

MSC-01807
11/1/70



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FINAL FLIGHT MISSION RULES

APOLLO 14
(AS-509/110/LM-8)

NOVEMBER 1, 1970

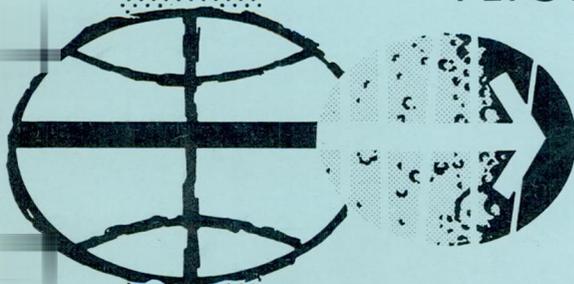
PREPARED BY
FLIGHT CONTROL DIVISION

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FOR NASA/DOD INTERNAL USE ONLY
INCLUDING APPROPRIATE CONTRACTORS

INDEXING DATA

DATE	OPR	#	T	PGM	SUBJECT	SIGNATOR	LOC
11-01-70	MSC	MSC-01807	R	AP0	(Title)	MSC	079-44



APOLLO 14
FINAL FLIGHT MISSION RULES

PREFACE

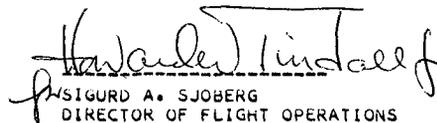
THIS DOCUMENT CONTAINS THE FINAL FLIGHT MISSION RULES FOR APOLLO 14 AS OF NOVEMBER 1, 1970. ALL SUBSEQUENT REVISIONS TO THIS DOCUMENT WILL BE PRINTED ON DIFFERENT COLORED PAGES FOR EASY RECOGNITION.

IT IS REQUESTED THAT ANY ORGANIZATION HAVING COMMENTS, QUESTIONS, OR SUGGESTIONS CONCERNING THESE MISSION RULES CONTACT MR. JOHN H. TEMPLE, FLIGHT CONTROL OPERATIONS BRANCH, BUILDING 30, ROOM 2030 PHONE 483-3838.

ANY REQUESTS FOR ADDITIONAL COPIES OR CHANGES TO THE DISTRIBUTION LIST IN APPENDIX B OF THIS DOCUMENT MUST BE MADE IN WRITING TO MR. SIGURD A. SJOBERG, 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---


SIGURD A. SJOBERG
DIRECTOR OF FLIGHT OPERATIONS

CONCURRED BY ---


JAMES A. MCDIVITT
COLONEL
MANAGER
APOLLO SPACECRAFT PROGRAM


R. SCOTT HAMNER
MSFC
MISSION OPERATIONS OFFICE

NASA - Manned Spacecraft Center

MISSION RULES

TABLE OF CONTENTS

R	ITEM		PAGE
		----- ' TABLE OF CONTENTS ' -----	
		INTRODUCTION AND PURPOSE	1
		PART I GENERAL GUIDELINES	
		OMSF GENERAL RULES	1-1
		PART II FLIGHT MISSION RULES	
		SECTION	
	1	GENERAL RULES AND SOP'S	1-1
	2	FLIGHT OPERATIONS RULES	2-1
	3	MISSION RULE SUMMARY	3-1
	4	GROUND INSTRUMENTATION REQUIREMENTS	4-1
	5	TRAJECTORY AND GUIDANCE	5-1
	6	SLV - TB1 THROUGH TB4/TB4A (LAUNCH)	6-1
	7	SLV - TB5 AND TB7 (COAST)	7-1
	8	SLV - TB6 (RESTART)	8-1
	9	SLV - TB8 (SAFING AND SLINGSHOT)	9-1
	10	CSM ENVIRONMENTAL CONTROL SYSTEM	10-1
	11	CSM CRYOGENICS	11-1
	12	CSM ELECTRICAL POWER SYSTEM	12-1
	13	DOCKING AND UMBILICAL	13-1
	14	CSM SEQUENTIAL	14-1
	15	GUIDANCE AND CONTROL	15-1
	16	CSM SERVICE PROPULSION SYSTEM	16-1
	17	CSM SM-RCS	17-1
	18	CSM CM-RCS	18-1
	19	EMU/EVA	19-1
	20	COMMUNICATIONS AND INSTRUMENTATION	20-1
	21	LM SEQUENTIAL & PYROTECHNIC	21-1
	22	LM ELECTRICAL POWER	22-1
	23	LM ENVIRONMENTAL CONTROL	23-1
	24	LM GUIDANCE AND CONTROL	24-1
	25	LM DPS	25-1
	26	LM APS	26-1
	27	LM RCS	27-1
	28	SPACE ENVIRONMENT	28-1
	29	RECOVERY	29-1
	30	AEROMEDICAL	30-1
	31	LUNAR SURFACE OPERATIONS	31-1
		MISSION	
		REV	
		DATE	
		SECTION	
		GROUP	
		PAGE	
		APOLLO 14	
		FNL	
		11/1/70	
		TABLE OF CONTENTS	
			1
			C

NASA - Manned Spacecraft Center

MISSION RULES

R ITEM

 ! INTRODUCTION & PURPOSE !

MISSION RULES ARE PROCEDURAL STATEMENTS WHICH PROVIDE FLIGHT CONTROL PERSONNEL WITH GUIDELINES TO EXPEDITE THE DECISION-MAKING PROCESS. THE RULES ARE BASED ON AN ANALYSIS OF MISSION EQUIPMENT CONFIGURATION, SYSTEMS OPERATIONS AND CONSTRAINTS, FLIGHT CREW PROCEDURES, AND MISSION OBJECTIVES. THE DIRECTOR OF FLIGHT OPERATIONS, MANNED SPACECRAFT CENTER, HOUSTON, TEXAS, HAS THE OVERALL RESPONSIBILITY FOR THE PREPARATION, CONTENTS, AND CONTROL OF THE FLIGHT MISSION RULES.

MISSION RULES CAN BE CATEGORIZED AS GENERAL AND SPECIFIC. GENERAL MISSION RULES CONTAIN THE BASIC PHILOSOPHIES USED IN THE DEVELOPMENT OF THE FLIGHT MISSION RULES. SPECIFIC MISSION RULES PROVIDE THE BASIC CRITERIA FROM WHICH REAL-TIME DECISIONS ARE MADE AND WILL BE FORMATTED AS FOLLOWS---

- A. THE CONDITION/MALFUNCTION COLUMN DEFINES THE FAILURE.
- B. THE PHASE COLUMN IDENTIFIES THE TIME INTERVAL IN WHICH THE CONDITION/MALFUNCTION OCCURS.
- C. THE RULING COLUMN DEFINES FLIGHT CONTROLLER ACTION AND/OR PROCEDURES THAT MUST BE ACCOMPLISHED AS A RESULT OF THE CONDITION.
- D. THE CUES/NOTES/COMMENTS COLUMN PROVIDES THE FLIGHT CONTROLLER WITH ADDITIONAL INFORMATION CONCERNING THE CONDITION/MALFUNCTION AND/OR RULING.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	INTRODUCTION AND PURPOSE		1-1

NASA - Manned Spacecraft Center

MISSION RULES

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 14	FNL	11/1/70	GENERAL GUIDELINES	OMSF GENERAL RULES	I-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION I - GENERAL GUIDELINES

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 14	FNL	11/1/70	GENERAL GUIDELINES	OMSF GENERAL RULES	I-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION I - GENERAL GUIDELINES

R	ITEM													
	I-14	FROM LIFTOFF TO UMBILICAL TOWER CLEARANCE, THE LAUNCH DIRECTOR 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	FLIGHT CREW SAFETY SHALL TAKE PRECEDENCE OVER THE ACCOMPLISHMENT OF MISSION OBJECTIVES.												
	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.												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">MISSION</th> <th style="width: 5%;">REV</th> <th style="width: 10%;">DATE</th> <th style="width: 25%;">SECTION</th> <th style="width: 15%;">GROUP</th> <th style="width: 20%;">PAGE</th> </tr> </thead> <tbody> <tr> <td>APOLLO 14</td> <td>FNL</td> <td>11/1/70</td> <td>GENERAL GUIDELINES</td> <td>OMSF GENERAL RULES</td> <td>I-4</td> </tr> </tbody> </table>			MISSION	REV	DATE	SECTION	GROUP	PAGE	APOLLO 14	FNL	11/1/70	GENERAL GUIDELINES	OMSF GENERAL RULES	I-4
MISSION	REV	DATE	SECTION	GROUP	PAGE									
APOLLO 14	FNL	11/1/70	GENERAL GUIDELINES	OMSF GENERAL RULES	I-4									

NASA - Manned Spacecraft Center

MISSION RULES

SECTION I - GENERAL GUIDELINES

R	ITEM							
I-24	<p>THE DOD MANAGER FOR MANNED SPACEFLIGHT SUPPORT OPERATIONS IS RESPONSIBLE FOR RECOVERY, AND FOR COMMAND AND CONTROL OF DOD RECOVERY FORCES. RECOMMENDATIONS, GUIDELINES AND REQUIREMENTS, AS SET FORTH BY NASA, WILL BE CONSIDERED TO EFFECT SAFE AND EXPEDITIOUS RECOVERY OF THE FLIGHT CREW AND SPACECRAFT.</p>							
I-25	<p>IF THE LM DESCENT STAGE WITH A NUCLEAR POWER SOURCE ABOARD IS ABANDONED WHILE SUBJECT TO EARTH RETURN, AND CREW SAFETY AND CONTROL SYSTEMS CONSIDERATIONS PERMIT, THE LM WILL BE TARGETED FOR AN OCEAN AREA REENTRY. THE PREDICTED IMPACT LOCATION WILL BE DETERMINED AND REPORTED TO THE APOLLO MISSION DIRECTOR.</p>							
I-26	<p>NO SPACE VEHICLE COMPONENT WILL BE DELIBERATELY TARGETED FOR A LUNAR IMPACT WITHOUT THE PRIOR APPROVAL OF THE APOLLO MISSION DIRECTOR.</p>							
<p>RULE NUMBERS I-27 THROUGH I-35 ARE RESERVED.</p>								
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	GENERAL GUIDELINES	OMSF GENERAL RULES	I-5	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION I - GENERAL GUIDELINES

R	ITEM	
		<p>-----</p> <p style="margin: 0;">! DEFINITIONS !</p> <p>-----</p>
I-36		PRIMARY OBJECTIVE--- 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.
I-37		DETAILED OBJECTIVE--- 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.
I-38		CATEGORY---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.
I-39		MANDATORY (M)--- 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.
I-40		HIGHLY DESIRABLE (HD)---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.
I-41		SPACE VEHICLE ELEMENT---A PART OF ANY LAUNCH VEHICLE OR SPACECRAFT SYSTEM.
I-42		OPERATIONAL SUPPORT ELEMENT--- 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.
I-43		REDLINE---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.
I-44		REDLINE FUNCTION---A REDLINE FUNCTION IS A PARAMETER THAT HAS BEEN IDENTIFIED TO MONITOR THE FUNCTIONING OF A UNIT TO ENSURE THE OPERATIONAL PERFORMANCE OF THAT UNIT IS ACCEPTABLE TO MEET THE PRIMARY OBJECTIVES. REDLINE FUNCTIONS ARE MANDATORY.
I-45		MEASUREMENT---A MEASUREMENT IS A SPECIFIC DATA CHANNEL OF INSTRUMENTATION MONITORING A SINGLE FUNCTION.
I-46		INSTRUMENTATION---INSTRUMENTATION IS THE EQUIPMENT THAT ACQUIRES, TRANSMITS AND MONITORS DATA FOR PERFORMANCE EVALUATION OF SPACE VEHICLE AND OPERATIONAL SUPPORT ITEMS.

	MISSION	REV	DATE	SECTION	GROUP	PAGE
	APOLLO 14	FNL	11/1/70	GENERAL GUIDELINES	OMSF GENERAL RULES	I-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION I - GENERAL GUIDELINES

R	ITEM							
	I-47	COUNTDOWN--- 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	PROCEED---CONTINUE IN ACCORDANCE WITH PRESCRIBED COUNTDOWN PROCEDURES.						
	I-49	HOLD--- 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	HOLD-POINT---A PREDETERMINED POINT WHERE THE COUNTDOWN MAY BE CONVENIENTLY INTERRUPTED.						
	I-51	SCRUB---THE LAUNCH IS TERMINATED TO BE RESCHEDULED.						
	I-52	RECYCLE---THE COUNTDOWN IS STOPPED AND RETURNED TO A DESIGNATED POINT OR AS SPECIFIED IN THE LAUNCH MISSION RULES.						
	I-53	TURNAROUND TIME---TURNAROUND TIME IS THE TOTAL TIME REQUIRED FROM A SCRUB TO THE NEXT SCHEDULED LIFTOFF TIME (T-O) INCLUDING RECYLCE AND COUNTDOWN.						
	I-54	CUTOFF---THE AUTOMATIC OR MANUAL COMMAND TO STOP THE LAUNCH SEQUENCE AFTER INITIATION OF THE 'AUTOMATIC LAUNCH SEQUENCE'.						
	I-55	LIFTOFF---THE EVENT DETERMINED BY THE INSTRUMENTATION UNIT UMBILICAL DISCONNECT SIGNAL AND IS THE POINT IN TIME WHEN PLUS TIME COMMENCES.						
	I-56	ABORT---MISSION TERMINATION BY UNSCHEDULED INTENTIONAL SEPARATION OF THE SPACECRAFT FROM THE LAUNCH VEHICLE PRIOR TO ORBITAL INSERTION.						
	I-57	EARLY MISSION TERMINATION--- UNSCHEDULED INTENTIONAL MISSION TERMINATION AT OR AFTER ORBITAL INSERTION.						
	I-58	MISSION PERIOD TERMINATION (LUNAR LANDING MISSION)--- MISSION PERIOD TERMINATION OCCURS UPON THE RELEASE OF THE FLIGHT CREW, FLIGHT HARDWARE, OR RELEASE OF THE LUNAR SAMPLES TO APPROVED PRINCIPLE INVESTIGATORS, WHICH EVER OCCURS LATER.						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	GENERAL GUIDELINES	OMSF GENERAL RULES	I-7

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 GENERAL RULES AND SOP'S

R	ITEM						
		----- ' GENERAL ' -----					
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 PRINCIPAL 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 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	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	GENERAL RULES AND SOP'S	GENERAL	1-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 GENERAL RULES AND SOP'S

R	ITEM						
1-10	MANDATORY SPACE VEHICLE INSTRUMENTATION FOR THE PURPOSES OF FLIGHT MISSION RULES MUST BE IN CONSONANCE WITH THE FOLLOWING CRITERIA--- (REFERENCE OMSF GENERAL RULE I-42).						
	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.						
	THE MANDATORY INSTRUMENTATION LISTINGS IN THIS DOCUMENT WILL BE CROSS-REFERENCED TO THE APPROPRIATE MISSION RULE MEETING THE ABOVE CRITERIA.						
1-11	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.						
1-12	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.						
1-13	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.						
1-14	THE COMMAND PILOT MAY INITIATE SUCH INFLIGHT ACTION AS HE DEEMS ESSENTIAL FOR CREW SAFETY.						
1-15	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 FRAME WORK OF THE MISSION RULES.						
	RULE NUMBERS 1-16 THROUGH 1-23 ARE RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	GENERAL RULES AND SOP'S	GENERAL	1-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 GENERAL RULES AND SOP'S

R	ITEM													
	1-33	CONTINGENCY ORBIT INSERTION (COI)--- AN SPS PROPULSIVE MANEUVER WHICH WILL PROVIDE CSM INSERTION INTO A SAFE ORBIT (HP GREATER THAN OR EQUAL TO 75 NM) IN THE EVENT OF AN SLV FAILURE OCCURRING IMMEDIATELY PRIOR TO INSERTION; OR IN THE EVENT OF DEGRADED SLV PERFORMANCE.												
	1-34	S-IVB DESTRUCT PACKAGE SAFING---THE EMERGENCY DESTRUCT PACKAGE IS SAFED BY THE RSO TRANSMITTING A COMMAND WHICH PERMANENTLY REMOVES POWER FROM THE RANGE SAFETY RECEIVERS.												
	1-35	S-IVB SAFING---A PASSIVATION SEQUENCE IN WHICH S-IVB LOX, LH2, AND HIGH PRESSURE SPHERES ARE DEPLETED.												
	1-36	PRELAUNCH PHASE (PRELN)---THE TIME INTERVAL FROM THE COMPLETION OF THE FLIGHT READINESS REVIEW TO LIFTOFF.												
	1-37	<p>FLIGHT PHASE---THE INTERVAL FROM LIFTOFF THROUGH SPLASHDOWN. FOR MISSION RULE PURPOSES THE FLIGHT PHASE IS FURTHER SUBDIVIDED AS SHOWN BELOW---</p> <p>A. LAUNCH PHASE---FROM LIFTOFF THROUGH INSERTION (TB1 THROUGH TB4).</p> <p>B. EARTH ORBIT PHASE---FROM INSERTION THROUGH S-IVB CUTOFF FOR TRANSLUNAR INJECTION (TLI).</p> <p>C. TD&E PHASE---FROM CSM/S-IVB SEPARATION THROUGH LM EJECTION FROM SLA.</p> <p>D. TRANSLUNAR COAST PHASE---FROM S-IVB CUTOFF FOR TLI THROUGH LO11 CUTOFF.</p> <p>E. DOCKED PHASE---THE TIME INTERVALS DURING WHICH THE LM AND CSM ARE DOCKED.</p> <p>F. LUNAR ORBIT PHASE---FROM LOI CUTOFF TO UNDOCKING AND FROM REDOCKING TO TEI CUTOFF.</p> <p>G. UNDOCKED PHASE---FROM UNDOCKING TO CSM CIRCULARIZATION.</p> <p>H. PRE-PDI PHASE---FROM CIRCULARIZATION TO PDI.</p> <p>I. POWERED DESCENT---THE TIME INTERVAL FROM THE INITIATION OF THE PDI MANEUVER TO TOUCHDOWN.</p> <ol style="list-style-type: none"> 1. PDI TO PDI + 5+30 - 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. PDI + 5+30 TO HIGH GATE - THIS PERIOD ENDS WHEN THE MANEUVER IS MADE TO VISUALLY ACQUIRE THE LANDING SITE. 3. HIGH GATE TO LO GATE---LO GATE IS THE POINT AT WHICH THE CREW TAKES OVER AND MANUALLY FLIES THE DESCENT. 4. LO GATE TO TOUCHDOWN---THE TIME INTERVAL FROM CREW TAKEOVER (APPROXIMATELY 500 FT ALTITUDE) TO LANDING. <p>J. LUNAR STAY PHASE---THE TIME INTERVAL FROM TOUCHDOWN UNTIL LIFTOFF.</p> <p>EVA---THE TIME INTERVAL FROM LM DEPRESSURIZATION UNTIL LM REPRESSURIZATION.</p> <p>K. ASCENT PHASE---THE TIME INTERVAL FROM LIFTOFF TO LM INSERTION INTO LUNAR ORBIT.</p> <p>L. RENDEZVOUS---THE TIME INTERVAL FROM INSERTION INTO LUNAR ORBIT AFTER ASCENT OR AFTER AN ABORTED DESCENT UNTIL CSM/LM DOCKING.</p> <p>M. TRANSEARTH COAST PHASE---FROM TEI CUTOFF TO CM/SM SEPARATION.</p> <p>N. ENTRY PHASE---FROM CM/SM SEPARATION TO SPLASHDOWN.</p>												
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">MISSION</th> <th style="width: 10%;">REV</th> <th style="width: 15%;">DATE</th> <th style="width: 20%;">SECTION</th> <th style="width: 15%;">GROUP</th> <th style="width: 15%;">PAGE</th> </tr> </thead> <tbody> <tr> <td>APOLLO 14</td> <td>FNL</td> <td>11/1/70</td> <td>GENERAL RULES AND SOP'S</td> <td>GENERAL</td> <td>1-4</td> </tr> </tbody> </table>	MISSION	REV	DATE	SECTION	GROUP	PAGE	APOLLO 14	FNL	11/1/70	GENERAL RULES AND SOP'S	GENERAL	1-4
MISSION	REV	DATE	SECTION	GROUP	PAGE									
APOLLO 14	FNL	11/1/70	GENERAL RULES AND SOP'S	GENERAL	1-4									

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 GENERAL RULES AND SOP'S

R	ITEM						
	1-44	LUNAR ABORT MODES AFTER EARLY LOI SHUTOFF (REFERENCE RULE 5-61 FOR ABORT MANEUVER DEFINITION)					
		A. DPS					
		1. MODE-I--- 0 TO 725 FPS (APPROX LOI IGN TO 1+39)					
		2. MODE-II--- 725 TO 1202 FPS (APPROX 1+39 TO 2+41)					
		3. MODE-III--- 1202 TO COMPLETION (APPROX 2+41 TO C/O)					
	1-45	SATURN L/V TIMEBASES---					
		TIME BASE	DEFINITION				NOMINAL INITIATE TIME
		TB1	LIFTOFF TO S-1C INBOARD ENGINE CUTOFF				0+00
		TB2	S-1C INBOARD ENGINE CUTOFF TO S-1C OUTBOARD ENGINE CUTOFF (S-1C/S-II STAGING)				2+15
		TB3	S-1C OUTBOARD ENGINES CUTOFF TO S-II CUTOFF (S-II/S-IVB STAGING)				2+44
		TB4	S-II CUTOFF TO S-IVB FIRST BURN CUTOFF				9+18
		TB5	S-IVB FIRST BURN CUTOFF TO S-IVB RESTART PREPARATIONS (RESTART MINUS 9' 38'')				11+46
		TB6	S-IVB RESTART MINUS 9' 38'' 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 OF EVASIVE BURN TO END OF S-IVB/IU LIFETIME.				4+14+22 (BY GROUND CMD.)
		RULE NUMBERS 1-46 THROUGH 1-47 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	GENERAL RULES AND SOP'S	GENERAL	1-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 GENERAL RULES AND SOP'S

R	ITEM						
		<div style="border: 1px dashed black; padding: 5px; margin: 0 auto; width: fit-content;"> CRITERIA FOR TARGET POINT SELECTION </div>					
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 DELTA VC READOUTS AND TO PASS CREW BACKUP GUIDANCE QUANTITIES				9	
		*OR FINAL MCC MANEUVER					
1-49		LUNAR RETURN ENTRY RANGE PRIORITY--- THE RELATIVE ENTRY RANGE (400,000 FEET TO SPLASH) PRIORITY IS AS FOLLOWS---					
		A. 1200 - 1400 NM (NOMINAL)					
		B. 1400 - 1800 NM (USED TO AVOID WEATHER VIOLATIONS IN PRIORITY A.)					
		C. 1800 - 2500 NM (USED TO AVOID EXTREME WEATHER VIOLATIONS IN PRIORITY A AND B.)					
		RULE NUMBERS 1-50 THROUGH 1-55 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	GENERAL RULES AND SOP'S	TARGET POINT SEL. CRITERIA	1-7

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 GENERAL RULES AND SOP'S

R	ITEM																					
	1-74	<p>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.</p>																				
	1-75	<p>EMERGENCY ENGINE SHUTDOWN METHODS.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="width: 15%;">INITIATOR</th> <th style="width: 15%;">METHOD</th> <th style="width: 15%;">STAGE</th> <th style="width: 55%;">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 NOTE---EDS WILL INITIATE ABORT FROM T-0 TO T + 30 SEC. HOWEVER, S-IC ENGINES WILL NOT BE SHUTDOWN</td> </tr> </tbody> </table>	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 NOTE---EDS WILL INITIATE ABORT FROM T-0 TO T + 30 SEC. HOWEVER, S-IC ENGINES WILL NOT BE SHUTDOWN
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 NOTE---EDS WILL INITIATE ABORT FROM T-0 TO T + 30 SEC. HOWEVER, S-IC ENGINES WILL NOT BE SHUTDOWN																			
	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>																				

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	GENERAL RULES AND SOP'S	PRELAUNCH RULES	1-10

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 GENERAL RULES AND SOP'S

R	ITEM						
1-77	ABORT MODES---						
	MODE I	BOUNDARY OF APPLICATION					
	1A	LES ABORT ENABLE (APPROX. T-45 MIN) TO GET 42 SEC. (10 K FEET)					
	1B	GET 42 SEC TO 100K FEET ALTITUDE (GET APPROX. 1 + 50)					
	1C	100K FEET ALTITUDE TO TOWER JETTISON (GET APPROX. 3 + 07)					
1-78	MODE II	BOUNDARY OF APPLICATION				PROCEDURES	
		TOWER JETTISON (GET APPROX. 3 + 07) UNTIL FULL LIFT SPLASHPOINT 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 14	FNL	11/1/70	GENERAL RULES AND SOP'S	PRELAUNCH RULES	1-11

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 GENERAL RULES AND SOP'S

R	ITEM						
1-79	MODE III	<u>BOUNDARY OF APPLICATION</u> ----- BETWEEN FULL LIFT SPLASH POINT =3200 NM AND INSERTION.	<u>PROCEDURES</u> ----- A. MCC PROVIDES--- 1. GETI AT S-IVB CUTOFF PLUS 2-05 2. DELTA V FOR 3350 NM SPLASH POINT 3. BURN DURATION 4. GET OF 300K 5. PITCH AT .05G 6. GET DROGUE B. MANEUVER IS SCS AUTO. C. ENTRY IS ROLL LEFT 55 DEGREES.				
NOTE MODE III "NO BURN" WILL BE CALLED IF THE ROLL LEFT 55 DEG. ENTRY RANGE IS LESS THAN 3350 NM.							
1-80	MODE IV	<u>BOUNDARY OF APPLICATION</u> ----- CONTINGENCY ORBIT INSERTION CAPABILITY TO INSERTION (BASED ON COI LINE ON GAMMA VS V PLOT FOR NEAR NOMINAL ALTITUDE)	<u>PROCEDURES</u> ----- A. MCC PROVIDES--- 1. GETI AT S-IVB CUTOFF PLUS 2-05 2. DELTA V REQUIRED TO ACHIEVE PERIGEE GREATER THAN OR EQUAL TO 75 NM 3. BURN DURATION 4. PITCH AT GETI B. MANEUVER IS SCS AUTO				
1-81	MODE	<u>BOUNDARY OF APPLICATION</u> ----- APOGEE KICK PRE-APOGEE CUTOFF, OUTSIDE THE COI BOUNDARY, CORRECTABLE TO SAFE ORBITAL CONDITIONS BY A MANEUVER AT APOGEE.	<u>PROCEDURES</u> ----- A. MCC PROVIDES--- 1. GETI FOR BURN AT APOGEE 2. DELTA V REQUIRED TO ACHIEVE PERIGEE GREATER THAN OR EQUAL TO 75 NM 3. BURN DURATION 4. PITCH ATTITUDE B. MANEUVER IS SCS AUTO				
RULES 1-82 THROUGH 1-86 ARE RESERVED							
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	GENERAL RULES AND SOP'S	PRELAUNCH RULES	1-12

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 1 GENERAL RULES AND SOP'S

R	ITEM						
		<div style="border: 1px dashed black; padding: 5px; display: inline-block;">CREW ABORT LIMITS</div>					
1-87	MAX Q REGION			PROCEDURES			
	A. (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.)			ABORT MODE I (ACTION ONLY AFTER BOTH HAVE REACHED THRESHOLD.)			
1-88	RATES AND ATTITUDE			PROCEDURES			
	A. PITCH AND YAW 1. L/O TO 2 MIN - 4 DEG/SEC 2. 2 MIN TO S-IVB CUTOFF - 9 DEG/SEC 3. YAW ERROR GREATER THAN 45 DEG.			ABORT MODE I ABORT MODE I, MODE II, MODE III, OR MODE IV			
	B. ROLL 1. L/O TO S-IVB CUTOFF - 20 DEG/SEC			ABORT MODE I, MODE II, MODE III, OR MODE IV			
1-89	EDS AUTOMATIC ABORT LIMITS (UNTIL MANUAL DEACTIVATION OF TWO ENGINES OUT AUTO AND LV RATES AT 2-00 MIN)	BOUNDARY OF APPLICATION					
	A. RATES PITCH AND YAW ROLL			4.0 +/- .5 DEG/SEC 20.0 +/- .5 DEG/SEC			
	B. ANY TWO ENGINES OUT						
	C. CM TO IU BREAKUP						
1-90	S-IVB TANK PRESSURE LIMITS						
	A. BULKHEAD DELTA P (FIRST SIVB 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	ENGINE FAILURES			PROCEDURES			
	LOSS OF 3 OR MORE S-II ENGINES PRIOR TO S-IVB TO COI CAPABILITY			ABORT MODE I, OR MODE II			
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	GENERAL RULES AND SOP'S	CREW ABORT LIMITS	1-13

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 FLIGHT OPERATIONS RULES

R	ITEM						
		----- ! GENERAL ! -----					
	2-1	<p>PRELAUNCH</p> <p>A. LAUNCH AZIMUTH LIMITATIONS RESTRICT LAUNCHES TO OCCUR BETWEEN 72 DEG. AND 96 DEG.</p> <p>B. THE FLIGHT DIRECTOR WILL EVALUATE WIND SIMULATIONS ALONG THE MODE 1 (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 (REF LMRO) 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. (REFERENCE SECTION 4 - GROUND INSTRUMENTATION REQUIREMENTS.) CONTINUOUS VOICE, TELEMETRY, AND TRACKING COVERAGE FOR THE SPACECRAFT IS REQUIRED FROM LIFTOFF THROUGH INSERTION PLUS 60 SEC. CONTINUOUS TELEMETRY COVERAGE IS REQUIRED FROM THE SLV FROM LIFTOFF THROUGH INSERTION PLUS 60 SEC. COMMAND IS HIGHLY DESIRABLE FOR BOTH VEHICLES.</p>					
	2-2	<p>LAUNCH</p> <p>IT IS PREFERABLE TO GO INTO ORBIT AND REENTER INTO THE WEST ATLANTIC 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 14	FNL	11/1/70	FLIGHT OPERATIONS RULES	GENERAL	2-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 FLIGHT OPERATIONS RULES

R	ITEM							
	2-3	<p>EARTH ORBIT</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 DELTA V 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 (HP GREATER THAN OR EQUAL TO 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>						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	FLIGHT OPERATIONS RULES	GENERAL	2-2	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 FLIGHT OPERATIONS RULES

R	ITEM							
	2-11	<p>TRANSLUNAR INJECTION</p> <p>A. THE TLI WILL BE GO IF THE S/C AND L/V SATISFY THE FOLLOWING CRITERIA---</p> <ol style="list-style-type: none"> 1. THERE HAVE BEEN NO FAILURES IN THE LAUNCH VEHICLE WHICH RESULTS IN --- <ol style="list-style-type: none"> (A) A CATASTROPHIC HAZARD. (B) ACHIEVEMENT OF AN S-IVB ENGINE BURN WITH EXPECTED CUTOFF OR SHUTDOWN CONDITIONS DEFINITELY PRECLUDING AN ACCEPTABLE LUNAR LANDING MISSION. IN APPLYING THIS CRITERIA TO SPECIFIC MISSION RULES, A NO GO RECOMMENDATION WILL BE REQUIRED IF INSUFFICIENT S-IVB CONSUMABLES ARE AVAILABLE TO ACHIEVE A LUNAR LANDING MISSION. 2. 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. <p>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.</p>						
	2-12	<p>TRANSPOSITION, DOCKING AND EJECTION (TD&E)</p> <p>A. THE NORMAL MINIMUM CABIN PRESSURE REDLINE OF 4.0 PSIA FOR TUNNEL/LM PRESSURIZATION SEQUENCES MAY BE WAIVED DURING TD&E. FOR TUNNEL OR LM LEAKS WHICH PREVENT NORMAL PRESSURIZATION, THE CM WILL BE DEPRESSURIZED AS REQUIRED FOR HATCH REMOVAL AND UMBILICAL HOOKUP.</p> <p>B. IF NORMAL LM EJECTION IS NOT SUCCESSFUL, NO ATTEMPT WILL BE MADE TO MAN THE LM AND 'STAGE' TO RECOVER THE ASCENT STAGE.</p>						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	FLIGHT OPERATIONS RULES	GENERAL	2-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 FLIGHT OPERATIONS RULES

R	ITEM						
2-13	TRANSLUNAR COAST	<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 IF CSM COMMUNICATIONS ARE LOST WITH THE MSFN. IF CSM COMMUNICATIONS CANNOT BE MAINTAINED, A LUNAR ORBIT MISSION WILL NOT BE FLOWN.</p> <p>D. A HYBRID TRAJECTORY WILL NOT BE FLOWN UNLESS THE CSM SYSTEMS MEET THE LOI CRITERIA. FOR A CSM SOLO MISSION, RCS CAPABILITY TO RETURN TO A FREE RETURN TRAJECTORY IS REQUIRED.</p> <p>E. TRANSLUNAR MIDCOURSE CORRECTIONS RESULTING IN A HYBRID TRAJECTORY WILL BE DESIGNED TO MEET LOI TARGETING CONSTRAINTS WHILE RESERVING A CAPABILITY TO PERFORM A RETURN TO EARTH MANEUVER WITH THE DPS ENGINE AS LATE AS 2 HRS AFTER PERILUNE ON THE CIRCUMLUNAR TRAJECTORY.</p>					
2-14	LUNAR ORBIT INSERTION	<p>LOI WILL BE INHIBITED AND A LUNAR FLYBY PERFORMED IF THE CSM DOES NOT SATISFY ANY OF THE FOLLOWING CONDITIONS---</p> <p>A. FULL CRITICAL SYSTEMS REDUNDANCY.</p> <p>B. ADEQUATE CONSUMABLES FOR MINIMUM LUNAR ORBIT OPERATIONS WITH CAPABILITY TO SUSTAIN A TANK LOSS AND RETURN TO EARTH WITH AN AVERAGE POWER LEVEL OF 40 AMPS.</p> <p>C. SPS PROPELLANT RESERVE CAPABILITY FOR TEI AND TRANSEARTH MCC'S.</p> <p>D. RCS PROPELLANT RESERVE TO ACCOMPLISH TEI CONTROL, TRANSEARTH MCC CONTROL, PTC, AND MINIMUM LUNAR ORBIT OPERATIONS.</p> <p>E. A DPS LOI WILL BE PERFORMED IF REQUIRED TO ACCOMPLISH A LUNAR ORBIT MISSION.</p>					
2-15	LUNAR ORBIT	<p>A. LOI DISPERSIONS</p> <p style="margin-left: 20px;">1. IF A STABLE ORBIT HAS NOT BEEN ACHIEVED, A DPS 2 HOUR ABORT WILL BE EXECUTED FOLLOWED BY A SUBSEQUENT DPS (OR APS) MANEUVER IF REQUIRED.</p> <p style="margin-left: 20px;">2. IF A STABLE ORBIT HAS BEEN ACHIEVED, AN SPS OR DPS TEI WILL BE PERFORMED AT THE NEXT OPPORTUNITY OR AN ALTERNATE MISSION WILL BE FLOWN.</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 TANK LOSS AT ANY POINT 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, TRANSEARTH MCC CONTROL, PTC, AND MINIMAL TRANSEARTH OPERATIONS.</p> <p>F. IF NORMAL MISSION OPERATIONS ARE INHIBITED, THE DPS WILL BE USED FOR TEI WHEN THERE IS A CHOICE BETWEEN THE DPS AND SPS.</p>					
2-16	INTRAVEHICULAR TRANSFER	<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 PROBLEM.</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	FLIGHT OPERATIONS RULES	GENERAL	2-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 FLIGHT OPERATIONS RULES

R	ITEM							
2-25	LM-POWERED DESCENT	<p>IF A SYSTEMS FAILURE OCCURS AND A CHOICE IS AVAILABLE---</p> <p>A. EARLY IN POWERED DESCENT WHEN DPS-TO-ORBIT CAPABILITY IS AVAILABLE, IT IS PREFERABLE TO ABORT IN FLIGHT THAN TO CONTINUE DESCENT. REDUNDANT CAPABILITY OF CRITICAL LM SYSTEMS IS REQUIRED TO CONTINUE POWERED DESCENT DURING THIS PERIOD. HOWEVER, FOR FAILURES EFFECTING VEHICLE LIFETIME (CONSUMABLES, COOLANT) CONSIDERATION WILL BE GIVEN TO CONTINUING POWERED DESCENT TO PDI + 6+30 IN ORDER TO ACHIEVE A SHORTER RENDEZVOUS.</p> <p>B. DURING THE REMAINDER OF POWERED DESCENT, IT IS PREFERABLE TO LAND AND LAUNCH FROM THE LUNAR SURFACE THAN TO ABORT. ONLY THOSE SYSTEMS FAILURES OR TRENDS THAT INDICATE IMPENDING LOSS OF THE CAPABILITY TO LAND, ASCEND AND ACHIEVE A SAFE ORBIT FROM THE LUNAR SURFACE, OR IMPENDING LOSS OF LIFE SUPPORT CAPABILITY WILL BE CAUSE FOR ABORT DURING THIS PERIOD.</p>						
2-26	LM-LUNAR STAY	<p>A. ONLY THOSE TIME-CRITICAL SYSTEMS FAILURES OR TRENDS THAT INDICATE IMPENDING LOSS OF THE CAPABILITY TO ASCEND AND ACHIEVE A SAFE ORBIT WILL BE CAUSE FOR AN IMMEDIATE ABORT (ANYTIME LIFTOFF) FROM THE LUNAR SURFACE.</p> <p>B. LOSS OF REDUNDANT CAPABILITY IN CRITICAL LM SYSTEMS IS CAUSE FOR ABORT AT THE NEXT BEST OPPORTUNITY.</p>						
2-27	EVA	<p>A. FOR THE NOMINAL (TWO-MAN) EVA, TOTAL EMU LIFE SUPPORT SYSTEMS CAPABILITY, EVA TO EVA DUPLEX VOICE, EVA TO MSFN VOICE FROM ONE CREWMAN, AND CRITICAL INSTRUMENTATION FOR BOTH ASTRONAUTS ARE REQUIRED.</p> <p>B. ALL PLANNED EVA'S WILL INCLUDE A 30-MINUTE POST-EVA RESERVE ON EMU CONSUMABLES.</p> <p>C. ALL EVA EXCURSIONS WILL BE LIMITED TO A MAXIMUM BSLSS OPERATIONAL RADIUS OF 3KM AND A MAXIMUM OPS OPERATIONAL RADIUS OF 1KM. 300 BTU'S ARE CONSIDERED THE MAXIMUM ACCEPTABLE CREW HEAT STORAGE.</p> <p>D. BOTH EVA CREWMEN WILL NOT REMAIN OUTSIDE OF MSFN COMM COVERAGE FOR A PERIOD EXCEEDING 5 MIN.</p> <p>E. 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> <p>F. THE LM WILL NOT BE PRESSURIZED WITH A CREWMAN ON THE SURFACE.</p> <p>G. A VACUUM TRANSFER WILL ONLY BE ATTEMPTED IN AN EMERGENCY.</p> <p>H. IF FAILURES PRECLUDE THE INITIATION OR CONTINUATION OF A TWO-MAN EVA, A ONE-MAN EVA WILL BE INITIATED. ONE MAN EVA'S WILL BE LIMITED TO AN OPERATIONAL RADIUS OF 1000 FEET FROM THE LM. THE PRIMARY OBJECTIVE WILL BE ALSEP DEPLOYMENT WITH ADDITIONAL OBJECTIVES IDENTIFIED IN REAL-TIME.</p> <p>I. 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 CEVT.</p> <p>J. THE ACTIVATION OF THE OPS IN THE MAKEUP MODE OR OF THE BSLSS (WITH SUFFICIENT CONSUMMABLES) WILL REQUIRE EXPEDITIOUS COMPLETION OF THE SPECIFIC ACTIVITY BEING PERFORMED FOLLOWED BY IMMEDIATE RETURN TO THE LM. ACTIVATION OF THE OPS IN HIGH OR LOW PURGE MODE WILL REQUIRE IMMEDIATE RETURN TO THE LM.</p> <p>K. THE AMOUNT OF SCIENTIFIC EQUIPMENT & PAYLOAD TAKEN INTO THE ASCENT STAGE WILL BE LIMITED SO AS NOT TO REQUIRE A DEPRESSURIZATION TO JETTISON EXCESS WEIGHT PRIOR TO ASCENT.</p> <p>L. NO EVA ACTIVITIES WILL BE CONDUCTED IN THE IMMEDIATE LINE OF FIRE AREA OF THE ASE MORTER BOX AFTER REMOVAL OF THE GRENADE SAFETY RELEASE ASSEMBLY.</p>						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	FLIGHT OPERATIONS RULES	GENERAL	2-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 2 FLIGHT OPERATIONS RULES

R	ITEM													
	2-28	<p>ASCENT</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>RENDEZVOUS</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 SHORT 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 LONG RNDZ (CSI, CDH) PROFILE WILL BE EXECUTED.</p>												
	2-30	<p>RETENTION OF THE LM ASC STAGE</p> <p>CONSIDERATION WILL BE GIVEN TO RETAINING THE ASC STAGE TO PROVIDE REDUNDANT CAPABILITY AFTER CSM SYSTEM FAILURES. THE DELTA VELOCITY RESERVED FOR WEATHER AVOIDANCE MAY BE TRADED OFF TO ACCOMPLISH A FASTER EARTH RETURN TIME</p>												
	2-31	<p>TRANSEARTH COAST</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 21,000 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>ALTERNATE MISSION</p> <p>A. E.O.</p> <ol style="list-style-type: none"> 1. CSM ONLY - APPROXIMATE 100 NM E.O. PHOTOGRAPHY, SPS INCLINATION CHANGE, SPS MNVR TO LOWER APOGEE IF REQUIRED. 2. CSM/LM - LM SYSTEMS POWER UP AND DPS MNVR TO LOWER APOGEE IF REQUIRED, APPROXIMATE 100 NM E.O. PHOTOGRAPHY MISSION, INCLINATION CHANGE. <p>B. L.O.</p> <ol style="list-style-type: none"> 1. CSM ONLY - LUNAR ORBIT PHOTOGRAPHY, REMAIN WITHIN RCS CAPABILITY TO RETURN TO A FREE RETURN TRAJ. 2. CSM/LM (NO LANDING CAPABILITY) - LM SYSTEMS POWER UP, LO PHOTOGRAPHY, PC MANEUVER. <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> <ol style="list-style-type: none"> 1. LUNAR IMPACT 2. OCEAN IMPACT 3. LUNAR ORBIT 												
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">MISSION</th> <th style="width: 10%;">REV</th> <th style="width: 15%;">DATE</th> <th style="width: 20%;">SECTION</th> <th style="width: 15%;">GROUP</th> <th style="width: 15%;">PAGE</th> </tr> </thead> <tbody> <tr> <td>APOLLO 14</td> <td>FNL</td> <td>11/1/70</td> <td>FLIGHT OPERATIONS RULES</td> <td>GENERAL</td> <td>2-7</td> </tr> </tbody> </table>	MISSION	REV	DATE	SECTION	GROUP	PAGE	APOLLO 14	FNL	11/1/70	FLIGHT OPERATIONS RULES	GENERAL	2-7
MISSION	REV	DATE	SECTION	GROUP	PAGE									
APOLLO 14	FNL	11/1/70	FLIGHT OPERATIONS RULES	GENERAL	2-7									

**3 MISSION RULE
SUMMARY**

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, RENDEZVOUS, AND DOCK.</p> <p style="text-align: center;">----- ' LAUNCH PHASE ' -----</p>						
3-1		<p>THE LAUNCH WILL BE ABORTED FOR THE FOLLOWING REASONS---</p> <p>A. SLV</p> <p style="margin-left: 40px;">S-II GIMBAL ACTUATOR HARDOVER INBOARD PRIOR TO S-IVB TO COI CAPABILITY</p> <p style="margin-left: 40px;">VIOLATION OF AUTO/MANUAL EDS LIMITS</p> <p style="margin-left: 40px;">S-II ENGINE FAILURES (TIME DEPENDENT)</p> <p style="margin-left: 40px;">FAILURE OF SECOND PLANE SEPARATION</p> <p style="margin-left: 40px;">S-IVB LOSS OF HYDRAULIC FLUID (PRIOR TO S-IVB IGNITION)</p> <p style="margin-left: 40px;">S-IVB LOSS OF THRUST (TIME DEPENDENT) (POSSIBLE COI CAPABILITY)</p> <p style="margin-left: 40px;">S-IVB LOX TANK PRESS GREATER THAN 50 PSI BEFORE TWR JETT</p> <p>B. CSM</p> <p style="margin-left: 20px;">1. ENVIRONMENTAL</p> <p style="margin-left: 40px;">LOSS OF CABIN AND SUIT PRESSURE</p> <p style="margin-left: 40px;">LOSS OF CABIN PRESSURE AND SUIT CIRCULATION</p> <p style="margin-left: 40px;">FIRE/SMOKE IN CM</p> <p style="margin-left: 40px;">LOSS OF CABIN PRESSURE AND O2 MANIFOLD LEAK</p> <p style="margin-left: 20px;">2. ELECTRICAL</p> <p style="margin-left: 40px;">THE FOLLOWING POWER SOURCES ARE REQUIRED TO CONTINUE LAUNCH:</p> <p style="margin-left: 60px;">- 1 F/C OR AUX BATT PLUS 1 ENTRY BATT, OR</p> <p style="margin-left: 60px;">- 3 ENTRY BATTs</p> <p style="margin-left: 40px;">UNCONTROLLABLE SHORTED MAIN BUS</p> <p style="margin-left: 40px;">LOSS OF BOTH AC BUSES DURING MODE I OR MODE II</p> <p style="margin-left: 20px;">3. PROPULSION</p> <p style="margin-left: 40px;">SUSTAINED LEAK OR LOSS OF HE PRESSURE (SOURCE OR MANIFOLD) IN BOTH CM-RCS RINGS (MODE I ONLY)</p> <p>C. VIOLATION OF TRAJECTORY LIMIT LINES</p> <p>D. TEAM DISCRETION WILL BE USED FOR---</p> <p style="margin-left: 20px;">1. SUIT/CABIN CONTAMINATION</p> <p style="margin-left: 20px;">2. MEDICAL PROBLEMS</p>						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	LAUNCH PHASE	3-1	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM						
3-2		THE S-IVB EARLY STAGING WILL BE USED AFTER 'S-IVB TO COI' CAPABILITY FOR THE FOLLOWING --- S-II GIMBAL ACTUATOR INBOARD HARDOVER S-II ENGINE FAILURES (TIME DEPENDENT) S-IVB COLD HE SHUTOFF VALVE(S) FAILS OPEN (AFTER TWR JETT)					
3-3		SWITCHOVER TO CSM GUIDANCE WILL BE PERFORMED FOR-- SATURN GUIDANCE REFERENCE FAILURE RULE NUMBERS 3-4 THROUGH 3-10 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	LAUNCH PHASE	3-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM							
		<p>----- ' EARTH ORBIT ' -----</p>						
	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>*S-IVB RANGE SAFETY PROPELLANT DISPERSAL SYSTEM ARMS INADVERTENTLY AFTER INSERTION AND PRIOR TO SAFING</p> <p>*S-IVB LOX TANK PRESS IS GREATER THAN 50 PSI</p> <p>LOSS OF ATTITUDE CONTROL DURING TB5</p> <p>*S-IVB COMMON BULKHEAD DELTA PRESSURE EXCEEDS LIMITS</p> <p>*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>INSUFFICIENT PROPELLANT REMAINS FOR ACHIEVING A 105K NM APOGEE ELLIPSE</p> <p>S-IVB ENGINE MAIN LOX VALVE FAILS TO CLOSE AT CUTOFF</p> <p>LOSS OF ATTITUDE CONTROL</p> <p>CONFIRMED ACTUATOR HARDOVER</p> <p>LOSS OF ENGINE HYDRAULIC FLUID</p> <p>MISALIGNMENT RATE BETWEEN THE IU AND IMU IS OUTSIDE LIMITS</p> <p>UNACCEPTABLE DIFFERENCES BETWEEN CMC AND IU PLATFORM VELOCITY COMPONENTS OR TOTAL VELOCITY AT INSERTION</p> <p>UNACCEPTABLE DIFFERENCE BETWEEN MSFN AND IU ORBITAL DECISION PARAMETERS</p>						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	EARTH ORBIT	3-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM	
3-14		TLI 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 DEVIATIONS FROM NOMINAL PROFILES EXCEED 45 DEG. D. OVERBURN OF 6 SECS AND VI (PGNS) EQUALS VI (PAD)
3-15		TLI WILL BE PERFORMED--- A. A SATURN GUIDANCE REFERENCE FAILURE BY CSM TAKEOVER IN EARTH ORBIT OR DURING TLI. TLI WILL BE PERFORMED BY MANUAL CONTROL AND CUTOFF TECHNIQUES. B. SATURN ACCELEROMETER FAILURES USING IU COMPUTER CONTROL WITH A MANUAL CUTOFF BASED ON TOTAL INERTIAL VELOCITY FROM THE CMC.
3-16		CSM SEPERATION (WITH 24 SEC RCS ASAP) FROM THE SIVB WILL BE DONE FOR THE FOLLOWING LOSSES OF SIVB ATTITUDE CONTROL. A. SIVB ATTITUDE RATES GREATER THAN OR EQUAL TO 5 DEG/SEC. B. SIVBYAW ATTITUDE GREATER THAN 45 DEG.
		RULES 3-17 THROUGH 3-20 ARE RESERVED.

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	EARTH ORBIT	3-4	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM						
		----- ' TD&E ' -----					
3-21		TD&E WILL NOT BE PERFORMED FOR---					
		A. PILOTS EVALUATION OF RATES AND ATTITUDES, AND SLA CONFIGURATION NOT ACCEPTABLE.					
		B. THE SLV IS NO-GO FOR---					
		1. VIOLATION OF S-IVB BULKHEAD DELTA P LIMITS					
		2. LOX TANK PRESSURE GREATER THAN 50 PSI					
3-22		THE FOLLOWING ACTIONS WILL BE TAKEN FOR LOSS OF SATURN ATTITUDE CONTROL CAPABILITY---					
		A. TLI CUTOFF TO S/C SEPARATION FROM BOOSTER	'BSE ACTION	'CREW ACTION			
			'1. RECOMMEND SPACECRAFT GUIDANCE TAKE OVER	'TAKEOVER CONTROL OF SATURN.			
			'2. IF SPACECRAFT SEPARATION OCCURS BEFORE 15 MINUTES, COMMAND TD&E MANEUVER INHIBIT.	'1. IF SUCCESSFUL, MANEUVER TO SEPARATION ATTITUDE AND SEPARATE. CREW DISCRETION FOR DOCKING AND LM EXTRACTION. EVASIVE MANEUVER WILL BE ACCOMPLISHED BY S/C.			
			'3. DO NOT COMMAND YAW MANEUVER OR EVASIVE BURN INITIATE (TB8 INITIATE).	'2. IF UNSUCCESSFUL - SEPARATE FROM BOOSTER IMMEDIATELY. CREW DISCRETION FOR DOCKING AND LM EJECTION. EVASIVE MANEUVER WILL BE ACCOMPLISHED BY S/C.			
			'4. COMMAND NON-PROPULSIVE S-IVB SAFEING.				
		B. S/C SEPARATION TO INITIATE (TB8 INITIATE).	'BSE ACTION				
			'1. IF BEFORE YAW MANEUVER, DO NOT COMMAND YAW MANEUVER	'1. CREW DISCRETION FOR DOCKING AND LM EJECTION.			
			'2. DO NOT COMMAND EVASIVE BURN (TB8 INITIATE).	'2. EVASIVE MANEUVER WILL BE ACCOMPLISHED BY S/C.			
			'3. COMMAND NON-PROPULSIVE S-IVB SAFEING.				
		C. AFTER EVASIVE BURN INITIATE (TB8 INITIATE).	'BSE ACTION	'CREW ACTION			
			'1. TERMINATE ALL FUNCTIONS INCLUDING LOX DUMP, ULLAGE ENGINE BURNS, AND LH2 CONTINUOUS VENT. ONBOARD PROGRAM WILL ACCOMPLISH NON-PROPULSIVE SAFEING.				
		RULE NUMBERS 3-23 THROUGH 3-29 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	TD+E	3-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM																									
	----- ' TRANSLUNAR COAST ' -----																									
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 HRS																									
	B. TLI C/O + 28 HRS																									
	C. LOI - 22 HRS																									
	D. LOI - 5 HRS																									
3-32	DURING THE LOI BURN, THE FLIGHT CREW WILL TAKE THE FOLLOWING ACTION---																									
	LOI ABORT MODES -----																									
	<table border="0"> <thead> <tr> <th>MODE</th> <th>TIME</th> <th>DELTA VM</th> <th>TYPE ABORT</th> </tr> <tr> <th>-----</th> <th>-----</th> <th>-----</th> <th>-----</th> </tr> </thead> <tbody> <tr> <td>I</td> <td><u>0 TO 33 SEC</u></td> <td><u>0 TO 238</u></td> <td rowspan="3">•DPS 2-HR DIRECT ABORT •DPS 30 MIN DIRECT ABORT •DPS TO DEPLETION 30 MIN DIRECT ABORT FOLLOWED BY AN APS BURN 2 HRS LATER</td> </tr> <tr> <td></td> <td><u>33 SEC TO 1+15</u></td> <td><u>238 TO 545</u></td> </tr> <tr> <td></td> <td><u>1+15 TO 1+39</u></td> <td><u>545 TO 725</u></td> </tr> <tr> <td>II</td> <td><u>1+39 TO 2+41</u></td> <td><u>725 TO 1202</u></td> <td rowspan="2">•DPS 2 IMPULSE CIRCUMLUNAR ABORT •EXCUTE TEI (SPS OR DPS) AT NEXT OPPORTUNITY OR INITIATE ALTERNATE MISSION</td> </tr> <tr> <td>III</td> <td><u>2+41 TO 6+07</u></td> <td><u>1202 TO 2986</u></td> </tr> </tbody> </table>	MODE	TIME	DELTA VM	TYPE ABORT	-----	-----	-----	-----	I	<u>0 TO 33 SEC</u>	<u>0 TO 238</u>	•DPS 2-HR DIRECT ABORT •DPS 30 MIN DIRECT ABORT •DPS TO DEPLETION 30 MIN DIRECT ABORT FOLLOWED BY AN APS BURN 2 HRS LATER		<u>33 SEC TO 1+15</u>	<u>238 TO 545</u>		<u>1+15 TO 1+39</u>	<u>545 TO 725</u>	II	<u>1+39 TO 2+41</u>	<u>725 TO 1202</u>	•DPS 2 IMPULSE CIRCUMLUNAR ABORT •EXCUTE TEI (SPS OR DPS) AT NEXT OPPORTUNITY OR INITIATE ALTERNATE MISSION	III	<u>2+41 TO 6+07</u>	<u>1202 TO 2986</u>
MODE	TIME	DELTA VM	TYPE ABORT																							
-----	-----	-----	-----																							
I	<u>0 TO 33 SEC</u>	<u>0 TO 238</u>	•DPS 2-HR DIRECT ABORT •DPS 30 MIN DIRECT ABORT •DPS TO DEPLETION 30 MIN DIRECT ABORT FOLLOWED BY AN APS BURN 2 HRS LATER																							
	<u>33 SEC TO 1+15</u>	<u>238 TO 545</u>																								
	<u>1+15 TO 1+39</u>	<u>545 TO 725</u>																								
II	<u>1+39 TO 2+41</u>	<u>725 TO 1202</u>	•DPS 2 IMPULSE CIRCUMLUNAR ABORT •EXCUTE TEI (SPS OR DPS) AT NEXT OPPORTUNITY OR INITIATE ALTERNATE MISSION																							
III	<u>2+41 TO 6+07</u>	<u>1202 TO 2986</u>																								
	A. ALL ABORT MANEUVERS ARE MCC TARGETED EXCEPT THE DPS 30 MIN ABORT IS TAKEN FROM THE CREW CHART.																									
	B. CONTROL LIMITS APPLY AS FOLLOWS---																									
	<table border="0"> <thead> <tr> <th>LOI DELTA T</th> <th>LOI DELTA V</th> <th>LIMITS</th> </tr> <tr> <th>-----</th> <th>-----</th> <th>-----</th> </tr> </thead> <tbody> <tr> <td><u>0 TO 33 SEC</u></td> <td><u>0 TO 238</u></td> <td>TIGHT</td> </tr> <tr> <td><u>33 SEC TO 3+ 20</u></td> <td><u>238 TO 1513</u></td> <td>LOOSE</td> </tr> <tr> <td><u>3+ 20 TO C/O</u></td> <td><u>1513 TO 2986</u></td> <td>TIGHT</td> </tr> </tbody> </table>	LOI DELTA T	LOI DELTA V	LIMITS	-----	-----	-----	<u>0 TO 33 SEC</u>	<u>0 TO 238</u>	TIGHT	<u>33 SEC TO 3+ 20</u>	<u>238 TO 1513</u>	LOOSE	<u>3+ 20 TO C/O</u>	<u>1513 TO 2986</u>	TIGHT										
LOI DELTA T	LOI DELTA V	LIMITS																								
-----	-----	-----																								
<u>0 TO 33 SEC</u>	<u>0 TO 238</u>	TIGHT																								
<u>33 SEC TO 3+ 20</u>	<u>238 TO 1513</u>	LOOSE																								
<u>3+ 20 TO C/O</u>	<u>1513 TO 2986</u>	TIGHT																								
	NOTE																									
	IF ANY BALL VALVE CLOSSES PREMATURELY, SHUTDOWN GOOD BANK 10 SEC PRIOR TO CUTOFF FOR VERIFICATION OF THE FAILURE																									
	RULES 3-33 THROUGH 3-37 ARE RESERVED.																									

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	TRANSLUNAR COAST	3-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM															
		<p>----- ! LUNAR ORBIT ! -----</p>														
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 +/- 2 DEG. FROM THE NOMINAL.</p> <p>C. CURRENT PERICYNTHION ALTITUDE LESS THAN 30,000 FT.</p> <p>D. PREDICTED ALTITUDE AT PDI IGNITION LESS THAN 30,000 FT. OR GREATER THAN 70,000 FT. (PREDICTIONS WILL BE BIASED USING EXPECTED/CALCULATED WORST CASE PROPOGATION ERRORS).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">WHEN POSSIBLE ANY REQUIRED MANEUVERS(S) WOULD BE SCHEDULED SHORTLY AFTER CREW WAKE-UP ON PDI DAY.</p>														
3-39		<p>DOI RESIDUALS---</p> <p>A. TRIM PGNS X-AXIS TO WITHIN +/- 1 FPS.</p> <p>1. IF A DOI OVERBURN RESULTS IN A RESIDUAL 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>2. RESIDUALS GREATER THAN 10 FPS WILL BE TRIMMED USING SPS.</p> <p>3. UNDERBURNS WILL NOT BE TRIMMED.</p> <p>B. IF EITHER THE PGNS OR EMS HAS OBVIOUSLY MALFUNCTIONED, THE RESIDUALS INDICATED BY THE REMAINING SYSTEM WILL BE TRIMMED AND MCC WILL RELAY A STAY/NO STAY DECISION BASED ON MSFN DATA ANALYSIS.</p>														
3-40		<p>AT AOS AFTER DOI, THE REQUIREMENT FOR THE BAILOUT MANEUVER WILL BE DETERMINED BY EVALUATION OF THE THREE TRAJECTORY MONITORING SOURCES. THESE SOURCES - PGNS, 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 APPLIES---</p> <p>1. IF THE PGNS AND EMS ARE AVAILABLE, BOTH SOURCES MUST INDICATE STAY TO REMAIN IN THE LOW ORBIT.</p> <p>2. IF ONLY THE PGNS IS AVAILABLE, IT MUST INDICATE STAY TO REMAIN IN THE LOW ORBIT.</p> <p>3. IF THE EMS RESIDUAL IS TRIMMED DUE TO CREW OBSERVATION OF A PGNS MALFUNCTION, THE BAIL OUT MANEUVER WILL BE EXECUTED AT THE NOMINAL TIME.</p> <p>NOTE---</p> <p>1. THE EMS VOTE IS NO STAY IF THE EMS INDICATES A 6 FPS OVERSPEED AFTER TRIMMING THE PGNS.</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 N. MI. ABOVE THE LUNAR TERRAIN. THIS ALTITUDE CORRESPONDS TO A PERICYNTHION ALTITUDE OF 3.6 N. MI. AND DOPPLER RESIDUALS AT AOS OF -32 CYCLES PER SECOND.</p>														
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">MISSION</th> <th style="width: 10%;">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: 10%;"></th> </tr> </thead> <tbody> <tr> <td>APOLLO 14</td> <td>FNL</td> <td>11/1/70</td> <td>MISSION RULE SUMMARY</td> <td>LUNAR ORBIT</td> <td>3-7</td> <td></td> </tr> </tbody> </table>	MISSION	REV	DATE	SECTION	GROUP	PAGE		APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	LUNAR ORBIT	3-7	
MISSION	REV	DATE	SECTION	GROUP	PAGE											
APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	LUNAR ORBIT	3-7											

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM					
3-41	THE FOLLOWING RNDZ/RESCUE OPTIONS WILL BE UTILIZED AS NECESSARY FOR FAILURES REQUIRING TERMINATION OF LUNAR LANDING---					
A.	FOR FAILURES FROM CIRCULARIZATION TO CIRCULARIZATION PLUS 1 HR, EXECUTE THE PDI ZERO ABORT SEQUENCE. DOCKING IN ABOUT 3 1/4 HRS.					
B.	FOR FAILURES FROM CIRCULARIZATION PLUS 1 HR TO PDI, EXECUTE THE NO PDI + 12 ABORT SEQUENCE. DOCKING IN ABOUT 5 1/4 HRS.					
C.	ABORT DURING POWERED DESCENT WILL INSERT THE LM INTO ORBIT UTILIZING THE ONBOARD VARIABLE ABORT TARGETING. FOR ABORTS DURING THE FIRST 6 MIN, DOCKING SHOULD OCCUR WITHIN 5 1/4 HRS, FOR ABORTS AFTER 6 MIN, DOCKING WILL OCCUR WITHIN 3 1/4 HRS.					
D.	FOR COMPLETE LM FAILURES PRIOR TO PDI, THE CSM WILL EXECUTE A FIVE IMPULSE RESCUE WITH DOCKING IN ABOUT 7 1/4 HRS FROM PDI.					
		RULE NUMBERS 3-42 THROUGH 3-48 ARE RESERVED				

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	LUNAR ORBIT	3-8

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM													
		<div style="border: 1px dashed black; padding: 5px; margin: 0 auto; width: fit-content;"> POWERED DESCENT PHASE </div>												
3-49	PDI IGNITION	THE FOLLOWING ACTION WILL BE TAKEN--- <ol style="list-style-type: none"> 1. AUTO ULLAGE GOOD <ul style="list-style-type: none"> - IF NO AUTO DPS IGN, FLIGHT CREW PERFORM MANUAL DPS IGNITION 2. NO AUTO ULLAGE <ul style="list-style-type: none"> -FLIGHT CREW BACK UP THE ULLAGE MANEUVER -IF NO AUTO DPS IGN FLIGHT CREW WILL NO-GO PDI 												
3-50	PDI TO LO GATE	POWERED DESCENT WILL BE ABORTED FOR THE FOLLOWING--- <ol style="list-style-type: none"> A. LR DATA IS REQUIRED FOR LANDING - NO LR DATA BY 10 K FT - ABORT. <ol style="list-style-type: none"> 1. LR CONVERGENCE (ALTITUDE ONLY) - DATA NOT BEING ACCEPTED OR CONVERGING FOLLOWING LOCKON FOR 60 SECONDS - ABORT. 2. LR DATA ACCEPTED AND CONVERGED CONTINOUS TO P-64 - CONTINUE MISSION IF LOSS OF LOCK OCCURS IN P-64. 3. LR DATA ACCEPTED AND CONVERGED WITH SUBSEQUENT DROPOUT - CONTINUE TO P-64. <ol style="list-style-type: none"> (A) LANDING RADAR REGAINED IN P-64. <ol style="list-style-type: none"> (1) DELTA H LESS THAN 1000 FT BETWEEN PGNS AND LR - CONTINUE MISSION. (2) DELTA H GREATER THAN 1000 FT BETWEEN PGNS AND LR - ATTEMPT MANUAL LANDING IN AGS. (B) LR NOT REGAINED IN P-64 - ABORT. 4. LATE LR LOCKON WITH DATA BEING INCORPORATED AND CONVERGING - CONTINUE TO P-64. <ol style="list-style-type: none"> (A) DELTA H LESS THAN 1000 FT BETWEEN PGNS AND LR - CONTINUE MISSION. (B) DELTA H GREATER THAN 1000 FT BETWEEN PGNS AND LR - ATTEMPT MANUAL LANDING IN AGS. B. 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 TO EXCEED MINUS 10 FPS, PRIOR TO LANDING RADAR ALTITUDE INCORPORATION AND CONVERGENCE (A MINUS VELOCITY DIFFERENCE INDICATES THAT THE AGS TRAJECTORY IS LOWER THAN THE PGNS TRAJECTORY). C. PGNS NAVIGATION ERRORS, CONFIRMED BY MSFN OR DOPPLER RESIDUALS, THAT RESULT IN THE FOLLOWING AGS-PGNS VELOCITY DIFFERENCES--- <ul style="list-style-type: none"> DELTA X DOT (DOWNRANGE) GREATER THAN +/- 45 FPS DELTA Y DOT (CROSSRANGE) GREATER THAN +/- 90 FPS DELTA Z DOT (RADIAL) GREATER THAN +/- 35 FPS D. 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 MINUS 20 FPS PRIOR TO LANDING RADAR ALTITUDE INCORPORATION AND CONVERGENCE. E. PGNS NAVIGATION ERRORS CONFIRMED BY DOPPLER RESIDUALS BUT NOT BY AGS, THAT RESULT IN THE FOLLOWING MSFN-PGNS VELOCITY DIFFERENCES--- <ul style="list-style-type: none"> DELTA Y DOT (CROSSRANGE) GREATER THAN +/- 200 FPS. DELTA Z DOT (RADIAL) GREATER THAN +/- 35 FPS. <p>NOTE---RULES C AND E ARE INDEPENDENT OF ANY TYPE OF LANDING RADAR UPDATE. FOR RULES B AND C, SWITCHOVER TO AGS WILL BE PERFORMED.</p>												
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">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: 25%;">PAGE</th> </tr> </thead> <tbody> <tr> <td>APOLLO 14</td> <td>FNL</td> <td>11/1/70</td> <td>MISSION RULE SUMMARY</td> <td>POWERED DESCENT</td> <td style="text-align: center;">3-9</td> </tr> </tbody> </table>	MISSION	REV	DATE	SECTION	GROUP	PAGE	APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	POWERED DESCENT	3-9
MISSION	REV	DATE	SECTION	GROUP	PAGE									
APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	POWERED DESCENT	3-9									

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM						
		<p>F. COMMANDED THRUST INCREASING PRIOR TO THROTTLE DOWN OR P63 TGO=80 SEC.</p> <p>G. NO LANDING SITE VISIBILITY BY P64 PLUS 60 SEC.</p> <p>H. NO THROTTLE RECOVERY BY P63/P64 PROGRAM SWITCH PLUS 15 SEC.</p> <p>I. FAILURE TO ACHIEVE FTP BY NOMINAL TIG +31 SEC. (ABORT AT GTC DIVERGENCE).</p> <p>J. FAILURE TO ENTER P64 WHEN TGO EQUALS 60 SECONDS.</p> <p>K. THE FOLLOWING PNGS ALARMS---20105,00214, 20430,20607,21103,01107, 21204,21302,21501,00402 (CONTINUING).</p> <p>L. VIOLATION OF THE TIME BIASED DPS ABORT BOUNDARY</p> <p>M. NO THROTTLE RECOVERY WITHIN 40 SEC AFTER GTC EQUALS 57 PERCENT</p>					
	3-51	<p>HIGH GATE TO TD</p> <p>AN ABORT WILL NOT BE PERFORMED FOR A PNGS FAILURE AFTER A PNGS INDICATION THAT THE HIGH GATE TARGETING CONDITIONS HAVE BEEN ACHIEVED.</p> <p>RULE NUMBERS 3-52 AND 3-53 ARE RESERVED.</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	POWERED DESCENT	3-10

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM	
		<p>----- ' EVA PHASE ' -----</p>
	3-54	<p>GENERAL</p> <p>FOR ANY MALFUNCTION ON A SCIENTIFIC TASK, A MAXIMUM OF 10 MINUTES WILL BE SPENT ON THE CONTINGENCY PROCEDURE BEFORE THE TASK IS ABANDONED WITH THE FOLLOWING EXCEPTIONS---</p> <p>A. RTG FUELING-- UP TO 20 MUNUTES WILL BE ALLOWED IN EXERCISING RTG FUELING CONTINGENCY PROCEDURES.</p> <p>B. ALSEP PACKAGE 1 TO PACKAGE 2 CABLE CONNECTION-- UP TO 20 MINUTES WILL BE ALLOWED FOR MAKING THE CABLE CONNECTION.</p> <p>C. ALSEP ANTENNA-- UP TO 30 MINUTES WILL BE ALLOWED FOR ANTENNA ERECTION AND ALIGNMENT.</p>
	3-55	<p>FOR EVA TERMINATION OR OTHER INTERRUPTIONS DURING ALSEP DEPLOYMENT, THE FOLLOWING PREFERRED DEPLOYMENT INTERRUPTION POINTS WILL BE OBSERVED IF PERMITTED BY CREW SAFETY CONSIDERATIONS---</p> <p>A. ANY POINT PRIOR TO DEFUELING THE FUEL CASK.</p> <p>B. AFTER FUELING THE RTG, THE ALSEP SHOULD BE CARRIED TO THE DEPLOYMENT SITE, PACKAGE NO. 1 SHOULD BE EMPLACED, THE SUBPALLET SHOULD BE REMOVED FROM PACKAGE NO. 2, AND THE RTG CABLE SHOULD BE INTERCONNECTED.</p> <p>C. DEPLOYMENT MAY BE INTERRUPTED ANY POINT THEREAFTER.</p>
	3-56	<p>IF ALSEP DEPLOYMENT IS NOT COMPLETED DURING EVA-1 AND THE TASK IS NOT ABANDONED, THE DEPLOYMENT WILL BE COMPLETED DURING EVA-2.</p>

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	EVA PHASE	3-11	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM							
3-57		CAMERA FRAME COUNTS WILL BE OBTAINED AT A SUFFICIENT FREQUENCY (APPROXIMATELY 30-MINUTE INTERVALS) TO ENABLE ACCURATE CORRELATION OF SAMPLES AND PHOTOS FOR SAMPLE ORIENTATION.						
3-58	LUNAR SURFACE OPERATIONS	IN ESTABLISHING THE OPERATIONAL EVA 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 AND TIMELINE CONSTRAINTS, AND SPECIFICALLY INTERESTING FEATURES VISABLE TO THE CREW.						
3-59		THE OPERATIONAL EVA PLAN WILL BE CONSTRAINED TO A MAXIMUM DURATION OF 4 HOURS AND 15 MIN. A MAXIMUM BSLSS OPERATIONAL RADIUS OF 3 KM AND A MAXIMUM OPS OPERATIONAL RADIUS OF 1 KM WILL BE APPLIED. EXTENSIONS, DETERMINED DURING THE EVA BASED ON CONSUMABLES USAGE RATES AND CREW COMFORT, TO A MAXIMUM OF APPROXIMATELY 5 HRS MAY BE IMPLEMENTED. PROBABLE EXTENSION POINTS WILL BE AFTER ALSEP DEPLOYMENT (FOR EVA 1) AND AT TRAVERSE SITES FARTHEST FROM THE LM (FOR EVA 2).						
3-60	THE CREW WILL HAVE PRIME RESPONSIBILITY FOR---	<ul style="list-style-type: none"> A. SELECTION OF SAMPLES TO BE COLLECTED. B. DECISIONS TO DEPART FROM THE OPERATIONAL EVA PLAN TO INVESTIGATE UNEXPECTED OR UNUSUAL FEATURES. C. ON THE SPOT DETERMINATION OF BEST TRAVERSE PATH TO PROVIDE MOBILITY EASE. D. ON THE SPOT DETERMINATION OF ACCESSIBILITY OF FEATURES OF INTEREST. E. SELECTION OF A SUITABLE LOCATION FOR PERFORMING EVA COMMUNICATIONS TEST. F. SELECTION OF APPROPRIATE PLACES FOR MET/SOIL INTERACTION EVALUATION. G. SELECTION OF APPROPRIATE PLACES FOR LUNAR SURFACE CLOSEUP CAMERA PHOTOGRAPHY. 						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	EVA PHASE	3-12	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM							
	3-61	GROUND INITIATED CHANGES TO THE OPERATIONAL EVA PLAN WILL BE LIMITED. THE FOLLOWING CONDITIONS WILL BE DEEMED REASONABLE CAUSES FOR GROUND INITIATED CHANGES.						
		A. UNEXPECTED FEATURES OF SIGNIFICANT SCIENTIFIC INTEREST REPORTED BY THE CREW.						
		B. CONSUMABLES CONSUMPTION RATES OR OTHER CONDITIONS NECESSITATE CURTAILMENT OR TERMINATION OF EVA.						
		C. CONSUMABLES CONSUMPTION RATES PERMIT EXTENSION OF EVA.						
		D. ENCOUNTERED OR PROJECTED INABILITY TO ACCOMPLISH SPECIFIC TASKS IN THE OPERATIONAL EVA PLAN.						
	3-62	ONE-MAN EVA'S WILL BE ALLOWED FOR COMPLETION OF THE FOLLOWING ACTIVITIES WITHIN TIME CONSTRAINTS, IN PRIORITY ORDER---						
		A. ABORTED EVA TERMINATION TASKS.						
		B. CONTINGENCY SAMPLE COLLECTION.						
		C. ALSEP DEPLOYMENT AND ACTIVATION.						
		D. COLLECTING SELECTED SAMPLES.						
		E. LRRR DEPLOYMENT.						
		F. COMPREHENSIVE SAMPLE COLLECTION.						
		G. OTHER TASKS WITHIN THE CAPABILITY OF A SINGLE CREWMAN.						
	3-63	FOR ONE-MAN EVA'S THE RADIUS OF OPERATIONS WILL BE LIMITED TO 300 METERS FROM THE LM.						
	3-64	FOR SITUATIONS REQUIRING DELETIONS OF TASKS TO MAKE UP TIMELINE LAGS, THE FOLLOWING TASKS IN THE LISTED ORDER WILL BE CONSIDERED FOR DELETION---						
		<u>TBD</u>						
	3-65	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.						
	3-66	THE GROUND WILL MONITOR THE TV PICTURE AND RECOMMEND CAMERA MOVEMENT TO PREVENT IRREVERSIBLE VIDICON TUBE BURNS FROM REFLECTIVE OBJECTS.						
	3-67	BETWEEN EVA'S THE TV CAMERA WILL BE LOCATED IN THE SUN AND OPERATING TO MINIMIZE THE POSSIBILITY OF FREEZING.						
	3-68	DELETED						
	3-69	IF THE THERMAL CONSTRAINTS ON THE CAMERA OPERATING TIME IN THE MESA ARE VIOLATED. THE GROUND WILL REQUEST THE CAMERA BE TURNED OFF.						
	3-70	DELETED						
	3-71	WHEN A BRIGHT OBJECT WITH A CONTRASTING DARK BACKGROUND IS IN THE FIELD OF VIEW THE GROUND WILL RECOMMEND 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.						
		RULES 3-72 THROUGH 3-79 ARE RESERVED.						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	EVA PHASE	3-13

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM							
		<p>----- ' ASCENT ' -----</p>						
	3-80	<p>ASCENT</p> <p>A. GUIDANCE SWITCHOVER TO AGS WILL BE PERFORMED FOR ---</p> <ol style="list-style-type: none"> 1. THE FOLLOWING PGNS ALARMS---20105,00214, 20430,20607, 21103,01107, 21204,21302, AND 21501. 2. PGNS NAVIGATION ERRORS, DURING ASCENT OR FOLLOWING DESCENT ABORT, THAT RESULT IN ANY OF THE FOLLOWING CONDITIONS--- <ol style="list-style-type: none"> (A) AGS PREDICTED HP AT INSERTION LESS THAN 40,000 FT (B) AGS PREDICTED HA AT INSERTION GREATER THAN TARGET VALUE PLUS 40 NAUTICAL MILES. (C) AGS PREDICTED INSERTION WEDGE ANGLES GREATER THAN 1.0 DEG. (DESCENT ABORT CASE OR COELLIPTIC SEQ RNDZ) GREATER THAN 0.5 DEG. (SHORT RNDZ) 3. CONFIRMED PNGS NAVIGATION ERRORS THAT RESULT IN THE FOLLOWING MSFN PNGS VELOCITY DIFFERENCES <ol style="list-style-type: none"> (A) DELTA VX (DOWN RANGE) GREATER THAN +/-24FPS (B) DELTA VY (CROSS RANGE) GREATER THAN +/-90FPS (COELLIPTIC SEQ. RNDZ) GREATER THAN +/-45FPS (SHORT RNDZ) (C) DELTA VZ (RADIAL) GREATER THAN +/-37FPS <p>B. THE GROUND WILL NOT REQUEST SWITCHOVER AFTER AGS TGO LESS THAN 30 SECONDS.</p> <p>C. DURING ASCENT, THE AGS WILL BE DECLARED NO-GO IF CONFIRMED AGS NAVIGATION ERRORS RESULT IN---</p> <ol style="list-style-type: none"> 1. PGNS PREDICTED INSERTION HP LESS THAN 30,000 FT. 2. PGNS PREDICTED INSERTION HA GREATER THAN TARGET VALUE PLUS 40 NM. 3. PGNS PREDICTED INSERTION WEDGE ANGLE GREATER THAN 1.0 DEGREE. (COELLIPTIC SEQ. RNDZ) GREATER THAN 0.5 DEG (SHORT RNDZ) 						
	3-81	<p>REQUIREMENTS TO COMMIT TO THE SHORT RNDZ</p> <p>A. PRIOR TO L₀ THE FOLLOWING IS REQUIRED.</p> <ol style="list-style-type: none"> 1. ONE OPERATIONAL LM GUIDANCE SYSTEM 2. WEDGE ANGLE AT LIFT-OFF LESS THAN .5 DEG. 3. LM RCS REDLINES MUST NOT HAVE BEEN VIOLATED 4. NO VIOLATION OF THE NAVIGATION REQUIREMENTS (REFERENCE MATRIX P.3-15) <p>B. AT INSERTION (PRE-TWEAK) THE FOLLOWING IS REQUIRED</p> <ol style="list-style-type: none"> 1. LM 3 AXIS ATTITUDE CONTROL 2. LM X AXIS TRANSLATION CAPABILITY 3. LM RCS DELTA V FOR TWEAK AND ATTITUDE CONTROL 4. TWEAK DELTA V LESS THAN 60 FPS 5. POST TWEAK HP GREATER THAN 5 N. MI. 6. NO VIOLATION OR THE NAVIGATION REQUIREMENTS (REFERENCE MATRIX P.3-15) <p>(NOTE: WITH THE EXCEPTION OF COMPUTERS, NO ONBOARD NAVIGATION SYSTEMS ARE VERIFIED AFTER LIFT-OFF)</p>						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	ASCENT	3-14

ACCEPTABLE COMBINATIONS OF G&N SYSTEMS NEEDED FOR SHORT RDZ

COMPUTERS (G+N)			RR			VHF			OPTICS/LITES					ACCEPTABLE COMBINATIONS OF NAV TECH
LGC	AEA	CMC	RR	TAPE-METER /RR	LGC/RR	VHF	VHF/CMC	VHF/EMS	LM COAS	CSM LITE	CSM COAS	LM LITE	SXT	
R ₁	R ₂		R ₁		R ₁	R ₂		R ₂	R ₂	R ₂				1. PGNCS+RR 2. AGS+VHF
R ₁		R ₂	R ₁		R ₁							R ₂	R ₂	1. PGNCS+RR 2. GNCS+SXT
R ₁		R ₂	R ₁		R ₁	R ₂	R ₂				(R ₂)	REFLECT-ED LIGHT	(R ₂)	1. PGNCS+RR 2. GNCS+VHF
	R ₁	R ₂	R ₁	R ₁								R ₂	R ₂	1. AGS+RR 2. GNCS+SXT
	R ₁	R ₂	R ₁	R ₁		R ₂	R ₂				(R ₂)	REFLECT-ED LIGHT	(R ₂)	1. AGS+RR 2. GNCS+VHF
	R ₁	R ₂				R ₁		R ₁	R ₁	R ₁		R ₂	R ₂	1. AGS+VHF 2. GNCS+SXT

1. R indicates that the system is required for the NAV technique to be available.
2. The numbers indicate which technique the system is required for.
3. The acceptable combinations of NAV techniques maintain two independent NAV methods.
4. Sextant or COAS is adequate for () cases.

INSTRUCTION: Mark through the failed systems (columns); then mark through the cases (rows) containing the failed systems. If one or more cases remain, short RDZ is GO.

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM						
		----- TRANSEARTH COAST -----					
	3-82	TRANSEARTH MCC WILL BE TARGETED TO ACHIEVE ENTRY CONDITIONS AS FOLLOWS---					
		A. IF VEI GREATER THAN 31000 FPS OR G&N NO GO, USE STEEP TARGET LINE.					
		B. IF VEI LESS THAN 31000 FPS AND G&N GO, USE SHALLOW TARGET LINE.					
		C. TRANSEARTH MIDCOURSE CORRECTON NOMINAL EXECUTION POINTS WILL BE AT THE FOLLOWING---					
		1. TEI + 15 HRS					
		2. EI - 22 HRS					
		3. EI - 3 HRS					
	3-83	TRANSEARTH MCC PHILOSOPHY					
		A. TEC MCC WILL NOT USE LANDING POINT CONTROL UNLESS THE LANDING POINT IS UNACCEPTABLE.					
		B. IF GAMMA EI IS OUTSIDE THE ENTRY CORRIDOR, EXECUTE MCC ASAP (EXCEPT---MCC 5)					
		C. MCC GREATER THAN MINIMUM IMPULSE CAPABILITY WILL USE THE SPS IF PRACTICAL.					
	3-84	RESERVED					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	TEC	3-16

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 MISSION RULE SUMMARY

R	ITEM	
		<p>----- MANEUVERS -----</p>
3-85		<p>THE FOLLOWING GUIDELINES WILL APPLY TO LM MANEUVERS---</p> <ol style="list-style-type: none"> 1. TRIMMING. <ol style="list-style-type: none"> A. DESCENT ABORTS/ASCENT - REAL TIME CALLOUT. B. ALL RENDEZVOUS MANEUVERS WILL BE NULLED. C. DOCKED DPS MANEUVERS WILL NOT BE TRIMMED. 2. ALTERNATE MISSION DOCKED DPS MANEUVERS WILL BE COMPLETED VIA AGS TAKEOVER FOR VIOLATION OF THE FOLLOWING LIMITS--- <ol style="list-style-type: none"> A. ATTITUDE RATES - 10 DEG./SEC. B. ATTITUDE ERRORS - 10 DEG. C. ATTITUDE EXCURSIONS - 10 DEG. 3. ALTERNATE MISSION DOCKED DPS MANEUVERS WILL BE TERMINATED AFTER VIOLATION OF THESE OVERBURN CRITERIA--- <ol style="list-style-type: none"> A. DPS LOI - 10 SEC AND DELTA V AGS GREATER THAN 10 FPS. B. DPS TEI - 10 SEC AND DELTA V AGS GREATER THAN 2 FPS. C. DPS LOI ABORTS - 10 SEC AND DELTA V AGS GREATER THAN 2 FPS. <p style="margin-left: 40px;">NOTE--- A CMC DELTA V OF 2 FPS (OVERSPEED) AND 10 SEC OVERBURN IS ALSO A VALID CUE FOR SHUTDOWN.</p>
3-86		<p>THE FOLLOWING TABLE, INCLUDING NOTES AND REFERENCES, SUMMARIZES THE TAKEOVER, RESTART, SHUTDOWN, TRIMMING REQUIREMENTS, AND SPS ENGINE LIMITS FOR ALL SPS MANEUVERS.</p> <p>RULE NUMBERS 3-87 THROUGH 3-89 ARE RESERVED.</p>

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	MANEUVERS	3-17	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY

MANEUVER	ENGINE LIMITS		RATES/ERRORS FOR		MANUAL START ACTION	OVERBURN SHUTDOWN CRITERIA	EARLY C/O RESTART CRITERIA	RCS TRIM GUIDELINES
	INHIBIT	TERMINATE	TAKEOVER	ACTION				
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 < 100 IF G8N GO ΔVTG > 60 OR C/O > 6 SEC EARLY	N/A
APOGEE KICK	NONE	ERRATIC ENG	5/5	COMPLETE	START	g	Hp < 100 IF G8N GO ΔVTG > 60 OR C/O > 6 SEC EARLY	N/A
TLC MCC	TIGHT ¹	TIGHT ¹	10/10	TERMINATE	DELAY	1 SEC	NO	X = 0.2 ^{a, b}
LOI	TIGHT				START			NO
a. MODE I								
0 TO 33 SEC		TIGHT	10/10	COMPLETE			YES	
33 SEC TO 1 + 15		LOOSE	10/10	COMPLETE			YES	
1 + 15 TO 1 + 39		LOOSE	10/10	COMPLETE			YES	
b. MODE II		LOOSE	10/10	COMPLETE			YES	
c. MODE III								
2 + 41 TO 3 + 20		LOOSE	10/10	COMPLETE			YES	
3 + 20 TO C/O		TIGHT ^h	10/10	COMPLETE		10 SEC	V _{GO} > 50 AND G8N GO	
DOI	TIGHT ¹	TIGHT ¹	10/10	TERMINATE	DELAY	8T	NO	X = 1.0
CIRC	TIGHT	TIGHT	10/10	TERMINATE	DELAY	1 SEC	NO	X = 1.0 Y = 0.2
RESCUE	LOOSE	LOOSE	10/10	COMPLETE	START	1 SEC	ΔV TOGO > 12	ALL = 0.2
LOPC	TIGHT	TIGHT	10/10	TERMINATE	DELAY	1 SEC	NO	NO
TEI (G8N)	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								
a. CORRIDOR	LOOSE ¹	LOOSE	10/10	COMPLETE	DELAY	1 SEC AND ΔV _C = 0	NO	X = 0.2
b. IP CONTROL	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 DEORB	LOOSE ^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 < 80 or decays 10 psi: inhibit burn for any leak in He or prop tank. 0 < GN₂A(B) < 400 psi: certain burns may be allowed with He tank leak if blowdown ΔV exceeds remaining mission requirements.^f

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:
- MCC₁: Trim X to 1.0 fps
 - Trim all MCC (except MCC4) only if X ≤ 2 fps
 - See Rule 5-131
 - Both prop tank pressures > 140; one GN₂ tank press > 400 If SM-RCS deorbit is available.
 - See Rule 5-27
 - Some limits may be downgraded if warranted by mission circumstance.

- See Rule 5-3
- If indication of ball valve fail, shut down good bank 10 sec prior to nominal cutoff to verify indication.
- If indication of ball valve failure inhibit burn, or if thrusting, shut down good bank to verify failure. If thrusting continues, re-enable good bank. For DOI apply only when bringing second bank on line.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	MANEUVERS	3-18

SATURN LAUNCH VEHICLE GO/NO-GO CRITERIA
(11/1/70)

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
<u>S-IC</u> LOSS OF THRUST (2 OR MORE ENG)	PRIOR TO TBI + 2:00 - ABORT	NO			
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				TLI TERMINATE
<u>II</u> LOSS OF ATTITUDE CONTROL	ABORT (LAUNCH)	NO	ATTEMPT S/C CONTROL TB5 AND TB7 TO TB7 + 15 MIN	DURING TB6 TO TB6 + 9 MIN 20 SEC	TLI TERM DURING BURN CREW OPTION AFTER TB7 + 15
INERTIAL ATTITUDE REFERENCE FAIL			LAUNCH, EPO TLI		
<u>S-II</u> LOSS OF THRUST (2 ENG).		FROM S-IVB TO COI TILL TB3 + 4 MIN 40 SEC			
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 + 66 SEC - ABORT				
<u>S-IVB</u> LOSS OF THRUST	PRIOR TO EPO - SEPARATE				
LOSS OF HYDRAULIC FLUID PRIOR TO START	INHIBIT START			INHIBIT TLI DURING TB5 AND TB6	
COLD HE FAIL OPEN	ABORT BEFORE TWR JETT	AFTER TWR JETT			
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 →		← -26 OR + 36 PSID (ANY TIME)	SEP TO 7000 FT MINIMUM →
START BOTTLE PRESS OUTSIDE RESTART LIMITS	SEP > 1800 PSIA			SEP > 1800 PSIA	
LOX CHILLDOWN FAIL				FOR LOX LEAD >20 SEC - INHIBIT	
S-IVB ACTUATOR HARDOVER	NO START			BEFORE TB6 + 9M 10S (AUX PUMP OP)	

3-19

LEGEND:



NO REQUIREMENT

CSM EECOM GO CRITERIA
11/1/70

	EARTH ORBIT			TLC		CONT L.O./DO1	UNDOCK AND SEP	CIRC	POWERED DESCENT		LUNAR STAY		LUNAR ORBIT (POST RNDZ)	POST DOCK LM JETT
	CONT BOOST	CONT E.O.	TLI	TD & E	CONT TLC				NFR/LOI	PDI	PDI TO T/D	PAST T1		
ECS														
CABIN INTEGRITY	← ⑦ CABIN INTEGRITY →				← CABIN INTEGRITY →				②		← CABIN INTEGRITY →			
NO FIRE OR SMOKE IN CABIN	← NO F OR S IN CABIN →				← NO FIRE OR SMOKE IN CABIN →				②		← NO F OR S IN CAB →			
NO O2 MANIFOLD LEAKS	← ⑦ NO O2 LEAKS →				← NO O2 MANIFOLD LEAKS →						← NO O2 MANIF 2 LEAK 1 OF 2 →			
MAIN O2 REGULATORS	← ⑦ 1 OF 2 → BOTH ③				← 1 OF 2 →						← 1 OF 2 →			
ECS COOLANT LOOPS		1 OF 2 ⑤	BOTH		← BOTH →				②		1 OF 2 ⑤	PRIMARY		
ECS RADIATORS		1 OF 2 ⑤	BOTH		← BOTH →		①	①-PRIMARY-①	①		1 OF 2 ⑤	PRIMARY ①		
ECS GLYCOL EVAPS														
SUIT INTEGRITY	SI ⑦							S'						
NO GLYCOL LEAK		← NO LEAK →			← NO GLYCOL LEAK →						← NO GLY LEAK →			
NO EXCESS CAB HUMIDITY		← NO HUMID →			← NO EXCESSIVE CABIN HUMIDITY →				②		← NO HUMID →			
POTABLE H2O TANK		POT										POT		
WASTE H2O TANK														
SUIT COMPRESSORS	← ⑦ 1 OF 2 ⑫ BOTH →				← 1 OF 2 →			⑫	⑫ ②		← ⑫ 1 OF 2 ⑫ →			⑫
SUIT CIRCUIT	← ⑦ SUIT CIRCUIT →				← SUIT CIRCUIT →				②		← SUIT CIRCUIT →			
OVBD DUMPS		← 1 OF 2 →			← 1 OF 2 →						← 1 OF 2 →			
CRYO														
O2 TANKS		1 OF 3	ALL		⑩	⑩	⑩-ALL-⑩	⑩	⑩	⑩		⑩	ALL	2 OF 3
H2 TANKS		1 OF 2	BOTH		← BOTH →						← BOTH →			1 OF 2
EPS														
FUEL CELLS	1 OR 1 + 1	0	2 OF 3	ALL	⑥	⑥	⑥-ALL-⑥	⑥	⑥	⑥		⑥	ALL	2 OF 3 ⑪
AUX BATTERIES		0												TBD
ENTRY BATTERIES		3	2 OF 3	ALL	⑥	⑥	⑥-ALL-⑥	⑥	⑥	⑥		⑥	ALL	⑥
MAIN BUSES	1 OF 2	← BOTH →			← BOTH →				②		← BOTH →			
BATTERY BUSES	1 OF 2	← BOTH →			← BOTH →				②		← BOTH →			
AC BUSES	1 OF 2 ⑨	← BOTH →			← BOTH →				②		← BOTH →			
BAT RELAY BUSES		← BATT RELAY BUS →			← BAT RELAY BUS →						← BAT RELAY BUS →			
INVERTERS	1 OF 3 ⑨	← 2 OF 3 →			← 2 OF 3 →				②		← 2 OF 3 →			
AC ΦA (1 AND 2)	1 OF 2	← BOTH →			← BOTH →				②		← BOTH →			
DOCKING														
DOCKING LATCHES					9 OF 12									
GN2 BOTTLES					9 OF 12			2 OF 4 ⑧						
SEQ														
SMJC NOT ACTIVATED		← ④ SMJC NOT ACT ④ →			← ④ SMJC NOT ACT ④ →									
SEQUENTIAL SYSTEMS		← BOTH →			← BOTH →									

- ① BASED ON AMOUNT OF WATER AVAILABLE, CONSIDERATION WILL BE GIVEN TO CONTINUING THE MISSION WITH SECONDARY RADIATORS AND PRIMARY EVAPORATORS
- ② LM DESCENT STAGE WILL BE RETAINED FOR TEI IF CONDITION NOT MET
- ③ IF ONE MAIN REG HAS FAILED OPEN AND THE OTHER IS FUNCTIONING NORMALLY, TLI WILL BE PERFORMED
- ④ NO REQUIREMENT IF SOURCE OF ACTIVATION CAN BE ISOLATED
- ⑤ MUST HAVE EITHER PRIMARY OR SECONDARY SYSTEM COMPOSED OF FUNCTIONING LOOP AND CORRESPONDING RADIATORS
- ⑥ BASED ON FAILURE MODE, 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 BASED ON FAILURE MODE, CONSIDERATION WILL BE GIVEN TO UNDOCKING WITH ONE GN2 BOTTLE REMAINING IN AN OPERABLE SYSTEM
- ⑨ MODE I AND II REGIONS ONLY, 0 THEREAFTER
- ⑩ CONSIDERATION WILL BE GIVEN TO CONTINUING AFTER LOSS OF A TANK IF OTHER 2 TANKS MEET REDLINE CRITERIA
- ⑪ BASED ON FAILURE MODE CONSIDERATION WILL BE GIVEN TO JETT LM WITH 1 REMAINING
- ⑫ 1 OF 2 SUIT COMPRESSORS OR VACUUM CLEANER

LEGEND: NO REQUIREMENTS
NOTE: A, 2 NO STAY CONDITIONS
• NONE

CSM GNC GO CRITERIA
(11/1/70)

GO NO-GO ITEM	EARTH ORBIT			TLC		LUNAR ORBIT (BEFORE UNDOCKING)			UNDOCK	CIRC	POWERED DESCENT		LUNAR STAY		LUNAR ORBIT (P-RNDZ)	POST DOCK	
	CONT BOOST	CONT EO	TLI	TD&E	CONT TLC	NFR LOI	CONT LOI	CONT LO	DOI			PDI	PDI TO TD	PAST T1	PAST T3 & SUBS	CONT L.O.	LM JETT
GNCS/SCS																	
DEORBIT CAPABILITY		SPS+B/U METHOD														C O L I S	
AUTO ATTITUDE CONTROL		← 3 AXIS →		①	← 3 AXIS →		← 3 AXIS →								2-AXIS	3- U I S	①
RATE DAMPING		← 3 AXIS →		①	← 3 AXIS →		← 3 AXIS →								2-AXIS	3- U I S	①
DIRECT RCS		← 3 AXIS →		①	← 3 AXIS →		← 3 AXIS →								2-AXIS	3- N I S	①
BMAGS P,Y		← 1 OF 2 →				1 OF 2									← 1 OF 2 →	N	
BMAGS R			1 OF 2			1 OF 2										1 O 2	
FDAI		← 1 OF 2 →				1 OF 2										1 O 2	
THC		← THC →														A P	
RHC		← 1 OF 2 →				1 OF 2										1 P 2	
EMS																L I	
CMC			CMC			CMC									← CMC →	C	CMC
ISS			ISS			ISS									← ISS →	A B	ISS
OSS			OSS			③									← OSS OR VHF →	L E	
OPTICS DAC			0-DAC			0-DAC									← 0-DAC →	F O	
NO SOLENOID DR GND																R	
TVC SERVO LOOP		1 OF 2	BOTH			BOTH									← BOTH →		
DSKY			1 OF 2			1 OF 2									← 1 OF 2 →	A P	1 OF 2
SPS																	
FU/OX TANK (W/O LEAK)		← FU/OX →				FU/OX									← FU/OX TNK →	O L	
GN ₂ TANK (W/O LEAK)		1 OF 2	BOTH			BOTH									← BOTH →	L O	
BALL VALVE BANK		1 OF 2	BOTH			BOTH									← BOTH →		
FEEDLINE TEMP > 40° F		← > 40° →				> 40°									← > 40° →	1	
FU/OX ΔP < 20 PSI		← < 20 →				< 20									← < 20 →	4	
FLANGE TEMP < 480° F		< 480°	N/A			< 480°									← < 480 →		
Pc > 70 PSI		> 70	N/A			> 70									← > 70 →		
ULLAGE CAPABILITY			BOTH			1 OF 2									← 1 OF 2 →		
HE TANK (W/O LEAK)		②	HE TNK			HE TNK									← HE TNK →		
SM RCS																	
HE TANK (W/O LEAK)		3 OF 4	ALL			3 OF 4									← 3 OF 4 →		3 OF 4
NO LEAK BELOW ISO VLV		3 OF 4	ALL	← 3 OF 4 →		4 OF 4									← 3 OF 4 →		4 OF 4
PKG TEMP > 55°		3 OF 4	ALL	← 3 OF 4 →		3 OF 4									← 3 OF 4 →		3 OF 4
THRUSTERS		ALL ROT AXES + X	3 OF 4 P.Y 6 OF 8 R	①		3 OF 4 P.Y 6 OF 8 R									← 3 OF 4 P.Y 6 OF 8 R →		①
CM RCS																	
HE TANK (W/O LEAK)	1 OF 2 MODE 1					BOTH									← BOTH →	B C	ONE
MANIFOLD (W/O LEAK)	1 OF 2 MODE 1					BOTH									← BOTH →	B C	ONE
NOT ARMED						NOT ARMED										N A R	

REFER TO MR 3-30

- ① REQUIRES 3-AXIS ATTITUDE CONTROL AND TRANSLATION 3-AXIS (ONE LATERAL AXIS MAY BE DEGRADED)
- ② MUST HAVE SUFFICIENT ULLAGE FOR DEORBIT
- ③ ASSUME LM CAN PROVIDE A GOOD ALIGNMENT

NOTE
1 T₂ NO STAY CONDITIONS
2 NONE

LEGEND: NO REQUIREMENT

LM TELMU GO CRITERIA
11/1/70

GO/NO-GO ITEM	UNDOCK	CIRC	POWERED DESCENT				LUNAR STAY			RENDEZVOUS LM ACTIVE		DOCKING
			PDI	PDI TO PDI+5:30	PDI+5:30 TO LO GATE	LO GATE TO T/D	STAY W/O EVA	2-MAN EVA	1-MAN EVA	CSI/CDH	TPI/TPF	
PYRO												
1. PYRO SYSTEMS ****	BOTH		BOTH	⑤	⑤	⑤		BOTH				
ELECTRICAL												
1. CDR AND LMP BUS ①	BOTH		BOTH									1 OF 2
2. DC FEEDERS ① ② ****	DESCENT					BOTH						
	ASCENT		BOTH									1 OF 2
3. BATTERIES ③ ****	DESCENT		2 OF 4					2 OF 4				
	ASCENT		BOTH					BOTH				1 OF 2
4. INVERTERS	1 OF 2		1 OF 2									
5. AC BUSES	BUS A		BUS A OR B									
ENVIRONMENTAL												
1. SUIT/CABIN INTEGRITY	SUIT AND CABIN		SUIT AND CABIN			SUIT		SUIT AND CABIN				
2. SUIT FANS ****	1 OF 2		1 OF 2					1 OF 2				
3. O ₂ DEMAND REGS ****		1 OF 2					④	1 OF 2				
4. H ₂ O SEPARATORS ****	1 OF 2 H ₂ O SEPARATORS		1 OF 2 H ₂ O SEPARATORS					1 OF 2 H ₂ O SEPS				
	DESCENT		DESCENT		⑥	2 OF 3		DESCENT				
5. O ₂ TANKS ③ ****	ASCENT		1 OF 2					1 OF 2				
	PRIMARY		BOTH		⑥	1 OF 2		BOTH				
6. COOLANT LOOPS ****	SECONDARY											
			BOTH		⑥	1 OF 2		BOTH				
7. H ₂ O FEED PATHS			BOTH		⑥	1 OF 2		BOTH				
8. H ₂ O TANKS ③ ****	DESCENT		DESCENT		⑥	2 OF 3		DES				
	ASCENT		1 OF 2					1 OF 2	③			
9. NO FIRE, SMOKE OR GLYCOL IN SUIT OR CABIN												

- ① DURING POWERED DESCENT WHEN TIME IS NOT AVAILABLE TO TROUBLESHOOT, A SHORT ON EITHER AN ASCENT OR DESCENT FEEDER WILL BE CONSIDERED LOSS OF A BUS AND THUS REQUIRE AN ABORT
- ② A SHORTED DC FEEDER WILL ALWAYS BE REASON FOR ABORTING THE LANDING MISSION. ONE OPEN DESCENT FEEDER WILL NOT BE REASON FOR ABORTING THE LANDING MISSION
- ③ FUNCTIONAL CAPABILITY ONLY - SEE REDLINES FOR CONSUMABLES REQUIREMENTS
- ④ DO NOT DEPRESS CABIN
- ⑤ ABORT FOR ARMED SYSTEM THAT CAN NOT BE DEARMED
- ⑥ CONSIDERATION WILL BE GIVEN TO CONTINUING DESCENT UNTIL THE SHORTER RDZ IS ACHIEVED AND THEN ABORT

LEGEND: **** RETAIN DESCENT STAGE ALAP
 ■ NO REQUIREMENT

NOTE:

1. T₁ NO STAY CONDITIONS:
 - LOSS OF 1 ASC BATT
 - LOSS OF BOTH COOLANT LOOPS
2. T₂ NO STAY CONDITIONS:
 - NONE

LM CONTROL GO CRITERIA
(11/1/70)

ITEM	UNDOCKING	CIRC	PDI	PDI TO PDI +5+30	PDI +5+30 TO HI GATE	HI GATE TO LO GATE	LO GATE TO TD	STAY W/O EVA	2 MAN EVA	1 MAN EVA	LM ACT RNDZ		DOCKING
											CSI/CDH	TPI/TPF	
GNC													
1. GUID STEER	PGNS											PGNS	
	AGS											AGS	
2. 3-AXIS ATT CONT	PGNS RATE CMD OR PGNS AUTO											PGNS	
	AGS RATE CMD ①											AGS	
3. 3-AXIS TRANS ⑧													
4. FDAI-ATT/RATES/ERR													
5. T/D 40 SEC OF 57% GTC													
6. VHF RNG/CSM OPTICS													
7. RR													
8. AOT													
9. LR													
10. DPS AUTO ON ⑧													
11. REDNT APS ON ⑤													
12. P&R GDA TRIM													
13. MAN THTL ⑦ (1 TTCA)													
14. AUTO THTL													
DPS													
1. FU OR OX INLET/ULLAGE PRESS PSI	<65%												
	>65%												
2. ΔP OX AND FU													
3. PROP TEMP > 50° < 90°													
4. PROP ΔT < 10° F													
5. PROP QTY > LOW LEVEL/2%													
6. FTP BLOWDOWN CAPABILITY													
7. FU/OX PQGS ΔQ < 13% ④													
8. 35% EROSION EXCEEDED													
9. NO VENT OX ③													
APS													
1. NO PROP/HE LEAKS AND REDUNDANT PRESS PATHS													
2. FU/OX INLET PRESS > 62 & < 220													
3. FU/OX ΔP (EITHER HIGH) < 90													
4. PROP TEMP > 50° & < 90°													
5. PROP ΔT < 10° F													
RCS													
1. RCS LEAKS													
2. FU/OX MANIF PRESS > 100													
3. PROP TEMP > 40°F < 100°F													
4. 3-AXIS ATT CONTROL													
5. 3-AXIS TRANSLATION													
6. NO IMPINGEMENT LIMITS EXCEEDED													
7. NO PAIR ISOLATED													

- ① AGS RATE CMD MAY CONSIST OF 2 AXIS RATE CMD AND ONE DIRECT, I.E. ONE RATE GYRO FAILED
- ② FOR SINGLE CONTROL MODE LANDING IS CREW OPTION
- ③ < 150 LB CASE WILL BE EVALUATED PRIOR TO T3
- ④ MSFN WILL EVALUATE CAPABILITY TO LAND WITH RESPECT TO PROPELLANT REMAINING
- ⑤ MANUAL IS MANDATORY PLUS EITHER PNGS AUTO OR AGS AUTO
- ⑥ LOSS OF PGNS GUID STEERING IS ACCEPTABLE PROVIDED RDNT 3-AXIS ATT CONTROL
- ⑦ WORK AROUND PROCEDURE EXISTS FOR MAXIMUM THRUST
- ⑧ NO AUTO ULLAGE PLUS NO AUTO START - PDI NO GO

LEGEND: NO REQUIREMENT

NOTE

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

COMMUNICATIONS/INSTRUMENTATION GO CRITERIA
11/1/70

GO/NO-GO ITEM	EARTH ORBIT		TLC			LUNAR ORBIT (BEFORE UNDOCKING)			UNDOCKING	CIRC	POWERED DESCENT				LUNAR STAY			RENDEZVOUS LM ACTIVE		LUNAR ORBIT POST REND	POST DOCK
	CONT BOOST	CONT E.O.	TLI	TD&E	CONT TLC	LOI	CONT LOI	CONT L.O./DOI	NOMINAL MISSION		PDI	PDI TO PDI +5	PDI+5 TO LO GATE	LO GATE TO T/D	STAY W/O EVA	2-MAN EVA	1-MAN EVA	CSI/CDH	TPI/TPF	CONT L.O.	LM JETT
USB 2-WAY VOICE COMM		①	CSM			CSM		CSM OR LM ⑤	CSM & LM	CSM	CSM AND LM	②-LM-②		CSM & LM ③	CSM & LM ③	CSM & LM ③			CSM	CSM	
VHF COMM LM/CSM									SIMPLEX OR DUPLEX												
VHF COMM LM/EVA																SIMP OR DUP	DUPLEX				
VHF COMM EVA/EVA																DUPLEX					
MSFN/EVA VOICE																EITHER CREWMAN					
CRITICAL INSTRUMENTATION		← CSM →				CSM		CSM	LM & CSM	CSM	← LM →	← LM →	← LM AND CSM →	← LM →						CSM	
LM TELEMETRY									LBR OR HBR		← LBR OR HBR →	④-④	← LBR OR HBR →								
CSM TELEMETRY		← HBR OR LBR →			← HBR OR LBR →			← HBR OR LBR →								← HBR OR LBR →					HBR OR LBR
CSM SCE			SCE																		

3-24

- ① VHF IS ACCEPTABLE
- ② CSM RELAY TO LM IS ACCEPTABLE
- ③ LM RELAY TO CSM IS ACCEPTABLE
- ④ ADEQUATE DATA TO MAKE FINAL GO/NO GO TO CONTINUE POWERED DESCENT
- ⑤ CSM COMM IS REQUIRED FOR DOI

LEGEND: NO REQUIREMENT

EMU GO CRITERIA
(11/1/70)

GO/NO-GO ITEM	UNDOCKING	CIRC	POWERED DESCENT				LUNAR STAY ②		
			PDI	PDI TO PDI+5 +30	PDI+5 +30 TO LO GATE	LO GATE TO T/D	STAY W/O EVA	2-MAN EVA	1-MAN EVA
CRITICAL INSTRUMENTATION								← EMU →	
LCG/LTL COOLANT LOOP								2 OF 2	1 OF 2
FEEDWATER SUPPLY								2 OF 2	1 OF 2
PRIMARY O ₂ SUPPLY(S)	← ① →							2 OF 2	1 OF 2
PLSS O ₂ PRESSURE REG(S)								2 OF 2	1 OF 2
PLSS FAN(S)								2 OF 2	1 OF 2
PLSS BATTERY(S)								2 OF 2	1 OF 2
EMU PRESSURE INTEGRITY								2 OF 2	1 OF 2
OPS O ₂ BOTTLE(S)	← ① →							2 OF 2	1 OF 2
OPS PRESSURE REG(S)								2 OF 2	1 OF 2
CONTAMINATION CONTROL								2 OF 2	1 OF 2
BSLSS								③	

3-25

① NOMINALLY BOTH OPS'S SOURCE PRESSURES WILL BE CHECKED OUT PRIOR TO UNDOCKING - SHOULD ONE OPS SOURCE PRESSURE FAIL TO MEET THE OPS GO/NO-GO CRITERIA AS DEFINED IN RULE 3-103, A CHECK OF POS PRESSURE WILL BE MADE ON A PLSS TO FULFILL THE RQMT FOR TWO LIFE-SUPPORT UNITS

② SUFFICIENT PLSS AND/OR OPS CONSUMABLES WILL BE RETAINED AT LM LIFTOFF TO SUPPORT A 30 MINUTE CEVA

③ REQUIRED FOR TRAVERSE DISTANCE GREATER THAN 1 KM FROM THE LM

LEGEND:  NO REQUIREMENT

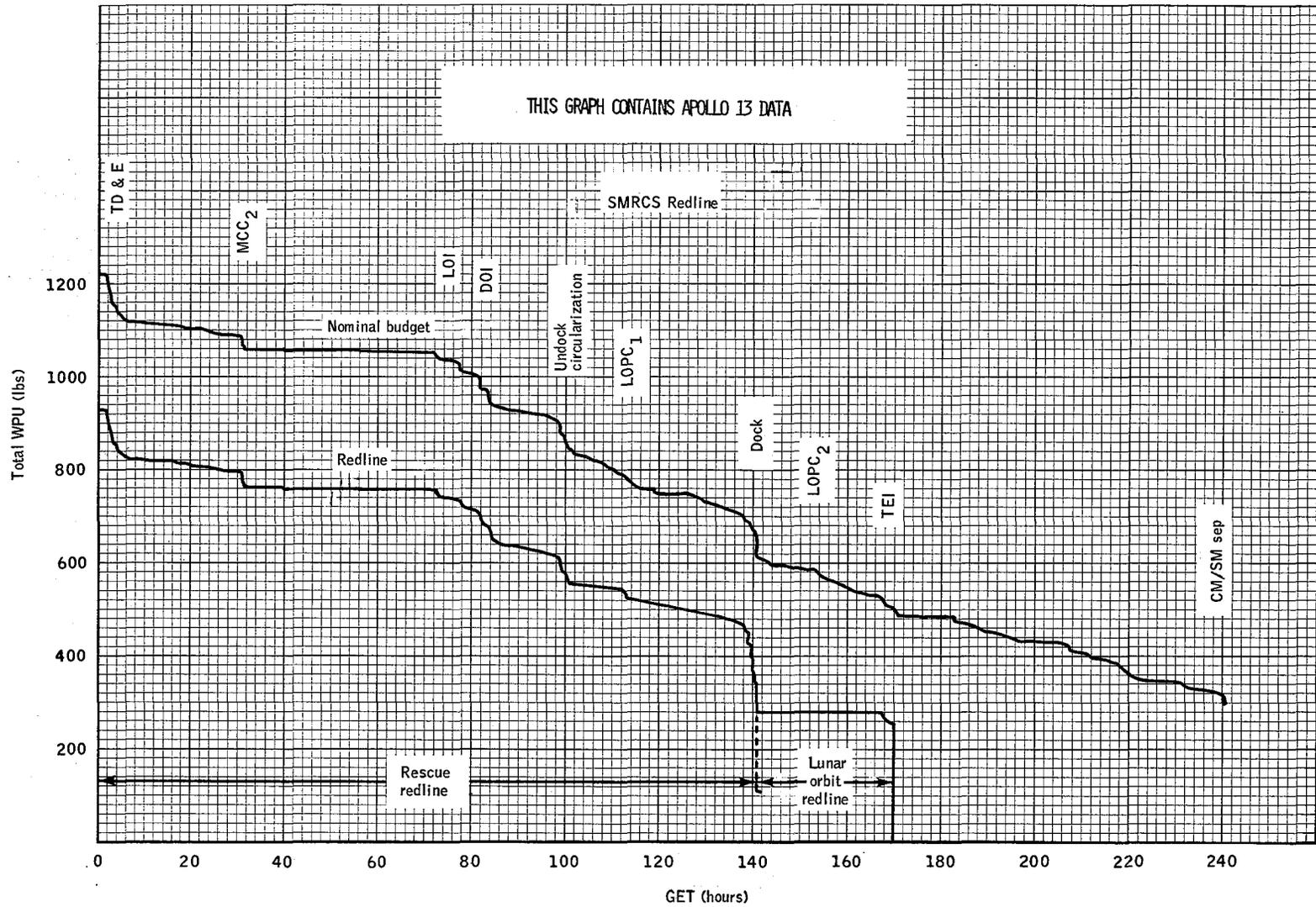
NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

R	ITEM	
		<p>----- ! CONSUMABLES ! -----</p>
	3-90	<p>SPS</p> <p>A. AFTER TD&E AND THE FIRST DOCKED SPS MCC, THE DELTA V REQUIRED TO CONTINUE WITH A LUNAR MISSION IS 5500 FPS (CSM UNDOCKED CAPABILITY).</p> <p>B. THE DELTA V REQUIRED FOR LOI GO IS LOI (FUNCTION OF LAUNCH DAY AND LAUNCH AZ) +3160 FPS (TEI AND TEC MCC'S).</p> <p>C. THE DELTA V REQUIRED FOR GO FOR UNDOCKING IS 4295 FPS. THIS DELTA V INCLUDES---</p> <p>700 FPS, LM RESCUE</p> <p>75 FPS, CIRC</p> <p>360 FPS, LOPCI</p> <p>3500 FPS, TEI (APPROXIMATELY 91 HR RETURN)</p> <p>160 FPS, 3 SIGMA MCC BASED ON SCS CONTROLLED TEI</p> <p><u>4295 FPS</u></p>
	3-91	<p>SM RCS</p> <p>A. THE CSM RESCUE REDLINE INCLUDES---</p> <ol style="list-style-type: none"> (1) NOMINAL USAGE FROM LAUNCH TO CSM CIRCULARIZATION BURN. (2) ATTITUDE HOLD FROM CIRCULARIZATION BURN TO LM LIFTOFF (INCLUDED IN THIS PERIOD IS LOPC 1 ULLAGE AND DAMPING). (3) RESCUE ALLOWANCE INCLUDING NOMINAL RENDEZVOUS BUDGET, THREE 10-SECOND 4-JET ULLAGES, AND CSM ACTIVE BRAKING. (4) TWO REVS ATTITUDE HOLD PLUS TEI (ULLAGE AND DAMPING). (5) 7 FPS MCC (1 SIGMA G6N TEI CUTOFF). (6) PTC ALLOWANCE. (7) NOMINAL USAGE FROM MCC 7 TO CM/SM SEP. <p>THE REDLINE DOES NOT INCLUDE CSM SOLO EXPERIMENTS, BOOTSTRAP PHOTOGRAPHY, OR P23'S IN TEC. THE CSM RESCUE REDLINE AT EARTH LAUNCH IS 940 LBS.</p> <p>B. VIOLATION OF THE LUNAR ORBIT REDLINE WILL RESULT IN TERMINATION OF LUNAR ORBIT ACTIVITIES. THE LO REDLINE INCLUDES---</p> <p>206 LB 2 REVS LO, TEI ULLAGE AND DAMPING, NOMINAL TEC BUDGET</p> <p><u>59 LB</u> 20 FPS MCC (3 SIGMA G6N TEI CUTOFF)</p> <p>265 LB</p> <p>RULE NUMBERS 3-92 AND 3-93 ARE RESERVED.</p>

	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	CONSUMABLES	3-26	



MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/70	MISSION RULE SUMMARY	CONSUMABLES	3-27

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

R	ITEM																																		
3-94	<p>CSM BATTERY ENERGY AND CRYOGENIC O2 AND H2</p> <p>THE FOLLOWING MINIMUM USABLE ENERGY/QUANTITIES MUST BE AVAILABLE TO INITIATE THE SPECIFIC PHASES.</p> <table border="1"> <thead> <tr> <th></th> <th>LAUNCH</th> <th>LOI</th> <th>UNDOCK</th> <th>PC-1</th> <th>PC-2</th> </tr> </thead> <tbody> <tr> <td>BATT AMP-HOURS</td> <td>3 BATT</td> <td>TBD ①</td> <td>TBD ②</td> <td>TBD ②</td> <td>TBD ③</td> <td>NA</td> </tr> <tr> <td>REMAINING</td> <td>2 BATT</td> <td>TBD</td> <td>TBD</td> <td>39.8</td> <td>TBD</td> <td>NA</td> </tr> <tr> <td>O2 (PERCENT EACH TANK)</td> <td>TBD</td> <td>TBD</td> <td>TBD</td> <td>TBD</td> <td>TBD</td> <td>N/A</td> </tr> <tr> <td>H2 (PERCENT EACH TANK)</td> <td>TBD</td> <td>TBD</td> <td>TBD</td> <td>TBD</td> <td>TBD</td> <td>NA</td> </tr> </tbody> </table> <p>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.</p> <p>② ALLOWS NOMINAL LUNAR STAY, BUT PRECLUDES PC-1 BURN.</p> <p>③ ENERGY REQUIRED TO PERFORM PC-1</p> <p>NOTES</p> <p>(A) PRELAUNCH BATTERY REDLINES ARE BASED ON FAILURE OF THE BATTERY CHARGER BEFORE ACCOMPLISHING ANY CHARGING.</p> <p>(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.</p> <p>(C) IF RESCUE IS REQUIRED, THE THREE-BATTERY ENERGY REQUIREMENTS WILL BE RECOVERED BY POWERING DOWN TO A TWO-BATTERY G&N ENTRY.</p> <p>(D) AUX BATT ENERGY NOT INCLUDED IN BATT REDLINES</p> <p>(E) CRYOGENIC REDLINES ARE BASED ON CAPABILITY TO PERFORM NOMINAL MISSION WITH CAPABILITY TO RETURN TO EARTH WITH A 40 AMP AVERAGE POWER LEVEL AFTER LOSS OF ONE CRYO TANK AT <u>TBD</u> (WORST CASE TIME FOR FAILURE).</p> <p>RULES 3-95 AND 3-96 ARE RESERVED.</p>		LAUNCH	LOI	UNDOCK	PC-1	PC-2	BATT AMP-HOURS	3 BATT	TBD ①	TBD ②	TBD ②	TBD ③	NA	REMAINING	2 BATT	TBD	TBD	39.8	TBD	NA	O2 (PERCENT EACH TANK)	TBD	TBD	TBD	TBD	TBD	N/A	H2 (PERCENT EACH TANK)	TBD	TBD	TBD	TBD	TBD	NA
	LAUNCH	LOI	UNDOCK	PC-1	PC-2																														
BATT AMP-HOURS	3 BATT	TBD ①	TBD ②	TBD ②	TBD ③	NA																													
REMAINING	2 BATT	TBD	TBD	39.8	TBD	NA																													
O2 (PERCENT EACH TANK)	TBD	TBD	TBD	TBD	TBD	N/A																													
H2 (PERCENT EACH TANK)	TBD	TBD	TBD	TBD	TBD	NA																													

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	CONSUMABLES	3-28

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

R	ITEM							
	3-97	<p>LM-RCS PROPELLANT GO/NO-GO'S AND REDLINES</p> <p>A. ASSUMPTIONS</p> <ol style="list-style-type: none"> 1. TOTAL LOADED 633 LBS EQUAL 100 PERCENT UNUSABLE TRAPPED PROPELLANT 7.3 PERCENT GROUND GAGING UNCERTAINTY 6.0 PERCENT TOTAL UNUSABLE 13.3 PERCENT 2. OPS RESERVE (A) PRIOR TO TPF - ONE REV LOS TRACKING OF CSM (STAGED) EQUALS 2.5 PERCENT (B) AFTER TPF - CSM ACTIVE DOCKING EQUALS 1.0 PERCENT 3. ALL GO/NO-GO'S ARE THE AVERAGE OF SYSTEM A&B. ALL REDLINES REQUIRE A PERCENT READING ON EACH INDIVIDUAL SYSTEMS GAUGE (OR AN EQUIVALENT AMOUNT OF PROPELLANT IF THE GAUGE HAS FAILED) EQUAL TO OR GREATER THAN THE REDLINE VALUE. 4. THE TWEAK BURN IS ASSUMED TO BE 10 FPS IN THE X AXIS AND 20 FPS IN THE Z AXIS. <p>B. GO/NO-GO'S</p> <ol style="list-style-type: none"> 1. UNDOCKING/SEPARATION--- PROPELLANT REQUIRED FOR UNDOCKING, DESCENT, ASCENT AND ONE REV RENDEZVOUS PLUS OPS RESERVE. 2. PDI PROPELLANT REQUIRED FOR DESCENT, ASCENT AND ONE REV RENDEZVOUS PLUS OPS RESERVE. 3. TWEAK PROPELLANT REQUIRED FOR NOMINAL LM ACTIVE ONE REV RNDZ PLUS OPS RESERVE (A) PROPELLANT REQUIRED FOR NOMINAL LM ACTIVE ONE REV RNDZ PLUS OPS RESERVE EXCEPT TPF (B) PROPELLANT REQUIRED FOR BAILOUT, 3 REV LOS, DOCKING PLUS OPS RESERVE 4. TPI PROPELLANT REQUIRED FOR REMAINDER OF ONE REV RNDZ PLUS OPS RESERVE. (A) PROPELLANT REQUIRED FOR REMAINDER OF ONE REV RNDZ PLUS OPS RESERVE EXCEPT TPF. 5. TPF PROPELLANT REQUIRED FOR REMAINDER OF ONE REV RNDZ PLUS OPS RESERVE. 						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	CONSUMABLES	3-29	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

R	ITEM						
	3-97 CONT.	<p>C. REDLINES</p> <ol style="list-style-type: none"> 1. UNDOCKING TO CIRC PROPELLANT REQUIRED FOR NOMINAL DOCKING PLUS OPS RESERVE 2. CIRC TO PDI PROPELLANT REQUIRED FOR LOS IN LONGEST ABORT RNDZ WITH DPS ATTACHED UNTIL JUST BEFORE TPF (P-20 MAXIMUM DEADBAND), STAGING, BRAKING, DOCKING PLUS OPS RESERVE. 3. PDI TO TOUCHDOWN PROPELLANT REQUIRED FOR DESCENT, NOMASCENT, LONGEST LOS FOR CSM RESCUE (P-20 MAXIMUM DEADBAND), BRAKING, DOCKING PLUS OPS RESERVE. 4. LUNAR STAY PROPELLANT REQUIRED FOR NOM ASCENT, LONGEST LOS FOR CSM RESCUE (P20 MAX DEADBAND), BRAKING, DOCKING, PLUS OPS RESERVE. 5. ASCENT TO TWEAK PROPELLANT REQUIRED FOR ASCENT, TWEAK, ONE REV RNDZ (CSM ACTIVE), DOCKING, PLUS OPS RESERVE. 6. TWEAK TO TPF PROPELLANT REQUIRED FOR ONE REV RNDZ (CSM ACTIVE), DOCKING, PLUS OPS RESERVE. 7. TPF TO DOCKING PROPELLANT REQUIRED FOR OPS RESERVE <p>RULES 3-98 THROUGH 3-101 ARE RESERVED.</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	CONSUMABLES	3-30

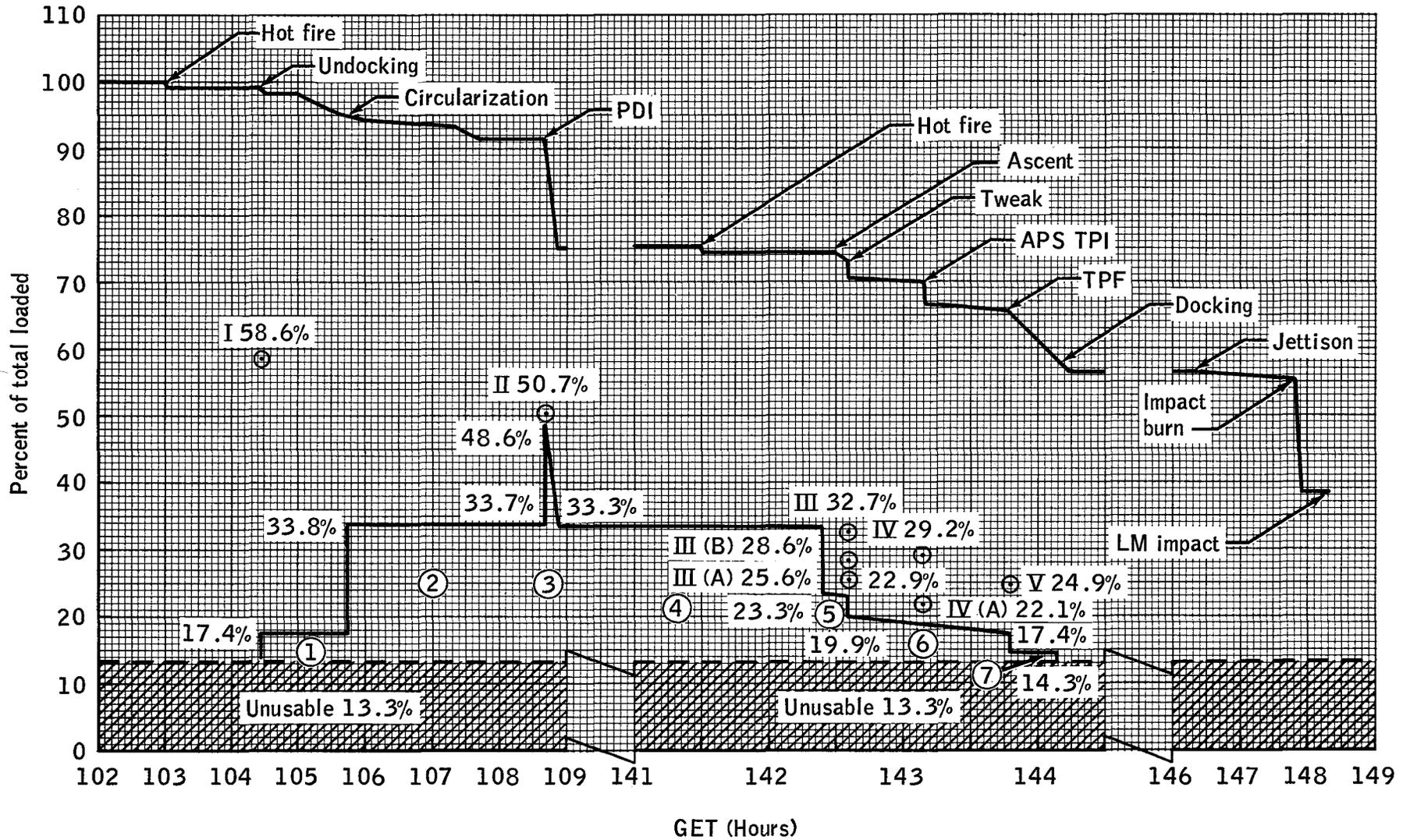


Figure.- LM RCS propellant profile.

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

R	ITEM						
3-102	LM EPS, ECS	<p>THE LM EPS AND ECS MINIMUM CONSUMABLE REQUIREMENTS ARE DEFINED AS FOLLOWS---</p> <p>A. FROM UNDOCKING TO TOUCHDOWN, THE MINIMUM REQUIREMENTS ARE BASED ON THE TIME TO COMPLETE A LANDING, A 24.5-HR STAY WITH 1 EVA, ASCENT, AND A 4.5 HR RENDEZVOUS THROUGH CREW TRANSFER, A TWO HOUR ORBITAL CONTINGENCY, AND REDUNDANT ASCENT EPS SOURCES FOR THE RENDEZVOUS.</p> <p>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 H2O TANK AND ONE ASCENT O2 TANK (THE LM CABIN IS CONSIDERED A REDUNDANT O2 SOURCE) MUST CONTAIN THE CONSUMABLES REQUIRED FOR LIFTOFF AND A 4.5HR RENDEZVOUS THROUGH CREW TRANSFER. THE TWO-HOUR ORBITAL CONTINGENCY, INSOFAR AS ASCENT O2, AND ELECTRICAL POWER ARE CONCERNED, IS CONSIDERED TO BE SATISFIED BY THE REDUNDANCY REQUIREMENT. SHOULD TWO ASCENT H2O TANKS BE AVAILABLE, THE REQUIREMENT FOR LIFTOFF THROUGH CREW TRANSFER CAPABILITY IN EACH TANK WILL SATISFY THE TWO-HOUR ORBITAL CONTINGENCY. IF ONLY ONE TANK IS AVAILABLE, IT MUST ALSO INCLUDE THE TWO-HOUR CONTINGENCY.</p> <p>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 TWO-HOUR SURFACE RESERVE. THE LAST FOUR HOURS OF THIS REQUIREMENT FOR EPS MUST BE SPLIT-BUS OPERATION. ASCENT STAGE MINIMUM REQUIREMENTS ARE AS STATED ABOVE.</p> <p>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-- SUFFICIENT CONSUMABLES BEING RETAINED FOR THIS PURPOSE.</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	CONSUMABLES	3-32

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

R	ITEM	GO/NO GO			STAY/NO STAY	
		UNDOCK	CIRC	PDI	LUNAR STAY	
		ROM(1) WITH 25.5-HR STAY	ROM WITH 25.5-HR STAY	ROM WITH 25.5-HR STAY	ROM(2) WITH 1 EVA	ROM(2) WITH 2 EVA'S
	ASC O2 (LBS EITHER TANK)	1.5	1.5	1.5	1.5	1.5
	PLUS					
	ASC/DES O2 (LBS)	24.6	24.1	23.4	23.1	31.7
	ASC H2O (4)	40	40	40	40	40
	PLUS					
	ASC/DES H2O (LBS)	145	133	113	108	154
	ASC AMP HRS (EACH BAT)	206	206	206	191	191
	PLUS					
	ASC/DES AMP HOURS	1024	963	826	761	994

(1) ROM = REMAINDER OF MISSION

(2) APPLIED AT T3-60 MIN, I.E. TOTAL SURFACE STAY TIMES ARE 25.5 AND 33.5 HOURS.

(3) LM IS 'STAY' IF SUFFICIENT ASCENT/DESCENT H2O AND ELECTRICAL POWER ARE AVAILABLE TO PROVIDE A T3 LIFTOFF, NOMINAL INSERTION & CSM RESCUE CAPABILITY AS A MINIMUM. LM IS 'STAY' EVEN IF ALL TANKED O2 IS LOST.

(4) ASSUMES ONLY ONE ASCENT H2O TANK AVAILABLE. IF TWO ARE AVAILABLE, EACH MUST CONTAIN 29 LBS.

GENERAL NOTE

VALUES IN TABLE ARE THE REQUIRED
USABLE AMOUNTS. UNUSABLES ARE---

	O2	H2O	A-H
ASC	.37	2.08	11
DES	3.39	16.4	27

(PER TANK OR BATTERY FOR
A FOUR DESCENT/TWO
ASCENT BATTERY
CONFIGURATION)

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	CONSUMABLES	3-33

3-102
CONT.

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

R	ITEM						
	3-103	EMU					
		A.	PLSS AMP HRS, O2, LIOH, & H2O REDLINES				
			NOMINAL AND ALTERNATE EVAS-THE PLSS AMP-HRS, O2, LIOH, AND H2O REDLINES FOR EACH OF THE NOMINAL OR ALTERNATE EVA'S ARE DEFINED AS THOSE VALUES REQUIRED FOR 30 MINUTES OF POST EVA RESERVE.				
		B.	PLSS AMP-HR, O2, LIOH AND H2O GO/NO GO'S ARE DEFINED AS THOSE VALUES REQUIRED TO COMPLETE THE EVA (NOMINAL OR ALTERNATE) PLUS THE VALUES REQUIRED FOR 30 MINUTES OF POST EVA RESERVE.				
		C.	NOMINAL (4 HR 15 MIN) EVA REQUIREMENTS PER CREWMAN				
			GO/NO-GO'S				
			EVA NO. 1		EVA NO. 2		
			4 HR	15	4 HR	15	
			POS (PSIA)		954		
			H2O (LBS)		6.4		
			AMP-HRS		15.2		
			LIOH (BTU'S)		5400		
			ASSUMPTIONS	EVA 1	EVA 2		
			MET RATE	1050 BTU/HR	1050 BTU/HR		
			HEAT LEAK	-100 BTU/HR	+100 BTU/HR		
			O2 LEAK RATE	0.035 LBS/HR	0.035 LBS/HR		

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	CONSUMABLES	3-34

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 3 - MISSION RULE SUMMARY - CONTINUED

R	ITEM																			
	3-103 CONT.																			
		<p>D. OPS O2, PLSS O2, H2O AND AMP-HRS GO/NO-GO'S ARE DEFINED AS THOSE VALUES REQUIRED TO COMPLETE A 30-MINUTE CEVA.</p>																		
		<table border="1" style="border-style: dashed; width: 100%;"> <tr> <td colspan="3" style="text-align: center;">CEVA GO/NO-GO TABLE</td> </tr> <tr> <td rowspan="2" style="text-align: center;">OPS</td> <td style="text-align: center;">ACTIVATED</td> <td style="text-align: center;">4600 PSIA/4.8 LBS</td> </tr> <tr> <td style="text-align: center;">UNACTIVATED</td> <td style="text-align: center;">5380 PSIA/5.6 LBS</td> </tr> <tr> <td></td> <td style="text-align: center;">POS</td> <td style="text-align: center;">325 PSIA/0.4 LBS</td> </tr> <tr> <td rowspan="3" style="text-align: center;">PLSS</td> <td style="text-align: center;">H2O</td> <td style="text-align: center;">1.7 LBS</td> </tr> <tr> <td style="text-align: center;">BAT</td> <td style="text-align: center;">3.2 AMP-HRS</td> </tr> <tr> <td style="text-align: center;">LIOH</td> <td style="text-align: center;">800 BTU'S</td> </tr> </table>	CEVA GO/NO-GO TABLE			OPS	ACTIVATED	4600 PSIA/4.8 LBS	UNACTIVATED	5380 PSIA/5.6 LBS		POS	325 PSIA/0.4 LBS	PLSS	H2O	1.7 LBS	BAT	3.2 AMP-HRS	LIOH	800 BTU'S
CEVA GO/NO-GO TABLE																				
OPS	ACTIVATED	4600 PSIA/4.8 LBS																		
	UNACTIVATED	5380 PSIA/5.6 LBS																		
	POS	325 PSIA/0.4 LBS																		
PLSS	H2O	1.7 LBS																		
	BAT	3.2 AMP-HRS																		
	LIOH	800 BTU'S																		
		<p>ASSUMPTIONS</p> <p>MET RATE 1050 BTU/HR</p> <p>O2 LEAK RATE 0.035 LBS/HR</p>																		

	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	MISSION RULE SUMMARY	CONSUMABLES	3-35	

**4 GROUND
INSTRUMENTATION
REQUIREMENTS**

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 GROUND INSTRUMENTATION REQUIREMENTS

R	ITEM							
4-1	GENERAL	<p>A. THE FOLLOWING PRELAUNCH REQUIREMENTS DEFINE THE MCC/MSFN REQUIREMENTS WHICH MUST BE MET BEFORE A 'GO' IS GIVEN FOR LAUNCH.</p> <p>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.</p> <p>C. WHERE REDUNDANCY EXISTS FOR MANDATORY ITEMS, A BACKUP CAPABILITY IS CONSIDERED HIGHLY DESIRABLE.</p>						
		<p style="text-align: center;">NOTE</p> <p style="text-align: center;">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---</p> <p>A. RECEIVE AND DISPLAY TELEMETRY AND TRACKING DATA.</p> <p>B. MAINTAIN VOICE COMMUNICATIONS WITH THE CREW.</p>						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	GROUND INSTR. REQUIREMENTS	GENERAL	4-1	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 GROUND INSTRUMENTATION REQUIREMENTS

R	RULE	CONDITION/MALFUNCTION'	PHASE	RULING	CUES/NOTES/COMMENTS			
	4-2	TELEMETRY						
		A. CONSOLE DISPLAY (D/TV, EVENTS, ANALOGS)	PRELAUNCH	MANDATORY	A. FOR DISPLAY OF MANDATORY S/V PARAMETERS.			
		B. PCM GROUND STATIONS (4)	PRELAUNCH	1 OF 4 MANDATORY, 1 HIGHLY DESIRABLE	B. FOR DISPLAY OF MANDATORY S/V EVENTS AND ANALOGS.			
		C. RECORDING AND PLAYBACK						
		ALDS	PRELAUNCH	BOTH DESIRABLE				
		MSFN						
		D. FM - GROUND STATION	PRELAUNCH	HIGHLY DESIRABLE				
	4-3	COMMAND						
		A. MOCR TOGGLE SWITCHES (BOTH A AND B)			A. FOR LAUNCH PHASE ABORT REQUEST			
		1. BSE ABORT REQUEST	PRELAUNCH	HIGHLY DESIRABLE				
		2. FIDO ABORT REQUEST	PRELAUNCH	HIGHLY DESIRABLE				
		3. FD ABORT REQUEST	PRELAUNCH	HIGHLY DESIRABLE				
		B. COMMAND PANELS--- INCO, GUIDO, BSE, TELCOM, CONTROL, CCATS	PRELAUNCH	HIGHLY DESIRABLE				
		C. MOCR CONSOLE/SITE SELECT CAPABILITY						
		1. RTC CONSOLE (CCATS)	PRELAUNCH	HIGHLY DESIRABLE				
		2. CCATS CMD CONSOLE MED						
		D. FC/M&O SWITCHING CAPABILITY						
		1. CCATS	PRELAUNCH	HIGHLY DESIRABLE				
		2. CCATS CMD MED						
		E. ABORT/CCATS TEST SWITCHING CAPABILITY	PRELAUNCH	HIGHLY DESIRABLE				
		1. FD CONSOLE						
		2. CCATS CMD MED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	GROUND INSTR REQUIREMENTS	MCC	4-2	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 GROUND INSTRUMENTATION REQUIREMENTS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	4-4	TRAJECTORY						
		A. TRAJECTORY DATA PROCESSING			A. THE TRAJECTORY DATA SOURCES ARE UTILIZED AS FOLLOWS---			
		1. AVAILABILITY OF ONE INDEPENDENT TRACKING SOURCE (IPR, USB) FROM LIFTOFF TO T + 10 MINUTES.	PRELAUNCH	1 MANDATORY	1. (A) INDEPENDENT VERIFICATION OF L/V NAVIGATION. (B) PROTECTION AGAINST VIOLATION OF LAUNCH ENVELOPE.			
		2. IU AND CMC TM VECTORS FROM LIFTOFF TO INSERTION PLUS 60 SECONDS.	PRELAUNCH	BOTH MANDATORY	A.2. REQUIRED FOR ORBIT GO/NO-GO			
		B. RTCC - DATA SELECT CAPABILITY	PRELAUNCH	MANDATORY	B. TO SELECT BEST AVAILABLE DATA SOURCE.			
	4-5	COMMUNICATIONS						
		A. MOCR---						
		AFD CONF LOOP FD LOOP	PRELAUNCH	1 OF 2 MANDATORY	FOR MISSION CONTROL			
		MOCR DYN MOCR SYS 1 & 2 A/G 1 LOOP A/G 2 LOOP	PRELAUNCH	ALL HIGHLY DESIRABLE				
		B. MCC/LAUNCH COMPLEX---						
		121 CLTC 111 CVTS 212 MSTC	PRELAUNCH	1 OF 3 MANDATORY	FOR TERMINAL COUNT COORDINATION OF MCC-PAD ACTIVITIES			
		C. MCC/RSO---						
		FD LINE TO RSO RSO PRIVATE LINE CAPE 111 RSO LOOP	PRELAUNCH	1 OF 3 MANDATORY	FOR TRAJECTORY VERIFICATION AND BOOSTER SAFING			
		D. MISCELLANEOUS---						
		BSE TM MONITOR LOOP CIF/USB LOOP	PRELAUNCH	DESIRABLE	USED FOR MONITORING SPACE VEHICLES SUBSYSTEM CHECKOUT			
		E. MCC/REMOVED SITES---						
		ONE A/G PATH	PRELAUNCH	MANDATORY	USED FOR COMMUNICATION WITH CREW			

		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	GROUND INSTR REQUIREMENTS	MCC	4-3	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 GROUND INSTRUMENTATION REQUIREMENTS

R	RULE	CONDITION/MALFUNCTION*	PHASE	RULING	CUES/NOTES/COMMENTS
	4-6	COMPUTER			
		A. MOC (IBM 360/75)	PRELAUNCH	MANDATORY	TO PROCESS MANDATORY S/V PARAMETERS AND TRAJECTORY DATA
		B. DSC (IBM 360/75)	PRELAUNCH	HIGHLY DESIRABLE	AN SSC (IBM 360/75) IS AVAILABLE AS BACKUP TO THE MOC OR DSC.
		C. CCATS (UNIVAC 494) - ONLINE	PRELAUNCH	1 MANDATORY AND 1	TO THROUGH PROCESS MANDATORY S/V PARAMETERS TO MOC
		CCATS (UNIVAC 494) - STANDBY		HIGHLY DESIRABLE	
		D. RTACF - 2	PRELAUNCH	1 HIGHLY DESIRABLE	PRELAUNCH IP PREDICTIONS FOR MODE 1 ABORTS.
	4-7	TIMING MITE (2)	PRELAUNCH	1 MANDATORY	MCC TIMING STANDARD TO SUPPORT MANDATORY RTCC/CCATS COMPUTERS

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	GROUND INSTR REQUIREMENTS	MCC	4-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 GROUND INSTRUMENTATION REQUIREMENTS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	4-9 CONT	5. PHI VS LAMBDA	PRELAUNCH	HIGHLY DESIRABLE ON 1 OF 2--- PLOTBOARD (A) RTCC (B) SSR PLOTBOARD	MONITOR FOR CROSS-RANGE LIMITS		
		6. T(FF) VS R(IP)	PRELAUNCH	HIGHLY DESIRABLE ON 1 OF 2--- (A) D/TV (B) SRR PLOTBOARD	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	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	MONITOR FOR L/V AND S/C NAVIGATION PERFORMANCE		
		10. GUIDO ANALOG CHART RECORDERS ONE AND TWO	PRELAUNCH	HIGHLY DESIRABLE ON TV			
		11. INSERTION/INJECTION DIGITALS	PRELAUNCH	MANDATORY ON D/TV	FOR G&N GO/NO-GO		
		C. ADEG CHANNELS 90-93	PRELAUNCH	HIGHLY DESIRABLE	FOR DSC DISPLAYS		
		D. VSM	PRELAUNCH	MANDATORY	FOR D/TV		
		E. AUX VSM	PRELAUNCH	HIGHLY DESIRABLE			
		F. EIDOPHORS (3)	PRELAUNCH	2 HIGHLY DESIRABLE			
<p>NOTE--- INDIVIDUAL FLIGHT CONTROLLERS WILL BE RESPONSIBLE FOR REPORTING LOSS OF DISPLAY CAPABILITY OF MANDATORY PARAMETERS TO THE FLIGHT DIRECTOR.</p>							
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	GROUND INSTR REQUIREMENTS	MCC	4-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 GROUND INSTRUMENTATION REQUIREMENTS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	4-15	HSK, GDS, MAD IT IS MANDATORY 2 OF 3 OF THESE SITES PROVIDE THE FOLLOWING CAPABILITIES---			
		A. TM USB	PRELAUNCH	MANDATORY	A. TO COVER TRANSLUNAR COAST AND LPO.
		B. TRACK USB	PRELAUNCH	MANDATORY	
		C. VOICE USB	PRELAUNCH	MANDATORY	
		D. CMD USB	PRELAUNCH	HIGHLY DESIRABLE	
	4-16	RIOMETER NETWORK SITES	PRELAUNCH		
		A. LIMA		HIGHLY DESIRABLE	
		B. CRO CYI		1 OF 2 HIGHLY DESIRABLE	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	GROUND INSTR. REQUIREMENTS	GSFC/KSC/MSFN	4-10

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 GROUND INSTRUMENTATION REQUIREMENTS

R	ITEM							
	4-17	<p>INTRODUCTION TO SITE FAILURE DECISION MATRIX</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 12 + 40)</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>						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	GROUND INSTR. REQUIREMENTS	GSFC/KSC/MSFN	4-11	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 4 GROUND INSTRUMENTATION REQUIREMENTS

R	ITEM	SITES FAILED				APPROXIMATE MANDATORY COVERAGE LOST FOR NO/GO ITEMS FOR ALL LAUNCH AZIMUTHS	CAPABILITY LOST			
		ALDS TM	MIL/CAPE	BDA	VAN		TELEMETRY	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	X				NONE SEE NOTE 1	GO	N/A	N/A	N/A
	S I T E		X			00-00 TO 04-10 SEE NOTE 2	GO	GO	NO-GO	NO-GO
	F A I L U R E			X		08-49 TO 09-10 SEE NOTE 3	GO	GO	GO	GO
	F A I L U R E				X	NONE	GO	GO	GO	GO
	M U L T I P L E	X	X			00-00 TO 04-10	NO-GO	GO	NO-GO	NO-GO
	M U L T I P L E		X	X		00-00 TO 09-10 SEE NOTE 2	GO	GO	NO-GO	NO-GO
	S I T E		X		X	00-00 TO 04-10 SEE NOTE 2	GO	GO	NO-GO	NO-GO
	F A I L U R E S			X	X	08-49 TO 16-05	NO-GO	GO	NO-GO	NO-GO
	F A I L U R E S	X				08-49 TO 09-10 SEE NOTE 3	GO	GO	GO	GO
	F A I L U R E S	X			X	NONE	GO	GO	GO	GO
	F A I L U R E S	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 14	FNL	11/1/70	GROUND INSTR. REQUIREMENTS	GSFC/KSC/MSFN	4-12

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM							
	5-1	<p>THE LAUNCH PHASE WILL BE TERMINATED FOR ANY OF THE FOLLOWING CONDITIONS---</p> <p>A. VIOLATION OF THE VEHICLE BREAKUP LINE.</p> <p>B. TFF IS LESS THAN OR EQUAL TO $1 + 40$ AND DECREASING AFTER TOWER JETTISON.</p> <p>C. VIOLATION OF ENTRY 'G' LIMIT.</p> <p>D. VS INCREASING.</p> <p>E. OVERSPEED CONDITIONS AT INSERTION.</p> <p>F. VIOLATION OF EXIT HEATING LINE.</p> <p>G. IF SLV-S/C VIOLATES THE MINIMUM MODE III BURN LINE BEFORE ACHIEVING MODE IV CAPABILITY.</p>						
	5-2	<p>THE LES WILL NOT BE JETTISONED UNTIL MODE II CAPABILITY IS ESTABLISHED BY TFF IS GREATER THAN OR EQUAL TO $1 + 20$ AND INCREASING.</p>						
	5-3	<p>MODE II, III, IV, AND APOGEE KICK.</p> <p>A. THE GROUND IS PRIME FOR ABORT MODE DETERMINATION AND MODE III MANEUVER COMPUTATION. THE CREW USING THE G AND N, WILL BE PRIME FOR MODE IV, APOGEE KICK MANEUVERS, AND DETERMINATION OF S-IVB OVERSPEED CONDITIONS.</p> <p>B. MANEUVERS WILL BE INTERRUPTED WHEN $TFF = 1 + 40$ AND DECREASING.</p> <p>C. MODE IV MANEUVERS WILL BE INTERRUPTED IF THE CURRENT ALTITUDE IS 75 NM, DECREASING AND HP IS LESS THAN 300K FT.</p> <p>D. IF ENTERING, UTILIZE LIFT TO AVOID LAND. UNAVOIDABLE LAND LANDING USE RL 90 DEG.</p> <p>E. IF NO SLA SEP OR IF SPS FAILS---</p> <ol style="list-style-type: none"> 1. HP IS LESS THAN 40 - EXECUTE CM/SM SEP BY $TFF = 1 + 40$. 2. HP IS BETWEEN 40 AND 75 - GROUND WILL DECIDE TO USE SM RCS ASAP OR AT APOGEE TO REDUCE HP TO 40 NM. 						
	5-4	<p>MODE III ABORTS.</p> <p>A. PREDICTED TFF AFTER SPS C/O IS LESS THAN $1 + 40$.</p> <ol style="list-style-type: none"> 1. FULL LIFT IP ON WATER - DO NOT BURN. 2. G&N GO AND FULL LIFT IP ON LAND - BURN TO $TFF = 1 + 40$, RL 90 DEG. 3. G&N NO-GO AND FULL LIFT IP ON LAND - BURN A REDUCED DELTA V TO MAINTAIN TFF AFTER C/O AND RL 90 DEG. <p>B. IF DELTA TB IS LESS THAN OR EQUAL TO 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 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	LAUNCH	5-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM							
5-5		<p>THE S/C CMC WILL BE NO-GO FOR ABORT MANEUVER DETERMINATION AND MONITORING FOR ANY OF THE FOLLOWING---</p> <p>A. CMC PROGRAM ALARMS---</p> <p>SINGLE OCCURRENCE - 00214, 00777, 01107, 01407, 04777, 07777, 10777, 13777, 14777, 00205</p> <p>CONTINUOUS OCCURRENCE - 20430, 20607, 20610, 21103, 21204, 21206, 21210, 21302, 21501, 21502, 21521, 31104, 31201, 31202, 31203, 31207, 31211</p> <p>B. RTCC AND CMC TFF DIFFERENCE OF GREATER THAN 40 SEC.</p> <p>C. CONFIRMED ERROR IN S/C PLATFORM VELOCITY COMPONENTS OF GREATER THAN 50 FPS IN X OR 100 FPS IN Z.</p> <p>D. CMC TRAJECTORY SOURCE INDICATES 'GO' OR 'NO-GO' INCONSISTENT WITH BEST TRAJECTORY SOURCE(S) INDICATION.</p>						
5-6		<p>THE ORBIT IS 'GO' IF HP IS GREATER THAN OR EQUAL TO 75 NM.</p> <p>RULES 5-7 THROUGH 5-19 ARE RESERVED.</p>						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	LAUNCH	5-2	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM						
5-26	RESERVED						
5-27	IF SPS FAILS AFTER EPO RETROFIRE IGNITION OR NO SLA SEP---						
	A. HP IS GREATER THAN 75 NM - RETARGET FOR NEXT BEST PTP USING RCS.						
	B. HP BETWEEN 40 AND 75 - PITCH UP TO LOCAL HORIZONTAL ATTITUDE AND BURN SM RCS USING FOLLOWING PRIORITIES---						
	1. BURN HP TO PAD VALUE						
	2. BURN MAXIMUM SM RCS DELTA V AVAILABLE						
	3. BURN CM RCS TO HP = 40 NM IF SM RCS DELTA V NOT SUFFICIENT TO OBTAIN HP = 40 NM IF HP IS LESS THAN OR EQUAL TO 40 NM TERMINATE ALL THRUSTING AT TFF = 7 MIN.						
	C. HP IS LESS THAN 40 NM - REMAIN IN RETRO ATTITUDE AND BURN SM RCS USING THE FOLLOWING PRIORITY---						
	1. BURN DELTA V RESIDUALS.						
	2. BURN MAXIMUM SM DELTA V AVAILABLE.						
	NOTE						
	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 DELTA V.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 1	FNL	11/1/70	TRAJECTORY AND GUIDANCE	EARTH ORBIT AND TLI	5-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM	
	5-28	<p>THE G&N IS NO-GO FOR ENTRY IF---</p> <p>A. THE CMC VALUE OF DOWNRANGE ERROR (RP - RT) AT .2G DIFFERS GREATER THAN +/- 100 NM FROM GROUND VALUE. CREW FAILOVER TO EMS ENTRY AS FIRST PRIORITY OR GROUND BANK ANGLE AND RETRB AS SECOND PRIORITY.</p> <p>B. V AND GAMMA AT 400K ARE OUTSIDE THE CORRIDOR. GROUND WILL PROVIDE ENTRY PROFILE.</p>
	5-29	<p>BOOSTER NAVIGATION AND TARGET UPDATES FOR TLI---</p> <p>A. AN IU NAVIGATION UPDATE WILL BE PERFORMED FOR THE FOLLOWING SITUATIONS. THE UPDATE WILL BE TIMETAGGED PRIOR TO LOS OF THE LAST SITE PRIOR TO TB6 INITIATION.</p> <p>1. WHERE AN IU ACCELEROMETER FAIL OCCURRED PRIOR TO EARTH ORBIT INSERTION.</p> <p>2. FOR A FIRST OR SECOND TLI OPPORTUNITY WHERE MSFN VERSUS IU DIFFERENCE VIOLATES ANY OF THE FOLLOWING---</p> <p style="margin-left: 40px;">AT GET = 56 MIN--- DOWNRANGE POSITION GREATER THAN +/- 87801 FT SEMI-MAJOR GREATER THAN +/- 3.1 NM CROSSRANGE VELOCITY GREATER THAN +/- 16 FPS</p> <p style="margin-left: 40px;">AT GET = 1 HR 45 MIN--- DOWNRANGE POSITION GREATER THAN +/- 181468 SEMI-MAJOR AXIS GREATER THAN +/- 3.5 NM CROSSRANGE VELOCITY GREATER THAN +/- 16 FPS</p> <p>B. THERE WILL BE NO IU TARGET UPDATES FOR EITHER TLI OPPORTUNITY.</p>
	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	<p>DISPERSED TLI C/O---</p> <p>PREDICTED DELTA V CAPABILITY (CSM ALONE) AFTER TD&E AND DOCKED SPS MIDCOURSE---</p> <p>A. GREATER THAN 5500 FPS - CONTINUE MISSION</p> <p>B. LESS THAN 5500 FPS - EXECUTE EARTH ORBIT ALTERNATE</p>

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	EARTH ORBIT AND TLI	5-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM							
5-35		<p>DIFFERENCE IN CMC AND IU PLATFORM VELOCITY COMPONENTS OR TOTAL VELOCITY AT INSERTION---</p> <p>A. VIOLATION OF ANY OF THE FOLLOWING MEANS TLI IS NO-GO---</p> <p style="margin-left: 40px;">DELTA XDOT IS GREATER THAN +/- 38 FPS</p> <p style="margin-left: 40px;">DELTA YDOT IS GREATER THAN +/- 73 FPS</p> <p style="margin-left: 40px;">DELTA ZDOT IS GREATER THAN +/- 87 FPS</p> <p style="margin-left: 40px;">DELTA VT IS GREATER THAN +/- 34 FPS</p> <p>B. VIOLATION OF ANY OF THE FOLLOWING MEANS TLI IS TEMPORARILY NO-GO---</p> <p style="margin-left: 40px;">DELTA XDOT IS BETWEEN +/- 7.5 AND +/- 38 FPS</p> <p style="margin-left: 40px;">DELTA YDOT IS BETWEEN +/- 41 AND +/- 73 FPS</p> <p style="margin-left: 40px;">DELTA ZDOT IS BETWEEN +/- 28 AND +/- 87 FPS</p> <p style="margin-left: 40px;">DELTA VT IS BETWEEN +/- 14 AND +/- 34 FPS</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">TLI IS NO-GO UNTIL PARTS C AND 5-36 ARE DETERMINED (ORBITAL PARAMETER DECISIONS).</p> <p>C. VIOLATION OF ANY OF THE FOLLOWING ORBITAL DECISION PARAMETERS AT GET = 1 HR 45 MIN MEANS TLI IS NO-GO. PARAMETERS ARE IU VERSUS MSFN.</p> <p style="margin-left: 40px;">SEMI-MAJOR AXIS IS GREATER THAN +/- 3.28 NM</p> <p style="margin-left: 40px;">CROSSRANGE VELOCITY IS GREATER THAN +/- 32 FPS</p>						
5-36		DIFFERENCE IN MSFN AND IU DOWNRANGE POSITION (DELTA RV) IS GREATER THAN +/- 105,100 FT AT GET = 56 MIN MEANS TLI IS NO-GO.						
5-37		<p>WITH AN S-IVB GUID REF FAIL OR AN S-IVB ACCELEROMETER FAIL DURING LAUNCH PHASE, VIOLATION OF ANY OF THE FOLLOWING ORBITAL DECISION PARAMETERS MEANS TLI IS NO GO. PARAMETERS ARE CMC VERSUS MSFN.</p> <p>A. DIFFERENCE IN DOWNRANGE POSITION IS GREATER THAN +/- 535,900 FEET AT GET = 56 MIN.</p> <p>B. DIFFERENCE IN SEMIMAJOR AXIS IS GREATER THAN +/- 11.6 N. MI AT GET = 1 HR 45 MIN.</p> <p>C. DIFFERENCE IN CROSSRANGE VELOCITY IS GREATER THAN +/- 78.7 FPS AT GET = 1 HR 45 MIN.</p>						
		RULES 5-38 THROUGH 5-45 ARE RESERVED.						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	EARTH ORBIT AND TLI	5-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM						
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, 10777, 13777, 14777						
	CONTINUOUS OCCURRENCE - 20430, 20607, 20610, 21103, 21204, 21206, 21210, 21302, 21501, 21502, 21521, 31104, 31201, 31202, 31203, 31207, 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 IS GREATER THAN 4 DEG FOR RETROFIRE FROM EPO.						
	C. LGC/IMU ALIGNMENT DISCREPANCY INDICATE BY GREATER THAN 2 DEG FROM PREDICTED COAS COORDINATES.						
	D. DIFFERENCE BETWEEN CMC/LGC GROUND NAV CHECK AFTER A NAV UPDATE FROM GROUND IS---						
	1. LATITUDE IS GREATER THAN .02 DEG.						
	2. LONGITUDE IS GREATER THAN .02 DEG.						
	3. H IS GREATER THAN .2 NM.						
5-47	SPACECRAFT TIMING MUST BE MAINTAINED WITHIN THE LIMITS---						
		CMC (SEC)	LGC (SEC)	AGS (SEC)			
	A. RETROFIRE	2	-----	-----			
	B. ENTRY	2	-----	-----			
	C. TLI	2	-----	-----			
	D. MCC'S	2	-----	-----			
	E. LOI/DOI	2	2	-----			
	F. TEI	2	2	-----			
	G. DESCENT	.5	.3	.3			
	H. ASCENT	.5	.3	.3			
	I. RENDEZVOUS	.5	.5	.5			
	J. SXT TRACKING	.5	-----	-----			
	RULES 5-48 THRU 5-55 ARE RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	MANEUVERS	5-7

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM						
		APOLLO 14 FNL 11/1/70 TRAJECTORY TRANSLUNAR					
	5-56	RESERVED					
	5-57	TRANSLUNAR MCC EXECUTION CRITERIA A. SPS MCC'S SHOULD BE GREATER THAN 3 SEC. B. MCC 2 AND 4 ARE PREFERRED EXECUTION POINTS. C. CONSIDERING THE ABOVE, FIRST MIDCOURSE WILL BE DELAYED UNTIL MCC 2 IF COST IS NOT PROHIBITIVE. D. IF THE NOMINAL MISSION DESIGN IS FREE RETURN, A NON-FREE MCC 2 OF 3 SEC SPS WILL BE EXECUTED TO AVOID MCC 3 WHEN FEASIBLE. E. FOR A NOMINAL HYBRID MISSION, THE MANEUVER TO GO NON-FREE RETURN WILL BE EXECUTED AT MCC 2.					
	5-58	RESERVED					
	5-59	LOI SHALL BE TARGETED WITHIN THESE CONSTRAINTS--- A. THE PERICYNTHION OF THE APPROACH HYPERBOLA WILL BE MAINTAINED WITHIN +/- 10 N.M. OF HP - TARGET. B. THE ALTITUDE OF THE NODE (BETWEEN THE APPROACH HYPERBOLA AND THE DESIRED LPO) WILL BE MAINTAINED BETWEEN -10 AND +15 N.M. OF HP TARGET.					
	5-60	A 'GO' FOR LOI REQUIRES THE FOLLOWING--- A. COMMITMENT TO 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 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	MANEUVERS COAST	5-8

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM																		
5-61		<p>PREMATURE LOI SHUTDOWN FOR SPS PROBLEMS (LOI ABORT MODES)</p> <p>A. SHUTDOWN IN MODE I REGION -</p> <p style="margin-left: 40px;">1. EXECUTE A DPS 2 HR DIRECT ABORT FOR LOI BURN TIME FROM <u>0</u> TO <u>33</u> SEC. LOI DELTA V FROM 0 TO 238</p> <p style="margin-left: 40px;">2. EXECUTE A DPS 30 MIN DIRECT ABORT FOR LOI BURN TIME FROM 33 SEC TO 1+15 LOI DELTA V FROM 238 TO 545</p> <p style="margin-left: 40px;">3. EXECUTE A DPS TO DEPLETION 30-MIN DIRECT ABORT FOLLOWED BY A SUPPLEMENTARY APS BURN 2 HRS LATER LOI BURN TIME FROM 1+15 TO 1+39 LOI DELTA V FROM 545 TO 725</p> <p>B. SHUTDOWN IN MODE II REGION - EXECUTE A DPS 2-IMPULSE CIRCULUNAR ABORT.</p> <p style="margin-left: 40px;">LOI BURN TIME FROM 1+39 TO 2+41 LOI DELTA V FROM 725 TO 1202</p> <p>C. SHUTDOWN IN MODE III REGION - EXECUTE TEI (SPS OR DPS) AT NEXT OPPORTUNITY OR INITIATE AN ALTERNATE MISSION.</p> <p style="margin-left: 40px;">LOI BURN TIME FROM 2+41 TO 6+07 LOI DELTA V FROM 1202 TO 2986</p> <p>NOTE---</p> <p style="margin-left: 40px;">1. ALL ABORT MANEUVERS ARE MCC-H TARGETED EXCEPT FOR THE DPS 30-MIN ABORT WHICH IS TAKEN FROM THE CREW CHART</p> <p style="margin-left: 40px;">2. CONTROL LIMITS APPLY AS FOLLOWS---</p> <table style="margin-left: 80px; border: none;"> <thead> <tr> <th style="text-align: left;">LOI DELTA TB</th> <th style="text-align: left;">LOI DELTA V</th> <th style="text-align: left;">LIMITS</th> </tr> </thead> <tbody> <tr> <td>0 - 33 SEC</td> <td>0 - 238</td> <td>TIGHT</td> </tr> <tr> <td>33 SEC-3+20</td> <td>238 - 1513</td> <td>LOOSE</td> </tr> <tr> <td>3+20 - C/O</td> <td>1513 - 2986</td> <td>TIGHT</td> </tr> </tbody> </table>	LOI DELTA TB	LOI DELTA V	LIMITS	0 - 33 SEC	0 - 238	TIGHT	33 SEC-3+20	238 - 1513	LOOSE	3+20 - C/O	1513 - 2986	TIGHT					
LOI DELTA TB	LOI DELTA V	LIMITS																	
0 - 33 SEC	0 - 238	TIGHT																	
33 SEC-3+20	238 - 1513	LOOSE																	
3+20 - C/O	1513 - 2986	TIGHT																	
5-62		<p>IF THE SPS FAILS AT IGNITION---</p> <p>A. MCC - RESCHEDULE MCC FOR FLYBY TRAJECTORY WITH DPS/SM-RCS EXECUTION.</p> <p>B. LOI - EXECUTE ABORT MANEUVER WITH DPS/SM-RCS.</p> <p>C. DOI - EXECUTE GROUND COMPUTED TEI WITH DPS AS SOON AS PRACTICAL.</p> <p>RULES 5-63 THROUGH 5-75 ARE RESERVED.</p>																	
		MISSION	REV	DATE	SECTION	GROUP	PAGE												
		APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	MANEUVERS COAST	5-9												

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM						
	5-76	THE DOI MANEUVER WILL BE TARGETED TO ACHIEVE A 50K FT PERICYNTHIAN AT PDI.					
	5-77	<p>A "GO" FOR DOI REQUIRES COMMITMENT TO AT LEAST 4 HRS IN LUNAR ORBIT.</p> <p>(NOTE--- THIS PROVIDES ONE FULL REV OF TRACK AFTER DOI FOR CALCULATION OF TEI.)</p>					
	5-78	<p>AFTER AOS, FOLLOWING DOI, 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 N.M. ABOVE THE LUNAR TERRAIN.</p> <p style="text-align: center;">NOTE</p> <ol style="list-style-type: none"> 1. THE PERICYNTHION ALTITUDE WHICH CORRESPONDS TO 1.0 N.M. CLOSEST APPROACH IS 3.6 N.M. 2. THE VALUE OF DOPPLER RESIDUALS AT AOS WHICH CORRESPONDS TO THIS PERICYNTHION IS -32 CYCLES PER SECOND. <p>RULES 5-79 THROUGH 5-80 ARE RESERVED.</p>					
	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	TRAJECTORY GUIDANCE	LUNAR ORBIT	5-10	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM							
5-89	LR DATA IS REQUIRED FOR LANDING--NO LR DATA BY 10K FT -ABORT.							
	<ul style="list-style-type: none"> A. LR CONVERGENCE (ALTITUDE ONLY) - DATA NOT BEING ACCEPTED OR CONVERGING FOLLOWING LOCKON FOR 60 SECONDS - ABORT. B. LR DATA ACCEPTED AND CONVERGED CONTINUOUS TO P-64 - CONTINUE MISSION IF LOSS OF LOCK OCCURS IN P-64. C. LR DATA ACCEPTED AND CONVERGED WITH SUBSEQUENT DROPOUT - CONTINUE TO P-64. <ul style="list-style-type: none"> 1. LANDING RADAR REGAINED IN P-64. <ul style="list-style-type: none"> (A) DELTA H LESS THAN 1000FT BETWEEN PGNS AND LR - CONTINUE MISSION. (B) DELTA H GREATER THAN 1000 FT BETWEEN PGNS AND LR - ATTEMPT MANUAL LANDING IN AGS. 2. LR NOT REGAINED AT P-64 - ABORT. D. LATE LR LOCKON WITH DATA BEING INCORPORATED AND CONVERGING - CONTINUE TO P-64. <ul style="list-style-type: none"> 1. DELTA H LESS THAN 1000 FT BETWEEN PGNS AND LR - CONTINUE MISSION. 2. DELTA H GREATER THAN 1000 FT BETWEEN PGNS AND LR - ATTEMPT MANUAL LANDING IN AGS. 							
5-90	<ul style="list-style-type: none"> A. POWERED DESCENT WILL BE TERMINATED FOR--- <ul style="list-style-type: none"> 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 TO EXCEED MINUS 10 FPS, PRIOR TO LANDING RADAR ALTITUDE INCORPORATION AND CONVERGENCE (A MINUS VELOCITY DIFFERENCE INDICATES THAT THE AGS TRAJECTORY IS LOWER THAN THE PGNS TRAJECTORY). 2. PGNS NAVIGATION ERRORS, CONFIRMED BY MSFN OR DOPPLER RESIDUALS, THAT RESULT IN THE FOLLOWING AGS-PGNS VELOCITY DIFFERENCES--- <ul style="list-style-type: none"> DELTA X DOT (DOWNRANGE) GREATER THAN +/- 45 FPS DELTA Y DOT (CROSSRANGE) GREATER THAN +/- 90 FPS DELTA Z DOT (RADIAL) GREATER THAN +/- 35 FPS 3. 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 MINUS 20 FPS PRIOR TO LANDING RADAR ALTITUDE INCORPORATION AND CONVERGENCE. 4. PGNS NAVIGATION ERRORS CONFIRMED BY DOPPLER RESIDUALS BUT NOT BY AGS, THAT RESULT IN THE FOLLOWING MSFN-PGNS VELOCITY DIFFERENCES--- <ul style="list-style-type: none"> DELTA Y DOT (CROSSRANGE) GREATER THAN +/- 200 FPS. DELTA Z DOT (RADIAL) GREATER THAN +/- 35 FPS. <p>NOTE---RULES 2 AND 4 ARE INDEPENDENT OF ANY TYPE OF LANDING RADAR UPDATE. FOR RULES 1 AND 2, SWITCHOVER TO AGS WILL BE PERFORMED.</p> <ul style="list-style-type: none"> 5. COMMANDED THRUST INCREASING PRIOR TO THROTTLE DOWN OR P63 TGO=80 SEC. 6. RESERVED 7. NO THROTTLE RECOVERY BY P63/664 PROGRAM SWITCH PLUS 15 SEC. 8. FAILURE TO ACHIEVE FTP BY NOMINAL TIG +31 SEC. (ABORT AT GTC DIVERGENCE). 9. FAILURE TO ENTER P64 WHEN TGO EQUALS 60 SECONDS. 10. THE FOLLOWING PGNS ALARMS---20105, 00214, 20430, 20607, 21103, 01107, 21204, 21302, 21501, 00402 (CONTINUING). <ul style="list-style-type: none"> B. POWERED DESCENT MANEUVER WILL BE TERMINATED AND AN ABORT REQUESTED IF THE TIME BIASED DPS ABORT BOUNDARY IS VIOLATED. 							
5-91	AN ABORT WILL NOT BE REQUESTED FOR A PGNS FAILURE AFTER A PGNS INDICATION THAT THE HIGH GATE TARGETING CONDITIONS HAVE BEEN ACHIEVED.							
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	DESCENT	5-12	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM							
	RULES	5-92 THROUGH 5-100 ARE RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	DESCENT	5-13	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM	DESCRIPTION
	5-101	<p>LM LIFTOFF WILL BE DELAYED ONE REVOLUTION RATHER THAN ACCEPTING A SLIP IN NOMINAL LIFTOFF TIME GREATER THAN</p> <p>A. <u>10</u> SECONDS FOR THE SHORT RNDZ TECHNIQUE</p> <p>B. <u>90</u> SECONDS FOR THE COELLIPTIC SEQUENCE RNDZ</p>
	5-102	<p>FOLLOWING A DESCENT ABORT, GUIDANCE SWITCHOVER TO AGS WILL BE PERFORMED FOR---</p> <p>A. THE FOLLOWING PGNS ALARMS--- 20105, 00214, 20430, 20607, 21103, 01107, 21204, 21302, AND 21501</p> <p>B. PGNS NAVIGATION ERRORS THAT RESULT IN---</p> <ol style="list-style-type: none"> 1. AGS PREDICTED INSERTION HP LESS THAN 40,000 FEET. 2. AGS PREDICTED INSERTION HA GREATER THAN TARGET VALUE PLUS 40 NAUTICAL MILES. 3. AGS PREDICTED INSERTION WEDGE ANGLE GREATER THAN 1.0 DEGREE.
	5-103	<p>DURING ASCENT, GUIDANCE SWITCHOVER TO AGS WILL BE PERFORMED FOR---</p> <p>A. THE FOLLOWING PGNS ALARMS--- 20105, 00214, 20430, 20607, 21103, 01107, 21204, 21302, AND 21501</p> <p>B. PGNS NAVIGATION ERRORS, CONFIRMED BY AGS RESIDUALS, THAT RESULT IN THE FOLLOWING MSFN-PNGS VELOCITY DIFFERENCES---</p> <p style="margin-left: 20px;">DELTA X DOT (DOWNRANGE) GREATER THAN +/- 24 FPS</p> <p style="margin-left: 20px;">DELTA Y DOT (CROSSRANGE) GREATER THAN +/- 90 FPS (COELLIPTIC SEQUENCE RENDEZVOUS) GREATER THAN +/- 45 FPS (SHORT RENDEZVOUS)</p> <p style="margin-left: 20px;">DELTA Z DOT (RADIAL) GREATER THAN +/- 37 FPS</p> <p>C. PGNS NAVIGATION ERRORS THAT RESULT IN---</p> <ol style="list-style-type: none"> 1. AGS PREDICTED INSERTION HP LESS THAN 40,000 FEET. 2. AGS PREDICTED INSERTION HA 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 (SHORT RENDEZVOUS) <p>D. IF MSFN NOT VALID DURING ASCENT THE FOLLOWING DOPPLER RESIDUALS WILL BE USED TO CONFIRM SWITCHOVER---</p> <ol style="list-style-type: none"> 1. AGS - PGNS DELTA X DOT (DOWNRANGE) GREATER THAN +/- 24 FPS AND DOPPLER - PGNS RESIDUAL GREATER THAN 10 FPS. 2. AGS - PGNS DELTA Z DOT (RADIAL) GREATER THAN +/- 37 FPS AND DOPPLER - PGNS RESIDUAL GREATER THAN 33 FPS.

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	ASCENT	5-14	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM						
5-104		DURING ASCENT, THE AGS WILL BE DECLARED NO-GO FOR CONFIRMED AGS NAVIGATION ERRORS THAT RESULT IN----					
		A. PGNS PREDICTED INSERTION HP LESS THAN 30,000 FT.					
		B. PGNS PREDICTED INSERTION HA GREATER THAN TARGET VALUE PLUS 40 N.M.					
		C. PGNS PREDICTED INSERTION WEDGE ANGLE GREATER THAN 1.0 DEGREE (COELLIPTIC SEQUENCE RENDEZVOUS) GREATER THAN 0.5 DEG (SHORT RENDEZVOUS)					
5-105		THE GROUND WILL NOT REQUEST SWITCHOVER AFTER AGS TGO LESS THAN 30 SEC.					
		RULES 5-106 THRU 5-110 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	ASCENT	5-15

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM							
	5-111	<p>THE PGNS IS PRIME FOR EITHER THE SHORT RNDZ (TPI ONLY) OR THE COELLIPTIC SEQUENCE (CSI,CDH,AND TPI) MANEUVER COMPUTATION/EXECUTION WITH THE AGS AS BACKUP UTILIZING THE ACCEPTED SOLUTION. THE AVAILABLE SOLUTIONS FOR THESE MANEUVER(S) ARE, (IN ORDER OF PRIORITY) PGNS,AGS,CMC,AND CHARTS.</p> <p>A. THE FOLLOWING VOTING LOGIC WILL BE OBSERVED FOR ALL MANEUVERS---</p> <ol style="list-style-type: none"> 1. IF VHF AND RR AGREES - VOTE 2 OUT OF 3 SOURCES AND EXECUTE THE PRIORITY SOLUTION 2. IF VHF AND RR DISAGREE - MSFN WILL BE UTILIZED TO ISOLATE THE FAILED SYSTEM <p>B. AGREEMENT BETWEEN SOURCES IS DEFINED AS---</p> <ol style="list-style-type: none"> 1. SHORT RNDZ - TPI--- <u>3</u> FPS IN DELTA VX, <u>7</u> FPS IN DELTA VY, <u>9</u> FPS IN DELTA VZ (NOTE--- LM BIASES OF +1 FPS IN DELTA VX AND -2 FPS IN DELTA VZ WILL BE APPLIED TO THE LM SOLUTION FOR COMPARISON WITH THE CSM SOLUTION) 2. COELLIPTIC SEQUENCE RNDZ <ol style="list-style-type: none"> A. CSI - 3 FPS IN DELTA VX B. CDH - 2 FPS IN DELTA VX, 6 FPS IN DELTA VZ C. TPI - 2 FPS IN DELTA VX, 5 FPS IN DELTA VY, 6 FPS IN DELTA VZ <p>C. THE CMC SOLUTION FOR THE PLANE CHANGE MANEUVER WILL ALWAYS BE EXECUTED IF GREATER THAN 5 FPS.</p>						
	5-112	<p>LIFTOFF WILL BE COMPUTED TO SATISFY THE FOLLOWING CONSTRAINTS---</p> <p>A. SHORT RNDZ</p> <ol style="list-style-type: none"> 1. THE DELTA H AT TPI WILL BE 15 NM. 2. THE DELTA θ AT TPI WILL BE + 1.69 DEG. 3. TPI WILL OCCUR 38 AFTER INSERTION 4. THE WEDGE ANGLE AT INSERTION WILL BE ZERO DEGREES. <p>B. COELLIPTIC SEQUENCE RNDZ.</p> <ol style="list-style-type: none"> 1. THE DELTA H AT TPI WILL BE 15 NM. 2. THE NOMINAL ELEVATION ANGLE (26.6) DEG WILL OCCUR 16 MIN PRIOR TO SUNRISE. 3. THE CDH MANEUVER WILL BE APPROXIMATELY ZERO DELTA V 						
	5-113	<p>COELLIPTIC SEQUENCE RNDZ EXECUTION SHALL, WHERE POSSIBLE, OBSERVE THE FOLLOWING CONSTRAINTS--</p> <p>A. THE ACTUAL DELTA H MAY BE SLIPPED +/- 5 NM. FROM 15 NM.</p> <p>B. TPI MAY OCCUR NO EARLIER THAN 31 MIN. PRIOR TO SUNRISE</p> <p>C. THE DELTA T BETWEEN CDH AND TPI MUST BE GREATER THAN 30 MIN.</p>						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	TRAJECTORY GUIDANCE	RENDEZVOUS	5-16

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM						
	5-121	RESERVED					
	5-122	RESERVED					
	5-123	TEC MCC FOR LANDING AREA CONTROL--- A. PRIOR TO EI-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. B. AFTER EI-24 HRS---WILL NOT BE EXECUTED.					
	5-124	RESERVED					
	5-125	BACKUP ENTRY IS CONSTRAINED AS FOLLOWS--- A. THE CONSTANT G ENTRY MUST FALL BETWEEN 3 AND 5 G'S. B. EMS RANGING WILL NOT BE ATTEMPTED UNTIL V IS LESS THAN 25500 FPS.					
	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.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	TRANSEARTH ENTRY	5-18

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM						
5-131	TEI ABORTS AND RESIDUAL TRIMMING PHILOSOPHY.						
	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 DELTA V RULES LISTED BELOW FOR PREMATURE SHUTDOWNS ARE GUIDELINES FOR USE OF RCS PROPELLANT.					
	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---					
	(A)	TEI DELTA V REMAINING GREATER THAN THE RCS DELTA V CAPABILITY MINUS 20 FPS - RESTART SPS AND COMPLETE THE TARGETED BURN. NO TRIM.					
	(B)	TEI DELTA V REMAINING LESS THAN THE RCS DELTA V 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.					
	NOTE---	THIS RULE ALSO APPLIES FOR A DPS TEI WITH NO OPERATIONAL SPS FOR BACKUP.					
	B.	PREMATURE DPS TEI SHUTDOWN WITH AN OPERATIONAL SPS AS BACKUP.					
	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 LESS THAN 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 GREATER THAN 1700 FPS) - TARGET THE SPS AT TEI + 2 HR.					
		RULES 5-132 THRU 5-139 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	TRANSEARTH ENTRY	5-20

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM						
		----- ' RANGE SAFETY RULES AND AGREEMENTS ' ----- ' GENERAL ' -----					
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-1C NO. 3 OR NO. 4 ENGINE HAS SHUT DOWN BY STATING 'RSO, NO. 3 OUT (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.					
5-146		IF AN ESTABLISHED IMPACT PREDICTION (IP) POINT IS ON THE CAPE KENNEDY LAND AREA, 'DESTRUCT/PD' WILL BE TRANSMITTED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	RANGE SAFETY	5-21

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM						
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.					
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 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	RANGE SAFETY	5-22

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM							
		<p>-----</p> <p>' TRACKING SOURCES '</p> <p>-----</p>						
	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 PLOTS 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 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	RANGE SAFETY	5-23

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM						
		----- ' AIRBORNE SYSTEMS ' -----					
	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 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	RANGE SAFETY	5-24

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM						
		----- ' TELEMETRY ' -----					
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 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	RANGE SAFETY	5-27	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 5 TRAJECTORY AND GUIDANCE

R	ITEM	
		<div style="border: 1px dashed black; padding: 5px; margin: 0 auto; width: fit-content;"> RANGE SAFETY WEATHER RESTRICTIONS </div>
5-168	WIND RESTRICTIONS---	AN ANNUAL PROFILE WIND RESTRICTION OF SIGMA 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 14	FNL	11/1/70	TRAJECTORY AND GUIDANCE	RANGE SAFETY	5-28	

||

6 SLV - TB1 THROUGH
TB4/TB4A (LAUNCH)

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TBI 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
	6-6	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 14	FNL	11/1/70	SLV - TBI THROUGH TB4/TB4A		6-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TBI THROUGH TB4/TB4A

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 LOSS OF ENGINE HYDRAULIC FLUID</p> <p>8-6 S-IVB ACTUATOR CONFIRMED HARDOVER PRIOR TO TB6 + 9 MIN 10 SEC</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 SIVB CUTOFF</p> <p>*7-6 S-IVB COLD HELIUM SHUTOFF VALVES FAIL TO CLOSE</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 style="text-align: center;">* 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 SIVB FIRST AND SECOND BURNS.</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV - TB1 THROUGH TB4/TB4A		6-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TBI THROUGH TB4/TB4A

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS												
	6-1	<p>S-IC STAGE LOSS OF THRUST</p> <p>A. ANY SINGLE ENGINE PRIOR TO TB3</p> <p>B. ANY TWO OR MORE ENGINES</p> <p>1. PRIOR TO DEACTIVATION OF TWO ENGINES AUTO ABORT</p> <p>2. AFTER DEACTIVATION OF TWO ENGINES AUTO ABORT</p> <p>C. 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)</p> <p>1. VOICE COMM WITH RSO</p> <p>2. NO VOICE COMM WITH RSO</p>	LAUNCH	<p>A. CONTINUE MISSION</p> <p>BSE INFORM FLIGHT AND FIDO.</p> <p>B. ABORT/CONTINUE MISSION</p> <p>1. ABORT BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST.</p> <p>2. CONTINUE MISSION BSE INFORM FLIGHT AND FIDO. CAPCOM ADVISE CREW OF POTENTIAL OVERRATE CONDITION.</p> <p>C. CONTINUE MISSION</p> <p>BSE INFORM FLIGHT AND FIDO. FLIGHT INFORM RSO.</p> <p>1.(A) FLIGHT CONFIRM ENGINE 3 OR 4 OUT VIA RSO PRIVATE LINE.</p> <p>(B) FLIGHT CONFIRM NO OTHER KNOWN ANOMALIES BY LIGHT ACTIVATION AND VOICE REPORT.</p> <p>2. FLIGHT CONFIRM ENGINE 3 OR 4 AND NO OTHER KNOWN ANOMALIES BY LIGHT ACTIVATION.</p>	<p>A&B. CUES---</p> <p>1. THRUST OK SWITCHES - OFF (K33-115 THROUGH K47-115)</p> <p>2. THRUST CHAMBER PRESSURE LESS THAN 500 PSIA (D8-101 THROUGH D8-105).</p> <p>3. LONGITUDINAL ACCELERATION - (A2-603).</p> <p>4. FINAL THRUST OK CUTOFF - ON (K52-115 THROUGH K56-115).</p> <p>A&B. NOTE---</p> <p>CREW MAY DEACTIVATE AUTOMATIC ABORT AFTER TBI + 120 SEC.</p> <p>C. CUES---</p> <p>1. THRUST CHAMBER PRESSURE LESS THAN 500 PSIA (D8-103, D8-104).</p> <p>2. ENGINE 3 OR ENGINE 4 THRUST OK SWITCHES OFF (K39-115, THROUGH K44-115).</p> <p>3. ENGINE 3 OR 4 FINAL THRUST OK CUTOFF (K54-115, K55-115).</p> <p>C. NOTES---</p> <p>1. RSO LOOP 111 OR FD LOOP BACKUP TO PL.</p> <p>2. CONFIRMATION OF NO OTHER KNOWN ANOMALIES WILL BE BASED ON ENGINE CHAMBER PRESSURE NOT DECREASING AND TOK SWITCHES ON.</p>												
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">MISSION</td> <td style="width: 10%;">REV</td> <td style="width: 10%;">DATE</td> <td style="width: 20%;">SECTION</td> <td style="width: 15%;">GROUP</td> <td style="width: 10%;">PAGE</td> </tr> <tr> <td>APOLLO 14</td> <td>FNL</td> <td>11/1/70</td> <td>SLV - TB1 THROUGH TB4/TB4A</td> <td></td> <td>6-4</td> </tr> </table>						MISSION	REV	DATE	SECTION	GROUP	PAGE	APOLLO 14	FNL	11/1/70	SLV - TB1 THROUGH TB4/TB4A		6-4
MISSION	REV	DATE	SECTION	GROUP	PAGE												
APOLLO 14	FNL	11/1/70	SLV - TB1 THROUGH TB4/TB4A		6-4												

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TBI THROUGH TB4/TB4A

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	6-2	LOSS OF ATTITUDE CONTROL A. PRIOR TO TB1 + 2 MIN	LAUNCH	A. CONTINUE MISSION BSE INFORM FLIGHT AND FIDO CREW WILL ABORT ON LIMITS (NOTE A.1)	<p>CUES---</p> <p>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.</p> <p>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)</p> <p>3. LOSS OF ATTITUDE CONTROL ALERT (SEE NOTE A.3.)</p> <p>NOTES---</p> <p>A.1. CREW ABORT LIMITS---</p> <p>(A) PITCH AND YAW RATE +/- 4 DEG/SEC</p> <p>(B) ROLL RATE +/- 20 DEG/SEC</p> <p>(C) PITCH, YAW, OR ROLL ERROR +/- 5 DEG AND Q-BALL DELTA P +/- 3.2 PSID</p> <p>2. THESE CUES ARE VALID IF RATE CHANNEL SWITCHOVER HAS NOT OCCURRED.</p> <p>3. LOSS OF ATTITUDE CONTROL ALERT WILL BE GIVEN FOR THE FOLLOWING CONDITIONS---</p> <p>(A) LVDC/LVDA COMPUTATIONAL FAILURE</p> <p>(B) ATTITUDE ERROR SIGNALS GREATER THAN +/- 5 DEG.</p> <p>(C) FAILURE TO INITIATE PROPER GUIDANCE SEQUENCE</p> <p>(D) S-1C ENGINE ACTUATOR HARDOVER GREATER THAN +/- 5 DEG.</p>			
		B. BETWEEN TB1 + 2 MIN AND TB5 INITIATE	LAUNCH	B. CONTINUE MISSION BSE INFORM FLIGHT AND FIDO CREW WILL ABORT ON LIMITS (NOTE B.1.)	<p>CUES---</p> <p>B.1. ANGULAR RATES - PITCH (R4-602), YAW (R5-602), OR ROLL (R6-602) GREATER THAN 5 DEG/SEC AND NOT DECREASING.</p> <p>2. ANGULAR RATES - PITCH (R13-602), YAW (R8-602), OR ROLL (R12-602) GREATER THAN 5 DEG/SEC AND NOT DECREASING. (SEE NOTE B.2)</p> <p>3. LOSS OF ATTITUDE CONTROL ALERT. (SEE NOTE B.3)</p> <p>NOTES---</p> <p>B.1 CREW ABORT LIMITS---</p> <p>(A) PITCH OR YAW RATE +/- 10 DEG/SEC</p> <p>(B) ROLL RATE +/- 20 DEG/SEC</p> <p>2. THESE CUES ARE VALID IF RATE CHANNEL SWITCH OVER HAS NOT OCCURRED.</p>			
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	SLV - TBI THROUGH TB4/TB4A		6-5	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TBI THROUGH TB4/TB4A

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	6-2 CONT				<p>3. LOSS OF ATTITUDE CONTROL ALERT WILL BE GIVEN FOR THE FOLLOWING CONDITIONS---</p> <p>(A) LVDC/LVDA COMPUTATIONAL FAILURE.</p> <p>(B) ATTITUDE ERROR SIGNALS PITCH, YAW, OR ROLL GREATER THAN + 5 DEG (TBI + 120 SEC AND S-II BURN)-- ROLL GREATER THAN +/- 3.5 DEG, PITCH AND YAW GREATER THAN +/- 5 DEG (S-IVB BURN ONLY)</p> <p>(C) FAILURE TO INITIATE PROPER GUIDANCE SEQUENCE</p> <p>(D) S-IVB ENGINE ACTUATOR HARDOVER GREATER THAN +/- 5 DEG (S-II BURN ONLY)</p> <p>(E) FAILURE OF S-IVB ENGINE HYDRAULICS (S-IVB BURN ONLY)</p> <p>CUES---</p>		
	6-3	INERTIAL PLATFORM FAILURE - ACCELEROMETER (ONE OR MORE AXIS)	LAUNCH COAST RESTART	CONTINUE MISSION BASE INFORM FLIGHT FIDO, AND GUIDO CAPCOM ADVISE CREW	<p>1. GUIDANCE STATUS WORD (MODE CODE 24 (H60-603)</p> <p>BITS D26 AND D25 FOR Z ACCEL SET TO 'ONE'</p> <p>BITS D24 AND D23 FOR X ACCEL SET TO 'ONE'</p> <p>BITS D22 AND D21 FOR Y ACCEL SET TO 'ONE'</p> <p>2. ACCELEROMETER PICKOFFS (X, Y, OR Z) INDICATE IN EXCESS OF 3 DEG AND NOT DECREASING. (H10-603, H11-603, H12-603)</p> <p>NOTES---</p> <p>1. NO EFFECT ON VEHICLE TRAJECTORY DURING S-IC STAGE BURN.</p> <p>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.</p> <p>3. IU STATE VECTOR AT INSERTION MAY BE NO GO AND A NAV UPDATE MAY BE REQUIRED FOR ACCEPTABLE INITIATION OF TB6 AND ACCEPTABLE TLI GUIDANCE.</p> <p>4. CREW WILL INITIATE MANUAL CUTOFF FOR AN OVERSPEED CONDITION.</p> <p>5. THE SECOND BURN PRECOMPUTED F/M PROFILE FOR THE FAILED AXIS ASSUMES NOMINAL PROPULSION PERFORMANCE AND NOMINAL MASS HISTORY.</p>		
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV - TB1 THROUGH TB4/TB4A		6-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TBI THROUGH TB4/TB4A

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	6-4	LAUNCH VEHICLE INERTIAL PLATFORM FAILURE - ATTITUDE REFERENCE	ALL	CONTINUE MISSION BSE INFORM FLIGHT AND RECOMMEND SPACECRAFT GUIDANCE TAKEOVER	<p>CUES---</p> <p>1. GUIDANCE REFERENCE FAILURE (D04 OR D06 MODE CODE 26 BIT D8 SET TO 'ONE' (H60-603)</p> <p>2. GUIDANCE STATUS WORD-(MODE CODE 24) (H60-603)</p> <p>BITS D20 AND D19 FOR Z GIMBAL SET TO 'ONE'</p> <p>BITS D18 AND D17 FOR X GIMBAL SET TO 'ONE'</p> <p>BITS D16 AND D15 FOR Y GIMBAL SET TO 'ONE'</p> <p>3. LADDER OUTPUTS CONSTANT FOR FAILED AXES (H54-603, H55-603, H56-603)</p> <p>4. ATTITUDE ERROR CONSTANT FOR FAILED AXES (H69-602, H70-602, H71-602)</p> <p>NOTES---</p> <p>1. IN THE EVENT OF THIS FAILURE PRIOR TO TB6, THE CREW WILL HAVE TO INITIATE TB6.</p>
	6-5	RESERVED			
	6-6	EXCESSIVE ATTITUDE ERROR IN PITCH OR YAW DURING S-II BURN	LAUNCH	CONTINUE MISSION/EARLY STAGE	<p>CUES---</p> <p>1. COMMANDED ANGLES MINUS GIMBAL ANGLES (H60-603) GREATER THAN 20 DEG AND DIVERGING</p> <p>2. ACTUATORS NOT RESPONDING (G8-201 THRU 204, G9-201 THRU 204, G30-201 THRU 204, G31-201 THRU 204)</p> <p>3. VERIFIED TRAJECTORY DEVIATION.</p> <p>NOTES---</p> <p>THIS RULE DOES NOT APPLY FOR OTHER IDENTIFIED LAUNCH VEHICLE MALFUNCTIONS. SEE FMR 6-2, 6-3, 6-4, 6-7, AND 6-9.</p>
		A. PRIOR TO S-IVB TO COI CAPABILITY		A. CONTINUE MISSION BSE INFORM FLIGHT AND FIDO	
		B. AFTER S-IVB TO COI CAPABILITY		B. EARLY STAGE BSE INFORM FLIGHT AND FIDO AND RECOMMEND EARLY STAGING	
		C. AFTER S-II CUTOFF MINUS 30 SECONDS		C. CONTINUE MISSION BSE INFORM FLIGHT AND FIDO	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	SLV - TB1 THROUGH TB4/TB4A		6-7

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TBI THROUGH TB4/TB4A

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
6-8	S-II STAGE ANY SINGLE ACTUATOR HARDOVER INBOARD	LAUNCH	ABORT/EARLY STAGE/CONTINUE MISSION				
	A. PRIOR TO S-IVB TO COI CAPABILITY		A. ABORT- BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST		CUES--- 1. YAW ACTUATOR POSITION EXCEEDS +6 DEG (G8-201 THRU 204, G30-201 THRU 204)		
	B. BETWEEN S-IVB TO COI CAPABILITY AND 30 SEC PRIOR TO S-II CUTOFF		B. EARLY STAGE BSE INFORM FLIGHT AND RECOMMEND EARLY STAGING		2. PITCH ACTUATOR POSITION EXCEEDS +6 DEG (G9-201 THRU 204, G31-201 THRU 204)		
	C. AFTER S-II CUTOFF MINUS 30 SEC		C. CONTINUE MISSION- BSE INFORM FLIGHT		3. ADJACENT CONTROL ENGINE ACTUATOR IN SAME PLANE MOVES 4 1/2 DEG INBOARD (SAME MEASUREMENTS AS CUES 1 AND 2) NOTES--- 1. 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 SEC	LAUNCH	ABORT BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST. CREW ABORT PRIOR TO TB3 + 66 SEC.		CUES--- 1. SECOND PLANE SEPARATION INDICATION SHOWS NO SEPARATION (M86-206, M87-206) 2. GUIDANCE MODE WORD 1 MODE CODE 25 BIT D15 REMAINS ZERO (M60-603). 3. IGNITION BUS VOLTAGE REMAINS AT APPROXIMATELY 28 VOLTS (M125-207). 4. RECIRCULATION BUS VOLTAGE REMAINS AT APPROXIMATELY 56 VOLTS (M111-207) NOTES--- THE CREW SHOULD ABORT AS SOON AS POSSIBLE AFTER MALFUNCTION OCCURS TO PRECLUDE EXCESSIVE THERMAL PROBLEMS IN AFT INTERSTAGE.		
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV - TBI THROUGH TB4/TB4A		6-9

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 6 - SLV - TBI THROUGH TB4/TB4A

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	6-12	S-IVB COLD HELIUM SHUTOFF VALVES FAIL OPEN A. PRIOR TO LAUNCH ESCAPE TOWER JETTISON AND LOX TANK ULLAGE PRESSURE IS 50 PSIA OR SATURATED AT UPPER LEVEL B. BETWEEN LAUNCH ESCAPE TOWER JETTISON AND 50 SEC PRIOR TO SII CUTOFF C. AFTER S-II CUTOFF MINUS 50 SEC	LAUNCH	A. ABORT BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST B. EARLY STAGE BSE INFORM FLIGHT AND RECOMMEND EARLY STAGING IMMEDIATELY C. CONTINUE MISSION BSE INFORM FLIGHT	CUES--- A. 1. LOX TANK ULLAGE PRESSURE (D179-406) 2. LOX TANK ULLAGE PRESSURE (D180-406) B&C 1. COLD HELIUM REG DISCHARGE PRESSURE REMAINS GREATER THAN 200 PSIA FOR A MINIMUM OF 20 SECONDS (D105-403) 2. LOX ULLAGE PRESSURE AT RELIEF SETTING (41-44 PSIA) AND RELIEVING (D179-406, D180-406) 3. COLD HE BOTTLE PRESSURE DECAYING (D261-403, D263-403) NOTE--- ALL CUES MUST INDICATE THE FAILURE FOR IMPLEMENTATION OF THIS RULE.		
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV - TB1 THROUGH TB4/TB4A		6-11

7 SLV - TB5 AND
TB7 (COAST)

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	RESERVED					
	7-13	IU ENVIRONMENTAL CONTROL SYSTEM FAILS					
	7-14	COMMON BULKHEAD DELTA P					
	7-15	LOSS OF S-IVB STAGE PNEUMATICS					
	7-16	RESERVED					
	7-17	LH2 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 LOSS OF HYDRAULIC FLUID					
	7-23	RESERVED					
	7-24	RESERVED					
	7-25	LOX NON-PROPULSIVE VENT FAILS TO OPEN					
	7-26	LH2 LATCHING VENT VALVE FAILS TO OPEN					
	7-27	GH2 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					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	7-1	PRIOR TO RESTART, INSUFFICIENT PROPELLANT REMAINS FOR ACHIEVEMENT OF ACCEPTABLE ALTERNATE MISSION.	EARTH ORBIT	NO S-IVB RESTART BSE INFORM FLIGHT AND RECOMMEND NO S-IVB RESTART.	CUE--- PROPELLANT REMAINING AS ASCERTAINED DURING REAL-TIME EVALUATIONS			
	7-2	LOSS OF ONE APS MODULE						
	A.	TB5 TO TB6+9 MIN 20 SEC	EARTH ORBIT TLC	A. CONTINUE MISSION 1. BSE INFORM FLIGHT AND COMMAND - S-IVB BURN MODE ON 2. CREW WILL STABILIZE THE VEHICLE WITH CSM RCS	CUES--- 1. MANIFOLD PRESSURE MOD. 1 BELOW 100 PSIA (D70-414), (D71-414) 2. MANIFOLD PRESSURE MOD. 2 BELOW 100 PSIA (D72-415), (D73-415)			
	B.	TB7 TO TB7+15 MIN		B. CONTINUE MISSION 1. BSE INFORM FLIGHT AND COMMAND - FCC POWER OFF 2. CREW WILL STABILIZE VEHICLE WITH CSM RCS				
	C.	TB7+15 MIN TO LM EJECTION		C. CONTINUE MISSION 1. BSE INFORM FLIGHT AND COMMAND - FCC POWER OFF 2. CREW DISCRETION FOR DOCKING				
	D.	LM EJECTION TO YAW MANEUVER COMPLETE		D. CONTINUE MISSION 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.	AFTER YAW ATTITUDE MANEUVER COMPLETE		E. CONTINUE MISSION BSE INFORM FLIGHT AND 1. AFTER ULLAGE BURN, COMMAND - S-IVB BURN MODE ON 2. AFTER LOX DUMP AND PRIOR TO APS BURN, COMMAND - S-IVB BURN MODE OFF 3. AFTER COMPLETION OF LUNAR IMPACT BURNS, COMMAND FCC POWER OFF	NOTES--- LIMITS IN FMR 7-8 CONDITION/MALFUNCTION 'D' DO NOT APPLY TO THE FAILURE IN 7-2 CONDITION/MALFUNCTION E.			
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-2	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	7-3	J-2 ENGINE MAIN FUEL VALVE (MFV) FAILS TO CLOSE AT---			CUES---
		A. FIRST S-IVB CUTOFF	EARTH ORBIT	A. CONTINUE MISSION BSE INFORM FLIGHT AND COMMAND (ASAP)--- 1. PREVALVES AND RECIRC SHUTOFF VALVES CLOSED (SEE NOTE1) 2. ATTEMPT TO CYCLE AND CLOSE MFV IF SUCCESSFUL, BSE COMMAND--- 3. PREVALVE AND RECIRC SHUTOFF VALVES OPEN	1. MAIN FUEL VALVE POSITION (G4-401). 2. MAIN FUEL VALVE OPEN (K118-401). 3. FUEL FLOWMETER FLOWRATE (F2-401). 4. FUEL RECIRC FLOWRATE (F5-404). NOTES--- 1. IF THE MFV IS OPEN, THE LH2 PUMP INLET PRESSURE WILL GO TO ZERO AFTER COMMAND ACTION (A.1). 2. THIS FAILURE WILL REQUIRE EVALUATION OF LH2 RESIDUALS TO DETERMINE ADEQUACY FOR TLI VELOCITY CUTOFF (REF FMR 7-1). 3. A FAILURE FOLLOWING SECOND BURN CUTOFF WILL REQUIRE A RE-EVALUATION OF LUNAR IMPACT VELOCITY DESIRED.
		B. SECOND S-IVB CUTOFF	TLC	B. CONTINUE MISSION BSE INFORM FLIGHT AND 1. ATTEMPT TO CLOSE MFV WHEN LOX DUMP IS COMPLETE, BSE CMD. 2. PREVALVES AND RECIRC VALVES CLOSE	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

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	EARTH ORBIT	A. CONTINUE MISSION/ NO S-IVB RESTART BSE INFORM FLIGHT AND COMMAND (ASAP)--- 1. PREVALVES AND RECIRC SHUTOFF VALVES CLOSED 2. ATTEMPT TO CLOSE MOV IF A.2 IS SUCCESSFUL, BSE INFORM FLIGHT AND COMMAND 3. PREVALVES AND RECIRC SHUTOFF VALVES OPEN IF A.2. IS UNSUCCESSFUL, BSE INFORM FLIGHT AND RECOMMEND NO SIVB RESTART	CUES--- 1. MAIN OXIDIZER VALVE POSITION (G3-401) GREATER THAN 10 DEG. 2. MAIN OXIDIZER VALVE OPEN-ON (K120-401). 3. LOX FLOWMETER FLOWRATE F1-40 GREATER THAN 47 LB/SEC. 4. LOX INJECTOR PRESSURE (D0005-401)
	B.	SECOND BURN CUTOFF	TLC	B. CONTINUE MISSION BSE INFORM FLIGHT AND 1. ATTEMPT TO CLOSE MOV WHEN LOX DUMP IS COMPLETE, BSE COMMAND 2. PREVALVES AND RECIRC VALVES CLOSE.	NOTES 1. IF THE MOV IS OPEN, THE LOX PUMP INLET PRESSURE WILL GO TO ZERO AFTER COMMAND (A1). 2. THIS FAILURE WILL REQUIRE EVALUATION OF LOX RESIDUALS TO DETERMINE ADEQUACY FOR TLI VELOCITY CUTOFF (REF FMR 7-1) DELTA VELOCITY REQUIREMENTS

MISSION	REV	DATE	SECTION	GROUP	PAGE
---------	-----	------	---------	-------	------

APOLLO 11 FNL	11/1/77	SLV-TB5 AND TB7			7-4
---------------	---------	-----------------	--	--	-----

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	7-5	RANGE SAFETY SYSTEM NOT SAFED AFTER INSERTION	EO		CUES---		
	A.	PROPELLANT DISPERSION SYSTEM NOT ARMED		A. CONTINUE MISSION	1. FIRING UNIT 1 RS EBW GREATER THAN OR EQUAL TO 1.6 VOLTS (M30-411).		
	B.	PROPELLANT DISPERSION SYSTEM ARMED AND RSO HAS NOT SENT MFCO		B. SPACECRAFT SEPARATION	2. FIRING UNIT 2 RS EBW GREATER THAN OR EQUAL TO 1.6 VOLTS (M31-411).		
				BSE INFORM FLIGHT AND RECOMMEND RSO SEND SAFE COMMAND	3. RANGE SAFETY RECEIVER NO. 1 ENABLE (N57-411) BETWEEN 2.4 AND 4.5 VOLTS.		
				1. RECOMMEND SPACECRAFT SEPARATION TO A SAFE DISTANCE (7000 FT).	4. RANGE SAFETY RECEIVER NO. 2 ENABLE (N62-411) BETWEEN 2.4 AND 4.5 VOLTS.		
				2. WHEN SPACECRAFT HAS REACHED A SAFE DISTANCE, RECOMMEND RSO SEND SAFE COMMAND.	5. RSO DISPLAY AND COMMAND SYSTEM STATUS.		
					NOTES---		
					1. RSO SHOULD NOT ATTEMPT TO SAFE THE RANGE SAFETY RECEIVERS ON REVS 2 AND 3 UNTIL MCC CONFIRMS 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 364 ARE VALID ONLY WHEN THE VEHICLE IS RECEIVING 450 MHZ RADIATION.		
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS												
	7-6	S-IVB STAGE COLD HELIUM SHUTOFF VALVES FAIL TO CLOSE AT---			CUES---												
		A. TB5 + 1.4 SEC	EARTH ORBIT	A. CONTINUE MISSION/SPACE- CRAFT SEPERATION BSE INFORM FLIGHT AND COMMAND---	1. COLD HELIUM REGULATOR DISCHARGE PRESSURE GREATER THAN 200 PSIA (D0105-403). 2. LOX TANK ULLAGE PRESSURES (D0179-406, D0180-406). 3. COLD HELIUM BOTTLE PRESSURE DECAYING (D261-403, D0263-403).												
				1. LOX NPV VALVE OPEN (REF NOTE 3) 2. ATTEMPT TO CLOSE STAGE COLD HELIUM SHUTOFF VALVES IF 2 SUCCESSFUL, BSE COMMAND IMMEDIATELY---	NOTES---												
				3. LOX NPV VALVE CLOSE (REF NOTE 3) 4. IF LOX ULLAGE PRESSURE AT 50 PSIA OR SATURATED BSE INFORM FLIGHT AND RECOMMEND IMMEDIATE SPACECRAFT SEPERATION TO A SAFE DISTANCE.	1. ACTION REQUIRED TO AVOID EXCEEDING LOX TK OVER PRESS OR BULKHEAD POSTIVE DELTA PRESS LIMITS (FMR7-14). 2. SEE FMR 7-18 FOR RESTART CRITERIA FOR OFF-NOMINAL COLD HELIUM PRESSURE. 3. IF LOX NPV VALVE FAILS TO OPEN THE LOX VENT VALVE CAN BE OPENED AS BACKUP.												
		B. TB7 + 1.1 SEC	TLC	B. CONTINUE MISSION AFTER TB7 + 2 MIN 30 SEC. BSE INFORM FLIGHT AND COMMAND---													
				1. LOX NPV VALVE OPEN (REF NOTE 3) AT TB7 + 15 MIN BSE SEND---													
				2. LOX NPV VALVE CLOSE (REF NOTE 3)													
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">MISSION</td> <td style="width: 10%;">REV</td> <td style="width: 10%;">DATE</td> <td style="width: 15%;">SECTION</td> <td style="width: 15%;">GROUP</td> <td style="width: 10%;">PAGE</td> </tr> <tr> <td>APOLLO 14</td> <td>FNL</td> <td>11/1/70</td> <td>SLV-TB5 AND TB7</td> <td></td> <td>7-6</td> </tr> </table>						MISSION	REV	DATE	SECTION	GROUP	PAGE	APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-6
MISSION	REV	DATE	SECTION	GROUP	PAGE												
APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-6												

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	7-7	S-IVB AUXILIARY HYDRAULIC PUMP FAILS			CUES---
	A.	TO TURN OFF AS SEQUENCED	EARTH ORBIT	A. CONTINUE MISSION BSE INFORM FLIGHT AND	A.1. SYSTEM PRESSURE (D41-403). 2. RESERVOIR LEVEL (L7-403). 3. AFT BUS NO. 2 CURRENT (M22-404). 4. HYDRAULIC RESERVOIR OIL PRESSURE (D42-403). NOTES---
				1. ATTEMPT TO TURN OFF AUXILIARY HYDRAULIC PUMP AS SOON AS POSSIBLE	A.1. FAILURE IN HYDRAULIC PUMP DEPLETES AFT NO. 2 BATTERY IN APPROXIMATELY 90 MIN AND OVERHEATS HYDRAULIC SYSTEM IN APPROXIMATELY 70 MIN
	B.	TO TURN ON		B. CONTINUE MISSION BSE INFORM FLIGHT AND	CUES---
		1. AS SEQUENCED AND THE HYDRAULIC FLUID TEMP IS BELOW OR PREDICTED TO BE BELOW TO 10 DEG F BEFORE NEXT STATION AOS		1. ATTEMPT TO TURN AUXILIARY HYDRAULIC PUMP ON	B.1. SYSTEM PRESSURE (D41-403). 2. RESERVOIR OIL LEVEL (L7-403). 3. AFTER BUS NO. 2 CURRENT (M22-404). 4. RESERVOIR PRESSURE (D42-403). 5. HYDRAULIC PUMP INLET OIL TEMP (C50-401). 6. RESERVOIR OIL TEMP (C51-403).
		2. AT TB6 + 3 MIN 39 SEC	TLI	2. COMMAND AUXILIARY HYDRAULIC PUMP OFF	
	C.	TO TURN ON FOR LOX DUMP (J-2 ENGINE NOT CENTERED IN PITCH PLANE PRIOR TO LOX DUMP)	TLC	C. CONTINUE MISSION	C.1. ACTUATOR POSITION (G1-400) 2. SYSTEM PRESSURE (D41-403) 3. X-PHI GREATER THAN 10 DEGREES (H60-603)
		1. ENGINE GIMBAL ANGLE LESS THAN +/- 3 DEGREES		1. CONTINUE MISSION BSE INFORM FLIGHT	NOTES---
		2. ENGINE GIMBAL ANGLE GREATER THAN +/- 3 DEGREES		2. CONTINUE MISSION BSE INFORM FLIGHT AND COMMAND---	1. THE ATTITUDE RATE LIMITS IN 7-8 DO NOT APPLY TO THIS RULE. 2. A PITCH ACTUATOR DEFLECTION IN EXCESS OF +/- 3 DEGREES IS ONLY EXPECTED FOR THE FOLLOWING CONDITIONS---
		3. ATTITUDE ERROR GREATER THAN 10 DEGREES DURING DUMP		3. CONTINUE MISSION BSE INFORM FLIGHT AND COMMAND---	(A) ERRONEOUS COMMAND SIGNAL (B) ACTUATOR FAILURE 3. 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.
				1. PREVALVES AND RECIRC VALVES CLOSED	
				1. PREVALVES AND RECIRC VALVES CLOSED.	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-7

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	7-8	LOSS OF ATTITUDE CONTROL DURING			CUES---
	A. TB5	EARTH ORBIT/ TLC	A. SPACECRAFT GUIDANCE TAKEOVER/ SPACECRAFT SEPARATION	BSE INFORM FLIGHT AND RECOMMEND SPACECRAFT GUIDANCE TAKEOVER IF UNSUCCESSFUL, BSE RECOMMEND 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 2. ANGULAR RATES-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)
	B. TB6 TO TB6 + 9 MIN 20 SEC	TLI	B. TLI INHIBIT	BSE INFORM FLIGHT AND RECOMMEND TLI INHIBIT	B. 1. SAME AS A.1. ABOVE 2. SAME AS A.2. ABOVE 3. LOSS OF ATTITUDE CONTROL ALERT (SEE NOTE 2)
	C. TB7	TLC	C. CREW DISCRETION BSE INFORM FLIGHT AND FIDO	1. DO NOT START EVASIVE MANEUVER 2. DO NOT INITIATE TB8 3. BSE PERFORM NON-PROPULSIVE SIVB SAFING BY GROUND COMMAND.	C. 1. SAME AS A.1. ABOVE 2. SAME AS A.2. ABOVE 3. LOSS OF ATTITUDE CONTROL ALER (SEE NOTES 2 AND 4)

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-8

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	7-8 CONT	D. TB8	TLC	D. CONTINUE MISSION BSE INFORM FLIGHT AND FIDO AND TERMINATE--- 1. LOX DUMP 2. ULLAGE ENGINE BURNS 3. LH2 CVS	D. 1. SAME AS B.1. ABOVE 2. SAME AS B.2. ABOVE 3. SAME AS B.3. ABOVE NOTES 1. IMMEDIATELY AFTER S-IVB CUTOFF, S/C RETURN OF CONTROL TO SATURN OR DURING PROGRAMMED 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 OCCURED 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 14	FNL	11/1/70	SLV-TB5 AND TB7		7-9

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	7-10	APS ULLAGE ENGINE(S) THRUST FAILS TO TERMINATE AT SEQUENCED TIMES	EARTH ORBIT/ TLI/TLC	CONTINUE MISSION BSE INFORM FLIGHT AND ATTEMPT TO TERMINATE ULLAGE ENGINE THRUST IF UNSUCCESSFUL, BSE INFORM FLIGHT OF IMPENDING LOSS OF ATTITUDE CONTROL CAPABILITY	CUES--- 1. ULLAGE ENGINE THRUST CHAMBER PRESSURE (D220-414, D221-415). 2. APS HELIUM SPHERE PRESSURE DECREASING (D35-414, D36-415, D250-414, D251-415).		
	7-11	IU STATE VECTOR DIFFERS FROM THE MSFN STATE VECTOR BY 6 SIGMA IU ERRORS AND CVS UNCERTAINTIES AND IS CONFIRMED BY A COMPARISON OF IMU TO MSFN	LAUNCH	CONTINUE MISSION BSE INFORM FLIGHT AND RECOMMEND IU NAVIGATION UPDATE	CUES--- 1. 6 SIGMA IU ERRORS AT T + 56 MIN. (A) DELTA A = 3.1 N.M. (B) DELTA RV = 87801 FT. (C) DELTA W DOT MAX = 16 FT/SEC WHEN DELTA W = 7277 FT. 2. 6 SIGMA IU ERRORS AT T + 1 HOUR 45 MIN. (A) DELTA A = 3.5 N.M. (B) DELTA RV = 181468 FT. (C) DELTA W DOT MAX = 16 FT/SEC WHEN DELTA W = 11338 FT.		
		RULE NUMBER 7-12 IS RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-11

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS												
	7-14	S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS---	EARTH ORBIT TLC	<p>A. CONTINUE MISSION</p> <p>BSE INFORM FLIGHT AND COMMAND---</p> <p>LH2 AND/OR LOX VENT VALVES OPEN OR CLOSED TO PRECLUDE REACHING SEPARATION LIMITS</p> <p>B. SPACECRAFT SEPARATION</p> <p>BSE INFORM FLIGHT AND FIDO AND RECOMMEND SPACECRAFT SEPARATION TO A SAFE DISTANCE</p>	<p>CUES---</p> <p>1. LH2 TANK ULLAGE PRESSURE (K177-408, D178-408).</p> <p>2. LOX TANK ULLAGE PRESSURE (D180-406, D179-406)</p> <p>3. LH2 PUMP INLET PRESSURE (D2-403).</p> <p>4. LOX PUMP INLET PRESSURE (D3-403).</p> <p>NOTES---</p> <p>1. MINUS DELTA PRESSURE IS DEFINED AS A FUEL TANK ULLAGE PRESSURE GREATER THAN THE LOX TANK ULLAGE PRESSURE.</p> <p>2. PLUS DELTA PRESSURE IS DEFINED AS A LOX TANK ULLAGE PRESSURE GREATER THAN THE FUEL TANK ULLAGE PRESSURE.</p> <p>3. THE MINIMUM RECOMMENDED DISTANCE BETWEEN THE S-IVB AND THE SPACECRAFT IS 7,000 FT.</p> <p>4. THE BULKHEAD WILL STRUCTURALLY FAIL AT THE ULTIMATE LIMITS OF MINUS 32.5 PSID OR PLUS 42.0 PSID.</p>												
<table border="1"> <thead> <tr> <th>MISSION</th> <th>REV</th> <th>DATE</th> <th>SECTION</th> <th>GROUP</th> <th>PAGE</th> </tr> </thead> <tbody> <tr> <td>APOLLO 14</td> <td>FNL</td> <td>11/1/70</td> <td>SLV-TB5 AND TB7</td> <td></td> <td>7-13</td> </tr> </tbody> </table>						MISSION	REV	DATE	SECTION	GROUP	PAGE	APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-13
MISSION	REV	DATE	SECTION	GROUP	PAGE												
APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-13												

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	7-19	LOW LOX TANK ULLAGE PRESSURE 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.	A. CONTINUE MISSION 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. AMBIENT REPRESS SYSTEM MODE SELECTOR ON AND CRYO OFF. 3. LOX TANK REPRESS CONTROL VALVE OPEN ON UNTIL TANK PRESSURE GREATER THAN REQUIRED, THEN OFF. 4. AMBIENT REPRESS SYSTEM MODE SELECTOR OFF AND CRYO ON. 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--- 5. BURNER LOX SHUTDOWN VALVE CLOSE. 6. AS CLOSE AS POSSIBLE TO TB6+7 MIN 30 SEC. LOX AMBIENT REPRESS ON	CUES--- 1. LOX ULLAGE PRESSURE (D179-406--D180-406) 2. LOX PUMP INLET PRESSURE (D3-403)		
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-15

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	7-20	J-2 ENGINE START BOTTLE PRESSURE OUTSIDE RESTART LIMITS	EARTH ORBIT		CUES---
		A. ABOVE 1400 PSIA DURING ORBITAL COAST FOR FIRST OPPORTUNITY RESTART OR ABOVE 1500 PSIA FOR SECOND OPPORTUNITY RESTART		A. CONTINUE MISSION BSE INFORM FLIGHT AND SEND---	1. START BOTTLE PRESSURE (D17-401, U241-401)
		B. ABOVE 1800 PSIA PRIOR TO RESTART		B. SPACECRAFT SEPARATION BSE INFORM FLIGHT AND FIDO AND RECOMMEND SPACECRAFT SEPARATION	
		C. BELOW 800 PSIA (SEE NOTE)	EARTH ORBIT	C. CONTINUE MISSION BSE INFORM FLIGHT AND COMMAND ASAP---	NOTES---
				1. START TANK RECHARGE ARM ON	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. START TANK VENT OPEN UNTIL TANK PRESSURE LESS THAN 300 PSIA, THEN CLOSE	2. A START BOTTLE PRESSURE OF 300 PSIA MAXIMUM IS ALLOWABLE AT START BOTTLE RECHARGE COMMAND.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-16

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	7-21	PU VALVE FAILS TO A MIXTURE RATIO GREATER THAN 5.0 TO 1 ANY TIME PRIOR TO RESTART	EARTH ORBIT/ TLI	CONTINUE MISSION BSE INFORM FLIGHT AND COMMAND--- 1. PU VALVE HARDOVER POSITION ON (LOW EMR 4.5 TO 1) (SEE NOTE 1) IF 1 IS UNSUCCESSFUL, BSE INFORM FLIGHT AND--- 2. VENT START BOTTLE TO ACCEPTABLE LIMITS	CUES--- 1. PU VALVE POSITION (G10-401). 2. PU FEEDBACK VOLTAGE (M61-411) NOTES--- 1. THIS FAILURE WILL REQUIRE EVALUATION OF RESIDUALS TO DETERMINE ADEQUACY FOR TLI VELOCITY CUTOFF (REF FMR 7-1). 2. PU FEEDBACK VOLTAGE M61, IS ONLY VALID WHEN PU SYSTEM POWER IS ON		
	7-22	S-IVB LOSS OF HYDRAULIC FLUID	ORBIT/ TLI	NO S-IVB RESTART (TB5)/TLI INHIBIT (TB6) BSE INFORM FLIGHT AND RECOMMEND NO S-IVB RESTART	CUES--- 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). NOTES--- 1. L7-403 PLUS ONE OF THE OTHER CUES ARE REQUIRED FOR IMPLEMENTATION OF THIS RULE. 2. IF ALL 3 CUES ARE FUNCTIONING PROPERLY, THEY ARE REQUIRED FOR IMPLEMENTATION OF THIS RULE.		
		RULE NUMBERS 7-23 AND 7-24 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-17

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	7-25	S-IVB STAGE LOX NONPROPULSIVE VENT (NPV) FAILS			CUES---		
		A. TO OPEN AT TB7 + 0.7 SEC	TLC	A. CONTINUE MISSION BSE INFORM FLIGHT AND VENT THE LOX TANK TO 18-20 PSIA PRIOR TO TB7 + 15 MIN.	1. LOX NPV NOZZLE PRESSURES (D243-404, D244-404). 2. LOX TANK ULLAGE PRESSURE (D180-406, D179-406). 3. LOX NPV OPEN DISCRETES (K198-424, K199-424).		
		B. TO LATCH OPEN AT TB8 + 23 MIN 22.2 SEC	TLC	B. CONTINUE MISSION BSE INFORM FLIGHT AND 1. ATTEMPT TO LATCH OPEN THE LOX VENT IF UNSUCCESSFUL, BSE COMMAND AT TB8 + 23 MIN 30 SEC.---			
				IF 1 IS UNSECESSFUL, BSE COMMAND AT TB8 + 23 MIN 30 SEC---			
				2. LH2 LATCHING VENT VALVE CLOSED			
	7-26	LH2 LATCHING VENT VALVE FAILS TO LATCH OPEN AS PROGRAMMED	TLC	CONTINUE MISSION BSE INFORM FLIGHT AND	CUES---		
		A. IN TB7		1. ATTEMPT TO OPEN THE LH2 LATCHING VENT VALVE IF UNSUCCESSFUL, BSE COMMAND---	1. LH2 NPV NOZZLE PRESSURE (D183-409, D184-409). 2. LH2 ULLAGE PRESSURE (D177-408, D178-408). 3. LH2 LATCHING VENT VALVE DISCRETES (K210-410, K211-410). 4. LH2 PUMP INLET PRESSURE (D2-403)		
				2. LH2 LATCHING VENT VALVE CLOSED 3. LH2 VENT VALVE OPEN AT TB7 + 15 MIN OR TB7 + 1 HR 15 MIN COMMAND---			
				4. LH2 VENT VALVE CLOSE			
		B. IN TB8		CONTINUE MISSION BSE INFORM FLIGHT AND---			
				1. ATTEMPT TO LATCH OPEN THE LH2 LATCHING VENT VALVE. IF 1 IS UNSUCCESSFUL, BSE COMMAND (ASAP)			
				2. LOX NPV OPEN OFF. 3. LOX VENT AND NPV BOOST CLOSE ON 4. LOX VENT AND NPV BOOST CLOSE OFF			
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-18

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 7 - SLV - TB5 AND TB7

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	7-27	ENGINE START BOTTLE DUMP FAILS TO INITIATE	TLC	CONTINUE MISSION BSE INFORM FLIGHT AND ATTEMPT TO OPEN THE START BOTTLE VENT VALVE	CUES--- 1. GH2 START BOTTLE PRESSURE (D17-401, D241-401).		
	7-28	S-IVB STAGE COLD HELIUM DUMP FAILS TO INITIATE	TLC	CONTINUE MISSION BSE INFORM FLIGHT AND 1. ATTEMPT TO INITIATE THE COLD HELIUM DUMP THROUGH LH2 COIL ON O2/H2 BURNER. IF UNSUCCESSFUL, BSE INFORM FLIGHT AND AFTER LOX NPV OPEN IN TBB COMMAND--- 2. LOX PRESSURIZATION SHUTOFF VALVES OPEN	CUES--- 1. COLD HELIUM BOTTLE PRESSURE (D261-403, D263-403).		
		RULE NUMBERS 7-29 AND 7-30 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV-TB5 AND TB7		7-19

8 SLV - TB6
(RESTART)

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 8 - SLV - TB6

R	ITEM	SUMMARY OF RESTART PHASE RULES					
		NOTE					
		MISSION RULES REQUIRING GROUND SUPPORT DURING TB6 CANNOT BE IMPLEMENTED ON APOLLO 14 BECAUSE OF MSFN COVERAGE LIMITATION. THOSE RULES ARE MARKED BY AN ASTERIX.					
	8-1	RESERVED					
	*8-2	O2/H2 BURNER LH2 VALVE FAILS					
	*8-3	LH2 CHILLDOWN SYSTEM FAILS					
	*8-4	LOX CHILLDOWN SYSTEM FAILS					
	*8-5	RESERVED					
	*8-6	S-IVB ACTUATOR HARDOVER					
	*8-7	CONTINUOUS VENT REGULATOR FAILS TO CLOSE					
	8-8	LOSS OF ATTITUDE CONTROL DURING SECOND BURN					
		THE FOLLOWING MISSION RULES ALSO APPLY TO THIS SECTION---					
	6-3	INERTIAL PLATFORM FAILURE - ACCELEROMETER					
	6-4	LAUNCH VEHICLE INERTIAL PLATFORM FAILURE ATTITUDE REFERENCE					
	6-11	S-IVB STAGE LOSS OF THRUST					
	7-2	LOSS OF ONE APS MODULE					
	*7-7	S-IVB AUXILIARY HYDRAULIC PUMP FAILS					
	*7-8	LOSS OF ATTITUDE CONTROL DURING TB6 TO TB6 + 9 MIN 10 SEC (CREW IMPLEMENTATION)					
	*7-9	CONTINUOUS VENT REGULATOR FAILS TO OPEN					
	7-13	IU ECS WATER VALVE FAILS TO CYCLE OPEN AND CLOSED					
	7-14	S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS MINUS 20 PSID OR PLUS 30 PSID, MINUS 26PSID OR PLUS 36 PSID (CREW IMPLEMENTATION)					
	*7-16	S-IVB ENGINE CONTROL BOTTLE PRESSURE LESS THAN 400 PSIA					
	7-17	LH2 TANK VENT FAILURE OR LEAK DURING ORBITAL COAST					
	*7-18	LOW COLD HELIUM SUPPLY PRESSURE					
	*7-19	LOX TANK ULLAGE PRESSURE LOW (CREW IMPLEMENTATION)					
	*7-20	J-2 ENGINE START BOTTLE PRESSURE OUTSIDE RESTART LIMITS.					
	*7-21	PU VALVE FAILS TO A MIXTURE RATIO GREATER THAN 5.0 TO 1 ANY TIME PRIOR TO RESTART					
	*7-22	S-IVB LOSS OF ENGINE HYDRAULIC FLUID					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV - TB6		8-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 8 - SLV - TB6

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
		RULE 8-1 IS RESERVED.						
8-2	S-IVB STAGE O2/H2 BURNER FUEL PROPELLANT VALVE FAILS CLOSED	TLI	CONTINUE MISSION BSE INFORM FLIGHT AND COMMAND---	<ol style="list-style-type: none"> 1. BURNER SHUTDOWN 2. CONTINUOUS VENT SYSTEM ORIFICE OPEN 3. CRYO REPRESSURIZATION OFF 	<p>CUES---</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). 3. AMBIENT REPRESSURIZATION MODE SELECT (K195-404). <p>NOTE---</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	CONTINUE MISSION BSE INFORM FLIGHT AND---	<ol style="list-style-type: none"> 1. ATTEMPT TO CORRECT SITUATION SPECIFIED IN NOTE 1.A, 1.B, 1.D <p>IF UNSUCCESSFUL, BSE INFORM FLIGHT</p>	<p>CUES---</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) <p>NOTES---</p> <ol style="list-style-type: none"> 1. LH2 CHILLDOWN WILL NOT BE SATISFACTORY IF--- <p>(A) PREVALVE IS OPEN</p> <p>(B) RECIRCULATION VALVE IS CLOSED</p> <p>(C) BLEED VALVE IS CLOSED</p> <p>(D) CHILLDOWN PUMP IS NOT ON</p>			
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	SLV - TB6		8-2	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 8 - SLV - TB6

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	8-4	S-IVB STAGE LOX CHILLDOWN SYSTEM FAILS DURING RESTART PREPARATIONS	TLI	CONTINUE MISSION/ TLI INHIBIT 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	CUES FOR CHILLDOWN FAILURE 1. LOX CHILLDOWN FLOW RATE (F4-424). 2. LOX ULLAGE PRESSURE TO LOX DUMP INLET PRESSURE DELTA P (D179-406,D180-406,D003-403) 3. LOX PUMP INLET TEMP NOT DECREASING(C4-403) LOX PREVALVE DISCRETES (K109-403,K110-403) LOX BLEED VALVE CLOSED (K126-401) LOX RECIRCULATION VALVE CLOSED (K139-424) CUES FOR MOV FAILURE 1. MOV POSITION GREATER THAN 10 DEG (G3-401) 2. MOV OPEN DISCRETE ON (K120-401) 3. LOX FLOWMETER (F1-401) 4. LOX INJECTOR PRESSURE (D005-401) NOTES--- 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 PROGRAMMED 8 SEC. LOX LEAD BEGINNING AT TB6+7 MIN 37.8 SEC.			
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	SLV - TB6		8-3	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 8 - SLV - TB6

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	8-5	RESERVED			
	8-6	S-IVB ACTUATOR CONFIRMED HARDOVER PRIOR TO TB6 + 9 MIN 10 SEC AND AUXILIARY HYDRALLIC PUMP IS OPERATING	TLI	TLI INHIBIT BSE INFORM FLIGHT AND RECOMMEND TLI INHIBIT	CUE--- 1. ACTUATOR POSITIONS +/- 5 DEG OR GREATER (G1-400, G1-403, G2-400, G2-403). NOTE--- BOTH INDIVIDUAL ACTUATOR POSITIONS MUST CONFIRM MALFUNCTION PRIOR TO RECOMMENDING TLI INHIBIT.
	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 (NOTE 1)	TLI	CONTINUE MISSION BSE INFORM FLIGHT AND COMMAND--- 1. ATTEMPT TO CLOSE THE CVS REGULATOR IF 1 IS UNSUCCESSFUL, BSE INFORM FLIGHT AND COMMAND--- 2. O2/H2 BURNER SHUTDOWN B. CONTINUE MISSION 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	CUES--- A.1. CVS NOZZLE PRESSURE REMAINS GREATER THAN 3 PSIA (D181-409--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) NOTE--- THIS FAILURE WILL REQUIRE REEVALUATION OF DELTA V REQUIRED FOR LUNAR IMPACT.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	SLV - TB6		8-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 8 - SLV - TB6

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	8-8	LOSS OF ATTITUDE CONTROL DURING S-IVB SECOND BURN	TLI	CONTINUE MISSION BASE INFORM FLIGHT AND FIDO. CREW WILL TAKE ACTION ON LIMITS (NOTE 1)	<p>CUES---</p> <p>1. ANGULAR RATES - PITCH (R4-602), YAW (R5-602), OR ROLL (R6-602) GREATER THAN 5 DEG/SEC AND NOT DECREASING</p> <p>2. ANGULAR RATES-PITCH (R13-602), YAW (R8-602), OR ROLL (R12-602) GREATER THAN 5 DEG/SEC AND NOT DECREASING. (SEE NOTE 3)</p> <p>3. LOSS OF ATTITUDE CONTROL ALERT (SEE NOTE 2).</p> <p>NOTES---</p> <p>1. TLI BURN 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 DEVIATION FROM NOMINAL PROFILES GREATER THAN 45 DEG</p> <p>2. LOSS OF ATTITUDE CONTROL ALERT WILL BE GIVEN FOR THE FOLLOWING CONDITIONS---</p> <p>(A) LVDC/LVDA COMPUTATIONAL FAILURE.</p> <p>(B) ATTITUDE ERROR SIGNALS ROLL GREATER THAN +/- 3.5 DEG, PITCH AND YAW GREATER THAN +/- 5 DEG.</p> <p>(C) FAILURE TO INITIATE PROPER GUIDANCE SEQUENCE.</p> <p>(D) FAILURE OF S-IVB ENGINE HYDRAULICS.</p> <p>3. THE CUES ARE VALID IF RATE CHANNEL SWITCHOVER HAS NOT OCCURRED.</p>		
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV - TB6		8-5

9 SLV - TBB (SAFING
AND LUNAR IMPACT)

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 9 - SLV TB8

R	ITEM	SUMMARY OF SAFING AND SLINGSHOT RULES					
	9-1	STAGE PNEUMATIC DUMP FAILS					
	9-2	LOX DUMP FAILS					
	9-3	ENGINE CONTROL BOTTLE DUMP FAILS					
	9-4	RESERVED					
	9-5	RESERVED					
THE FOLLOWING REFERENCED FLIGHT MISSION RULES ARE ALSO APPLICABLE DURING TIME BASE EIGHT (TB8)							
	7-3	J-2 ENGINE MAIN FUEL VALVE (MFV) FAILS TO CLOSE AT FIRST S-IVB CUTOFF, SECOND S-IVB CUTOFF					
	7-4	J-2 ENGINE MAIN OXIDIZER VALVE FAILS TO CLOSE AT FIRST S-IVB CUTOFF, SECOND BURN CUTOFF					
	7-8	LOSS OF ATTITUDE CONTROL DURING TB5 AND TB7 TO SPACECRAFT SEPARATION, TB6 TO TB6 + 9 MIN 20 SEC AFTER SPACECRAFT SEPARATION, AFTER TB8 INITIATE					
	7-13	IU ECS VALVE FAILS TO CYCLE OPEN AND CLOSED					
	7-14	S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS MINUS 20 PSID OR PLUS 30 PSID, MINUS 26 PSID OR PLUS 36 PSID.					
	7-25	S-IVB STAGE LOX NON-PROPULSIVE VENT (NPV) FAILS TO OPEN AT TB7 + 0.7 SEC, TO LATCH OPEN AT TB 8 + 17 MIN 3 SEC					
	7-26	LH2 LATCHING VENT VALVE FAILS TO LATCH OPEN AS PROGRAMMED					
	7-28	S-IVB STAGE COLD HELIUM DUMP FAILS TO INITIATE					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV - TB8		9-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 9 - SLV TB8

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	9-1	S-IVB STAGE PNEUMATIC DUMP FAILS TO INITIATE	TLC	CONTINUE MISSION BSE INFORM FLIGHT AND 1. ATTEMPT TO OPEN THE ENGINE PUMP PURGE CONTROL VALVE	CUES--- 1. ENGINE PUMP PURGE PRESSURE (D50-403). 2. AMBIENT HELIUM SUPPLY PRESSURE (D236-403, D256-403).		
	9-2	S-IVB LOX DUMP FAILS TO INITIATE	TLC	CONTINUE MISSION BSE INFORM FLIGHT AND COMMAND THE MAIN OXIDIZER VALVE OPEN	CUES--- 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) NOTES--- 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 REEVALUATION OF THE LUNAR IMPACT DELTA VELOCITY WILL BE REQUIRED.		
	9-3	ENGINE CONTROL BOTTLE DUMP FAILS TO INITIATE	TLC	CONTINUE MISSION BSE INFORM FLIGHT AND 1. ATTEMPT TO OPEN THE ENGINE HELIUM CONTROL VALVE	CUE--- 1. ENGINE CONTROL REG. PRESS (D18-401). 2. ENGINE CONTROL HELIUM SPHERE PRESSURE (D19-401, D242-401).		
	RULES 9-4 AND 9-5 ARE RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV - TB8		9-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 9 - SLV - TB8 - CONTINUED

R	ITEM	MEAS NUMBER	ONBOARD	TRANSDUCERS	CATEGORY	EFFEC TIVITY	MISSION RULE REF
----- PRELAUNCH INSTRUMENTATION -----							
STAGE COMMUNICATIONS SYSTEM AND FLIGHT CONTROL MEASUREMENT CATEGORIZATION							
STAGE COMMUNICATIONS SYSTEM							
S-II STAGE							
	LINK BP1					HD	
	MUX BP1AO					HD	
	MUX BP1BO					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	
FLIGHT CONTROL MEASUREMENTS							
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			1 OF 2		REQUIRED TO COMPLETE MULTIPLE WORD GROUND COMMANDS
	COMPUTER RESET PULSE NO. 2-GUIDANCE DECODER	J72-603			M		
*ONBOARD DIS- PLAY MANDATORY							
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SLV - TB8	PRELAUNCH INSTR	9-3

10 CSM ENVIRONMENTAL
CONTROL

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM

R	ITEM						
		<div style="border: 1px dashed black; padding: 5px; display: inline-block;">GENERAL</div>					
	10-1	<p>LAUNCH</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>TLC & TEC</p> <p>WATER EVAPORATION WILL BE LIMITED TO COMPONENT TESTING.</p> <p>POWERED DESCENT</p> <p>THERE ARE NO CSM ENVIRONMENTAL CONTROL SYSTEMS FAILURES FOR WHICH POWERED DESCENT WILL BE TERMINATED.</p> <p>ALL PHASES</p> <ul style="list-style-type: none"> A. BACKUP SYSTEMS AND BACKUP COMPONENTS WILL NORMALLY BE USED FOR THE MOST RAPID PRACTICAL RETURN TO EARTH, NOT FOR MISSION CONTINUATION. 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. C. TO CONTINUE, WATER QUANTITY PREDICTIONS MUST REFLECT ADEQUATE QUANTITIES TO MEET NORMAL MISSION REQUIREMENTS. 					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	CSM ENVIRONMENT CONTROL	GENERAL	10-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM

R	ITEM																
		<p>----- ! SYSTEMS MANAGEMENT ! -----</p>															
	10-10	<p>O2 SYSTEM</p> <p>A. SUIT FLOW RELIEF VALVE WILL REMAIN CLOSED FOR DURATION OF FLIGHT.</p> <p>B. NORMAL CM REPRESSURIZATION WITH LM MANNED WILL UTILIZE THE REPRESS PACK.</p> <p>C. THE REPRESS PACK VALVE WILL BE IN OFF POSITION FOR ALL PHASES EXCEPT LAUNCH, ENTRY, AND TUNNEL/LM PRESSURIZATION AND RECHARGE</p> <p>D. THE SUIT CIRCUIT MUST BE PURGED OF ACCUMULATED H2 ONCE EVERY 6 HOURS FOR ONE 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. ALL UNDOCKED OPERATIONS. 3. TD&E. 4. GLYCOL LEAKS IN COMMAND MODULE. 5. FIRE, SMOKE, CONTAMINATION IN CABIN. <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>J. A LEAKING HIGH PRESSURE VESSEL IN THE CM WILL NOT BE RECHARGED.</p> <p>COOLANT MANAGEMENT</p> <p>A. FOR SIMULTANEOUS PRIMARY AND SECONDARY LOOP OPERATION, NORMALLY EITHER THE PRIMARY OR SECONDARY LOOP RADIATOR WILL 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>															
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">MISSION</th> <th style="width: 10%;">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: 10%;"></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">APOLLO 14</td> <td style="text-align: center;">FNL</td> <td style="text-align: center;">11/1/70</td> <td style="text-align: center;">CSM ENVIRONMENT CONTROL</td> <td style="text-align: center;">MANAGEMENT</td> <td style="text-align: center;">10-3</td> <td></td> </tr> </tbody> </table>	MISSION	REV	DATE	SECTION	GROUP	PAGE		APOLLO 14	FNL	11/1/70	CSM ENVIRONMENT CONTROL	MANAGEMENT	10-3		
MISSION	REV	DATE	SECTION	GROUP	PAGE												
APOLLO 14	FNL	11/1/70	CSM ENVIRONMENT CONTROL	MANAGEMENT	10-3												

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
				----- SPECIFIC -----	
	10-20	CABIN PRESSURE CANNOT BE RELIEVED	LAUNCH	CONTINUE MISSION	NORMAL RELIEF STARTS AT 50 SECONDS
	10-21	CABIN PRESSURE DECREASING AND/OR LESS THAN 4.5 PSIA AND---			CREW OPTION TO USE LM ENVIRONMENT FOR EARTH RETURN IN LIEU OF SUITED RETURN.
		A. SUIT PRESSURE GREATER THAN 3.5 PSIA	LAUNCH	A.1. CONTINUE MISSION	
			PRE-PDI	2. ENTER NEXT BEST PTP- NO GO FOR PDI. RETAIN DESCENT STAGE FOR TEI.	
			POWERED DESCENT	3. CONTINUE MISSION- NO GO FOR LUNAR STAY	
			ALL	4. ENTER NEXT BEST PTP IF CABIN PRESS NOT RESTORED GREATER THAN 4.5 PSIA.	
		B. SUIT PRESSURE LESS THAN 3.5 PSI	LAUNCH	B.1. ABORT ASAP	
			ALL	2. ENTER ASAP	
		C. LOSS OF SUIT CIRCULATION	LAUNCH	C.1. ABORT ASAP OPEN DIRECT O2 45 DEG FROM LAUNCH SETTING.	C.1. CORRESPONDS TO 12.6 LB/HR (APPROX 3 CFM/CREWMAN)
			ALL	2. ENTER ASAP	

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	CSM ENVIRONMENT CONTROL SYSTEM	SUIT/CABIN	10-5	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	10-22	LOSS OF SUIT CIRCUIT, CABIN STABLE AND GREATER THAN 4.5 PSIA			LM SYSTEMS (IF AVAILABLE) WILL BE USED FOR CO2 AND H2O REMOVAL.			
			LAUNCH	A. CONTINUE MISSION OPEN DIRECT O2 VALVE 45 DEG FROM LAUNCH SETTING.	A. CORRESPONDS TO 12.6 LB/HR (APPROX 3 CFM/CREWMAN)			
			EO	B. ENTER NEXT BEST PTP 1. DOFF SUITS. 2. OPEN WASTE OVERBOARD DRAIN VALVE TO OBTAIN CABIN BLEED FLOW. 3. DON FACE MASKS AFTER 1 HOUR	B.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.			
			PRE-PDI	C. ENTER NEXT BEST PTP- NO GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI.				
			POWERED DESCENT	D. CONTINUE MISSION- NO GO FOR LUNAR STAY				
			ALL	E. ENTER NEXT BEST PTP				
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	CSM ENVIRONMENT CONTROL SYSTEM	SUIT/CABIN	10-6	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	10-23	LOSS OF SURGE TANK OR REPRESS PACK	ALL	A. CONTINUE MISSION	FOR LEAK IN SURGE TANK, ISOLATE SURGE TANK AND PLACE REPRESS PKG VALVE TO FILL.			
	10-24	LOSS OF SURGE TANK AND REPRESS PACK	LAUNCH ALL TEC	A. CONTINUE MISSION B. CONTINUE MISSION PLAN TO RESTORE ENTRY O2 BY STORING OPS IN CM AT FINAL LM EGRESS. C. CONTINUE MISSION DOFF SUITS FOR ENTRY.	B. OPS O2 QTY--- 4 LBS/OPS (TWO OPS AVAILABLE)			
	10-25	FIRE OR SMOKE IN COMMAND MODULE	LAUNCH PRE-PDI POWERED DESCENT ALL	A. ABORT 1. DECOMPRESS CABIN 2. TROUBLESHOOT ELECTRICAL SYSTEM PER FLIGHT CREW CHECKLIST BOOST FIRE PROCEDURES. B. ENTER NEXT BEST PTP- NO GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI C. CONTINUE MISSION- NO GO FOR LUNAR STAY D.1. TROUBLESHOOT/COMBAT FIRE PER FLIGHT CREW CHECKLIST EMERGENCY PROCEDURES. 2. ASSESS DAMAGE AND REMOVE POWER FROM AFFECTED SYSTEMS 3. ENTER NEXT BEST PTP RETAIN LM				
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	CSM ENVIRONMENT CONTROL SYSTEM	SUIT/CABIN	10-7	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	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 ALL	A. CONTINUE MISSION B. CONTINUE MISSION NO-GO FOR UNDOCK	
	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. CONTINUE MISSION 2. CONTINUE MISSION- 3. ENTER NEXT BEST PTP (A) VERIFY SURGE TANK AND REPRESS PACK ISOLATED UNTIL ENTRY. (B) RETRIEVE OPS FROM LM, IF DOCKED B.1. ABORT ASAP 2. ENTER ASAP USE OPS IN SUITED MODE FOR ENTRY IF PRACTICAL	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. LM O2 (IF AVAILABLE) MAY BE USED TO SUPPLEMENT CSM SUPPLY.
	10-29	LOSS OF ONE MAIN REGULATOR A. FAILED CLOSED B. FAILED OPEN	LAUNCH EO ALL ALL	A.1. CONTINUE MISSION- 2. CONTINUE MISSION- NO GO FOR TLI 3. CONTINUE MISSION B. CONTINUE MISSION	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	10-30	BOTH MAIN REGULATORS FAILED CLOSED	LAUNCH UNDOCKED/ PRE-PDI POWERED DESCENT/ LUNAR STAY ALL	A. CONTINUE MISSION B. CONTINUE MISSION C. ENTER NEXT BEST PTP	LM SYSTEMS (IF AVAILABLE) MAY BE USED IN LIEU OF CSM SYSTEMS		
	10-31	LOSS OF ONE SUIT COMPRESSOR	LAUNCH EO ALL	A. CONTINUE MISSION B. CONTINUE MISSION- NO GO FOR TLI C. CONTINUE MISSION			
	10-32	LOSS OF TWO SUIT COMPRESSORS	LAUNCH E.O. TLC. LO ALL OTHER	A. CONTINUE MISSION- OPEN DIRECT 02 45 DEG FROM LAUNCH SETTING B. CONTINUE MISSION- NO GO FOR TLI C. ENTER NEXT BEST PTP. NO GO FOR UNDOCKING. D. CONTINUE MISSION	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 14	FNL	11/1/70	CSM ENVIRONMENT CONTROL SYSTEM	SUIT/CABIN	10-9

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	10-41	SECONDARY LOOP MALFUNCTIONS			
		A. LOSS OF EVAPORATOR	ALL	A. CONTINUE MISSION	
		B. LOSS OF RADIATORS	EO	B.1. NO-GO FOR TLI LOOP IS STILL OPERATIONAL IN EVAPORATIVE MODE.	
			TLC	2. ENTER NEXT BEST PTP	
			LUNAR ORBIT	3. CONTINUE MISSION	
		C. TOTAL LOSS OF LOOP	EO	C.1. NO-GO FOR TLI	
			TLC	2. ENTER NEXT BEST PTP	
			LUNAR ORBIT	3. CONTINUE MISSION	
	10-42	LOSS OF PRIMARY AND SECONDARY EVAPORATORS	ALL	A. CONTINUE MISSION	
	10-43	LOSS OF ALL COOLING, PRIMARY AND SECONDARY			LM SYSTEMS (IF AVAILABLE) WILL BE USED TO SUPPLEMENT CSM OPERATIONS.
			LAUNCH	A. CONTINUE MISSION	
			EO	B. ENTER NEXT BEST ATP OR PTP MAXIMUM ORBIT TIME--- 4 HOURS EMERGENCY POWER DOWN FOLLOWED BY 1.5 HOURS OF POWER UP FOR ENTRY.	B. LOSS OF TWO FUEL CELLS POWER DOWN.
			POWERED DESCENT	C. CONTINUE MISSION-	
			ALL	D. ENTER ASAP	

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	CSM ENVIRONMENT CONTROL SYSTEM	COOLANT	10-11	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	10-44	CONFIRMED LEAK OF GYLCOL COOLANT			LM ENVIRONMENT (IF AVAILABLE) MAY BE USED FOR EARTH RETURN IN LIEU OF CSM.
		A. IN COMMAND MODULE	LAUNCH	A.1. CONTINUE MISSION	
			EO	2. ENTER NEXT BEST PTP DON SUITS. PURGE SUIT LOOP WITH DIRECT O2.	
			POWERED DESCENT	3. CONTINUE MISSION- NO GO FOR LUNAR STAY	
			ALL	4. ENTER NEXT BEST PTP	
		B. IN SUIT CIRCUIT	LAUNCH	B.1. CONTINUE MISSION	
			EO	2. ENTER NEXT BEST PTP DOFF SUITS AND USE FACE MASKS IF REQUIRED.	
			POWERED DESCENT	3. CONTINUE MISSION NO GO FOR LUNAR STAY	
			ALL	4. ENTER NEXT BEST PTP	
		RULE NUMBERS 10-45 THROUGH 10-49 ARE RESERVED.			

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM ENVIRONMENT CONTROL SYSTEM	COOLANT	10-12

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 10 - CSM ENVIRONMENTAL CONTROL SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	10-50	LOSS OF OVERBOARD DUMPS A. NORMAL OVERBOARD DUMPS FROZEN OR BLOCKED B. LOSS OF ALL OVERBOARD DUMP CAPABILITY	ALL EO TLC LUNAR ORBIT UNDOCKED/ PRE-PDI/ POWERED DESCENT/ LUNAR STAY	A. CONTINUE MISSION B.1. ENTER NEXT BEST PTP 2. CONTINUE MISSION	A.1. UTILIZE AUXILIARY DUMP FOR URINE AND WASTE WATER DISPOSAL. 2. BLEED O2 FROM WATER TANK THROUGH WASTE MANAGEMENT OVERBOARD DRAIN VALVE INTO CABIN. B.1.(A) IF POTABLE AND WASTE TANKS (OR WASTE TANKS ALONE) BECOME FULL, FORCED WATER BOILING WILL BE NECESSARY TO ALLOW FUEL CELL AND/OR CYCLIC ACCUMULATOR OPERATION. (B) LM URINE STORAGE BAGS (IF AVAILABLE) WILL BE USED. 2. UNDOCKING MAY BE PERFORMED.
	10-51	UNCONTROLABLE HIGH HUMIDITY	LAUNCH PRE-PDI POWERED DESCENT ALL	A. CONTINUE MISSION B. ENTER NEXT BEST PTP- NO GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI C. CONTINUE MISSION- NO GO FOR LUNAR STAY D. ENTER NEXT BEST PTP	LM SYSTEMS MAY BE USED FOR HUMIDITY CONTROL.
	10-52	WASTE WATER TANK LEAK OR LOSS OF WASTE WATER STORAGE CAPABILITY	ALL	CONTINUE MISSION	LM SYSTEMS (IF AVAILABLE) MAY BE USED TO SUPPLEMENT CSM WHEN POTABLE WATER TANK BECOMES FULL, FUEL CELL WATER WILL BE DUMPED THROUGH OVERBOARD PRESSURE RELIEF VALVES

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM ENVIRONMENT	WATER & WASTE MANAGEMENT	10-13

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	REFERENCE		
	CABIN PRES	CF0001P	METER	COMMON	1 OF	10-20		
	SUIT PRES	CF0012P	METER	COMMON	3 M			
	TANK BLADDER PRES	CF0120P	-----	-----				
	SUIT PRESS (CUFF GAGES)	-----	-----	-----	MANDATORY (EACH CREWMAN)	10-21		
	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	CF0072P	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	SF0236T	METER	-----	HD			

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM ENVIRONMENT CONTROL SYSTEM	INSTR REQUIREMENTS	10-15

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 11 - CSM CRYOGENICS

R	ITEM								
		<div style="border: 1px dashed black; padding: 5px; margin: 0 auto; width: fit-content;"> SYSTEMS MANAGEMENT </div>							
	11-10	CRYO MANAGEMENT	<p>A. NORMALLY, TANK PRESSURES WILL BE MAINTAINED BY USE OF TANK HEATERS IN 'AUTO' MODE</p> <p>B. MANUAL PRESSURE CONTROL WILL NORMALLY BE USED AS REQUIRED TO MAINTAIN---</p> <ol style="list-style-type: none"> 1. TANK PRESSURES GREATER THAN 750 PSIA O2 AND 200 PSIA FOR H2. 2. H2 QUANTITY BALANCE WITHIN 3 PERCENT 3. O2 QUANTITY BALANCE BETWEEN THE TWO HIGH TANKS TO MAINTAIN A SINGLE TANK RETURN AT AN AVERAGE FUEL CELL POWER LEVEL OF 40 AMPS ON EITHER OF THESE TANKS <p>C. ONE FUEL CELL MAY BE PURGED OR THE SPACECRAFT ELECTRICAL LOADS MAY BE INCREASED TO PRECLUDE CRYO TANK VENTING.</p> <p>D. H2 TANK FANS WILL NOT BE OPERATED IN THE AUTO MODE.</p> <p>E. O2 TANK 3 ISOLATION VALVE WILL NORMALLY REMAIN OPEN</p>						
	11-11	CRYO GAGING	<p>A. ONBOARD CRYOGENIC QUANTITY GAGING IS PRIME. ACCURACY IS +/-2.65 PERCENT (+/-8.48 LB O2, +/-0.72 LB H2) PER TANK. INSTANTANEOUS O2 QUANTITY ACCURACIES MAY BE DEGRADED FROM THESE NUMBERS DUE TO LACK OF TANK FANS.</p> <p>B. MCC CALCULATED QUANTITY USING PRESSURE VERSUS TEMPERATURE IS BACKUP.</p> <p>RULE NUMBERS 11-12 THROUGH 11-19 ARE RESERVED.</p>						
			MISSION	REV	DATE	SECTION	GROUP	PAGE	
			APOLLO 14	FNL	11/1/70	CSM CRYOGENICS	MANAGEMENT	11-2	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 11 - CSM CRYOGENICS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
				<div style="border: 1px dashed black; padding: 5px; margin: 0 auto; width: 80%;"> SPECIFIC MISSION RULES </div>				
	11-20	LOSS OF ONE O2 TANK	LAUNCH EO ALL POST DOCK	A. CONTINUE MISSION B. CONTINUE MISSION NO-GO FOR TLI C. CONSIDERATION WILL BE GIVEN TO CONTINUING THE MISSION AFTER LOSS OF A TANK IF OTHER TWO TANKS MEET REDLINE CRITERIA. JETTISON LM	LM, PLSS, AND OPS O2 WILL BE USED AS REQUIRED TO SUPPLEMENT CSM O2.			
	11-21	LOSS OF TWO O2 TANKS	LAUNCH E.O. POWERED DESCENT ALL	A. CONTINUE MISSION B. CONTINUE MISSION NO GO FOR TLI C. CONTINUE MISSION NO GO FOR LUNAR STAY D. ENTER NEXT BEST PTP RETAIN LM				
	11-22	LOSS OF ONE H2 TANK	LAUNCH E.O. TLC PWRD DESCENT ALL	A. CONTINUE MISSION B. CONTINUE MISSION C. NO GO TLI NO GO LOI D. CONTINUE MISSION NO GO LUNAR STAY E. ENTER NEXT BEST PTP JETTISON LM.				
	11-23	LOSS OF 3 O2 TANKS AND/OR 2 H2 TANKS	LAUNCH TLC PWRD DESCENT ALL	A. CONTINUE MISSION ISOLATE SURGE TANK BEFORE 800 PSIA B. ENTER NEXT BEST PTP. NO GO FOR LOI C. CONTINUE MISSION NO GO FOR LUNAR STAY D. ENTER NEXT BEST PTP, RETAIN LM	AUX BATTERY WILL POWER SMJC'S.			
		RULE NUMBERS 11-24 THROUGH 11-49 ARE RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	CSM CRYOGENICS	SPECIFIC	11-3	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 11 - CSM CRYOGENICS

R	ITEM	INSTRUMENTATION REQUIREMENTS					MISSION RULE REFERENCE
11-50	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY		
	O2 TANK 1 QTY	SC0032Q	METER	COMMON	2 OF 3	11-20	
	O2 TANK 2 QTY	SC0033Q	METER	COMMON	MANDATORY	21,22	
	O2 TANK 3 QTY	SC0051Q	METER	COMMON			
	O2 TANK 1 TEMP	SC0041T	----	----	HIGHLY	11-20	
	O2 TANK 2 TEMP	SC0042T	----	----	DESIRABLE	21,22	
	O2 TANK 3 TEMP	SC0055T	----	----			
	H2 TANK 1 QTY	SC0030Q	METER	COMMON	1 OF 2	11- 21,22	
	H2 TANK 2 QTY	SC0031Q	METER	COMMON	MANDATORY		
	H2 TANK 1 TEMP	SC0043T	----	----	HIGHLY	11-21,22	
	H2 TANK 2 TEMP	SC0044T	----	----	DESIRABLE		
	O2 TANK 1 PRESS	SC0037P	METER	COMMON	2 OF 3	11-20,21,22	
	O2 TANK 2 PRESS	SC0038P	METER	COMMON	MANDATORY	11-20,21,22	
	O2 TANK 3 PRESS	SC0053P	METER	COMMON			
	H2 TANK 1 PRESS	SC0039P	METER	COMMON	1 OF 2	11-20,22	
	H2 TANK 2 PRESS	SC0040P	METER	COMMON	MANDATORY	11- 21,22	
	O2 TANK 2 AND 3 MAN. PRESS	SC0069P	C+W	COMMON	HD		
	O2 TANK 1 HTR TEMP	SC0070T	METER	COMMON	HD	11-23	
	O2 TANK 2 HTR TEMP	SC0071T	METER	COMMON	HD	11-23	
	O2 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 14	FNL	11/1/70	CSM CRYOGENICS	INSTR REQ	11-4	

12 CSM ELECTRICAL
POWER SYSTEM

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

R	ITEM	RULE NUMBERS 12-9 THROUGH 12-19 ARE RESERVED.					
	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	CSM ELECTRICAL POWER SYSTEM	GENERAL	12-2	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

R	ITEM																				
		----- ' SYSTEMS MANAGEMENT ' -----																			
	12-20	<p>BUS MANAGEMENT</p> <p>A. ONE AND ONLY ONE FUEL CELL WILL BE TIED TO BOTH MAIN BUSES.</p> <p>B. INVERTERS WILL BE CONFIGURED SUCH THAT MAIN BUS A WILL SUPPLY AC BUS 1 AND MAIN BUS B WILL SUPPLY AC BUS 2.</p> <p>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.</p> <p>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.</p> <p>E. MINIMUM MAIN BUS VOLTAGE WILL BE MAINTAINED TO BE COMPATIBLE WITH ONLINE OPERATION EQUIPMENT.</p> <table style="margin-left: 40px; border: none;"> <tr><td>1. SPS</td><td style="text-align: right;">24.5</td></tr> <tr><td>2. PGNS</td><td style="text-align: right;">25.0</td></tr> <tr><td>3. AUTO SM-RCS</td><td style="text-align: right;">22.0</td></tr> <tr><td>4. AUTO CM-RCS</td><td style="text-align: right;">21.0</td></tr> <tr><td>5. DIRECT SM-RCS</td><td style="text-align: right;">21.0</td></tr> <tr><td>6. DIRECT CM-RCS</td><td style="text-align: right;">17.0</td></tr> <tr><td>7. INVERTERS</td><td style="text-align: right;">19.0</td></tr> </table>	1. SPS	24.5	2. PGNS	25.0	3. AUTO SM-RCS	22.0	4. AUTO CM-RCS	21.0	5. DIRECT SM-RCS	21.0	6. DIRECT CM-RCS	17.0	7. INVERTERS	19.0					
1. SPS	24.5																				
2. PGNS	25.0																				
3. AUTO SM-RCS	22.0																				
4. AUTO CM-RCS	21.0																				
5. DIRECT SM-RCS	21.0																				
6. DIRECT CM-RCS	17.0																				
7. INVERTERS	19.0																				
	12-21	<p>BATTERY MANAGEMENT</p> <p>A. BATTERIES A AND B WILL BE USED TO SUPPLEMENT MAIN BUS LOADS FROM T-75 SECONDS TO INSERTION.</p> <p>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.</p> <p>C. BATTERY CHARGING WILL BE TERMINATED FOR ONE OF THE FOLLOWING, WHICHEVER OCCURS FIRST---</p> <table style="margin-left: 40px; border: none;"> <tr><td>1. INTEGRATED AMP-HOURS INTO BATTERY BY CHARGER EQUALS INTEGRATED AMP-HOURS OUT OF BATTERY BY LOADS.</td></tr> <tr><td>2. WHEN BATTERY CHARGER CURRENT DECREASES TO 0.62 AMPS (CORRESPONDS TO 39.5 VDC AT THE BATTERY BUS)</td></tr> </table> <p>D. THREE BATTERIES WILL BE TIED TO THE MAIN BUSES FOR DEORBIT MANEUVER AND ENTRY.</p> <p>E. BATTERIES ARE CONSIDERED TO HAVE 40 AMP-HR CAPABILITY INFIGHT AND 45 AMP-HR CAPABILITY FOR POSTLANDING.</p> <p>F. A SINGLE BATTERY THAT CANNOT BE RECHARGED WILL NOT BE USED EXCEPT DURING DEORBIT, ENTRY AND POSTLANDING.</p> <p>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.</p> <p>H. THE AUX BATTERY WILL NOT BE USED FOR NORMAL MISSION OPERATIONS.</p>	1. INTEGRATED AMP-HOURS INTO BATTERY BY CHARGER EQUALS INTEGRATED AMP-HOURS OUT OF BATTERY BY LOADS.	2. WHEN BATTERY CHARGER CURRENT DECREASES TO 0.62 AMPS (CORRESPONDS TO 39.5 VDC AT THE BATTERY BUS)																	
1. INTEGRATED AMP-HOURS INTO BATTERY BY CHARGER EQUALS INTEGRATED AMP-HOURS OUT OF BATTERY BY LOADS.																					
2. WHEN BATTERY CHARGER CURRENT DECREASES TO 0.62 AMPS (CORRESPONDS TO 39.5 VDC AT THE BATTERY BUS)																					
			MISSION	REV	DATE	SECTION	GROUP	PAGE													
			APOLLO 14	FNL	11/1/70	CSM ELECTRICAL POWER SYSTEM	MANAGEMENT	12-3													

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

R	ITEM							
	12-22	FUEL CELL MANAGEMENT						
		<p>A. FUEL CELL WILL BE 'SHUTDOWN' 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 DEG. F. 2. TCE TEMP GREATER THAN 225 DEG. 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. <p>C. FUEL CELL O2 AND H2 PURGES WILL NORMALLY BE PERFORMED AT 12 AND 48 HOUR INTERVALS, RESPECTIVELY. HOWEVER, THE INTERVALS WILL BE FLEXIBLE TO COINCIDE WITH WATER DUMPS (REF. MR 10-10 C).</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 MIN OF HEATER OPERATION AFTER PURGE COMPLETION.</p> <p>G. FC INLINE HEATERS WILL NORMALLY OPERATE IN 'AUTO' CONTINUOUSLY.</p> <p>H. REACTANT VALVES MUST REMAIN OPEN AT ALL TIMES UNLESS THE FUEL CELL IS DECLARED FAILED.</p> <p>I. ADDITIONAL POWER LOADS WILL BE ADDED AS REQUIRED TO MAINTAIN FC RAD OUT TEMP GREATER THAN -40 DEG. IF CRYO BUDGET JEOPARDIZED OR RAD OUT TEMPS NOT MAINTAINED GREATER THAN -40 DEG, 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 SHUTDOWN OR OPEN CIRCUIT A FUEL CELL, FUEL CELL 2 WILL BE SELECTED.</p>						
	12-23	INVERTER MANAGEMENT						
		<p>INVERTERS MAY BE REMOVED FROM LINE FOR ANY OF THE FOLLOWING REASONS---</p> <ol style="list-style-type: none"> A. INVERTER TEMP GREATER THAN 190 DEG. F. B. SPACECRAFT LOAD MANAGEMENT. <p>RULE NUMBERS 12-24 THROUGH 12-29 ARE RESERVED</p>						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	CSM ELECTRICAL	MANAGEMENT	12-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
				<div style="border: 1px dashed black; padding: 5px; margin: 0 auto; width: 80%;"> SPECIFIC MISSION RULES </div>	
	12-30	LOSS OF ONE FUEL CELL (OUTPUT LESS THAN 5 AMPS)	LAUNCH	A. CONTINUE MISSION 1. 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.
			E.O.	B. NO-GO FOR TLI 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.	
			TLC, L.O., LUNAR STAY	C. BASED ON FAILURE MODE, CONSIDERATION WILL BE GIVEN TO CONTINUING WITH NOMINAL MISSION.	
			ALL	CONTINUE MISSION	
	12-31	LOSS OF TWO FUEL CELLS (OUTPUT LESS THAN 5 AMPS EACH)	LAUNCH	A. CONTINUE MISSION 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. 2. AUX. BATTERY MAY BE USED IN LIEU OF BATT C
			POWERED DESCENT	B. CONTINUE MISSION NO GO FOR LUNAR STAY	
			ALL	C. ENTER NEXT BEST PTP 1. CONNECT REMAINING FUEL CELL TO BOTH MAIN BUSES. 2. PERFORM POWER DOWN TO MAINTAIN MAIN BUS VOLTS GREATER THAN 24.5 VDC	C. ONE ENTRY BATTERY OR AUX BATT MAY BE USED TO SUPPLEMENT REMAINING FC FOR G+N ALIGNMENT PRIOR TO DEORBIT. 2. REF. CREW EMERGENCY POWERDOWN PROCEDURE.

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	12-32	LOSS OF THREE FUEL CELLS A. OUTPUT LESS THAN 10 AMPS EACH	LAUNCH POWERED DESCENT ALL	A. CONTINUE MISSION 1. AFTER 2 + 00 EDS AUTO/OFF TO OFF. 2. TIE BAT C TO BOTH MAIN BUSES. 3. TIE AUX. BATT TO MAIN A. 4. ENTER 3-1 AT NORMAL POWER IF FUEL CELLS CANNOT BE RESTORED. B. CONTINUE MISSION NO GO FOR LUNAR STAY C. ENTER NEXT BEST PTP	LM SYSTEMS (IF AVAILABLE) MAY BE USED TO SUPPLEMENT FUEL CELL POWER. A. 3. 4.75 HOURS LEFT IN ORBIT BEFORE DEORBIT MANEUVER.
	12-33	LOSS OF ALL SM POWER PLUS ONE ENTRY BATTERY CURRENT LESS THAN 50 PERCENT OF LOAD ON EITHER REMAINING BATTERY	LAUNCH EO POWERED DESCENT ALL	A. ABORT B. ENTER NEXT BEST ATP OR PTP PERFORM EMERGENCY POWER DOWN C. CONTINUE MISSION NO GO FOR LUNAR STAY D. ENTER NEXT BEST PTP PERFORM EMERGENCY POWER DOWN	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. B. 2.4 HOURS LEFT IN ORBIT BEFORE SPS IGNITION

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM ELECTRICAL	FUEL CELLS	12-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

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. CONTINUE MISSION 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.			
			EO	B. NO-GO FOR TLI	B. IF LOST DURING SPS MANEUVER, CONTINUE ON REMAINING BATTERY.		
			ALL	C. 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			
			PRE-PDI	B. ENTER NEXT BEST PTP- NO GO FOR PDI			
			POWERED DESCENT	C. CONTINUE MISSION- NO GO FOR LUNAR STAY			
			ALL	D. ENTER NEXT BEST PTP USE ONE BATTERY ENTRY PROCEDURE.	D. IF LOSS DURING SPS MANEUVER, ATTEMPT TO TIE BATTERY C TO BOTH MAINS.		
	12-42	LOSS OF BATTERY CHARGER	EO	A. CONTINUE MISSION ROTATE BATTERY C FOR BURNS TO MAINTAIN BALANCED BATTERIES			
			TLC	B. NO-GO FOR LOI IF SUM OF TWO LOWEST ENTRY BATTERIES LESS THAN 45.8 AMP HRS.			
			LO	C. NO-GO FOR UNDOCK IF SUM OF TWO LOWEST ENTRY BATTERIES LESS THAN 42.8 AMP HRS.			
		RULE NUMBERS 12-43 THROUGH 12-49 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	CSM ELECTRICAL POWER SYSTEM	BATTERIES/ CHARGER	12-8

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	12-50	MAIN BUS TIE MOTOR SWITCH FAILURES			
		A. ONE MOTOR SWITCH FAILS OPEN	LAUNCH	A.1. CONTINUE MISSION (A) IF MOTOR SW A/C TIE BAT C TO MAIN BUS A. (B) IF MOTOR SW B/C TIE BAT C TO MAIN BUS B.	
			ALL	2. CONTINUE MISSION CLOSE ALTERNATE MOTOR SW AND USE MAIN BUS TIE CB'S AS MOTOR SWITCHES.	A.2. BATTERIES MUST BE CHARGED THROUGH OPEN MOTOR SW. LEAVE BATTERY CB CLOSED FOR CHARGING.
		B. ONE OR BOTH MOTOR SW FAILED CLOSED	ALL	B. CONTINUE MISSION USE CB'S AS MOTOR SWITCHES.	B. IF BOTH MOTOR SWITCHES FAIL CLOSED, BATTERIES CANNOT BE CHARGED.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM ELECTRICAL POWER SYSTEM	DC DISTRIBUTION	12-9

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS	
12-51	A. MAIN BUS A SHORTED GREATER THAN 25 AMPS		LAUNCH	A.1. CONTINUE MISSION (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. ENTER NEXT BEST PTP - NO GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI.		
			POWERED DESCENT	A.3. CONTINUE MISSION NO GO FOR LUNAR STAY		
			ALL	A.4. ENTER NEXT BEST PTP. POWER DOWN MAIN A.		
			B. MAIN BUS B SHORTED GREATER THAN 25 AMPS	LAUNCH	B.1. CONTINUE MISSION (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. ENTER NEXT BEST PTP - NO GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI.	
				POWERED DESCENT	B.3. CONTINUE MISSION NO GO FOR LUNAR STAY	
				ALL	B.4. ENTER NEXT BEST PTP POWER DOWN MAIN B	
			C. MAIN BUS SHORTED GREATER THAN 25 AMPS AND FUEL CELL(S) CANNOT BE DISCONNECTED FROM SHORTED BUS.	LAUNCH	C.1. ABORT	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. CONTINUE MISSION NO GO FOR LUNAR STAY	
				ALL	C.4. ENTER NEXT BEST PTP	C.4. IF FUEL CELL FEED CIRCUITRY SHORTED, CLOSE FC REACTANT VALVES.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1 /70	CSM ELECTRICAL POWER SYSTEM	DC DISTRIBUTION	12-10

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
12-52	A. BATTERY BUS SHORTED GREATER THAN 5 AMPS		LAUNCH	A.1. CONTINUE MISSION (A) PLACE EDS AUTO/OFF TO OFF. (B) OPEN ASSOCIATED MAIN BUS TO BAT BUS CB. (C) TIE BAT C TO ASSOCIATED MAIN BUS.	A.1. GREATER THAN 18 AMPS WILL CAUSE BATTERY BUS VOLTAGE TO BE LESS THAN OR EQUAL TO MAIN BUS VOLTAGE.
			PRE-PDI	2. ENTER NEXT BEST PTP- NO GO FOR PDI RETAIN LM DESCENT STAGE FOR TEI	
			POWERED DESCENT	3. CONTINUE MISSION- NO GO FOR LUNAR STAY	
			ALL	4. ENTER NEXT BEST PTP IF BUS NOT RESTORED	
12-53	B. BATTERY BUS SHORTED LESS THAN 5 AMPS		ALL	B. CONTINUE MISSION REMOVE POWER FROM BUS EXCEPT FOR MANEUVERS AND ENTRY	A.4. REMOVE POWER FROM BUS, IF SHORTED LESS THAN OR EQUAL TO 10 AMPS. POWER BUS JUST PRIOR TO ENTRY TO MAINTAIN SECS REDUNDANCY.
			BATTERY RELAY BUS SHORTED		
12-53	A. SHORT GREATER THAN 2.0 AMPS		LAUNCH	A.1. CONTINUE MISSION	
			POWERED DESCENT	2. CONTINUE MISSION. NO GO FOR LUNAR STAY	
			ALL	3. ENTER NEXT BEST PTP OPEN BATTERY BUS TO BATTERY RELAY BUS CB'S.	
12-53	B. SHORT LESS THAN 2.0 AMPS		ALL	B. CONTINUE MISSION	B. CHARGE BAT B CONTINUOUSLY WITH BAT B POWER ENTRY AND POST LANDING CB OPEN. CONSIDER BATTERY CHARGER LOST FOR MISSION PLANNING.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	PNL	11/1/70	CSM ELECTRICAL	DC DISTRIBUTION	12-11

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	12-54	A. LOSS OF BATT RELAY BUS OR ONE BATTERY BUS (UNABLE TO POWER BUS)	LAUNCH PRE-PDI POWERED DESCENT ALL	A.1. CONTINUE MISSION 2. ENTER NEXT BEST PTP- NO GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI. 3. CONTINUE MISSION- NO GO FOR LUNAR STAY 4. ENTER NEXT BEST PTP			
		B. LOSS OF ONE MAIN BUS (UNABLE TO POWER BUS)	LAUNCH PRE-PDI POWERED DESCENT ALL	B.1. CONTINUE MISSION 2. ENTER NEXT BEST PTP. NO GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI. 3. CONTINUE MISSION NO GO FOR LUNAR STAY 4. ENTER NEXT BEST PTP. RETAIN LM			
	12-55	LOSS OF AUX BATT	POST DOCK ALL	TBD CONTINUE MISSION			
		RULE NUMBERS 12-56 THROUGH 12-59 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	CSM ELECTRICAL	DC DISTRIBUTION	12-12

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	12-60	LOSS OF TWO INVERTERS	LAUNCH PRE-PDI POWERED DESCENT ALL	A. CONTINUE MISSION B. ENTER NEXT BEST PTP- NO GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI C. CONTINUE MISSION- NO GO FOR LUNAR STAY D. ENTER NEXT BEST PTP RETAIN LM	PLACE REMAINING INVERTER ON BOTH AC BUSES.			
	12-61	LOSS OF ONE AC BUS (TWO PHASES CANNOT BE MAINTAINED GREATER THAN 95 VAC)	LAUNCH PRE-PDI POWERED DESCENT ALL	A. CONTINUE MISSION B. ENTER NEXT BEST PTP- NO GO FOR PDI. RETAIN LM DESCENT STAGE FOR TEI C. CONTINUE MISSION- NO GO FOR LUNAR STAY D. ENTER NEXT BEST PTP RETAIN LM				
	12-62	LOSS OF BOTH AC BUSES	LAUNCH POWERED DESCENT ALL	A. ABORT MODE I OR MODE II 1. OPEN DIRECT O2 FOR SUIT VENTILATION. 2. IF AFTER MODE II, ENTER PTP 2-1. B. CONTINUE MISSION- C. ENTER NEXT BEST PTP OR ATP. RETAIN LM IF SUITED, REMOVE HELMET AND GLOVES. IF TIME PERMITS, REMOVE SUITS. IF CABIN DEPRESSURIZED, USE DIRECT O2 UNTIL CABIN IS REPRESSURIZED.	A.2. INITIATE CONTINUOUS FC H2 PURGE FOR COOLING. 2. 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 14	FNL	11/1/70	CSM ELECTRICAL POWER SYSTEM	AC DISTRIBUTION	12-13	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 12 - CSM ELECTRICAL POWER SYSTEM - CONCLUDED

R	ITEM	----- ' INSTRUMENTATION REQUIREMENTS ' -----					MISSION RULE REFERENCE
	12-70	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	
		AC BUS 1 PHASE A VAC	CC0200V	METER	SEPARATE	HIGHLY DESIRABLE	
		AC BUS 1 PHASE B VAC	-----	METER	-----	HIGHLY DESIRABLE	12-5,6,61
		AC BUS 1 PHASE C VAC	-----	METER	-----	HIGHLY DESIRABLE	
				COMMON METER			
		AC BUS 2 PHASE A VAC	CC0203V	METER	SEPARATE	HIGHLY DESIRABLE	
		AC BUS 2 PHASE B VAC	-----	METER	-----	HIGHLY DESIRABLE	12-5,6,61
		AC BUS 2 PHASE C VAC	-----	METER	-----	HIGHLY DESIRABLE	
		MAIN BUS A VDC	CC0206V	METER	SEPARATE	1 OF 2	12-32,52,20C
		MAIN BUS B VDC	CC0207V	METER	SEPARATE	MANDATORY	12-22
		BAT BUS A VDC	CC0210V	METER	SEPARATE	HIGHLY DESIRABLE	
		BAT BUS B VDC	CC0211V	METER	SEPARATE	HIGHLY DESIRABLE	
		BAT RELAY BUS VDC	CC0232V	METER	SEPARATE	HIGHLY DESIRABLE	
		BAT A CURRENT	CC0222C	METER	COMMON		
		BAT B CURRENT	CC0223C	METER	COMMON	2 OF 3 MANDATORY	12-4,33,40,41
		BAT C CURRENT	CC0224C	METER	COMMON		
		FC 1 CURRENT	SC2113C	METER	COMMON		
		FC 1 O2 FLO	SC2141R	METER	COMMON	1 OF 3 MANDATORY	12-7,31,32,33, 22A
		FC 1 H2 FLO	SC2139R	METER	COMMON		
		FC 2 CURRENT*	SC2114C	METER	COMMON		
		FC 2 O2 FLO	SC2142R	METER	COMMON	1 OF 3 MANDATORY	12-7,31,32,33, 22A
		FC 2 H2 FLO	SC2140R	METER	COMMON		
		FC 3 CURRENT	SC2115C	METER	COMMON		
		FC 3 O2 FLO	SC2144R	METER	COMMON	1 OF 3 MANDATORY	12-7,31,32,33, 22A
		FC 3 H2 FLO	SC2141R	METER	COMMON		
		BAT CHARGER CURRENT	SC0215C	METER	COMMON	HIGHLY DESIRABLE	
		FC 1 SKIN TEMP	SC2084T	METER	COMMON	HIGHLY DESIRABLE	
		FC 2 SKIN TEMP	SC2085T	METER	COMMON	HIGHLY DESIRABLE	12-22B
		FC 3 SKIN TEMP	SC2086T	METER	COMMON	HIGHLY DESIRABLE	
		FC 1 COND TEMP	SC2081T	METER	COMMON	HIGHLY DESIRABLE	
		FC 2 COND TEMP	SC2082T	METER	COMMON	HIGHLY DESIRABLE	12-22B
		FC 3 COND TEMP	SC2083T	METER	COMMON	HIGHLY DESIRABLE	
		FC 1 RAD OUT TEMP	SC2087T	METER	COMMON	HIGHLY DESIRABLE	
		FC 2 RAD OUT TEMP	SC2088T	METER	COMMON	HIGHLY DESIRABLE	12-221
		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	
		FC 2 PH	SC2161X	TALKBACK	COMMON	HIGHLY DESIRABLE	12-22E
		FC 3 PH	SC2162X	TALKBACK	COMMON	HIGHLY DESIRABLE	
		AUX BATT (SM BATT)	SC0230V	-----	-----	HIGHLY DESIRABLE	
NOTE--- USE BAT C IN LIEU OF BATTERY WITH LOST INST							
* COMMON SHUNT FOR FC 2 AND AUX BATT CURRENT							

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM ELECTRICAL POWER SYSTEM	INSTR REQ	12-14

13 DOCKING AND
UMBILICAL

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 13 - DOCKING AND UMBILICAL

R	ITEM						
		<div style="border: 1px dashed black; padding: 5px; margin: 0 auto; width: fit-content;">GENERAL</div>					
	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 FOWARD HATCH PRIMARY LOCK/UNLOCKED 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 TALK BACK INDICATORS* ARE BARBER POLE, TD&E WILL BE ATTEMPTED.					
		*NOTE---THE ONLY DOCKING PROBE INSTRUMENTATION CONSISTS OF TWO TALK BACK INDICATORS IN THE CSM.					
		RULE NUMBERS 13-7 THROUGH 13-10 ARE RESERVED					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	DOCKING AND UMBILICAL	GENERAL	13-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 13 - DOCKING AND UMBILICAL

R	ITEM						
		----- ' MANAGEMENT ' -----					
	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 ONE NITROGEN BOTTLE REMAINING IN AN OPERABLE SYSTEM.					
	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---					
		<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 JETTS			
		0 PSIA		NO MORE THAN 4 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 14	FNL	11/1/70	DOCKING AND UMBILICAL	MANAGEMENT	13-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 13 - DOCKING AND UMBILICAL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
SPECIFIC MISSION RULES							
	13-20	FAILURE TO ACHIEVE OR MAINTAIN POWER TO X-LUNAR BUS LOADS FROM CSM	DOCKED	CONTINUE MISSION - 1. INSURE LM DESCENT BATTERY LOW VOLTAGE TAPS - ON 2. OPEN LM EPS CB 11 & CB 16---DES ECA CIRCUIT BREAKERS WITHIN 6 HOURS OF THE TIME THE DESCENT BATTERIES WERE TURNED ON. 3. CLOSE EPS LM CB 11 & CB 16---DES ECA CIRCUIT BREAKERS AT FIRST PLANNED MANNING.	• NOMINAL MISSION MAY BE PERFORMED BECAUSE ECA THERMAL CONSTRAINTS WILL NOT BE VIOLATED WITH DESCENT ECA CIRCUIT BREAKERS OPEN. OVER CURRENT PROTECTION, HOWEVER, IS LOST UNTIL THESE CIRCUIT BREAKERS ARE CLOSED. EXTRA DESCENT AMP HOURS USED MAY AFFECT LUNAR STAY TIME.		
	13-21	FAILURE TO ACHIEVE S-IVB/LM SEPARATION OR FAILURE TO MATE LM UMBILICALS (P23 AND P24)	TD&E	PERFORM CSM/LM FINAL SEP	S-IVB/LM SEP CANNOT BE ACHIEVED WITHOUT MATING AT LEAST ONE UMBILICAL. POWER CAN BE SWITCHED AND MAINTAINED WITH EITHER PLUG.		
	13-22	FAILURE TO ACHIEVE CSM/LM FINAL SEPARATION	DOCKED	MUST PERFORM NORMAL UNDOCKING A. RETRIEVE PROBE AND DROGUE AND INSTALL. B. AFTER UNDOCKING, DEPRESS CSM AND JETTISON PROBE OVERBOARD.			
	13-23	FAILURE TO INDICATE DOCKING PROBE EXTEND OR BOTH TALK BACK INDICATORS ARE BARBER POLE.	TD&E UNDOCKED	A. CONTINUE MISSION ATTEMPT TD&E B. CONTINUE MISSION ATTEMPT DOCKING	DOCKING RING TUNNEL STRUCTURE DAMAGE MAY OCCUR TO THE EXTENT THAT TUNNEL PRESSURE CAN NOT BE MAINTAINED.		
	13-24	CANNOT REMOVE CSM FORWARD HATCH	TD&E DOCKED	A. PERFORM CSM/LM FINAL SEP B. PERFORM CSM/LM FINAL SEP IF LM MANNED, PERFORM EVT TO CSM.			
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	DOCKING AND UMBILICAL	SPECIFIC	13-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 13 - DOCKING AND UMBILICAL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	13-25	CANNOT REMOVE DOCKING PROBE, LM DROGUE, AND/OR LM UPPER HATCH.	DOCKED	CONTINUE MISSION PERFORM EVT IF LM MANNED	SPS AND SM RCS MANEUVERS MAY BE PERFORMED		
	13-26	FAILURE TO RELEASE CAPTURE LATCHES	DOCKED	REDOCK			
	13-27	PRIMARY FORWARD HATCH LOCK/UNLOCK MECHANISM INOPERATIVE	ALL	CONTINUE MISSION			
	13-28	FAILURE TO LOCK CSM FORWARD HATCH	TD&E DOCKED	CONTINUE MISSION 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	NO UNDOCKING			
	13-30	LOSS OF PRIMARY OR SECONDARY DOCKING SYSTEM	DOCKED	CONTINUE MISSION BASED ON FAILURE MODE, CONSIDERATION WILL BE GIVEN TO UNDOCKING WITH ONE GN2 BOTTLE REMAINING IN AN OPERABLE SYSTEM.			
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	DOCKING AND UMBILICAL	SPECIFIC	13-4

14 CSM SEQUENTIAL

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 14 - CSM SEQUENTIAL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
				SPECIFIC MISSION RULES			
	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. CONTINUE MISSION ENTER 3-1 IF BUS NOT RESTORED B. TERMINATE OPERATIONS ENTER NEXT BEST PTP IF BUS NOT RESTORED C. CONTINUE MISSION	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	LAUNCH EO TLC LUNAR ORBIT/ LUNAR STAY	A.1. CONTINUE MISSION 2. TERMINATE OPERATIONS ENTER NEXT BEST PTP 3. CONTINUE MISSION	A.2. USE BATTERY TIE FOR PYRO POWER TO AFFECTED BUS B. USE BATTERY TIE FOR PYRO POWER TO AFFECTED BUS		
		B. SHORTED LESS THAN 10 AMPS	ALL	B. CONTINUE MISSION			
		C. PYRO BUS TM READS 0 VDC AND PYRO BAT ONBOARD GREATER THAN 35 VDC	LAUNCH ALL	C.1. CONTINUE MISSION 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	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 = TO BAT BUS VOLTAGE.		
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	CSM SEQUENTIAL	SPECIFIC	14-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 14 - CSM SEQUENTIAL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	14-22	TELEMETRY INDICATES AN EDS VOTE INPUT 1, 2, OR 3	LAUNCH	CONTINUE MISSION 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			
	14-23	LET JETTISON MOTOR DOES NOT FIRE	LAUNCH	CONTINUE MISSION 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. CONTINUE MISSION				
	14-25	ACTIVATED CM RCS PRESS LOGIC RELAYS.	ALL	CONTINUE MISSION 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			
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	CSM SEQUENTIAL	SPECIFIC	14-4	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 14 - CSM SEQUENTIAL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	14-26	ACTIVATED SLA DEPLOY LOGIC RELAYS	ALL	CONTINUE MISSION 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	ENTER NEXT BEST PTP			
	14-28	LOST GROUND TO RESISTOR NETWORK FOR LOGIC OR PYRO BUS VOLTS MEASUREMENTS	LAUNCH EO TD+E ALL	CONTINUE MISSION ARM BOTH SYSTEMS B. CONTINUE MISSION DO NOT ARM AFFECTED SYSTEM UNTIL SEQUENTIAL GO/NO GO PRIOR TO ENTRY UNLESS OTHER SYSTEM FAILS.	ARMING AFFECTED SYSTEM WILL RESULT IN LOSS OF FOLLOWING PCM MEASUREMENTS--- LOGIC A SC2142R FC 1 O2 FLOW SP0930P FU SM/ENG INTERFACE P LOGIC B SC2140R FC 2 H2 FLOW ST0832K ALPHA CT. RATE CHAN 3 PYRO A SC2143R FC 2 O2 FLOW PYRO B SC2139R FC 1 H2 FLOW ST0831K ALPHA CT. RATE CHAN 2		
	14-29	ACTIVATED APEX JETTISON LOGIC RELAYS	LUNAR ORBIT LUNAR STAY ALL	A. CONTINUE MISSION DO NOT ARM PYRO BUSES UNTIL MALFUNCTION HAS BEEN ISOLATED B. ENTER NEXT BEST PTP 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 14	FNL	11/1/70	CSM SEQUENTIAL	SPECIFIC	14-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 14 - CSM SEQUENTIAL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	14-30	ACTIVATED DROGUE CHUTE DEPLOY LOGIC RELAY	LUNAR ORBIT/ LUNAR STAY ALL	A. CONTINUE MISSION DO NOT ARM PYRO BUSES UNTIL MALFUNCTION HAS BEEN ISOLATED B. ENTER NEXT BEST PTP. DO NOT ARM PYRO BUSES UNTIL MALFUNCTION HAS BEEN ISOLATED.	MAY BE DETECTED AT ANY TIME (CE0001X AND/OR CE0002X)		
	14-31	ACTIVATED PILOT CHUTE DEPLOY LOGIC RELAY	LUNAR ORBIT/ LUNAR STAY ALL	A. CONTINUE MISSION DO NOT ARM PYRO BUSES UNTIL MALFUNCTION HAS BEEN ISOLATED B. ENTER NEXT BEST PTP DO NOT ARM PYRO BUSES UNTIL MALFUNCTION HAS BEEN ISOLATED	DETECTED AT SECS POWER UP PRIOR TO ENTRY (CE0003X AND/OR CE0004X) WITH ELS BAT A(B) CB CLOSED		
		RULE NUMBERS 14-32 THROUGH 14-49 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	CSM SEQUENTIAL	SPECIFIC	14-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 14 - CSM SEQUENTIAL - CONCLUDED

R	ITEM	----- INSTRUMENTATION REQUIREMENTS -----					MISSION RUL REFERENCE
14-50	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY		
	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	SC2962C	METER	COMMON	HD	-----	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

R	ITEM						
15-6		ASCENT, DESCENT---THERE ARE NO GUIDANCE AND CONTROL SYSTEM FAILURES THAT AFFECT THE ASCENT OR DESCENT PHASES.					
15-7		<p>LUNAR STAY PHASE</p> <p>LUNAR STAY WILL BE TERMINATED EARLY IF REDUNDANT SPS CONTROL CAPABILITY IS LOST. IN ADDITION, THE FOLLOWING MINIMUM CONTROL CAPABILITIES MUST BE AVAILABLE FOR THE ACCOMPLISHMENT OF TEI.</p> <ol style="list-style-type: none"> 1. ATTITUDE CONTROL - DIRECT RCS IN TWO AXES AND RATE DAMPING IN TWO AXES. 2. TVC - BOTH SERVO LOOPS AND TWO TVC CONTROL MODES (ACCEL CMD EXCLUDED). 3. G&N - THE G&N MUST BE FULLY OPERATIONAL WITH THE EXCEPTION OF OPTICS AND NAV DSKY. <p>RULES 15-8 AND 15-9 ARE RESERVED.</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	GUIDANCE AND CONTROL	GENERAL	15-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

R	ITEM							
		----- ' SYSTEMS MANAGEMENT ' -----						
	15-10	ATTITUDE CONTROL---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.						
	15-11	PIPA BIAS WILL BE UPDATED WHEN ACTUAL BIAS DIFFERS FROM THE VALUE IN CMC ERASABLE BY +/- .003 FT/SEC ² . THE FAILURE LIMIT ON THE CSM ACCELEROMETER IS +/- .164 FT/SEC ² . THE FIRST GYRO BIAS DRIFT WILL BE UPDATED IF THE DRIFT IS +/- 1 MERU (.015 DEG/HR). THEREAFTER, +/- 3 MERU (+/- .045 DEG/HR) WILL BE THE UPDATE CRITERIA. THE FAILURE LIMIT ON THE CSM GYRO IS +/- 100 MERU (+/- 1.5 DEG/HR).						
	15-12	DELTA V COUNTER DRIFT SHOULD THE DELTA V COUNTER DRIFT BE GREATER THAN 0.01 FT/SEC ² , THE VC SETTING WILL BE APPROPRIATELY BIASED. SHOULD THE DRIFT BE GREATER THAN 0.1 FT/SEC ² , THE EMS WILL BE CONSIDERED FAILED.						
	15-13	DAP INITIALIZATION 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. <u>CSM, LM WEIGHT--- WILL 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.</u>						
		RULE NUMBERS 15-14 THROUGH 15-19 RESERVED.						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	GUIDANCE AND CONTROL	SYSTEMS MANAGEMENT	15-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
				SPECIFIC MISSION RULES				
15-20		LOSS OF EITHER BMAG 1 OR 2 IN EITHER PITCH OR YAW CHANNEL	ALL	CONTINUE MISSION	A. REF MALF PROC--- G6C-1,3,4+8 SCS-1,3,3A,+6 B. NO SCS AUTO TVC C. IF IN YAW CHANNEL, AFTER .05G, RSI IS USABLE 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. CONTINUE MISSION	A. MTVC ACCEL CMD IS ONLY MODE III OR MODE IV SPS CONTROL MODE.			
			TLC	B. NO-GO FOR LOI				
			DESCENT	C. CONTINUE MISSION				
			ALL OTHERS	D. TERMINATE PHASE AND ENTER NEXT BEST PTP	D.1. IN LUNAR ORBIT DO DPS TEI. 2. 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.			
15-22		LOSS OF ROLL BMAG	ENTRY	E. CONTINUE MISSION	E. RSI AND SCS FDAI ROLL UNUSABLE WITH YAW CHANNEL FAILURES.			
	A. NUMBER ONE		ALL	A. CONTINUE MISSION	A.1. MANUAL ROLL ATTITUDE CONTROL REQUIRED IN ALL SCS MODES. 2. NO SCS FDAI ROLL. RSI VALID.			
	B. NUMBER TWO		ALL	B. CONTINUE MISSION	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 14	FNL	11/1/70	GUIDANCE AND CONTROL	SCS	15-5	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
15-23	LOSS OF BOTH ROLL BMAG'S	LAUNCH EO TLC ALL OTHERS	A. CONTINUE MISSION B.1. NO GO FOR TLI 2. ENTER NEXT BEST PTP IF SM DEORBIT NOT AVAILABLE C. NO-GO FOR LOI D. CONTINUE MISSION	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 DESCENT ALL OTHERS	A. CONTINUE ALTERNATE EO MISSION SELECT 1 OR 2 ON TVC GIMBAL DRIVE SWITCH IN APPROPRIATE AXIS B. NO-GO FOR LOI C. CONTINUE MISSION D. TERMINATE PHASE AND ENTER NEXT BEST PTP	- MAINTAIN 20 LBS/QUAD/AXIS FOR HARDOVER RECOVERY FOR UNDOCKED AND --- LBS/QUAD/ AXIS FOR HARDOVER RECOVERY FOR DOCKED SPS MANEUVERS. D. IN LUNAR ORBIT DO DPS TEI.				
15-25	LOSS OF BOTH TVC SERVO LOOPS	LAUNCH EO TLC DESCENT ALL OTHERS	A. CONTINUE MISSION B. ENTER NEXT BEST PTP RCS DEORBIT C. NO-GO FOR LOI D. CONTINUE MISSION E. TERMINATE PHASE AND ENTER NEXT BEST PTP	A.1. REF MALF PROC G6C-1, G6N-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. CONTINUE MISSION USE REMAINING RHC B. CONTINUE MISSION 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 14	FNL	11/1/70	GUIDANCE AND CONTROL	SCS	15-6	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

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

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	GUIDANCE AND CONTROL	SCS	15-7

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

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

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	GUIDANCE AND CONTROL	SCS	15-8

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	15-31	LOSS OF AC2 PHASE A			- 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&Y DRIVE NO. 2 • IN EARTH ORBIT, LOSS OF AC2 RESULTS IN ALL THREE DEORBIT METHODS BEING SUBJECTED TO A SINGLE FAILURE (AC1 PHASE A).
			LAUNCH	A. CONTINUE MISSION	
			TLC	B. NO-GO FOR LOI	
			DESCENT	C. CONTINUE MISSION	
			ALL OTHERS	D. TERMINATE PHASE AND ENTER NEXT BEST PTP	D. IN LUNAR ORBIT DO DPS TEI.
	15-32	LOSS OF ORBIT RATE DISPLAY (ORDEAL) EARTH AND LUNAR	ALL	CONTINUE MISSION	REF MALF PROC G&C-4+5
	15-33	LOSS OF ENTRY MONITOR SYSTEM	ALL	CONTINUE MISSION	REF MALF PROC EMS-1
	15-34	GROUND AT EITHER SPS SOL DRIVER OUTPUT AND UNABLE TO REMOVE	ALL	CONTINUE MISSION- OPEN SPS PILOT VALVE CB'S	• REF MALF PROC G&C-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	15-35	LOSS OF TRANSLATION HAND CONTROLLER	LAUNCH	A. CONTINUE MISSION	
			EARTH ORBIT TLC	B. ENTER NEXT BEST PTP C. CONTINUE MISSION	B. VIOLATES BOTH SM AND HYBRID DEORBIT MINIMUM REQUIREMENTS.
			LO	D. NO-GO FOR UNDOCKING	VIOLATES LM RESCUE MINIMUM REQUIREMENTS.
			DOI	E. NO GO FOR DOI, CIRC AND PDI	
			UNDOCKED	F. DOCK	
			ALL OTHERS	G. CONTINUE MISSION	
		RULE NUMBERS 15-36 THROUGH 15-49 ARE RESERVED.			

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	GUIDANCE AND CONTROL	SCS	15-10

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	15-50	LOSS OF COMMAND MODULE COMPUTER			<ul style="list-style-type: none"> • REF MALF PROC G6N-5
			LAUNCH	A. CONTINUE MISSION	
			EO	B. CONTINUE ALTERNATE EO MISSION IF BOTH SPS AND SM DEORBIT CAPABILITY AVAILABLE	B. VIOLATES HYBRID DEORBIT MINIMUM REQUIREMENTS
			TLC	C. NO-GO FOR LOI	
			LO	D. ENTER NEXT BEST PTP	
			UNDOCKED	E. DOCK	E. VIOLATES LM RESCUE MINIMUM REQUIREMENTS
			DESCENT	F. CONTINUE MISSION	
			POST DOCK	G. RETAIN LM ASCENT	G. USE LM FOR COMMB/U
			ENTRY	H. PERFORM BACKUP ENTRY	I. IN LUNAR ORBIT DO DPS TEI.
			ALL OTHERS	I. TERMINATE PHASE AND ENTER NEXT BEST PTP	
	15-51	LOSS OF DSKY			<ul style="list-style-type: none"> • REF MALF PROC G6C 5
		A. EITHER MDC OR LEB DSKY	ALL	A. CONTINUE MISSION	
		B. BOTH MDC AND LEB DSKY	EO	B.1. CONTINUE ALTERNATE EO MISSION IF BOTH SPS AND SM DEORBIT CAPABILITY AVAILABLE	B.1. VIOLATES HYBRID DEORBIT MINIMUM REQUIREMENTS
			TLC	2. NO-GO FOR LOI	
			LO	3. ENTER NEXT BEST PTP	
			UNDOCKED	4. DOCK	4. VIOLATES LM RESCUE MINIMUM REQUIREMENTS
			DESCENT	5. CONTINUE MISSION	
			POST DOCK	6. RETAIN LM ASCENT	6. USE LM FOR COMMB/U
			ENTRY	7. PERFORM BACKUP ENTRY	8. IN LUNAR ORBIT DO DPS TEI.
			ALL OTHERS	8. TERMINATE PHASE AND ENTER NEXT BEST PTP	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	GUIDANCE AND CONTROL	G&N	15-11

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	15-52	LOSS OF INERTIAL SUBSYSTEM			<ul style="list-style-type: none"> • REF MALF PROC G&N-6
			LAUNCH	A. CONTINUE MISSION	
			EO	B. CONTINUE ALTERNATE EO MISSION IF BOTH SPS AND SM DEORBIT CAPABILITY AVAILABLE	B. VIOLATES HYBRID DEORBIT MINIMUM REQUIREMENTS
			TLC	C. NO-GO FOR LOI	
			LO	D. ENTER NEXT BEST PTP	
			UNDOCKED	E. DOCK	E. VIOLATES LM RESCUE REQUIREMENTS
					G. USE LM G+N TO MONITOR BURNS
			DESCENT	F. CONTINUE MISSION	
			POST DOCK	G. RETAIN LM ASCENT	
			ENTRY	H. PERFORM BACKUP ENTRY	
			ALL OTHERS	I. TERMINATE PHASE AND ENTER NEXT BEST PTP	1.1. VIOLATES LM RESCUE MINIMUM REQUIREMENTS 2. IN LUNAR ORBIT DO DPS TEI
	15-53	LOSS OF OPTICS SUBSYSTEM			<ul style="list-style-type: none"> • REF MALF PROC G&N-5
			LAUNCH	A. CONTINUE MISSION	
			EO	B. CONTINUE ALTERNATE EO MISSION	
				USE BACKUP ALIGNMENT PROCEDURE (COAS)	
			TLC	C. NO-GO FOR LOI	
			ALL OTHERS	CONTINUE MISSION	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14 FNL		11/1/70	GUIDANCE AND CONTROL	G&N	15-12

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 15 - GUIDANCE AND CONTROL - CONCLUDED

R	ITEM	----- INSTRUMENTATION REQUIREMENTS -----					
15-60	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION RULE REFERENCE	
	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 -OB/HD-PCM	15-24/25	
	YAW GIMBAL POS 1 & 2	CH3518H	GPI	COMMON	1 OF 2 MANDATORY -OB/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 14	FNL	11/1/70	GUIDANCE AND CONTROL	INSTR REQ	15-14	

16 CSM SERVICE
PROPULSION
SYSTEM

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS

R	ITEM						
		----- ' GENERAL ' -----					
	16-1	A. CATEGORIES OF FAILURES--- FAILURES AFFECTING THE SPS FAIL INTO ONE OF THREE CATEGORIES--- 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. B. ULLAGE REQUIREMENTS--- 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. C. PREMATURE TERMINATION OF BURNS--- CRITICAL BURNS WILL NOT BE TERMINATED BECAUSE OF ANOMALIES. NON-CRITICAL BURNS WILL BE TERMINATED UNDER VARIOUS CONDITIONS AS SPECIFIED IN RULE 3-31 AND THE SPECIFIC RULES OF THIS SECTION.					
	16-2	LAUNCH PHASE THERE ARE NO SPS FAILURES WHICH REQUIRE A LAUNCH ABORT.					
	16-3	RESERVED					

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	CSM SPS	GENERAL	16-1	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS

R	ITEM						
16-4	EARTH ORBIT PHASE	<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 SMRCS 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	TRANSLUNAR COAST PHASE	<p>A. CRITICAL BURNS IN THIS PHASE ARE TIME CRITICAL ABORTS, BURNS TO ASSURE FREE RETURN OR BURNS TO AVOID LUNAR OR LAND IMPACT. HOWEVER, ONCE INITIATED WITH THE SPS, THESE BURNS ARE CONSIDERED NON-CRITICAL BECAUSE SUFFICIENT TIME IS AVAILABLE FOR ANALYSIS AND POSSIBLE CORRECTIVE ACTION.</p> <p>B. IF THE SPS IS INCAPABLE OF PERFORMING NON-CRITICAL MANEUVERS, FURTHER NON-CRITICAL BURNS AND LOI WILL BE INHIBITED.</p> <p>C. 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>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	CSM SPS	GENERAL	16-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS

R	ITEM	
16-6	LUNAR ORBIT PHASE	<p>A. TEI IS THE ONLY CRITICAL BURN IN THIS PHASE.</p> <p>B. IF THE SPS IS INCAPABLE OF PERFORMING NON-CRITICAL BURNS, FURTHER NON-CRITICAL BURNS WILL BE INHIBITED.</p> <p>C. LM DPS MAY BE USED FOR TEI IF THE CAPABILITY EXISTS.</p>
16-7	DESCENT PHASE	<p>THE LM POWERED DESCENT WILL BE ABORTED FOR SPS PROPELLANT LEAKS.</p>
16-8	UNDOCKED AND LUNAR STAY PHASES	<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 ONLY FOR SPS PROPELLANT LEAKS.</p>
16-9	ASCENT PHASE	<p>LM RESCUE BURNS MAY BE REQUIRED, AND THEY ARE CRITICAL.</p>
16-10	TRANSEARTH COAST PHASE	<p>CRITICAL BURNS IN THIS PHASE ARE MIDCOURSE CORRECTIONS TO ATTAIN THE PROPER ENTRY CORRIDOR WHICH ARE OUTSIDE SM-RCS CAPABILITY. HOWEVER, ONCE INITIATED, THESE BURNS ARE CONSIDERED NON-CRITICAL BECAUSE SUFFICIENT TIME IS THEN AVAILABLE FOR ANALYSIS AND POSSIBLE CORRECTIVE ACTION.</p>
16-11	THERE ARE NO SPS FAILURES REQUIRING RETENTION OF THE LM ASCENT STAGE.	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM SPS	GENERAL	16-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS

R	ITEM							
		----- ' SYSTEMS MANAGEMENT ' -----						
16-12	PROPELLANT GAGING	<p>A. FOR BURNS LESS THAN 25 SECONDS DURATION---</p> <ol style="list-style-type: none"> 1. PRIME METHOD----IMU DELTA V OBTAINED 2. BACKUP METHOD----FLOW RATE X BURNTIME <p>B. FOR BURNS GREATER THAN 25 SECONDS DURATION---</p> <ol style="list-style-type: none"> 1. PRIME METHOD----IMU DELTA V OBTAINED 2. BACKUP METHOD----ONBOARD GAGING SYSTEM 						
16-13	THE PU VALVE WILL BE USED TO MAINTAIN THE UNBALANCE READING---	<p>A. PRIOR TO CROSSOVER---AT THE STABLE VALUE OCCURING APPROXIMATELY 25 SEC AFTER LOI IGNITION.</p> <p>B. AFTER CROSSOVER--- AT APPROXIMATELY ZERO UNBALANCE.</p>						
16-14	DUAL BANK VS SINGLE BANK OPERATION	<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 6 SECONDS. THE FIRST BURN WILL BE STARTED ON BANK A.</p>						
16-15	PROPELLANT MANAGEMENT	<p>A. THE SPS PROPELLANT REDLINE PRE LOI TO PROVIDE CAPABILITY FOR LOI, TEI (NORMAL RETURN) AND TEMC (3 SIGMA SCS CUTOFF ON TEI) IS 91 PERCENT INDICATED PROPELLANT REMAINING.</p> <p>B. THE SPS PROPELLANT REDLINE PREUNDOCKING TO PROVIDE CAPABILITY FOR CIRC, LM RESCUE, LOPC 1, TEI (SLOW RETURN) AND TEMC (3 SIGMA SCS CUTOFF ON TEI) IS 31.5 PERCENT INDICATED PROPELLANT REMAINING.</p>						
16-16	PROPELLANT FEEDLINE TEMPERATURE MANAGEMENT	<p>SPS LINE HEATERS WILL BE MANUALLY CYCLED TO MAINTAIN FEEDLINE TEMPERATURES BETWEEN 45 DEG. F AND 75 DEG. F. AND ENGINE VALVE TEMPERATURE ABOVE 45 DEG. F.</p>						
16-17	ULLAGE MANAGEMENT	<p>IN GENERAL, SPS BURNS REQUIRING ULLAGE WILL BE PRECEDED BY A TWO JET ULLAGE.</p>						
		<p>RULE NUMBERS 16-18 THROUGH 16-19 ARE RESERVED.</p>						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	CSM SPS	MANAGEMENT	16-4	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS

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. N/A B. NO-GO FOR LOI/DOI C. ENTER NEXT BEST PTP USE LM DPS IF AVAILABLE D. N/A E. ENTER NEXT BEST PTP	MALF PROC SPS-9			
16-23	LOSS OF BOTH GN2 TANK PRESSURES (LESS THAN 400 PSIA)	LAUNCH EO TLC LO UNDOCKED DESCENT LUNAR STAY TEC	A. CONTINUE MISSION B. ENTER NEXT BEST PTP RCS DEORBIT C. NO-GO FOR LOI/DOI D. PLAN TEI ASAP WITH LM DPS E. DOCK ASAP F. CONTINUE MISSION G. RETURN TO CSM ASAP H. CONTINUE MISSION	• MALF PROC--- SPS 9 • TRANSDUCER INDICATION CANNOT BE VERIFIED WITHOUT ENGINE OPERATION. E. DO NOT STAGE LM			
16-24	FUEL FEEDLINE AND/OR OXIDIZER FEEDLINE TEMP LESS THAN 40 DEG F. AND UNABLE TO INCREASE.	LAUNCH EO TLC LO UNDOCKED DESCENT LUNAR STAY TEC	A. CONTINUE MISSION B. ENTER NEXT BEST PTP RCS DEORBIT C. NO-GO FOR LOI/DOI D. PLAN TEI ASAP WITH LM DPS E. DOCK ASAP F. CONTINUE MISSION G. RETURN TO CSM ASAP H. CONTINUE MISSION	• MALF PROC--- SPS 11 LIMITATION FOR CRITICAL BURNS IS 25 DEG F. F. DO NOT STAGE LM			
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	CSM SPS	SPECIFIC	16-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	16-25	ENGINE FLANGE TEMP GOES HIGHER THAN 480 DEG F DURING AN SPS BURN.	LAUNCH	NOT APPLICABLE			
			EO	ENTER NEXT BEST PTP			
				RCS DEORBIT			
			TLC	NO GO FOR LOI/DOI/PDI			
			LO	ENTER NEXT BEST PTP, USE DPS IF AVAILABLE.			
		A. DURING NON-CRITICAL BURN	ALL	A. TERMINATE BURN INHIBIT FURTHER NON-CRITICAL BURNS			
		B. DURING CRITICAL BURN	ALL	B. CONTINUE BURN INHIBIT FURTHER NON-CRITICAL BURNS			
	16-26	THRUST CHAMBER PRESSURE LESS THAN 70 PSI CONFIRMED BY OTHER INSTRUMENTATION	LAUNCH	NOT APPLICABLE	• MALF PROC--- SPS 6		
			EO	ENTER NEXT BEST PTP - RCS DEORBIT	• CONFIRMING INSTRUMENTATION INCLUDES ONBOARD PC METER, CREW, DEGRADED THRUST, FU AND OX INTERFACE PRESSURES, F/O VALVE POSITIONS, FU AND OX TANK PRESSURES.		
			TLC	NO GO FOR LOI/DOI/PDI			
			LO	ENTER NEXT BEST PTP, USE LM DPS IF AVAILABLE			
		A. DURING NON-CRITICAL BURN		A. TERMINATE BURN INHIBIT FURTHER NON-CRITICAL BURNS			
		B. DURING CRITICAL BURN		B. CONTINUE BURN INHIBIT FURTHER NON-CRITICAL BURNS			
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	CSM SPS	SPECIFIC	16-7

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
16-27	LACK OF ULLAGE CAPABILITY	LAUNCH	A. NOT APPLICABLE		
		EO	B. NO-GO FOR TLI CONTINUE MISSION IN EO WITH SUITABLE ALTERNATE		
		TLC	C. NO-GO FOR LOI/DOI		
		LO	D. ENTER NEXT BEST PTP		PRECLUDES LM RESCUE
		UNDOCKED	E. REDOCK		
		ALL OTHERS	F. CONTINUE MISSION INHIBIT NON-CRITICAL BURNS IF POSSIBLE		
16-28	DELTA P BETWEEN FUEL AND OX TANK PRESSURES GREATER THAN 20 PSI AND UNABLE TO DECREASE	LAUNCH	CONTINUE MISSION		MALF PROC--- SPS 1C
		EO	ENTER NEXT BEST PTP RCS DEORBIT		
		TLC	NO-GO FOR LOI/DOI		
		LO	PLAN TEI ASAP WITH LM DPS		
		UNDOCKED	DO NOT STAGE LM DOCK ASAP		
		ALL OTHERS	RETURN TO CSM OR ATTEMPT CSM RESCUE CONTINUE MISSION		
	A. DURING NON-CRITICAL BURN	OTHERS	A. TERMINATE BURN INHIBIT FURTHER NON-CRITICAL BURNS		
	B. DURING CRITICAL BURN	OTHERS	B. CONTINUE BURN INHIBIT FURTHER NON-CRITICAL BURNS		

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM SPS	SPECIFIC	16-8

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS

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. CONTINUE MISSION B. NO-GO FOR TLI CONTINUE MISSION IN EO IF SUFFICIENT ULLAGE BLOWDOWN DELTA V CAPABILITY EXISTS C. NO-GO FOR LOI/DOI/PDI D. NO-GO FOR UNDOCKING E. DOCK ASAP F. CONTINUE MISSION	• BLOWDOWN DELTA V REMAINING IS A FUNCTION OF ULLAGE VOLUME AT TIME OF FAILURE. MALF PROC--- SPS 7&8
		RULE NUMBERS 16-30 THROUGH 16-49 ARE RESERVED.			

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM SPS	SPECIFIC	16-9

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 16 - CSM SPS - CONCLUDED

R	ITEM	----- INSTRUMENTATION REQUIREMENTS -----					MISSION RULE REFERENCE
16-50	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY		
	OX TK PRESS	SP0003P	METER/C&W	COMMON	M O/B	16-20, 28	
	OX SM/ENG INTERFACE P	SP0931P	-	-	HD	16-20, 29	
	FU TK PRESS	SP0006P	METER/C&W	COMMON	M O/B	16-20, 28	
	FU SM/ENG INTERFACE P	SP0930P	-	-	HD	16-20, 28	
	SPS VLV ACT PRESS-PRI	SP0600P	METER	COMMON		16-21, 22	
	SPS VLV ACT PRESS-SEC	SP0601P	METER	COMMON	-1 OF 2 M O/B	16-21, 22	
	SPS FU FEEDLINE TEMP	SP0048T	METER	COMMON		16-24	
	SPS OX FEEDLINE TEMP	SP0049T	SYS TEST	COMMON	-1 OF 2 M		
	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 M		16-21, 26	
	FU/OX VLV 2 POS	SP0023H	DISPLAY	SEPARATE M	1 OF 2 O/B	16-21, 26	
	FU/OX VLV 3 POS	SP0024H	DISPLAY	SEPARATE M	1 OF 2 O/B	16-21, 26	
	FU/OX VLV 4 POS	SP0025H	DISPLAY	SEPARATE 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	

	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	CSM SPS	INSTR REQ	16-10	

11

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 17 - CSM SM-RCS

R	ITEM						
		----- ' GENERAL ' -----					
	17-1	<p>LAUNCH</p> <p>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.</p>					
	17-2	<p>EARTH ORBIT PHASE</p> <p>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.</p> <p>B. LOSS OF TWO OR MORE QUADS IS CAUSE FOR ENTRY INTO THE NEXT BEST PTP.</p> <p>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.</p> <p>2. LOSS OF TWO OPPOSITE QUADS WILL DESTROY THE CAPABILITY TO PERFORM PRECISE 3-AXIS ATTITUDE CONTROL AND PRECLUDES SM OR HYBRID DEORBIT.</p>					
	17-3	<p>TRANSLUNAR COAST</p> <p>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 3-AXIS ATTITUDE CONTROL AND 3 AXIS TRANSLATION CONTROL.</p>					
	17-4	<p>LUNAR ORBIT</p> <p>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.</p> <p>RULE NUMBERS 17-5 THROUGH 17-14 ARE RESERVED.</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	CSM SM-RCS	GENERAL	17-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 17 - CSM SM-RCS

R	ITEM	<p>----- ' SYSTEMS MANAGEMENT ' -----</p>					
17-15	PROPELLANT GAGING	<p>A. PRIME METHOD---RTCC EQUATION (6 PERCENT).</p> <p>B. BACKUP METHOD---HELIUM PRESSURE/TEMPERATURE (11 PERCENT) (ONBOARD)</p>					
17-16	QUAD PROPELLANT BALANCE	<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	SECONDARY PROPELLANT FUEL PRESSURE VALVE	<p>THE RCS SECONDARY FUEL PRESSURIZATION VALVE WILL BE OPENED FOLLOWING TD + E OR WHEN THE PRIMARY FUEL MANIFOLD PRESSURE REACHES 150 PSIA OR RTCC SHOWS 119 LBS WILL BE REACHED DURING A TRANSLATION MANEUVER, WHICHEVER COMES FIRST.</p>					
<p>RULE NUMBERS 17-18 THROUGH 17-19 ARE RESERVED.</p>							
	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	CSM SM-RCS	MANAGEMENT	17-2	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 17 - CSM SM-RCS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
				----- SPECIFIC MISSION RULES -----	
17-20	SUSTAINED LEAK IN HELIUM TANK				• MALF PROC--- RCS 2
	A. ONE OR MORE QUADS	LAUNCH		A. CONTINUE MISSION	• QUAD WILL REMAIN USABLE UNTIL HE MANIFOLD PRESSURE REACHES 75 PSI
	B. ONE QUAD (ALL OTHER QUADS NORMAL)	EO		B.1. NO-GO FOR TLI	
		TLC		2. CONTINUE MISSION	
		LO		3. NO GO FOR DOI OR UNDOCKING	
		UNDOCKED		4. DOCK ASAP	
		DESCENT/LUNAR STAY		5. CONTINUE MISSION	
	C. MORE THAN ONE QUAD	EO		C.1. CONTINUE MISSION ENTER PRIOR TO LOSS OF HYBRID DEORBIT CAPABILITY	
		TLC		2.(A) NO GO FOR LOI (B) CONTINUE MISSION IF SUFFICIENT BLOWDOWN CAPABILITY EXISTS	
		DESCENT		3. CONTINUE MISSION	
		ALL OTHERS		4. TERMINATE PHASE AND ENTER NEXT BEST PTP	C.4.(A) IN LUNAR ORBIT, DO DPS TEI. (B) RETAIN LM ASCENT STAGE THRU TEI DEPENDING UPON LM RCS PROPELLANT REMAINING.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM SM-RCS	SPECIFIC	17-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 17 - CSM SM-RCS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
17-21	SUSTAINED LEAK BELOW HE ISOLATION VALVE (COULD BE HELIUM OR FUEL OR OXIDIZER)				<ul style="list-style-type: none"> MALF PROC--- RCS 1C QUAD WILL REMAIN USABLE UNTIL HE MANIFOLD PRESSURE REACHES 75 PSI. 		
	A. ONE OR MORE QUADS	LAUNCH	A. CONTINUE MISSION				
	B. ONE QUAD (ALL OTHER QUADS NORMAL)	EO	B.1. NO-GO FOR TLI				
		TLC	2.(A) NO GO FOR LOI	(B) ENTER NEXT BEST PTP IF LM NOT AVAILABLE			
		LO	3. NO GO FOR DOI OR UNDOCKING				
		UNDOCKED	4. DOCK ASAP				
		DESCENT	5. CONTINUE MISSION				
		LUNAR STAY	6. CONTINUE MISSION				
	C. MORE THAN ONE	DESCENT	C.1. CONTINUE MISSION				
		ALL OTHER	2. TERMINATE PHASE AND ENTER NEXT BEST PTP.		<ul style="list-style-type: none"> C.2.(A) IN LUNAR ORBIT DO DPS TEI. (B) RETAIN LM ASCENT STAGE FOR TEI DEPENDING UPON LM APS/ RCS PROPELLANT REMAINING. 		
17-22	PACKAGE TEMP LESS THAN 55 DEG F. AND UNABLE TO INCREASE	LAUNCH	NOT APPLICABLE		<ul style="list-style-type: none"> MALF PROC--- RCS 1A 		
	A. ONE QUAD (ALL OTHER QUADS NORMAL)	EO	A.1. NO-GO FOR TLI				
		TLC	2.(A) CONTINUE MISSION				
		LO	3. NO GO FOR DOI OR UNDOCKING				
		UNDOCKED	4. DOCK ASAP				
		DESCENT	5. CONTINUE MISSION				
		LUNAR STAY	6. CONTINUE MISSION				
	B. MORE THAN ONE QUAD	DESCENT	B.1. CONTINUE MISSION				
		ALL OTHER	2. TERMINATE PHASE AND ENTER NEXT BEST PTP.		<ul style="list-style-type: none"> B.2.(A) IN LUNAR ORBIT DO DPS TEI (B) RETAIN LM ASCENT STAGE FOR TEI DEPENDING UPON LM APS/ RCS PROPELLANT. 		
	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	CSM SM-RCS	SPECIFIC	17-4	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 17 - CSM SM-RCS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
17-23	LOSS OF INDIVIDUAL THRUSTERS OR THRUSTER COMBINATIONS AS A RESULT OF CLOGGING, FREEZING, BURNOUT, OR CONTROL SYSTEM MALFUNCTION	LAUNCH		NOT APPLICABLE	CONTROL SYSTEM MALFUNCTION WILL CAUSE LOSS OF AUTO COILS OF THRUSTER ALTHOUGH DIRECT COILS ARE STILL AVAILABLE.
	A. LOSS OF ANY ROLL THRUSTER	LO UNDOCKED ALL OTHERS		A.1. NO-GO FOR UNDOCKING 2. DOCK ASAP 3. CONTINUE MISSION	
	B. LOSS OF FOLLOWING THRUSTER COMBINATIONS---	EO		B.1. CONTINUE ALTERNATE EO MISSION	
	TWO PITCH OR TWO YAW,			IF BOTH SPS AND SM RCS DEORBIT CAPABILITY AND ALL AXIS ATTITUDE CONTROL AVAILABLE	
	ONE PITCH AND ONE YAW,				
	PITCH AND TWO ROLL IN SAME DIRECTION,	TLC		2. NO-GO FOR LOI 3. PLAN TEI FOR NEXT OPPORTUNITY	
	ONE YAW AND TWO ROLL IN SAME	TLC UNDOCKED		4. DOCK ASAP	
	THREE ROLL IN SAME DIRECTION	DESCENT LUNAR STAY		5. CONTINUE MISSION 6. ENTER NEXT BEST PTP	B.5. RETAIN LM ASCENT STAGE FOR TEI IF LOSS OF ALL THRUSTERS IN ONE DIRECTION IN SAME AXIS
	C. LOSS OF +X THRUSTERS ON ADJACENT QUADS.	ALL		C. INHIBIT NON-CRITICAL SPS BURNS	C. REF SPS RULE 16-27, LACK OF ULLAGE CAPABILITY
	RULE 17-24 THROUGH 17-49 ARE RESERVED.				

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM SM-RCS	SPECIFIC	17-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 17 - CSM SM-RCS - CONCLUDED

R	ITEM	----- ' INSTRUMENTATION REQUIREMENTS ' -----					
	17-50	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION RULE REFERENCE
		SM HE TK A PRESS	SR5001P	METER	COMMON		17-20, 21
		QTY SM-RCS PROP SYS A	SR5025Q	METER	COMMON	-1 OF 2 M	17-20, 21
		SM HE TK B PRESS	SR5002P	METER	COMMON		17-20, 21
		QTY SM-RCS PROP SYS B	SR5026Q	METER	COMMON	-1 OF 2 M	17-20, 21
		SM HE TK C PRESS	SR5003P	METER	COMMON		17-20, 21
		QTY SM-RCS PROP SYS C	SR5027Q	METER	COMMON	-1 OF 2 M	17-20, 21
		SM HE TK D PRESS	SR5004P	METER	COMMON		17-20, 21
		QTY SM-RCS PROP SYS D	SR5028Q	METER	COMMON	-1 OF 2 M	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 14	FNL	11/1/70	CSM SM-RCS	INSTR REW	17-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 18 - CSM CM-RCS

R	ITEM							
		<p>-----</p> <p style="margin-left: 40px;">' GENERAL '</p> <p>-----</p>						
	18-1	<p>LAUNCH</p> <p>A. A SUSTAINED LEAK IN OR THE LOSS OF HELIUM SUPPLY PRESSURE OR HELIUM MANIFOLD PRESSURE IN ONE CM RCS RING IS NOT CAUSE FOR ABORT SINCE THE REMAINING RING IS CAPABLE OF ABORT OR ENTRY ATTITUDE CONTROL. THIS FAILURE WILL REQUIRE ENTRY INTO PTP 6-4 SINCE SYSTEMS ARE NO LONGER REDUNDANT.</p> <p>B. A SUSTAINED LEAK IN OR THE LOSS OF HELIUM SUPPLY PRESSURE OR HELIUM MANIFOLD PRESSURE IN BOTH CM RCS RINGS PRIOR TO TOWER JETTISON IS JUSTIFICATION FOR A MODE I ABORT. AFTER TOWER JETTISON, IT IS NOT CAUSE FOR ABORT SINCE THE ABILITY TO PERFORM A SAFE ENTRY INTO THE ATLANTIC AT THE END OF THE FIRST REV STILL EXISTS BY USING THE CONTINGENCY SM RCS SPIN UP PRIOR TO CM/SM SEP. THIS METHOD OF ENTRY IS CONSIDERED OPERATIONALLY PREFERABLE TO PERFORMING AN ABORT AND PRESENTS LESS POTENTIAL HAZARD TO CREW RECOVERY. FURTHERMORE, CM RCS CONTROL IS REQUIRED FOR ABORTS IN THE MODE II AND MODE III REGIONS, AND TO ABORT THE LAUNCH IN THESE REGIONS FOR LOSS OF CM RCS CAPABILITY WOULD PUT THE SPACECRAFT AND CREW INTO AN UNSAFE ENVIRONMENT.</p>						
	18-2	<p>LUNAR ORBIT, LUNAR STAY PHASES</p> <p>A. LUNAR ORBIT ACTIVITIES WILL BE TERMINATED FOR LOSS OR IMPENDING LOSS OF ONE CM RCS SYSTEM.</p> <p>B. THESE PHASES WILL BE CONTINUED IF THE CM-RCS IS ARMED.</p> <p>C. LOSS OF ONE SYSTEM IS CAUSE FOR ENTRY INTO THE NEXT BEST PTP.</p>						
	18-3	<p>LM DESCENT PHASE</p> <p>THERE ARE NO CSM RCS FAILURES THAT ARE CAUSE FOR TERMINATING THE DESCENT PHASE.</p>						
	18-4	<p>ALL OTHER PHASES</p> <p>A. SUSTAINED LEAK IN OR LOSS OF HELIUM SUPPLY PRESSURE OR HELIUM MANIFOLD PRESSURE (COULD BE EITHER FUEL OR OXIDIZER) IN ONE CM RCS RING DELETES THE REDUNDANCY OF THE ENTRY ATTITUDE CONTROL SYSTEM AND REDUCES THE DELTA V AVAILABLE FOR HYBRID DEORBIT. LOSS OF HELIUM SUPPLY PRESSURE OR HELIUM MANIFOLD PRESSURE IN BOTH CM RCS RINGS DELETES ALL ENTRY ATTITUDE CONTROL CAPABILITY REQUIRING CONTINGENCY SM RCS SPIN UP PRIOR TO CM/SM SEP. THE LOSS OF ONE OR BOTH CM RCS RINGS IS CAUSE FOR TERMINATING THE PHASE AND MISSION BY ENTRY INTO THE NEXT BEST PTP.</p> <p>B. ARMING OF THE CM RCS RINGS, WHETHER THE PROPELLANT ISOLATION VALVES ARE OPENED OR CLOSED, IS CAUSE FOR TERMINATING THE PHASE AND MISSION INTO THE NEXT BEST PTP.</p> <p>C. LOSS OF BOTH RINGS IS CAUSE FOR RETAINING THE LM ASCENT STAGE.</p> <p> </p> <p>RULE NUMBERS 18-5 THROUGH 18-9 ARE RESERVED.</p>						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	CSM CM-RCS	GENERAL	18-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 18 - CSM CM-RCS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS														
----- SPECIFIC MISSION RULES -----																			
18-20	SUSTAINED LEAK IN OR COMPLETE LOSS OF HELIUM SUPPLY PRESSURE																		
	A. ONE RING	LAUNCH	A.1. CONTINUE MISSION AND ENTER PTP 6-4																
		DESCENT	2. CONTINUE MISSION																
		ALL OTHERS	3. TERMINATE PHASE AND ENTER NEXT BEST PTP		A.3. NORMAL ENTRY														
	B. BOTH RINGS	LAUNCH	B.1. CONTINUE MISSION AND ENTER PTP 2-1. UNLESS PRIOR TO TOWER JETTISON. IF PRIOR TO TOWER JETTISON, ABORT																
		DESCENT	2. CONTINUE MISSION																
		ALL OTHERS	3. TERMINATE PHASE AND ENTER NEXT BEST PTP		B.3. CONTINGENCY SM RCS SPINUP PRIOR TO CM/SM SEP FOR DEORBIT AND TBD FOR LUNAR RETURN 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. CONTINUE MISSION AND ENTER PTP 6-4																
		DESCENT	2. CONTINUE MISSION																
		ALL OTHERS	3. TERMINATE PHASE AND ENTER NEXT BEST PTP																
	B. BOTH RINGS	LAUNCH	B.1. CONTINUE MISSION AND ENTER PTP 2-1. UNLESS PRIOR TO TOWER JETTISON. IF PRIOR TO TOWER JETTISON, ABORT.																
		DESCENT	2. CONTINUE MISSION																
		ALL OTHERS	3. TERMINATE PHASE AND ENTER NEXT BEST PTP		B.3. CONTINGENCY SM RCS SPINUP PRIOR TO CM/SM SEP FOR DEORBIT AND TBD FOR LUNAR RETURN ENTRY.														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">MISSION</td> <td style="width: 5%;">REV</td> <td style="width: 10%;">DATE</td> <td style="width: 20%;">SECTION</td> <td style="width: 15%;">GROUP</td> <td style="width: 10%;">PAGE</td> <td style="width: 15%;"></td> </tr> <tr> <td>APOLLO 14</td> <td>FNL</td> <td>11/1/70</td> <td>CSM CM-RCS</td> <td>SPECIFIC</td> <td>18-3</td> <td></td> </tr> </table>						MISSION	REV	DATE	SECTION	GROUP	PAGE		APOLLO 14	FNL	11/1/70	CSM CM-RCS	SPECIFIC	18-3	
MISSION	REV	DATE	SECTION	GROUP	PAGE														
APOLLO 14	FNL	11/1/70	CSM CM-RCS	SPECIFIC	18-3														

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 18 - CSM CM-RCS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	18-22	CM RCS IS ARMED FOR ANY REASON	LO/ DESCENT/ LUNAR STAY ALL OTHERS	CONTINUE MISSION TERMINATE PHASE AND ENTER NEXT BEST PTP			
		RULE NUMBERS 18-23 THROUGH 18-49 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	CSM CM-RCS	SPECIFIC	18-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 18 - CSM CM-RCS - CONCLUDED

R	ITEM	----- INSTRUMENTATION REQUIREMENTS -----					MISSION RULE REFERENCE
18-50	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS CATEGORY			
	CM HE TK A PRESS	CR0001P	METER	COMMON	M	18-20	
	CM HE TK B PRESS	CR0002P	METER	COMMON	M	18-20	
	CM TK A TEMP	CR0003P	METER	COMMON	HD	18-20	
	CM TK B TEMP	CR0004P	METER	COMMON	HD	18-20	
	CM HE MNFLD A PRESS	CR0035P	METER/C&W	SEPARATE	M	18-21	
	CM HE MNFLD B PRESS	CR0036P	METER/C&W	SEPARATE	M	18-21	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	CSM CM-RCS	INSTR REQ	18-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 19 - EMU/EVA -

R	ITEM						
		<p>----- ! GENERAL ! -----</p>					
	19-1	<p>TO INITIATE AND CONTINUE THE FOLLOWING MISSION PHASES, THE EXTRAVEHICULAR MOBILITY UNIT (EMU) MUST PROVIDE THE FOLLOWING MINIMUM CAPABILITIES---</p> <p>A. DOCKED (TUNNEL HARDWARE INSTALLED)/UNDOCKED/RNDZ</p> <p>ANY COMBINATION OF TWO OPS AND/OR PLSS UNITS WITH SUFFICIENT O2 CONSUMABLES TO SUPPORT A 30 MINUTE CONTINGENCY EVT (CEVT)</p> <p>B. EVA</p> <ol style="list-style-type: none"> 1. CRITICAL INSTRUMENTATION 2. THERMAL CONTROL 3. EMU PRESSURE INTEGRITY 4. PRIMARY OXYGEN SUBSYSTEM 5. PLSS FAN 6. PLSS POWER SUPPLY 7. OPS O2 PRESSURE REGULATION 8. CONTAMINATION CONTROL 9. SUFFICIENT PLSS CONSUMABLES TO SUPPORT CHECKOUT, PLANNED EVA AND A 30 MINUTE POST-EVA RESERVE. 10. SUFFICIENT OPS CONSUMABLES TO SUPPORT 30 MINUTE PURGE OPERATIONS AT HIGH PURGE FLOW. 11. BSLSS IF TRAVERSE DISTANCE IS GREATER THAN <u>1</u> KM FROM LM. 					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	EMU/EVA	GENERAL	19-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 19 - EMU/EVA -

R	ITEM	
	19-2	<p>DEFINITIONS</p> <p>LOSS OF EMU PRESSURE INTEGRITY</p> <ol style="list-style-type: none"> 1. UNABLE TO MEET 0.3 PSI/MIN PRESSURE DECAY CRITERIA DURING EMU PRESSURE INTEGRITY CHECK. 2. EMU REGULATED PRESSURE LESS THAN 3.75 PSID (TM) AND DECREASING ON LUNAR SURFACE WHICH REPRESENTS AN O2 USAGE RATE GREATER THAN 0.7 LBS/HR <p>LOSS OF PRIMARY OXYGEN SUBSYSTEM (POS)</p> <ol style="list-style-type: none"> 1. SOURCE PRESSURE LESS THAN 135 PSIA OR 5 PERCENT (INDICATOR) 2. UNABLE TO SUPPLY OXYGEN TO OXYGEN VENTILATION LOOP (OVL) 3. IMPROPER PLSS PRESSURE REGULATION (LESS THAN 3.75 OR GREATER THAN 4.05 PSID) <p>LOSS OF PLSS POWER SUPPLY</p> <ol style="list-style-type: none"> 1. PLSS BATTERY VOLTAGE LESS THAN 16.0 VDC AND DECREASING 2. PLSS BATTERY CURRENT DRAIN GREATER THAN 3.0 AMPS AND INCREASING (DOES NOT INCLUDE CHECKOUT) <p>LOSS OF THERMAL CONTROL</p> <ol style="list-style-type: none"> 1. LOSS OF LCG/LTL CIRCULATION 2. LCG H2O INLET TEMPERATURE AND SUBLIMATOR O2 OUTLET TEMPERATURE OF 50 DEG F AND INCREASING AND LCG H2O DELTA T LESS THAN 5 DEG F AND DECREASING WITH DIVERTER VALVE IN 'MAX' POSITION (THIS CONSTITUTES A FAILED SUBLIMATOR) 3. DEPLETED FEEDWATER RESERVOIR OR INABILITY TO SUPPLY H2O TO SUBLIMATOR <p>EMERGENCY RETURN CAPABILITY</p> <ol style="list-style-type: none"> 1. THE OPS HIGH PURGE FLOW (8 LBS/HR) RETURN TRAVERSE CAPABILITY OF <u>1</u> KM REPRESENTS A 3 FT/SEC TRAVERSE RATE 300 BTUS CREWMAN HEAT STORAGE, AND 13 MINUTES FOR TERMINATION AND INGRESS. 2. THE OPS LOW PURGE FLOW (4 LBS/HR)/BSLSS RETURN TRAVERSE CAPABILITY OF <u>3</u> KM REPRESENTS A 3 FT/SEC TRAVERSE RATE, 5 MIN FOR BSLSS ACTIVATION/DEACTIVATION, AND 13 MIN FOR TERMINATION AND INGRESS.

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	EMU/EVA	GENERAL	19-2	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 19 - EMU/EVA -

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
				<div style="border: 1px dashed black; padding: 2px;"> SPECIFIC </div>			
19-20	LOSS OF EMU PRESSURE INTEGRITY		EVA	ACTIVATE OPS	REF MALF EMU		
	1. PGA PRESS LESS THAN 3.7 BUT GREATER THAN 3.4 PSID			1. TERMINATE EVA			
	2. PGA PRESS LESS THAN 3.4 PSID			2. TERMINATE EVA IMMEDIATELY			
19-21	PLSS FAN FAILURE		EVA	TERMINATE EVA IMMEDIATELY	REF MALF EMU		
				1. ACTIVATE OPS			
				2. OPEN PGA PURGE VALVE-LOW FLOW			
19-22	CONTAMINATION IN VENTILATION SYSTEM		EVA	TERMINATE EVA IMMEDIATELY	REF MALF EMU		
				1. ACTIVATE OPS			
				2. OPEN PGA PURGE VALVE-LOW FLOW			
	RULES 19-23 THROUGH 19-29 ARE RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	EMU/EVA	SPECIFIC	19-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 19 - EMU/EVA -

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	19-30	LOSS OF THERMAL CONTROL	EVA	TERMINATE EVA 1. IF ADDITIONAL COOLING IS REQUIRED, ACTIVATE BLSS OR CREWMAN MAY ELECT TO ACTIVATE OPS IN HIGH PURGE FLOW MODE IF LESS THAN 1 KM FROM LM AND CIRCUMSTANCES PERMIT	REF MALF EMU		
	19-31	LOSS OF POS	EVA	TERMINATE EVA 1. ACTIVATE OPS 2. IF EMU PRESSURE GREATER THAN 4.05 PSID (CTM) CLOSE POS SHUTOFF VALVE	REF MALF EMU NOTE--- IN THE EVENT OF HIGH PGA PRESSURE, PGA PURGE VALVE MAY BE OPENED FOR PRESSURE RELIEF FOLLOWING OPS ACTIVATION.		
	19-32	LOSS OF PLSS POWER	EVA	TERMINATE EVA IMMEDIATELY 1. ACTIVATE OPS 2. OPEN PGA PURGE VALVE LOW FLOW 3. ACTIVATE BLSS OR CREWMAN MAY ELECT TO ACTIVATE OPS IN HIGH PURGE FLOW MODE IF LESS THAN 1 KM FROM LM AND CIRCUMSTANCES PERMIT.	REF MALF EMU		
	19-33	LOSS OF CRITICAL INSTRUMENTATION	EVA	TERMINATE EVA	REF MR 19-42		
NOTE--- REF SECTION 20 FOR EVA COMMUNICATIONS RULES							
RULES 19-34 THROUGH 19-40 ARE RESERVED.							
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	EMU/EVA	SPECIFIC	19-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 19 - EMU/EVA - CONCLUDED

R	ITEM	INSTRUMENTATION REQUIREMENTS						
	19-41	PRELAUNCH INSTRUMENTATION MEAS DESCRIPTION	FM/FM PAM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION RULE REFERENCE	
		FEED H2O PRESS	GT8110P/GT8210P		COMMON	HD	19-2,3,30	
		LOW FEED H2O PRESS		TONE-FLAG		M		
		PLSS EKG	GT8124J/GT8224J			*		
		PLSS BAT CUR	GT8140C/GT8240C			HD	19,1,2,10, 21,32	
		PLSS BAT VOLT	GT8141V/GT8241V			HD	19-1,2,10,32	
		LCG H2O TEMP	GT8154T/GT8254T			HD	19-1,2,7,30	
		PGA PRESS	GT8168P/GT8268P			HD	19-1,2,20,31	
		PGA PRESS GAGE		CUFF GAGE		M		
		LOW PGA PRESS		TONE-FLAG		M		
		SUBL O2 OUT TEMP	GT8170T/GT8270T			HD	19-1,2,3,21, 30,11,14	
		PLSS-CO2 PP	GT8175P/GT8275P			HD	19-1,13,22	
		PLSS O2 PRESS	GT8182P/GT8282P		COMMON	HD	19-1,2,20,31	
		PLSS O2 QTY IND		METER		M		
		HIGH O2 FLOW		TONE-FLAG		M	19-1,2,20,31	
		LOW VENT FLOW		TONE-FLAG		M	19-1,21	
		LCG H2O DELTA T	GT8196T/GT8296T			HD		
		OPS PRESS GAGE		METER		M	19-1,4,14	
		OPS REG PRESS GAGE		METER		**M		
		EVC SYNC	GT8100X/GT8200X			M		
		EVC CAL 0 VDC	GT8101V/GT8201V			HD		
		EVC CAL 5 VDC	GT8102V/GT8202V			HD		
		* AEROMEDICAL PARAMETER REFERENCE SECTION 30.						
		**1 OF 2 OPS REG PRESS GAGES IS MANDATORY.						
	19-42	CRITICAL INSTRUMENTATION						
		MEAS DESCRIPTION	PAM FM/FM	ONBOARD	TRANSDUCER			
		PLSS O2 PRESS OR PLSS O2 QTY IND	GT8182P/ GT8282P	METER	COMMON			
		PGA PRESS GAGE		CUFF GAGE	} 10F3 M			
		PGA PRESS	GT8168P/ GT8268P					
		LOW PGA PRESS TONE		TONE	} 10F3 M			
		LOW VENT FLOW TONE	GT8140C/ GT8240C	TONE				
		PLSS BAT CURRENT						
		SUBL O2 OUT TEMP	GT8170T/ GT8270T					

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION

R	ITEM							
		----- ' GENERAL ' -----						
	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 BOTH SPACECRAFT 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. POWERED DESCENT ADDITIONAL REQUIREMENTS.</p> <p>LM VOICE REQUIRED TILL LO GATE. THERE ARE NO CSM COMMUNICATIONS SYSTEMS FAILURES FOR WHICH LM POWERED DESCENT WILL BE TERMINATED.</p> <p>D. LUNAR STAY ADDITIONAL REQUIREMENTS.</p> <ol style="list-style-type: none"> 1. FOR TWO-MAN EVA---VOICE COMM BETWEEN MSFN AND ONE EVA PLUS DUPLEX VOICE BETWEEN BOTH EVA CREWMAN. 2. FOR ONE-MAN EVA---VOICE COMM BETWEEN MSFN AND LM OR EVA PLUS DUPLEX VOICE BETWEEN THE LM AND EVA CREWMAN. <p>E. THE LM WILL BE RETAINED FOR TEC COMM IN EVENT OF LOSS OF ALL COMM BETWEEN THE CSM AND THE GROUND.</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; PLUS THE RECEPTION OF VOICE VIA LM BY BOTH EVA'S) 2. BACKUP---EVA-1 AR/EVA-2B OR EVA-1 A/EVA-2B OR EVA-1 B/EVA-2A (EITHER MODE COMBINATION ALLOWS DUPLEX VOICE BETWEEN EVA'S PLUS THE TRANSMISSION OF VOICE FROM BOTH THE EVA'S TO THE LM PLUS THE TRANSMISSION OF DATA FROM ONE EVA TO THE LM AND THE RECEIVING OF LM VOICE BY ONE EVA.) <p>B. ONE-MAN EVA</p> <ol style="list-style-type: none"> 1. PRIME---EVA-1A OR EVA-2A (ALLOW DUPLEX VOICE BETWEEN EVA AND THE LM PLUS THE TRANSMISSION OF DATA FROM EVA TO LM) 2. BACKUP---EVA-1B OR EVA-2B (ALLOWS DUPLEX VOICE BETWEEN EVA AND LM) <p>RULES 20-3 THROUGH 20-6 ARE RESERVED.</p>						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	COMM & INST	FUNCTIONAL COMM-GENERAL	20-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION

R	ITEM							
20-9	LM STEERABLE ANTENNA MANAGEMENT	<p>A. DURING ALL PHASES THE STEERABLE ANTENNA TEMPERATURE SHOULD BE MAINTAINED BETWEEN -65 DEG. F AND 185 DEG. F.</p>						
20-10	APOLLO COLOR TELEVISION CAMERA MANAGEMENT	<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.</p> <p>B. THE GROUND WILL MONITOR THE TV PICTURE AND RECOMMEND CAMERA MOVEMENT 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 OPERATING TO MINIMIZE THE POSSIBILITY OF FREEZING.</p> <p>D. DELETED</p> <p>E. IF THE THERMAL CONSTRAINTS ON THE CAMERA OPERATING TIME IN THE MESA ARE VIOLATED, THE GROUND WILL REQUEST THE CAMERA BE TURNED OFF.</p> <p>F. DELETED</p> <p>G. WHEN A BRIGHT OBJECT, WITH A CONTRASTING DARK BACKGROUND IS IN THE FIELD OF VIEW, THE GROUND WILL RECOMMEND 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>RULES 20-11 AND 20-12 ARE RESERVED.</p>						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	COMM & INST	FUNCTIONAL COMM-MNG.	20-3	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS														
				<div style="border: 1px dashed black; padding: 2px;"> SPECIFIC </div>															
	20-13	LOSS OF TWO-WAY VHF VOICE COMM BETWEEN SPACECRAFT	DOCKED UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY	CONTINUE NO GO FOR SEP MNVR DOCK ASAP NO GO FOR CSM CIRC CONTINUE MISSION CONTINUE MISSION CONTINUE MISSION	REF LM MAL PROC COMM 3, LOSS OF VHF VOICE COMM WITH CSM REF CSM MAL PROCEDURE COMM 5 - LOSS OF VHF COMM WITH LM NOTE---MSFN RELAY MAY BE UTILIZED														
	20-14	LOSS OF TWO-WAY VOICE COMM WITH MSFN	A. CSM ONLY LAUNCH EARTH ORBIT TLC DOI UNDOCKED/POWERED DESCENT LUNAR STAY B. LM ONLY DOCKED UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY	A.1. CONTINUE MISSION 2. ENTER NEXT BLOCK DATA POINT 3. CONTINUE MISSION NO GO FOR LOI 4. CONTINUE MISSION NO GO FOR SEP MANEUVER 5. CONTINUE MISSION 6. CONTINUE MISSION B.1. CONTINUE MISSION NO GO FOR SEP MANEUVER 2. RETURN TO VICINITY OF CSM NO GO FOR PDI 3.A. PDI TO LO GATE RETURN TO VICINITY OF CSM ASAP B. LO GATE TO TOUCHDOWN CONTINUE MISSION. 5. LM LIFTOFF NEXT ASCENT OPPORTUNITY.	REF CSM MAL PROCEDURES 7&8 - LOSS OF CSM VOICE COMM A.3 ENTER LM EARLY TO USE LM S-BAND FOR VOICE COMM WITH MSFN. UTILIZE VHF OF VHF RELAY FROM LM. IF UNABLE TERMINATE LUNAR STAY AND PERFORM A DOCKED TEI. NOTE--- RETAIN LM FOR COMM DURING TEC REF LM MAL PROC COMM-- 4 LOSS OF S-BAND VOICE COMM 5A. S-BAND RECEIVER CANNOT ACQUIRE PHASE LOCK. B.3. CSM RELAY ACCEPTABLE														
	20-15	LOSS OF TWO CSM AUDIO CENTERS	EPO ALL	CONTINUE MISSION NO GO FOR TLI CONTINUE MISSION-NO GO FOR LOI															
	20-16	LOSS OF VOICE FROM EVA-2 TO EVA-1	DUAL EVA	CONTINUE MISSION EVA-2 GO TO POSITION 'B'	EVA-1 HAS EVC-1 EVA-2 HAS EVC-2														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">MISSION</td> <td style="width: 10%;">REV</td> <td style="width: 10%;">DATE</td> <td style="width: 15%;">SECTION</td> <td style="width: 15%;">GROUP</td> <td style="width: 10%;">PAGE</td> <td style="width: 25%;"></td> </tr> <tr> <td>APOLLO 14</td> <td>FNL</td> <td>11/1/70</td> <td>COMM & INST</td> <td>FUNCTIONAL COMM-SPECIFIC</td> <td>20-4</td> <td></td> </tr> </table>						MISSION	REV	DATE	SECTION	GROUP	PAGE		APOLLO 14	FNL	11/1/70	COMM & INST	FUNCTIONAL COMM-SPECIFIC	20-4	
MISSION	REV	DATE	SECTION	GROUP	PAGE														
APOLLO 14	FNL	11/1/70	COMM & INST	FUNCTIONAL COMM-SPECIFIC	20-4														

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	20-17	LOSS OF VOICE FROM EVA-1 TO EVA-2	DUAL EVA	CONTINUE MISSION 1. EVA-2 GO TO POSITION 'A' 2. EVA-1 GO TO POSITION 'B'			
	20-18	LOSS OF DUPLEX VOICE BETWEEN EVA-1 AND EVA-2	DUAL EVA	TERMINATE EVA			
	20-19	LOSS OF TWO-WAY VOICE BETWEEN MSFN AND EVA	DUAL EVA	TERMINATE EVA 1. EVA-2 GO TO POSITION 'A' EVA-1 GO TO POSITION 'B' 2. IF UNABLE TO RE-ESTABLISH COMM EVA-2 RETURN TO LM AND RECONFIGURE COMM 3. IF ABLE TO RE-ESTABLISH COMM, CONTINUE EVA.			
	20-20	LOSS OF TWO-WAY VOICE BETWEEN MSFN AND BOTH LM AND EVA	ALT EVA (ONE-MAN)	TERMINATE EVA 1. RECONFIGURE LM TO RE-ESTABLISH COMM. 2. IF ABLE TO RE-ESTABLISH COMM, CONTINUE EVA.			
	20-21	LOSS OF DUPLEX VOICE BETWEEN LM AND EVA	ALT EVA (ONE-MAN)	TERMINATE EVA 1. RECONFIGURE LM AND EVA TO VHF BACKUP MODE. 2. IF ABLE TO RE-ESTABLISH DUPLEX COMM, CONTINUE EVA.			
		RULES 20-22 THROUGH 20-25 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	COMM & INST	FUNCTIONAL COMM-SPECIFIC	20-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION

R	ITEM						
		----- ' GENERAL ' -----					
	20-26	A. BASELINE REQUIREMENT (ALL PHASES EXCEPT LAUNCH) 1. 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 INST. SYS FAILURES FOR WHICH LM POWERED DESCENT WILL BE TERMINATED.					
	20-27	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 RULES 20-28 THROUGH 20-29 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	COMM & INSTR	CSM INST - GENERAL	20-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION

R	ITEM							
		<div style="border: 1px dashed black; padding: 5px; margin: 0 auto; width: 100px;"> MANAGEMENT </div>						
	20-30	DSE MANAGEMENT A. LM AND CSM LOW BIT RATE TELEMETRY WILL BE RECORDED CONTINUOUSLY WHEN NOT IN CONTACT WITH GROUND TELEMETRY SITES EXCEPT DURING PERIODS OF VHF RANGING WHEN NO LM TM WILL BE RECORDED, AND WILL BE NORMALLY PLAYED BACK AT LEAST ONCE PER REVOLUTION IN LUNAR ORBIT. B. CM HIGH BIT RATE DSE RECORDINGS WILL BE MADE DURING THE FOLLOWING OPERATIONS--- 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 (TBD) 9. LM FINAL SEP C. DURING SLEEP PERIODS 1. USING HIGH GAIN ANTENNAS, DSE RECORDING AND DUMPING WILL BE MANAGED PER (A) ABOVE.						
	20-31	CTE MANAGEMENT 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. B. CTE WILL BE ALLOWED TO DRIFT +/-5 SEC BEFORE BEING UPDATED AFTER ORBIT INSERTION. RULES 20-32 THROUGH 20-34 ARE RESERVED.						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	COMM & INSTR	CSM INST - MANAGEMENT	20-7

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
				<div style="border: 1px dashed black; padding: 5px; margin: 0 auto; width: 80px;"> SPECIFIC </div>			
	20-35	LOSS OF CSM TM A. HBR OR LBR B. ALL TM	ALL LAUNCH EO LO POWERED DESCENT LUNAR STAY	A. CONTINUE MISSION B.1. CONTINUE MISSION 2. ENTER NEXT BEST PTP 3. NO GO FOR LUNAR OPERATIONS 4. CONTINUE MISSION 5. LM LIFTOFF AT THE NEXT ASCENT OPPORTUNITY.	REF CSM MAL PROCEDURE. COMM 10 - MSFN REPORTS LOSS OF REALTIME PCM. DSE MAY BE UTILIZED FOR TM IF AVAILABLE.		
	20-36	LOSS OF CRITICAL INSTRUMENTATION	LAUNCH EO TLC LO	CONTINUE MISSION ENTER NEXT BEST PTP NO GO FOR TLI CONTINUE MISSION NO GO LOI NO GO FOR LUNAR OPERATIONS			
	20-37	LOSS OF ONE CSM PMP POWER SUPPLY	ALL	CONTINUE MISSION			
	20-38	LOSS OF BOTH CSM POWER AMPLIFIERS	EPO ALL	NO GO FOR TLI CONTINUE MISSION IF HI GAIN ANT IS AVAILABLE			
	20-39	LOSS OF THE SCE	EPO TLC LUNAR ORBIT LUNAR STAY	CONTINUE MISSION NO GO FOR TLI CONTINUE MISSION CONTINUE MISSION CONTINUE MISSION			
		RULES 20-40 THROUGH 20-44 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	COMM & INSTR	CSM INST - SPECIFIC	20-8

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION

R	ITEM						
		<div style="border: 1px dashed black; padding: 5px; display: inline-block;">GENERAL</div>					
	20-45	<p>A. BASELINE REQUIREMENT</p> <p>1. 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> <p>B. POWERED DESCENT ADDITIONAL REQUIREMENTS</p> <p>LM HBR TELEMETRY</p> <p>C. LUNAR STAY ADDITIONAL REQUIREMENTS</p> <p>LM LBR OR HBR TM IS REQUIRED. IF LM TM DATA IS LOST DURING THE EVA, ONE CREWMAN WILL RETURN AND ATTEMPT TO RE-ESTABLISH THE LOST COMMUNICATIONS LINK.</p>					
	20-46	<p>THE MISSION WILL BE CONTINUED WITH THE LOSS OF THE---</p> <p>A. LM UPDATA LINK</p> <p>B. LM CAUTION AND WARNING SYSTEM</p> <p>C. LM DSEA</p> <p>D. EVA TELEMETRY</p> <p>E. LM FM DOWNLINK</p> <p>F. LM USB RANGING (PRN)</p> <p>G. VHF RANGING</p> <p>RULES 20-47 THROUGH 20-49 ARE RESERVED.</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	COMM & INST	LM INST - GENERAL	20-9

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION

R	ITEM					
		<div style="border: 1px dashed black; padding: 5px; display: inline-block;">MANAGEMENT</div>				
	20-50	LM USB/TM MANAGEMENT				
		<p>A. FOR NORMAL LM POWERED UP PHASES, THE LM STEERABLE ANTENNA WITH THE POWER AMPLIFIER WILL BE USED. DURING LUNAR STAY, IF THE ERECTABLE ANTENNA IS USED, THE POWER AMPLIFIER MAY BE TURNED OFF IF HBR TM 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> <p>SYSTEM MONITORING</p> <p>DURING SLEEP PERIODS TBD CREWMEN WILL SLEEP WITH HEADSETS TO MONITOR FOR MASTER ALARMS OR GROUND COMMUNICATIONS.</p> <p>RULES 20-51 THROUGH 20-54 ARE RESERVED.</p>				

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	COMM & INST	LM INST - MANAGEMENT	20-10

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
				<div style="border: 1px dashed black; padding: 2px; margin: 0 auto; width: 80px;"> SPECIFIC </div>	
	20-55	LOSS OF LM TM			REF LM MAL PROC COMM 6
		A. LOSS OF LBR ONLY	ALL	A. CONTINUE MISSION	
		B. LOSS OF HBR ONLY	ALL	B.1. CONTINUE MISSION	MSFN REPORTS LOSS OF PCM
					ADEQUATE DATA TO MAKE FINAL GO/NO GO TO CONTINUE POWERED DESCENT.
		C. LOSS OF ALL TM	DOCKED	C.1. CONTINUE MISSION-NO GO FOR UNDOCKING	
			ALL	2. RETURN TO VICINITY OF CSM	
			POWERED DESCENT	3.(A) PDI TO LO GATE - ABORT-DOCK ASAP	
			LUNAR STAY	(B) LO GATE TO TD - CONTINUE MISSION	
				4. LM LIFTOFF NEXT LAUNCH OPPORTUNITY	
	20-56	LOSS OF CRITICAL INSTRUMENTION	DOCKED	DO NOT UNDOCK	
			UNDOCKED	DOCK ASAP	
		RULES 20-57 THROUGH 20-59 ARE RESERVED.			

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	COMM & INST	LM INST - SPECIFIC	20-11

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 20 - COMMUNICATIONS AND INSTRUMENTATION CONCLUDED

R	ITEM	CSM- INSTRUMENTATION REQUIREMENTS					
		MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION RULE REF
20-60		UDL VALIDITY SIGNAL	CT0262V	-	-	HD	20-27A
		USB RECEIVER AGC	CT0620E	METER	COMMON	HD	20-27,20-7A(9), 20-8B
		USB RECEIVER ERROR	CT0604F	-	-	HD	
		DSE TAPE MOTION	CT0012X	TB	-	HD	20-27,20-30
		CTE TIME	CT0145F	-	-	HD	20-31
		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	
		LM- INSTRUMENTATION REQUIREMENTS					
20-61		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&W PWR FAIL	GL4054X	CAUTION	-	HD	
		MASTER ALARM	GL4069X	MASTER ALARM	-	HD	
		DUA STATUS	GT0441X	-	-	HD	20-46
		S-BND ST PH ERR	GT0992B	-	-	HD	
		S-BND RCVR SIG	GT0994V	METER /CAUTION	-	HD	20-46
		STEERABLE ANT TEMP	GT0454	METER /CAUTION	-	HD	20-9B,20-50
		XMTR PO	GT0993	-----	-	HD	20-46,20-55
		VHF B RCVR AGC	GT0625	- - -	-	HD	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	COMMUNICATIONS AND INSTR	PRELAUNCH REQMTS	20-121

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 21 - LM SEQUENTIAL AND PYROTECHNIC

R	ITEM	<p style="text-align: center;">----- MANAGEMENT -----</p> <p>21-10 APS WILL NOMINALLY BE PRESSURIZED IMMEDIATELY PRIOR TO STAGING. APS WILL NOT NORMALLY BE PRESSURIZED MORE THAN 24 HOURS PRIOR TO THE LAST APS BURN--- HOWEVER, IN A CONTINGENCY CASE, THE APS MAY BE PRESSURIZED UP TO 3-1/2 DAYS PRIOR TO THE LAST APS BURN.</p> <p>21-11 IF UNABLE TO DEPLOY ONE OR MORE LANDING GEAR, A LANDING WILL NOT BE ATTEMPTED. DESCENT ENGINE BURNS WILL BE CONTINUED SINCE CONTROL PROBLEMS ARE NOT EXPECTED TO EXIST AND DAMAGE TO THE LANDING GEAR FROM THE BURN WILL NOT AFFECT ALTERNATE MISSIONS.</p> <p>21-12 UNDOCKED STAGING WITH ONE PYRO SYSTEM WILL BE PERFORMED ONLY IF ABSOLUTELY NECESSARY TO MAINTAIN CREW SAFETY.</p> <p>21-13 FOR A K1 THROUGH K6 FAILURE, THE GOOD SYSTEM WILL BE DISABLED AND A PYRO FUNCTION, OTHER THAN STAGING, ATTEMPTED (WITH THE MASTER ARM SWITCH OFF) TO DETERMINE IF K1 HAS FAILED CLOSED. IF BOTH SYSTEMS ARE FAILED IN THIS MODE, THEY MUST BOTH BE TESTED FOR A K1 FAILURE INDEPENDENTLY. A PYRO SYSTEM CANNOT BE DISABLED FOR A K1 FAILURE.</p> <p>21-14 AN ARMED PYRO SYSTEM(S) THAT CANNOT BE DEARMED IS CONSIDERED UNSAFE FOR THE VIBRATION/SHOCK ENVIRONMENT ASSOCIATED WITH LUNAR TOUCHDOWN.</p> <p>RULE NUMBERS 21-15 THROUGH 21-19 ARE RESERVED.</p>					
	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	LM SEQUENTIAL AND PYROTECHNIC	MANAGEMENT	21-2	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 21 - LM SEQUENTIAL AND PYROTECHNIC

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	21-22	A RELAY K7 THROUGH K15 INADVERTENTLY CLOSES	ALL		<p>RELAYS</p> <p>K7 - RCS PRES</p> <p>K8 - LAND GEAR DEPLOY</p> <p>K8A - LAND GEAR DEPLOY</p> <p>K9 - DPS CRYO HE PRESS</p> <p>K10 - ASC HE TANK 1</p> <p>K11 - ASC HE TANK 2</p> <p>K12 - ASC FUEL AND OX COMP VALVE (SYSTEM B ONLY)</p> <p>K12A - ASC FUEL AND OX COMP VALVES</p> <p>K13 - DPS FUEL AND OX VENT</p> <p>K14 - DPS AMBIENT HE</p> <p>K15 - DPS FUEL AND OX COMP VALVES</p> <p>A AND B - PRIOR TO DPS CRYO HE PRESS, THE FAILED SYSTEM WILL BE DISABLED FOR ALL PYRO FUNCTIONS. SUBSEQUENT PYRO FUNCTIONS WILL BE ACCOMPLISHED USING SYSTEMS A AND B.</p>		
		A. SYSTEM A		<p>A. CONTINUE MISSION</p> <p>OPEN LOGIC POWER</p> <p>'A' C/B UNTIL AFTER DPS SHE PRESSURIZATION. CLOSE DES PROPULSION FUEL AND OXID VENTS THEN CLOSE LOGIC POWER 'A' C/B.</p>			
		B. SYSTEM B		<p>B. CONTINUE MISSION</p> <p>OPEN LOGIC POWER</p> <p>'B' C/B UNTIL AFTER DPS SHE PRESSURIZATION. CLOSE DES PROPULSION FUEL AND OXID VENTS THEN CLOSE LOGIC POWER 'B' C/B.</p>			
		C. BOTH SYSTEMS		<p>C. 1. CONTINUE MISSION</p> <p>2. PRIOR TO POSITIONING MASTER ARM SW TO 'ON'-----</p> <p>CLOSE DES HE REG 1 AND 2 AND DES PROPULSION FUEL AND OXID VENTS. ALSO, THE DESCENT PROPELLANT ISOL VLV SWITCH MUST BE HELD IN THE FIRE POSITION WHEN THE MASTER ARM SWITCH IS POSITIONED TO 'ON' FOR THE FIRST TIME.</p> <p>3. OPEN DES HE REG 1 AT TIG OF DPS 1 BURN</p>			
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM SEQUENTIAL AND PYROTECHNIC	SPECIFIC	21-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 21 - LM SEQUENTIAL AND PYROTECHNIC

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	21-23	UNABLE TO STAGE			THIS RULE ONLY APPLIES TO ALTERNATE MISSIONS
		A. ASCENT AND DESCENT STAGES STILL RIGIDLY TIED TOGETHER	RNDZ	A. 1. CONTINUE MISSION 2. USE RCS FOR MANEUVERS	A. CSM RESCUE MAY BE INITIATED DUE TO RCS REDLINES
		B. INCOMPLETE STAGING, VEHICLE NOT RIGID	RNDZ	B. 1. EXECUTE CSM RESCUE 2. GO TO DRIFTING FLIGHT	B. EVT MAY BE REQUIRED BECAUSE OF INABILITY TO DOCK.
		RULE NUMBERS 21-24 THROUGH 21-49 ARE RESERVED			

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM SEQUENTIAL AND PYROTECHNIC	SPECIFIC	21-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 21 - LM SEQUENTIAL AND PYROTECHNIC - CONCLUDED

R	ITEM	PRELAUNCH INSTRUMENTATION							
	21-50	MEAS DESCRIPTION	PCM	ONBOARD		CATEGORY	MISSION RULE REFERENCE		
		ED RLY A K1-K6	GY0201X	SYS A STAGING LIGHT	COMMON CAUTION LIGHT	M	21-1, 2, 3, 13, 20, 21,		
		ED RLY B K1-K6	GY0202X	SYS B STAGING LIGHT		HD			
		ED RLY A K7-K15	GY0231X	-----		M	21-1, 2, 3, 13, 20, 21,		
		ED RLY B K7-K15	GY0232X	-----		HD	21-1, 3, 22		
		SELECTED ED BAT VOLT	-----	METER		M	21-1, 2, 20		

	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	LM SEQUENTIAL AND PYROTECHNIC	PRELAUNCH INSTR	21-6	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 22 - LM ELECTRICAL POWER

R ITEM

 ' GENERAL '

22-1 TO INITIATE MANNED LM MISSION PHASES, THE ELECTRICAL POWER SYSTEM MUST PROVIDE THE FOLLOWING MINIMUM CAPABILITIES---

NOTE

LM ACTIVE RENDEZVOUS/CONTINGENCY RETURN ASSUMED

- A. DOCKED WITH HATCH OPEN AND TUNNEL CLEAR
 - 1. CDR OR LMP BUS
 - 2. TWO DESCENT BATTERIES WITH ASSOCIATED FEEDER OR ONE ASCENT BATTERY WITH ASSOCIATED FEEDER.
 - 3. SUFFICIENT AVAILABLE ASCENT OR DESCENT ELECTRICAL ENERGY TO COMPLETE THE PLANNED ACTIVITY PERIOD.
- B. DOCKED WITH HATCH CLOSED
 - 1. CDR AND LMP BUSES
 - 2. TWO DESCENT BATTERIES PLUS ONE ASCENT BATTERY OR BOTH ASCENT BATTERIES.
 - 3. BOTH ASCENT FEEDERS
 - 4. SUFFICIENT AVAILABLE ASCENT OR DESCENT ELECTRICAL ENERGY TO COMPLETE THE PLANNED ACTIVITY PERIOD PLUS A RESERVE OF 1 HOUR.
- C. UNDOCKED/SEPARATION AND SUBSEQUENT PHASES SEE LM TELMU GO/NO GO CRITERIA - PAGE 3-18.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM ELECTRICAL	GENERAL	22-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 22 - LM ELECTRICAL POWER

R	ITEM							
	22-2	<p>DEFINITIONS---</p> <p>LOSS OF CDR OR LMP BUS</p> <ul style="list-style-type: none"> A. INABILITY TO MAINTAIN BUS VOLTAGE GREATER THAN 26.5 VDC B. A BUS CURRENT GREATER THAN OR EQUAL TO 90 AMPS <p>LOSS OF AN EPS BATTERY</p> <ul style="list-style-type: none"> A. BATTERY OUTPUT LESS THAN OR EQUAL TO 2 AMPS WHEN CONNECTED TO A BUS B. TEMPERATURE GREATER THAN OR EQUAL TO 145 DEG F WITH VOLTAGE EQUAL (UNSTAGED CONFIGURATION) OR LESS THAN NOMINAL (STAGED CONFIGURATION), AND CURRENT LESS THAN NOMINAL C. INABILITY TO MEET VOLTAGE REGULATION AT REQUIRED LOAD D. INABILITY TO BE CONNECTED TO A FEEDER DUE TO A MALFUNCTIONED ECA E. BATTERY OPEN CIRCUIT VOLTAGE BELOW 31.8 VDC STEADY STATE <p>LOSS OF A DC BUS FEEDER</p> <ul style="list-style-type: none"> A. DESCENT - INABILITY TO USE AS A POWER PATH THE ELECTRICAL CONNECTIONS FROM THE OUTPUT TERMINALS OF THE DESCENT ECA'S TO THE DFR B. ASCENT - INABILITY TO USE AS A POWER PATH THE ELECTRICAL CONNECTIONS FROM THE OUTPUT TERMINALS OF THE ASCENT ECA'S TO THE BAT FEED TIE CIRCUIT BREAKERS <p>LOSS OF OVERCURRENT PROTECTION</p> <ul style="list-style-type: none"> A. DEFINITE LOSS IF--- <ul style="list-style-type: none"> (1) BOTH CIRCUIT BREAKERS POWERING THE ECA'S FAIL OPEN (ALL DESCENT OR ALL ASCENT BATTERIES, DEPENDENT ON WHICH PAIR OF CIRCUIT BREAKERS FAILED) (2) FAILURE OF AN ASCENT BATTERY NORMAL FEED CONTACTOR B. PROBABLE LOSS IF--- <ul style="list-style-type: none"> (1) UNABLE TO MEASURE A BATTERY CURRENT BOTH ONBOARD AND ON TELEMETRY (2) UNABLE TO TAKE THE BATTERY OFF LINE <p>LOSS OF AN INVERTER AND/OR ASSOCIATED AC DISTRIBUTION</p> <ul style="list-style-type: none"> A. AC BUS VOLTAGE LESS THAN OR EQUAL TO 110.5 OR GREATER THAN OR EQUAL TO 120 VAC B. AC BUS FREQUENCY LESS THAN OR EQUAL TO 390 OR GREATER THAN OR EQUAL TO 410 HZ C. POWER CANNOT BE SUPPLIED TO AN AC BUS 						
	22-3	<p>ANY SPECIFIC EPS MISSION RULE REQUIRING A NEXT BEST OPPORTUNITY LIFTOFF WILL BE CAUSE FOR TERMINATION OF AN EVA. ADDITIONALLY, A CREWMAN WILL RETURN FROM THE EVA TO CORRECT THE FOLLOWING---</p> <ul style="list-style-type: none"> A. A DESCENT BATTERY MALFUNCTION REQUIRING THE BATTERY TO BE TAKEN OFF LINE. B. AN INVERTER MALFUNCTION IF THE STEERABLE ANTENNA IS AFFECTED (ASSUMES THE ERECTABLE ANTENNA IS NOT DEPLOYED). <p>RULE NUMBERS 22-4 THROUGH 22-9 ARE RESERVED.</p>						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	LM ELECTRICAL	GENERAL	22-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 22 - LM ELECTRICAL POWER

R	ITEM						
		----- ' MANAGEMENT ' -----					
	22-10	THE MISSION WILL BE CONTINUED AFTER LIFTOFF WITH THE LOSS OF OVERCURRENT PROTECTION. IF THIS PROTECTION IS LOST PRIOR TO LIFTOFF, A HOLD WILL BE CALLED.					
		A. IF OVERCURRENT PROTECTION IS LOST ON AN INDIVIDUAL DESCENT BATTERY, THE BATTERY WILL BE LEFT ON LINE EXCEPT FOR EVA.					
		B. IF ALL DESCENT OVERCURRENT PROTECTION IS LOST, BOTH ASCENT BATTERIES WILL BE PARALLELED WITH THE DESCENT BATTERIES ON LINE PERIODICALLY TO MONITOR CURRENT AND OBTAIN A CONSUMABLE TREND.					
		C. IF ONE OR BOTH ASCENT BATTERY NORMAL FEED CONTACTORS FAIL OPEN, THE SPACECRAFT WILL BE CONFIGURED WHEN ASCENT STAGE ONLY OPERATIONS ARE REQUIRED, USING THE BACKUP FEEDS ON BOTH ASCENT BATTERIES WITH THE CROSSTIES LEFT OPEN.					
	22-11	THE ASCENT BATTERIES WILL BE PRECONDITIONED FOR---					
		A. ABORT STAGING WITH TWO ASCENT BATTERIES/SPLIT BUS OPERATION - BY REMOVING A MINIMUM OF 2.5 AMP HOURS FROM THE BATTERY ON THE LMP BUS (NORMALLY BATTERY 5) AND A MINIMUM OF 5 AMP HOURS FROM THE BATTERY ON THE CDR BUS (NORMALLY BATTERY 6) IMMEDIATELY PRIOR TO PDI.					
		B. LUNAR L/O OR STAGING DURING COASTING FLIGHT WITH TWO ASCENT BATTERIES/SPLIT BUS OPERATION - BY REMOVING A MINIMUM OF 2.5 AMP HOURS FROM EACH ASCENT BATTERY IMMEDIATELY PRIOR TO DISCONNECTING THE LAST DESCENT BATTERY FROM EACH BUS.					
		C. LUNAR L/O OR STAGING DURING COASTING FLIGHT WITH ONE ASCENT BATTERY/TWO BUS OPERATION - BY REMOVING A MINIMUM OF 5 AMP HOURS FROM THE REMAINING ASCENT BATTERY IMMEDIATELY PRIOR TO DISCONNECTING THE LAST DESCENT BATTERY FROM THE BUSES.					
	22-12	THE BAL LOAD CROSSTIES (30A) WILL BE OPEN FOR MAIN PROPULSION BURNS, STAGING, AND WHENEVER AGS IS IN THE OPERATE MODE WITH BOTH 'AEA' CIRCUIT BREAKERS CLOSED. THE BUS CROSSTIES (100A) WILL NOMINALLY NEVER BE CLOSED.					
	22-13	ELECTRICAL POWER WILL NEVER BE INTENTIONALLY APPLIED TO A SHORT TO HELP DETERMINE ITS LOCATION UNLESS THE FEEDER FAULT LIGHT HAS FAILED. A GOOD BUS WILL NEVER BE CROSSTIED INTO A SHORT OR POSSIBLE SHORT.					
	22-14	THE INVERTERS WILL BE SWITCHED FOR A VOLTAGE LESS THAN OR EQUAL TO 112 VAC OR A FREQUENCY GREATER THAN OR EQUAL TO 402 OR LESS THAN OR EQUAL TO 398 HZ.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APO9LO 14	FNL	11/1/70	LM ELECTRICAL	MANAGEMENT	22-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 22 - LM ELECTRICAL POWER

R	ITEM							
	22-15	BATTERY MANAGEMENT WILL BE PERFORMED ONLY DURING LUNAR STAY PERIODS AND THEN ONLY IF IT CAN PREVENT VIOLATION OF CONSUMABLE REDLINES DUE TO LOSS OF A SINGLE DESCENT BATTERY.						
	22-16	FOR A SHORTED DESCENT FEEDER, THE ASCENT BATTERIES WILL BE PLACED ON NORMAL FEED WITH THE SHORT ISOLATED VIA THE DEADFACE RELAY. OPERATIONALLY THIS RESULTS IN THE LOSS OF ALL REMAINING DESCENT ELECTRICAL ENERGY FOR CONSUMABLE CONSIDERATIONS. THE TWO DESCENT BATTERIES THAT STILL HAVE AN OPERABLE FEED PATH WILL BE USED ONLY IF NECESSARY TO MAINTAIN CREW SAFETY.						
	22-17	IF AN ASCENT BATTERY IS LOST AT ANY TIME EXCEPT DURING POWERED DESCENT, THE REMAINING ASCENT BATTERY WILL BE USED AT THE REQUIRED TIME BY PLACING THE BATTERY ON ITS NORMAL AND BACKUP FEEDPATHS WITH THE BUS CROSS-TIE (100A) CB'S CLOSED. PRIOR TO PRESSING THE ABORT STAGE BUTTON, THE DESCENT BATTERIES MUST BE TURNED OFF AND THE DES ECA CB'S (2) MUST BE OPENED. DURING POWERED DESCENT THE REMAINING ASCENT BATTERY WILL BE USED ONLY ON ITS NORMAL FEEDPATH AND WITH THE CROSS-TIE CB'S OPEN. SHOULD THERE BE AN ABORT STAGE DURING POWERED DESCENT AFTER ONE ASCENT BATTERY HAS FAILED, THE ASSOCIATED BUS WILL BE LOST AT STAGING.						
	22-18	FOR AN OPEN DESCENT FEEDER OR FOR THE LOSS OF TWO DESCENT BATTERIES ON THE SAME BUS THE CROSS TIE BAL LOAD CIRCUIT BREAKERS WILL BE CLOSED ON THE LUNAR SURFACE AND THE MISSION CONTINUED WITHIN THE CONSUMMABLES BUDGET.						
	22-19	FOR A SHORTED ASCENT FEEDER ON THE LUNAR SURFACE, THE ASCENT BATTERIES WILL NOT BE CONNECTED UNTIL THE NOMINAL TIME TO MEET PRECONDITIONING REQUIREMENTS.						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APO9LO 14	FNL	11/1/70	LM ELECTRICAL	MANAGEMENT	22-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 22 - LM ELECTRICAL POWER

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
				<div style="border: 1px dashed black; padding: 2px;"> SPECIFIC </div>			
22-20	LOSS OF EITHER DC BUS		ALL DOCKED UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY	A. DELAY STAGING ALAP B. CONTINUE MISSION 1. DO NOT UNDOCK 2. CREWMEN OPERATE WITH CONNECTING HATCHES OPEN AND TUNNEL CLEAR 3. PERFORM LIMITED SYSTEMS EVALUATION C. DOCK ASAP/ NO GO CIRC D. NO GO PDI/DOCK ASAP E. ABORT DOCK ASAP F. LIFTOFF AT NEXT BEST OPPORTUNITY	REF MALF PROC EPS--- 1 UNSTAGED DC BUS 2 STAGED DC BUS . LOSS OF DC BUS RESULTS IN LOSS OF ONE PYRO SYSTEM . LOSS OF EITHER DC BUS DURING DESCENT ENGINE BURNS RESULTS IN THROTTLING TO 100 PERCENT. IF ON INV 2, LOSS OF THE LMP BUS CAUSES THE ENG TO SHUT DOWN.		
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM ELECTRICAL	SPECIFIC	22-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 22 - LM ELECTRICAL POWER

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	22-21	SHORTED DC BUS FEEDER			REF MALF PROC EPS---
		A. DESCENT	ALL	A.1. CONTINUE MISSION	1 UNSTAGED DC BUS
			UNDOCKED	2. NO GO CIRC/DOCK ASAP	2 STAGED DC BUS
			PRE-PDI	3. DOCK ASAP	• SEE MANAGEMENT RULE 22-16
			POWERED DESCENT	4. ABORT DOCK ASAP	
			LUNAR STAY	5. LIFTOFF AT NEXT BEST OPPORTUNITY	
		B. ASCENT	ALL	B.1. DELAY STAGING ALAP	• SEE MANAGEMENT RULE 22-19
			DOCKED	2. CONTINUE MISSION	
				(A) DO NOT UNDOCK	
				(B) CREWMEN OPERATE WITH CONNECTING HATCHES OPEN AND TUNNEL CLEAR	
				(C) PERFORM LIMITED SYSTEMS EVALUATION	
			UNDOCKED	3. DOCK ASAP/NO GO CIRC	
			PRE-PDI	4. NO GO PDI DOCK ASAP	
			POWERED DESCENT	5. ABORT DOCK ASAP	
			LUNAR STAY	6. LIFTOFF AT NEXT BEST OPPORTUNITY	

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	LM ELECTRICAL	SPECIFIC	22-6	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 22 - LM ELECTRICAL POWER

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	22-22	LOSS OF ASCENT BATTERY(S)			REF MALF PROC EPS---
		A. LOSS OF ONE ASCENT BATTERY	DOCKED	A. 1. CONTINUE MISSION NO GO CIRC DO NOT STAGE UNLESS DESCENT BATTERIES AND O2 ARE DEPLETED	2 STAGED DC BUS 4 STAGED BATTERY
			UNDOCKED		
			PRE-PDI	2. RETURN TO VICINITY OF CSM ASAP NO GO PDI DO NOT STAGE UNLESS DESCENT BATTERIES AND O2 ARE DEPLETED	
			POWERED DESCENT	3.(A) PDI TO PDI + 5+30 - ABORT DELAY STAGING ALAP (B) PDI + 5+30 TO TD - CONTINUE MISSION	
			LUNAR STAY	4. LIFTOFF AT NEXT BEST OPPORTUNITY	
		B. LOSS OF TWO ASCENT BATTERIES	ALL	B. 1. DO NOT STAGE DO NOT UNDOCK DOCK ASAP IF UNDOCKED	NOTE--- THIS RULE DOES NOT APPLY AFTER PDI + 5+30

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM ELECTRICAL	SPECIFIC	22-7

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 22 - LM ELECTRICAL POWER

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	22-23	LOSS OF DESCENT BATTERY(S)			REF MALF PROC EPS---
		A. LOSS OF ONE DESCENT BATTERY	ALL	A. CONTINUE MISSION	1 UNSTAGED DC BUS 5 UNSTAGED BAT TB ABNORMAL
		B. LOSS OF TWO DESCENT BATTERIES	ALL	B. CONTINUE MISSION	NOTE--- SEE MANAGEMENT RULE 22-18. CONSUMABLES DICTATE GO/NO GO FOR REMAINING MISSION PHASES.
		C. LOSS OF THREE OR MORE DESCENT BATTERIES	DOCKED	C. 1. DO NOT UNDOCK OPERATE WITH CONNECTING HATCHES OPEN AND TUNNEL CLEAR	
			UNDOCKED	2. DOCK ASAP, NO GO CIRC	
			PRE-PDI	3. NO GO PDI DOCK ASAP	
			POWERED DESCENT	4.(A) PDI TO LO GATE - ABORT DOCK ASAP (B) LO GATE TO TD - CONTINUE MISSION	
			LUNAR STAY	5. LIFT OFF AT NEXT BEST OPPORTUNITY	

	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	LM ELECTRICAL	SPECIFIC	22-8	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 22 - LM ELECTRICAL POWER

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	22-24	LOSS OF INVERTER(S)			REF MALF PROC EPS---		
	A.	LOSS OF ONE INVERTER	ALL	A. 1. CONTINUE MISSION	6 INVERTER		
	B.	LOSS OF BOTH INVERTERS	DOCKED UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY	B. 1. CONTINUE MISSION NO GO CIRC 2. DO NOT PERFORM PDI 3.(A) PDI TO LO GATE - ABORT (B) LO GATE TO TD - CONTINUE MISSION 4. CONTINUE MISSION	• LOSS OF AC POWER RESULTS IN LOSS OF DPS GIMBALS, RR, S-BND STEERABLE ANT (HBR TM), BOTH FDAI SPHERES, HBR TM IS AVAILABLE FROM AN OMNI ANTENNA AND A 210 FT. MSFN SITE.		
	22-25	LOSS OF AC BUSES			REF MALF PROC EPS---		
	A.	LOSS OF BUS A	DOCKED UNDOCKED PRE-PDI POWERED DESCENT/ LUNAR STAY	A. 1. CONTINUE MISSION NO GO CIRC 2. CONTINUE MISSION	6 INVERTER LOSS OF AC BUS A RESULTS IN LOSS OF DPS GIMBAL CONTROL, RENDEZ RADAR, AND INTEGRAL LIGHTING LOSS OF AC BUS B RESULTS IN LOSS OF S-BAND STEERABLE ANTENNA (HBR TM) AND NUMERIC LIGHTING, HBR TM IS AVAILABLE FROM AN OMNI ANTENNA AND A 210 FT MSFN SITE.		
	B.	LOSS OF BUS B	ALL	B. CONTINUE MISSION	LOSS OF BOTH AC BUSES RESULTS IN THE ABOVE PLUS LOSS OF BOTH FDAI SPHERES AND THE AOT		
	C.	LOSS OF BOTH BUS A AND B	DOCKED/ UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY	C.1. CONTINUE MISSION- NO GO CIRC 2. DO NOT PERFORM PDI 3.(A) PDI TO LO GATE- ABORT (B) LO GATE TO TD - CONTINUE MISSION 4. CONTINUE MISSION			
	RULE NUMBERS 22-26 THROUGH 22-49 ARE RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM ELECTRICAL POWER	SPECIFIC	22-9

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 22 - LM ELECTRICAL POWER - CONCLUDED

R	ITEM	INSTRUMENTATION REQUIREMENTS				
	22-50	MEAS DESCRIPTION	PCM	ONBOARD	CATEGORY	MISSION RULE REFERENCE
		AC BUS FREQ	GC0155F	CAUT	1 OF 2	22-2,5,24,25
		AC BUS VOLTS	GC0071V	METER, CAUT	M	
		BAT 1 CUR	GC1201C	METER	1 OF 2	
		BAT 2 CUR	GC1202C	METER	M PCM	
		LMP BUS VOLTS	GC0302V	METER, CAUT	2 OF 3 M	22-2,10,14,20,21,22,23
		BAT 1 VOLTS	GC0201V	METER		
		BAT 2 VOLTS	GC0202V	METER		
		BAT 5 VOLTS	GC0205V	METER		
		BAT 3 CUR	GC1203C	METER	1 OF 2	
		BAT 4 CUR	GC1204C	METER	M PCM	
		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 5 CUR	GC1205C	METER	M PCM	
		BAT 6 CUR	GC1206C	METER	M PCM	
		BAT 1 MAL	GC9961U	CAUT, COMP	HD	22-2,10,14,20,21,23
		BAT 2 MAL	GC9962U	CAUT, COMP	HD	
		BAT 3 MAL	GC9963U	CAUT, COMP	HD	
		BAT 4 MAL	GC9964U	CAUT, COMP	HD	
		BAT 6 MAL	GC9966U	CAUT, COMP	HD	22-2,10,20,21,22,23
		BATTERY MAL	GL4047X	COMP	HD	
		BAT 1 LOW TAP	GC4362X	FLAG	HD	22-2,10,20,21,23
		BAT 2 LOW TAP	GC4364X	FLAG	HD	
		BAT 3 LOW TAP	GC4365X	FLAG	HD	
		BAT 4 LOW TAP	GC4368X	FLAG	HD	
		BAT 5 B/U CDR	GC4369X	FLAG	HD	22-2,10,17,20,21,22
		BAT 6 NORM CDR	GC4370X	FLAG	HD	
		BAT 5 NORM LMP	GC4371X	FLAG	HD	
		BAT 6 B/U LMP	GC4372X	FLAG	HD	
NOTE--- LOSS OF SEVERAL OF THE HD MEASUREMENTS ABOVE WILL CAUSE SEVERELY DEGRADED MISSION MONITORING CAPABILITY.						

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM ELECTRICAL POWER	INSTR REQ	22-10

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL

R	ITEM						
23-1		<p>----- GENERAL -----</p> <p>TO INITIATE THE MANNED LM PHASES THE ENVIRONMENTAL CONTROL SYSTEM MUST PROVIDE THE FOLLOWING MINIMUM CAPABILITIES---</p> <p style="text-align: center;">NOTE LM ACTIVE RENDEZVOUS/CONTINGENCY RETURN IS ASSUMED</p> <p>A. DOCKED WITH HATCH OPEN AND TUNNEL CLEAR</p> <p style="margin-left: 20px;">1. COMBINED VEHICLE PRESSURE INTEGRITY</p> <p style="margin-left: 20px;">2. ONE LM COOLANT LOOP</p> <p>B. DOCKED WITH HATCH CLOSED</p> <p style="margin-left: 20px;">1. CABIN PRESSURE INTEGRITY</p> <p style="margin-left: 20px;">2. SUIT LOOP INTEGRITY</p> <p style="margin-left: 20px;">3. ONE SUIT FAN</p> <p style="margin-left: 20px;">4. ONE COOLANT LOOP</p> <p style="margin-left: 20px;">5. SUFFICIENT O2, H2O, AND LIOH CONSUMABLES TO COMPLETE THE PLANNED ACTIVITY PERIOD PLUS A RESERVE OF 1 HOUR</p> <p>C. UNDOCKED/SEPARATION AND SUBSEQUENT PHASES SEE LM TELMU GO/NO GO CRITERIA - PAGE 3-18.</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM ENVIRONMENTAL CONTROL	GENERAL	23-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL

R	ITEM						
23-2	DEFINITIONS---	<p>LOSS OF CABIN INTEGRITY</p> <p style="padding-left: 40px;">LM PRESSURE VESSEL LEAKAGE SUCH THAT CABIN PRESSURE CANNOT BE MAINTAINED GREATER THAN OR EQUAL TO 4.6 PSIA WITH AN O₂ FLOW RATE OF 0.6 LBS/HR. FOR DOCKED ACTIVITIES THIS WILL BE RELAXED TO A FLOW RATE OF 6 LBS/HR.</p> <p>LOSS OF SUIT LOOP INTEGRITY</p> <p style="padding-left: 40px;">TOTAL PGA/SUIT LOOP LEAKAGE GREATER THAN OR EQUAL TO 0.3 PSI/MIN (0.6 LBS/HR) DURING SUIT LOOP PRESSURE CHECK OR A VISABLE TEAR IN THE PGA.</p> <p>LOSS OF COOLANT LOOP</p> <p style="padding-left: 40px;">A. SUSTAINED GLYCOL TEMPERATURE GREATER THAN OR EQUAL TO 50 DEGREE F AND RISING EXCEPT DURING COOLANT LOOP STARTUP AND DRYOUT (SUBLIMATOR LOST).</p> <p style="padding-left: 40px;">B. GLYCOL PUMP DELTA P LESS THAN OR EQUAL TO 6 PSID (CIRCULATION LOST) OR KNOWN LOSS OF H₂O FEED CAPABILITY TO THE SUBLIMATOR(S).</p> <p>GLYCOL COOLANT LEAK</p> <p style="padding-left: 40px;">OBSERVED FLUID IN CABIN CONFIRMED BY TASTE OR PRESENCE OF GLYCOL LOW INDICATION CONFIRMED BY STATIC PRESSURE DROP.</p> <p>LOSS OF DESCENT O₂ TANK</p> <p style="padding-left: 40px;">INABILITY TO TRANSFER O₂ FROM DESCENT TANK OR MSFN CONFIRMATION OF INADEQUATE DESCENT TANK PRESSURE WITH O₂ MANIFOLD PRESSURE.</p> <p>LOSS OF ASCENT O₂ TANK</p> <p style="padding-left: 40px;">A. MSFN CONFIRMATION OF LOSS OF ASCENT TANK PRESSURE WITH O₂ MANIFOLD PRESSURE-- OR</p> <p style="padding-left: 40px;">B. IF O₂ MANIFOLD PRESSURE CANNOT BE READ, AND VEHICLE IS UNSTAGED AND DESCENT O₂ TANK GREATER THAN 35 PERCENT, CREW MAY CONFIRM LOSS BY BALANCING ONE TANK AGAINST THE OTHER, WITH MSFN COVERAGE--- OR</p> <p style="padding-left: 40px;">C. IF STAGED OR IF DESCENT O₂ LESS THAN 35 PERCENT, LOSS OF ONBOARD AND MSFN READOUT.</p> <p>LOSS OF DESCENT H₂O TANK</p> <p style="padding-left: 40px;">A. MSFN CONFIRMATION OF LOSS OF DESCENT TANK PRESSURE WITH DES H₂O P AND H₂O DELTA P.</p> <p style="padding-left: 40px;">B. INABILITY TO SUPPLY H₂O TO W/B RESULTING IN RISING GLYCOL AND SUIT LOOP TEMPERATURE (CREW AND MSFN) AND DROP IN H₂O DELTA P (MSFN ONLY).</p> <p>LOSS OF ASCENT H₂O TANK</p> <p style="padding-left: 40px;">A. LOSS OF MEASUREMENT AND REMAINING TANK FEEDING AT TWICE NORMAL RATE.</p> <p style="padding-left: 40px;">B. ONE TANK FEEDING TWICE NORMAL RATE AND NO CHANGE IN MEASUREMENT ON OTHER TANK.</p>					
23-3	IF A SUBLIMATOR IS LOST DUE TO BREAKTHROUGH, NO RESTART ATTEMPT WILL BE MADE.						
23-4	OXYGEN PURGE SYSTEM AND PLSS CONSUMABLES WILL BE RESERVED FOR POSSIBLE EVT AND WILL NOT BE CONSIDERED FOR LM GO/NO-GO'S OR REDLINES.						
23-5	TWO POUNDS OF OXYGEN CONTAINED IN THE LM CABIN WILL BE CONSIDERED AVAILABLE IN CALCULATING GO/NO-GO'S OR REDLINES. THE CABIN CAN BE CONSIDERED, WHEN DISCUSSING FUNCTIONAL PRESSURE VESSEL REQUIREMENTS, AS A BACKUP TO THE ASCENT O ₂ TANKS.						
23-6	ANY SPECIFIC MISSION RULES REQUIRING A NEXT BEST OPPORTUNITY LIFTOFF WILL BE CAUSE FOR TERMINATION OF AN EVA. ADDITIONALLY, A CREWMAN WILL BE REQUIRED TO RETURN FROM AN EVA TO CORRECT A FAILED OPEN DEMAND REGULATOR.						
	RULE NUMBERS 23-7 THROUGH 23-10 ARE RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM ENVIRONMENTAL CONTROL	GENERAL	23-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL

R	ITEM	
		<p>----- ' SYSTEMS MANAGEMENT ' -----</p>
	23-11	IF EITHER ASCENT O2 TANK IS LESS THAN OR EQUAL TO 95 PERCENT, IT WILL BE REPLENISHED FROM THE DESCENT O2 WHEN THE DESCENT TANK QUANTITY IS GREATER THAN OR EQUAL TO 35 PERCENT AND AS CLOSE TO STAGING AS POSSIBLE.
	23-12	THE PLSS FILL VALVE WILL BE CLOSED, EXCEPT FOR REPRESSURIZING THE PLSS AND FOR MSFN REQUESTED READOUTS OF O2 MANIFOLD PRESSURE.
	23-13	CREW WILL GO TO EGRESS MODE IF INSUFFICIENT O2 IS AVAILABLE TO MAINTAIN CABIN PRESSURE FOR THE REQUIRED TIME. ADDITIONALLY, A MISSION PHASE WILL NOT BE INITIATED IF THIS CONDITION CAN BE ANTICIPATED.
		RULE NUMBERS 23-14 THROUGH 23-19 ARE RESERVED.

	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	LM ENVIRONMENTAL CONTROL	MANAGEMENT	23-3	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
				<div style="border: 1px dashed black; padding: 5px; margin: 0 auto; width: 80%;"> SPECIFIC MISSION RULES </div>	
	23-20	LOSS OF SUIT LOOP INTEGRITY	DOCKED	CONTINUE MISSION 1. PERFORM SYSTEMS EVALUATION WITHIN CONSUMABLES LIFETIME CONSTRAINTS WITH HATCH OPEN AND TUNNEL CLEAR 2. NO-GO FOR UNDOCKING	• REF MALF PROC ECS--- 4A SUIT/FAN
			UNDOCKED	DOCK ASAP DO NOT STAGE WHILE UNDOCKED NO-GO FOR CIRC	
			PRE-PDI	DOCK ASAP DO NOT STAGE WHILE UNDOCKED	
			POWERED DESCENT	1. PDI TO PDI +5+30 - ABORT DOCK ASAP DO NOT STAGE WHILE UNDOCKED 2. PDI +5+30 TO TD - ABORT DOCK ASAP	
			LUNAR STAY	LIFTOFF AT NEXT BEST OPPORTUNITY	
			RNDZ	CONTINUE MISSION DOCK ASAP	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM ENVIRONMENTAL CONTROL	SPECIFIC	23-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	23-21	LOSS OF CABIN PRESSURE INTEGRITY			• REF MALF PROC ECS---		
			DOCKED	CONTINUE MISSION 1. PERFORM SYSTEMS EVALUATION WITHIN CONSUMABLES LIFETIME CONSTRAINTS WITH ONE CREWMAN ON THE CSM UMBILICALS 2. NO-GO FOR UNDOCKING	2A CABIN		
			UNDOCKED	DOCK ASAP DO NOT STAGE WHILE UNDOCKED NO-GO FOR CIRC			
			PRE-PDI	DOCK ASAP DO NOT STAGE WHILE UNDOCKED NO-GO FOR PDI			
			POWERED DESCENT	1. PDI TO PDI +5+30 - ABORT DOCK ASAP DO NOT STAGE WHILE UNDOCKED 2. PDI +5+30 TO LO GATE - ABORT DOCK ASAP 3. LO GATE TO TD - CONTINUE MISSION			
			LUNAR STAY	LIFTOFF AT NEXT BEST OPPORTUNITY			
			RNDZ	CONTINUE MISSION DOCK ASAP			
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM ENVIRONMENTAL CONTROL	SPECIFIC	23-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	23-22	SUIT FAN(S) FAILURE			• REF MALF PROC ECS---
		A. ONE SUIT FAN	ALL	A.1. CONTINUE MISSION	7A ECS
		B. TWO SUIT FANS	DOCKED	B.1. CONTINUE MISSION WITH TUNNEL CLEAR AND ON TRANSFER UMBILICAL OR CW GARMENT W/O SUIT	B. REMOVE HELMET AND GLOVES • REF MALF PROC ECS---
			UNDOCKED	NO-GO FOR UNDOCKING 2. DOCK ASAP	4 SUIT FAN
			PRE-PDI	DO NOT STAGE WHILE UNDOCKED NO-GO FOR CIRC 3. DOCK ASAP	
			POWERED DESCENT	DO NOT STAGE WHILE UNDOCKED NO GO FOR PDI 4.(A) PDI TO PDI + 5+30 ABORT DOCK ASAP	PLACE DEMAND REG B TO 'DIRECT 02' IMMEDIATELY OR REMOVE HELMETS (MUST BE REMOVED FOR STAGING.)
				DO NOT STAGE WHILE UNDOCKED	
				(B) PDI + 5+30 TO LO GATE ABORT	
				(C) LO GATE TO TD CONTINUE MISSION	
			LUNAR STAY	5. LIFTOFF AT NEXT BEST OPPORTUNITY	RETAIN PLSS'S FOR ASCENT IF POSSIBLE.
			RNDZ	6. DOCK ASAP	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM ENVIRONMENTAL CONTROL	SPECIFIC	23-6

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	23-23	DEMAND REGULATOR(S) FAIL OPEN OR CLOSED			<ul style="list-style-type: none"> • REF MALF PROC ECS--- 3 CABIN PRESS IND HI 5 SUIT PRESS HI 6 O2 QTY
		A. ONE REGULATOR	ALL	A. CONTINUE MISSION	
		B. TWO REGULATORS	DOCKED/ UNDOCKED/ PRE-PDI POWERED DESCENT LUNAR STAY RNDZ	B.1. CONTINUE MISSION DO NOT UNDOCK NO GO CIRC 2. NO GO PDI 3. CONTINUE MISSION 4. DO NOT DEPRESS CABIN LUNAR STAY MAY BE CONTINUED WITHIN CONSUMABLES BUDGET 5. CONTINUE MISSION	

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	LM ENVIRONMENTAL CONTROL	SPECIFIC	23-7	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	23-24	LOSS OF H2O SEPARATOR(S)			• REF MALF PROC ECS--- 7B ECS
		A. ONE H2O SEPARATOR	ALL	A. CONTINUE MISSION	
		B. TWO H2O SEPARATORS	DOCKED	B.1. CONTINUE MISSION	
			UNDOCKED PRE-PDI	2. DOCK ASAP NO GO PDI DO NOT STAGE WHILE UNDOCKED	
			POWERED DESCENT	3. CONTINUE MISSION	
			LUNAR STAY	4. LIFTOFF NEXT BEST OPPORTUNITY	
			RNDZ	5. CONTINUE MISSION AND DOCK ASAP	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM ENVIRONMENTAL CONTROL	SPECIFIC	23-8

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	23-25	LOSS OF O2 TANK(S)						
		A. ONE ASCENT TANK	ALL	A. CONTINUE MISSION				
		B. TWO ASCENT TANKS	DOCKED	B.1. DO NOT UNDOCK				
			UNDOCKED	2. DOCK ASAP				
			PRE-PDI	NO GO CIRC				
				NO GO PDI				
				DELAY STAGING ALAP				
			POWERED	3.(A) PDI TO PDI + 5+30				
			DESCENT	ABORT				
				DELAY STAGING ALAP				
				(B) PDI + 5+30 TO LO				
				GATE ABORT				
				(C) LO GATE TO				
				TOUCHDOWN				
				CONTINUE MISSION				
			LUNAR	4. STAY WITHOUT EVA				
			STAY					
			RNDZ	5. CONTINUE MISSION				
		C. DESCENT TANK	DOCKED	C.1. CONTINUE MISSION				
			UNDOCKED/	2. DOCK ASAP				
			PRE-PDI	NO GO CIRC				
				NO GO PDI				
			POWERED	3. CONTINUE MISSION				
			DESCENT					
			LUNAR	4. LIFTOFF NEXT BEST				
			STAY	OPPORTUNITY				
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	LM ENVIRONMENTAL CONTROL	SPECIFIC	23-9	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
23-26	LOSS OF COOLANT LOOP(S) A. PRIMARY LOOP OR SECONDARY LOOP	DOCKED UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY RNDZ	A.	1. CONTINUE MISSION ON SECONDARY LOOP NO-GO FOR CIRC 2. RETURN TO VICINITY OF CSM NO-GO FOR PDI 3. CONTINUE MISSION ON SECONDARY LOOP 4. LIFTOFF NEXT BEST OPPORTUNITY. FOR LOSS OF PRIMARY LOOP--- (A) OPEN CB (II) IMU OPR (B) AT LIFTOFF= 60 MIN, CLOSE CB (II) IMU OPR AND CONTINUE MISSION 5. CONTINUE MISSION	• REF MALF PROC ECS--- 7E ECS -GLYCOL 9 GLYCOL 10 GLYCOL PRESS LOW			
	B. BOTH LOOPS (ANY COMBINATION OF LOSS OF CIRCULATION, SUBLIMATION CAPABILITY, OR H2O FEED FOR BOTH LOOPS)	DOCKED UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY RNDZ	B.	1. INGRESS CSM ASAP NO-GO FOR UNDOCKING 2. DOCK ASAP 3. NO GO CIRC DO NOT STAGE, NO GO PDI 4.(A) PDI TO PDI + 5+30 ABORT DOCK ASAP DO NOT STAGE (B) PDI + 5+30 TO LO-GATE- ABORT DOCK ASAP (C) LO-GATE TO TD - CONTINUE MISSION 4. LIFTOFF NEXT BEST OPPORTUNITY 5. CONTINUE MISSION	B.4.(C) LIFT OFF IMMEDIATELY AFTER TOUCHDOWN. B.5. CREW MAY ELECT TO REMOVE PGA'S FOR COOLING.			
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	LM ENVIRONMENTAL CONTROL	SPECIFIC	23-10	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	23-29	FIRE OR SMOKE IN CABIN OR SUIT	ALL	TROUBLESHOOT/COMBAT FIRE ASSESS DAMAGE AND TRANSFER TO CSM IF NECESSARY	REF AOH PROC 9.3.2
	23-30	CONTAMINATION IN CABIN	ALL	CREW MAY ELECT TO DECOMPRESS	IF UNABLE TO CLEAR CONTAMINATION, MISSION MAY BE TERMINATED EARLY.
	23-31	GLYCOL COOLANT LEAK	ALL	TRANSFER TO CSM	REF MALF PROC ECS---
		A. CABIN	ALL	A. PURGE SUIT WITH DIRECT O2	8 GLYCOL
		B. SUIT	ALL	B. DISCONNECT FROM SUIT LOOP	
		RULE NUMBERS 23-32 THROUGH 23-49 ARE RESERVED.			

	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	LM ENVIRONMENTAL CONTROL	SPECIFIC	23-12	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 23 - LM ENVIRONMENTAL CONTROL - CONCLUDED

R	ITEM	INSTRUMENTATION REQUIREMENTS				
	23-50	MEAS DESCRIPTION	PCM	ONBOARD	CATEGORY	MISSION RULE REF
		SUIT PRESS	GF1301P	METER WARNING	HD HD	23-1,2,6,20,21,23
		CABIN PRESS	GF3571P	METER	1 OF 3	
		U/H RLF PRESS	GF3591P	-----	M	23-1,2,5,13,20,21,
		F/H RLF PRESS	GF3592P	-----		23,29
		DES O2 PRESS	GF3584P	METER, CAUT	} } 1 OF 2	
		O2 MFLD PRESS	GF3589P	-----		M
		ASC 1 O2 PRESS	GF3582P	METER, CAUT	1 OF 3	21,23,25
		ASC 2 O2 PRESS	GF3583P	METER, CAUT	M	
		GLYCOL PUMP DELTA P	GF2021P	-----	1 OF 2	
		SEC GLYCOL PUMP PRESS	GF2921P	-----		M
		GLYCOL PUMP PRESS	GF9997U	METER		
		SEL GLYCOL LVL LOW	GF9986U	CAUT		
		GLYCOL TEMP	GF9998U	METER, CAUT	1 OF 2	23-1,2,3,6,26,31
		GLYCOL OUTLET TEMP	GF2581T	-----	M	
		SUIT TEMP	GF1281T	METER		
		GLYCOL INLET TEMP	GF2531T	-----		
		DES H2O QTY	GF4581Q	METER, CAUT	1 OF 2	
		DES H2O PRESS	GF4501P	-----	M	23-1,2,27,28
		ASC 1 H2O QTY	GF4582Q	METER, CAUT	1 OF 2	
		ASC 2 H2O QTY	GF4583Q	METER, CAUT	M	
		PRI H2O REG DELTA P	GF4101P	-----	HD	23-1,2,27,28
		RTG TEMP	GL8275T	-----	HD	
		REPR ELEC OPEN	GF3572X	WARNING	HD	23-1,2,5,13,20,21,23,
		CO2 PART PRESS	GF1521P	METER, CAUT, COMP	HD	23-1,24,30
		H2O SEP RATE	GF9999U	CAUT, COMP	HD	23-1,22,24
		SUIT DIV EGRESS	GF1221X	-----	HD	23-1,20,21,22,29

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 24 - LM GUIDANCE AND CONTROL

R	ITEM							
	<p>24-6 LANDING RADAR</p> <p>A. THE LR SHOULD NOT NORMALLY BE OPERATED AT AN ANTENNA TEMP LESS THAN + 50 DEG F, HOWEVER, THE LUNAR LANDING MISSION WILL BE ATTEMPTED IF THE ANTENNA TEMP IS ABOVE THE CRITICAL LIMIT OF -15 DEG F (HARDWARE DAMAGE).</p> <p>B. LR ACTIVATION WILL BE DELAYED IF THE LR TEMP IS PREDICTED TO BE GREATER THAN 145 DEG. F AT PDI + 8+30 (HI GATE)</p> <p>24-7 AGS</p> <p>A. 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.</p> <p>B. THE AGS CAN BE USED TO PERFORM DOCKED ATTITUDE HOLD CONTROL.</p> <p>C. THE AGS IN PULSE MODE USING ONLY TTCA CONTROL CAN BE USED TO PERFORM A DOCKED BURN.</p> <p>RULE NUMBERS 24-8 THROUGH 24-19 ARE RESERVED.</p>							
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	LM GUIDANCE AND CONTROL	MANAGEMENT	24-3	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 24 - LM GUIDANCE AND CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
				SPECIFIC	
	24-20	LOSS OF GUIDANCE STEERING			
		A. OPERATIONAL AGS	ALL	CONTINUE MISSION	<ul style="list-style-type: none"> • REF MALF PROC AGS--- 1 AGS WARNING LIGHT 2 DEDA RESPONSE IS ABNORMAL
		B. OPERATIONAL PGNS	DOCKED/ UNDOCKED	B.1.(A) RETURN TO CSM (B) NO-GO FOR CIRC	<ul style="list-style-type: none"> • REF MALF PROC PGNS--- 1 LGC WARN
			PRE-PDI	2.(A) RETURN TO CSM ASAP (B) NO-GO FOR PDI	<ul style="list-style-type: none"> 2 ISS WARN 3 TEMP CAUTION 4 GIMBAL LOCK
			POWERED DESCENT	3.(A) PRIOR TO HI GATE ABORT (B) AFTER HI GATE (1) LAND MANUALLY (2) NO-GO FOR EXTENDED LUNAR STAY IF FAILURE ALSO AFFECTS REDUNDANT 3-AXIS ATT CONTROL	
			LUNAR STAY	4. ASCEND AT NEXT BEST OPPORTUNITY IF FAILURE ALSO AFFECTS REDUNDANT 3-AXIS ATT CONTROL	
			RNDZ	5. CONTINUE MISSION	
	24-21	LOSS OF FDAI FUNCTIONS (ATT, RATES, ERRORS)	ALL	CONTINUE MISSION CREW OPTION	
	24-22	LOSS OF AOT	ALL	CONTINUE MISSION	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM GUIDANCE AND CONTROL	SPECIFIC - PGNS/CES/AGS	24-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 24 - LM GUIDANCE AND CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	24-23	LOSS OF RNDZ RADAR/ VHF RANGING/OPTICAL TRACKING A. LOSS OF ANY ONE	ALL	A.1. CONTINUE MISSION 2. REF. 3-81 FOR NAVIGATION AND TRACKING REQUIREMENTS FOR M=1 RNDZ	CSM OPTICAL TRACKING CAPABILITY REQUIRES THE LM TRACKING LIGHT AND THE ABILITY TO VISUALLY TRACK.			
		B. LOSS OF ANY TWO	DOCKED/ UNDOCKED PRE PDI ALL OTHER	B.1.(A) RETURN TO CSM ASAP (B) NO-GO FOR PDI 2.(A) CONTINUE MISSION (B) REF 3-81 FOR NAVIGATION AND TRACKING REQUIREMENTS FOR M=1 RNDZ				
	24-24	LOSS OF LANDING RADAR	DOCKED/ UNDOCKED PRE-PDI POWERED DESCENT	1. RETURN TO CSM ASAP 2. NO-GO FOR CIRC 1. RETURN TO CSM ASAP 2. NO-GO FOR PDI 1. PRIOR TO ADEQUATE ALTITUDE UPDATING OF LM STATE VECTORS--- (A) NO-GO FOR LANDING (B) ABORT 2. AFTER ADEQUATE ALTITUDE UPDATING OF LM STATE VECTORS--- CONTINUE MISSION	1. GUIDO TO DECIDE WHEN ADEQUATE UPDATING OF LM STATE VECTORS HAS BEEN ACCOMPLISHED. REF MALF PROC PGNS--- 6 ALT LT 7 VEL LT REF MALF PROC HTRS--- 2 LR TEMP ABNORMAL			
		RULES 24-25 THROUGH 24-27 ARE RESERVED						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	LM GUIDANCE AND CONTROL	SPECIFIC - PGNS/CES/AGS	24-5	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 24 - LM GUIDANCE AND CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	24-30	LOSS OF PITCH OR ROLL GDA	ALL	ENGINE GIMBAL - OFF CONTINUE MISSION UNLESS RCS IMPINGEMENT CONSTRAINTS ARE VIOLATED.	RCS IMPINGEMENT CONSTRAINTS ARE A FUNCTION OF THE GDA POSITION AT THE TIME OF FAILURE. SODB INFO WILL BE USED TO DETERMINE CAPABILITY TO COMPLETE DESCENT FOR A GIVEN GDA POSITION.			
	24-31	LOSS OF REDUNDANT ASC ENG ON CAPABILITY	DOCKED/ UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY	1. RETURN TO CSM ASAP 2. NO-GO FOR CIRC 1. RETURN TO CSM ASAP 2. NO-GO FOR PDI 1. IF DPS INSERTION CAPABILITY EXISTS, ABORT 2. AFTER DPS INSERTION CAPABILITY CONTINUE MISSION 3. NO-GO FOR EXTENDED LUNAR STAY ASCEND AT NEXT BEST OPPORTUNITY				
	24-32	LOSS OF DPS AUTO ON CAPABILITY	DOCKED/ UNDOCKED PRE-PDI POWERED DESCENT	CONTINUE MISSION CONTINUE MISSION 1. IF AUTOMATIC ULLAGE HAS OCCURRED--- A. ENG START PUSH B. DES ENG CMD OVRD ON 2. IF AUTOMATIC ULLAGE HAS NOT OCCURRED A. INHIBIT PDI IGNITION B. NO-GO FOR PDI	• REF MALF PROC CES ---10 MPS DOES NOT THRUST WHEN EVENT TIMER IND 00.00			
		RULE NUMBER 24-33 IS RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	LM GUIDANCE AND CONTROL	SPECIFIC - PGNS/CES/AGS	24-8	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 24 - LM GUIDANCE AND CONTROL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	24-34	LOSS OF AUTO THRUST CONTROL	ALL	CONTINUE MISSION	• REF MALF PROC CES--- 11 ENG THR AND CMD DO NOT AGREE/ OFF SCHEDULE.
	24-35	LOSS OF MANUAL THRUST CONTROL	ALL	CONTINUE MISSION	
	24-36	LOSS OF LUNAR CONTACT LIGHTS	POWERED DESCENT	CONTINUE MISSION	
		RULE NUMBER 24-37 THROUGH 24-39 ARE RESERVED			

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM GUIDANCE AND CONTROL	SPECIFIC - PGNS/CES/AGS	24-9

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 24 - M GUIDANCE AND CONTROL - CONTINUED

R	ITEM	PRELAUNCH INSTRUMENTATION					MISSION RULE REFERENCE
	24-40	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	
		LGC DOWNLINK	GG0001U	-	-	M	24-20
		PLS TORO REF	GG1040V	-	-	HD	24-20
		2.5 VDC TM BIAS	GG1110V	-	-	HD	24-20
		IMU 28 VAC 800	GG1201V	-	-	HD	24-20
		IRIG SUSP 3.2 KC	GG1331V	-	-	HD	24-20
		IMU STBY	GG1513X	-	-	HD	24-20
		LGC OPR	GG1523X	-	-	HD	24-20
		X PIPA OUT IN PHASE	GG2001V	-	-	HD	24-20
		Y PIPA OUT IN PHASE	GG2021V	-	-	HD	24-20
		Z PIPA OUT IN PHASE	GG2041V	-	-	HD	24-20
		IG SVO ERR IN PHASE	GG2107V	-	-	HD	24-20
		IG IX RSVR OUT SIN	GG2112V	FDAI	COMMON	HD	24-20
		IG IX RXVR OUT COS	GG2113V	FDAI	COMMON	HD	24-20
		MG SVO ERR IN PHASE	GG2137V	-	-	HD	24-20
		MG IX RSVR OUT SIN	GG2142V	FDAI	COMMON	HD	24-20
		MG IX RSVR OUT COS	GG2143V	FDAI	COMMON	HD	24-20
		OG SVO ERR IN PHASE	GG2167V	-	-	HD	24-20
		OG RSVR OUT SIN	GG2172V	FDAI	COMMON	HD	24-20
		OG RSVR OUT COS	GG2173V	FDAI	COMMON	HD	24-20
		PITCH ATT ERR	GG2219V	FDAI	COMMON	HD - PCM	24-20
		YAW ATT ERR	GG2249V	FDAI	COMMON	HD - PCM	24-20
		ROLL ATT ERR	GG2279V	FDAI	COMMON	HD - PCM	24-20
		PIPA TEMP	GG2300T	C&W	SEPARATE	HD - PCM	24-20
		RR SHFT SIN	GG3304V	FDAI	COMMON	HD - PCM	24-23
		RR SHFT COS	GG3305V	FDAI	COMMON	HD - PCM	24-23
		RR TRUN SIN	GG3324V	FDAI	COMMON	HD - PCM	24-23
		RR TRUN COS	GG3325V	FDAI	COMMON	HD - PCM	24-23
		LGC WARNING	GG9001X	C&W	COMMON	HD - PCM	24-20
		ISS WARNING	GG9002X	C&W	COMMON	HD - PCM	24-20
		LR ANT TEMP	GN7563T	TEMP MONITOR	COMMON	HD - PCM	
		RR NO TRACK	GN7621X	C&W	COMMON	HD - PCM	24-23
		RR ANT TEMP	GN7723T	TEMP MONITOR	COMMON	HD - PCM	24-23
		YAW ERR CMD	GH1247V	-	-	M	24-28
		PITCH ERR CMD	GH1248V	-	-	M	24-28
		ROLL ERR CMD	GH1249V	-	-	M	24-28
		JD A4D OUTPUT	GH1419V	-	-	HD	24-27
		RCS TCP A4D	GR5032X	-	-	HD	24-27
		JD B3D OUTPUT	GH1423V	-	-	HD	24-27
		RCS TCP B3D	GR5036X	-	-	HD	24-27
		JD A2D OUTPUT	GH1427V	-	-	HD	24-27
		RCS TCP A2D	GR5040X	-	-	HD	24-27
		JD B1D OUTPUT	GH1431V	-	-	HD	24-27
		RCS TCP B1D	GR5044X	-	-	HD	24-27
		JD B4U OUTPUT	GH1418V	-	-	HD	24-27
		JD B4F OUTPUT	GH1420V	-	-	HD	24-27
		JD A4R OUTPUT	GH1421V	-	-	HD	24-27
		JD A3U OUTPUT	GH1422V	-	-	HD	24-27
		JD B3A OUTPUT	GH1424V	-	-	HD	24-27
		JD A3R OUTPUT	GH1425V	-	-	HD	24-27
		JD B2U OUTPUT	GH1426V	-	-	HD	24-27
		JD A2A OUTPUT	GH1428V	-	-	HD	24-27
		JD B2L OUTPUT	GH1429V	-	-	HD	24-27
		JD A1U OUTPUT	GH1430V	-	-	HD	24-27
		JD A1F OUTPUT	GH1432V	-	-	HD	24-27
		JD B1L OUTPUT	GH1433V	-	-	HD	24-27
		RCS TCP B4U	GR5031X	-	-	HD	24-27
		RCS TCP B4F	GR5033X	-	-	HD	24-27
		RCS TCP A4R	GR5034X	-	-	HD	24-27
		RCS TCP A3U	GR5035X	-	-	HD	24-27
		RCS TCP B3A	GR5037X	-	-	HD	24-27
		RCS TCP A3R	GR5038X	-	-	HD	24-27
		RCS TCP B2U	GR5039X	-	-	HD	24-27
		RCS TCP A2A	GR5041X	-	-	HD	24-27
		RCS TCP B2L	GR5042X	-	-	HD	24-27
		RCS TCP A1U	GR5043X	-	-	HD	24-27
		RCS TCP A1F	GR5045X	-	-	HD	24-27
		RCS TCP B1L	GR5046X	-	-	HD	24-27
		YAW ATT ERR	GH1455V	FDAI	COMMON	HD	24-28
		PITCH ATT ERR	GH1456V	FDAI	COMMON	HD	24-28

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM GUIDANCE AND CONTROL	PRELAUNCH INSTR	24-10

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 24 - M GUIDANCE AND CONTROL - CONTINUED

R	ITEM	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION RULE REFERENCE
	24-40 CONT	ROLL ATT ERR	GH1457V	FDAI	COMMON	HD	24-28
		RGA YAW RATE	GH1461V	FDAI	COMMON	M ON BOARD	24-28
		RGA PITCH RATE	GH1462V	FDAI	COMMON	M PCM/HD	24-28
		RGA ROLL RATE	GH1463V	FDAI	COMMON	M	24-28
		AGS SEL	GH1621X	-	-	HD	24-33
		ROLL PLSD/DIR	GH1628X	-	-	HD	24-33
		PITCH PLSD/DIR	GH1629X	-	-	HD	24-33
		YAW PLSD/DIR	GH1630X	-	-	HD	24-33
		AUTO ON	GH1214X	-	-	HD	24-31
		APS ARM	GH1230X	-	-	M	24-31
		ENG FIRE OVRD	GH1286X	-	-	HD	24-31
		MAN THRUST CMD	GH1311V	METER	SEPARATE	M	24-34,24-35
		PITCH GDA POS	GH1313V	-	-	M	24-30
		ROLL GDA POS	GH1314V	-	-	M	24-30
		P TRM FAIL	GH1323X	C&W	COMMON	HD	24-30
		R TRM FAIL	GH1330X	C&W	COMMON	HD	24-30
		AUTO THRUST CMD	GH1331V	METER	SEPARATE	HD	24-34
		DPS ARM	GH1348X	-	-	HD	24-32,24-31
		VAR INJ ACT POS	GQ6806H	-	-	HD	24-34,24-35
		CES AC PWR FAIL	GL4026X	C&W	COMMON	HD	24-30
		CES DC PWR FAIL	GL4027X	C&W	COMMON	HD	24-30
		AGS DOWNLINK DATA	GI0001X	-	-	HD	24-33
		ASA TEMP	GI3301T	-	-	HD	24-33
		ASA PWR/AEA FAIL	GL4028X	C&W	COMMON	HD	24-33
		AUTO OFF	GH1217X	-	-	HD	24-32,24-31
		AGS AUTO	GH1641X	-	-	HD	24-27
		AGS ATT HOLD	GH1642X	-	-	HD	24-27
		PGNS AUTO	GH1643X	-	-	HD	24-27
		PGNS ATT HOLD	GH1644X	-	-	HD	24-27
		LR RNG DATA NO GOOD	GN7521X	C&W	COMMON	HD	
		LR VEL DATA NO GOOD	GN7557X	C&W	COMMON	HD	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM GUIDANCE AND CONTROL	PRELAUNCH INSTR	24-11

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 25 - LM PROPULSION - DPS

R	ITEM	<div style="border: 1px dashed black; padding: 5px; display: inline-block;">GENERAL</div>					
	25-1	RESERVED					
	25-2	DEFINITIONS					
		A. AN OPERATIONAL DPS IS DEFINED AS FOLLOWS---					
		1. FUEL AND/OR OXID ENGINE INLET PRESSURE GREATER THAN 30 PSIA AT INITIATION.					
		2. FUEL AND/OR OXID ENGINE INLET PRESSURES GREATER THAN 120 PSIA (ULLAGE PRESSURES GREATER THAN 123 PSIA.) DURING A BURN WITH THROTTLE LESS THAN 65 PERCENT OR GREATER THAN 150 PSIA (ULLAGE PRESSURES GREATER THAN 160 PSIA.) WITH THROTTLE GREATER THAN 65 PERCENT.					
		3. TO INITIATE A BURN, THE OXIDIZER AND FUEL BULK TEMPERATURES MUST BE GREATER THAN 50 DEG F AND LESS THAN 90 DEG F.					
		4. DELTA TEMP BETWEEN FUEL AND OXID LESS THAN 25 DEG F FOR BURNS LESS THAN 400 SEC, AND LESS THAN 10 DEG F FOR BURNS GREATER THAN 400 SEC ONLY TO INITIATE A BURN.					
		5. (A) DELTA PRESSURE BETWEEN FUEL AND OXID ENGINE INLET PRESSURES LESS THAN 25 PSID PRIOR TO LOW GATE.					
		(B) DELTA PRESSURE (FUEL HIGH) LESS THAN 50 PSID AT START OF ANY BURN.					
		6. SUPERCRITICAL HELIUM ADEQUATE TO COMPLETE MISSION.					
		B. THE LOW THROTTLE POINT IS DEFINED AS THE MINIMUM POSITION THAT THE THROTTLE ACTUATOR WILL ASSUME WITH MINIMUM MANUAL THROTTLE COMMAND VOLTAGE.					
		C. DPS INSERTION CAPABILITY IS THE ABILITY TO OBTAIN A SAFE INSERTION WITH ONLY THE DPS.					
		RULES 25-3 THROUGH 25-10 ARE RESERVED.					
	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	LM PROPULSION -DPS	GENERAL - DPS	25-1	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 25 - LM PROPULSION - DPS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
SPECIFIC MISSION RULES							
25-30		LOSS OF OPERATIONAL DPS (PRIOR TO LOW GATE REF MR 25-2 FOR DEFINITION. AFTER LOW GATE ONLY LOW INLET PRESSURES LESS THAN 150 PSIA)	DOCKED/ UNDOCKED PRE-PDI POWERED DESCENT	A. INHIBIT DPS BURNS B. RNDZ ASAP 1. INHIBIT PDI 2. RNDZ WITH APS C. ABORT STAGE	REF MAL PROC DPS--- 1 DES REG 1A FUEL/OXID PRESS ABNORMAL 2 FUEL/OXID TEMP ABNORMAL 3 HE PRESS ABNORMAL		
25-31		START TANK LEAK PRIOR TO PRESSURIZATION A. FUEL AND/OR OXID ENGINE INLET P GREATER THAN 30 PSIA. B. FUEL AND/OR OXID ENGINE INLET P LESS THAN 30 PSIA.	ALL	A. CONTINUE MISSION INHIBIT FIRING DPS START TANK SQUIB B. CONTINUE MISSION 1. FIRE SQUIB TO START TANK	REF MAL PROC DPS--- 3 HE PRESS ABNORMAL NOTE PRESSURIZATION SYSTEM MAY BE OPENED TO START TANK LEAK. CLOSE PRIMARY HE REG SOV AFTER EACH BURN AND REOPEN AT INITIATION OF EACH BURN.		
25-32		RESERVED					
25-33		LOSS OF SUPERCRITICAL PRESSURE (DPS IN BLOWDOWN MODE) A. GREATER THAN 31 PERCENT PWGS B. LESS THAN OR EQUAL TO 31 PERCENT PWGS	POWERED DESCENT	A. ABORT ABORT STAGE PRIOR TO INLET PRESSURES LESS THAN OR EQUAL TO 150 PSIA. (ULLAGE PRESSURE LESS THAN 160 PSIA.) B. CONTINUE MISSION	REF MAL PROC DPS 3 HE PRESS ABNORMAL		
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM PROPULSION -DPS	SPECIFIC-DPS	25-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 25 - LM PROPULSION - DPS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	25-34	LEAK BETWEEN SHE SQUIB AND QUAD CHECK VALVES	ALL	A. PRESSURIZE DPS WITH AMB TANK WHILE IN SITE COVERAGE 1. INHIBIT DPS BURNS FOR LEAK RATE GREATER THAN 20 PSI/SEC. 2. IF LEAK RATE LESS THAN 20 PSI/SEC (A) CLOSE HE REG 1 (B) OPEN DES HE REG 1 OR 2 IMMEDIATELY AFTER IGNITION.	REF MAL PROC DPS 1 DES REG 3 HE PRESS ABNORMAL NOTE--- MSFN WILL EVALUATE WHICH REG TO OPEN		
	RULE NUMBER 25-35 RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM PROPULSION -DPS	SPECIFIC-DPS	25-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 25 - LM PROPULSION - DPS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	25-36	93 SEC AFTER LO LEVEL SENSE	POWERED DESCENT	CREW EVALUATION LAND OR ABORT	5 SEC CAPABILITY AT FTP 20 SEC CAPABILITY AT 25 PERCENT THROTTLE
	25-37	LOW LEVEL CONFIRMS INSUFFICIENT PROPELLANT TO LAND OR DELTA BETWEEN FUEL AND OXIDIZER PWGS READINGS GREATER THAN 13 PERCENT	POWERED DESCENT	A. ABORT B. ABORT STAGE AT DPS DEPLETION	REF MAL PROC DPS 6 DES QTY
	25-38	PWGS READING 2 PERCENT (EITHER FUEL OR OXID) AND NO VALID TIME ESTIMATE FROM LOW LEVEL	POWERED DESCENT	ABORT ABORT STAGE AT DPS DEPLETION	REF MAL PROC DPS 7 PWGS IND ABNORMAL NOTE--- THE GROUND CALC DPS QUANTITY WILL BE USED IF BOTH THE LOW LEVEL AND PWGS FAIL.
	25-39	EXCESSIVE PROPELLANT USAGE (PREDICTED MARGIN AT TOUCHDOWN LESS THAN -0.2 PERCENT).	POWERED DESCENT	A. PRIOR TO P64 - CONTINUE MISSION B. AFTER P64 BUT PRIOR TO LO GATE. 1. ABORT 2. ABORT STAGE AT DPS DEPLETION	NOTE---THROTTLEDOWN TIME, THRUST LEVEL, AND SYSTEM PRESSURES ARE SECONDARY CUES WHICH INDICATE OFF NOMINAL DPS PERFORMANCE.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM PROPULSION -DPS	SPECIFIC-DPS	25-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 25 - LM PROPULSION - DPS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS												
	25-40	UNABLE TO VENT DPS AFTER LANDING.															
	A.	UNABLE TO VENT DPS FUEL TANKS	LUNAR STAY	A. CONTINUE MISSION													
	B.	UNABLE TO VENT OXIDIZER TANKS AND GREATER THAN 150 LBS OF OXIDIZER IN EACH OXIDIZER TANK		B. CONTINUE MISSION													
	C.	UNABLE TO VENT OXIDIZER TANKS AND LESS THAN 150 LBS OF OXIDIZER IN EACH OXIDIZER TANK		C. STAY UNTIL AT LEAST T-3	NOTE--- STAY TIME DEPENDS UPON OXIDIZER REMAINING IN EACH TANK AND WILL BE DETERMINED REAL TIME.												
	25-41	35 PERCENT THROAT AREA INCREASE EXCEEDED	ALL	ABORT STAGE	NOTE--- THROTTLE DOWN TIME, THRUST LEVEL, AND SYSTEM PRESSURES ARE SECONDARY CUES WHICH INDICATE OFF NOMINAL DPS PERFORMANCE												
		RULES 25-42 THROUGH 25-49 ARE RESERVED.															
<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 14</td> <td>FNL</td> <td>11/1/70</td> <td>LM PROPULSION -DPS</td> <td>SPECIFIC-DPS</td> <td>25-6</td> </tr> </tbody> </table>						MISSION	REV	DATE	SECTION	GROUP	PAGE	APOLLO 14	FNL	11/1/70	LM PROPULSION -DPS	SPECIFIC-DPS	25-6
MISSION	REV	DATE	SECTION	GROUP	PAGE												
APOLLO 14	FNL	11/1/70	LM PROPULSION -DPS	SPECIFIC-DPS	25-6												

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 25 - LM DPS - CONCLUDED

R	ITEM	----- ' DPS - PRELAUNCH INSTRUMENTATION ' -----					
	25-50	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCER	CATEGORY	MISSION RULE REFERENCE
		START TNK PRESS	GQ3015P	HE MON	COMMON	HD	25-31,32,35
		HE REG PRESS	GQ3018P	C&W	COMMON	HD 1 OF 2	25-34,30,35
		HE REG PRESS	GQ3025P			HD M-PCM	25-34,30,35
		HE PRESS	GQ3435P			HD 1 OF 2	25-33,30,32
		HE PRESS	GQ3436P	PRESS		HD M	25-33,30,32
		FU TNK 1 QTY	GQ3603Q	QTY	COMMON	HD 1 OF 2	25-37,38,39,45
		FU TNK 2 QTY	GQ3604Q	QTY	COMMON	HD M	25-37,38,39,40
		OX TNK 1 QTY	GQ4103Q	QTY	COMMON	HD 1 OF 2	25-37,38,39,40
		OX TNK 2 QTY	GQ4104Q	QTY	COMMON	HD M	25-37,38,39,40
		FU 1 TEMP	GQ3718T	TEMP MON	COMMON	HD 1 OF 2	25-30
		FU 2 TEMP	GQ3719T	TEMP MON	COMMON	HD M	25-30
		OX 1 TEMP	GQ4218T	TEMP MON	COMMON	HD 1 OF 2	25-30
		OX 2 TEMP	GQ4219T	TEMP MON	COMMON	HD M	25-30
		FU PRESS	GQ3611P			M	25-30,31,32,33, 35
		OX PRESS	GQ4111P			M	25-30,31,32,33, 35
		TCP	GQ6510P	THRUST	COMMON	M-PCM	25-30,41
		LOW LEVEL	GQ4455X	DPS LOW	COMMON	M	25-36

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	LM DPS	PRELAUNCH INSTR	25-7	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 26 - LM PROPULSION - APS

R	ITEM						
		----- GENERAL -----					
	26-1	RESERVED					
	26-2	DEFINITIONS---					
		A. AN OPERATIONAL APS (PREPRESSURIZATION) IS DEFINED AS FOLLOWS--- 1. DELTA PRESS BETWEEN APS FUEL AND OXID ENGINE INLET PRESSURES LESS THAN 90 PSID. 2. DELTA TEMP BETWEEN APS FUEL AND OXID LESS THAN 10 DEG F. 3. APS FUEL AND/OR OXID TEMP GREATER THAN 50 DEG F AND LESS THAN 90 DEG F. 4. APS FUEL OR OXID INLET PRESSURE GREATER THAN 62 PSIA AND LESS THAN 220 PSIA. 5. REDUNDANT PRESSURIZATION PATHS AND NO HELIUM TANK OR HELIUM LINE LEAKS.					
		B. AN OPERATIONAL APS (POST-PRESSURIZATION) IS DEFINED AS FOLLOWS--- 1. ADEQUATE SOURCE PRESSURE FOR DELTA V REQUIRED AND REDUNTANT PRESSURIZATION PATHS. 2. DELTA TEMP BETWEEN APS FUEL AND OXID LESS THAN 60 DEG F FOR BURNS LESS THAN 100 SECONDS AND 10 DEG F FOR BURNS GREATER THAN 100 SECONDS. 3. APS FUEL AND/OR OXID TEMP GREATER THAN 50 DEG F AND LESS THAN 120 DEG F FOR BURNS LESS THAN 100 SECONDS AND GREATER THAN 50 DEG F AND LESS THAN 90 DEG F FOR BURNS GREATER THAN 100 SECONDS. 4. APS FUEL AND/OR OXID INLET PRESSURES GREATER THAN 115 PSIA. (ULLAGE PRESSURE GREATER THAN 125 PSIA) 5. DELTA PRESSURE BETWEEN FUEL AND OXID INLET PRESSURES LESS THAN OR EQUAL TO 15 PSID.					
		RULES 26-3 THROUGH 26-12 ARE RESERVED					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM PROP - APS	GENERAL	26-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 26 - LM PROPULSION - APS

R	ITEM						
		----- ' SYSTEMS MANAGEMENT ' -----					
	26-13	THE MINIMUM IMPULSE OF THE APS ENGINE IS 1257 PLUS OR MINUS 104 LBS - SEC, WHICH CORRESPONDS TO AN ELECTRICAL ON/OFF TIME OF 0.5 SEC.					
	26-14	ONLY PREMISSION APPROVED APS MULTIBURN PROFILES WILL BE EXECUTED, SINCE NO DATA EXISTS TO ALLOW REALTIME SUPPORT FOR EXAMINING APS FREEZING, CHARRING, BACKWALL TEMPERATURE CONSTRAINTS FOR MULTIBURN PROFILES.					
	26-15	PROPELLANT GAGING (NO ONBOARD READOUT)--- A. PRIME METHOD--- APS QTY FROM LGC MASS CALCULATION (THREE PERCENT) B. BACKUP METHOD--- FLOW RATE X TIME (5 PERCENT)					
		RULES 26-16 THROUGH 26-19 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM PROPULSION - APS	MANAGEMENT	26-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 26 - LM PROPULSION - APS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
				----- SPECIFIC -----	
26-20	LOSS OF AN OPERATIONAL APS	DOCKED/ UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY RNDZ		A. RETURN TO CSM NO-GO FOR CIRC B. RETURN TO CSM ASAP NO-GO FOR PDI C. ABORT USE DPS AS LONG AS POSSIBLE D. ASCEND NEXT BEST OPPORTUNITY E. USE RCS FOR TPI	REF MAL PROC APS 1 ASC PRESS 2 FUEL OR OXID TEMP ABNORMAL 2A FUEL OR OXID PRESS ABNORMAL 3 HE PRESS ABNORMAL OR DECR.
26-21	APS HE SOURCE PRESSURE	DOCKED/ UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY LUNAR STAY RNDZ		A. 1. RETURN TO CSM NO-GO FOR CIRC 2. RETURN TO CSM NO-GO FOR PDI 3. ABORT (A) USE DPS AS LONG AS POSSIBLE (B) OPTIMIZE APS HELIUM 4. ASCEND NEXT BEST OPPORTUNITY (A) DO NOT ASC FEED (B) OPTIMIZE APS HELIUM B.1.(A) ASCEND IMMEDIATELY (B) DO NOT ASC FEED 2. CONTINUE MISSION	REF MAL PROC APS 1 ASC PRESS 3 HE PRESS ABNORMAL OR DECR. NOTE ONE HELIUM BOTTLE CAN SUPPLY SUFFICIENT APS DELTA V CAPABILITY FOR NONLANDING ALTERNATE MISSIONS.
		B. LEAK AFTER PRESSURIZATION	LUNAR STAY		

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM PROPULSION - APS	SPECIFIC	26-3

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 26 - LM PROPULSION - APS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	26-22	APS HE LEAK BETWEEN QUAD CHECK VALVES AND ASC HE REG 1 AND 2 SHUTOFF VALVES	DOCKED/ UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY RNDZ	A. RETURN TO CSM NO-GO FOR CIRC B. RETURN TO CSM NO-GO FOR PDI C. ABORT (1) USE DPS AS LONG AS POSSIBLE (2) OPTIMIZE APS HELIUM D. ASCEND NEXT BEST OPPORTUNITY 1. DO NOT ASC FEED 2. OPTIMIZE APS HELIUM E. CONTINUE MISSION CLOSE HE SOV'S	REF MAL PROC APS 3 HE PRESS ABNORMAL OR DECR.
	26-23	APS PROPELLANT/VAPOR LEAK DOWNSTREAM OF QUAD CHECK VALVES	UNDOCKED/ PRE-PDI POWERED DESCENT STAY RNDZ	A. DOCK ASAP B. ABORT 1. USE DPS AS LONG AS POSSIBLE C. ASCEND IMMEDIATELY 1. DO NOT ASC FEED D. USE RCS FOR TPI	REF MAL PROC APS 1. ASC PRESS 2A FUEL OR OXID PRESS ABNORMAL 3. HE PRESS ABNORMAL OR DECR.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM PROPULSION - APS	SPECIFIC	26-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 26 - LM PROPULSION - APS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	26-24	APS PROP VALVE MISMATCH (DELTA POS)	ALL	A. CONTINUE MISSION 1. IF BURNING OR HAVE HAD AT LEAST ONE APS, INHIBIT SUBSEQUENT APS BURNS	THIS INDICATION PRIOR TO FIRST APS ENGINE ON WILL BE CONSIDERED A TM FAILURE
	26-25	APS FU AND/OR OXID LOW LEVEL			APS MAL PROC APS 4 ASC QTY
		A. DURING ASCENT	ASCENT	A. CONTINUE MISSION 1. OPEN RCS MAINS 2. CLOSE ASC FEED	
		B. CONFIRMS INSUFFICIENT PROPELLANT FOR APS TPI	RNDZ	B. USE RCS FOR TPI	
		RULES 26-26 THROUGH 26-29 ARE RESERVED.			

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM PROPULSION - APS	SPECIFIC	26-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 26 - LM APS - CONCLUDED

R	ITEM	APS - PRELAUNCH INSTRUMENTATION					MISSION RULE REFERENCE
		MEAS DESCRIPTION	PCM	ONBOARD TRANSDUCER	CATEGORY		
26-30		APS HE 1 PRESS	GP0001P	HEL MON C&W COMMON	M - PCM	26-20,21,22	
		APS HE 2 PRESS	GP0002P	HEL MON C&W COMMON	M - PCM	26-20,21,22	
		APS HE REG PRESS	GP0018P		HD 1 OF 2	26-20,22	
		APS HE REG PRESS	GP0025P	C&W COMMON	HD M - PCM	26-20,22	
		APS HE 1 TEMP	GP0201T	HEL MON COMMON	HD - PCM	26-21	
		APS HE 2 TEMP	GP0202T	HEL MON COMMON	HD - PCM	26-21	
		APS FUEL TEMP	GP0718T	TEMP COMMON	M - PCM	26-20	
		APS FUEL LOW	GP0908X	C&W COMMON	HD	26-25	
		APS OXID TEMP	GP1218T	TEMP COMMON	M - PCM	26-20	
		APS OXID LOW	GP1408X	C&W COMMON	HD	26-25	
		APS FUEL PRESS	GP1501P	C&W COMMON	M - PCM	26-20,21,22,23	
		APS OXID PRESS	GP1503P	C&W COMMON	M - PCM	26-20,21,22,23	
		VLVS A DELTA POS	GP2997U		HD	26-24	
		VLVS B DELTA POS	GP2998U		HD	26-25	
		APS TCP	GP2010P		HD		

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM APS	PRELAUNCH INSTR	26-6

27 LM REACTION
CONTROL SYSTEM

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 27 - LM REACTION CONTROL SYSTEM

R	ITEM						
		----- ' GENERAL ' -----					
	27-1	RESERVED					
	27-2	DEFINITIONS					
		A. OPERATIONAL RCS SYSTEM					
		1. AN RCS SYSTEM CONTAINS EIGHT OPERATIONAL THRUSTERS SUPPLIED BY ITS OWN PRESSURIZATION AND PROPELLANT FEED SYSTEM INDEPENDENT OF ASCENT FEED AND CROSSFEED.* 2. FUEL AND/OR OXID MANIFOLD PRESSURES GREATER THAN OR EQUAL TO 100 PSI. 3. FUEL TEMP GREATER THAN OR EQUAL TO 40 DEG F AND LESS THAN OR EQUAL TO 100 DEG F. 4. QUAD TEMP GREATER THAN 119 DEG F.					
		*INDIVIDUAL THRUSTERS REQUIRED FOR DIFFERENT MISSION PHASES WILL BE COVERED SEPARATELY.					
		RULE NUMBERS 27-3 THROUGH 27-9 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM REACTION CONTROL SYSTEM	GENERAL - RCS	27-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 27 - LM REACTION CONTROL SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
----- SPECIFIC MISSION RULES -----					
	27-20	LOSS OF OPERATIONAL RCS SYSTEM A OR B	ALL	A. CLOSE MAINS OF AFFECTED SYSTEM IF LOSS OF SYSTEM RESULTED FROM ANYTHING OTHER THAN ISOLATION OF JETS B. CROSSFEED FROM GOOD SYSTEM DOCKED DO NOT UNDOCK UNDOCKED DOCK ASAP NO-GO FOR CIRC PRE-PDI RETURN TO CSM ASAP NO-GO FOR PDI POWERED ABORT DESCENT ABORT STAGE LUNAR ASCEND NEXT BEST STAY OPPORTUNITY RNDZ CONTINUE MISSION	REF MAL PROC RCS 1 RCS 1A HE PRESS LOW OR DECR. 1B PQMD ABNORMAL 2 RCS PRESS OR TEMP ABNORMAL 3 RCS A(B) REG
	27-21	RCS THRUSTER PAIR A. ONE PAIR ISOLATED	DOCKED UNDOCKED PRE-PDI POWERED DESCENT/ LUNAR STAY/ RNDZ	A. 1. DO NOT UNDOCK 2. DOCK ASAP NO-GO FOR CIRC 3. RETURN TO CSM ASAP NO-GO FOR PDI 4. CONTINUE MISSION	REF MAL PROC RCS 4 RCS TCA A.1. WITH AN RCS PAIR ISOLATED SOME TRANSLATION CAPABILITY IS LOST DEPENDING ON THE RCS PAIR ISOLATED.

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 27 - LM REACTION CONTROL SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	27-22	DECREASING OR LOSS OF RCS HE PRESSURE	ALL	A. 1. CONTINUE USING BOTH SYSTEMS UNTIL MFLD PRESS IN BAD SYSTEM IS LESS THAN 100 PSI, THEN CLOSE MAINS OF BAD SYSTEM 2. CROSSFEED FROM GOOD SYSTEM B. RETURN TO CSM AND DOCK ASAP NO GO FOR CIRC C. RETURN TO CSM AND DOCK ASAP NO-GO FOR PDI D.1. CONTINUE MISSION IF SUFFICIENT BLOWDOWN CAPABILITY EXISTS IN FAILED SYSTEM TO MEET THE RCS REDLINES DEFINED IN MR 3.97. 2. IF THIS CAPABILITY DOES NOT EXIST--- A. PDI-ABORT B. LUNAR STAY-ASCEND NEXT BEST OPPORTUNITY E. CONTINUE MISSION	REF MAL PROC RCS 1 RCS 1A HE PRESS LOW OR DECR. 1B PQMD ABNORMAL WHEN MFLD PRESS DROPS BELOW 100 PSI, THE SYSTEM IS CONSIDERED NON-OPERATIONAL REF RULE 27-2 D. RCS TROUBLESHOOTING WILL NOT BE PERFORMED AFTER HI GATE
	27-23	RCS PROPELLANT LEAK BETWEEN MAINS AND ISOLATION VALVES	DOCKED/ UNDOCKED PRE-PDI POWERED DESCENT/ LUNAR STAY RNDZ	A.1. RETURN TO CSM ASAP 2. NO GO FOR CIRC B. RETURN TO CSM ASAP 1. NO-GO FOR PDI C.1. PDI TO HIGH GATE A. ABORT 2. HIGH GATE TO TD A. CONTINUE MISSION D. ASCEND NEXT BEST OPPORTUNITY E. CONTINUE MISSION	REF MAL PROC RCS 1 RCS 1A HE PRESS LOW OR DECR. 1B. PQMD ABNORMAL E. WITH AN RCS SYSTEM ISOLATED SOME TRANSLATION CAPABILITY IS LOST

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LM REACTION CONTROL SYSTEM	SPECIFIC RCS	27-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 27 - LM REACTION CONTROL SYSTEM

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	27-24	RESERVED					
	27-25	IMPINGEMENT CONSTRAINTS VIOLATED	DOCKED/ UNDOCKED PRE-PDI POWERED DESCENT LUNAR STAY RNDZ	A. DOCK ASAP NO GO FOR CIRC B. DOCK ASAP NO GO FOR PDI C.1. ABORT 2. ABORT STAGE AS SOON AS POSSIBLE D. CONTINUE MISSION E. USE RCS + Z FOR TPI.	REF MAL PROC RCS 1B PQMD ABNORMAL		
		RULES 27-26 THROUGH 27-29 ARE RESERVED.					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LM REACTION CONTROL SYSTEM	SPECIFIC RCS	27-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 27 - LM REACTION CONTROL - CONCLUDED

R	ITEM	----- PRELAUNCH INSTRUMENTATION -----					
27-30	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCER	CATEGORY	MISSION RULE REFERENCE	
	RCS 'A' PROP QTY	GR1085Q	QUANTITY	COMMON	HD 10F2	27-23,22,20	
	RCS 'A' HE PRESS	GR1101P	PRESS MON C&W	COMMON	HD M	27-23,20	
	RCS 'A' REG PRESS	GR1201P	PRESS MON C&W	COMMON	HD-PCM	27-20,22,23	
	RCS 'B' REG PRESS	GR1202P	PRESS MON C&W	COMMON	HD-PCM	27-20,22,23	
	RCS 'B' PROP QTY	GR1095Q	QUANTITY	COMMON	HD 10F2	27-23,20,22	
	RCS 'B' HE PRESS	GR1102P	PRESS MON C&W	COMMON	HD M	27-23,20	
	RCS 'A' FUEL TEMP	GR2121T	TEMP MON	COMMON	M-PCM	27-20	
	RCS 'B' FUEL TEMP	GR2122T	TEMP MON	COMMON	M-PCM	27-20	
	RCS MAIN 'A' CLSD	GR9609U	MAIN SOV	COMMON	HD		
	RCS MAIN 'B' CLSD	GR9610U	MAIN SOV	COMMON	HD		
	RCS 'A' FUEL MFLD PRESS	GR2201P	PRESS MON	COMMON	M	27-20,23	
	RCS 'B' FUEL MFLD PRESS	GR2202P	PRESS MON	COMMON	M	27-20,23	
	RCS 'A' OX MFLD PRESS	GR3201P	PRESS MON	COMMON	M	27-20,23	
	RCS 'B' OX MFLD PRESS	GR3202P	PRESS MON	COMMON	M	27-20,23	
	A/B XFEED OPEN	GR9613U	CRSFD	COMMON	HD		
	QUAD 1 'A' TCA ISOL VLV	GR9667U	SYS A QUAD 1	COMMON	HD	27-21	
	QUAD 2 'A' TCA ISOL VLV	GR9665U	SYS A QUAD 2	COMMON	HD	27-21	
	QUAD 3 'A' TCA ISOL VLV	GR9663U	SYS A QUAD 3	COMMON	HD	27-21	
	QUAD 4 'A' TCA ISOL VLV	GR9661U	SYS A QUAD 4	COMMON	HD	27-21	
	QUAD 1 'B' TCA ISOL VLV	GR9668U	SYS B QUAD 1	COMMON	HD	27-21	
	QUAD 2 'B' TCA ISOL VLV	GR9666U	SYS B QUAD 2	COMMON	HD	27-21	
	QUAD 3 'B' TCA ISOL VLV	GR9664U	SYS B QUAD 3	COMMON	HD	27-21	
	QUAD 4 'B' TCA ISOL VLV	GR9662U	SYS B QUAD 4	COMMON	HD	27-21	
	QUAD 1 TEMP	GR6004T	TEMP MON	COMMON	HD	27-24	
	QUAD 2 TEMP	GR6003T	TEMP MON	COMMON	HD	27-24	
	QUAD 3 TEMP	GR6002T	TEMP MON	COMMON	HD	27-24	
	QUAD 4 TEMP	GR6001T	TEMP MON	COMMON	HD	27-24	
	ASC FEED OXID 'A' OPEN	GR9641U	SYS A ASC OXID	COMMON	HD		
			ASC FUEL				
	ASC FEED FUEL 'A' OPEN	GR9631U	SYS A ASC OXID	COMMON	HD		
			ASC FUEL				
	ASC FEED FUEL 'B' OPEN	GR9632U	SYS B ASC OXID	COMMON	HD		
			ASC FUEL				
	ASC FEED OXID 'B' OPEN	GR9642U	SYS B ASC OXID	COMMON	HD		
			ASC FUEL				

28 SPACE
ENVIRONMENT

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 28 - SPACE ENVIRONMENT

R	ITEM						
		----- ' MANAGEMENT ' -----					
29-3		THE EXISTING AND PROJECTED RADIATION ENVIRONMENT WILL BE A PART OF THE GO/NO-GO DECISION PROCESS.					
28-4		PRIORITY OF DATA---					
		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 14	FNL	11/1/70	SPACE ENVIRONMENT	MANAGEMENT	28-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 28 - SPACE ENVIRONMENT

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
				<div style="border: 1px dashed black; padding: 5px; margin: 0 auto; width: fit-content;"> SPECIFIC MISSION RULES </div>	
	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	PRE-LAUNCH EPO	A. HOLD UNTIL INFORMATION FROM REPORTING SOURCES INDICATES THE MOD WILL NOT BE EXCEEDED. 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. 2. FOR DOSES APPROACHING THE MOD CONTINUE MISSION WITH CONTINUOUS PRD MONITORING AND CREW ASSESSMENT. CONSIDERATIONS WILL BE GIVEN TO CHANGING THE TRAJECTORY TO A LOW EARTH ORBIT OR REENTERING ASAP BASED ON ACTUAL CONDITIONS. ALL OTHER 'C. CONTINUE MISSION.	B.1. CREW SHOULD BEGIN PERSONAL DOSIMETER READOUTS PER SOP 2-8
	28-12	RADIATION CONFIRMED BY PRD READOUTS OR ONBOARD TM AND PROJECTED TO EXCEED THE MOD	ALL	REENTER NEXT BEST PTP	ALSO APPLIES TO ALTERNATE EARTH ORBIT MISSION.
	28-13	MAJOR SOLAR FLARE PREDICTED	ALL	CONTINUE MISSION.	

MISSION	REV	DATE	SECTION	GROUP	PAGE	
APOLLO 14	FNL	11/1/70	SPACE ENVIRONMENT	SPECIFIC	28-3	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 28 - SPACE ENVIRONMENT

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	28-14	MAJOR SOLAR FLARE HAS OCCURRED			
		A. UNCONFIRMED PARTICLE EVENT	ALL	A. CONTINUE MISSION.	
		B. CONFIRMED PARTICLE EVENT AND SOLAR PARTICLE ALERT NETWORK/RTACF ANALYSIS INDICATES THE MOD WILL BE EXCEEDED DURING THE MISSION	PRE-LAUNCH	B.1. HOLD UNTIL DATA ANALYSIS INDICATES THAT THE MOD WILL NOT BE EXCEEDED.	
			EPO	B.2. CONTINUE MISSION. IF DATA ANALYSIS INDICATES THAT THE MOD WILL BE EXCEEDED BY A SIGNIFICANT AMOUNT PRIOR TO MISSION COMPLETION, TLI IS NO-GO.	
			ALL OTHERS	3. CONTINUE MISSION. CONSIDERATION WILL BE GIVEN TO EARLY (OR EXTENDED) TEI AND INHIBITING CREW TRANSFER TO LM.	
		C. CONFIRMED PARTICLE EVENT AND S/C TLM OR PRD READOUT PROJECTIONS INDICATE THE MOD WILL BE EXCEEDED DURING THE MISSION	TLC	C.1. CONTINUE MISSION. CONSIDERATION SHOULD BE GIVEN TO ENTER IN NEXT BEST PTP IF THE TOTAL DOSE CAN BE REDUCED SIGNIFICANTLY WITHOUT INCREASING THE TOTAL RISK TO THE CREW.	C.1. CREW SHOULD BEGIN PERSONAL DOSIMETER AND RADIATION SURVEY METER READOUTS PER SOP 2-8
			LO	2. CONTINUE MISSION. CONSIDER EXTENDING LUNAR ORBIT STAY TIME IF THE TOTAL DOSE TO THE CREW WOULD BE REDUCED SIGNIFICANTLY BY LUNAR SHIELDING.	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.
			LUNAR STAY	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.	
			ALL OTHER PHASES	4. CONTINUE MISSION	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	SPACE ENVIRONMENT	SPECIFIC	28-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 28 - SPACE ENVIRONMENT - CONCLUDED

R	ITEM	INSTRUMENTATION REQUIREMENTS					
		MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION RULE REF
	28-15	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
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	SPACE ENVIRONMENT	INSTR REQ	28-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 29 - RECOVERY

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
				----- SPECIFIC -----				
	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 - 24 HOURS, RETAIN DELTA V 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>								
				WORLD WIDE	LAUNCH SITE			
		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 14	FNL	11/1/70	RECOVERY	SPECIFIC	29-1	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 29 - RECOVERY

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	29-6	AN ELLIPSE 163 NM UPRANGE, 152 NM DOWNRANGE AND 50 NM TO EITHER SIDE OF 55 DEG/55DEG 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 109 NM UPRANGE AND DOWNRANGE AND 40 NM TO EITHER SIDE OF 90 DEG/90DEG TARGET POINT-- AND ELIPSE 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 14	FNL	11/1/70	RECOVERY	SPECIFIC	29-2	

30 AEROMEDICAL

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 30 - AEROMEDICAL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
				<div style="border: 1px dashed black; padding: 2px;"> SPECIFIC MISSION RULES </div>	
	30-15	LOSS OR UNREADABLE EKG	ALL PHASES	A. CONTINUE MISSION	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. CONTINUE MISSION	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. CONTINUE MISSION	MCC SURGEON WILL EVALUATE THE PROBLEM AND MAY RECOMMEND EARLY MISSION TERMINATION IF CORRECTIVE ACTION IS NOT EFFECTIVE.
			EPO	B. NO-GO FOR TLI	
			TLC	C. NO-GO FOR LOI	
			LO	D. ENTER NEXT BEST PTP	
			EVA	E. TERMINATE EVA	
			TEC	F. ENTER NEXT BEST PTP	
	30-17	ABNORMAL RESPIRATORY RATE	LAUNCH	A. CONTINUE MISSION	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. NO-GO FOR TLI	
			TLC	C. NO-GO FOR LOI	
			LO	D. ENTER NEXT BEST PTP	
			TEC	E. ENTER NEXT BEST PTP	
	30-18	ONSET OF SERIOUS MEDICAL PROBLEM	LAUNCH	A. CONTINUE MISSION CREW MAY ELECT TO ABORT IF INTOLERABLE	MCC SURGEON WILL EVALUATE AND MAY RECOMMEND EARLY MISSION TERMINATION IF CORRECTIVE ACTION IS NOT EFFECTIVE.
			EPO	B. ENTER NEXT BEST PTP	
			TLC	C. ENTER NEXT BEST PTP	
			LO	D. ENTER NEXT BEST PTP	
			EVA	E. TERMINATE EVA	
			TEC	F. ENTER NEXT BEST PTP	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	AEROMEDICAL	SPECIFIC PHYSIOLOGICAL	30-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 30 - AEROMEDICAL

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS			
	30-19	DYSBARISM IN ANY CREWMAN	LAUNCH	A. CONTINUE MISSION CREW MAY ELECT TO ABORT IF CONDITION IS INTOLERABLE	A.1. CHECK SUIT INTEGRITY. 2. IF CONDITIONS PERMIT CREW MAY ELECT TO OVER-PRESSURIZE. (A) ALL THREE SUITS CONNECTED TO SUIT CIRCUIT. (B) SUIT DEMAND REG TO PRESS POSITION (C) MONITOR SUIT PRESS (SHOULD REACH 4 PSID IN 75 SEC). (D) SELECT SUIT DEMAND REG INLET SEL VALVE TO OFF WHEN SUIT PRESS REACHES 4.0 PSID. (E) MAINTAIN SUIT OVERPRESSURE BY OPENING INLET SELECTOR VALVE AS NECESSARY. NOTE--- RELIEF FUNCTION OF DEMAND REGULATOR IS ISOLATED WHEN USING THIS PROCEDURE.			
			ALL	B. TERMINATE PHASE ENTER NEXT BEST PTP	B. MCC SURGEON WILL EVALUATE AND MAY RECOMMEND EARLY MISSION TERMINATION IF CORRECTIVE ACTION IS NOT EFFECTIVE.			
	30-20	ORAL TEMP EXCEEDS 101 DEG F. DESPITE CORRECTIVE ACTION.			MCC SURGEON MAY RECOMMEND EARLY MISSION TERMINATION IF TREATMENT IS UNSUCCESSFUL.			
		A. IF DUE TO ILLNESS	LAUNCH	A.1. NOT APPLICABLE				
			ALL	2. TERMINATE PHASE ENTER NEXT BEST PTP				
		B. IF RESULTANT FROM THERMAL OVERLOAD	LAUNCH	B.1. NOT APPLICABLE				
			ALL	2. TERMINATE PHASE ENTER NEXT BEST PTP				
	30-21	PLSS METABOLIC OVERLOAD.	EVA	A. IF AMBER LINE IS EXCEEDED--- DECREASE ACTIVITY.	A. AMBER LINE LIMIT IS WORK SUSTAINED AT A RATE GREATER THAN 2500 BTU/HR FOR A PERIOD LONGER THAN 5 MINUTES, AS DETERMINED BY PREFLIGHT ERGOMETRY CALIBRATIONS. THE MCC SURGEON WILL EVALUATE AND MAY RECOMMEND DECREASED CREW ACTIVITY.			
				B. IF RED LINE IS EXCEEDED--- STOP ACTIVITY AND REST.	B. RED LINE LIMIT IS WORK SUSTAINED AT A RATE GREATER THAN 3000 BTU/HR FOR A PERIOD LONGER THAN 2 MINUTES, AS DETERMINED BY PREFLIGHT ERGOMETRY CALIBRATIONS. MCC SURGEON WILL EVALUATE AND MAY RECOMMEND THAT THE CREW STOP ACTIVITY AND REST.			
		RULE NUMBERS 30-22 THROUGH 30-24 ARE RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	AEROMEDICAL	SPECIFIC PHYSIOLOGICAL	30-3	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 30 - AEROMEDICAL

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	LAUNCH ALL	A.1. CONTINUE MISSION 2. CONTINUE MISSION CHANGE LIOH CANISTER	A. PCO2 SHOULD DECREASE BELOW 2 MM HG WITHIN 30 MINUTES.			
		B. GREATER THAN OR EQUAL TO 7.6 MM HG AND UNABLE TO DECREASE	LAUNCH ALL	B.1. CONTINUE MISSION 2. CONTINUE MISSION (A) OPEN SUITS AND BREATHE FROM CABIN (B) CHANGE SECOND LIOH CANISTER (C) TEST PCO2 SENSOR	B.2. LIOH CANISTERS WILL NOT BE CHANGED IN AN UNPRESSURIZED CABIN. B.2.(C) PCO2 SENSOR TEST--- <ul style="list-style-type: none"> • ISOLATE SUIT CIRCUIT BY DISCONNECTING SUIT HOSES FROM THE SPACECRAFT • SUIT CIR RET AIR VALVE CLOSED • CRACK O2 METERING VALVE TO OPEN • PURGE FOR 30 SECONDS • CLOSED O2 METERING VALVE • IF ABOVE PROCEDURE RESULTS IN A PCO READING NEAR ZERO, THE PCO2 SENSOR IS OPERATING PROPERLY 			
		C. GREATER THAN OR EQUAL TO 10 MMHG	LAUNCH ALL	C.1. CONTINUE MISSION 2. TERMINATE PHASE ENTER NEXT BEST PTP				
	30-26	PCO2 INSTRUMENTATION FAILURE	ALL	CONTINUE MISSION USE ONBOARD CO2 TAPES				
		RULE NUMBER 30-27 THROUGH 30-34 ARE RESERVED.						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	AEROMEDICAL	SPECIFIC EQUIPMENT	30-4	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 30 - AEROMEDICAL - CONCLUDED

R	ITEM	----- INSTRUMENTATION REQUIREMENTS -----					
		CSM					
30-35	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION RULE REFERENCE	
	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	CJ0200R	NOT DISPLAYED		HD	30-17	
	PNEUMOGRAM	CJ0201R	NOT DISPLAYED		HD	30-17	
	PNEUMOGRAM	CJ0202R	NOT DISPLAYED		HD	30-17	
	LM						
	CO2 PARTIAL PRESSURE	GF1521P	METER		HD		
	ELECTROCARDIOGRAM	GT9999	NOT DISPLAYED		M*	30-15/16	
	PNEUMOGRAM		NOT DISPLAYED		HD	30-17	
	PLSS						
	PLSS ELECTROCARDIOGRAM	GT8124J			M*	30-15/16	
	*MANDATORY TO CABIN CLOSEOUT						
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	AEROMEDICAL	INSTR REQ	30-5

31 ALSEP

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS

R	ITEM						
		----- GENERAL -----					
	31-1	FOR ANY MALFUNCTION ON A SCIENTIFIC TASK, A MAXIMUM OF 10 MINUTES WILL BE SPENT ON THE CONTINGENCY PROCEDURE BEFORE THE TASK IS ABANDONED WITH THE FOLLOWING EXCEPTIONS--- A. RTG FUELING-- UP TO 20 MINUTES WILL BE ALLOWED IN EXERCISING RTG FUELING CONTINGENCY PROCEDURES. B. ALSEP PACKAGE 1 TO PACKAGE 2 CABLE CONNECTION-- UP TO 20 MINUTES WILL BE ALLOWED FOR MAKING THE CABLE CONNECTION. C. ALSEP ANTENNA-- UP TO 30 MINUTES WILL BE ALLOWED FOR ANTENNA ERECTION AND ALIGNMENT.					
	31-2	RESERVED					
	31-3	RESERVED					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LUNAR SURFACE OPS.	GENERAL SURFACE OPS.	31-1

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS

R	ITEM							
	31-4	RESERVED						
	31-5	CAMERA FRAME COUNTS WILL BE OBTAINED AT A SUFFICIENT FREQUENCY (APPROXIMATELY 30-MINUTE INTERVALS) TO ENABLE ACCURATE CORRELATION OF SAMPLES AND PHOTOS FOR SAMPLE ORIENTATION.						
	31-6	IN ESTABLISHING THE OPERATIONAL EVA 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 AND TIMELINE CONSTRAINTS, AND SPECIFICALLY INTERESTING FEATURES VISIBLE TO THE CREW.						
	31-7	THE OPERATIONAL EVA PLAN WILL BE TIME CONSTRAINED TO A MAXIMUM DURATION OF <u>4.25</u> HOURS. THE RADIUS DISTANCE CONSTRAINT, FROM THE LM, IS 3 KM WHEN THE BSLSS IS CARRIED AND 1 KM WHEN THE BSLSS IS NOT CARRIED. EXTENSIONS, DETERMINED DURING THE EVA BASED ON CONSUMABLES USAGE RATES AND CREW COMFORT TO A MAXIMUM OF <u>5</u> HOURS, MAY BE IMPLEMENTED. PROBABLE EXTENSION POINTS WILL BE AFTER ALSEP DEPLOYMENT (FOR EVA 1) AND AT TRAVERSE SITES FARTHEST FROM THE LM (FOR EVA 2)						
	31-8	<p>THE CREW WILL HAVE PRIME RESPONSIBILITY FOR---</p> <p>A. SELECTION OF SAMPLES TO BE COLLECTED.</p> <p>B. DECISIONS TO DEPART FROM THE OPERATIONAL EVA.</p> <p>C. ON THE SPOT DETERMINATION OF BEST TRAVERSE PATH TO PROVIDE MOBILITY EASE.</p> <p>D. ON THE SPOT DETERMINATION OF ACCESSIBILITY OF FEATURES OF INTEREST.</p> <p>E. SELECTION OF A SUITABLE LOCATION FOR PERFORMING EVA COMMUNICATIONS TEST.</p> <p>F. SELECTION OF APPROPRIATE PLACES FOR MET/SOIL INTERACTION EVALUATION.</p> <p>G. SELECTION OF APPROPRIATE PLACES FOR LUNAR SURFACE CLOSE-UP CAMERA PHOTOGRAPHY.</p>						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	LUNAR SURFACE OPS.	GENERAL SURFACE OPS.	31-2

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS

R	ITEM							
	<p>31-9 GROUND INITIATED CHANGES TO THE OPERATIONAL EVA PLAN WILL BE LIMITED. THE FOLLOWING CONDITIONS WILL BE DEEMED REASONABLE CAUSES FOR GROUND INITIATED CHANGES.</p> <ul style="list-style-type: none"> A. UNEXPECTED FEATURES OF SIGNIFICANT SCIENTIFIC INTEREST REPORTED BY THE CREW. B. CONSUMABLES CONSUMPTION RATES OR OTHER CONDITIONS NECESSITATE CURTAILMENT OR TERMINATION OF EVA. C. CONSUMABLES CONSUMPTION RATES PERMIT EXTENSION OF EVA. D. ENCOUNTERED OR PROJECTED INABILITY TO ACCOMPLISH SPECIFIC TASKS IN THE OPERATIONAL EVA PLAN. <p>31-10 ONE-MAN EVA'S WILL BE ALLOWED FOR COMPLETION OF THE FOLLOWING ACTIVITIES WITHIN TIME CONSTRAINTS, IN PRIORITY ORDER---</p> <ul style="list-style-type: none"> A. ABORTED EVA TERMINATION TASKS. B. CONTINGENCY SAMPLE COLLECTION. C. ALSEP DEPLOYMENT. D. COLLECTING SELECTED SAMPLES. E. LRRR DEPLOYMENT. F. COMPREHENSIVE SAMPLE COLLECTION. G. OTHER TASKS WITHIN THE CAPABILITY OF A SINGLE CREWMAN. <p>31-11 FOR ONE-MAN EVA'S THE RADIUS OF OPERATIONS WILL BE LIMITED TO 300 METERS FROM LM.</p> <p>31-12 FOR SITUATIONS REQUIRING DELETIONS OF TASKS TO MAKEUP TIMELINE LAGS, THE FOLLOWING TASKS IN THE LISTED ORDER WILL BE CONSIDERED FOR DELETION---</p> <p style="text-align: center;">TBD</p> <p>RULES 31-13 THROUGH 31-15 ARE RESERVED.</p>							
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	LUNAR SURFACE OPS.	GENERAL SURFACE OPS.	31-3	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	31-16	MESA WILL NOT DEPLOY		A. EXERCISE CONTINGENCY PROCEDURE B. PROCEED TO ALSEP DEPLOYMENT.	NOTE--- EMU RECHARGE NOT POSSIBLE, LI0H AND BATTERIES IN MESA MET NOT AVAILABLE		
	31-17	RESERVED					
	31-18	RESERVED					
	31-19	RESERVED					
	31-20	RESERVED					
	31-21	SAMPLE RETURN CONTAINER LATCH WILL NOT LATCH A. ONE LATCH WILL NOT LATCH B. BOTH LATCHES WILL NOT LATCH		A. CONTINUE MISSION. B. DISCARD SRC AND TRANSFER SAMPLES IN EQUIPMENT TRANSFER BAG.			
	31-22	RESERVED					
	31-23	SPECIAL ENVIRONMENTAL SAMPLE CONTAINER WILL NOT CLOSE		PLACE THE SAMPLE IN SAMPLE BAG AND DISCARD CONTAINER			
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LUNAR SURFACE OPS.	SPECIFIC SURFACE OPS.	31-4

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
	31-24	RESERVED					
	31-25	RESERVED					
	31-26	ALS CLOSE-UP CAMERA CYCLE LIGHT DOES NOT FUNCTION		A. IF FLASH OCCURS CONTINUE MISSION B. IF NO FLASH REMOVE CASSETTE AND DISCARD CAMERA.	HOLD CAMERA ABOVE SURFACE, DEPRESS TRIGGER AND CHECK FOR FLASH.		
	31-27	ALS CLOSE-UP CAMERA CYCLE LIGHT REMAINS ON FOR MORE THAN 10 SECONDS		IF LIGHT GOES OUT WITHIN 25 SECONDS CONTINUE MISSION IF LIGHT STAYS ON REMOVE CASSETTE AND DISCARD CAMERA			
	31-28	SCIENTIFIC EQUIPMENT BAY DOORS WILL NOT OPEN		ABANDON ALSEP	PLAN EXTENDED TRAVERSE ALSEP PACKAGE 1+2, LUNAR PORTABLE MAGNETOMETER+ALHT ARE LOCATED IN SEU BAY		
	31-29	RESERVED					
	31-30	RESERVED					
	31-31	SEU BAY DOORS WILL NOT CLOSE		CONTINUE MISSION			
	31-32	POSITIVE LOSS OF ANY METER ON LUNAR PORTABLE MAGNETOMETER		DISCARD THE INSTRUMENT	METER NEEDLE BECOMES PHYSICALLY BROKEN, STUCK OR OTHERWISE UNABLE TO PROVIDE A READING.		
		RULES 31-33 THROUGH 31-39 ARE RESERVED					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LUNAR SURFACE OPS.	SPECIFIC SURFACE OPS.	31-5

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS

R	ITEM	
	31-48	<p>CPLEE</p> <p>A. THE CPLEE WILL BE GROUND COMMANDED TO OPERATE ASAP AFTER DEPLOYMENT</p> <p>B. IF THE DUST COVER COMES OFF DURING DEPLOYMENT, DO NOT REINSTALL AND CONTINUE DEPLOYMENT</p>
	31-49	<p>CCGE</p> <p>A. THE CCGE WILL BE COMMANDED TO OPERATE-SELECT TO VERIFY THAT IT IS OPERABLE AS SOON AFTER DEPLOYMENT AS POSSIBLE.</p> <p>B. THE CCGE WILL NOT BE LEFT IN OPERATE-SELECT FOR LONGER THAN 5 MINUTES WITH THE DUST COVER INSTALLED.</p> <p>C. GROUND COMMAND 105/107 (REMOVE DUST COVER) WILL NOT BE SENT PRIOR TO OPERATING THE CCGE IN BOTH THE CAL ENABLE MODE AND THE RANGE MODE A (NORMAL MODE). THE DUST COVER WILL NOMINALLY BE REMOVED BETWEEN 2ND EVA TERMINATION AND LM ASCENT.</p>
	31-50	<p>ASE</p> <p>A. FOR OPERATION OF THE ASE IN THE THUMPER OR MORTAR MODES, SUFFICIENT TIME WILL BE ALLOWED AFTER ASE ACTIVATION TO PERMIT GEOPHONE AMP, TEMPERATURES TO STABILIZE (UP TO 12 MIN.)</p> <p>B. A MINIMUM WAITING PERIOD OF 60 SEC. WILL BE ALLOWED BETWEEN ARMING + FIRING THE MORTARS (FOR CHARGING OF CAPACITORS)</p> <p>C. IF THE CREW DOES NOT HAVE TIME TO PERFORM THE THUMPER ACTIVITY AND ARM THE GLA ARMING, THE GLA SHALL BE PRIMARY</p> <p>D. THE CMD CARRIER WILL REMAIN UP WHILE THE ASE IS IN OPERATE SELECT</p>
	31-51	<p>SIDE/CCIG</p> <p>A. THE SIDE/CCIG WILL BE TURNED ON ASAP AFTER DEPLOYMENT</p> <p>B. THE CCIG DUST COVER WILL BE REMOVED BY GND. CMD. ASAP AFTER DEPLOYMENT.</p> <p>RULES 31-52 THRU 31-70 ARE RESERVED</p>

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LUNAR SURFACE OPS.	GENERAL - ALSEP	31-7

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS

R	ITEM						
		<p>----- ' GENERAL ' -----</p>					
		<p>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 EXCERPED FROM THE SYSTEMS MISSION RULES DOCUMENT FOR ALSEP 4. (SMRD FOR ALSEP NO.4) AND MISSING LETTERS OR NUMBERS PERTAINING TO GUIDELINES OR RULING WILL BE FOUND IN THAT DOCUMENT.</p>					
		<p>ALSEP OPERATIONAL GUIDELINE</p>					
	31-71	GENERAL					
		<p>A. THESE ALSEP GENERAL OPERATIONAL GUIDELINES ARE BASED ON OBJECTIVES IN THE FOLLOWING PRIORITIES---</p>					
		<p>(1) PSE (5) DTREM (M515)</p> <p>(2) ASE (6) ENGINEERING</p> <p>(3) SIDE</p> <p>(4) CPLEE</p>					
		<p>NOTE - RIPPLE-OFF SEQUENCE--- 1) CPLEE, 2) SIDE, AND 3) PSE.</p>					
		<p>B THROUGH K - REFERENCE SMRD FOR ALSEP NO.4</p>					
		<p>L. THE ALSEP TURN-ON SEQUENCE IS---</p>					
		<p>(1) ASTRONAUT ACTIVATES SHORTING PLUG SWITCH ASAP AFTER DEPLOYMENT.</p> <p>(2) CREW WILL ACTIVATE ASTRO SWITCHES NO. 1 AND NO. 5 PER DIRECTION FROM THE GROUND. SWITCHES NO. 1 AND NO. 5 WILL BE ACTIVATED BASED ON PREDICTED AVAILABILITY OF 33.2 WATTS FROM THE RTG (SEE FIGURE 3.2-2, ALSEP SODB).</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	LUNAR SURFACE OPS.	GENERAL - ALSEP	31-8

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS

R	ITEM							
		<p>M. IF THE GROUND IS UNABLE TO COMMAND A TRANSMITTER ON AND/OR EXPERIMENTS ON, THE ASTRONAUT WILL TURN ON ASTRO SWITCHES NO. 2 AND/OR NO.3 AND/OR NO.4 DURING EVA NO.1 WHEN REQUESTED FROM THE GROUND. THE TRANSMITTER WILL NOMINALLY BE INITIATED BY THE TRIPPING OF THE HOLD OFF CIRCUIT. THE ASE THUMPER ACTIVITY WILL BE PERFORMED REGARDLESS OF GROUND COMMAND CAPABILITY.</p> <p>N THROUGH O - REFERENCE SMRD FOR ALSEP NO.4</p> <p>P. IF ALSEP DEPLOYMENT TIME BECOMES CONSTRAINED AND THE CREW MUST RETURN TO THE LM, THE RTG SHORTING SWITCH AND ASTRONAUT SWITCH NO.1 SHALL BE ACTUATED BY THE CREW IF THE ANTENNA IS LEVELED AND ALIGNED. IF THE ANTENNA IS NOT LEVEL AND ALIGNED, THESE SWITCHES SHALL NOT BE ACTUATED. (PICK UP HERE ON EVA NO.2).</p> <p>Q THROUGH R - REFERENCE SMRD FOR ALSEP NO.4</p> <p>S. THE 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.</p> <p>T - REFERENCE SMRD FOR ALSEP NO.4</p> <p>U. THE ASE WILL BE COMMANDED TO STANDBY SELECT IF THE THUMPER ARM OR GERNADE ARM WARNING OCCURS WITHOUT GROUND COMMAND OR CREW ACTION.</p>						
	31-72	REFERENCE SMRD FOR ALSEP NO. 4						
	31-73	ASE OPERATIONAL GUIDELINES						
		<p>A. OPERATION OF THE ASE, IN ANY MODE, WILL BE PERFORMED ONLY WHEN ASI-1 (CENTRAL STATION PACKAGE TEMP.) IS ABOVE <u>-20</u> DEG C, AS-2 (MOTOR BOX TEMP.) IS ABOVE <u>-30</u> DEG C, AND AS-3 (GRENADE LAUNCHER ASSEMBLY TEMP) IS ABOVE <u>-30</u> DEG. C.</p> <p>B THROUGH D REFERENCE SMRD FOR ALSEP NO. 4</p> <p>E. FOR OPERATION OF THE ASE IN THE THUMPER OR MORTAR MODES, SUFFICIENT TIME WILL BE ALLOWED AFTER ASE ACTIVATION TO PERMIT GEOPHONE AMPLIFIER TEMPERATURES TO STABILIZE. (UP TO 15 MINUTES.)</p> <p>F THROUGH K - REFERENCE SMRD FOR ALSEP NO. 4.</p> <p>L. IF THE CREW DOES NOT HAVE TIME TO DO THE THUMPER ACTIVITY AND ARM THE GLA, ARMING THE GLA SHALL BE PRIMARY.</p>						
	31-74	THROUGH 31-132 - REFERENCE SMRD FOR ALSEP NO. 4						
			MISSION	REV	DATE	SECTION	GROUP	PAGE
			APOLLO 14	FNL	11/1/70	LUNAR SURFACE OPS.	GENERAL - ALSEP	31-9

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	31-133	DURING DEPLOYMENT GROUND IS UNABLE TO COMMAND ASE TO HIGH BIT RATE.		A. SEE RULE 31-101 B. (1) HAVE THE CREW ACTIVATE SWITCH NO. 4, FOR THUMPER ACTIVITY. (2) AT COMPLETION OF THUMPER ACTIVITY, ATTEMPT TO COMMAND TO HBR OFF (CMD 005) PRIOR TO TURNING SWITCH NO. 5 CW.	(ALSEP 4 SYSTEMS MISSION RULES) SWITCH NO 5 WILL BE TURNED CCW JUST PRIOR TO CREW DEPARTING AREA.
	31-134	REFERENCE SMRD FOR ALSEP NO. 4			
	31-135	DURING DEPLOYMENT, GROUND UNABLE TO COMMAND ASE TO OPERATE.		A. SEE RULE 31-101 B. PRIOR TO THUMPER MODE--- (1) HAVE CREW ACTIVATE SWITCH NO. 4 (2) CMD TO NBR (CMD 005-HBR-OFF) (3) CM TO HBR (CMD 003-HBR SEL) WHEN GEOPHONE NO. 2 IS IMPLACED (4) CMD TO NBR (CMD 005-HBR OFF) AT COMPLETION OF THUMBER MODE (5) TURN SWITCH NO 5 CW AS IN NORMAL DEPLOYMENT SEQUENCE (6) AFTER GLA ARMING AND SAFING PIN REMOVAL, ACTIVATE SWITCH NO. 4 AFTER TURNING SWITCH NO. 5 CCW (7) CMD TO NBR (CMD 005-HBR OFF)	(ALSEP 4 SYSTEMS MISSION RULES) THIS MALFUNCTION CAN RESULT FROM A TOTAL CMD SYSTEM FAILURE OR A SINGLE CMD GATE FAILURE THE RULING APPLIES IN EITHER CASE STEP 5 PUTS ASE IN STAND-BY SELECT ALSEP IN NBR STEP 6 AND 7 LEAVE ASE IN OPERATE SELECT ALSEP IN NBR. ASE WILL NOT SURVIVE LUNAR NIGHT IN OPERATE SELECT

	MISSION	REV	DATE	SECTION	GROUP	PAGE	
	APOLLO 14	FNL	11/1/70	LUNAR SURFACE OPS.	GENERAL - ALSEP	31-10	

NASA - Manned Spacecraft Center

MISSION RULES

SECTION 31 - LUNAR SURFACE OPERATIONS

R	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
	31-136	REFERENCE SMRD FOR ALSEP NO. 4			
	31-137	ASI FAILS TO DETONATE.		A. ATTEMPT TO FIRE AGAIN. B. GO TO NEXT ASI, BUT CONTINUE TO ATTEMPT TO FIRE IN THE SAME LOCATION UNTIL AN ASI DOES FIRE	EVEN SPACING OF ASI FIRING IS MORE IMPORTANT THAN TOTAL DISTRIBUTION OF FIRINGS
	31-144	31-138 THROUGH 31-143 REFERENCE SMRD FOR ALSEP NO. 4 SIDE DUST COVER COMES OFF DURING DEPLOYMENT		DO NO REINSTALL	CONTINUE DEPLOYMENT.
	31-151	31-145 THROUGH 31-150 REFERENCE SMRD FOR ALSEP NO. 4 CPLEE DUST COVER COMES OFF DURING DEPLOYMENT.		DO NO REINSTALL	CONTINUE DEPLOYMENT.

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	LUNAR SURFACE OPS.	GENERAL - ALSEP	31-11

APPENDICES

A ACRONYMS AND
SYMBOLS

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX A - ACRONYMS AND SYMBOLS

R	ITEM		
	AC	ALTERNATING CURRENT	CONF CONFERENCE
	ACA	ATTITUDE CONTROLLER ASSEMBLY	CONTROL LM GNC SYSTEMS ENGINEER
	ACCEL	ACCELEROMETER	CP COMMUNICATIONS PROCESSOR
	ACCUM	ACCUMULATOR	CRO CARNARVON MSFN REMOTED SITE
	ACS	ATTITUDE CONTROL AND STABILIZATION SYSTEM	CRYO CRYOGENICS
	ACT	ACTUATOR	CSI CONCENTRIC SEQUENCE INITIATE
	ADEG	AUXILIARY DISPLAY EQUIPMENT GROU	CSM COMMAND SERVICE MODULE
	AEA	ABORT ELECTRONICS ASSEMBLY	CTE CENTRAL TIMING EQUIPMENT
	AELD	ASCENT ENGINE LATCHING DEVICE	CVS CONTINUOUS VENT SYSTEM
	AFD	ASSISTENT FLIGHT DIRECTOR	CVTS CHIEF VEHICLE TEST SUPERVISOR
	AFETR	AIR FORCE EASTERN TEST RANGE	CW CLOCKWISE
	A/G	AIR-TO-GROUND	C&W CAUTION AND WARNING
	AGS	ABORT GUIDANCE SYSTEM	CYI CANARY ISLAND
	ALDS	APOLLO LAUNCH DATA SYSTEM	
	ALT	ALTERNATE	
	AM	AMPLITUDE MODULATION	
	AMP	AMPERE(S)	DAP DIGITAL AUTO PILOT
	ANT	ANTENNA	DB DEADBAND
	AOA	ANGLE OF ATTACK	DC DIRECT CURRENT
	AOH	APOLLO OPERATIONS HANDBOOK	DCA DIGITAL COMMAND ASSEMBLY
	AOT	ALIGNMENT OPTICAL TELESCOPE	DCS DIGITAL COMMAND SYSTEM
	APS	ASCENT PROPULSION SYSTEM	DDD DIGITAL DISPLAY DRIVER
	APS	AUXILIARY PROPULSION SYSTEM	DECA DESCENT ENGINE CONTROL ASSEMBLY
	ARIA	APOLLO RANGE INSTRUMENTATION AIRCRAFT	DEDA DATA ENTRY AND DISPLAY ASSEMBLY
	ASA	ABORT SENSOR ASSEMBLY	DEG DEGREE
	ASAP	AS SOON AS PRACTICAL	DESC DESCENT
	ASC	ASCENT	DFI DEVELOPMENT FLIGHT INSTRUMENTATION
	ATCA	ATTITUDE TRANSLATION CONTROLLER ASSEMBLY	DK DOCK
	ATP	ALTERNATE TARGET POINT	DKD DOCKED
	ATT	ATTITUDE	DOD DEPARTMENT OF DEFENSE
	AUX	AUXILIARY	DPS DESCENT PROPULSION SYSTEM
	AZUSA	ELECTRONIC TRACKING AND VECTORING SYSTEM ETR	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
	BA	BANK ANGLE	
	BAP	BEST ADOPTIVE PATH	
	BAT	BATTERY	
	BDA	BERMUDA MSFN REMOTED SITE	
	B/H	BLOCK HOUSE	
	BMAG	BODY MOUNTED ATTITUDE GYRO	ECS ENVIRONMENTAL CONTROL SYSTEM
	BRSD	BERMUDA RANGE SAFETY OFFICER	EDS EMERGENCY DETECTION SYSTEM
	BSE	BOOSTER SYSTEMS ENGINEER	EECOM ELECTRICAL, ENVIRONMENTAL, AND COMMUNICATIONS
	BTU	BRITISH THERMAL UNIT	EKG ELECTROCARDIOGRAM
			EMR ERROR MONITOR REGISTER
			EMS ENTRY MONITORING SYSTEM
			EMU EXTRA-VEHICULAR 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 EXTRA-VEHICULAR ACTIVITY
			EVAP EVAPORATOR
			EVT EXTRA-VEHICULAR TRANSFER
			EVVA EXTRA-VEHICULAR VISOR ASSEMBLY
	CAL	CALIBRATE	
	CASTS	COUNTDOWN AND STATUS TRANSMISSION SYSTEM	
	CB	CIRCUIT-BREAKER	
	CCATS	COMMAND, COMMUNICATIONS, AND TELEMETRY SYSTEM	
	CCW	COUNTERCLOCKWISE	
	CDH	CONSTANT DELTA HEIGHT	
	CDP	COMMAND DATA PROCESSOR	
	CDR	COMMANDER	
	CDU	COUPLING DATA UNIT	
	CES	CONTROL ELECTRONICS SYSTEM	
	CEVT	CONTINGENCY EXTRA VEHICULAR TRANSFER	
	CFM	CUBIC FEET PER MINUTE	
	CIF	CENTRAL INSTRUMENTATION FACILITY	
	CIM	COMPUTER INPUT MATRIX	
	CKT	CIRCUIT	
	CLTC	CHIEF LAUNCH VEHICLE TEST CONDUCTOR	F/A FORWARD/AFT
	CM	COMMAND MODULE	FC FUEL CELL OR FLIGHT CONTROL
	CMC	COMMAND MODULE COMPUTER	FCSM FLIGHT COMBUSTION STABILITY MONITOR
	CMD	COMMAND	FD FLIGHT DIRECTOR
	CMP	COMMAND MODULE PILOT	FDAI FLIGHT DIRECTOR ATTITUDE INDICATOR
	C/O	CUTOFF	FDO FLIGHT DYNAMICS OFFICER
	CO2	CARBON DIOXIDE	FIDO FLIGHT DYNAMICS OFFICER
	COAS	CREW OPTICAL ALIGNMENT SIGHT	FIG FIGURE
	COI	CONTINGENCY ORBIT INSERTION	FITH FIRE IN THE HOLE
	COMM	COMMUNICATION	

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX A - ACRONYMS AND SYMBOLS

R	ITEM		
	FL	FULL LIFT	LMDE LM DESCENT ENGINE
	FM	FREQUENCY MODULATION	LMP LM MODULE PILOT
	FPS	FEET PER SECOND	L/O LIFTOFF
	FQR	FLIGHT QUALIFICATION RECORDER	LOI LUNAR ORBIT INSERTION
	FTP	FIXED THROTTLE POINT	LOS LINE-OF-SIGHT
			LOX LIQUID OXYGEN
			L/R LEFT/RIGHT
			LV LOW-VOLTAGE
	G	GRAVITY	L/V LAUNCH VEHICLE
	G&C	GUIDANCE AND CONTROL	LVDA LAUNCH VEHICLE DATA ADAPTER
	GASTA	GIMBAL ANGLE SEQUENCE TRANSLATION ASSEMBLY	LVDC LAUNCH VEHICLE DIGITAL COMPUTER
	GBI	GRAND BAHAMA ISLAND	
	GDA	GIMBAL DRIVE ASSEMBLY	
	GDC	GYRO DISPLAY COUPLER	
	GET	GROUND ELAPSED TIME	MALF MALFUNCTION
	GETI	GROUND ELAPSED TIME OF IGNITION	MCC MISSION CONTROL CENTER
	GMT	GREENWICH MEAN TIME	MCC MIDCOURSE CORRECTION
	GMTLO	GREENWICH MEAN TIME OF LIFTOFF	MC&W MASTER CAUTION AND WARNING
	G&N	GUIDANCE AND NAVIGATION	MDAS MEDICAL DATA ACQUISITION SYSTEM
	GN2	GASEOUS NITROGEN	MED MANUAL ENTRY DEVICE
	GNC	GUIDANCE NAVIGATION CONTROL	MESC MASTER EVENTS SEQUENCE CONTROLLER
	GNCS	GUIDANCE, NAVIGATION, AND CONTROL SYSTEM	MFCO MANUAL FUEL CUTOFF
	GND	GROUND	MFV MAIN FUEL VALVE
	GRR	GUIDANCE REFERENCE RELEASE	MGA MIDDLE GIMBAL AXIS
	GSFC	GODDARD SPACE FLIGHT CENTER	MIL MERRITT ISLAND
	GTS	GIMBAL TRIM SYSTEM	MITE MASTER INSTRUMENTATION TIMING EQUIPMENT
	GUIDO	GUIDANCE OFFICER	MNFLD MANIFOLD
			M&O MAINTENANCE AND OPERATION
			MOC MISSION OPERATIONS COMPUTER
	H2	HYDROGEN	MSFN MANNED SPACE FLIGHT NETWORK
	H2O	WATER	MSK MANUAL SELECT KEYBOARD
	HA	HEIGHT OF APOGEE	MSTC CSM SPACECRAFT TEST CONDUCTOR
	HAW	HAWAII	MTVC MANUAL THRUST VECTOR CONTROL
	HBR	HIGH-BIT-RATE	MUX MULTIPLEXER
	HF	HIGH FREQUENCY	
	HP	HEIGHT OF PERIGEE	
	HS	HIGH-SPEED	
	HZ	HERTZ	
			NASA NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
			NCC COMBINED CORRECTIVE MANEUVER
			NM NAUTICAL MILES
			NPV NON-PROPULSIVE VENT
			NSR COELLIPTICAL MANEUVER
	IC	INTERCOMMUNICATIONS EQUIPMENT	
	IGA	INNER GIMBAL AXIS	
	IMU	INERTIAL MEASUREMENT UNIT	
	INJ	INJECTOR	
	INST	INSTRUMENTATION	
	INV	INVERTER	
	IP	IMPACT POINT OR IMPACT PREDICTION	O2 OXYGEN
	IRIG	INERTIAL RATE INTEGRATING GYRO	O/B ONBOARD
	ISOL	ISOLATION	ODOP OFFSET DOPPLER AND POSITION
	ISS	INERTIAL SUBSYSTEM	OGA OUTER GIMBAL AXIS
	IU	INSTRUMENTATION UNIT	OMSF OFFICE OF MANNED SPACE FLIGHT
	IVT	INTRAVEHICULAR TRANSFER	OPS OXYGEN PURGE SYSTEM
			ORDEAL ORBITAL RATE DRIVE ELECTRONICS
			APOLLO LM
			OXID OXIDIZER
	JD	JET DRIVER	
			PAFB PATRICK AIR FORCE BASE
			PAM PULSE AMPLITUDE MODULATION
	KOH	POTASSIUM HYDROXIDE	PB PUSH-BUTTON
	KSC	KENNEDY SPACE CENTER	PC PERICYNTHION
			PCM PULSE CODE MODULATION
			PCMGS PULSE CODE MODULATION GROUND STATION
	LB	POUND	PCO2 PARTIAL PRESSURE CARBON DIOXIDE
	LBR	LOW-BIT-RATE	PDS/D0 PLOTTING DISPLAY SUBCHANNEL/DATA DISTRIBUTION
	LCG	LIQUID COOLING GARMENT	PGA PRESSURE GARMENT ASSEMBLY
	LES	LAUNCH ESCAPE SYSTEM	PGNCS PRIMARY GUIDANCE AND NAVIGATION CONTROL SYSTEM CSM
	LET	LAUNCH ESCAPE TOWER	PGNS PRIMARY GUIDANCE AND NAVIGATION SYSTEM LM
	LGC	LM GUIDANCE COMPUTER	
	LH2	LIQUID HYDROGEN	
	LIOH	LITHIUM HYDROXIDE	
	LM	LUNAR MODULE	

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	ACRONYMS AND SYMBOLS		A-2

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX A - ACRONYMS AND SYMBOLS

R	ITEM		
	PIPA	PULSE INTEGRATING PENDULOUS ACCELEROMETER	SODB SPACECRAFT OPERATIONAL DATA BOOK
	PLSS	PORTABLE LIFE SUPPORT SYSTEM	SOL SOLENOID
	PO	POWER OUT	SOP STANDARD OPERATING PROCEDURE
	PO2	PARTIAL PRESSURE OXYGEN	SOV SHUT-OFF VALVE
	POS	POSITION	SPAN SPACECRAFT PLANNING AND ANALYSIS
	POS	PRIMARY OXYGEN SYSTEM	SPS SERVICE PROPULSION SYSTEM
	PPM	PARTS PER MILLION	SRO SUPERINTENDENT RANGE OPERATIONS
	PQGS	PROPELLANT QUANTITY GAGING SYSTEM	SSC SPACE SUIT COMMUNICATOR
	PRELN	PRELAUNCH	STBY STANDBY
	PRESS	PRESSURE	SW SWITCH
	PRI	PRIMARY	SXT SEXTANT
	PROC	PROCEDURE	
	PROP	PROPELLANT	TB TIME BASE
	PSA	POWER SERVO AMPLIFIER	TBD TO BE DETERMINED
	PSI	POUNDS PER SQUARE INCH	TC TEST CONDUCTOR
	PSID	POUNDS PER SQUARE INCH DIFFERENCE	T/C TELEMETRY AND COMMUNICATIONS
	PSS	PAD SAFETY SUPERVISOR	TCE CONDENSER EXHAUST TEMPERATURE
	PTA	PULSE TORQUE ASSEMBLY	TCP THRUST CHAMBER PRESSURE
	PTP	PREFERRED TARGET POINT	TD&E TRANSPORTATION, DOCKING AND EJECTION
	PTV	PITCH THRUST VECTOR	TDP TELEMETRY DATA PROCESSOR
	PU	PROPELLANT UTILIZATION	TELCOM LM EECOM
	PUGS	PROPELLANT UTILIZATION AND GAGING SYSTEM	TEMP TEMPERATURE
	PVT	PRESSURE-VOLUME-TEMPERATURE	TFF TIME OF FREE FALL
	PYRO	PYROTECHNICS	THC THRUST AND CONTROLLER
			TIG TIME OF IGNITION
	QTY	QUANTITY	TLI TRANSLUNAR INJECTION
			TM TELEMETRY
			TMG THERMAL METEROID GARMENT
			TNK TANK
			TOK THRUST OKAY
			TPF TERMINAL PHASE FINALIZATION
			TPI TERMINAL PHASE INITIATE
			TRNS TRANSFER
			TRUN TRUNNION
			TTT TRANSLATION THRUST CONTROLLER
			TTY TELETYPE
			TVC THRUST VECTOR CONTROL
	RAD	RADIATOR	
	RET	RETRACT	
	RCS	REACTION CONTROL SYSTEM	
	RCU	REMOTE CONTROL UNIT	
	RCVR	RECEIVER	
	REF	REFERENCE	
	REFSMMAT	REFERENCE STABLE MEMBER MATRIX	
	REQD	REQUIRED	
	RETRB	RETRO ELAPSED TIME TO REVERSE B	U/D UP/DOWN
	RETRO	RETROFIRE OFFICER	UDL UPDATA LINK
	REV	REVOLUTION	UHF ULTRA HIGH FREQUENCY
	RF	RADIO FREQUENCY	UNDKD UNDOCKED
	RFO	RETROFIRE OFFICER	USB UNIFIED S-BAND
	RGA	RATE GYRO ASSEMBLY	
	RHC	ROTATION HAND CONTROLLER	VC VELOCITY COUNTER
	RIP	RANGE OF IMPACT POINT	VEI INERTIAL VELOCITY AT ENTRY
	RL	ROLL LEFT	VGX VELOCITY TO BE GAINED X-AXIS
	RNDZ	RENDEZVOUS	VGX VELOCITY TO BE GAINED X-AXIS
	RP-RT	DOWNRANGE ERROR	VGX VELOCITY TO BE GAINED X-AXIS
	RR	RENDEZVOUS RADAR	VGZ VELOCITY TO BE GAINED Z-AXIS
	RR	ROLL RIGHT	VHF VERY HIGH FREQUENCY
	RSI	ROLL STABILITY INDICATOR	VLV VALUE
	RSO	RANGE SAFETY OFFICER	VSM VIDEO SWITCHING MATRIX
	RSVR	RESOLVER	
	RTACF	REAL-TIME AUXILIARY COMPUTING FACILITY	WBD WIDE-BAND DATA
	RTC	REAL-TIME COMMAND	WMS WASTE MANAGEMENT SYSTEM
	RTCC	REAL-TIME COMPUTER COMPLEX	WT WEIGHT
	S/C	SPACECRAFT	XFEED CROSSFEED
	SCE	SIGNAL CONDITIONING EQUIPMENT	XMIT TRANSMIT
	SCS	STABILIZATION AND CONTROL SYSTEM	XMTR TRANSMITTER
	SEC	SECONDARY	
	SEC	SECOND	
	SECO	SUSTAINER ENGINE CUTOFF S-IVBCUTOFF	Y YAW OR Y-AXIS
	SECS	SEQUENTIAL EVENTS CONTROL SYSTEM	YTV YAW THRUST VECTOR
	SHE	SUPER-CRITICAL HELIUM	
	SIG	SIGNAL	
	SLA	SPACECRAFT LM ADAPTER	Z Z-AXIS
	SLV	SATURN LAUNCH VEHICLE	
	SM	SERVICE MODULE	
	SMJC	SERVICE MODULE JETTISON CONTROLLER	

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX A - ACRONYMS AND SYMBOLS

R	ITEM														
		-- -----													
		: : :													
		SYMBOLS													
		<table border="0" style="width: 100%;"> <tr> <td style="width: 30%;">H</td> <td>ALTITUDE</td> </tr> <tr> <td>DELTA VIN</td> <td>DELTA VELOCITY IN INSERTION</td> </tr> <tr> <td>DELTA TB</td> <td>DELTA BURN TIME</td> </tr> <tr> <td>DELTA H</td> <td>DELTA ALTITUDE</td> </tr> </table>						H	ALTITUDE	DELTA VIN	DELTA VELOCITY IN INSERTION	DELTA TB	DELTA BURN TIME	DELTA H	DELTA ALTITUDE
H	ALTITUDE														
DELTA VIN	DELTA VELOCITY IN INSERTION														
DELTA TB	DELTA BURN TIME														
DELTA H	DELTA ALTITUDE														
		MISSION	REV	DATE	SECTION	GROUP	PAGE								
		APOLLO 14	FNL	11/1/70	ACRONYMS AND SYMBOLS		A-4								

**B DISTRIBUTION
LIST**

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX B - DISTRIBUTION LIST

R	ITEM	DISTRIBUTION LIST					
		<p>DEPUTY DIRECTOR</p> <p>AB/KRAFT, JR.</p> <p>DIRECTOR OF FLIGHT OPERATIONS</p> <p>FA/SJOBERG, S.A. TINDALL, H.W. ROSE, R.G. KOONS, W.E.</p> <p>FLIGHT CONTROL DIVISION</p> <p>FC/KRANZ, E.F. LUNNEY, G.S. GRIFFIN, G.D. WINDLER, M.L. FRANK, M.P. ROACH, J.W. BROOKS, M.F.</p> <p>FC2/HARLAN, C.S. (28) FC3/ALDRICH, A.D. (43) FC3/BLAIR, L.W. (2) FC4/HANNIGAN, J.E. (25) EDELIN, F. (4) FC5/BOSTICK, J.C. (16) FC6/SHELLEY, C.B. (25) FC7/HOOVER, R. (4) FC8/SAULTZ, J.E. (8) P-MO-F/HAMNER, R.S. (20)</p> <p>FLIGHT SUPPORT DIVISION</p> <p>FS2/SATTERFIELD, J.M. FS63/SEGOTA, P. (3) SANBORN, S.D. (20) FS5/STOKES, J.D. (3) GIBSON, F.F., JR. GARMAN, J.R. (2)</p> <p>MISSION PLANNING AND ANALYSIS DIVISION</p> <p>FM/MAYER, J.P. (2) FM13/PARTIN, R.P. (3) FM2/BENNETT, F.V. (6) FM3/BROWN, R.H. (5) FM4/MCPHERSON, J.C. FM5/BERRY, R. (5) FM6/LINEBERRY, E.C. (2) FM7/CASSETI, M.D.</p> <p>LANDING AND RECOVERY DIVISION</p> <p>FL/HAMMACK, J.B. GRANGER, H.E. FL12/CORDINER, D.H. FL2/STULKEN, D.E. (3) FL5/STONESIFER, J.C. FL7/CHASE, W.R.</p> <p>DIRECTOR OF FLIGHT CREW OPERATIONS</p> <p>CA/SLAYTON, D.K. CB/ASTRONAUT OFFICE (25)</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	APPENDIX B - DISTR LIST		B-1

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX B - DISTRIBUTION LIST

R	ITEM						
		<p>FLIGHT CREW SUPPORT DIVISION</p> <p>CF/NORTH, W.J. CF13/GRIMM, D.F. CF21/DEMENT, M.E. CF212/FUSCH, S. CF3/ALLEN, LOUIS CF24/CRAMER, P. CF5/RICHARD, L.G. (2) CF6/O'NEIL, J.W. (10) CF7/KUEHNEL, H.A. CF8/FABER, S. (3) CFK/MC CAFFERTY, (16) CF2/PEARCE, J.</p> <p>DIRECTOR OF MEDICAL RESEARCH AND OPERATIONS</p> <p>DA/BERRY, C.A., M.D. CATTERSON, A.D., M.D. DD/MEDICAL OPERATIONS (7)</p> <p>PUBLIC AFFAIRS OFFICE</p> <p>AP/DUFF, B. AP3/GREEN, D.J. (5)</p> <p>APOLLO SPACECRAFT PROGRAM OFFICE</p> <p>PA/MC DIVITT, J.A. PC/GRAY, W.H. PD/KUBICKI, R.L. PD12/MISSION STAFF ENGINEER PD5/GOREE, J.F. (2) PD7/KOHR, D. PD7/SILVER, M. (25) PD9/CRAIG, J.W. PE/CORCORAN, D.M. (3) PF/COHEN, A. (3) PP32/TASH, H.L. (5) PP5/THOMPSON, R.F. PT/ARABIAN, D.D. PT3/DATA LIBRARY (8) APPO-KT/DOUGLAS, W.H. NA/BLAND, W.M., JR.</p> <p>DIRECTOR OF ENGINEERING AND DEVELOPMENT</p> <p>EA/FAGET, M.A. EA1/BOND, A.C. EA2/GARDINER, R.A. EA8/DEANS, P.H. EB5/MARLOWE, G.D., JR. EB8/MELLIFF, V.C. JOHNSON, G.W. EC/SMYLIE, R.E. HURT, P.F. EC3/SAMONSKI, F.H. (2) EC4/HINNERS, A.H. EC7/RADNOFSKY, M.I. EC9/LUTZ, C.C. EE13/KINGSLEY, M.G. (9) EG2/COX, K.J. EG7/HANAWAY, J. EG8/WILSON, R.E. EG/MIT/IL-LAWTON, T.M. EP/FERGUSON, R.B. EP2/YODZIS, C.W. (4) EP4/POHL, H.O. (2) EP5/RICE, W.E. (2) ES/KOTANCHIK, J.N. (3) ES12/ROGERS, W.F. (2) EX/REDD, B.</p>					
		MISSION	REV	DATE	SECTION	GROUP	PAGE
		APOLLO 14	FNL	11/1/70	APPENDIX B - DISTR LIST		B-2

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX B - DISTRIBUTION LIST

R	ITEM							
		<p>FLIGHT SAFETY OFFICE</p> <p>SM/RICE CN (3)</p> <p>RELIABILITY AND CERTIFICATION OFFICE</p> <p>NB2/WILLIAMS, H.L. (2) ND/JONES, J.A.</p> <p>DIRECTOR OF SCIENCE AND APPLICATIONS</p> <p>TA/CALIO, A.J. (3) TG/FREDEN, S.F., DR. TM2/CRUM, E. (2) TM5/STEPHENSON W. TN/WRIGHT, R.A. (3)</p> <p>SKYLAB PROGRAM OFFICE</p> <p>KM/BISHOP, A.A.</p> <p>TRW HOUSTON</p> <p>ROBERTSON, R.L. (3) TRW TECHNICAL INFORMATION CENTER, HOUSTON OPERATIONS (2) H2/2064-MITCHELL R.A.</p> <p>NORTH AMERICAN ROCKWELL HOUSTON</p> <p>HARMAN, H.A. (2)</p> <p>GODDARD SPACE FLIGHT CENTER</p> <p>KNOX, C.B. (9) CODE 821.1 MANNED FLIGHT OPERATIONS DIVISION, REQUIREMENTS SECTION</p> <p>JOHN F. KENNEDY SPACE CENTER NASA - MSOB</p> <p>KENNEDY SPACE CENTER, FLORIDA ATTEN, HO/ASTRO OFF (6) CD/DE BUS, K., DR. AP-SCO/BEDDINGFIELD, S. AP-SVO/SMITH, A.G. (4) LO/KAPYRAN, W.J. LO-OPN/DONNELLY, P. LO-PLN-2/KNIGHT, G.W. (2) LV/GRUENE, H. LV-ENG/RIGELL, I.A. LV-TOM-1/HART, J.J. LV-TOM-4/YOUMANS, R.E. LV-GDC/LEALMAN, R.E. LV-INS/EDWARDS, M.D. LS/WILLIAMS, J.J. LS-ENG-1/GASKINGS, R.B. (4) MARS, C.B. (4) TBC, 3L15/PARK, J.E. (2) NAR, 2M16/WEAVER, R.A. (2) MDC, 27812/SHAFFER, J.R. (2) IBM, 3N1/GROVIER, P.M. (2) TS/CLARK, R.L. (5) AP-SYM/MOORE, A.H. (6) IN/SENDLER, K. (5) SO/GORMAN, R. (3) IS-TSM2/CLARK, B. BEASON, W.P. PSK/MORSE, A.E. KSC MISSION DIRECTOR'S OFFICE, R3121 NSO BLDG GAC/WATSON, J.K. (6); MAIL STOP 300-6</p> <p>MARSHALL SPACE FLIGHT CENTER</p> <p>MSFC/P-MO-MGR, MISSION OPERATIONS OFFICE (30)</p>						
		MISSION	REV	DATE	SECTION	GROUP	PAGE	
		APOLLO 14	FNL	11/1/70	APPENDIX B - DISTR LIST		8-3	

NASA - Manned Spacecraft Center

MISSION RULES

APPENDIX B - DISTRIBUTION LIST

R	ITEM
	<p>OFFICE MANNED SPACEFLIGHT</p> <p>MYERS, D. PETRONE, R. LEE, C.M. MAO-4/LAND, E.W. (20) MAO-3/STOUT, F.E. (2) TC/DRAPER, C.N. (5) MOR/SCHULHERR, R.M. MAT/ALLMAN, J.</p> <p>DOD MSF SUPPORT OFFICE PAFB, FLA</p> <p>ZR2/RAPP, J.F., MAJ. MASK, K.J., COL. (5) HOLT, C.L., COL. (2) DDMS-N/DEARMAN, J., MAJ. ETOOP-2 PAFB FLA, 32925 (7)</p> <p>MIT INST. LABORATORIES CAMBRIDGE, MASS.</p> <p>NEVINS, J. (4) COPPS, S. (2) JOHNSON, M. (2) LARSON, R. (2) FELLMAN, P. (3)</p> <p>GRUMMAN AIRCRAFT ENGINEERING CORP., BETHPAGE, NEW YORK</p> <p>PRATT, R. (35)</p> <p>NASA, DAYTONA BEACH OPER, P.O. BOX 2500, DAYTONA BEACH, FLA. 32015</p> <p>CAHALAN, P.F. MA-2D</p> <p>GENERAL ELECTRIC, 1830 NASA BLVD. HOUSTON, TEXAS 77058</p> <p>HORNSBY, J. CODE 753</p> <p>ATOMIC ENERGY COMMISSION</p> <p>ZS5/REMINI, W.C. (2)</p> <p>BENDIX TDX/MILEY, R.R. (2)</p> <p>BOEING CORPORATION HAO4/DATA MANAGEMENT (4)</p>

MISSION	REV	DATE	SECTION	GROUP	PAGE
APOLLO 14	FNL	11/1/70	APPENDIX B - DISTR LIST		B-4

C CHANGE CONTROL

APOLLO

FFMR

**FINAL FLIGHT
MISSION RULES**

**APOLLO 14
AS 509/110/LM-8)**

NOVEMBER 1, 1970



**FCD
MSC
NASA**