THAN 20 PSI AND UNABLE TO DECREASE</p> <p>A. DURING NON-CRITICAL BURN</p> <p>B. DURING CRITICAL BURN</p> | <p>LAUNCH</p> <p>EO</p> <p>TLC</p> <p>LO</p> <p>UNDOCKED</p> <p>ALL OTHERS</p> | <p>A. CONTINUE MISSION</p> <p>B. <u>ENTER NEXT BEST PTP</u></p> <p>RCS DEORBIT</p> <p>C. <u>NO-GO FOR LOI</u></p> <p>D. <u>ENTER NEXT BEST PTP</u></p> <p>E. <u>DOCK ASAP</u></p> <p>F. <u>CONTINUE MISSION</u></p> <p>--<u>TERMINATE BURN</u></p> <p>INHIBIT FURTHER NON-CRITICAL BURNS</p> <p>--<u>CONTINUE BURN</u></p> <p>INHIBIT FURTHER NON-CRITICAL BURNS</p> | <p>MALF PROC SPS 1C</p> <p>D. DO DPS TEI.</p> | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM SPS | SPECIFIC | 16-9 | Tape 65.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-----------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|------------|
| | 16-29 | LEAK OR COMPLETE LOSS OF HELIUM SUPPLY PRESSURE OR BOTH HELIUM VALVES FAIL CLOSED | LAUNCH EO TLC LO UNDOCKED ALL OTHERS | A. <u>CONTINUE MISSION</u> B. <u>NO-GO FOR TLI</u> CONTINUE MISSION IN EO IF SUFFICIENT ULLAGE BLOW-DOWN ΔV CAPABILITY EXISTS C. <u>NO-GO FOR LOI</u> D. <u>NO-GO FOR UNDOCKING</u> ENTER NEXT BEST PTP IF LM DPS NOT AVAILABLE FOR TEI E. <u>DOCK ASAP</u> F. <u>CONTINUE MISSION</u> INHIBIT NON-CRITICAL BURNS | BLOWDOWN ΔV REMAINING IS A FUNCTION OF ULLAGE VOLUME AT TIME OF FAILURE. MALF PROC SPS 7 AND 8 D. PLAN DPS TEI | | | |
| | | RULE NUMBERS 16-30 THROUGH 16-49 ARE RESERVED. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| - | | APOLLO 17 | FNL | 9/1/72 | CSM SPS | SPECIFIC | 16-10 | Tape 39.10 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS - CONCLUDED

| R | ITEM | INSTRUMENTATION REQUIREMENTS | | | | | |
|---|-------|------------------------------|---------|-----------|-------------|--------------|--------------------|
| | 16-50 | MEAS DESCRIPTION | PCM | ONBOARD | TRANSDUCERS | CATEGORY | MSN RULE REFERENCE |
| | | OX TK PRESS | SP0003P | METER/C&W | COMMON | 1 OF 2 M O/B | 16-20,28 |
| | | OX TK PRESS | SP0033P | METER/C&W | COMMON | | 16-20,28 |
| | | OX SM/ENG INTERFACE P | SP0931P | - | - | HD | 16-20,29 |
| | | FU TK PRESS | SP0006P | METER/C&W | COMMON | 1 OF 2 M O/B | 16-20,28 |
| | | FU TK PRESS | SP0066P | METER/C&W | COMMON | | 16-20,28 |
| | | FU SM/ENG INTERFACE P | SP0930P | - | - | HD | 16-20,28 |
| | | SPS VLV ACT PRESS-PRI | SP0600P | METER | COMMON | M O/B OR PCM | 16-21,22 |
| | | SPS VLV ACT PRESS-SEC | SP0601P | METER | COMMON | M O/B OR PCM | 16-21,22 |
| | | SPS FU FEEDLINE TEMP | SP0048T | METER | COMMON | HD | 16-24 |
| | | SPS OX FEEDLINE TEMP | SP0049T | SYS TEST | COMMON | HD | |
| | | ENG CHAMBER PRESS | SP0661P | METER | COMMON | M O/B | 16-26 |
| | | He TK PRESS | SP0001P | METER | SEPARATE | 1 OF 2 M | 16-29 |
| | | FU/OX VLV 1 POS | SP0022H | DISPLAY | SEPARATE | 1 OF 2 M | 16-21,26 |
| | | FU/OX VLV 2 POS | SP0023H | DISPLAY | SEPARATE | 1 OF 2 M | 16-21,26 |
| | | FU/OX VLV 3 POS | SP0024H | DISPLAY | SEPARATE | 1 OF 2 M | 16-21,26 |
| | | FU/OX VLV 4 POS | SP0025H | DISPLAY | SEPARATE | 1 OF 2 M | 16-21,26 |
| | | OX TK 1 QTY - TOTAL AUX | SP0655Q | DISPLAY | COMMON | HD | 16-10,11,13 |
| | | OX TK 2 QTY | SP0656Q | DISPLAY | COMMON | HD | 16-10,11,13 |
| | | FU TK 1 QTY - TOTAL AUX | SP0657Q | DISPLAY | COMMON | HD | 16-10,11,13 |
| | | FU TK 2 QTY | SP0658Q | DISPLAY | COMMON | HD | 16-10,11,13 |
| | | ENG INJ FLANGE TEMP | SP0062T | - | - | HD | 16-25 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 17 - CSM SM-RCS

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|------|-----------|-------|------|--|-----------|-----|--------|------------|---------|------|-----------|
| | | <u>GENERAL</u> | | | | | | | | | | | | | | |
| 17-1 | <u>LAUNCH</u> | THE LOSS OF ONE QUAD IS NOT CAUSE FOR ABORT AND THERE ARE NO SINGLE FAILURES NOR ANY REASONABLE REALISTIC COMBINATION OF FAILURES WHICH LEAD ONLY TO LOSS OF MULTIPLE QUADS. THERE ARE, THEREFORE, NO SM-RCS FAILURES WHICH ARE CONSIDERED CAUSE FOR ABORT. | | | | | | | | | | | | | | |
| 17-2 | <u>EARTH ORBIT PHASE</u> | A. LOSS OF ONE QUAD, IN ITSELF, IS NOT NECESSARILY CAUSE FOR EARLY TERMINATION OF THE MISSION. THE GUIDELINE IS THAT AS LONG AS THE SPACECRAFT ATTITUDE CAN BE CONTROLLED AND THE SPS CAN BE BURNED THE MISSION NEED NOT BE TERMINATED EARLY. HOWEVER, LOSS OF ONE QUAD WILL REQUIRE TLI BE INHIBITED AND MAY LEAD TO EARLY MISSION TERMINATION SINCE THE CAPABILITY TO PERFORM SM OR HYBRID DEORBIT WILL BE AFFECTED. B. LOSS OF TWO OR MORE QUADS IS CAUSE FOR ENTRY INTO THE NEXT BEST PTP. 1. LOSS OF TWO ADJACENT QUADS WILL DESTROY THE CAPABILITY TO PERFORM ULLAGE MANEUVERS AND WILL REQUIRE DELETION OF NON-CRITICAL SPS MANEUVERS. LOSS OF TWO ADJACENT QUADS PRECLUDES SM OR HYBRID DEORBIT. 2. LOSS OF TWO OPPOSITE QUADS WILL DESTROY THE CAPABILITY TO PERFORM PRECISE THREE-AXIS ATTITUDE CONTROL AND PRECLUDES SM OR HYBRID DEORBIT. | | | | | | | | | | | | | | |
| 17-3 | <u>TRANSLUNAR COAST</u> | LOSS OF ONE QUAD IS NOT CAUSE FOR TLC TERMINATION OR LOI INHIBIT. TD&E WILL CONTINUE AS LONG AS THE SM RCS CAN PROVIDE THREE-AXIS ATTITUDE CONTROL AND THREE-AXIS TRANSLATION CONTROL. | | | | | | | | | | | | | | |
| 17-4 | <u>LUNAR ORBIT</u> | LOSS OF ONE QUAD IS NOT, IN ITSELF, CAUSE FOR EARLY TERMINATION OF LUNAR ORBIT OR LUNAR STAY PHASES. UNDOCKING WILL BE NO-GO BECAUSE LOSS OF ONE QUAD PRECLUDES CSM ACTIVE DOCKING. LOSS OF TWO QUADS IS CAUSE FOR TERMINATING LUNAR ORBIT OR LUNAR STAY PHASES, AND IS ALSO CAUSE FOR PERFORMING TEI WITH THE LM DPS OR RETAINING THE LM ASCENT STAGE THROUGH TEI FOR ATTITUDE CONTROL. | | | | | | | | | | | | | | |
| 17-5 | <u>CSM EVA</u> | THE CSM EVA WILL BE NO-GO OR, IF IN PROGRESS, WILL BE TERMINATED FOR THE FOLLOWING FAILURES: A. DELETED B. LOSS OF ANY ONE OF THRUSTERS C2 AND D2, C3, C4, C1 AND D1, D3, D4 IF LM RCS CANNOT BE USED FOR ATTITUDE CONTROL. RULE NUMBERS 17-6 THROUGH 17-14 ARE RESERVED | | | | | | | | | | | | | | |
| | | <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 17</td><td>FNL</td><td>9/1/72</td><td>CSM SM-RCS</td><td>GENERAL</td><td>17-1</td><td>Tape 47.1</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | CSM SM-RCS | GENERAL | 17-1 | Tape 47.1 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | CSM SM-RCS | GENERAL | 17-1 | Tape 47.1 | | | | | | | | | | |
| NASA — MS | | | | | | | | | | | | | | | | |

MISSION RULES

| R | ITEM | | | | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|------|-----------|-------|------|--|-----------|-----|--------|------------|---------|------|-----------|
| | | <u>SYSTEMS MANAGEMENT</u> | | | | | | | | | | | | | | |
| 17-15 | <u>PROPELLANT GAGING</u> | <p>A. PRIME METHOD: RTCC EQUATION (5 PERCENT)</p> <p>B. BACKUP METHOD: HELIUM PRESSURE/TEMPERATURE (11 PERCENT) (ONBOARD)</p> | | | | | | | | | | | | | | |
| 17-16 | <u>QUAD PROPELLANT BALANCE</u> | <p>PROP ISOLATION VALVES WILL NOT BE USED FOR QUAD PROPELLANT BALANCE. PROPELLANT BALANCE WILL BE ACCOMPLISHED BY SELECTING TWO-JET +X AND -X TRANSLATIONS WITH EITHER THE PITCH OR YAW QUAD AND BY CHOOSING SUITABLE JETS FOR ATTITUDE CONTROL. PROPELLANT DIFFERENCES BETWEEN QUADS WILL BE MAINTAINED WITHIN ± 50 POUNDS.</p> | | | | | | | | | | | | | | |
| 17-17 | <u>SECONDARY PROPELLANT FUEL PRESSURE VALVE</u> | <p>THE RCS SECONDARY FUEL PRESSURIZATION VALVE WILL BE OPENED WHEN THE FUEL MANIFOLD PRESSURE REACHES 150 PSIA OR RTCC SHOWS 115 LBS WILL BE EXCEEDED DURING A TRANSLATION MANEUVER.</p> <p>RULE NUMBERS 17-18 THROUGH 17-19 ARE RESERVED.</p> | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>MISSION</th><th>REV</th><th>DATE</th><th>SECTION</th><th>GROUP</th><th>PAGE</th><th></th></tr> </thead> <tbody> <tr> <td>APOLLO 17</td><td>FNL</td><td>9/1/72</td><td>CSM SM-RCS</td><td>GENERAL</td><td>17-2</td><td>Tape 52.8</td></tr> </tbody> </table> | | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | CSM SM-RCS | GENERAL | 17-2 | Tape 52.8 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | CSM SM-RCS | GENERAL | 17-2 | Tape 52.8 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 17 - CSM SM-RCS - CONTINUED

| SECTION 17 - CSM SM-RCS - CONTINUED | | | | | | | | | |
|-------------------------------------|--|-------------------------------------------------------------------------------|--|------------|--|--------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------|--|
| RULE | | CONDITION/MALFUNCTION | | PHASE | | RULING | | CUES/NOTES/COMMENTS | |
| | | | | | | <u>SPECIFIC MISSION RULES</u> | | | |
| 17-20 | | SUSTAINED LEAK IN HELIUM TANK | | | | | | MALF PROC RCS 2 QUAD WILL REMAIN USABLE UNTIL He MANIFOLD PRESSURE REACHES 75 PSI. | |
| | | A. ONE OR MORE QUADS | | LAUNCH | | A. <u>CONTINUE MISSION</u> | | | |
| | | B. ONE QUAD (ALL OTHER QUADS NORMAL) | | EO | | B.1. <u>NO-GO FOR TLI</u> | | | |
| | | | | ALL OTHERS | | 2. <u>CONTINUE MISSION</u> | | | |
| | | C. MORE THAN ONE QUAD | | EO | | C.1. <u>CONTINUE MISSION</u> ENTER PRIOR TO LOSS OF HYBRID DEORBIT CAPABILITY | | | |
| | | | | TLC | | 2.(A) <u>NO-GO FOR LOI</u> (B) <u>CONTINUE MISSION</u> IF SUFFICIENT BLOWDOWN CAPABILITY EXISTS | | | |
| | | | | DESCENT | | 3. <u>CONTINUE MISSION</u> | | | |
| | | | | ALL OTHERS | | 4. <u>TERMINATE PHASE AND</u> <u>ENTER NEXT BEST PTP</u> | | C.4.(A) IN LUNAR ORBIT, DO DPS TEI. (B) RETAIN LM ASCENT STAGE THROUGH TEI DEPENDING UPON LM RCS PROPELLANT REMAINING. | |
| 17-21 | | SUSTAINED LEAK BELOW He ISOLATION VALVE (COULD BE HELIUM OR FUEL OR OXIDIZER) | | | | | | MALF PROC RCS 1C QUAD WILL REMAIN USABLE UNTIL He MANIFOLD PRESSURE REACHES 75 PSI. | |
| | | A. ONE OR MORE QUADS | | LAUNCH | | A. <u>CONTINUE MISSION</u> | | | |
| | | B. ONE QUAD (ALL OTHER QUADS NORMAL) | | EO | | B.1. <u>NO-GO FOR TLI</u> | | | |
| | | | | TLC | | 2.(A) <u>CONTINUE MISSION</u> | | | |
| | | | | LO | | 3. <u>NO-GO FOR DOI OR UNDOCKING</u> | | B.3. RETAIN LM ASCENT STAGE FOR TEI DEPENDING ON LM APS/RCS PROPELLANT REMAINING. | |
| | | | | UNDOCKED | | 4. <u>DOCK ASAP</u> | | | |
| | | | | DESCENT | | 5. <u>CONTINUE MISSION</u> | | | |
| | | | | LUNAR STAY | | 6. <u>CONTINUE MISSION</u> | | | |
| | | | | CSM EVA | | 7. <u>CONTINUE MISSION</u> | | B.7. CONSIDERATION WILL BE GIVEN TO CONTINUING THE MISSION BASED ON AMOUNT OF CONTAMINANTS | |
| | | C. MORE THAN ONE QUAD | | DESCENT | | C.1. <u>CONTINUE MISSION</u> | | | |
| | | | | ALL OTHER | | 2. <u>TERMINATE PHASE AND</u> <u>ENTER NEXT BEST PTP</u> | | C.2. IN LUNAR ORBIT DO DPS TEI. | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 17 - CSM SM-RCS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------|-----------|
| | 17-22 | PACKAGE TEMP LESS THAN 55° F AND UNABLE TO INCREASE A. ONE QUAD (ALL OTHER QUADS NORMAL) B. MORE THAN ONE QUAD | LAUNCH ALL TLC DESCENT ALL OTHER | NOT APPLICABLE A. <u>CONTINUE MISSION</u> B.1. <u>CONTINUE MISSION</u> NO-GO LOI 2. <u>CONTINUE MISSION</u> 3. <u>TERMINATE PHASE AND</u> <u>ENTER NEXT BEST PTP</u> | MALF PROC RCS 1A B.3.(A) IN LUNAR ORBIT DO DPS TEI. (B) RETAIN LM ASCENT STAGE FOR TEI DEPENDING UPON LM APS/RCS PROPELLANT. | | | |
| | 17-23 | LOSS OF INDIVIDUAL THRUSTERS OR THRUSTER COMBINATIONS AS A RESULT OF CLOGGING, FREEZING, BURNOUT, OR CONTROL SYSTEM MALFUNCTION A. LOSS OF ANY ROLL THRUSTER B. LOSS OF FOLLOWING THRUSTER COMBINATIONS: TWO PITCH OR TWO YAW ONE PITCH AND ONE YAW PITCH AND TWO ROLL IN SAME DIRECTION ONE YAW AND TWO ROLL IN SAME DIRECTION THREE ROLL IN SAME DIRECTION C. LOSS OF +X THRUSTERS ON ADJACENT QUADS D. LOSS OF ANY ONE OF C2 AND D2, C3, C4, C1 AND D1, D3, D4 RULE 17-24 THROUGH 17-49 ARE RESERVED. | LAUNCH ALL EO TLC TLC/ UNDOCKED DESCENT LUNAR STAY EO ALL CSM EVA | NOT APPLICABLE A. <u>CONTINUE MISSION</u> B.1. CONTINUE ALTERNATE EO MISSION IF BOTH SPS AND SM RCS DEORBIT CAPABILITY AND ALL AXIS ATTITUDE CONTROL AVAILABLE 2. <u>NO-GO FOR LOI</u> PLAN TEI FOR NEXT OPPORTUNITY 3. <u>DOCK ASAP</u> 4. <u>CONTINUE MISSION</u> 5. <u>ENTER NEXT BEST PTP</u> C.1. <u>ENTER NEXT BEST PTP</u> 2. <u>INHIBIT NON-CRITICAL SPS BURNS</u> D. <u>NO-GO/TERMINATE</u> | CONTROL SYSTEM MALFUNCTION WILL CAUSE LOSS OF AUTO COILS OF THRUSTER ALTHOUGH DIRECT COILS ARE STILL AVAILABLE. B.4. RETAIN LM ASCENT STAGE FOR TEI IF LOSS OF ALL THRUSTERS IN ONE DIRECTION IN SAME AXIS. C. REF SPS RULE 16-27, LACK OF ULLAGE CAPABILITY D. USE LM RCS FOR ATTITUDE CONTROL IF AVAILABLE. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM SM-RCS | SPECIFIC | 17-4 | Tape 44.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 17 - CSM SM-RCS - CONCLUDED

| R | ITEM | INSTRUMENTATION REQUIREMENTS | | | | | |
|-------|-----------------------|------------------------------|-----------|-------------|------------|--------------------|--|
| 17-50 | MEAS DESCRIPTION | PCM | ONBOARD | TRANSDUCERS | CATEGORY | MSN RULE REFERENCE | |
| | SM He TK A PRESS | SR5001P | METER | COMMON } | 1 M | 17-20,21 | |
| | QTY SM-RCS PROP SYS A | SR5025Q | METER | COMMON } | O/B OR PCM | 17-20,21 | |
| | SM He TK B PRESS | SR5002P | METER | COMMON } | 1 M | 17-20,21 | |
| | QTY SM-RCS PROP SYS B | SR5026Q | METER | COMMON } | O/B OR PCM | 17-20,21 | |
| | SM He TK C PRESS | SR5003P | METER | COMMON } | 1 M | 17-20,21 | |
| | QTY SM-RCS PROP SYS C | SR5027Q | METER | COMMON } | O/B OR PCM | 17-20,21 | |
| | SM He TK D PRESS | SR5004P | METER | COMMON } | 1 M | 17-20,21 | |
| | QTY SM-RCS PROP SYS D | SR5028Q | METER | COMMON } | O/B OR PCM | 17-20,21 | |
| | SM ENG PKG A TEMP | SR5065T | METER/C&W | COMMON | HD | 17-22 | |
| | SM ENG PKG B TEMP | SR5066T | METER/C&W | COMMON | HD | 17-22 | |
| | SM ENG PKG C TEMP | SR5067T | METER/C&W | COMMON | HD | 17-22 | |
| | SM ENG PKG D TEMP | SR5068T | METER/C&W | COMMON | HD | 17-22 | |
| | SM He TK A TEMP | SR5013T | METER | COMMON | HD | 17-20,21 | |
| | SM He TK B TEMP | SR5014T | METER | COMMON | HD | 17-20,21 | |
| | SM He TK C TEMP | SR5015T | METER | COMMON | HD | 17-20,21 | |
| | SM He TK D TEMP | SR5016T | METER | COMMON | HD | 17-20,21 | |
| | SM He MAN A PRESS | SR5729P | --- | -- | HD | 17-20,21 | |
| | SM He MAN B PRESS | SR5776P | --- | -- | HD | 17-20,21 | |
| | SM He MAN C PRESS | SR5817P | --- | -- | HD | 17-20,21 | |
| | SM He MAN D PRESS | SR5830P | --- | -- | HD | 17-20,21 | |
| | SM FU MAN A PRESS | SR5737P | METER/C&W | COMMON | HD | 17-12,21 | |
| | SM FU MAN B PRESS | SR5784P | METER/C&W | COMMON | HD | 17-12,21 | |
| | SM FU MAN C PRESS | SR5822P | METER/C&W | COMMON | HD | 17-12,21 | |
| | SM FU MAN D PRESS | SR5823P | METER/C&W | COMMON | HD | 17-12,21 | |
| | SM OX MAN A PRESS | SR5733P | --- | -- | HD | 17-21 | |
| | SM OX MAN B PRESS | SR5780P | --- | -- | HD | 17-21 | |
| | SM OX MAN C PRESS | SR5820P | --- | -- | HD | 17-21 | |
| | SM OX MAN D PRESS | SR5821P | --- | -- | HD | 17-21 | |

| | | | | | | | |
|--|-----------|-----|--------|------------|-----------|------|-----------|
| | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | APOLLO 17 | FNL | 9/1/72 | CSM SM-RCS | INSTR REQ | 17-5 | Tape 58.3 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 18 - CSM CM-RCS - CONTINUED

| R | ITEM | SYSTEMS MANAGEMENT | | | | | |
|---|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|------------|------------|------|
| | 18-10 | <p><u>THRUSTER TEMP CONTROL</u></p> <p>CM RCS THRUSTERS MAY BE HEATED PRIOR TO ENTRY FOR 20 MINUTES OR UNTIL THE LOWEST INDICATED TEMPERATURE IS 28° F, WHICHEVER COMES FIRST. IF THRUSTER(S) HEATER FUNCTION FAILS, CM RCS IS STILL CONSIDERED OPERATIONAL PENDING RESULTS OF CM RCS CHECKOUT PRIOR TO ENTRY.</p> <p>MALF PROC RCS 5.</p> | | | | | |
| | 18-11 | <p><u>HELIUM INTERCONNECT</u></p> <p>AS A LAST RESORT, IF THE HELIUM IN ONE RING IS DEPLETED DUE TO A LEAK AND THE PROPELLANT IS DEPLETED IN THE OTHER RING, THE SYSTEMS MAY BE INTERCONNECTED IF THE REMAINING PROPELLANT IS REQUIRED FOR CONTROL. ONCE INTERCONNECTED, THE RINGS CANNOT BE ISOLATED.</p> <p>MALF PROC RCS 4.</p> <p>RULE NUMBERS 18-12 THROUGH 18-19 ARE RESERVED.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | CSM CM-RCS | MANAGEMENT | 18-3 |
| | | Tape 40.8 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 18 - CSM SM-RCS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|---------------------------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------|------|-----------|
| | | | | <div>SPECIFIC MISSION RULES</div> | | | | |
| | 18-20 | SUSTAINED LEAK IN OR COMPLETE LOSS OF HELIUM SUPPLY PRESSURE ONE OR BOTH RINGS | ALL | CONTINUE MISSION IN SUFFICIENT BLOWDOWN IS AVAILABLE IN EACH RING FOR ENTRY | | | | |
| | 18-21 | SUSTAINED LEAK IN OR COMPLETE LOSS OF HELIUM MANIFOLD PRESSURE (COULD BE EITHER FUEL OR OXIDIZER) | | | | | | |
| | | A. ONE RING | LAUNCH | A.1. <u>CONTINUE MISSION AND ENTER NEXT BEST PTP</u> | A.3. CONSIDERATION WILL BE GIVEN TO CONTINUING BASED ON AMOUNT OF CONTAMINANTS. | | | |
| | | | DESCENT | 2. <u>CONTINUE MISSION</u> | | | | |
| | | | EVA | 3. <u>CONTINUE MISSION</u> | | | | |
| | | | ALL OTHERS | 4. <u>TERMINATE PHASE AND ENTER NEXT BEST PTP</u> | | | | |
| | | B. BOTH RINGS | LAUNCH | B.1. CONTINUE MISSION AND ENTER NEXT BEST PTP UNLESS PRIOR TO TOWER JETTISON. IF PRIOR TO TOWER JETTISON, ABORT. | B.3. CONSIDERATION WILL BE GIVEN TO CONTINUING BASED ON AMOUNT OF CONTAMINANTS. B.4. CM SPIN-UP REQUIRED PRIOR TO ENTRY. | | | |
| | | | DESCENT | 2. <u>CONTINUE MISSION</u> | | | | |
| | | | EVA | 3. <u>CONTINUE MISSION</u> | | | | |
| | | | ALL OTHER | 4. <u>TERMINATE PHASE AND ENTER NEXT BEST PTP</u> | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM CM-RCS | SPECIFIC | 18-4 | Tape 47.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 18 - CSM CM-RCS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | CUES/NOTES/COMMENTS | | |
|---|-------|--------------------------------------------------------------------------------------|-------|-------------------------|------------|---------------------|------|------------|
| | 18-22 | CM RCS IS ARMED FOR ANY REASON RULE NUMBERS 18-23 THROUGH 18-49 ARE RESERVED. | ALL | <u>CONTINUE MISSION</u> | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | CSM CM-RCS | SPECIFIC | 18-5 | Tape 43A.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 18 - CSM CM-RCS - CONCLUDED

| R | ITEM | INSTRUMENTATION REQUIREMENTS | | | | | |
|---|-------|------------------------------|------------|----------------|--------------------|-----------------|---------------------------|
| | 18-50 | <u>MEAS DESCRIPTION</u> | <u>PCM</u> | <u>ONBOARD</u> | <u>TRANSDUCERS</u> | <u>CATEGORY</u> | <u>MSN RULE REFERENCE</u> |
| | | CM He TK A PRESS | CRO001P | METER | COMMON | M O/B OR PCM | 18-20 |
| | | CM He TK B PRESS | CRO002P | METER | COMMON | M O/B OR PCM | 18-20 |
| | | CM TK A TEMP | CRO003P | METER | COMMON | HD | 18-20 |
| | | CM TK B TEMP | CRO004P | METER | COMMON | HD | 18-20 |
| | | CM He MNFLD A PRESS | CRO035P | C&W METER | SEPARATE | 1 OF 2 M | 18-21 |
| | | CM He MNFLD B PRESS | CRO036P | C&W METER | SEPARATE | 1 OF 2 M | 18-21 |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | CSM CM-RCS | INSTR REQ | 18-6 |
| | | Tape 40.11 | | | | | |

THIS SECTION HAS BEEN
DELETED. REFERENCE
EVA MISSION RULES IN
SECTION 3 OF THIS
DOCUMENT.

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION

| R | ITEM | | | | | | |
|------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|---------------|-------------------------|-----------|
| | | <u>GENERAL</u> | | | | | |
| 20-1 | | <p>A. BASELINE REQUIREMENTS (ALL PHASES EXCEPT LAUNCH)</p> <ol style="list-style-type: none"> 1. TWO-WAY VOICE COMM BETWEEN SPACECRAFT 2. TWO-WAY VOICE COMM BETWEEN CSM OR LM AND MSFN DURING ALL DOCKED ACTIVITIES AND BETWEEN CSM, LM/LCRU AND MSFN DURING UNDOCKED ACTIVITIES <p>B. LAUNCH</p> <p>THERE ARE NO COMMUNICATIONS FAILURES FOR WHICH THE LAUNCH/INSERTION PHASE WILL BE TERMINATED.</p> <p>C. LUNAR STAY ADDITIONAL REQUIREMENTS</p> <ol style="list-style-type: none"> 1. FOR TWO-MAN EVA: VOICE COMM BETWEEN MSFN AND ONE EVA CREWMAN 2. FOR ONE-MAN EVA: VOICE COMM BETWEEN MSFN AND LM/LCRU AND EVA CREWMAN <p style="text-align: center;"><u>NOTE</u> MSFN-TO-EVA-ONLY VOICE IS ACCEPTABLE IF TV IS AVAILABLE TO MONITOR CREW.</p> <p>D. THE LM WILL BE RETAINED FOR TEC COMM IN EVENT OF LOSS OF ALL COMM BETWEEN THE CSM AND THE GROUND.</p> <p>E. FAILURE OF VOICE OR TM TO THE MSFN, OR FAILURE OF TWO-WAY VOICE COMMUNICATIONS TO THE CMP, OR BOTH, WILL NOT PRECLUDE THE NOMINAL CMP EVA.</p> | | | | | |
| 20-2 | | <p>VHF EVA COMMUNICATIONS PRIORITIES ARE:</p> <p>A. TWO-MAN EVA</p> <ol style="list-style-type: none"> 1. PRIME: EVA-1 AR/EVA-2 AR (RELAY MODE ALLOWS DUPLEX VOICE BETWEEN EVA'S PLUS THE TRANSMISSION OF VOICE AND DATA FROM BOTH EVA'S TO LM/LCRU PLUS THE RECEPTION OF VOICE VIA LM/LCRU BY BOTH EVA'S 2. BACKUP: EVA-1 AR/EVA-2B OR EVA-1A/EVA-2B OR EVA-1B/EVA-2A (EITHER MODE COMBINATION ALLOWS DUPLEX VOICE BETWEEN EVA'S PLUS THE TRANSMISSION OF VOICE FROM BOTH THE EVA'S TO THE LM/LCRU PLUS THE TRANSMISSION OF DATA FROM ONE EVA TO THE LM/LCRU AND THE RECEIVING OF LM/LCRU VOICE BY ONE EVA) <p>B. ONE-MAN EVA</p> <ol style="list-style-type: none"> 1. PRIME: EVA-1A OR EVA-2A (ALLOWS DUPLEX VOICE BETWEEN EVA AND THE LM/LCRU PLUS THE TRANSMISSION OF DATA FROM EVA TO LM/LCRU) 2. BACKUP: EVA-1B OR EVA-2B (ALLOWS DUPLEX VOICE BETWEEN EVA AND LM) <p style="text-align: center;"><u>NOTE</u> NO VOICE CAPABILITY VIA LCRU IN THIS MODE.</p> <p>RULES 20-3 THROUGH 20-6 ARE RESERVED.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | FUNCTIONAL COMM-GENERAL | 20-1 |
| | | | | | | | Tape 24.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------|------|-----------|-------|------|--|-----------|-----|--------|---------------|---------------------|------|-----------|
| | | <div>MANAGEMENT</div> | | | | | | | | | | | | | | |
| | 20-7 | <div>VOICE CONFIGURATION</div> <div>A. LM/CSM/MSFN</div> <div><div>1. VHF DUPLEX B AND USB WILL BE TRANSMITTED/RECEIVED SIMULTANEOUSLY FOR LAUNCH THROUGH CY1, REV 1. VHF SIMPLEX A AND USB WILL BE TRANSMITTED/RECEIVED SIMULTANEOUSLY FOR EARTH ORBIT AFTER CY1, REV 1 LOS.</div><div>2. VHF A SIMPLEX 296.8 MHZ IS PRIME VOICE COMM BETWEEN VEHICLES EXCEPT DURING RANGING WHEN DUPLEX B (CSM) AND DUPLEX A (LM) WILL BE USED.</div><div>3. VHF B SIMPLEX 259.7 MHZ IS BACKUP TO VHF A SIMPLEX 296.8 MHZ</div><div>4. USB IS PRIME VOICE COMM BETWEEN MSFN AND CSM, LM, OR LCRU.</div><div>5. USB/VHF RELAY IS VOICE COMM BACKUP TO USB BETWEEN MSFN AND MALFUNCTIONED S/C.</div><div>6. NORMAL VOICE COMM WILL USE SIMULTANEOUS MSFN UPLINK TO BOTH VEHICLES. HOWEVER, IF REQUIREMENT SHOULD EXIST, SIMULTANEOUS INDEPENDENT MSFN/CSM, MSFN/LM, AND MSFN/LCRU COMM MODES WILL BE INITIATED.</div><div>7. THE PRIME CSM/LM COMMUNICATIONS MODE DURING THE LUNAR ORBIT PHASE IS VHF. THE PRIME VHF MODE IS VHF A SIMPLEX UNLESS THIS MODE IS PRECLUDED BY THE USE OF VHF RANGING. DURING LUNAR STAY PHASE, THE PRIME CSM/LM/LCRU MODE IS MSFN RELAY.</div><div>8. THE CSM AND LM WILL TRANSMIT SIMULTANEOUSLY ON VHF AND USB DURING ALL LM POWERED UP PHASES IN LUNAR ORBIT.</div><div>9. IN THE EVENT OF A COMPLETE LOSS OF CSM S-BAND COMMUNICATIONS WITH MSFN, THE LM WILL BE CONFIGURED FOR LM TWO-WAY RELAY AND RETAINED FOR TEI AND TEC.</div></div> <div>B. LM/EVA/MSFN</div> <div>LM/LCRU TWO-WAY RELAY WITH TWO-MAN EVA IS THE PRIME MODE PLANNED FOR EVA OPERATION.</div> | | | | | | | | | | | | | | |
| | 20-8 | <div>CSM VHF/USB MANAGEMENT</div> <div>A. FOR CREW REST PERIODS, CSM S-BAND ANTENNAS WILL BE SELECTED BY GROUND COMMANDS.</div> <div>B. NORMAL CONTROL OF THE S-BAND MODES WILL BE BY GROUND COMMAND. CSM COMMUNICATIONS SWITCH POSITION WILL REFLECT OUT-OF-SITE CONTACT CONFIGURATION.</div> | | | | | | | | | | | | | | |
| | | <table><tr><td>MISSION</td><td>REV</td><td>DATE</td><td>SECTION</td><td>GROUP</td><td>PAGE</td><td></td></tr><tr><td>APOLLO 17</td><td>FNL</td><td>9/1/72</td><td>COMM AND INST</td><td>FUNCTIONAL COMM-MGT</td><td>20-2</td><td>Tape 24.2</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | FUNCTIONAL COMM-MGT | 20-2 | Tape 24.2 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | COMM AND INST | FUNCTIONAL COMM-MGT | 20-2 | Tape 24.2 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|-----------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------|------|------------|-------|------|--|-----------|-----|--------|--------------|---------------------|------|------------|
| | 20-9 | <p><u>LM STEERABLE ANTENNA MANAGEMENT</u></p> <p>A. LM UPLINK MODES 2 AND 3 AND ALL PRN UPLINKS WILL BE AVOIDED IF POSSIBLE WHEN THE STEERABLE ANTENNA IS OPERATING IN THE AUTO TRACK MODE.</p> <p>B. THE STEERABLE ANTENNA TEMP SHOULD BE MAINTAINED BETWEEN -65° F AND 150° F. THE STEERABLE ANTENNA MAY BE OPERATED TO 195° F DURING CRITICAL MISSION PHASES.</p> | | | | | | | | | | | | | | |
| | 20-10 | <p><u>GCTA MANAGEMENT</u></p> <p>A. THE COLOR TV CAMERA WILL NOT BE POINTED SUCH THAT THE SUN WILL BE IN THE FIELD OF VIEW. THE CAMERA MAY BE POINTED NEAR THE SUN. HOWEVER, IF OBJECTIONABLE FLARE OCCURS, THE GROUND WILL REQUEST THE CAMERA TO BE MOVED OR WILL MOVE THE CAMERA VIA GROUND COMMANDS.</p> <p>B. THE GROUND WILL MONITOR THE TV PICTURE AND RECOMMEND CAMERA MOVEMENT (OR MOVE THE CAMERA VIA COMMANDS) TO PREVENT IRREVERSIBLE VIDICON TUBE BURNS FROM REFLECTIVE OBJECTS.</p> <p>C. BETWEEN EVA'S THE TV CAMERA WILL BE LOCATED IN THE SUN AND OFF TO MAINTAIN THERMAL BALANCE.</p> <p>D. RESERVED</p> <p>E. WHEN A BRIGHT OBJECT, WITH A CONTRASTING DARK BACKGROUND IS IN THE FIELD OF VIEW, THE GROUND WILL RECOMMEND OR COMMAND AN ALC SWITCH SETTING TO GET THE BEST PICTURE. THE ALC-PEAK WILL GIVE THE BEST PICTURE OF THE BRIGHT OBJECT, AND THE ALC-AVERAGE WILL GIVE THE BEST PICTURE OF THE DARK BACKGROUND.</p> <p>F. THE GROUND WILL NEVER INITIATE GCTA COMMANDS THAT WOULD CAUSE MORE THAN TWO DRIVE MOTORS TO OPERATE SIMULTANEOUSLY.</p> <p>G. THE GCTA WILL BE POSITIONED VIA GROUND COMMAND AS NECESSARY TO PROVIDE THERMAL MANAGEMENT.</p> <p>H. THE TV CAMERA AND THE TV CONTROL UNIT WILL BE DUSTED AT EACH STOP.</p> | | | | | | | | | | | | | | |
| | 20-11 | <p><u>LCRU MANAGEMENT</u></p> <p>A. THE THERMAL BLANKETS ON THE LCRU WILL BE POSITIONED AS REQUIRED TO MAINTAIN THERMAL MANAGEMENT.</p> <p>B. NOMINAL MODE OF OPERATION FOR MOVING IS PM1/WB1. NOMINAL MODE OF OPERATION FOR FIXED BASE IS FM/TV. BACKUP MODE OF OPERATION FOR MOVING IS PM1/NB. THE CONTINGENCY MODE FOR MOVING IS PM2/NB. THE TV REMOTE MODE WILL BE UTILIZED TO OBTAIN THE CLEAREST TV PICTURE (THIS MODE ALLOWS THE GROUND TO COMMAND OFF THE VOICE DOWNLINK AND WILL BE USED FOR LM ASCENT TV COVERAGE).</p> <p>C. THE THERMAL BLANKETS ON THE LCRU SHOULD BE OPENED 100 PERCENT FOR EITHER HANDCARRY MODE. THE CREW SHOULD RETAIN THE THERMAL BLANKET FOR POSSIBLE FUTURE USE.</p> <p>D. THE LCRU BATTERY WILL BE CHANGED WHEN THE VOLTAGE IS 27.5 V IF STOPPED OR, IF MOVING, AT THE NEXT STOP.</p> <p>E. THE LCRU WILL BE DUSTED AT EACH STOP.</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 17</td><td>FNL</td><td>9/1/72</td><td>COMMAND INST</td><td>FUNCTIONAL COMM-MGT</td><td>20-3</td><td>Tape 52.10</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | COMMAND INST | FUNCTIONAL COMM-MGT | 20-3 | Tape 52.10 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | COMMAND INST | FUNCTIONAL COMM-MGT | 20-3 | Tape 52.10 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | ITEM | | | | | | |
|---|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|---------------|---------------------|------|
| | 20-12 | <p><u>SDS MANAGEMENT</u></p> <p>A. THE CSM PCM WILL BE OPERATED IN HBR DURING ALL SCIENTIFIC OPERATIONS, EXCEPT FOR PORTIONS OF LUNAR SOUNDER OPERATIONS.</p> <p>B. THE CONTROL OF THE DSE WILL BE VIA GROUND COMMAND WHENEVER POSSIBLE. HOWEVER, THE CREW MAY BE REQUESTED TO OPERATE THE DSE AT CERTAIN TIMES DURING AWAKE PERIODS TO ASSIST IN OBTAINING THE MAXIMUM AMOUNT OF SCIENTIFIC DATA.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | FUNCTIONAL COMM-MGT | 20-4 |

Tape 52.11

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|---|-------|---------------------------------------------------|--------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | <div>SPECIFIC</div> | |
| | 20-13 | LOSS OF TWO-WAY VHF VOICE COMM BETWEEN CSM AND LM | DOCKED | <u>CONTINUE MISSION</u> NO-GO FOR SEP MNVR | REF LM MAL PROC COMM 3 - LOSS OF VHF VOICE COMM WITH CSM |
| | | | UNDOCKED | <u>DOCK ASAP</u> NO-GO FOR CSM CIRC AND DOI ₂ | REF CSM MAL PROCEDURE COMM 5 - LOSS OF VHF COMM WITH LM NOTE: MSFN RELAY MAY BE UTILIZED. |
| | | | PRE-PDI | <u>CONTINUE MISSION</u> | |
| | | | POWERED DESCENT | <u>CONTINUE MISSION</u> | |
| | | | LUNAR STAY | <u>CONTINUE MISSION</u> | |
| | 20-14 | LOSS OF TWO-WAY VOICE COMM WITH MSFN | | | REF CSM MAL PROCEDURES 7 AND 8 - LOSS OF CSM VOICE COMM |
| | | A. CSM ONLY | LAUNCH | A.1. <u>CONTINUE MISSION</u> | |
| | | | EARTH ORBIT | 2. <u>ENTER NEXT BLOCK DATA POINT</u> | |
| | | | TLC | 3. <u>CONTINUE MISSION</u> | A.3 ENTER LM EARLY TO USE LM S-BAND FOR VOICE COMM WITH MSFN. LM COMM WILL BE USED FOR VOICE, AND CSM TM USED FOR SIM BAY SCIENCE OPERATIONS. |
| | | | DDI | 4. <u>CONTINUE MISSION</u> NO-GO FOR SEP MANEUVER | |
| | | | UNDOCKED/POWERED DESCENT | 5. <u>CONTINUE MISSION</u> | |
| | | | LUNAR STAY | 6. <u>CONTINUE MISSION</u> | A.6 UTILIZE VHF OF VHF RELAY FROM LM. IF UNABLE, TERMINATE LUNAR STAY AND PERFORM A DOCKED TEI. NOTE: RETAIN LM FOR COMM DURING TEC. |
| | | B. LM ONLY | DOCKED | B.1. <u>CONTINUE MISSION</u> NO-GO FOR SEP MANEUVER | REF LM MAL PROC COMM 4 - LOSS OF S-BAND VOICE COMM |
| | | | UNDOCKED PRE-PDI | 2. <u>RETURN TO VICINITY OF CSM</u> NO-GO FOR PDI | |
| | | | POWERED DESCENT | 3. <u>PDI TO TOUCHDOWN - CONTINUE MISSION</u> | |
| | | | LUNAR STAY | 4. <u>LM LIFTOFF NEXT ASCENT OPPORTUNITY</u> | B.4 COMM VIA LCRU IS ACCEPTABLE. |

| | | | | | | | |
|--|-----------|-----|--------|---------------|--------------------------|------|-----------|
| | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | FUNCTIONAL COMM-SPECIFIC | 20-5 | Tape 24.5 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------|-----------|
| | 20-15 | LOSS OF TWO CSM AUDIO CENTERS | EPO TLC DOCKED UNDOCKED PRE-PDI/ DESCENT/ LUNAR STAY POST DOCK | <u>CONTINUE MISSION</u> NO-GO FOR TLI <u>CONTINUE MISSION</u> <u>CONTINUE MISSION</u> NO-GO FOR DOI OR UNDOCKING NO-GO FOR CIRC <u>CONTINUE MISSION</u> <u>RETAIN ASCENT STAGE</u> | | | | |
| | 20-16 | FAILURE OF LM VHF RELAY. NO TWO-WAY VOICE WITH EITHER CREWMAN. | LUNAR STAY | <u>CONTINUE MISSION</u> PROCEED WITH EVA AND ACTIVATE THE LCRU ASAP | | | | |
| | 20-17 | LOSS OF VOICE FROM EVA-2 TO EVA-1 | DUAL EVA | <u>CONTINUE MISSION</u> EVA-2 GO TO POSITION "B" | EVA-1 (CDR) HAS EVC-1, EVA-2 (LMP) HAS EVC-2. IF ON LCRU: 1. EVA 2 CANNOT COMMUNICATE WITH MSFN. 2. NO TM FROM EVA-2. 3. EVA 2 MUST PROCEDURALLY TIME-SHARE ALL VOICE TRANSMISSIONS WITH MSFN. 4. MODES WILL BE SWITCHED EVERY 45 MIN TO MONITOR PLSS DATA ON BOTH CREWMEN. | | | |
| | 20-18 | LOSS OF VOICE FROM EVA-1 TO EVA-2 | DUAL EVA | <u>CONTINUE MISSION</u> A. EVA-2 GO TO POSITION "A" B. EVA-1 GO TO POSITION "B" | IF ON LCRU: B.1. EVA-1 CANNOT COMMUNICATE WITH MSFN AND NO TM. 2. EVA-1 MUST PROCEDURALLY TIME-SHARE ALL VOICE TRANSMISSIONS WITH MSFN. 3. MODES WILL BE SWITCHED EVERY 45 MINUTES TO MONITOR PLSS DATA ON BOTH CREWMEN. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | FUNCTIONAL COMM-SPECIFIC | 20-6 | Tape 24.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|----------------------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------|-----------|
| | 20-19 | LOSS OF DUPLEX VOICE BETWEEN EVA-1 AND EVA-2 | DUAL EVA | <u>CONTINUE EVA</u> A. BOTH CREWMEN WILL GO TO POSITION "A" B. IF STILL NO COMM, SELECT POSITION "B" C. IF STILL NO COMM, CONTINUE EVA IF ONE CREWMAN CAN RECEIVE MSFN VOICE. IF NOT ABLE TO RECEIVE MSFN VOICE, RETURN TO VHF RANGE OF LM. | A.1. SIMPLEX CONFIGURATION WILL REQUIRE PTT OPERATION VICE VOX. 2. DATA WILL ONLY BE TRANSMITTED WHEN THE TRANSMITTER IS KEYED. B. EVCS MODE-B WILL NOT COMMUNICATE WITH LCRU. | | | |
| | 20-20 | LOSS OF TWO-WAY VOICE BETWEEN MSFN AND EVA A. LCRU B. LM | DUAL EVA | VOICE UPLINK WITH TV AVAILABLE FOR MSFN MONITORING OF CREW RESPONSES IS ACCEPTABLE A. <u>CONTINUE EVA</u> 1. EVA-2 GO TO POSITION "A" EVA-1 GO TO POSITION "B" 2. IF SUCCESSFUL, CONTINUE EVA. 3. IF UNSUCCESSFUL, RETURN TO VHF RANGE OF LM. B. <u>CONTINUE EVA</u> 1. IF LCRU AVAILABLE, ACTIVATE ASAP AND CONTINUE EVA. 2. IF LCRU NOT AVAILABLE, EVA 2 RETURN TO LM AND RECONFIGURE COMM. THEN CONTINUE EVA WITHIN VHF RANGE OF LM. | A.1. EVCS MODE-B WILL NOT COMMUNICATE WITH LCRU. | | | |
| | 20-21 | LOSS OF TWO-WAY VOICE BETWEEN MSFN AND EVA A. LCRU B. LM | ALT EVA (ONE-MAN) | VOICE UPLINK WITH TV AVAILABLE FOR MSFN MONITORING OF CREW RESPONSES IS ACCEPTABLE A.1. ATTEMPT TO RECONFIGURE EVCS. 2. IF SUCCESSFUL, CONTINUE EVA. 3. IF NOT SUCCESSFUL, RETURN TO VHF RANGE OF LM AND CONTINUE EVA. B.1. IF LCRU AVAILABLE, ACTIVATE ASAP AND CONTINUE EVA 2. IF LCRU NOT AVAILABLE, RETURN TO LM AND RECONFIGURE COMM. THEN CONTINUE EVA WITHIN VHF RANGE OF LM | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | FUNCTIONAL COMM-SPECIFIC | 20-7 | Tape 24.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------|-----------|
| | 20-22 | LOSS OF LCRU | EVA | <u>CONTINUE EVA</u> RETURN TO WITHIN VHF RANGE OF LM | | | | |
| | 20-23 | LOSS OF LCRU HGA | EVA | <u>CONTINUE EVA</u> USE LGA | BY SWITCHING ANTENNA CONNECTIONS ON LCRU, TV AVAILABLE TO 210 FT SITE. | | | |
| | 20-24 | LOSS OF LCRU LGA | EVA | <u>CONTINUE EVA</u> IF LOST DURING MOVING MODE, CONTINUE TO NEXT STOP AND REGAIN COMM VIA HGA. | HGA CANNOT BE USED FOR MOVING COMM. | | | |
| | 20-25 | LOSS OF LCRU BATTERY | EVA | <u>CONTINUE EVA</u> A. PRIOR TO TRAVERSE-INSTALL BATTERY ASSIGNED TO NEXT EVA. B. DURING TRAVERSE-SWITCH TO LRV POWER UNTIL NEXT STOP, THEN INSTALL BATTERY FROM PREVIOUS EVA. | A. THE LAST EVA TRAVERSE WILL BE PLANNED BASED ON LRV POWER AVAILABLE. B. LCRU BATTERY FROM PREVIOUS EVA WILL BE CARRIED ON THE LRV. | | | |
| | 20-26 | LOSS OF LCRU MOVING COMM MODE | EVA | <u>CONTINUE EVA</u> WHEN NEXT STOP IS REACHED, SWITCH ANTENNA CONNECTIONS AND USE FM/TV OR TV REMOTE MODE. | MOVING MODES: PRI - PM1/WB B/U - PM1/NB CONT - PM2/NB | | | |
| | 20-27 | LOSS OF PM1 TRANSMITTER OR RECEIVER | EVA | <u>CONTINUE EVA</u> A. MOVING COMM-SWITCH LGA TO HGA CONNECTION PORT. B. STOPPED COMM- 1. 210 FT SITE AVAILABLE, RETAIN SWITCHED CONFIGURATION 2. 210 FT SITE NOT AVAILABLE, RETURN TO NORMAL CONFIGURATION. | B.1. TV AVAILABLE TO 210 FT SITE ON LGA B.2. TV AVAILABLE VIA HGA | | | |
| | 20-28 | LOSS OF TRANSMITTER 2 | EVA | <u>CONTINUE EVA</u> SWITCH TO PM1 TRANSMITTER TO REGAIN VOICE AND TM | TV AND COMMAND CAPABILITY IS LOST. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | FUNCTIONAL COMM-SPECIFIC | 20-8 | Tape 25.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------------------------------------------------------|--------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------|------|-----------|
| | 20-29 | LOSS OF RECEIVER 2 | EVA | <u>CONTINUE EVA</u> LOSS OF COMMAND AND UP VOICE A. DURING GEOLOGICAL STOP, REMAIN IN FM/TV OR TV REMOTE B. DURING WALKING PART OF THE STOP, SELECT PM1/WB | A. CREW CAN MANUALLY POSITION CAMERA. B. TV AND COMMAND CAPABILITY IS LOST | | | |
| | 20-30 | LOSS OF LCRU VHF RECEIVER | EVA | <u>CONTINUE EVA</u> UTILIZE TV VISUAL RESPONSES OF CREW AS CUE TO RECEIPT OF MCC UPLINKS. | | | | |
| | 20-31 | LOSS OF LCRU VHF TRANSMISSION | EVA | <u>CONTINUE EVA</u> RETURN TO VHF RANGE OF LM | | | | |
| | 20-32 | LOSS OF LCRU TV (GCTA) | EVA | <u>CONTINUE EVA</u> A. BYPASS TCU BY RECABLING. LOSS OF COMMAND CONTROL WILL RESULT B. IF STILL NO TV, SELECT PM1/WB AND CONTINUE WITHOUT TV. | A. CREW CAN MANUALLY CONTROL CAMERA | | | |
| | 20-33 | LOSS OF COMMAND TO LCRU TV (GCTA) | EVA | <u>CONTINUE EVA</u> CREW MANUALLY CONTROL TV. | | | | |
| | 20-34 | LOSS OF LCRU/GCTA TM | LUNAR STAY | <u>CONTINUE MISSION</u> | ONBOARD CREW READOUTS WILL BE REQUIRED. | | | |
| | 20-35 | LCRU TEMP MORE THAN 120 DEG F | LUNAR STAY | <u>CONTINUE MISSION</u> BEGIN DUTY CYCLE OPERATIONS | DUTY CYCLE: 5 MIN ON AND 10 MIN OFF | | | |
| | 20-36 | GCTA TEMP MORE THAN 122 DEG F | LUNAR STAY | <u>CONTINUE MISSION</u> REPOSITION CAMERA | MANUAL OR BY GROUND COMMAND | | | |
| | RULE NUMBERS 20-37 THROUGH 20-40 ARE RESERVED. | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | FUNCTIONAL COMM-SPECIFIC | 20-9 | Tape 25.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | ITEM | |
|-------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| | | <div>CSM - GENERAL</div> |
| 20-41 | A. BASELINE REQUIREMENT (ALL PHASES EXCEPT LAUNCH) | |
| | | CRITICAL INSTRUMENTATION - CRITICAL INSTRUMENTATION IS THAT INSTRUMENTATION REQUIRED TO VERIFY MISSION GO/NO-GO CRITERIA. |
| | B. LAUNCH | |
| | | THERE ARE NO CSM INSTRUMENTATION FAILURES FOR WHICH THE LAUNCH/INSERTION PHASE WILL BE TERMINATED. |
| | C. POWERED DESCENT ADDITIONAL REQUIREMENTS | |
| | | THERE ARE NO CSM INSTRUMENTATION SYSTEMS FAILURES FOR WHICH LM POWERED DESCENT WILL BE TERMINATED. |
| 20-42 | THE MISSION WILL BE CONTINUED WITH THE LOSS OF THE: | |
| | A. CSM UPDATA LINK | |
| | B. CSM CAUTION AND WARNING SYSTEM | |
| | C. CSM DSE | |
| | D. CSM HIGH GAIN ANTENNA | |
| | E. CSM FM DOWNLINK | |
| | F. CSM USB RANGING (PRN) | |
| | G. VHF RANGING | |
| | H. SDS | |
| | | RULES 20-43 THROUGH 20-45 ARE RESERVED |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | ITEM | |
|-------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | <u>CSM - MANAGEMENT</u> |
| 20-46 | <u>DSE MANAGEMENT</u> | <p>A. LM AND CSM LOW-BIT-RATE TELEMETRY WILL BE RECORDED CONTINUOUSLY WHEN NOT IN CONTACT WITH GROUND TELEMETRY SITES EXCEPT DURING PERIODS OF ORBITAL SCIENCE OPERATIONS WHEN CSM HBR WILL BE RECORDED WITH THE EXPERIMENT DATA AND DURING PERIODS OF VHF RANGING WHEN NO LM TM WILL BE RECORDED. LM AND CSM LOW-BIT-RATE TELEMETRY WILL BE NORMALLY PLAYED BACK AT LEAST ONCE PER REVOLUTION IN LUNAR ORBIT.</p> <p>B. CM HIGH-BIT-RATE DSE RECORDINGS WILL BE MADE DURING THE FOLLOWING OPERATIONS:</p> <ol style="list-style-type: none"> 1. LAUNCH 2. TLI 3. S-IVB/CSM SEPARATION 4. TD&E 5. ALL SPS MANEUVERS AND MIDCOURSE CORRECTIONS 6. DOCKING AND UNDOCKING 7. CM/SM SEPARATION AND ENTRY 8. DTO REQUIREMENTS 9. LM FINAL SEP 10. ORBITAL SCIENCE OPERATIONS <p>C. DURING SLEEP PERIODS</p> <p>USING HIGH GAIN ANTENNAS, DSE RECORDING AND DUMPING WILL BE MANAGED PER "A" ABOVE.</p> |
| 20-47 | <u>CTE MANAGEMENT</u> | <p>A. CTE WILL BE CONFIGURED TO CLOCK IN GET FOR FLIGHT. HOWEVER, IF A HOLD OCCURS AFTER T-15 MINUTES, CTE WILL NOT BE CORRECTED UNTIL COMPLETION OF POWERED FLIGHT.</p> <p>B. CTE WILL BE ALLOWED TO DRIFT ± 5 SEC BEFORE BEING UPDATED AFTER ORBIT INSERTION.</p> <p>RULE NUMBERS 20-48 THROUGH 20-50 ARE RESERVED</p> |
| | | |
| | MISSION | REV |
| | APOLLO 17 | FNL |
| | DATE | 9/1/72 |
| | SECTION | COMM AND INST |
| | GROUP | CSM INST MANAGEMENT |
| | PAGE | 20-11 |
| | | Tape 25.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|----------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------|-------|-----------|
| | | | | <u>CSM - SPECIFIC</u> | | | | |
| | 20-51 | LOSS OF CSM TM A. HBR OR LBR B. ALL TM | ALL LAUNCH EO ALL | A. <u>CONTINUE MISSION</u> B.1. <u>CONTINUE MISSION</u> 2. <u>ENTER NEXT BEST PTP</u> 3. <u>CONTINUE MISSION</u> | REF CSM MAL PROCEDURE COMM 10 - MSFN REPORTS LOSS OF REAL-TIME PCM. DSE MAY BE UTILIZED FOR TM IF AVAILABLE. | | | |
| | 20-52 | LOSS OF CRITICAL INSTRUMENTATION | LAUNCH EO TLC LO | <u>CONTINUE MISSION</u> <u>ENTER NEXT BEST PTP</u> <u>NO-GO FOR TLI</u> <u>CONTINUE MISSION</u> <u>NO-GO FOR LOI</u> <u>NO-GO FOR LUNAR OPERATIONS</u> | | | | |
| | 20-53 | LOSS OF ONE CSM PMP POWER SUPPLY | ALL | <u>CONTINUE MISSION</u> | | | | |
| | 20-54 | LOSS OF BOTH CSM POWER AMPLIFIERS | EPO ALL SCIENCE | <u>NO-GO FOR TLI</u> <u>CONTINUE MISSION IF HIGH GAIN ANT IS AVAILABLE</u> <u>CONTINUE MISSION BASED ON AMOUNT OF SCIENCE DATA THAT CAN BE OBTAINED</u> | | | | |
| | 20-55 | LOSS OF THE SCE | ALL | <u>CONTINUE MISSION</u> | | | | |
| | 20-56 | COMPLETE OR PARTIAL LOSS OF SCIENTIFIC TM | ALL SCIENCE | <u>CONTINUE MISSION</u> <u>CONTINUE MISSION BASED ON AMOUNT OF SCIENCE DATA THAT CAN BE OBTAINED.</u> | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | CSM INST MANAGEMENT | 20-12 | Tape 65.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------------------------------------------------------|------------------------|--------------------|---------------------------------------------------------------------------------------------------------------|---------------------|------------------------|-------|-----------|
| | 20-57 | LOSS OF FM TRANSMITTER | ALL SCIENCE | <u>CONTINUE MISSION</u> CONTINUE MISSION BASED ON AMOUNT OF SCIENTIFIC DATA THAT CAN BE OBTAINED | | | | |
| | 20-58 | LOSS OF HGA | ALL SCIENCE | <u>CONTINUE MISSION</u> CONTINUE MISSION BASED ON AMOUNT OF SCIENTIFIC DATA THAT CAN BE OBTAINED | | | | |
| | 20-59 | LOSS OF DSE | ALL SCIENCE | <u>CONTINUE MISSION</u> <u>CONTINUE MISSION</u> ONLY REAL-TIME DATA WILL BE AVAILABLE | | | | |
| | RULE NUMBERS 20-60 THROUGH 20-65 ARE RESERVED. | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | CSM INST MANAGEMENT | 20-13 | Tape 65.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | ITEM | | | | | | |
|-------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|---------------|-----------------|-------|
| | | <u>LM - GENERAL</u> | | | | | |
| 20-66 | A. BASELINE REQUIREMENT | <p>CRITICAL INSTRUMENTATION - CRITICAL INSTRUMENTATION IS THAT INSTRUMENTATION, ONBOARD OR TM DURING MSFN AOS, OR ONBOARD ONLY DURING MSFN LOS, REQUIRED TO VERIFY MISSION GO/NO-GO CRITERIA.</p> | | | | | |
| | B. LUNAR STAY ADDITIONAL REQUIREMENTS | <p>LM LBR OR HBR TM IS REQUIRED. IF LM TM DATA IS LOST DURING AN EVA, THAT EVA WILL BE CONTINUED.</p> | | | | | |
| 20-67 | THE MISSION WILL BE CONTINUED WITH THE LOSS OF THE: | <p>A. LM UPDATA LINK B. LM CAUTION AND WARNING SYSTEM C. LM DSEA D. EVA TELEMETRY E. LM FM DOWNLINK F. LM USB RANGING (PRN) G. VHF RANGING H. GCTA I. LCRU</p> | | | | | |
| | | <p>RULE NUMBERS 20-68 THROUGH 20-70 ARE RESERVED.</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | LM INST-GENERAL | 20-14 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

| R | ITEM | | | | | | |
|---|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|---------------|--------------------|-------|
| | | <u>LM - MANAGEMENT</u> | | | | | |
| | 20-71 | <u>LM USB/TM MANAGEMENT</u> | | | | | |
| | | <p>A. FOR NORMAL LM POWERED-UP PHASES, THE LM STEERABLE ANTENNA WITH THE POWER AMPLIFIER WILL BE USED. DURING LUNAR STAY, THE POWER AMPLIFIER WILL BE TURNED OFF. LBR TM, PLSS AND VOICE CIRCUIT MARGINS ARE ADEQUATE.</p> <p>B. DURING PERIODS OF LM OUT-OF-STATION CONTACT (LUNAR FAR SIDE), THE TM BIT RATE WILL BE SWITCHED FROM HBR TO LBR AND TRANSMITTED TO THE CSM OVER VHF B EXCEPT DURING VHF RANGING AND PERIODS OF CRITICAL VOICE COMMUNICATIONS.</p> | | | | | |
| | 20-72 | <u>SYSTEM MONITORING</u> | | | | | |
| | | DURING SLEEP PERIODS TBD CREWMEN WILL SLEEP WITH HEADSETS TO MONITOR FOR MASTER ALARMS OR GROUND COMMUNICATIONS. | | | | | |
| | | RULE NUMBERS 20-73 THROUGH 20-75 ARE RESERVED. | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | LM INST-MANAGEMENT | 20-15 |
| | | | | | | | |

Tape 26.1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION - CONTINUED

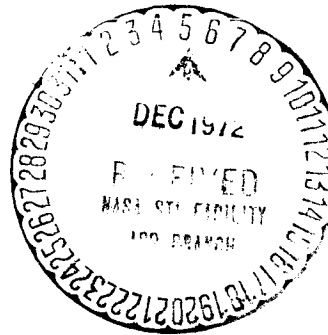
| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------|-----------|
| | | | | <u>LM - SPECIFIC</u> | | | | |
| | 20-76 | LOSS OF LM TM A. LOSS OF LBR ONLY B. LOSS OF HBR ONLY C. LOSS OF ALL TM | ALL ALL DOCKED PRE PDI POWERED DESCENT LUNAR STAY DUAL EVA | A. <u>CONTINUE MISSION</u> B. <u>CONTINUE MISSION</u> C.1. <u>CONTINUE MISSION</u> NO-GO FOR UNDOCKING 2. <u>RETURN TO VICINITY OF CSM</u> 3. <u>CONTINUE MISSION IF</u> ADEQUATE DATA IS AVAIL- ABLE TO MAKE FINAL GO/NO-GO DECISION (TM OR ONBOARD DISPLAY) 4. <u>NO-GO FOR NORMAL STAY</u> <u>TIME AND TWO MAN EVA.</u> ONE MAN EVA ACCEPTABLE IF O/B MONITORING IS AVAILABLE. 5. <u>CONTINUE EVA</u> ATTEMPT TO RE-ESTABLISH TM AFTER EVA. | REF LM MAL PROC COMM 6 MSFN REPORTS LOSS OF PCM. ADEQUATE DATA TO MAKE FINAL GO/NO-GO TO CONTINUE POWERED DESCENT. | | | |
| | 20-77 | LOSS OF CRITICAL INSTRUMENTION RULE NUMBERS 20-78 THROUGH 20-80 ARE RESERVED. | DOCKED UNDOCKED LUNAR STAY | <u>DO NOT UNDOCK</u> <u>DOCK ASAP</u> <u>LIFT OFF NEXT BEST OPPORTUNITY</u> | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | LM INST- SPECIFIC | 20-16 | Tape 26.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATION AND INSTRUMENTATION - CONCLUDED

| R | ITEM | CSM - INSTRUMENTATION REQUIREMENTS | | | | | |
|---|-------|------------------------------------|------------|-------------------|--------------------|---------------------|--------------------------|
| | 20-81 | <u>MEAS DESCRIPTION</u> | <u>PCM</u> | <u>ONBOARD</u> | <u>TRANSDUCERS</u> | <u>CATEGORY</u> | <u>MISSION RULE REF</u> |
| | | UDL VALIDITY SIGNAL | CT0262V | - | - | HD | 20-42 |
| | | USB RECEIVER AGC | CT0620E | METER | COMMON | HD | 20-42,20-7A(9), 20-88 |
| | | USB RECEIVER ERROR | CT0604F | - | - | HD | |
| | | DSE TAPE MOTION | CT0012X | TB | - | HD | 20-42,20-46 |
| | | CTE TIME | CT0145F | - | - | HD | 20-47 |
| | | SCE 10 VDC | CT0018V | - | - | HD | |
| | | SCE 5 VDC | CT0017V | - | - | HD | |
| | | SCE 20 VDC | CT0015V | - | - | HD | |
| | | SCE -20 VDC | CT0016V | - | - | HD | |
| | | PCM HI REF 85 PERCENT | CT0125V | - | - | HD | |
| | | PCM HI REF 15 PERCENT | CT0126V | - | - | HD | |
| | | HI GAIN ANT POS-PITCH | ST0152H | - | - | HD | |
| | | HI GAIN ANT POS-YAW | ST0153H | - | - | HD | |
| | | HGA BEAM WIDTH SW POS - NAR | CT0161X | - | - | HD | |
| | | HGA BEAM WIDTH SW POS - MED | CT0162X | - | - | HD | |
| | | HGA TRACK SW POS - AUTO | CT0163X | - | - | HD | |
| | | HGA TRACK SW POS - REACQ | CT0164X | - | - | HD | |
| | | MASTER UNIT TEMP | ST0562T | | | HD | 20-56 |
| | | SLAVE UNIT TEMP | ST0563T | | | HD | 20-56 |
| | | LM - INSTRUMENTATION REQUIREMENTS | | | | | |
| | 20-82 | <u>MEAS DESCRIPTION</u> | <u>PCM</u> | <u>ONBOARD</u> | <u>TRANSDUCERS</u> | <u>CATEGORY</u> | <u>MISSION RULE REF</u> |
| | | PCM OSC FAIL 2 | GL0422V | - | - | 1 OF 2 | |
| | | PCM OSC FAIL 3 | GL0423V | - | - | HD | |
| | | CAL 85 PCT | GL0401V | - | - | HD | |
| | | CAL 15 PCT | GL0402V | - | - | HD | |
| | | MET | GL0501W | - | - | HD | |
| | | C AND W FAIL | GL4054X | CAUTION | - | HD | |
| | | MASTER ALARM | GL4069X | MASTER ALARM | - | HD | |
| | | DUA STATUS | GT0441X | - | - | HD | 20-67 |
| | | S-BND ST PH ERR | GT0992B | - | - | HD | |
| | | S-BND RCVR SIG | GT0994V | METER /CAUTION | - | HD | 20-67 |
| | | STEERABLE ANT TEMP | GT0454 | METER /CAUTION | - | HD | 20-98,20-71 |
| | | XMTR PO | GT0993 | - | - | HD | 20-67,20-76 |
| | | LCRU RADIATOR TEMP | RT8001T | METER | REDUNDANT | HD | 20-34 |
| | | LCRU SUBSYSTEMS VOLTAGE | RT8003T | METER | - | HD | 20-34 |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | COMM AND INST | PRELAUNCH REQMTS | 20-17 |
| | | | | | | | Tape 26.3 |



NOTE

**SECTION 21 NOW COVERS
LM/EMU INSTRUMENTATION.**

**FORMER LM SECTIONS 21
THROUGH 27 HAVE BEEN
DELETED TO ELIMINATE
DUPLICATION BETWEEN
THEM AND THE LM TELMU
AND CONTROL SUMMARY
RULES IN SECTION 3.**

**21 LM/EMU
INSTRUMENTATION**

**21 LM SEQUENTIAL
AND PYROTECHNIC**

**22 LM ELECTRICAL
POWER**

**23 LM ENVIRONMENTAL
CONTROL**

**24 LM GUIDANCE
AND CONTROL**

25 LM DFS

26 LM APS

**27 LM REACTION
CONTROL SYSTEM**

**28 SPACE
ENVIRONMENT**

29 RECOVERY

30 AEROMEDICAL

**31 LUNAR SURFACE
OPERATIONS**

32 ALSEP

**33 LUNAR ORBIT
EXPERIMENTS**

APPENDICES

**A ACRONYMS AND
SYMBOLS**

**B DISTRIBUTION
LIST**

C CHANGE CONTROL

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 21 - LM/EMU INSTRUMENTATION

| R | ITEM | INSTRUMENTATION REQUIREMENTS | | | | | | |
|------------------------------------------------------------------------------------------------------------------------|------|------------------------------|------------------|---------|---------------------------|----------------------------|------|-----------|
| | | SYSTEM | MEAS DESCRIPTION | PCM | ONBOARD | CATEGORY | | |
| | | SEQUENTIAL/ PYROTECHNIC | ED RLY A K1-K6 | GY0201X | SYS A STAGING LIGHT | HD | | |
| | | | | | | COMMON CAUTION LIGHT | HD | |
| | | | ED RLY B K1-K6 | GY0202X | SYS B STAGING LIGHT | HD | | |
| | | | ED RLY A K7-K15 | GY0231X | ----- | HD | | |
| | | | ED RLY B K7-K15 | GY0232X | ----- | HD | | |
| | | | SELECTED ED BAT | ----- | METER | HD | | |
| | | ELECTRICAL POWER | AC BUS FREQ | GC0155F | CAUT | 1 OF 2 | | |
| | | | AC BUS VOLTS | GC0071V | METER, CAUT | M | | |
| | | | BAT 1 CUR | GC1201C | METER | 1 OF 3 M PCM | | |
| | | | BAT 2 CUR | GC1202C | METER | | | |
| | | | BAT L CUR | GC1207C | METER | 1 OF 3 M PCM | | |
| | | | BAT 3 CUR | GC1203C | METER | | | |
| | | | BAT 4 CUR | GC1207C | METER | | | |
| | | | LMP BUS VOLTS | GC0302V | METER, CAUT | 2 OF 3 M | | |
| | | | BAT 1 VOLTS | GC0201V | METER } | | | |
| | | | BAT 2 VOLTS | GC0202V | METER } | | | |
| | | | BAT 5 VOLTS | GC0205V | METER | | | |
| | | | CDR BUS VOLTS | GC0301V | METER, CAUT | 2 OF 3 M | | |
| | | | BAT 3 VOLTS | GC0203V | METER } | | | |
| | | | BAT 4 VOLTS | GC0204V | METER } | | | |
| | | | BAT 6 VOLTS | GC0206V | METER | | | |
| | | | BAT L VOLTS | GC0207V | METER | HD | | |
| | | | BAT 5 CUR | GC1205C | METER } | 1 OF 2 M PCM | | |
| | | | BAT 6 CUR | GC1206C | METER } | | | |
| | | | BAT 1 MAL | GC9961U | CAUT, COMP | HD | | |
| | | | BAT 2/L MAL | GC9962U | CAUT, COMP | HD | | |
| | | | BAT 3/L MAL | GC9963U | CAUT, COMP | HD | | |
| | | | BAT 4 MAL | GC9964U | CAUT, COMP | HD | | |
| | | | BAT 5 MAL | GC9965U | CAUT, COMP | HD | | |
| | | | BAT 6 MAL | GC9966U | CAUT, COMP | HD | | |
| | | | BATTERY MAL | GL4047X | COMP | HD | | |
| | | | BAT 1 LOW TAP | GC4362X | FLAG | HD | | |
| | | | BAT 4 LOW TAP | GC4368X | FLAG | HD | | |
| | | | BAT 5 B/U CDR | GC4369X | FLAG | HD | | |
| | | | BAT 6 NORM CDR | GC4372X | FLAG | HD | | |
| <p>NOTE</p> <p>LOSS OF SEVERAL HD MEASUREMENTS WILL CAUSE SEVERELY DEGRADED MISSION MONITORING CAPABILITY.</p> | | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | LM/EMU INSTRUMENTATION | LM TELMU | 21-1 | Tape 60.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 21 - LM/EMU INSTRUMENTATION - CONTINUED

| R | ITEM | SECTION 27 - ENVIRONMENTAL INSTRUMENTATION - CONTINUED | | | | | | |
|--------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------|-----------------------|---------|---------------------------|----------|------|-----------|
| | | SYSTEM | MEAS DESCRIPTION | PCM | ONBOARD | CATEGORY | | |
| | | ENVIRONMENTAL CONTROL | SUIT PRESS | GF1301P | METER WARNING | HD HD | | |
| | | | CABIN PRESS | GF3571P | METER } | 1 OF 3 | | |
| | | | U/H RLF PRESS | GF3591P | ----- } | M | | |
| | | | F/H RLF PRESS | GF3592P | ----- } | | | |
| | | | DES 2 O2 PRESS | GF0584P | METER } | 1 OF 2 | | |
| | | | DES 1 O2 PRESS | GF3584P | METER, CAUT } | M | | |
| | | | ASC 1 O2 PRESS | GF3582P | METER, CAUT } | 1 OF 2 | | |
| | | | ASC 2 O2 PRESS | GF3583P | METER, CAUT } | M | | |
| | | | GLYCOL PUMP DELTA P | GF2021P | ----- } | | | |
| | | | SEC GLYCOL PUMP PRESS | GF2921P | ----- } | 1 OF 2 | | |
| | | | GLYCOL PUMP PRESS | GF9997U | METER } | M | | |
| | | | SEL GLYCOL LVL LOW | GF9986U | CAUT } | | | |
| | | | GLYCOL TEMP | GF9998U | METER, CAUT } | | | |
| | | | GLYCOL OUTLET TEMP | GF2581T | ----- } | | | |
| | | | SUIT TEMP | GF1281T | METER } | 1 OF 2 | | |
| | | | GLYCOL INLET TEMP | GF2531T | ----- } | M | | |
| | | | DES 2 H2O PRESS | GF0500P | METER } | 1 OF 2 | | |
| | | | DES 1 H2O PRESS | GF4500P | METER } | M | | |
| | | | ASC 1 H2O QTY | GF4502P | METER } | 1 OF 2 | | |
| | | | ASC 2 H2O QTY | GF4503P | METER } | M | | |
| | | | PRI H2O REG DELTA P | GF4101P | ----- | HD | | |
| | | | REPR ELEC OPEN | GF3572X | WARNING | HD | | |
| | | | CO2 PART PRESS | GF1521P | METER, CAUT, COMP | HD | | |
| | | | H2O SEP RATE | GF9999U | CAUT, COMP | HD | | |
| | | | SUIT DIV EGRESS | GF1221X | ----- | HD | | |
| <div>NOTE</div> <div>LOSS OF SEVERAL HD MEASUREMENTS WILL CAUSE SEVERELY DEGRADED MISSION MONITORING CAPABILITY.</div> | | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | LM/EMU INSTRUMENTATION | LM TELMU | 21-2 | Tape 60.7 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 21 - LM/EMU INSTRUMENTATION - CONTINUED

| R | ITEM | | | | | | | |
|--------------------------------------------------------------------------------------------------------------------------------|------|-----------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------|----------------------------------|------|-----------|
| | | SYSTEM | MEAS DESCRIPTION | FM/FM PAM | ONBOARD | CATEGORY | | |
| | | EMU/EVA | FEED H2O PRESS LOW FEED H2O PRESS LOW VENT FLOW | GT8110P/GT8210P | TONE-FLAG TONE-FLAG | HD HD 1 OF 2 | | |
| | | | PLSS BAT CUR PLSS BAT VOLT LCG H2O TEMP PGA PRESS PGA PRESS LOW PGA PRESS | GT8140C/GT8240C GT8141V/GT8241V GT8154T/GT8254T GT8168P/GT8268P | CUFF GAGE TONE-FLAG | M HD HD 1 OF 3 M | | |
| | | | SUBL O2 OUT TEMP PLSS-CO2 PP PLSS O2 PRESS PLSS O2 QTY IND HIGH O2 FLOW LCG H2O Δ T | GT8170T/GT8270T GT8175P/GT8275P GT8182P/GT8282P GT8196T/GT8296T | METER TONE-FLAG | HD HD HD HD HD HD | | |
| | | | OPS PRESS GAGE OPS REG PRESS GAGE EVC CAL 0 VDC EVC CAL 5 VDC | GT8101V/GT8201V GT8102V/GT8202V | METER METER | HD HD HD HD | | |
| <div>NOTE</div> <div>LOSS OF SEVERAL HD MEASUREMENTS WILL CAUSE SEVERELY DEGRADED MISSION MONITORING CAPABILITY.</div> | | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | LM/EMU INSTRUMENTATION | LM TELMU | 21-3 | Tape 60.8 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 21 - LM/EMU INSTRUMENTATION - CONTINUED

| R | ITEM | INSTRUMENTATION REQUIREMENTS | | | | | | |
|------------------------------------------------------------------------------------------------|------|------------------------------|---------------------|----------|---------------------------|------------|------|-----------|
| | | SYSTEM | MEAS DIScription | PCM | ONBOARD | CATEGORY | | |
| | | GUIDANCE | LGC DOWNLINK | GG0001X | - | M | | |
| | | AND | PLS TORO REF | GG1040V | - | HD | | |
| | | CONTROL | 2.5 VDC TM BIAS | GG1110V | - | HD | | |
| | | | IMU 28 VAC 800 | GG1201V | - | HD | | |
| | | | IRIG SUSP 3.2 KC | GG1331V | - | HD | | |
| | | | IMU STBY | GG1513X | - | HD | | |
| | | | LGC OPR | GG1523X | - | HD | | |
| | | | X PIPA OUT IN PHASE | GG2001V | - | HD | | |
| | | | Y PIPA OUT IN PHASE | GG2021V | - | HD | | |
| | | | Z PIPA OUT IN PHASE | GG2041V | - | HD | | |
| | | | IG SVO ERR IN PHASE | GG2101V | - | HD | | |
| | | | IG 1X RSVR OUT SIN | GG2112V | FDAI | HD | | |
| | | | IG 1X RXVR OUT COS | GG2113V | FDAI | HD | | |
| | | | MG SVO ERR IN PHASE | GG2137V | - | HD | | |
| | | | MG 1X RSVR OUT SIN | GG2142V | FDAI | HD | | |
| | | | MG 1X RSVR OUT COS | GG2143V | FDAI | HD | | |
| | | | OG SVO ERR IN PHASE | GG2167V | - | HD | | |
| | | | OG RSVR OUT SIN | GG2172V | FDAI | HD | | |
| | | | OG RSVR OUT COS | GG2173V | FDAI | HD | | |
| | | | PITCH ATT ERR | GG2219V | FDAI | HD-PCM | | |
| | | | YAW ATT ERR | GG2249V | FDAI | HD-PCM | | |
| | | | ROLL ATT ERR | GG2279V | FDAI | HD-PCM | | |
| | | | PIPA TEMP | GG2300T* | C&W | HD-PCM | | |
| | | | RR SHIFT SIN | GG3304V | FDAI | HD-PCM | | |
| | | | RR SHIFT COS | GG3305V | FDAI | HD-PCM | | |
| | | | RR TRUN SIN | GG3324V | FDAI | HD-PCM | | |
| | | | RR TRUN COS | GG3325V | FDAI | HD-PCM | | |
| | | | LGC WARNING | GG9001X | C&W | HD-PCM | | |
| | | | ISS WARNING | GG9002X | C&W | HD-PCM | | |
| | | | LR ANT TEMP | GN7563T | TEMP MONITOR | HD-PCM | | |
| | | | RR NO TRACK | GN7621X | C&W | HD-PCM | | |
| | | | RR ANT TEMP | GN7723T | TEMP MONITOR | HD-PCM | | |
| | | | LR RNG BAD | GN7521X | C&W | HD | | |
| | | | LR VEL BAD | GN7557X | C&W | HD | | |
| | | | YAW ERR CMD | GH1247V | - | HD | | |
| | | | PITCH ERR CMD | GH1248V | - | HD | | |
| | | | ROLL ERR CMD | GH1249V | - | HD | | |
| | | | JD A4D OUTPUT | GH1419V | - | HD | | |
| | | | RCS TCP A4D | GR5023X | - | HD | | |
| | | | JD B3D OUTPUT | GH1423V | - | HD | | |
| | | | JD A2D OUTPUT | GH1427V | - | HD | | |
| | | | RCS TCP A2D | GR5040X | - | HD | | |
| | | | JD B1D OUTPUT | GH1431V | - | HD | | |
| | | | RCS TCP B1D | GR5044X | - | HD | | |
| | | | JD B4U OUTPUT | GH1418V | - | HD | | |
| | | | JD B4F OUTPUT | GH1420V | - | HD | | |
| | | | JD A4R OUTPUT | GH1421V | - | HD | | |
| | | | JD A3U OUTPUT | GH1422V | - | HD | | |
| | | | JD B3A OUTPUT | GH1424V | - | HD | | |
| | | | JD A3R OUTPUT | GH1425V | - | HD | | |
| | | | JD B2U OUTPUT | GH1426V | - | HD | | |
| | | | JD A2A OUTPUT | GH1428V | - | HD | | |
| | | | JD B2L OUTPUT | GH1429V | - | HD | | |
| | | | JD A1U OUTPUT | GH1430V | - | HD | | |
| | | | JD A1F OUTPUT | GH1432V | - | HD | | |
| | | | JD B1L OUTPUT | GH1433V | - | HD | | |
| * INDICATES SEPARATE TRANSDUCERS USED FOR ONBOARD AND PCM | | | | | | | | |
| NOTE | | | | | | | | |
| LOSS OF SEVERAL HD MEASUREMENTS WILL CAUSE SEVERELY DEGRADED MISSION MONITORING CAPABILITY. | | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | LM/EMU INSTRUMENTATION | LM CONTROL | 21-4 | Tape 60.9 |

MISSION RULES

| R | ITEM | SYSTEM | MEAS DESCRIPTION | PCM | ONBOARD | CATEGORY |
|---|-----------------|-------------------------------------------|------------------|----------|------------------|----------|
| | | GUIDANCE AND CONTROL (CONTINUED) | RCS TCP B4U | GR5031X | - | HD |
| | RCS TCP B4F | | GR5033X | - | HD | |
| | RCS TCP A4R | | GR5034X | - | HD | |
| | RCS TCP A3U | | GR5035X | - | HD | |
| | RCS TCP B3A | | GR5037X | - | HD | |
| | RCS TCP A3R | | GR5038X | - | HD | |
| | RCS TCP B2U | | GR5039X | - | HD | |
| | RCS TCP A2A | | GR5041X | - | HD | |
| | RCS TCP B2L | | GR5042X | - | HD | |
| | RCS TCP A1U | | GR5043X | - | HD | |
| | RCS TCP A1F | | GR5045X | - | HD | |
| | RCS TCP B1L | | GR5046X | - | HD | |
| | YAW ATT ERR | | GH1455V | FDAI | HD | |
| | PITCH ATT ERR | | GH1456V | FDAI | HD | |
| | ROLL ATT ERR | | GH1457V | FDAI | HD | |
| | RGA YAW RATE | | GH1461V | FDAI | HD | |
| | RGA PITCH RATE | | GH1462V | FDAI | HD | |
| | RGA ROLL RATE | | GH1463V | FDAI | HD | |
| | AGS SEL | | GH1621X | - | HD | |
| | ROLL PLS/DIR | | GH1628X | - | HD | |
| | PITCH PLS/DIR | | GH1629X | - | HD | |
| | YAW PLS/DIR | | GH1630X | - | HD | |
| | AUTO ON | | GH1214X | - | HD | |
| | APS ARM | | GH1230X | - | HD | |
| | ENG FIRE OVRD | | GH1286X | - | HD | |
| | MAN THRUST CMD | | GH1311V | METER | HD | |
| | PITCH GDA POS | | GH1313V | - | HD | |
| | ROLL GDA POS | | GH1314V | - | HD | |
| | P TRM FAIL | | GH1323X | C&W | HD | |
| | R TRM FAIL | | GH1330X | C&W | HD | |
| | AUTO THRUST CMD | | GH1331V | METER | HD | |
| | DPS ARM | | GH1348X | - | HD | |
| | DPS VAR ACT | | GQ6806H | - | HD | |
| | CES AC PWR FAIL | | GL4026X | C&W | HD | |
| | CES DC PWR FAIL | | GL4027X | C&W | HD | |
| | AGS DOWNLINK | | GI0001X | - | HD | |
| | ASA TEMP | | GI3301T | - | HD | |
| | AGS PWR FAIL | | GL4028X | C&W | HD | |
| | AUTO OFF | | GH1217X | - | HD | |
| | AGS AUTO | | GH1641X | - | HD | |
| | AGS ATT HOLD | | GH1642X | - | HD | |
| | PGNS AUTO | | GH1643X | - | HD | |
| | PGNS ATT HOLD | | GH1644X | - | HD | |
| | DESCENT | | START TNK PRESS | GQ3015P | HE MON | HD |
| | PROPULSION | | HE REG PRESS | GQ3018P | C&W | HD |
| | | HE REG PRESS | GQ3025P | | HD | |
| | | HE PRESS | GQ3435P | PRESS | 1 OF 2 M | |
| | | HE PRESS | GQ3436P | | | |
| | | FU TNK 1 QTY | GQ3603Q | QTY | 1 OF 4 M | |
| | | FU TNK 2 QTY | GQ3604Q | | | |
| | | OX TNK 1 QTY | GQ4103Q | QTY | SEE NOTE 2 | |
| | | OX TNK 2 QTY | GQ4104Q | | | |
| | | FU 1 TEMP | GQ3718T | TEMP MON | HD | |
| | | FU 2 TEMP | GQ3719T | TEMP MON | HD | |
| | | OX 1 TEMP | GQ4218T | TEMP MON | HD | |
| | | OX 2 TEMP | GQ4219T | TEMP MON | HD | |
| | | FU PRESS | GQ3611P | | 2 OF 3 M | |
| | | OX PRESS | GQ4111P | | | |
| | | TCP | GQ6510P | THRUST | | |
| | | LOW LEVEL | GQ4455X | DPS LOW | HD SEE NOTE 3 | |

| MISSION | REV | DATE | SECTION | GROUP | PAGE | |
|-----------|-----|--------|---------------------------|------------|------|-----------|
| APOLLO 17 | FNL | 9/1/72 | LM/EMU INSTRUMENTATION | LM CONTROL | 21-5 | Tape 61.1 |

SECTIONS 21 THROUGH 27 ARE DELETED. REFERENCE TELMU AND CONTROL MISSION RULES IN SECTION 3 OF THIS DOCUMENT.

THE LM DETAILED RULES WERE DELETED TO ELIMINATE DUPLICATION BETWEEN THEM AND THE SUMMARY RULES IN SECTION 3.

IN SOME CASES, THE SUMMARY RULES HAVE BEEN EXPANDED TO INCLUDE DATA PREVIOUSLY COVERED ONLY IN THE DETAILED RULES.

| | |
|----|----------------------------------|
| 21 | LM SEQUENTIAL AND PYROTECHNIC |
| 22 | LM ELECTRICAL POWER |
| 23 | LM ENVIRONMENTAL CONTROL |
| 24 | LM GUIDANCE AND CONTROL |
| 25 | LM DFS |
| 26 | LM APS |
| 27 | LM REACTION CONTROL SYSTEM |

SECTION 28 - SPACE ENVIRONMENT

NASA — MSC

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 28 - SPACE ENVIRONMENT - CONTINUED

| R | ITEM | MANAGEMENT | | | | | |
|------|---------------------------------------------------------------------------------------------------|------------|-----|--------|-------------------|------------|------|
| 28-3 | THE EXISTING AND PROJECTED RADIATION ENVIRONMENT WILL BE A PART OF THE GO/NO-GO DECISION PROCESS. | | | | | | |
| 28-4 | <u>PRIORITY OF DATA</u> | | | | | | |
| | A. NATURAL (SOLAR PARTICLE EVENT) | | | | | | |
| | 1. PRELAUNCH AND EPO | | | | | | |
| | (A) SOLAR PARTICLE ALERT NETWORK (SPAN) | | | | | | |
| | (B) VELA NATURAL RADIATION SATELLITE | | | | | | |
| | (C) PIONEER RADIATION SATELLITE | | | | | | |
| | (D) EXPLORER RADIATION SATELLITE | | | | | | |
| | (E) SOLAR PARTICLE MONITORING SYSTEM (SPMS) | | | | | | |
| | 2. ALL OTHER PHASES | | | | | | |
| | (A) S/C INSTRUMENTATION | | | | | | |
| | (1) VAN ALLEN BELT DOSIMETER (VABD) | | | | | | |
| | (2) PERSONAL RADIATION DOSIMETER (PRD) | | | | | | |
| | (3) NUCLEAR PARTICLE DETECTION SYSTEM (NPDS) | | | | | | |
| | (B) SOLAR PARTICLE ALERT NETWORK (SPAN) | | | | | | |
| | (C) VELA NATURAL RADIATION SATELLITE | | | | | | |
| | (D) PIONEER RADIATION SATELLITE | | | | | | |
| | (E) EXPLORER RADIATION SATELLITE | | | | | | |
| | (F) SOLAR PARTICLE MONITORING SYSTEM (SPMS) | | | | | | |
| | B. ARTIFICIAL | | | | | | |
| | 1. ALL PHASES EXCEPT EPO | | | | | | |
| | (A) JAEIC | | | | | | |
| | (B) RIOMETER | | | | | | |
| | 2. EPO | | | | | | |
| | (A) JAEIC | | | | | | |
| | (B) RIOMETER | | | | | | |
| | (C) PRD | | | | | | |
| | 3. EARTH ORBITAL MISSION | | | | | | |
| | (A) PRD | | | | | | |
| | (B) JAEIC | | | | | | |
| | (C) RIOMETER | | | | | | |
| | RULE NUMBERS 28-5 THROUGH 28-9 ARE RESERVED. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | SPACE ENVIRONMENT | MANAGEMENT | 28-2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 28 - SPACE ENVIRONMENT - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-----------------------------------------------------------------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------|------|-----------|
| | | | | <u>SPECIFIC MISSION RULES</u> | | | | |
| | 28-10 | ANY SOURCE REPORTS A POSSIBLE ARTIFICIAL EVENT | ALL | PROCEED UNTIL VERIFICATION FROM ALL OTHER SOURCES. | | | | |
| | 28-11 | DEFINITE ARTIFICIAL EVENT CONFIRMED BY REPORTING SOURCES | PRELAUNCH | A. HOLD UNTIL INFORMATION FROM REPORTING SOURCES INDICATES THE MOD WILL NOT BE EXCEEDED. | | | | |
| | | | EPO | B.1. CONTINUE MISSION UNLESS DATA ANALYSIS INDICATES THAT THE DOSE PROJECTED THROUGH TLI WILL EXCEED THE MOD BY A SIGNIFICANT AMOUNT. IF THE MOD WILL BE EXCEEDED BY A SIGNIFICANT AMOUNT, PERFORM A LOW EARTH ORBIT ALTERNATE MISSION. | B.1. CREW SHOULD BEGIN PERSONAL DOSIMETER READOUTS PER FCOH SOP 2.8. | | | |
| | | | ALL OTHER | 2. FOR DOSES APPROACHING THE MOD CONTINUE MISSION WITH CONTINUOUS PRD MONITORING AND CREW ASSESSMENT. CONSIDERATION WILL BE GIVEN TO CHANGING THE TRAJECTORY TO A LOW EARTH ORBIT OR REENTERING ASAP BASED ON ACTUAL | | | | |
| | | | | C. <u>CONTINUE MISSION</u> | | | | |
| | 28-12 | RADIATION CONFIRMED BY PRD READOUTS OR ONBOARD TM AND PROJECTED TO EXCEED THE MOD | ALL | <u>REENTER NEXT BEST PTP</u> | ALSO APPLIES TO ALTERNATE EARTH ORBIT MISSION. | | | |
| | 28-13 | MAJOR SOLAR FLARE PREDICTED | ALL | <u>CONTINUE MISSION</u> | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | SPACE ENVIRONMENT | SPECIFIC | 28-3 | Tape 28.3 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 28 - SPACE ENVIRONMENT - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | | CUES/NOTES/COMMENTS | |
|---|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| | 28-14 | MAJOR SOLAR FLARE HAS OCCURRED A. UNCONFIRMED PARTICLE EVENT B. CONFIRMED PARTICLE EVENT AND SOLAR PARTICLE ALERT NETWORK/RTACF ANALYSIS INDICATES THE MOD WILL BE EXCEEDED DURING THE MISSION C. CONFIRMED PARTICLE EVENT AND S/C TM OR PRD READOUT PROJECTIONS INDICATE THE MOD WILL BE EXCEEDED DURING THE MISSION | ALL PRELAUNCH EPO ALL OTHERS TLC LO LUNAR STAY ALL OTHER PHASES | A. <u>CONTINUE MISSION</u> B.1. HOLD UNTIL DATA ANALYSIS INDICATES THAT THE MOD WILL NOT BE EXCEEDED. 2. <u>CONTINUE MISSION</u> IF DATA ANALYSIS INDICATES THAT THE MOD WILL BE EXCEEDED BY A SIGNIFICANT AMOUNT PRIOR TO MISSION COMPLETION, TLI IS NO-GO. 3. <u>CONTINUE MISSION</u> CONSIDERATION WILL BE GIVEN TO EARLY (OR EXTENDED) TEI AND INHIBITING CREW TRANSFER TO LM. C.1. <u>CONTINUE MISSION</u> CONSIDERATION SHOULD BE GIVEN TO ENTERING NEXT BEST PTP IF THE TOTAL DOSE CAN BE REDUCED SIGNIFICANTLY WITHOUT INCREASING THE TOTAL RISK TO THE CREW. 2. <u>CONTINUE MISSION</u> CONSIDER EXTENDING LUNAR ORBIT STAY TIME IF THE TOTAL DOSE TO THE CREW WOULD BE REDUCED SIGNIFICANTLY BY LUNAR SHIELDING. 3. CONSIDER REDUCING THE LUNAR STAY TIME AND/OR EVA IF THE TOTAL DOSE TO THE CREW CAN BE REDUCED SIGNIFICANTLY WITHOUT INCREASING THE TOTAL RISK TO THE CREW. 4. <u>CONTINUE MISSION</u> | | C.1. CREW SHOULD BEGIN PERSONAL DOSIMETER AND RADIATION SURVEY METER READOUTS PER FCOH SOP 2.8. 2.(A) HATCH-DOWN ATTITUDE MAY BE USED TO REDUCE THE TOTAL DOSE. (B) IF A PARTICLE EVENT IS CONFIRMED, THE CREW WILL TRANSFER FROM THE LM TO THE CSM ASAP. | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | SPACE ENVIRONMENT | SPECIFIC | 28-4 |
| | | | | | | | Tape 28.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 28 - SPACE ENVIRONMENT - CONCLUDED

| R | ITEM | | | | | | |
|---|-------|-----------------------------------------------|------------|----------------|----------------------|----------------------------|---------------------|
| | | <u>INSTRUMENTATION REQUIREMENTS</u> | | | | | |
| | 28-15 | <u>MEAS DESCRIPTION</u> | <u>PCM</u> | <u>ONBOARD</u> | <u>TRANSDUCERS</u> | <u>CATEGORY</u> | <u>MSN RULE REF</u> |
| | | RADIATION DOSIMETER 1 (CM DEPTH DOSE RATE) | CK1051K | - | - | HD | 28-12 |
| | | VABD | | | | | |
| | | RADIATION DOSIMETER 2 (CM SKIN DOSE RATE) | CK1052K | - | - | HD | 28-12 |
| | | DOSIMETER RATE CHANGE | CK1053R | - | - | HD | 28-12 |
| | | NPDS | | | | | |
| | | PROTON COUNT RATE CHAN 1 | ST0820K | - | - | HD | 28-14 |
| | | PROTON COUNT RATE CHAN 2 | ST0821K | - | - | HD | 28-14 |
| | | PROTON COUNT RATE CHAN 3 | ST0822K | - | - | HD | 28-14 |
| | | PROTON COUNT RATE CHAN 4 | ST0823K | - | - | HD | 28-14 |
| | | ALPHA COUNT RATE CHAN 1 | ST0830K | - | - | HD | 28-14 |
| | | ALPHA COUNT RATE CHAN 2 | ST0831K | - | - | HD | 28-14 |
| | | ALPHA COUNT RATE CHAN 3 | ST0832K | - | - | HD | 28-14 |
| | | PROTON INTEGER COUNT RATE | ST0838K | - | - | HD | 28-14 |
| | | TEMP NUCLEAR PART. DET | ST0840T | - | - | HD | 28-14 |
| | | TEMP NUCLEAR PART. ANAL | ST0841T | - | - | HD | 28-14 |
| | | PERSONAL RADIATION DOSIMETER (PRD) | - | 3 ONBOARD | | MANDATORY TO BE ONBOARD | 28-14 |
| | | RATE SURVEY METER (RSM) | - | 1 ONBOARD | | MANDATORY TO BE ONBOARD | 28-14 |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | SPACE ENVIRONMENT | INSTR REQ | 28-5 |
| | | | | | | Tape 28.5 | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 29 - RECOVERY

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | | | | | | | | | | | | | |
|---------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------|--------------------|---------------|----------|----------|---------|---------|--------|------------|------|--------|-------------|------|------|
| | | | | <div>SPECIFIC</div> | | | | | | | | | | | | | | | | |
| | 29-1 | ACCEPTABLE WEATHER CONDITIONS AND RECOVERY CAPABILITY* IN THE LAUNCH SITE AREA | PRELAUNCH | MANDATORY | | | | | | | | | | | | | | | | |
| | 29-2 | ACCEPTABLE WEATHER CONDITIONS AND RECOVERY CAPABILITY* IN THE LAUNCH ABORT AREA TO 1000 NM DOWNRANGE AND IN THE MIDPACIFIC RECOVERY ZONE | PRELAUNCH | HIGHLY DESIRABLE | | | | | | | | | | | | | | | | |
| | 29-3 | MINIMUM OF 71 AMP-HOURS OF CM POSTLANDING POWER AVAILABLE AT LANDING | | HIGHLY DESIRABLE | TO PROVIDE 40 HOURS OF CM POSTLANDING POWER PLUS ONE UPRIGHTING. | | | | | | | | | | | | | | | |
| | 29-4 | MINIMUM OF 35 AMP-HOURS OF CM POSTLANDING POWER AVAILABLE AT LANDING | | MANDATORY | TO PROVIDE 18 HOURS OF CM POSTLANDING POWER PLUS ONE UPRIGHTING | | | | | | | | | | | | | | | |
| | 29-5 | UNTIL ENTRY MINUS 24 HOURS, RETAIN ΔV CAPABILITY TO MOVE ENTRY POINT ±500 NM | | HIGHLY DESIRABLE | TO PROVIDE WEATHER AVOIDANCE CAPABILITY. | | | | | | | | | | | | | | | |
| | | | | | <p>*RECOVERY CAPABILITY WILL BE BASED PRIMARILY UPON THE LOCAL RECOVERY UNIT COMMANDER'S EVALUATION OF HIS CAPABILITY TO PERFORM THE RECOVERY OPERATION. WEATHER CONDITIONS AT THE TIME OF CM LANDING AFFECT BOTH RECOVERY CAPABILITY AND STRUCTURAL INTEGRITY OF THE CM. THE FOLLOWING GUIDELINES ARE USED TO INDICATE WHEN IT MAY BE NECESSARY TO RE-EVALUATE:</p> <table><tr><td></td><td><u>WORLD WIDE</u></td><td><u>LAUNCH SITE</u></td></tr><tr><td>SURFACE WINDS</td><td>25 KNOTS</td><td>25 KNOTS</td></tr><tr><td>CEILING</td><td>1500 FT</td><td>500 FT</td></tr><tr><td>VISIBILITY</td><td>3 NM</td><td>1/2 NM</td></tr><tr><td>WAVE HEIGHT</td><td>8 FT</td><td>8 FT</td></tr></table> | | <u>WORLD WIDE</u> | <u>LAUNCH SITE</u> | SURFACE WINDS | 25 KNOTS | 25 KNOTS | CEILING | 1500 FT | 500 FT | VISIBILITY | 3 NM | 1/2 NM | WAVE HEIGHT | 8 FT | 8 FT |
| | <u>WORLD WIDE</u> | <u>LAUNCH SITE</u> | | | | | | | | | | | | | | | | | | |
| SURFACE WINDS | 25 KNOTS | 25 KNOTS | | | | | | | | | | | | | | | | | | |
| CEILING | 1500 FT | 500 FT | | | | | | | | | | | | | | | | | | |
| VISIBILITY | 3 NM | 1/2 NM | | | | | | | | | | | | | | | | | | |
| WAVE HEIGHT | 8 FT | 8 FT | | | | | | | | | | | | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | | | |
| | | APOLLO 17 | FNL | 9/1/72 | RECOVERY | SPECIFIC | 29-1 | Tape 29.3 | | | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 29 - RECOVERY - CONCLUDED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|---------------------|----------|------|-----------|
| | 29-6 | AN ELLIPSE 163 NM UP-RANGE, 152 NM DOWNRANGE AND 50 NM TO EITHER SIDE OF 55 DEG/55 DEG TARGET POINT, AND AN ELLIPSE 105 NM UPRANGE AND DOWNRANGE AND 40 NM TO EITHER SIDE OF THE ROLL RIGHT 90 DEG (DELAYED) TARGET POINT WILL BE CLEAR OF ALL LAND. | EARTH ORBITAL | MANDATORY | | | | |
| | 29-7 | REMAINDER OF MANEUVER FOOTPRINT AND AN ELLIPSE 139 NM UPRANGE AND DOWNRANGE AND 40 NM TO EITHER SIDE OF 90 DEG/90 DEG TARGET POINT, AND AN ELLIPSE 105 NM UPRANGE AND DOWNRANGE AND 40 NM TO EITHER SIDE OF ROLL RIGHT 90 DEG TARGET POINT WILL BE CLEAR OF LARGE LAND MASSES. | EARTH ORBITAL | HIGHLY DESIRABLE | | | | |
| | 29-8 | A 5 NM RADIUS CIRCLE CENTERED ON THE GNCS TARGET POINT AND AN ELLIPSE 26 NM UPRANGE, 26 NM DOWNRANGE AND 52 NM EITHER SIDE OF THE EMS TARGET POINT WILL BE CLEAR OF ALL LAND. | POST-TLI | MANDATORY | | | | |
| | 29-9 | REMAINDER OF OPERATIONAL FOOTPRINT (SEE RULE 1-40) WILL BE CLEAR OF LARGE LAND MASSES | POST-TLI | HIGHLY DESIRABLE | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | RECOVERY | SPECIFIC | 29-2 | Tape 29.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 30 - AEROMEDICAL

| R | ITEM | | | | | | |
|---|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-------------|---------|------|
| | | <u>GENERAL</u> | | | | | |
| | 30-1 | <u>PRELAUNCH</u> | | | | | |
| | | PRIOR TO COMMITTING TO LAUNCH, THE FOLLOWING CONDITIONS MUST BE MET: | | | | | |
| | | A. SATISFACTORY FLIGHT CREW PHYSIOLOGICAL STATUS. | | | | | |
| | | B. THE MINIMUM CABIN OXYGEN CONCENTRATION FOR LAUNCH IS 60 PERCENT. | | | | | |
| | | C. THE MINIMUM SUIT OXYGEN CONCENTRATION FOR LAUNCH IS 95 PERCENT. | | | | | |
| | 30-2 | THE SUIT CIRCUIT MUST BE MAINTAINED AT LEAST 2 INCHES OF WATER PRESSURE ABOVE THE CABIN PRESSURE. SUIT LOOP PURGE IS REQUIRED IF THE SUIT-TO-CABIN DELTA PRESSURE REMAINS AT ZERO FOR A PERIOD OF 5 MINUTES. | | | | | |
| | 30-3 | THE POTABLE WATER PH MUST BE WITHIN 6.0 TO 8.0 AT SERVICING AND FINAL SAMPLING. | | | | | |
| | 30-4 | THE MAXIMUM ALLOWABLE CONCENTRATION OF PCO ₂ IS 5 MM OF Hg. | | | | | |
| | 30-5 | <u>LAUNCH</u> | | | | | |
| | | THERE ARE NO MEDICAL REASONS FOR ABORTING DURING THE LAUNCH PHASE OTHER THAN THOSE CONDITIONS INTOLERABLE TO THE CREW. | | | | | |
| | 30-6 | <u>EARTH ORBIT AND DEEP SPACE OPERATIONS</u> | | | | | |
| | | EARLY MISSION TERMINATION FOR MEDICAL REASONS FALLS INTO TWO CATEGORIES: | | | | | |
| | | A. ONSET OF CONDITIONS WHICH ADVERSELY AFFECT CREW SAFETY, OR FUNCTION AND PERFORMANCE | | | | | |
| | | B. FAILURE OF SPACECRAFT SYSTEMS TO MAINTAIN A PHYSIOLOGICALLY SATISFACTORY ENVIRONMENT | | | | | |
| | 30-7 | <u>WATER PALATABILITY</u> | | | | | |
| | | CREW EVALUATION OF THE DRINKING WATER TASTE WILL BE THE BASIS FOR DETERMINING WATER PALATABILITY, EVEN FOR KOH CONTAMINATION. | | | | | |
| | | RULE NUMBERS 30-8 THROUGH 30-14 ARE RESERVED. | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | AEROMEDICAL | GENERAL | 30-1 |
| | | Tape 29.5 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 30 - AEROMEDICAL - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-------------------------------------|------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------|-----------|
| | | | | <div>SPECIFIC MISSION RULES</div> | | | | |
| | 30-15 | LOSS OF OR UNREADABLE EKG | ALL PHASES | A. <u>CONTINUE MISSION</u> | A. ARTIFACTS ANTICIPATED DURING LAUNCH. MCC SURGEON WILL EVALUATE THE PROBLEM AND MAY RECOMMEND EARLY MISSION TERMINATION IF CORRECTIVE ACTION IS NOT EFFECTIVE. | | | |
| | | | EVA | B. <u>CONTINUE MISSION</u> | B. MCC SURGEON WILL EVALUATE PROBLEM AND RECOMMEND CORRECTIVE ACTION. IF NOT EFFECTIVE, CEVA MAY BE RECOMMENDED. | | | |
| | 30-16 | ABNORMAL HEART RATE, RHYTHM, OR EKG | LAUNCH | A. <u>CONTINUE MISSION</u> | MCC SURGEON WILL EVALUATE THE PROBLEM AND MAY RECOMMEND EARLY MISSION TERMINATION IF CORRECTIVE ACTION IS NOT EFFECTIVE. | | | |
| | | | EPO | B. <u>NO-GO FOR TLI</u> | | | | |
| | | | TLC | C. <u>NO-GO FOR LOI</u> | | | | |
| | | | LO | D. <u>ENTER NEXT BEST PTP</u> | | | | |
| | | | EVA | E. <u>TERMINATE EVA</u> | | | | |
| | | | TEC | F. <u>ENTER NEXT BEST PTP</u> | | | | |
| | 30-17 | ABNORMAL RESPIRATORY RATE | LAUNCH | A. <u>CONTINUE MISSION</u> | THE ABNORMAL RATES WILL BE EVALUATED BY THE MCC SURGEON AND EARLY MISSION TERMINATION MAY BE RECOMMENDED IF CORRECTIVE ACTION IS NOT EFFECTIVE. | | | |
| | | | EPO | B. <u>NO-GO FOR TLI</u> | | | | |
| | | | TLC | C. <u>NO-GO FOR LOI</u> | | | | |
| | | | LO | D. <u>ENTER NEXT BEST PTP</u> | | | | |
| | | | TEC | E. <u>ENTER NEXT BEST PTP</u> | | | | |
| | 30-18 | ONSET OF SERIOUS MEDICAL PROBLEM | LAUNCH | A. <u>CONTINUE MISSION</u> CREW MAY ELECT TO ABORT IF INTOLERABLE | MCC SURGEON WILL EVALUATE THE PROBLEM AND MAY RECOMMEND EARLY MISSION TERMINATION IF CORRECTIVE ACTION IS NOT EFFECTIVE. | | | |
| | | | EPO | B. <u>ENTER NEXT BEST PTP</u> | | | | |
| | | | TLC | C. <u>ENTER NEXT BEST PTP</u> | | | | |
| | | | LO | D. <u>ENTER NEXT BEST PTP</u> | | | | |
| | | | EVA | E. <u>TERMINATE EVA</u> | | | | |
| | | | TEC | F. <u>ENTER NEXT BEST PTP</u> | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | AEROMEDICAL | SPECIFIC PHYSIOLOGICAL | 30-2 | Tape 29.6 |

MISSION RULES

[illegible]

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 30 - AEROMEDICAL - CONTINUED

| SECTION 30 - AEROMEDICAL - CONTINUED | | | | | | | | | |
|--------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| R | RULE | CONDITION/MALFUNCTION | PHASE | | RULING | CUES/NOTES/COMMENTS | | | |
| | 30-25 | INCREASE IN PCO2 A. IS GREATER THAN OR EQUAL TO 7.6 MM Hg B. GREATER THAN OR EQUAL TO 7.6 MM Hg AND UNABLE TO DECREASE C. GREATER THAN OR EQUAL TO 10 MM Hg | LAUNCH ALL LAUNCH ALL LAUNCH ALL | | A.1. <u>CONTINUE MISSION</u> 2. <u>CONTINUE MISSION</u> CHANGE L10H CANISTER B.1. <u>CONTINUE MISSION</u> 2. <u>CONTINUE MISSION</u> (A) OPEN SUITS AND BREATHE FROM CABIN (B) CHANGE SECOND L10H CANISTER (C) TEST PCO2 SENSOR C.1. <u>CONTINUE MISSION</u> 2. <u>TERMINATE PHASE</u> ENTER NEXT BEST PTP | A. PCO2 SHOULD DECREASE BELOW 2 MM Hg WITHIN 30 MINUTES. B.2. L10H CANISTERS MAY BE CHANGED IN AN UNPRESSURIZED CABIN. B.2. (C) PCO2 SENSOR TEST: PURGE PCO2 SENSOR WITH DIRECT O2 VALVE OPEN FOR 10 SEC (REF ECS MALF NO. 12). IF ABOVE PROCEDURE RESULTS IN A PCO2 READING NEAR ZERO, THE PCO2 SENSOR IS OPERATING PROPERLY. C.2. PLSS ACCEPTABLE CO2 LEVEL IS 15 MM Hg (REFERENCE EVA MISSION RULES CHART) | | | |
| | 30-26 | PCO2 INSTRUMENTATION FAILURE < | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 30 - AEROMEDICAL - CONCLUDED

| R | ITEM | INSTRUMENTATION REQUIREMENTS | | | | | |
|-------|------|---------------------------------------|------------|----------------------|--------------------|-----------------|---------------------------|
| 30-35 | | <u>MEAS DESCRIPTION</u> | <u>PCM</u> | <u>ONBOARD</u> | <u>TRANSDUCERS</u> | <u>CATEGORY</u> | <u>MSN RULE REFERENCE</u> |
| | | <u>CSM</u> | | | | | |
| | | ELECTROCARDIOGRAM | CJ0060J | NOT DISPLAYED | | M* | 30-15,16 |
| | | ELECTROCARDIOGRAM | CJ0061J | NOT DISPLAYED | | M* | 30-15,16 |
| | | ELECTROCARDIOGRAM | CJ0062J | NOT DISPLAYED | | M* | 30-15,16 |
| | | CO2 PARTIAL PRESSURE | CF0005P | METER | COMMON | HD | 30-2,27,28 |
| | | SUIT CABIN DELTA PRESS | CF0003P | NOT DISPLAYED | | HD | 30-3,19 |
| | | ORAL TEMPERATURE | | CLINICAL THERMOMETER | | M | 30-20 |
| | | PNEUMOGRAM | CJ0200P | NOT DISPLAYED | | HD | 30-17 |
| | | PNEUMOGRAM | CJ0201P | NOT DISPLAYED | | HD | 30-17 |
| | | PNEUMOGRAM | CJ0202P | NOT DISPLAYED | | HD | 30-17 |
| | | <u>LM</u> | | | | | |
| | | CO2 PARTIAL PRESSURE | GF1521P | METER | | HD | |
| | | ELECTROCARDIOGRAM | GT9999 | NOT DISPLAYED | | M** | 30-15,16 |
| | | PNEUMOGRAM | | NOT DISPLAYED | | HD | 30-17 |
| | | <u>PLSS</u> | | | | | |
| | | PLSS ELECTROCARDIOGRAM | GT8124J | | | M** | 30-15,16 |
| | | | GT8224J | | | M** | 30-15,16 |
| | | *MANDATORY UNTIL SUIT ROOM DEPARTURE. | | | | | |
| | | **MANDATORY UNTIL LM CLOSEOUT. | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | AEROMEDICAL | INSTR REQ | 30-5 |
| | | Tape 43A.7 | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS

| R | ITEM | <div> <div>CONSTRAINTS AND OPTIONS</div> </div> | | | | | |
|---|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-------------------|-------------------------|------|
| | 31-1 | <p>LRV MOBILITY RATES WILL BE DETERMINED IN REAL TIME. THESE RATES WILL BE PROJECTED FOR MAINTAINING THE EFFECTIVE OPERATIONAL ENVELOPE AND REASSESSING THE TRAVERSE PLAN. THE PROJECTED RATES MAY BE ADJUSTED UPWARD OR DOWNWARD FROM COMPUTED RATES BASED ON QUALITATIVE JUDGEMENT OF:</p> <p>A. TERRAIN DIFFERENCES</p> <p>B. LOSSES IN DRIVING TIME ATTRIBUTABLE TO SURFACE OBSERVATIONS</p> <p>C. UNSCHEDULED STOPS</p> <p>RULE NUMBERS 31-2 THROUGH 31-30 ARE RESERVED</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | LUNAR SURFACE OPS | CONSTRAINTS AND OPTIONS | 31-1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS - CONTINUED

| R | ITEM | PRECEDENCE/SCHEDULING | | | | | | |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------|----------|-------------------|-----------------------|------|-----------|
| 31-31 | IN ESTABLISHING THE SURFACE EXPLORATION PLAN, THE TRAVERSE PLANS PREPARED BEFORE LAUNCH WILL BE USED AS BASELINES AND MODIFIED AS NECESSARY TO ACCOMMODATE THE ACTUAL LANDING POINT, RADIUS OF OPERATIONS, TIMELINE AND MOBILITY CONSTRAINTS, AND LUNAR SURFACE HARDWARE CAPABILITY TO REACH THE SE SELENOLOGICAL FEATURES. THE MINIMUM TIME REQUIRED FOR EACH REGION ARE INCLUDED: | | | | | | | |
| | A. SOUTH MASSIF | TBD | MINIMUM TIME | | | | | |
| | B. NORTH MASSIF | TBD | MINIMUM TIME | | | | | |
| | C. DARK MANTLE | TBD | MINIMUM TIME | | | | | |
| | D. LIGHT MANTLE | TBD | MINIMUM TIME | | | | | |
| 31-32 | FOR SITUATIONS WHERE ALL SURFACE TASKS CANNOT BE ACCOMPLISHED, THE FOLLOWING ORDER OF PRECEDENCE WILL BE USED IN MAKING STATION/TASK TRADE-OFFS. | | | | | | | |
| | EVA 1 | | EVA 2 | | EVA 3 | | | |
| | STATION | PRIORITY | STATION | PRIORITY | STATION | PRIORITY | | |
| | ALSEP | 1 | 2 | 1 | 6 } | 1 | | |
| | 1 | 2 | 3 | 2 | 7 } | | | |
| | | | 4 | 3 | 8 | 2 | | |
| | | | 5 | 4 | 10 | 3 | | |
| | | | | | 9 | 4 | | |
| 31-33 | REASSESSMENT OF THE OPERATIONAL EVA PLAN WILL BE DONE IF ANY OF THE FOLLOWING CONDITIONS EXIST: | | | | | | | |
| | A. BEHIND TIMELINE BY MORE THAN 10 PERCENT OF EVA TIME REMAINING | | | | | | | |
| | B. AHEAD OF TIMELINE BY MORE THAN 15 MINUTES | | | | | | | |
| | C. DEGRADATION OF THE LRV TO SUCH AN EXTENT THAT A MINIMUM OF 4 KM/HR VEHICLE SPEED CANNOT BE MAINTAINED OR THE PLANNED TRAVERSE VIOLATES THE REDEFINED OPERATIONAL ENVELOPE | | | | | | | |
| 31-34 | IF A REALIGNMENT OF THE TRAVERSE IS REQUIRED, EITHER BY EXTENSIONS OR REDUCTIONS, THE REVISION WILL NORMALLY BE PASSED TO THE CREW AS EVA PAD UPDATES AT APPROXIMATELY THE 1/3 AND 2/3 EVA COMPLETION POINTS. | | | | | | | |
| 31-35 | TOTAL DRIVING TIME FROM THE LM TO STATION 2 WILL BE LIMITED TO 1 HOUR. DEPARTURE TIME FROM STATION 2 WILL BE LIMITED TO 2 HOURS AND 50 MIN TO MAINTAIN MARGINS FOR STATION 3 AND 4 WALKBACK. | | | | | | | |
| | 31-36 THROUGH 31-50 ARE RESERVED. | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | LUNAR SURFACE OPS | PRECEDENCE/SCHEDULING | 31-2 | Tape 56.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS - CONTINUED

| R | ITEM | SYSTEMS MANAGEMENT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----|--------|-------------------|----------------|------------|-------------------------|-----------------------------|----------------------|------------|--|--|--------------|-----|-----|----------------|-----|-----|------------|--|--|--------------|--------------------------|-------------------|----------------|-----------------|-------------|--|--|----------------|--|--|------|
| 31-51 | THE LRV RADIATOR COVERS WILL BE DUSTED BEFORE OPENING. THE RADIATOR SURFACES WILL BE DUSTED EACH TIME THE COVERS ARE OPENED WITH RADIATORS IN THE SUN. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31-52 | THE AUXILIARY PWR BYPASS SWITCH WILL BE PUT IN THE ON POSITION ONLY AFTER EVA 3. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31-53 | THE DRIVE ENABLE SWITCHES WILL NOT BE OPERATED AFTER INITIAL CONFIGURATION EXCEPT AS REQUIRED FOR FAILURES OR MALFUNCTION ISOLATION. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31-54 | LRV PARKING CONSTRAINTS FOR LRV AND PAYLOAD THERMAL CONSIDERATIONS ARE AS FOLLOWS: A. THE LRV WILL BE PARKED A MINIMUM OF <u>20</u> FT FROM THE NEAREST LM SIDE. B. <table><tr><th><u>PARKING DURATION</u></th><th><u>REQUIRED SUN AZIMUTH</u></th><th><u>CRITICAL ITEM</u></th></tr><tr><td colspan="3">LESS THAN:</td></tr><tr><td>6 HRS IN SUN</td><td>ANY</td><td>N/A</td></tr><tr><td>2 HRS IN SHADE</td><td>ANY</td><td>N/A</td></tr><tr><td colspan="3">MORE THAN:</td></tr><tr><td>6 HRS IN SUN</td><td>80°-110° CCW FROM UPSUN*</td><td>LCRU, C&D CONSOLE</td></tr><tr><td>2 HRS IN SHADE</td><td>NOT RECOMMENDED</td><td>C&D CONSOLE</td></tr><tr><td></td><td></td><td>LRV NAVIGATION</td></tr><tr><td></td><td></td><td>LCRU</td></tr></table> *FOR BETWEEN EVA'S PARKING, THE LRV NAVIGATION HEADING WILL BE USED TO PARK THE LRV 85° CCW FROM UPSUN. HEADING WILL BE SPECIFIED BY MCC BASED ON SUN AZIMUTH. | | | | | | | <u>PARKING DURATION</u> | <u>REQUIRED SUN AZIMUTH</u> | <u>CRITICAL ITEM</u> | LESS THAN: | | | 6 HRS IN SUN | ANY | N/A | 2 HRS IN SHADE | ANY | N/A | MORE THAN: | | | 6 HRS IN SUN | 80°-110° CCW FROM UPSUN* | LCRU, C&D CONSOLE | 2 HRS IN SHADE | NOT RECOMMENDED | C&D CONSOLE | | | LRV NAVIGATION | | | LCRU |
| <u>PARKING DURATION</u> | <u>REQUIRED SUN AZIMUTH</u> | <u>CRITICAL ITEM</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LESS THAN: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 HRS IN SUN | ANY | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 HRS IN SHADE | ANY | N/A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MORE THAN: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 HRS IN SUN | 80°-110° CCW FROM UPSUN* | LCRU, C&D CONSOLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 HRS IN SHADE | NOT RECOMMENDED | C&D CONSOLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | LRV NAVIGATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | LCRU | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31-55 | LRV BATTERY POWER/THERMAL MANAGEMENT WILL BE ACCOMPLISHED THROUGH CONFIGURATION OF THE BATTERY LOADS, LIMITING USE OF NON-CRITICAL SYSTEMS AND BY OPENING THE BATTERY COVERS WHILE PARKING UPSUN AT TRAVERSE STOPS GREATER THAN 30 MIN. THE CONDITIONS TO BE MAINTAINED THROUGH THIS MANAGEMENT IN ORDER OF PRIORITY ARE: A. BATTERIES SHALL BE MAINTAINED IN TEMPERATURE RANGE OF: 1. 40° F - 125° F FOR EVA 1 AND 2 2. 40° F - 140° F FOR EVA 3 B. RELATIVE STATE-OF-CHARGE BETWEEN BATTERIES BALANCED TO WITHIN 20 AMP-HOURS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | APOLLO 17 | FNL | 9/1/72 | LUNAR SURFACE OPS | LRV MANAGEMENT | 31-3 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | Tape 52.12 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|-------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------|------|-----------|
| | | | | <div>SPECIFIC</div> | | | | |
| | 31-60 | RESERVED | | | | | | |
| | 31-61 | FORWARD OR REAR STEERING UNIT FAILS TO RESPOND TO HAND-CONTROLLER COMMAND | | ELECTRICALLY DISABLE THE FAILED STEERING UNIT. | MAY EVENTUALLY REQUIRE PINNING IF UNPOWERED STEERING WANDERS EXCESSIVELY. | | | |
| | 31-62 | FORWARD OR REAR STEERING UNIT DRIVE HARDOVER WITH HAND CONTROLLER IN NEAR CENTER POSITION | | ELECTRICALLY DISABLE AND MECHANICALLY DECOUPLE AFFECTED UNIT AND LOCK AFFECTED WHEELS IN STRAIGHT AHEAD POSITION. | MECHANICAL DECOUPLING AND STEERING LOCKING ARE IRREVERSIBLE FOR THE FRONT WHEELS. | | | |
| | 31-63 | BOTH STEERING UNITS DRIVE HARDOVER CONTRARY TO STEERING COMMAND OR FAIL TO RESPOND TO HAND CONTROLLER | | ELECTRICALLY DISABLE, DECOUPLE, AND LOCK STEERING. CREW ASSESS DIRECTIONAL CONTROL USING LEFT/RIGHT DRIVE POWER TO DETERMINE TRAVERSE LIMITS. | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| - | | APOLLO 17 | FNL | 9/1/72 | LUNAR SURFACE OPS | LRV MOBILITY | 31-5 | Tape 41.6 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------|-----------|
| | 31-64 | DELETED | | | | | | |
| | 31-65 | TRACTION DRIVE MOTOR TEMP EXCEEDS 400°F OR PREDICTED TO EXCEED 450°F A. MOTOR IS NOT NEEDED TO MAINTAIN LRV MOBILITY B. MOTOR IS REQUIRED TO MAINTAIN ACCEPTABLE LRV MOBILITY | | A. REMOVE MOTOR FROM SERVICE ELECTRICALLY. DECOUPLE MECHANICALLY AT NEXT STOP. B. MOTOR WILL BE KEPT IN SERVICE. TRAVERSE WILL BE ADJUSTED TO BE WITHIN WALKING ENVELOPE BEFORE TDS REACHES 450°F. | A. MOTOR IS REUSABLE AFTER COOLDOWN TO BELOW 400 DEG F. DUST REMOVAL MAY HELP COOLDOWN. V. ATTEMPT MOTOR COOLDOWN WHILE IN USE BY: 1. DRIVING AT LEAST 4 KM/HR 2. AVOIDING PROLONGED UPSLOPES 3. BRUSHING ACCUMULATED DUST | | | |
| | 31-66 | INSUFFICIENT POWER TO COMPLETE THE NOMINAL MISSION | | TAKE ACTION IN THE FOLLOWING ORDER AS REQUIRED: 1. REMOVE THE LCRU FROM LRV POWER 2. CURTAIL THE TRAVERSE TO WITHIN THE LRV POWER AVAILABLE | | | | |
| | 31-67 | BRAKE WILL NOT RELEASE ON ONE WHEEL A. TRACTION DRIVE IS NOT REQUIRED FOR LRV MOBILITY B. TRACTION DRIVE IS REQUIRED FOR LRV MOBILITY | | A. REMOVE POWER AND DECOUPLE WHEEL BEFORE CONTINUING MISSION. B. ATTEMPT TO FREE BRAKE BY BACKING/FORWARD MOTION, LEFT AND RIGHT STEERING COMMANDS, AND INDUCED SHOCKS AND VIBRATION. IF ALL FAILS, USE TRACTION DRIVE TO ACHIEVE LRV MOBILITY. | A. IT WOULD BE WORTH TIME TO CHECK THE WHEEL AFTER EACH STOP AS WORKING VIBRATION AND SHOCK MAY FREE MECHANISM. B. IT IS DUBIOUS IF TRACTION DRIVE WILL OVERCOME BRAKE, BUT ALL EFFORTS SHOULD BE EXPENDED BEFORE ABANDONING LRV. | | | |
| | 31-68 | ABNORMAL AMPERE UNBALANCE BETWEEN BATTERY 1 AND BATTERY 2 | | REDISTRIBUTE LOADS TO MAINTAIN BATTERY REDUNDANCY. IF A DEFINITE MOTOR SHORT EXISTS (LOSS OF POWER OUTPUT OF TRACTION DRIVE), SHUT DOWN TRACTION DRIVE AND DECOUPLE AT NEXT STOP IF EXCESSIVE MECHANICAL DRAG IS SUSPECTED. | | | | |
| | 31-69 | RESERVED | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | LUNAR SURFACE OPS | LRV ELECTRICAL | 31-6 | Tape 46.8 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------|-----------|
| | 31-70 | TRACTION DRIVE MOTOR POWER CIRCUITRY: A. FAILS ON B. FAILS OFF | | A. REMOVE POWER FROM AFFECTED TRACTION DRIVE. USE AS NECESSARY TO ACHIEVE ACCEPT- ABLE MOBILITY. B. REMOVE POWER FROM AFFECTED TRACTION DRIVE | A. DRIVE POWER CB WILL POP IF FAILURE OCCURS WHILE BRAKE IS SET. CURRENT LIMITING IS BYPASSED. B. NO "JACKRABBIT" MODE CAPABILITY WITH AFFECTED TRACTION DRIVE. | | | |
| | 31-71 | TRACTION DRIVE MOTOR CONTROL CIRCUITRY: A. FAILS ON B. FAILS OFF RULE NUMBERS 31-72 THROUGH 31-100 ARE RESERVED. | | A. USE AFFECTED TRACTION DRIVE AS DESIRED TO ACHIEVE MAX MOBILITY. POWER DOWN IF MOTOR IS UNMANAGEABLE AND FOR STOPS. B. POWER DOWN AFFECTED TRACTION DRIVE. DECOUPLE IF EXCESS- IVE WHEEL DRAG IS SUSPECTED. | A. USE DRIVE POWER SWITCH TO TURN AFFECTED MOTOR ON OR OFF. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| - | | APOLLO 17 | FNL | 9/1/72 | LUNAR SURFACE OPS | LRV DRIVE | 31-7 | Tape 41.8 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS - CONTINUED

| R | ITEM | | | | | | | |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----|--------|-------------------|--------------------|------|-----------|
| | | <div>SURFACE EXPLORATION SYSTEMS</div> | | | | | | |
| 31-101 | THE FILM-REMAINING STATUS FOR 70-MM FILM WILL BE TRACKED VIA PERIODIC CREW READ-OUTS TO ENSURE RETENTION OF ADEQUATE FILM FOR TASKS REMAINING ON THE EVA. FOR FILM-LIMITED SITUATIONS, PHOTO DOCUMENTATION WILL BE REDUCED IN THE FOLLOWING SEQUENTIAL STEPS: A. ELIMINATE HIGHLY DESIRABLE PHOTOGRAPHY BEGINNING WITH LOWEST PRIORITY TASKS. B. ELIMINATE MANDATORY PHOTOGRAPHY WHERE TV COVERAGE CAN ADEQUATELY FULFILL THE PHOTO DOCUMENTATION REQUIREMENT. C. ELIMINATE MANDATORY PHOTOGRAPHY BEGINNING WITH LOWEST PRIORITY TASK. | | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | LUNAR SURFACE OPS | SURFACE EXPLOR SYS | 31-8 | Tape 56.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS |
|---|--------|---------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | <div>TRAVERSE GRAVIMETER</div> | |
| | 31-102 | TGE MEASUREMENT MADE WHILE MOUNTED TO THE LRV INDICATES A PHASE LOCKED LOOP RATE ALARM | | THE MEASUREMENT WILL BE REPEATED WITH THE TGE PLACED ON THE LUNAR SURFACE. ALL FUTURE MEASUREMENTS WILL BE MADE WITH THE TGE PLACED ON THE LUNAR SURFACE. | A PHASE LOCKED LOOP RATE ALARM IS INDICATED BY THE THREE MOST SIGNIFICANT DIGITS OF THE DISPLAY BEING ZERO. |
| | 31-103 | TGE MEASUREMENT MADE WHILE PLACED ON LUNAR SURFACE INDICATES A PHASE LOCKED LOOP RATE ALARM | | PHASE LOCK LOOP BYPASS MODE WILL BE USED TO REPEAT THE MEASUREMENT AND FOR ALL FUTURE MEASUREMENTS. | <div>1. PHASE LOCKED LOOP RATE ALARM IS INDICATED BY THE THREE MOST SIGNIFICANT DIGITS OF THE DISPLAY BEING ZERO.</div> <div>2. PHASE LOCKED LOOP BYPASS MODE IS INITIATED BY DEPRESSING BOTH "GRAY" AND "READ" SWITCHES SIMULTANEOUSLY.</div> <div>3. ALL MEASUREMENTS IN PHASE LOCKED LOOP BYPASS MODE HAVE A ZERO IN THE MOST SIGNIFICANT DIGIT OF THE DISPLAY.</div> |
| | 31-104 | INTERMEDIATE OVEN HOT ALARM IS EXPERIENCED PRIOR TO DEPARTURE ON EVA-1. | | PLACE TGE IN LM SHADE WITH RADIATOR COVER OPENED PRIOR TO DEPARTING ON EVA TRAVERSE. | <div>1. INTERMEDIATE OVEN HOT ALARM IS INDICATED BY A 6 OR 7 IN THE EIGHTH MOST SIGNIFICANT DIGIT OF THE DISPLAY.</div> <div>2. TGE WILL BE USED ON EVA'S II AND III.</div> |
| | 31-105 | PRECISION OVEN TEMP REACHES MAXIMUM POSITIVE DEVIATION | | <div>NO FURTHER MEASUREMENTS WILL BE TAKEN DURING THE REMAINDER OF THE CURRENT TRAVERSE.</div> <div>TGE WILL BE PLACED IN THE LM SHADOW WITH THE RADIATOR SURFACE EXPOSED AT THE EARLIEST CONVENIENCE.</div> | MAXIMUM POSITIVE DEVIATION IS INDICATED BY AN ODD NUMBER IN THE EIGHTH MOST SIGNIFICANT DIGIT OF THE DISPLAY AND A "7" IN THE NINTH (LEAST) SIGNIFICANT DIGIT. |
| | 31-106 | RESERVED | | | |

| | | | | | | | | |
|-----------|--|-----|--------|-------------------|--|--------------------|------|-----------|
| MISSION | | REV | DATE | SECTION | | GROUP | PAGE | |
| APOLLO 17 | | FNL | 9/1/72 | LUNAR SURFACE OPS | | SURFACE EXPLOR SYS | 31-9 | Tape 66.1 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|--------|----------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------|-----------|
| | 31-107 | TGE PHASE LOCK LOOP FAILS TO ACQUIRE LOCK DURING A NORMAL GRAVITY MEASUREMENT | | PHASE LOCK LOOP BYPASS MODE WILL BE USED TO REPEAT THE MEASUREMENT AND FOR ALL FUTURE MEASUREMENTS | 1. FAILURE OF PHASE LOCK LOOP TO ACQUIRE LOCK IS INDICATED BY A "9" IN THE MOST SIGNIFICANT DIGIT OF THE DISPLAY. 2. PHASE LOCKED LOOP BYPASS MODE IS INITIATED BY DEPRESSING BOTH "GRAV" AND "READ" SWITCHES SIMULTANEOUSLY. 3. ALL MEASUREMENTS MADE IN THE PHASE LOCKED LOOP BYPASS MODE HAVE A ZERO IN THE MOST SIGNIFICANT DIGIT OF THE DISPLAY. | | | |
| | 31-108 | TGE IS OPERATED IN PHASE LOCKED LOOP BYPASS MODE. | | TGE WILL BE PLACED ON LUNAR SURFACE FOR ALL MEASUREMENTS TAKEN IN THE PLL BYPASS MODE. | PLL BYPASS MODE HAS NO FILTERING REQUIRED FOR LRV MOUNTED MEASUREMENTS. | | | |
| | 31-109 | TGE MEASUREMENT IN PHASE LOCKED LOOP BYPASS MODE INDICATES ZEROS IN THE SEVEN MOST SIGNIFICANT DIGITS OF THE DISPLAY | | ABANDON THE TRAVERSE GRAVIMETER EXPERIMENT | LOSS OF VIBRATING STRING SIGNAL ACCELEROMETER. | | | |
| | 31-110 | BIAS MEASUREMENT LIGHT FAILS TO EXTINGUISH AFTER 5 MINUTES OF MEASUREMENT TIME. | | ABANDON TRAVERSE GRAVIMETER EXPERIMENT | LOSS OF VIBRATING STRING ACCELEROMETER OUTPUT. | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | LUNAR SURFACE OPS | SURFACE EXPLOR SYS | 31-10 | Tape 66.2 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS - CONTINUED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|--------|----------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------|-------|-----------|
| | | | | | | | | |
| | | | | SURFACE ELECTRICAL PROPERTIES | | | | |
| | 31-111 | SEP RECEIVER TEMP AT INITIAL DEPLOYMENT IS > <u>TBD</u> ° F | | OPEN RADIATOR COVERS 100% DURING EVA 1. | 1. SEP IS NOT USED DURING EVA 1. 2. COVERS NORMALLY REMAIN CLOSED DURING EVA 1. | | | |
| | 31-112 | SEP RECEIVER TEMP PRIOR TO A TRAVERSE IS: A. > <u>TBD</u> ° F B. < 20° F | | A. OPEN RADIATOR COVERS <u>100%</u> DURING THE EVA B. CLOSE RADIATOR COVERS DURING THE EVA PLACE THE RECEIVER IN STBY MODE PRIOR TO THE TRAVERSE. | | | | |
| | 31-113 | SEP RADIATORS ARE EXPOSED | | A. THE RADIATOR SURFACES WILL BE DUSTED AFTER OPENING THE COVERS AT THE END OF EACH TRAVERSE B. THE RADIATOR SURFACES WILL BE DUSTED AT THE BEGINNING OF EACH STOP DURING WHICH THE COVERS WILL BE OPEN. | | | | |
| | 31-114 | RESERVED | | | | | | |
| | 31-115 | BETWEEN EVA SEP CONFIGURATION | | RADIATOR COVERS WILL NORMALLY BE OPENED <u>20%</u> FOR BETWEEN EVA COUNTDOWN. THIS WILL BE ADJUSTED TO 80% OR 100% DEPENDING ON REAL-TIME THERMAL CONDITIONS AT THE END OF THE EVA. | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | LUNAR SURFACE OPS | SURFACE EXPLOR SYS | 31-11 | Tape 66.3 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 32 - ALSEP

| R | ITEM | | | | | | | |
|------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|---------|---------|------|-----------|
| | | <div>GENERAL</div> | | | | | | |
| | | THE FOLLOWING MISSION RULES APPLY TO FLIGHT CREW INVOLVEMENT WITH THE APOLLO LUNAR SURFACE EXPERIMENT PACKAGE (ALSEP) WHILE THE CREW IS ON THE LUNAR SURFACE. THESE RULES ARE EXCERPTED FROM THE EMRD FOR APOLLO 17, AND MISSING LETTERS ON RULES OR MISSING RULE NUMBERS PERTAINING TO GUIDELINES OR RULINGS WILL BE FOUND IN THAT DOCUMENT. | | | | | | |
| | | <div>ALSEP OPERATIONAL GUIDELINES</div> | | | | | | |
| 32-1 | | <div>GENERAL</div> | | | | | | |
| | | A. THESE ALSEP GENERAL OPERATIONAL GUIDELINES ARE BASED ON OBJECTIVES IN THE FOLLOWING PRIORITIES: | | | | | | |
| | | 1. HFE | | | | | | |
| | | 2. LSF | | | | | | |
| | | 3. LSG | | | | | | |
| | | 4. LMS | | | | | | |
| | | 5. LEAM | | | | | | |
| | | <div>NOTE</div> | | | | | | |
| | | RIPPLE-OFF SEQUENCE IS: | | | | | | |
| | | 1. PDR 1 (7 W) | | | | | | |
| | | 2. PDR 2 (14 W) | | | | | | |
| | | 3. LMS | | | | | | |
| | | 4. LEAM | | | | | | |
| | | 5. HFE | | | | | | |
| | | B. THROUGH H. } REFERENCE EMRD FOR APOLLO 17 | | | | | | |
| | | I. THE ALSEP SHORTING PLUG SWITCH WILL BE ACTIVATED ASAP AFTER CENTRAL STATION DEPLOYMENT. | | | | | | |
| | | J. IF THE GROUND IS UNABLE TO OBTAIN DOWNLINK, THE GROUND WILL REQUEST THE ASTRONAUT TO ROTATE THE RESET POWER SWITCH CW AND THEN CCW. | | | | | | |
| | | K. REFERENCE APOLLO 17 EMRD | | | | | | |
| | | L. 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 ADDITIONAL PROTECTION AGAINST THE GENERATION OF SPURIOUS COMMANDS. | | | | | | |
| | | M. 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. | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | ALSEP | GENERAL | 32-1 | Tape 26.4 |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 32 - ALSEP - CONTINUED

| R | ITEM | |
|---|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | 32-1 (CONT) | <p>N. IF A HARD OBJECT IS ENCOUNTERED WHICH REDUCES DRILL RATE TO LESS THAN 5 INCHES PER MINUTE ON EITHER HFE PROBE HOLE, THE FOLLOWING WILL BE ACCOMPLISHED:</p> <p>1. IF THE SECOND STEM SECTION IS NOT ATTACHED, WITHDRAW AND START AT A NEW LOCATION FOR A MAXIMUM OF TWO WITHDRAWALS.</p> <p>2. IF THE SECOND STEM SECTION IS ATTACHED, CONTINUE UNTIL 10 MINUTES OF POWER ON TIME FOR DRILL STRING HAS ELAPSED.</p> <p>O. REFERENCE APOLLO 17 EMRD</p> <p>P. IF THE CREW MUST RETURN TO THE LM PRIOR TO COMPLETE ALSEP DEPLOYMENT, THE SHORTING PLUG SWITCH WILL BE ACTIVATED "ON" IF THE ANTENNA IS EMPLACED. IF THE ANTENNA IS NOT EMPLACED, THIS SWITCH WILL NOT BE ACTIVATED (PICK UP HERE ON EVA 2)</p> <p>Q. THROUGH R. REFERENCE APOLLO 17 EMRD</p> <p>S. FOR ANY MALFUNCTION DURING A SURFACE TASK, A MAXIMUM OF 10 MIN WILL BE SPENT ON THE CONTINGENCY PROCEDURE BEFORE THE TASK IS ABANDONED, WITH THE FOLLOWING EXCEPTIONS:</p> <p>1. RTG FUELING - UP TO 20 MIN WILL BE ALLOWED IN EXERCISING RTG FUELING CONTINGENCY PROCEDURES.</p> <p>2. ALSEP PACKAGE 1 TO PACKAGE 2 CABLE CONNECTIONS - UP TO 20 MIN WILL BE ALLOWED FOR MAKING THE CABLE CONNECTION.</p> <p>3. ALSEP ANTENNA - UP TO 30 MIN WILL BE ALLOWED FOR ANTENNA ERECTION AND ALIGNMENT.</p> <p>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.</p> <p>T. 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 $\pm 15^\circ$.</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 ON WAY BACK TO LM.</p> <p>6. DEPLOY ALSEP EXPERIMENTS AND COMPLETE TASKS. A HOLD POINT EXISTS AFTER EACH TASK IS COMPLETED. DEPRESS SHORTING PLUG SWITCH AND ROTATE ASTRO SWITCH 1 CLOCKWISE ON WAY BACK TO LM (SEE CONTINGENCY PROCEDURES FOR HOLD POINTS).</p> |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 32 - ALSEP - CONTINUED

| R | ITEM | | | | | | | | | | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------------|---------------------------|---------------------|------------------|------|----------------------|---------------|-----|--------------------------|---------|---------|------|-----------|
| | 32-1 (CONT) | U. IF ALL SPOTS ON TEMP LABLE ON HORSE COLLAR ARE BLACK AFTER FUELING RTG, CREW MUST NOT TOUCH SHORTING PLUG UNTIL IT HAS COOLED SUFFICIENTLY (10 MIN ON PKG 1). V. ALSEP DEPLOYMENT WILL NOT BE STARTED IF IT IS KNOWN THAT LESS THAN <u>1 HR 30 MIN</u> IS AVAILABLE FOR ALSEP IN EVA 1. | | | | | | | | | | | | | | |
| | 32-2 AND 32-3 | REFERENCE APOLLO 17 EMRD | | | | | | | | | | | | | | |
| | 32-4 | A. REFERENCE APOLLO 17 EMRD B. THE CREW WILL REPORT RECHECK OF THE LSG LEVEL AND ALIGNMENT AFTER EXPERIMENT UNCAGING. | | | | | | | | | | | | | | |
| | 32-5 | A. REFERENCE APOLLO 17 EMRD B. THE LSP CHARGES WILL BE DEPLOYED IN LINE OF SIGHT WITH THE LSP XMTR ANTENNA AND IN AN AREA WHERE THE CHARGE WILL HAVE UNIFORM CONTACT WITH THE LUNAR SURFACE C. THROUGH D REFERENCE APOLLO 17 EMRD E. DEPLOYMENT OF THE LSP EXPLOSIVE PACKAGE (EP) WILL BE TERMINATED ANY TIME ONLY ONE SAFETY FEATURE REMAINS. THE FOLLOWING CONDITIONS MUST BE MET BEFORE THE EP CAN DETONATE: 1. ASTRO SW #2 ROTATED TO CW (ENABLE) POSITION. ENABLES 29 V TO THE LSP CENTRAL ELECTRONICS. 2. LSP "OPERATE" CMD (OCTAL 055) RECEIVED BY LSP CENTRAL ELECTRONICS. 3. LSP TRANSMITTER PULSES ENABLE CMD (OCTAL 156) RECEIVED BY LSP CENTRAL ELECTRONICS. 4. LSP FORMAT ON CMD (OCTAL 003) RECEIVED BY THE ALSEP CENTRAL STATION DDP. 5. TIME-OUT OF SAFE/ARM SLIDE TIMER TO THE ARM CONDITION. 6. TIME-OUT OF THERMAL BATTERY TIMER. STATUS OF EACH OF THESE SAFETY FEATURES DURING NORMAL CREW HANDLING IS AS FOLLOWS: <table><tr><th></th><th><u>FEATURES SAFED</u></th><th><u>TOTAL NUMBER SAFED</u></th></tr><tr><td>1. ALSEP DEPLOYMENT</td><td>1, 2, 3, 4, 5, 6</td><td>6</td></tr><tr><td>2. CHARGE DEPLOYMENT</td><td>2, 3, 4, 5, 6</td><td>5</td></tr><tr><td>3. LSP PASSIVE LISTENING</td><td>3, 5, 6</td><td>3</td></tr></table> | | <u>FEATURES SAFED</u> | <u>TOTAL NUMBER SAFED</u> | 1. ALSEP DEPLOYMENT | 1, 2, 3, 4, 5, 6 | 6 | 2. CHARGE DEPLOYMENT | 2, 3, 4, 5, 6 | 5 | 3. LSP PASSIVE LISTENING | 3, 5, 6 | 3 | | |
| | <u>FEATURES SAFED</u> | <u>TOTAL NUMBER SAFED</u> | | | | | | | | | | | | | | |
| 1. ALSEP DEPLOYMENT | 1, 2, 3, 4, 5, 6 | 6 | | | | | | | | | | | | | | |
| 2. CHARGE DEPLOYMENT | 2, 3, 4, 5, 6 | 5 | | | | | | | | | | | | | | |
| 3. LSP PASSIVE LISTENING | 3, 5, 6 | 3 | | | | | | | | | | | | | | |
| | 32-6 THRU 32-80 | REFERENCE APOLLO 17 EMRD | | | | | | | | | | | | | | |
| <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 17</td><td>FNL</td><td>9/1/72</td><td>ALSEP</td><td>GENERAL</td><td>32-3</td><td>Tape 60.1</td></tr></table> | | | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | ALSEP | GENERAL | 32-3 | Tape 60.1 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | ALSEP | GENERAL | 32-3 | Tape 60.1 | | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 32 - ALSEP - CONCLUDED

| R | RULE | CONDITION/MALFUNCTION | PHASE | RULING | CUES/NOTES/COMMENTS | | | |
|---|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------|------|-----------|
| | 32-81 | UNABLE TO DRILL NORMAL HFE EMPLACEMENT HOLES A. IF EITHER HOLE IS LESS THAN 24 INCHES DEEP AND DRILL IS INOPERABLE B. NEITHER HOLE IS 24 INCHES DEEP AND DRILL IS STILL OPERABLE C. IF HOLE IS NOT NOMINAL DEPTH | | A.1. HAND-AUGER BORE STEMS INTO SUBSURFACE AT LEAST 40 INCHES 2. IF UNSUCCESSFUL INSERT PROBE INTO HOLE MADE BY A DOUBLE CORE TUBE. FILL HOLE AROUND PROBE. 3. IF UNABLE TO OBTAIN DEPTH >24 INCHES, DIG TRENCH APPROX. 4 FT LONG, SLOPING FROM 1 INCH DEEP AT ONE END TO APPROX. 18 INCHES DEEP AT 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. B. DRILL DEEP CORE AT PROBE NO. 1 LOCATION AND INSERT PROBE IN HOLE THROUGH TREADLE, AND CAVE SOIL IN AROUND PROBE. C. PLACE PROBE IN HOLE AS FAR AS IT WILL GO. EMPLACE LOWER RADATION SHIELD ON THE TOP OF THE PROBE REGARDLESS OF PROBE DEPTH. | B. USE TREADLE AND EXTRACTOR TO HOLD SOIL IN PLACE. MOVE TREADLE AT LEAST 10 FEET DOWN THE CABLE TOWARD THE ELECTRONICS. | | | |
| | 32-82 | HAVE CHOICE OF DRILLING SECOND HFE HOLE OR CORE SAMPLE HOLE | | DRILL SECOND HFE PROBE EMPLACEMENT HOLE. | HFE HAS PRIORITY OVER CORE SAMPLE. | | | |
| | 32-83 | DRILL RATE REDUCED TO LESS THAN 5 INCHES PER MINUTE | | A. IF LESS THAN TWO STEM SECTIONS ARE ATTACHED TO THE POWER HEAD, WITHDRAW AND START AT NEW LOCATION FOR MAXIMUM OF TWO WITHDRAWALS. B. IF TWO OR MORE STEM SECTIONS ARE ATTACHED TO THE POWER HEAD, CONTINUE UNTIL 10 MINUTES OF POWER ON TIME FOR THE DRILL STRING HAS ELAPSED. | | | | |
| | 32-84 THRU 32-110 | REFERENCE APOLLO 17 EMRD | | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
| | | APOLLO 17 | FNL | 9/1/72 | ALSEP | SPECIFIC | 32-4 | Tape 47.7 |

SECTION 33 IS DELETED.
REFERENCE LUNAR ORBIT
EXPERIMENT MISSION
RULES IN SECTION 3 OF
THIS DOCUMENT.

THIS SECTION WAS DELETED
TO ELIMINATE DUPLICATION
OF RULES IN SECTION 3
OF THIS DOCUMENT.

~~33 LUNAR ORBIT
EXPERIMENTS~~

MISSION RULES

[illegible]

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX A - ACRONYMS AND SYMBOLS - CONTINUED

| R | ITEM | |
|---|-------|-----------------------------------------------|
| | CSI | CONCENTRIC SEQUENCE INITIATE |
| | CSM | COMMAND SERVICE MODULE |
| | CTE | CENTRAL TIMING EQUIPMENT |
| | CVS | CONTINUOUS VENT SYSTEM |
| | CVTS | CHIEF VEHICLE TEST SUPERVISOR |
| | CW | CLOCKWISE |
| | C&W | CAUTION AND WARNING |
| | CYI | CANARY ISLAND |
| | DAP | DIGITAL AUTO PILOT |
| | DB | DEADBAND |
| | DC | DIRECT CURRENT |
| | DCA | DIGITAL COMMAND ASSEMBLY |
| | DCS | DIGITAL COMMAND SYSTEM |
| | DDD | DIGITAL DISPLAY DRIVER |
| | DECA | DESCENT ENGINE CONTROL ASSEMBLY |
| | DEDA | DATA ENTRY AND DISPLAY ASSEMBLY |
| | DEG | DEGREE |
| | DESC | DESCENT |
| | DFI | DEVELOPMENT FLIGHT INSTRUMENTATION |
| | DIC | DPS INSERTION CAPABILITY |
| | DK | DOCK |
| | DKD | DOCKED |
| | DOD | DEPARTMENT OF DEFENSE |
| | DPS | DESCENT PROPULSION SYSTEM |
| | DRA | DISCRETE RECOVERY AREA |
| | DRS | DATA RECEIVING STATION |
| | DSC | DYNAMIC STANDBY COMPUTER |
| | DSE | DATA STORAGE EQUIPMENT |
| | DSKY | DISPLAY KEYBOARD |
| | DTO | DETAILED TEST OBJECTIVE |
| | D/TV | DIGITAL TO TELEVISION |
| | ECS | ENVIRONMENTAL CONTROL SYSTEM |
| | EDS | EMERGENCY DETECTION SYSTEM |
| | EECOM | ELECTRICAL, ENVIRONMENTAL, AND COMMUNICATIONS |
| | EKG | ELECTROCARDIOGRAM |
| | EMR | ERROR MONITOR REGISTER |
| | EMRD | EXPERIMENTS MISSION RULE DOCUMENT |
| | EMS | ENTRY MONITORING SYSTEM |
| | EMU | EXTRAVEHICULAR MOBILITY UNIT |
| | ENG | ENGINE |
| | EPS | ELECTRICAL POWER SYSTEM |
| | ERR | ERROR |
| | ESE | ELECTRONIC SUPPORT EQUIPMENT |
| | ETDM | RANGE SAFETY SUPERVISOR, KSC CALLOUT |
| | ETR | EASTERN TEST RANGE |
| | EVA | EXTRAVEHICULAR ACTIVITY |
| | EVAP | EVAPORATOR |
| | EVT | EXTRAVEHICULAR TRANSFER |
| | EVVA | EXTRAVEHICULAR VISOR ASSEMBLY |
| | F/A | FORWARD/AFT |
| | FC | FUEL CELL OR FLIGHT CONTROL |
| | FCSM | FLIGHT COMBUSTION STABILITY MONITOR |
| | FD | FLIGHT DIRECTOR |
| | FDAI | FLIGHT DIRECTOR ATTITUDE INDICATOR |
| | FDO | FLIGHT DYNAMICS OFFICER |
| | FIDO | FLIGHT DYNAMICS OFFICER |
| | FIG | FIGURE |
| | FITH | FIRE IN THE HOLE |
| | FL | FULL LIFT |
| | FM | FREQUENCY MODULATION |
| | FPS | FEET PER SECOND |
| | FQR | FLIGHT QUALIFICATION RECORDER |
| | FTP | FIXED THROTTLE POINT |
| | G | GRAVITY |
| | G&C | GUIDANCE AND CONTROL |
| | GASTA | GIMBAL ANGLE SEQUENCE TRANSLATION ASSEMBLY |
| | GBI | GRAND BAHAMA ISLAND |

| | MISSION | REV | DATE | SECTION | GROUP | PAGE | |
|--|-----------|-----|--------|----------------------|-------|------|-----------|
| | APOLLO 17 | FNL | 9/1/72 | ACRONYMS AND SYMBOLS | | A-2 | Tape 30.3 |

MISSION RULES

| R | ITEM |
|---|-----------------------------------------------|
| | GCTA GROUND COMMAND TV ASSEMBLY |
| | GDA GIMBAL DRIVE ASSEMBLY |
| | GDC GYRO DISPLAY COUPLER |
| | GET GROUND ELAPSED TIME |
| | GETI GROUND ELAPSED TIME OF IGNITION |
| | GMT GREENWICH MEAN TIME |
| | GMTLO GREENWICH MEAN TIME OF LIFTOFF |
| | G&N GUIDANCE AND NAVIGATION |
| | GN2 GASEOUS NITROGEN |
| | GNC GUIDANCE, NAVIGATION, AND CONTROL |
| | GNCS GUIDANCE, NAVIGATION, AND CONTROL SYSTEM |
| | GND GROUND |
| | GRR GUIDANCE REFERENCE RELEASE |
| | GRS GAMMA-RAY SPECTROMETER |
| | GSFC GODDARD SPACE FLIGHT CENTER |
| | GTS GIMBAL TRIM SYSTEM |
| | GUIDO GUIDANCE OFFICER |
| | H2 HYDROGEN |
| | H2O WATER |
| | Ha HEIGHT OF APOGEE |
| | HAW HAWAII |
| | HBR HIGH BIT RATE |
| | HF HIGH FREQUENCY |
| | HFE HEAT FLOW EXPERIMENT |
| | Hp HEIGHT OF PERIGEE |
| | HS HIGH-SPEED |
| | HZ HERTZ |
| | IC INTERCOMMUNICATIONS EQUIPMENT |
| | IGA INNER GIMBAL AXIS |
| | IMU INERTIAL MEASUREMENT UNIT |
| | INJ INJECTOR |
| | INST INSTRUMENTATION |
| | INV INVERTER |
| | IP IMPACT POINT OR IMPACT PREDICTION |
| | IRIG INERTIAL RATE INTEGRATING GYRO |
| | ISOL ISOLATION |
| | ISS INERTIAL SUBSYSTEM |
| | IU INSTRUMENTATION UNIT |
| | IVT INTRAVEHICULAR TRANSFER |
| | JD JET DRIVER |
| | KOH POTASSIUM HYDROXIDE |
| | KSC KENNEDY SPACE CENTER |
| | LB POUND |
| | LBR LOW BIT RATE |
| | LCG LIQUID COOLING GARMENT |
| | LCRU LUNAR COMM RELAY UNIT |
| | LEAM LUNAR EJECTA AND METEORITES |
| | LES LAUNCH ESCAPE SYSTEM |
| | LET LAUNCH ESCAPE TOWER |
| | LGC LM GUIDANCE COMPUTER |
| | LH2 LIQUID HYDROGEN |
| | LioH LITHIUM HYDROXIDE |
| | LM LUNAR MODULE |
| | LMDE LM DESCENT ENGINE |
| | LMP LUNAR MODULE PILOT |
| | LMS LUNAR MASS SPECTROMETER |
| | L/O LIFT OFF |
| | LOI LUNAR ORBIT INSERTION |
| | LOS LINE-OF-SIGHT |
| | LOX LIQUID OXYGEN |
| | L/R LEFT/RIGHT |
| | LRV LUNAR ROVING VEHICLE |
| | LSG LUNAR SURFACE GRAVIMETER |
| | LSP LUNAR SEISMIC PROFILING |
| | LV LOW VOLTAGE |
| | L/V LAUNCH VEHICLE |
| | LVDA LAUNCH VEHICLE DATA ADAPTER |
| | LVDC LAUNCH VEHICLE DIGITAL COMPUTER |

| MISSION | REV | DATE | SECTION | GROUP | PAGE | |
|-----------|-----|--------|----------------------|-------|------|-----------|
| APOLLO 17 | FNL | 9/1/72 | ACRONYMS AND SYMBOLS | | A-3 | Tape 58.5 |

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX A - ACRONYMS AND SYMBOLS - CONTINUED

| R | ITEM | | | | | | |
|---|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----------------------|-------|-----------|
| | | <p> MALF MALFUNCTION MC MAPPING CAMERA MCC MISSION CONTROL CENTER MCC MIDCOURSE CORRECTION MC&W MASTER CAUTION AND WARNING MDAS MEDICAL DATA ACQUISITION SYSTEM MED MANUAL ENTRY DEVICE MFSC MASTER EVENTS SEQUENCE CONTROLLER MFCO MANUAL FUEL CUTOFF MFV MAIN FUEL VALVE MGA MIDDLE GIMBAL AXIS MIL MERRITT ISLAND MITE MASTER INSTRUMENTATION TIMING EQUIPMENT MNFLD MANIFOLD M&O MAINTENANCE AND OPERATION MOC MISSION OPERATIONS COMPUTER MS MASS SPECTROMETER MSFN MANNED SPACE FLIGHT NETWORK MSK MANUAL SELECT KEYBOARD MSTC CSM SPACECRAFT TEST CONDUCTOR MTVC MANUAL THRUST VECTOR CONTROL MUX MULTIPLEXER </p> <p> NASA NATIONAL AERONAUTICS AND SPACE ADMINISTRATION NCC COMBINED CORRECTIVE MANEUVER NM NAUTICAL MILES NPV NON-PROPULSIVE VENT NSR COELLIPTICAL MANEUVER </p> <p> O2 OXYGEN O/B ONBOARD ODOP OFFSET DOPPLER AND POSITION OGA OUTER GIMBAL AXIS OMSF OFFICE OF MANNED SPACE FLIGHT OPS OXYGEN PURGE SYSTEM ORDEAL ORBITAL RATE DRIVE ELECTRONICS APOLLO LM OXID OXIDIZER </p> <p> PAFB PATRICK AIR FORCE BASE PAM PULSE AMPLITUDE MODULATION PB PUSH-BUTTON PC PAN CAMERA PC PERICYNTHION PCM PULSE CODE MODULATION PCMGS PULSE CODE MODULATION GROUND STATION PCO2 PARTIAL PRESSURE CARBON DIOXIDE PDR POWER DISSIPATION RESISTOR PDS/DD PLOTTING DISPLAY SUBCHANNEL/DATA DISTRIBUTION P&FS PARTICLES AND FIELDS SUBSATELLITE PGA PRESSURE GARMENT ASSEMBLY PGNCS PRIMARY GUIDANCE AND NAVIGATION CONTROL SYSTEM, CSM PGNS PRIMARY GUIDANCE AND NAVIGATION SYSTEM, LM PIPA PULSE INTEGRATING PENDULOUS ACCELEROMETER PLSS PORTABLE LIFE SUPPORT SYSTEM PO POWER OUT PO2 PARTIAL PRESSURE OXYGEN POS POSITION POS PRIMARY OXYGEN SYSTEM PPM PARTS PER MILLION POGS PROPELLANT QUANTITY GAGING SYSTEM PRELN PRELAUNCH PRESS PRESSURE PRI PRIMARY PROC PROCEDURE PROP PROPELLANT PSA POWER SERVO AMPLIFIER PSI POUNDS PER SQUARE INCH PSID POUNDS PER SQUARE INCH DIFFERENTIAL PSS PAD SAFETY SUPERVISOR PTA PULSE TORQUE ASSEMBLY PTP PREFERRED TARGET POINT PTV PITCH THRUST VECTOR PU PROPELLANT UTILIZATION PUGS PROPELLANT UTILIZATION AND GAGING SYSTEM PVT PRESSURE-VOLUME-TEMPERATURE PYRO PYROTECHNICS </p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | ACRONYMS AND SYMBOLS | | A-4 |
| | | | | | | | Tape 30,5 |

MISSION RULES

APPENDIX A - ACRONYMS AND SYMBOLS - CONTINUED

NASA — MSC

MISSION RULES

| R | ITEM |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p> TPF TERMINAL PHASE FINALIZATION TPI TERMINAL PHASE INITIATE TRNS TRANSFER TRUN TRUNNION TTC TRANSLATION THRUST CONTROLLER TTY TELETYPE TVC THRUST VECTOR CONTROL </p> <p> U/D UP/DOWN UDL UPDATA LINK UHF ULTRAHIGH FREQUENCY UNDKD UNDOCKED USB UNIFIED S-BAND </p> <p> VC VELOCITY COUNTER VEI INERTIAL VELOCITY AT ENTRY VGX VELOCITY TO BE GAINED X-AXIS VGY VELOCITY TO BE GAINED Y-AXIS VGZ VELOCITY TO BE GAINED Z-AXIS VHF VERY HIGH FREQUENCY VLV VALVE VSM VIDEO SWITCHING MATRIX </p> <p> WBD WIDE-BAND DATA WMS WASTE MANAGEMENT SYSTEM WT WEIGHT </p> <p> XFEED CROSSFEED XMIT TRANSMIT XMTR TRANSMITTER </p> <p> Y YAW OR Y-AXIS YTV YAW THRUST VECTOR </p> <p> Z Z-AXIS </p> <p> <u>SYMBOLS</u> </p> <p> H ALTITUDE ΔVIN DELTA VELOCITY IN INSERTION ΔTB DELTA BURN TIME ΔH DELTA ATTITUDE </p> |

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX B - DISTRIBUTION LIST

| R | ITEM | DISTRIBUTION LIST | | | | | |
|---|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|-----------------------|-------|------|
| | | <p><u>DIRECTOR</u></p> <p>AA/KRAFT, C. C., JR. AB/SJOBERG, S. A. AC/ABBEY, G.</p> <p><u>DIRECTOR OF FLIGHT OPERATIONS</u></p> <p>FA/TINDALL, H. W. ROSE, R. G.</p> <p><u>FLIGHT CONTROL DIVISION</u></p> <p>FC/KRANZ, E. F. GRIFFIN, G. D. FRANK, M. P. ROACH, J. W. BROOKS, M. F. FC2/HARLAN, C. S. FC3/LOE, T. R. (43) FC3/BLAIR, L. W. (2) FC4/HANNIGAN, J. E. (25) FC5/BOSTICK, J. C. (16) FC8/SHELLEY, C. B. (6) FC6/HOOVER, R. (24) FC9/SAULTZ, J. E. (18) P-MO-F/HAMNER, R. S. (20) FC7/STULLKEN, D. E. (27) ALSO, SEND EXTRA COPIES TO STULLKEN/FC7</p> <p><u>FLIGHT SUPPORT DIVISION</u></p> <p>FS/STOKES, J. D. FS4/BULLOCK, E. C. (18) FS6/RANDALL, E. L. FS6/GARMAN, J. R. FS7/WATKINS, J. D.</p> <p><u>MISSION PLANNING AND ANALYSIS DIVISION</u></p> <p>FM/MAYER, J. P. (2) FM2/BENNETT, F. V. (6) FM3/BROWN, R. H. FM4/JENKINS, M. V. FM7/CASSETT, M. D. FM8/LINEBERRY, E. C. FM9/MCHENRY, E. N. FM13/GURLEY, J. R. (3)</p> <p><u>DIRECTOR OF FLIGHT CREW OPERATIONS</u></p> <p>CA/SLAYTON, D. K. CB/ASTRONAUT OFFICE (10)</p> <p><u>FLIGHT CREW INTEGRATION DIVISION</u></p> <p>CD4/KUEHNEL, H. A. CD2/FRANKLIN, G. C.</p> <p><u>CREW TRAINING AND SIMULATION DIVISION</u></p> <p>CE12/RUDD, C. D. WARD, T. CE2/FABER, S. CEK/THOMPSON, L. E. (16)</p> | | | | | |
| | | MISSION | REV | DATE | SECTION | GROUP | PAGE |
| | | APOLLO 17 | FNL | 9/1/72 | APPENDIX B-DISTR LIST | | B-1 |

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX B - DISTRIBUTION LIST - CONTINUED

| R | ITEM | | | | | | | | | | | | | | |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------|-------|---------|-----------|------|--|-----------|-----|--------|----------------------------|--|-----|-----------|
| | <p><u>FLIGHT SAFETY OFFICE</u></p> <p>SN/RICE, C. N. (3)</p> <p><u>RELIABILITY AND CERTIFICATION OFFICE</u></p> <p>NB2/WILLIAMS, H. L. (2) ND/JONES, J. A.</p> <p><u>DIRECTOR OF SCIENCE AND APPLICATIONS</u></p> <p>TA/CALIO, A. J. (3) TA/WRIGHT, R. A. (3) TD5/BALDWIN, R. (10)</p> <p><u>SKYLAB PROGRAM OFFICE</u></p> <p>KM/BISHOP, A. A.</p> <p><u>TRW HOUSTON</u></p> <p>TRW TECHNICAL INFORMATION CENTER, HOUSTON OPERATIONS (5) H2/2064-MITCHELL, R. A.</p> <p><u>NORTH AMERICAN ROCKWELL HOUSTON</u></p> <p>SWIM, R. (2)</p> <p><u>GODDARD SPACE FLIGHT CENTER</u></p> <p>KNOX, C. B. (9) CODE 821.1 MANNED FLIGHT OPERATIONS DIVISION, REQUIREMENTS SECTION</p> <p><u>JOHN F. KENNEDY SPACE CENTER NASA - MSOB</u></p> <p>AA-AVO/SMITH, A. G. (4) CEK/ASTRO OFFICE (6) LO/KAPYRAN, W. J. LO-PLN-2/KNIGHT, G. W. LV/GRUENE, H. LV-B/RIGELL, I. A. LV-OMO-1/NAGEL, C. G. LV-OMO-3/YOUMANS, R. E. LV-GDC/LEALMAN, R. E. LV-INS/EDWARDS, M. D. LS/WILLIAMS, J. J. LS-ENG-7/GASKINS, R. B. (4) LS-ENG-8/MARS, C. B. (4) TBC, VAB 2L1/ZYZAK, E. E. (2) NR, 3M1/FISCHER, G. R. (2) MDC, 3K1/SHAFFER, J. R. (2) IBM, 3N1/GROVIER, P. M. (2) TS/CLARK, R. L. (2) RS/MOORE, A. H. IN/SENDER, K. (3) SO/GORMAN, R. E. PSK/MORSE, A. E. KSC MISSION DIRECTOR'S OFFICE, R3121, MSO BLDG. GAC, M/S 300-6/WATSON, J. K. (6)</p> <p><u>MARSHALL SPACE FLIGHT CENTER</u></p> <p>MSFC/P-MO-MGR, MISSION OPERATIONS OFFICE (40)</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 17</td><td>FNL</td><td>9/1/72</td><td>APPENDIX B - DISTR LIST</td><td></td><td>B-3</td><td>Tape 21.6</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | APPENDIX B - DISTR LIST | | B-3 | Tape 21.6 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | APPENDIX B - DISTR LIST | | B-3 | Tape 21.6 | | | | | | | | | |

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX B - DISTRIBUTION LIST - CONCLUDED

| R | ITEM | | | | | | | | | | | | |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------|-------|---------|-------|------|-----------|-----|--------|----------------------------|--|-----|
| | <p><u>OFFICE MANNED SPACEFLIGHT</u></p> <p>M/MYERS, D. MA/PETRONE, R. MA/LEE, C. M. MAO/LAND, E. W. (20) TC/DRAPER, C. N. (5) MAE/ALLMAN, J.</p> <p><u>DOD MSF SUPPORT OFFICE PAFB, FLA</u></p> <p>DDMS-M DDMS-N/DEARMAN, J., MAJ. ETOOP-2 PAFB FLA, 32925 (7)</p> <p><u>MIT INST. LABORATORIES CAMBRIDGE, MASS.</u></p> <p>NEVINS, J. (4) COPPS, S. (2) LARSON, R. (2) FELLMAN, P. (3)</p> <p><u>GRUMMAN AIRCRAFT ENGINEERING CORP., BETHPAGE, NEW YORK</u></p> <p>PRATT, R. (35)</p> <p><u>NASA, DAYTONA BEACH OPER, P. O. BOX 2500, DAYTONA BEACH, FLA. 32015</u></p> <p>MA-2D/CAHALAN, P. F.</p> <p><u>GENERAL ELECTRIC, 1830 NASA BLVD, HOUSTON, TEXAS 77058</u></p> <p>GE/753/NELSON, G. C.</p> <p><u>BENDIX</u></p> <p>TDX/MILEY, R. R. (2)</p> <p><u>BOEING CORPORATION</u></p> <p>HAQ4/DATA MANAGEMENT (4)</p> <p><u>WEATHER</u></p> <p>SANDERSON, ALAN N.</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 17</td><td>FNL</td><td>9/1/72</td><td>APPENDIX B - DISTR LIST</td><td></td><td>B-4</td></tr></table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | APOLLO 17 | FNL | 9/1/72 | APPENDIX B - DISTR LIST | | B-4 |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | APPENDIX B - DISTR LIST | | B-4 | | | | | | | | |
| | Tape 21.7 | | | | | | | | | | | | |

APPENDIX C - CHANGE CONTROL

NASA — MSC

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX C - CHANGE CONTROL - CONCLUDED

| R | ITEM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------|-------------------------|--------------------------------|-----------------------|-----------------------|--|-----------|-----|--------|--------------------------------|--|----------------------------|-----------|--|--------------------------|--|--|--------------------------|--|--|--------------------------------------------------------------------------------|--|--|---------------------------------------|--|--|--------------------------------|--|--|---------------------|---------------------|----------------------|-------------------------|-----------------------|-------------------------|------------------------|-----------------------|-----------------------|------------------------|-------------------------|--|--|-----------------------|---------------------|--|--|--|
| | | <p>2.3 PUBLICATION AND DISTRIBUTION OF INTERIM CHANGES</p> <p>INTERIM CHANGES WILL BE DISTRIBUTED VIA AN ABBREVIATED DISTRIBUTION LIST CONSISTING OF THE MISSION CONTROL TEAM, PERTINENT NASA ORGANIZATIONS, AND THE APPROPRIATE VEHICLE CONTRACTOR(S).</p> <p>3.0 <u>REVISIONS</u></p> <p>3.1 DEVELOPMENT</p> <p>THE AFD 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 IN THE PAGE CONCERNED).</p> <p>3.2 APPROVAL</p> <p>SINCE ALL INTERIM CHANGES WILL HAVE RECEIVED PRIOR CONCURRENCES AND APPROVAL, ONLY THE FLIGHT DIRECTOR (OR THE AFD IN THE FLIGHT DIRECTOR'S ABSENCE) WILL BE REQUIRED TO APPROVE REVISIONS.</p> <p>3.3 PUBLICATION</p> <p>3.3.1 SCHEDULE</p> <p>REVISIONS WILL BE MADE ON AN "AS REQUIRED" BASIS.</p> <p>3.3.2 DISTRIBUTION</p> <p>REVISIONS WILL BE PRINTED AND DISTRIBUTED THROUGH THE NORMAL ADMINISTRATIVE CHANNELS.</p> <div style="text-align: center; margin-top: 20px;"> <small>NASA-MANNED SPACECRAFT CENTER MISSION RULE REQUEST/REVISION</small> </div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 5%;">REV</th> <th style="width: 5%;">RULE</th> <th style="width: 30%;">CONDITION/MALFUNCTION</th> <th style="width: 5%;">PHASE</th> <th style="width: 30%;">RULING</th> <th style="width: 25%;">NOTES/COMMENTS</th> </tr> </thead> <tbody> <tr> <td style="height: 150px;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <div style="margin-top: 10px;"> <small>CHANGE RATIONALE: <input type="checkbox"/> NEW TECHNICAL DATA <input type="checkbox"/> CLARIFICATION</small> </div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td colspan="3"><small>ORIGINATOR:</small></td> <td colspan="3"><small>APPROVED:</small></td> <td colspan="3"><small>APPROVED:</small></td> </tr> <tr> <td colspan="3"><small>NAME ORGANIZATION EXT</small></td> <td colspan="3"><small>COGNIZANT BRANCH CHIEF</small></td> <td colspan="3"><small>FLIGHT DIRECTOR</small></td> </tr> <tr> <td><small>AFD:</small></td> <td><small>BSE:</small></td> <td><small>FIDO:</small></td> <td><small>AEROMED:</small></td> <td><small>GUIDO:</small></td> <td><small>CONTROL:</small></td> <td><small>TELCOM:</small></td> <td><small>EECOM:</small></td> <td><small>OTHER:</small></td> </tr> <tr> <td><small>CAPCOM:</small></td> <td><small>O&P:</small></td> <td></td> <td></td> <td><small>RETRO:</small></td> <td><small>GNC:</small></td> <td></td> <td></td> <td></td> </tr> </table> <p style="font-size: small; margin-top: 5px;">MSC FORM 1555 (Rev. Dec 68)</p> <p style="text-align: center; margin-top: 20px;">FIGURE C-1. - MISSION RULE CHANGE REQUEST FORM</p> | REV | RULE | CONDITION/MALFUNCTION | PHASE | RULING | NOTES/COMMENTS | | | | | | | <small>ORIGINATOR:</small> | | | <small>APPROVED:</small> | | | <small>APPROVED:</small> | | | <small>NAME ORGANIZATION EXT</small> | | | <small>COGNIZANT BRANCH CHIEF</small> | | | <small>FLIGHT DIRECTOR</small> | | | <small>AFD:</small> | <small>BSE:</small> | <small>FIDO:</small> | <small>AEROMED:</small> | <small>GUIDO:</small> | <small>CONTROL:</small> | <small>TELCOM:</small> | <small>EECOM:</small> | <small>OTHER:</small> | <small>CAPCOM:</small> | <small>O&P:</small> | | | <small>RETRO:</small> | <small>GNC:</small> | | | |
| REV | RULE | CONDITION/MALFUNCTION | PHASE | RULING | NOTES/COMMENTS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <small>ORIGINATOR:</small> | | | <small>APPROVED:</small> | | | <small>APPROVED:</small> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <small>NAME ORGANIZATION EXT</small> | | | <small>COGNIZANT BRANCH CHIEF</small> | | | <small>FLIGHT DIRECTOR</small> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <small>AFD:</small> | <small>BSE:</small> | <small>FIDO:</small> | <small>AEROMED:</small> | <small>GUIDO:</small> | <small>CONTROL:</small> | <small>TELCOM:</small> | <small>EECOM:</small> | <small>OTHER:</small> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <small>CAPCOM:</small> | <small>O&P:</small> | | | <small>RETRO:</small> | <small>GNC:</small> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 20%;">MISSION</th> <th style="width: 5%;">REV</th> <th style="width: 10%;">DATE</th> <th style="width: 20%;">SECTION</th> <th style="width: 15%;">GROUP</th> <th style="width: 10%;">PAGE</th> <th style="width: 30%;"></th> </tr> <tr> <td>APOLLO 17</td> <td>FNL</td> <td>9/1/72</td> <td>APPENDIX C - CHANGE CONTROL</td> <td></td> <td>C-2</td> <td style="text-align: right;">Tape 29.2</td> </tr> </table> | MISSION | REV | DATE | SECTION | GROUP | PAGE | | APOLLO 17 | FNL | 9/1/72 | APPENDIX C - CHANGE CONTROL | | C-2 | Tape 29.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MISSION | REV | DATE | SECTION | GROUP | PAGE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APOLLO 17 | FNL | 9/1/72 | APPENDIX C - CHANGE CONTROL | | C-2 | Tape 29.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |