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	MISSION	RULES	

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I GENERAL GUIDELINES

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		MISSION RULES						
REV	ITEM	OMSF GENERAL RULES						
	I-1	MISSION RULES ARE EFFECTIVE DURING THE LAUNCH COUNTDOWN, FLIGHT AND RECOVERY OPERATIONS, AND DURING PRELAUNCH TESTS WHEN APPLICABLE. THEY ARE BASED ON MISSION OBJECTIVES AS STATED IN THE APOLLO FLIGHT MISSION ASSIGNMENTS DOCUMENT M-D MA 500-11. PROPOSED CHANGES TO THE MISSION OBJECTIVES STATED IN THE						
	I-2	THE DIRECTOR OF FLIGHT OPERATIONS AND THE DIRECTOR OF LAUNCH OPERATIONS OR THEIR DESIGNATED REPRESENTA- TIVE WILL INSURE COORDINATION OF THEIR RESPECTIVE MISSION RULE CHANGES WITH THE MISSION DIRECTOR AND						
	I-3	OTHER APPROPRIATE ORGANIZATIONS. FOLLOWING THE CDDT OR FRT, WHICHEVER OCCURS FIRST, MISSION DIRECTOR APPROVAL AND CONCURRENCE WILL BE REQUIRED ON ALL RULES CHANGES AFFECTING SAFETY, ACCOMPLISHMENT OF TEST OBJECTIVES, DEVIATIONS FROM THE						
	I-4	NOMINAL MISSION AND PRELAUNCH CONSTRAINTS. CONCURRENCE MAY BE OBTAINED VERBALLY IF TIME CONSIDERATIONS SO DICTATE.						
	1-4 I-5	INVOLVE CHANGES TO: MISSION OBJECTIVES, MISSION RULES, FLIGHT PLAN CONTENT, OR LAUNCH/FLIGHT SAFETY.						
	I-6	DIRECTOR, DOD MANAGER FOR MSF SUPPORT OPERATIONS, AND THE MISSION DIRECTOR MAY TAKE OR RECOMMEND ANY ACTION REQUIRED FOR OPTIMUM CONDUCT OF THE MISSION. THE COMMAND PILOT, SPACECRAFT TEST CONDUCTOR, LAUNCH VEHICLE TEST CONDUCTOR, SPACE VEHICLE TEST SUPER-						
		VISOR, LAUNCH OPERATIONS MANAGER, LAUNCH DIRECTOR, FLIGHT DIRECTOR, DOD MANAGER FOR MANNED SPACE FLIGHT SUPPORT OPERATIONS, OR THE MISSION DIRECTOR MAY REQUEST A HOLD FOR CONDITIONS WITHIN THEIR RESPECTIVE AREAS OF RESPONSIBILITY.						
	I-7	DURING THE COUNTDOWN THE LAUNCH VEHICLE AND SPACECRAFT PROGRAM MANAGERS AND RESPECTIVE CENTER OPERATIONS MANAGERS SHALL 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-8	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.						
	I-9	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 COORDINA- TION WITH THE APPROPRIATE OPERATIONS AND PROGRAM MANAGERS. GENERALLY THE LOSS OF A MANDATORY ITEM WILL RESULT IN A SCRUB.						
	I-10 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 ITEM. THIS AUTHORITY SHALL BE EXERCISED AS CIRCUMSTANCES DICTATE AND AFTER APPROPRIATE RECOMMENDATIONS FROM THE PROGRAM MANAGERS, LAUNCH DIRECTOR, AND FLIGHT DIRECTOR.							
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			MASA — Mannea Spacecran MISSION RULES							
REV	I TEM	~								
	I-11	BE SCRUBBED FOR OTHER AGGRAVATIN	LL BE GIVEN TO THE REPAIR OF ANY HIGHLY DE ANY SINGLE HIGHLY DESIRABLE ITEM. IF TWO G CIRCUMSTANCES OCCUR, THE MISSION DIRECTO IATE OPERATIONS AND PROGRAM MANAGERS.	OR MORE HIGHLY DESIRABLE ITEMS F	AIL AND/OR					
	I-12	THE COUNTDOWN WILL NOT BE HELD NOR THE LAUNCH SCRUBBED FOR FAILURE OF DESIRABLE ITEMS.								
	I-13	TO LIFTOFF. IF CONTINUE ON THE	E, THE LAUNCH SITE AND MCC WILL VERIFY TEL THE MCC LOSES A PARAMETER BUT THE LAUNCH S LAUNCH SITE READOUT. THIS IS TRUE EXCEPT ULES) UPON WHICH MISSION RULES ACTION IS T BLEM.	ITE HAS A VALID READOUT, THE MCC FOR THOSE MANDATORY PARAMETERS (WILL LISTED IN THE					
	I-14	THE COUNTDOWN WI	LL CONTINUE WHERE POSSIBLE CONCURRENTLY WI	TH CORRECTION OF AN EXISTING PRO	BLEM.					
	I-15		ALL MANUAL ABORT REQUESTS FROM THE GROUND HE FAILURE. CREW ABORT ACTION WILL NORMAL		WO INDEPENDENT					
,	I -1 6		, THE DIRECTOR OF LAUNCH OPERATIONS WILL B MERGENCIES EXCEPT FOR RECOVERY OPERATIONS							
	I -17	ARMED UNTIL THE	TIONS MANAGER MAY SEND AN ABORT REQUEST FR SPACE VEHICLE REACHES SUFFICIENT ALTITUDE SENDING AN ABORT REQUEST WILL BE ESTABLIS	TO CLEAR THE TOP OF THE UMBILICA						
	I-18	SIBILITY FOR SEN	TOWER CLEAR, THE LAUNCH DIRECTOR AND FLIGH DING AN ABORT REQUEST. THE CRITERIA FOR S HED IN THE LAUNCH AND FLIGHT RULES RESPECT	ENDING AN ABORT REQUEST DURING T	RESPON- HIS PERIOD					
	I-19		TIONS MANAGER WILL INFORM MCC WHEN THE SPA WER" OVER ONE OF THE LOOPS FROM KSC TO MCC		TOWER BY					
	I-20	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 THE DAMAGE AND PROVIDE INFORMATION TO THE FLIGHT DIRECTOR FOR ANY ACTION NECESSARY AFTER UMBILICAL TOWER CLEARANCE.								
	1-21	COMPLETE GROUND CONTROL OF THE SPACE VEHICLE PASSES TO THE FLIGHT DIRECTOR WHEN THE SPACE VEHICLE REACHES SUFFICIENT ALTITUDE TO CLEAR THE TOP OF THE UMBILICAL TOWER.								
	I-22 IN THE MCC, THE FLIGHT DIRECTOR, FLIGHT DYNAMICS OFFICER, AND BOOSTER SYSTEMS ENGINEER WILL HAVE THE CAPABILITY TO SEND AN ABORT REQUEST SIGNAL. THE CRITERIA FOR SENDING AN ABORT REQUEST WILL BE ESTABLISHED IN THE FLIGHT RULES.									
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REV	TIEM								
	I-23	THE COMMAND PILOT MAY INITIATE SUCH INFLIGHT ACTION AS HE DEEMS ESSENTIAL FOR CREW SAFETY.							
	I-24	FLIGHT CREW SAFETY SHALL TAKE PRECEDENCE OVER THE ACCOMPLISHMENT OF MISSION OBJECTIVES.							
	I-25	IN THE EVENT OF COMMUNICATIONS LOSS BETWEEN THE MANNED SPACE FLIGHT NETWORK AND THE SPACECRAFT, T COMMAND PILOT WILL ASSUME RESPONSIBILITY FOR MISSION CONDUCT AS DESCRIBED WITHIN THE FLIGHT RULES							
	I-26	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.							
	I -27	THE DOD MANAGER FOR MANNED SPACE FLIGHT SUPPORT OPERATIONS IS RESPONSIBLE FOR RECOVERY AND 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.							
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l									
		RULES I-28 THROUGH I-35 ARE RESERVED.							
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MISSION RULES

		MISSION RULES						
REV	ITEM							
	I-36	DEFINITIONS <u>REDLINE</u> : A REDLINE VALUE IS A MAXIMUM AND/OR MINIMUM LIMIT OF A CRITICAL PARAMETER NECESSARY TO IDENTIFY VEHICLE, SYSTEM, AND COMPONENT PERFORMANCE AND OPERATION. REDLINE VALUES WILL BE ESTABLISHED SUCH THAT FURTHER DEGRADATIONS OF THE SYSTEM OR COMPONENT COULD LEAD TO A FAILURE TO ACCOMPLISH THE						
	I-37	PRIMARY MISSION. <u>REDLINE FUNCTION</u> : A REDLINE FUNCTION IS A PARAMETER THAT HAS BEEN IDENTIFIED TO MONITOR THE FUCTIONING OF A UNIT TO INSURE THE OPERATIONAL PERFORMANCE OF THAT UNIT IS ACCEPTABLE TO MEET THE PRIMARY MISSION. REDLINE FUNCTIONS ARE MANDATORY.						
	I-38	PRIMARY OBJECTIVE: A STATEMENT OF THE PRIMARY PURPOSE OF FLIGHT. WHEN USED IN CENTER CONTROL DOCUMEN- TATION, THE PRIMARY OBJECTIVE MAY BE AMPLIFIED BUT NOT MODIFIED. DETAILED TEST OBJECTIVES WILL BE GENERATED AND AMPLIFIED TO FULFILL EACH PRIMARY OBJECTIVE.						
	1-39	PRINCIPAL DETAILED TEST OBJECTIVE: A DETAILED TEST OBJECTIVE WHICH MUST BE ACCOMPLISHED PRIOR TO THE LUNAR LANDING MISSION. ANY PRINCIPAL DETAILED TEST OBJECTIVE NOT SATISFACTORILY COMPLETED ON THE ASSIGNED MISSION CAN BE ATTEMPTED ON A SUBSEQUENT MISSION WITHOUT MAJOR IMPACT.						
	I-40	MANDATORY DETAILED TEST OBJECTIVE: A PRINCIPAL DETAILED TEST OBJECTIVE WHICH MUST BE SATISFACTORILY COMPLETED ON THE ASSIGNED MISSION. FAILURE TO DO SO WOULD UNDULY COMPROMISE SUBSEQUENT FLIGHT SCHED- ULES AND/OR REQUIRE SUBSEQUENT SPACE VEHICLE RECONFIGURATION.						
	I-41	SECONDARY DETAILED TEST OBJECTIVE: A DETAILED TEST OBJECTIVE WHICH WOULD PROVIDE SIGNIFICANT DATA OR EXPERIENCE BUT WHICH IS NOT A PREREQUISITE TO THE LUNAR LANDING MISSION.						
	I-42	MANDATORY (M): A MANDATORY ITEM IS A SPACE VEHICLE OR OPERATIONAL SUPPORT ELEMENT THAT IS ESSENTIAL FOR ACCOMPLISHMENT OF THE PRIMARY MISSION, WHICH INCLUDES PRELAUNCH, FLIGHT, AND RECOVERY OPERATIONS THAT INSURE CREW SAFETY AND EFFECTIVE OPERATIONAL CONTROL AS WELL AS THE ATTAINMENT OF THE MANDATORY DETAILED TEST OBJECTIVES.						
	I-43	HIGHLY DESIRABLE (HD): A HIGHLY DESIRABLE ITEM IS A SPACE VEHICLE OR OPERATIONAL SUPPORT ELEMENT THAT SUPPORTS AND ENHANCES THE ACCOMPLISHMENT OF THE PRIMARY MISSION AND IS ESSENTIAL FOR THE ACCOMPLISHMENT OF THE PRIMARY DETAILED TEST OBJECTIVES.						
	1-44	DESIRABLE (D): A DESIRABLE ITEM IS A SPACE VEHICLE ELEMENT OR OPERATIONAL SUPPORT ELEMENT THAT IS NOT ESSENTIAL FOR THE ACCOMPLISHMENT OF THE PRIMARY MISSION.						
	I-45	COUNTDOWN: THE PERIOD OF TIME STARTING WITH LAUNCH VEHICLE POWER UP FOR THE LAUNCH (OR SIMULATED LAUNCH) WHICH INCLUDES SERVICE STRUCTURE REMOVAL, LAUNCH VEHICLE CRYOGENIC TANKING, SPACECRAFT CLOSEOUT, AND THE TERMINAL COUNT.						
	I-46	HOLD: INTERRUPTION OF THE COUNTDOWN FOR UNFAVORABLE WEATHER, REPAIR OF HARDWARE, OR CORRECTION OF CONDITIONS UNSATISFACTORY FOR LAUNCH OR FLIGHT.						
	I-47	HOLD-POINT: A PREDETERMINED POINT WHERE THE COUNTDOWN MAY BE CONVENIENTLY INTERRUPTED.						
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MISSION RULES

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EV ITEM	1								
I-48	PROCE	D: CONTIN	UE IN ACCORDAN	ICE WITH PRESC	RIBED COUNTDO	WN PROCEDURES.			
1-49		<u>E:</u> THE CO	UNTDOWN IS STO	OPPED AND RETU	RNED TO A DES	IGNATED POINT	OR AS SPECIFIED	IN THE	LAUNCH
I-50	SCRUB	THE LAUN	CH IS POSTPONE	Ð.					
I -5 1			OMATIC OR MANL H SEQUENCE STA		stop the lau	NCH SEQUENCE A	FTER INITIATION	OF THE	
I - 52			ENT DETERMINED EN PLUS TIME (UMENTATION U	NIT UMBILICAL D	ISCONNECT SIGNA	L AND IS	THE
I-53			TERMINATION BY ORBITAL INSER		INTENTIONAL S	SEPARATION OF T	HE SPACECRAFT F	ROM THE	LAUNCH
I-54	EARLY	MISSION TE	RMINATION: UN	SCHEDULED INT	TENTIONAL MISS	SION TERMINATIO	N AT OR AFTER O	RBITAL I	NSERTION.
I-55	MEASUREMENT: A MEASUREMENT IS A SPECIFIC DATA CHANNEL OF INSTRUMENTATION MONITORING A SINGLE FUNCTION.								
1-56	INSTR						ISMITS AND MONIT		FOR
1-56						ACQUIRES, TRAN SUPPORT ITEMS.	ISMITS AND MONIT	ors data	FOR
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IL FLIGHT MISSION RULES

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I GEN RULES AND SOP⁶S

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				MISSION RULES				
REV	ITEM			GENERAL				
	1-1	RATION	ALIZATION RE	N RULES OUTLINE PREPLANNED DECISIONS DES QUIRED WHEN NON-NOMINAL SITUATIONS OCCU Y OPERATIONS.				
	1-2			THE SPECIFIC MISSION RULES MAY DEVIATE HESE GENERAL RULES. THE SPECIFIC MISSION		NED IN		
	1-3			OR MAY, AFTER ANALYSIS OF THE FLIGHT, CH . COMPLETION OF THE MISSION.	DOSE TO TAKE ANY NECESSARY ACTION	REQUIRED		
	1-4	THE CO	MMAND PILOT	MAY INITIATE SUCH INFLIGHT ACTION AS HE	DEEMS ESSENTIAL FOR CREW SAFETY.			
	1-5	IN THE COMMAN	EVENT OF CO	MMUNICATIONS LOSS BETWEEN THE MANNED SP. ASSUME RESPONSIBILITY OF MISSION DIREC	ACE FLIGHT NETWORK AND THE SPACEOF FION WITHIN THE FRAMEWORK OF THE N	RAFT, THE MISSION RULES.		
		<u>CONFIR</u>	MATION OF M	ALFUNCTIONS				
	1-6	BETWEE	N SPACECRAFT	THE CREW AND GROUND WILL VERIFY ALL MA AND GROUND TELEMETRY READOUTS, THE SPA ADEQUATE INSTRUMENTATION AND THAT APPL	CECRAFT READOUTS ARE PRIME. (ASSU	MING		
	1-7	THIS P		IS THAT ARE CONSIDERED TO BE INTERIM OR NO ALL SUBSEQUENT REVISIONS UNTIL THE N				
	1-8			S LISTED IN THESE RULES ARE THE ACTUAL V ND ARE NOT BIASED TO COMPENSATE FOR TIME		KNOWN		
	1-9			RWISE, MANDATORY AND HIGHLY DESIRABLE IN OR PCM CAPABILITY.	NSTRUMENTATION REQUIREMENTS ARE SA	ATISFIED		
	1-10		ORY SPACE VE	HICLE INSTRUMENTATION FOR THE PURPOSES (CRITERIA:	OF FLIGHT MISSION RULES MUST BE IN	ONSONANCE		
		A. RE	QUIRED TO IN	SURE FLIGHT CREW SAFETY.				
		B. RE	QUIRED TO IN	IPLEMENT RULES RESULTING IN LAUNCH ABORT	5.			
		C. RE	QUIRED TO IN	IPLEMENT RULES RESULTING IN EARLY MISSIO	N TERMINATION.			
		D. RE	QUIRED TO M	AKE DECISION TO CONTINUE TO THE NEXT MIS	SION PHASE.			
		THE MANDATORY INSTRUMENTATION LISTINGS IN THIS DOCUMENT WILL BE CROSS-REFERENCED TO THE APPROPRIATE MISSION RULE MEETING THE ABOVE CRITERIA.						
	1-11	ANY IN	STRUMENTATIO	CATEGORIZING INSTRUMENTATION AS HIGHLY IN REQUIRED FOR NORMAL SYSTEMS MANAGEMEN IRY CATEGORY.				
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REV	ITEM		<u></u>								
	1-12							SYSTEMS MALF			
		DURAT	ION SUCH THA	AT ACCOMPL	ISHMENT OF TH	HE MANDATORY	AND PRIM	ARY MISSION O	BJECTIVES WI	LL BE CO	MPROMISED.
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		RULE N 1-20 A	NUMBERS 1-13 ARE RESERVED	THROUGH							
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		MASA — Manned Spacecro Mission RULES							
εv	ITEM	FLIGHT CONTROLLER ACTION FOR FAILURES DURING TERMINAL CO	UNTDOWN						
	1-21	MANDATORY - THE COGNIZANT FLIGHT CONTROLLER WILL REQUEST A LOSS OR FAILURE OF A MANDATORY ITEM. PRIOR TO T-I MIN CONFIRMED PRIOR TO REQUESTING A HOLD. AT T-11 SEC ALL DESIRABLE UNLESS SPECIFICALLY DESIGNATED AS MANDATORY TO FOR MANDATORY ITEMS WITHOUT VERIFICATION DUE TO THE LIMI	A HOLD FROM THE FLIGHT DIRECTOR I , FAILURES OF MANDATORY ITEMS WILL ANDATORY ITEMS WILL REVERT TO HIGH L/O. AFTER T-1 MIN, HOLDS WILL BI	BE LY					
	1-22	1-22 <u>HIGHLY DESIRABLE</u> - THE COGNIZANT FLIGHT CONTROLLER WILL NOTIFY THE FLIGHT DIRECTOR IN CASE OF A OR A FAILURE OF A HIGHLY DESIRABLE ITEM. A HOLD MAY BE CALLED BY THE FLIGHT DIRECTOR TO REPAIR ITEM WHEN IT IS CONVENIENT AND IF THE ESTIMATED TIME TO REPAIR OR REPLACE THE ITEM IS ACCEPTABLE							
	1-23	DESIRABLE - FLIGHT CONTROLLERS WILL NOT CALL HOLDS FOR T IN THIS CATEGORY BECAUSE THEY ARE ITEMS OF SUPPORT WHICH							
A	1-24	MANUAL CUTOFF WILL NOT BE ATTEMPTED FROM T-11 SECONDS TO	T-0.						
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		RULE NUMBERS 1~25 THROUGH 1-30 ARE RESERVED.							
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 1-51 ASAP: AS SOON AS PRACTICABLE (I.E., AS SOON AS POSSIBLE AND REASONABLE). 1-52 REENTER ASAP: REENTER AS SOON AS PRACTICABLE (I.E., AS SOON AS POSSIBLE AND REASONABLE). 1-53 TERMINATE ASAP: REENTER WITH THE MINIMUM TRIP TIME TO AN UNSPECIFIED LANDING AREA. 1-54 PTP: A "PREFERRED TARGET POINT" IS A STRATEGICALLY LOCATED SET OF COORDINATES FOR WHICH THE SPACECRAFT SHOULD BE TARGETED IF TIME PERMITS. 1-55 ATE: AN "ALTERNATE TARGET POINT" IS A STRATEGICALLY LOCATED SET OF COORDINATES FOR WHICH THE SPACECRAFT TARGET POINT BETWEEN PTP'S. 1-56 NEXT BEST PTP: A PREFERRED TARGET POINT WHICH CAN BE REACHED BY THE SPACECRAFT WITHIN THE CONSTRAINTS. 1-57 IN "ALTERNATE TARGET POINT BETWEEN PTP'S. 1-58 NEXT BEST PTP: A PREFERRED TARGET POINT WHICH CAN BE REACHED BY THE SPACECRAFT WITHIN THE CONSTRAINTS. 1-59 IN THE SPACECRAFT PROBLEM CAUSING THE EARLY MISSION TERMINATION AND ALLOWING THE BEST POSSIBLE REENTRY AND LANDING AREA CONDITIONS. 1-57 FOR THE PURPOSE OF MISSION RULE ACTION, CRITICAL SPS MANEUVERS ARE DEFINED AS: A. MODE III ABORT BURNS D. DECORDIT BURNS C. APOGEE KICK BURNS D. DECORDIT BURNS C. ADOGEE KICK BURNS D. MOC'I SREQUIRED TO ACHIEVE A FREE RETURN TRAJECTORY F. TRANSLAWAR AND TRANSEARTH ABORT MANEUVERS G. MODE I AND III ABORTS FROM LLARA ORBIT H. TEI I. MCC'S REQUIRED FOR ENTRY CORRIDOR CONTROL 1-38 PLICHT PHASE: THE FLICHT PHASE IS THE TIME INTERVAL FROM LIFTOFF TO SPLASHOWN AND FOR THE PURPOSE OF THE FLICH PHASE: THE TIME INTERVAL FROM LIFTOFF TO INSERTION. EARTH PARKING ORBIT PHASE: THE TIME INTERVAL FROM LIFTOFF TO INSERTION. EARTH PARKLING ORBIT PHASE: THE TIME INTERVAL FROM LIFTOFF TO INSERTION. EARTH PARKLING ORBIT PHASE: THE TIME INTERVAL FROM LIFTOFF TO INSERTION. EARTH PARKLING ORBIT PHASE: THE TIME INTERVAL FROM LIFTOFF TO INSERTION. 	. •				MISSION RULES					
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1-39 TRANSEARTH COAST PHASE: THE TIME INTERVAL FROM TEI CUTOFF UNTIL SPLASHDOWN. 1-39 RECOVERY PHASE: THE RECOVERY PHASE IS THE TIME INTERVAL FROM SPLASHDOWN TO PICKUP OF THE SPACECRAFT B MISSION REV DATE SECTION GROUP PAGE APOLLO 8 FINAL 11/7/68 GENERAL RULES AND SOP'S DEFINITIONS 1-4			TRANSL	UNAR COAST F	HASE: THE TIME INTERVAL FROM TLI CUTOFF	UNTIL LOI1 CUTOFF.				
1-39 RECOVERY PHASE: THE RECOVERY PHASE IS THE TIME INTERVAL FROM SPLASHDOWN TO PICKUP OF THE SPACECRAFT B MISSION REV DATE SECTION GROUP PAGE APOLLO 8 FINAL 11/7/68 GENERAL RULES AND SOP'S DEFINITIONS 1-4			LUNAR	PARKING ORBI	T PHASE: THE TIME INTERVAL FROM LOI1 CU	TOFF UNTIL TEI CUTOFF.				
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APOLLO 8 FINAL 11/7/68 GENERAL RULES AND SOP'S DEFINITIONS 1-4		1-39								
	MI	ISSION	REV	DATE	SECTION	GROUP	PAGE			
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	FEC/I	SG Form	292 (A	UG 68)	-		-			

MISSION	RULES
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REV	ITEM								
	1-40	REENTRY DEFINITIONS							
		A. AUTOMATIC - REENTRY CONTROLLED BY CMC WHICH OUTPUTS BANK ANGLE COMMANDS TO THE RCS.							
		B. CLOSED LOOP - REENTRY CONTROLLED BY THE CREW MANUALLY FLYING BANK ANGLE MODULATION USING CMC ENTRY PROGRAM OUTPUTS.							
		C. OPEN LOOP REENTRY - REENTRY CONTROLLED BY THE CREW USING SPACECRAFT DISPLAYS AND FLYING:							
		1. BANK ANGLE (RL 0-180) AND RETRB (RR 0-180).							
		2. CONSTANT BANK ANGLE - CONSTANT BANK ANGLES >90 DEGREES WILL NOT BE FLOWN EXCEPT WHEN SKIPOUT RULE IS VIOLATED.							
		3. ROLLING ENTRY - MAINTAIN CONSTANT 18 DEGREES PER SECOND ROLL RATE.							
	•	4. EMS RANGING - CONSTANT BANK ANGLE IS HELD TO 1G THEN THE RANGE TO GO DISPLAY AND THE RANGE POTENTIAL LINES ARE COMPARED TO MODULATE THE BANK ANGLE. AT RETRB THE PRESENT BANK ANGLE IS REVERSE.							
		D. CONSTANT G REENTRY - REENTRY CONTROLLED BY THE CREW USING G LEVELS AS A CUE TO ROLL THE SPACECRAFT TO MAINTAIN A SPECIFIED G LEVEL.							
		E. EMS REENTRY - REENTRY CONTROLLED BY THE CREW USING THE CONSTANT G MODE UNTIL VELOCITY <25,500 FPS. THE EMS IS THEN USED TO CONTROL RANGE BY NULLING THE DIFFERENCE BETWEEN THE RANGE-TO-GO COUNTER AND THE RANGE POTENTIAL GUIDELINES. ALL MANEUVERS ARE OVERRIDDEN AS NECESSARY TO PREVENT EITHER AN ONSET OR OFFSET VIOLATION.							
		<u>NOTE</u>							
		OPEN LOOP REENTRY FOR LOW							
		EARTH ORBIT REENTRY ONLY.							
		RULE NUMBERS 1-41 THROUGH 1-44 ARE RESERVED.							
MI	SSION	REV DATE SECTION GROUP PAGE							
APO	OLLO 8	FINAL 11/7/68 GENERAL RULES AND SOP'S DEFINITIONS 1-5							
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EV	ITEM			
	1-45	CRITERIA FOR TARGET POINT SELECTION IN EPO		
		THE CRITERIA LISTED BELOW WILL BE USED WHEN CHOOSING BETWEEN CRITICALITY OF THE MISSION SITUATION WILL AFFECT THE APPLICA		
			PRIORITY	
		ACCEPTABLE WEATHER CONDITIONS FOR RECOVERY OPERATIONS	1	
		CAPABILITY OF RECOVERY FORCES	2	
		COMMUNICATION WITH THE SPACECRAFT FROM A GROUND STATION AT L 40 MINUTES PRIOR TO DEORBIT BURN	EAST 3	
		SUFFICIENT DAYLIGHT FOR RECOVERY OPERATIONS	4	
		A GROUND STATION FOR POST-DEORBIT BURN TRACKING	5	
		VOICE CONTACT PRIOR TO AND DURING DEORBIT BURN	6	
		POST-BLACKOUT TRACKING DATA AVAILABLE FOR REENTRY (ASSUMES PRE-BLACKOUT ACQUISITION)	7	
		GROUND STATIONS AVAILABLE TO OBTAIN DELTA V _C READOUTS AND TO PASS CREW BACKUP GUIDANCE QUANTITIES ^C	8	
	1-46	LUNAR RETURN ENTRY RANGE PRIORITY		
		THE RELATIVE ENTRY RANGE (400,000 FEET TO SPLASH) PRIORITY I	S AS FOLLOWS:	
		A. 1200 NM - 1400 NM (NOMINAL)		
		B. 1400 NM - 1800 NM (USED TO AVOID WEATHER VIOLATIONS IN F	RIORITY 1)	
		C. 1800 NM - 2500 NM (USED TO AVOID EXTREME WEATHER VIOLATI	ONS IN PRIORITY 1 AND 2)	
		C. 1800 NM - 2500 NM (USED TO AVOID EXTREME WEATHER VIOLATI	ONS IN PRIORITY 1 AND 2)	
		C. 1800 NM - 2500 NM (USED TO AVOID EXTREME WEATHER VIOLATI	ONS IN PRIORITY 1 AND 2)	
		C. 1800 NM - 2500 NM (USED TO AVOID EXTREME WEATHER VIOLATI	ONS IN PRIORITY 1 AND 2)	
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		C. 1800 NM - 2500 NM (USED TO AVOID EXTREME WEATHER VIOLATI	ONS IN PRIORITY 1 AND 2)	
		C. 1800 NM - 2500 NM (USED TO AVOID EXTREME WEATHER VIOLATI	ONS IN PRIORITY 1 AND 2)	
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		C. 1800 NM - 2500 NM (USED TO AVOID EXTREME WEATHER VIOLATI	ONS IN PRIORITY 1 AND 2)	
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		C. 1800 NM - 2500 NM (USED TO AVOID EXTREME WEATHER VIOLATI	ONS IN PRIORITY 1 AND 2)	
		C. 1800 NM - 2500 NM (USED TO AVOID EXTREME WEATHER VIOLATI	ONS IN PRIORITY 1 AND 2)	
		C. 1800 NM - 2500 NM (USED TO AVOID EXTREME WEATHER VIOLAT) RULE NUMBERS 1-47 THROUGH 1-49 ARE RESERVED.	ONS IN PRIORITY 1 AND 2)	-
MI	SSION	RULE NUMBERS 1-47 THROUGH	ONS IN PRIORITY 1 AND 2)	

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MISSION RULES

					الطويقة الكان بيرين بي منابع الشيفة بالمنت ويرين بيد بالمتحدي في ترجم ا			
ΕV	ITEM	LAUNCH	ABORTS					
	1-50	ABORT REQUEST COMMANDS ARE DEFINED AS COMMANDS TRANSMITTED FROM THE MSFN OR B/H WHICH ILLUMINATE T ABORT REQUEST LIGHT ON THE CMD PILOT'S PANEL. THE "ABORT LIGHT" AND A VOICE REPORT "ABORT" OVER A ARE CONSIDERED TWO CUES FOR THE CREW TO TAKE THE NECESSARY ACTION TO ABORT THE MISSION. THE GROUN WILL USE TWO INDEPENDENT CUES PRIOR TO TRANSMITTING "ABORT REQUEST". ADDITIONAL CUES FOR THE CREW WILL COME FROM ONBOARD INDICATIONS.						
	1-51	WHENEVE	ER POSSIBLE,	, ALL ABORTS AND EARLY MISSION T	ERMINATIONS WILL BE TIMED F	FOR A WATER LANDING.		
	1-52			OR WILL INITIATE THE ABORT REQUE IONS, AND LAUNCH VEHICLE MALFUNC		SYSTEMS MALFUNCTIONS,		
	1-53			CS OFFICER WILL INITIATE THE ABO CEEDS THE FLIGHT DYNAMICS ENVELO		THE FLIGHT PHASE IF THE		
	1-54	TIME-CF	RITICAL SYST	MS ENGINEER WILL INITIATE THE AB TEMS MALFUNCTIONS THAT WOULD NOT IVB CUTOFF.				
	1-55	LAUNCH UNTIL 1 TO TRAM	OPERATIONS THE SPACE VE NSFER OF COM	TION THAT WILL HAVE ABORT REQUES MANAGER MAY SEND AN ABORT REQUE EHICLE REACHES SUFFICIENT ALTITU NTROL TO THE FLIGHT DIRECTOR, TH ROM KSC BASED ON THE FOLLOWING C	ST FROM THE TIME THE LAUNCI DE TO CLEAR THE TOP OF THE E LAUNCH OPERATIONS MANAGEI	H ESCAPE SYSTEM IS ARMED UMBILICAL TOWER. PRIOR		
		A. MA	JOR STRUCTU	RAL FAILURE OR EXPLOSION.				
		B. LOS	SS OF POSIT	IVE VERTICAL MOTION.				
				E VEHICLE TILTING.				
					TING MARCHARE ADODT ACTIO	A.I		
		0. 10	WER CULLISI	ON RESULTING IN DAMAGE NECESSITA	TING IMMEDIATE ABORT ACTIO	N.		
	1–56	LIGHT THE MFO IF TRAN	IN THE SPACE CO COMMAND NSMITTED. AFTER TRANS	DOWN THE SLV BY TRANSMITTING THE ECRAFT. THE MFCO WILL INITIATE INITIATES A 4.0 SEC TIMER ON THE THE RSO DESTRUCT COMMAND CAN THE MITTING MFCO UPON VERIFICATION O	AN AUTO-ABORT IF TRANSMITT GROUND WHICH IN TURN ENAB N DESTROY THE SLV. THE RS	ED PRIOR TO EDS DISABLE. LES DESTRUCT CAPABILITY O WILL ALWAYS SAFE THE		
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	ISSION	REV	DATE	SECTION	GROUP	PAGE		
	LLO 8	FINAL	11/7/68	GENERAL RULES AND SOP'S	LAUNCH ABORTS	1-7		

υT	ITEM		<u></u>	MISSION RULES						
V										
	1-57	ENGINE SHUTDO	WN METHODS AVAILABLE:							
		INITIATOR	METHOD	STAGE	TIME_FRAME					
		ASTRONAUT	CCW ON THC	SIC, SII, S-IVB	T+30 SEC TO SECO					
		ASTRONAUT	S-II/S-IVB L/V STAGE SWITCH	SII, S-IVB	T+2:33 TO SECO ALSO IN TLI BURN					
		RSO	RF CMD (MFCO)	SIC, SII, S-IVB	T-0 TO INSERTION					
		EDS	2 OUT OF 3 VOTING LOGIC	SIC	T+30 SEC TO EDS AUTO OFF AT T+2:00					
		NOTE: THE FL	IGHT CREW AND THE EDS CAN	INOT SHUT DOWN THE SLV DI	JRING THE FIRST 30 SEC OF POW	ERED FLIGHT.				
	1-58	ABORTS ARE IN	NITIATED BY:							
		A. CREW								
		B. EMERGENCY	(DETECTION SYSTEM (EDS)							
			E REQUIRED BY:		•					
			PERATIONS MANAGER							
		B. FLIGHT D								
		C. FLIGHT DY	NAMICS OFFICER (FDO)							
		D. BOOSTER S	SYSTEMS ENGINEER (BSE)							
4	1-59		BORTS ARE IMPLEMENTED FOR		RES WHICH PRECLUDE CONTINUING	; LAUNCH TO				
1		1 + 45 MODE 1	I							
		3 + 00 MODE I 4 + 30 MODE I								
Ì		9 + 00 MODE I								
	1-60	THE FIXED TIM	ME ABORT PROCEDURE IS AS I	FOLLOWS:						
		A. APPROPRIA	TE FLIGHT CONTROLLER GIVE	ES RED STATUS AND VOICE	REPORT OF FAILURE TO FLIGHT D	DIRECTOR.				
		B. CREW CONF	FIRM FAILURE.							
		C. FLIGHT DETERMINE ABORT TIME TO BE USED.								
		D. RETRO BEGIN COUNTDOWN AT ABORT TIME MINUS 10 SECONDS.								
			CAPCOM RELAY COUNTDOWN TO CREW.							
		j								
			TIATE ABORT ON "MARK".	·						
		G. FLIGHT DI AFTER "MA		SEND MFCO" IF THE CREW	IS UNABLE TO SHUT DOWN WITHIN	5 SECONDS				
M	ISS10N	REV DATE	SECT 10N	6	ROUP	PAGE				

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REV	ITEM			
		ABORT MODES:		
	1-61	MODE I	BOUNDARY OF APPLICATION	PROCEDURES
		1A	LES ABORT ENABLE (≈T-30 MIN) TO GET 0 + 42	REFERENCE AOH
		1B	GET = 0 + 42 TO 100K FEET ALTITUDE (GET ≈ 1 + 50)	REFERENCE AOH
		1C	100K FEET ALTITUDE TO TOWER JETTISON (GET ≈ 3 + 07)	REFERENCE ACH
Α	1-62	MODE II	TOWER JETTISON (GET ≈ 3 + 07 UNTIL FULL LIFT SPLASHPOINT IS 3200 NM	A. REFERENCE ACH
			DOWNRANGE.	B. MCC PROVIDES
				 GET AND PITCH AT 400K FT GET DROGUE
				C. ENTRY IS FULL LIFT
A	1-63	MODE III		A. REFERENCE ACH
			AND INSERTION.	B. MCC PROVIDES:
				 GETI AT S-IVB CUTOFF PLUS 2:05 DELTA V FOR 3350 NM SPLASHPOINT BURN DURATION GET AND PITCH ATT AT 400K FT GET DROGUE
				C. MANEUVER IS SCS AUTO.
				D. ENTRY IS ROLL LEFT 55 DEGREES.
	1-64	MODE IV	ATTAINMENT OF CONTINGENCY ORBIT INSERTION CAPABILITY UNTIL INSER-	A. REFERENCE ACH
			TION.	B. MCC PROVIDES:
				 GETI AT S-IVB CUTOFF PLUS 2:05 DELTA V REQUIRED TO ACHIEVE PERIGEE ≥75 NM BURN DURATION
				C. MANEUVER IS SCS AUTO
	1-65	APOGEE KICK	PRE-APOGEE CUTOFFS, OUTSIDE THE COI BOUNDRY, CORRECTABLE TO SAFE	A. REFERENCE ACH
			ORBITAL CONDITIONS BY A MANEUVER AT APOGEE.	B. MCC PROVIDES:
				 GETI FOR BURN AT APOGEE DELTA V REQUIRED TO ACHIEVE ≥75 NM
				3. BURN DURATION
				C. MANEUVER IS SCS AUTO
м	SSION	REV DATE	SECTION	GROUP PAGE
<u> </u>	0LLO 8	A 12/11/6		LAUNCH ABORTS - MODES 1-9
L .		292 (AUG 68)	CEREIVAL ROLES AND SUF S	

1. 1.5 1.5 2.5 2.5

		MISSION RULES		
REV	ITEM			
		CREW ABORT LIMITS		
	1-66	MAX Q REGION A. (00:50 TO 2:00)		
		AOA 2100 PCT AND ROLL ATTITUDE 26 DEGREES	- ABORT MODE I	
		 B. (00:50 TO 1:25) 1. LV GUID LT - ON 2. LV RATE LT - ON 	- ABORT MODE I	
		RATES		
	1–67		- ABORT MODE I - ABORT MODE I, MODE II OR MODE III	
		B. ROLL		
		1. L/O TO SECO - 20 DEG/SEC	- ABORT MODE I, MODE II, MODE III OR MODE IV.	
	1-68	EDS AUTOMATIC ABORT LIMITS (UNTIL MANUAL DEACTIVATION TWO ENG OUT AUTO AND LV RATES AT 2:00.	OF	
		A. RATES PITCH AND YAW 4.0 ± .5 DEG/SEC ROLL 20.0 ± .5 DEG/SEC		
		B. ANY TWO ENGINES OUT		
		C. CM TO IU BREAKUP		
T.				
1				
A		RULE NUMBERS 1-69 THROUGH		
Î.		1-74 ARE RESERVED.		
M	ISSION	REV DATE SECTION	GROUP	PAGE
APO	OLLO 8	A 12/11/68 GENERAL RULES AND SOP'S	LAUNCH ABORTS - LIMITS	1-10
FEC/	TSG Form	m 292 (AUG 6E)	ware a strategy ware and the second strategy ware strategy w	L

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MISSION RULES

1-75 IF COMMANS WILL NOT BE TRANSMITTED TO THE SPACEDART OR LANKON VEHICLE DURING THE LANKON PHASE UNLESS SPECIFIC MISSION RULES ARE INVOKED WHICH REQUIRE COMMAND ACTIVITY. 1-76 THE RIO MULL SAFE THE S-TWB DESTRUCT SYSTEM AFTER COMFININT OF S-1V0 C/O FROM THE FLIGHT DIVIMUES THE REGIST (STEM THE FLIGHT DIVIMUES STER). THE REGIST SYSTEM CANNOT SEE REINITATED. 1-76 THE RIO MULL SAFE THE S-TWB DESTRUCT SYSTEM AFTER COMFININT OF S-1V0 C/O FROM THE FLIGHT DIVIMUES THE REGIST SYSTEM CANNOT SEE REINITATED. 1F THE RSO'S VERIFICATION OF S-TWD COTOFF. ONCE SAFED, THE S-IVB DESTRUCT SYSTEM CANNOT SE REINITATED. 1F THE RSO'S VERIFICATION OF S-TWD COTOFF. ONCE SAFED, THE S-IVB DESTRUCT SYSTEM CANNOT SE REINITATED. 1F THE RSO INITIATES MFCO, THE RSO MILL INITIATE SAFING AFTER VERIFICATION OF S-IVB CUTOFF. 1F THE RSO INITIATES MFCO, THE RSO MILL INITIATE SAFING AFTER VERIFICATION OF S-IVB CUTOFF. 1SS10M REV DATE 1SS10M REV DATE MISSION REV DATE SS10M REV DATE MISSION REV DATE	EV	ITEM							•			
OFFICER. IF COMMUNICATIONS ARE LOST WITH THE FILOD, THE S-IVB DESTRUCT SYSTEM VIEL BE SAFED ASAED ON THE RESO'S VERIFICATION OF S-IVB CUTOFF. IF THE RESO INITIATES MFCO, THE RESO WILL INITIATE SAFING AFTER VERIFICATION OF S-IVB CUTOFF.	••	1-75									THE LAUNCH	PHASE
		1-76	OFFICE THE RS	R. IF COMM O'S VERIFIC	UNICATIONS ATION OF S-	ARE LOST WIT	TH THE FIDO ONCE SAFE), THE S-1 ED, THE S-	IVB DESTRU -IVB DESTR	CT SYSTEM W UCT SYSTEM	ILL BE SAFE CANNOT BE R	D BASED ON EINITIATED.
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2 FLIGHT OPERATIONS RULES

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REV	ITEM					
		PRELA	UNCH			
A	2-1			WILL BE CONTROLLED BY:		
						ET
				IGHTING REQUIREMENTS RESTRICTING LAUNCH T		DE I.
		B. E	IR LAUNCH AZ	ZIMUTH LIMITATIONS RESTRICTING LAUNCHES TO	OCCUR BETWEEN 72° AND 107°.	
A	2-2	OF CR LANDI AND T THAT LAND	ITICAL COUNT NG. IF THE HE SPACECRAF THE SPACECRA LANDING WITH	OR WILL EVALUATE THE MODE I (TOWER) ABORT TOOWN ACTIVITIES AND WILL ADVISE THE LAUNC FLIGHT DIRECTOR IS UNABLE TO PROVIDE THIS T WIND CONSTRAINTS FOR LA D IP'S WILL BE FT NOT BE LAUNCHED OR REMAIN IN A TOWER A A HORIZONTAL VELOCITY COMPONENT OF GREAT I DIRECTOR WILL BE PRIME FOR CALLING HOLDS	H DIRECTOR OF ANY PREDICTED PERI EVALUATION, A LAND LANDING WILL APPLIED. THESE CONSTRAINTS (REF BORT MODE IF A TOWER ABORT WOULD ER THAN 54 FEET PER SECOND AT IM	ODS OF LAND BE ASSUMED LMRD) REQUIRE RESULT IN A IPACT. IN ALL
A	2-3			NOT BE ATTEMPTED IF THE MINIMUM GROUND INS 3 - GROUND INSTRUMENTATION REQUIREMENTS.		OMISED,
			H			
Α	2-4	THERE	FORE, THE LA	TO GO INTO ORBIT AND REENTER INTO THE WES AUNCH WILL BE CONTINUED AS LONG AS THE CRE SENT WHICH JEOPARDIZE CREW SAFETY AND SUFF FION PLUS ENTRY.	W CONDITION IS SATISFACTORY AND	NO S/C OR SLV
		-				
	0 F					
	2-5			BILITY REQUIREMENTS FOR EARTH ORBIT ARE:		
				Y OF SPS DEORBIT AND ONE ALTERNATE METHOD		
		L	ISE. FOR MIS	IS THE PRIME DEORBIT METHOD UNLESS SPECIFI SSION PLANNING, SUFFICIENT AV WILL BE RESE (POINT IN THE ORBIT.		
				ID TECHNIQUE, THE SM-RCS WILL BE USED AS M ACHIEVING THE TARGET PERIGEE OF 40 NM.	UCH AS PRACTICAL AND THE CM-RCS	AS LITTLE AS
		D. I	N MAINTAININ	G THE HYBRID DEORBIT REDLINE, THE FOLLOWI	NG ASSUMPTIONS ARE MADE:	
		1	. A MAXIMUN	OF 80 FPS IS AVAILABLE FROM THE CM-RCS.		
		2	. A MINIMUN	OF 30 POUNDS IN EACH CM-RCS RING WILL BE	RESERVED FOR ENTRY ATTITUDE COM	ITROL.
		3	SUFFICIEN	NT SM-RCS WILL BE RESERVED TO SUPPLEMENT T	THE CM-RCS IN ACHIEVI G A 40 NM F	PERIGEE
A.	2–6	THE		5-IVB CONSUMABLES ARE REMAINING TO ACHIEVE SEPARATED FROM THE S-IVB, AN ALTERNATE EAR D UNMANNED.		
MIS	SSION	REV	DATE	SECTION	GROUP	PAGE
APOL	LO 8	A	12/11/68	FLIGHT OPERATIONS RULES	GENERAL	2-1

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I		MISSION RULES						
REV	ITEM							
		TRANSLUNAR COAST						
Α	2-7	DISPERSED S-IVB TLI CUTOFF:						
		A. IF THE PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVES (INCLUDING EXECUTION OF BAP MCC, LOI, CIRCULATION AND TEI) ARE GREATER THAN OR EQUAL TO 1000 FPS, THE MIDCOURSE CORRECTION (MCC) WILL BE PERFORMED CONSISTENT WITH A LUNAR ORBIT MISSION.						
		B. IF THE PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVE IS LESS THAN <u>1000</u> FPS AND THE PREDICTED END OF LUNAR FLYBY MISSION FUEL RESERVE IS GREATER THAN <u>5500</u> FPS THE MCC WILL BE PERFORMED FOR A FREE RETURN FLYBY.						
		C. IF THE PREDICTED END OF LUNAR FLYBY MISSION FUEL RESERVES IS LESS THAN <u>5500</u> FPS AN ALTERNATE EARTH ORBIT MISSION OR A DIRECT ABORT WILL BE PERFORMED.						
А	2-8	THE NOMINAL MIDCOURSE CORRECTION DECISION POINTS FOR THE TRANSLUNAR COAST PHASE ARE TLI C/O PLUS 6 HOURS, TLI C/O PLUS 25 HOURS, LOI MINUS 22 HOURS AND LOI MINUS 8 HOURS. THE EARLIEST EXECUTION TIME FOR A MCC WHICH WILL BE CONSIDERED IS TLI C/O PLUS 3 HOURS.						
А	2-9	IF THE ΔV OF THE FIRST MCC IS LESS THAN 3 FPS IT WILL NOT BE EXECUTED AT THE PLANNED TIME SINCE THE 3 SIGMA MSFN VELOCITY UNCERTAINTY AT THE NOMINAL TIME OF MANEUVER COMPUTATION IS 3 FPS.						
		IF THE ΔV OF SUBSEQUENT MCC'S IS BETWEEN 5 FPS AND 10 FPS IT WILL BE EXECUTED AT THE PLANNED TIME. IF THE MCC ΔV IS LESS THAN 5 FPS THE EXECUTION TIME MAY BE DELAYED (EXCEPT FOR THE LAST MCC) TO ALLOW THE ΔV TO GROW. IF THE MCC ΔV IS GREATER THAN 10 FPS, IT MAY BE PERFORMED EARLY TO REDUCE THE MCC ΔV .						
A	2-10	THE FLIGHT CREW WILL TERMINATE LOI AND TAKE THE FOLLOWING ACTION, DEPENDING UPON THE SPECIFIC FAILURE						
		A. PERFORM THE 15 MINUTE ABORT FOR:						
		1. LOSS OF ONE GN, BOTTLE (<400 PSI) AND DECAY IN THE OTHER.						
		2. PRESSURE DECAY IN EITHER SPS PROPELLANT TANK TO 140 PSI.						
		3. FUEL-OXIDIZER AP >20 PSI.						
		4. CHAMBER PRESSURE <70 PSI.						
		5. FLANGE TEMPERATURE LIGHT AS LONG AS MODE I (APPROXIMATELY FIRST 2 MINUTES).						
		6. ANY BALL VALVE FAILS TO OPEN AT IGNITION						
		B. MTVC TAKEOVER AND COMPLETE THE BURN FOR:						
		1. GEN NO-GO.						
		2. ATTITUDE EXCURSION >10°						
		3. RATES >10°/SEC						
		C. RESTART AND COMPLETE THE BURN UNDER SCS CONTROL FOR:						
		SPS SHUTDOWN AT CMC RESTART.						
		D. STANDBY UNTIL MSFN COVERAGE FOR:						
		1. INADVERTENT SPS SHUTDOWN.						
		2. FLANGE TEMPERATURE SHUTDOWN AFTER 2 MINUTES OF BURN.						
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		A 12/11/08 FLIGHT OPERATIONS ROLES GENERAL 2-2						

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				MISSION RU		
REV	ITEM	LUN	AR ORBIT			
A	2-11		PERSED LOI CUT	OFF:		
				ING APOLUNE IS GREATER THAN APPRO	XIMATELY 9000 NM, A DIRECT RETURN	N ABORT MANEUVER WILL
		в.		ING APOLUNE IS LESS THAN APPROXIM L BE EVALUATED AND A TEI OR A CIR		
		c.		ING PERILUNE IS LESS THAN 25 NM A REATER THAN 40 NM.	MANEUVER(S) WILL BE PERFORMED A	SAP TO INCREASE
A	2-12	TRA	NSEARTH COAST	MCC PHILOSOPHY		:
		Α.		GET LINE WILL BE USED FOR MCC'S U D THE G&N IS GO, THEN THE SHALLOW		RFACE IS LESS THAN
		В.		USED FOR LANDING AREA CONTROL PRI IONS, UNACCEPTABLE WEATHER, OR LA		
		с.		PATH ANGLE IS OUTSIDE THE ENTRY S SOON AS PRACTICAL. MCC'S LESS RACY).		
		D.	THE LAST MCC	WILL BE SCHEDULED NO LATER THAN E	ENTRY INTERFACE MINUS 2 HOURS.	
A	2-13	<u>G0/</u>	ND-GO'S			
			BINED FLIGHT C TIMES INDICAT	ONTROL/FLIGHT CREW GO/NO-GO'S WIL	L BE MADE FOR EACH OF THE FOLLOW	ING MISSION PHASES AT
		Α.	ORBIT AT INSE	RTION		
		в.	TRANSLUNAR IN	JECTION AT THE SITE PRIOR TO THE	MANEUVER	
		c.	TRANSLUNAR CO	AST PRIOR TO MCC NO. 1 AND ONCE E	VERY 24 HOURS THEREAFTER.	
		D.	LOI NO. 1 APP	ROXIMATELY 1 HOUR PRIOR TO THE MA	NEUVER	
		Ε.	LOI NO. 2 APP	ROXIMATELY 1 HOUR PRIOR TO THE MA	NEUVER	
		F.	TEI APPROXIMA	TELY 1 HOUR PRIOR TO THE MANEUVER	R.	
MI	SSION	REV	DATE	SECTION	GROUP	PAGE
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				MISSION RULES		
REV	ITEM					
Α	2-14	ALTE	RNATE MISSIO	<u>NS</u>		
				DRBIT INSERTION REQUIRING AN SPS AV G	REATER THAN 900 FPS: CONDUCT A LOW	EARTH ORBIT
			MANEUVER TO A	GNITION OR CONTINGENCY ORBIT INSERTIO ACHIEVE A HIGH ELLIPSE (H _a 4000 NM) A DEBOOST TO 400 NM APOGEE AND CONTINU ROXIMATELY 10 DAYS).	ND PERFORM NAVIGATION AND PASSIVE T	HERMAL CONTROL
		c.	SIVB CUTOFF THE DESIRED	RESULTING IN AN APOGEE >100 NM BUT <	4000 NM: RESHAPE THE ELLIPSE TO PL M ALTERNATE "B" DESCRIBED ABOVE.	ACE APOGEE IN
			PERIGEE TO PL	RESULTING IN AN APOGEE >4000 NM BUT LACE LATER PERIGEE OVER A MSFN SITE. RIGEE AND CONTINUE WITH LOW EARTH ORB	DEBOOST TO AN APOGEE OF APPROXIMAT	ELY 400 NM AT
			PERIGEE TO P	RESULTING IN AN APOGEE >22000 NM BUT LACE LATER PERIGEE OVER THE RECOVERY SEMISYNCHRONOUS ORBIT. REMAIN IN THI	SITE. PERFORM A MANEUVER AT THE LA	TER PERIGEE TO
		F.	S-IVB CUTOFF DEPENDING UP	RESULTING IN AN APOGEE ≥60000 NM: P ON THE ∆V REQUIRED (REF RULE 2-6 FOR	ERFORM A CIRCUMLUNAR OR LUNAR ORBIT	MISSION
			•			
				•		
	N					
A			S 2-15 THROUG ARE RESERVED			
				······································		
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M	ISS	ION	RU	ILES

				MISSION RULES	· · · · · · · · · · · · · · · · · · ·	
REV	ITEM					
А	2-20	<u>SUMMAR</u>	RULES			
		THE LA	NUNCH PHASE	WILL BE ABORTED FOR THE FOLLOWING REASONS:		
					RULES	
		S-IC E	NGINE HARDO	VER	5-5	
				SSURE DURING S-IC OR S-II HARDOVER /MANUAL EDS LIMITS (REF RULES 1-66, 1-67,	1-68, 1-69)	
•		TWO EN	GINE OUT ON	S-II (TIME DEPENDENT) PLANE SEPARATION	5-15 5-16	
		S-IVB	LOSS OF THR	UST (TIME DEPENDENT)	5-19	
				ECTORY LIMIT LINES SUIT PRESSURE	4-1 6-21	
	•		OF CABIN AND MOKE IN CM	SUIT CIRCULATION	6-21 6-25	
		LOSS	OF CABIN PRE	SSURE AND O ₂ MANIFOLD LEAK LLS AND 1 BATTERY	6-28 8-27	
		UNCONT	FROLLABLE SH	ORTED MAIN BUS	8-47	
				USES DURING MODE I OR MODE II LOSS OF HE PRESSURE IN BOTH CM-RCS RINGS	(MODE I ONLY) 8-59 14-15	4
A	2-21	THE FO		L BE DISABLED EARLY FOR LOSS OF ANY ENTRY	BATTERY	
^			JO LOOTO WIL			
	0.00					
	2-22	EARTH				
				BE CONTINUED AS LONG AS:	· · · · ·	
			E WILL BE G	REATER THAN 75 NM AFTER 20 REVS TISFACTORY		
		1		COMMUNICATIONS CAL INSTRUMENTATION		
		SUFFIC	LIENT CONSUM	ABLES FOR AT LEAST TWO REVS PAST THE NEXT DEORBIT AND ONE ALTERNATE METHOD	GO/NO-GO PTP PLUS ENTRY	
						FACT THO
		CONTRO	DL METHODS F	IT ADEQUATE PROPELLANT, ONE TVC SERVO LOOP OR MAINTAINING THREE-AXIS ATTITUDE CONTROL	-	
				ORBIT ADEQUATE PROPELLANT, TRANSLATION CAF	ABILITY, ONE FDAI AND RATE DAMP	ING
				ORBIT, SM-RCS REQUIREMENTS (RATE DAMPING N N DSKY CONTROL, AND TWO RHC'S.	IUST BE SCS) PLUS TWO GOOD CM-RC	S SYSTEMS,
				(ALSO NO UNDUE CONTAMINATION IN EITHER CA		
		- TWO - AT L	GOOD MAIN, _EAST TWO GO	BATTERY, AC, AND LOGIC, PYRO BUSES AND THE OD FUEL CELLS, TWO IN ERTERS AND TWO ENTRY	E BATTERY RELAY BUS (BATTERIES	
		- SATI	ISFACTORY PR	IMARY COOLANT LOOP, URINE DUMP, SUIT CIRCU	JLATION	
Α	2-23	SPACEO	RAFT SEPARA	TION FROM THE S-IVB WILL BE PERFORMED EARL	Y FOR THE FOLLOWING:	
					RULES	
		TIME E	BASE 5 FAILS	TO INITIATE AT CUTOFF	5-25	
				Y PROPELLANT DISPERSAL SYSTEM ARMS INADVEF OR TO SAFING	RTENTLY AFTER 5-47	
		S-IVB	COLD HE SHU	TOFF VALVE FAILS TO CLOSE CONTROL DUIRNG TB5	5-49 5-51	
				HEAD DELTA PRESSURE EXCEEDS LIMITS	5-55	
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DALESSE SERVICE

MISSION RULES

EV ITEM	TLI WILL BE INHIBITED FOR THE FOLLOWING REASONS:		
A 2-24	TLI WILL BE INHIBITED FOR THE FOLLOWING REASONS:		
A 2-24	TLI WILL BE INHIBITED FOR THE FOLLOWING REASONS:		
		RULES	
1	S-IVB INERTIAL GUIDANCE SYSTEM IS NO-GO	4-31	
	MISALIGNMENT RATE BETWEEN THE IU AND IMU IS >0.6 DEG/HR.	4-32	
	UNACCEPTABLE DIFFERENCES BETWEEN CMC AND IU PLATFORM VELOCITY COMPONENTS OR TOTAL VELOCITY AT INSERTION	4-35	
	UNACCEPTABLE DIFFERENCE BETWEEN MSFN AND IU DOWNRANGE POSITION AT 55 MIN GET.		
	S-IVB FIRST BURN LONGER THAN 303 SECONDS	5-22	
	S-IVB ENGINE MAIN LOX VALVE FAILS TO CLOSE AT CUTOFF	5-46 5-51	
	CONTINUOUS VENT SYSTEM REGULATOR FAILS TO OPEN	5-50	
	LOSS OF STAGE PNEUMATICS	5-54	
	LOSS OF ENGINE CONTROL BOTTLE PRESSURE (<600 PSI)	5-57 5-65	
	LOSS OF ENGINE HYDRAULIC FLUID	5-66	
	LOSS OF CABIN INTEGRITY	6-21	
	LOSS OF SUIT CIRCULATION	6-22 6-24	
	FIRE OR SMOKE IN THE CABIN	6-25	
	LOSS OF SUIT INTEGRITY	6-27	
	LOSS OF ONE MAIN O2 REGULATORS	6-28 6-29	
	LOSS OF ONE SUIT COMPRESSOR	6-31	
	LOSS OF PRIMARY RADIATOR	6-35	
	LOSS OF PRIMARY COOLANT LOOP	6-35 6-36	
	LOSS OF SECONDARY RADIATOR	6-36	
	LOSS OF SECONDARY LOOP	6-36	
	LEAK OF GLYCOL COOLANT FAILURE OF BOTH H2O ACCUMULATORS LOSS OF POTABLE OR WASTE H2O TANK LOSS OF ANY CRYO TANK LOSS OF ONE FUEL CELL LOSS OF ONE ENTRY BATTERY LOSS OF ONE BATTERY, MAIN OR BATTERY RELAY BUS LOSS OF TWO INVERTERS	6-38 6-46	
	LOSS OF POTABLE OR WASTE H20 TANK	6-47	
	LOSS OF ANY CRYO TANK	7-15	
	LOSS OF ONE FUEL CELL	8–24 8–37	
	LOSS OF ONE BATTERY, MAIN OR BATTERY RELAY BUS	8-50	
		8-57	
	LOSS OF ONE A/C BUS LOSS OF ALL T/M	8-58 9-12	
	LOSS OF NORMAL DOWN VOICE	9-12	
	LOSS OF DOWN VOICE BACKUP	9-15	
		9-17 9-18	
	LOSS OF NORMAL DOWN VOICE LOSS OF DOWN VOICE BACKUP LOSS OF NORMAL UP VOICE LOSS OF UP VOICE BACKUP LOSS OF ALL UP OR DOWN VOICE IN ONE TRANSPONDER LOSS OF ALL UP OR DOWN VOICE IN ONE TRANSPONDER LOSS OF ONE PM POWER SUPPLY LOSS OF BOTH POWER AMPLIFIERS LOSS OF THE SCE	9-20	
	LOSS OF ONE PM POWER SUPPLY	9-22	
	LOSS OF BOTH POWER AMPLIFIERS	9-25 9-26	
	LOSS OF TWO AUDIO CENTERS	9-27	
	SMJC ACTIVATED PREMATURELY	10-16	
	ACTIVATED DROGUE CHUTE DEPLOY CIRCUIT LOSS OF BOTH BMAGS IN PITCH, YAW, OR ROLL	10-20 11-26,28	3
	LOSS OF BOTH FDAI'S	11-34	,
	LOSS OF ACI PHASE A	11-35	
	LOSS OF AC2 PHASE A GROUND AT EITHER SPS SOL DRIVER OUTPUT	11-36 11-39	
	LOSS OF CMC	11-45	
	LOSS OF NAV DSKY (CMC WARNING RELAY)	11-47	
	LOSS OF ISS LOSS OF OPTICS SUBSYSTEM	11-48 11-49	
	LOSS OF OPTICS CDU DAC	11-50	
	SUSTAINED PRESSURE DECAY IN SPS FUEL OR OX TANK	12-25	
	LOSS OF BOTH GN2 TANK PRESSURES FUEL FEED LINE AND/OR OXID FEED LINE TEMP <25°F, AND UNABLE TO INCREASE	12-28 12-29	
	FUEL/OXIDIZER AP GREATER THAN 20 PSI	12-34	
	LOSS OF HE SOURCE PRESSURE	12-35	
	HELIUM TANK LEAK IN ONE QUAD LEAK DOWN STREAM OF HE ISOLATION VALVE (SM-RCS)	13-20 13-21	
	LOSS OF ONE PITCH, ONE YAW, OR TWO ROLL THRUSTERS IN THE SAME DIRECTION	13-23	
	LOSS OF HELIUM SOURCE PRESS - ONE RING	14-15	
	CM-RCS ARMED	14-17 13-22	
	PACKAGE TEMP <70°F AND UNABLE TO INCREASE		
	PACKAGE TEMP <70-P AND UNABLE TO INCREASE		
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EV	ITEM		
Α	2-24	IU PLATFORM ACCELEROMETER FAILURE	5-58
	(CONT)	COLD HE SPHERE PRESS LOW	5-61
		LH2 ULLAGE PRESS LOW	5-64
		J ₂ ENGINE START BOTTLE PRESS HIGH	5-67
		LOX ULLAGE PRESS LOW	5-68
4	2-25	LOI WILL BE INHIBITED AND A CIRCUMLUNAR FLIGHT WILL BE ACCOMPLISHED IF THES	
			RULE
		LOSS OF SURGE TANK AND REPRESS PACK	6-24
		LOSS OF PRIMARY EVAPORATOR	6-35
		LOSS OF ONE ENTRY BATTERY	8-37
		LOSS OF ONE FUEL CELL	8-24
		LOSS OF ALL T/M	9-12
		LOSS OF ALL REAL-TIME DOWN VOICE (CREW HAS FLYBY PAD)	9-16
		LOSS OF ALL UP VOICE (CREW HAS FLYBY PAD)	9-19 11-26
		LOSS OF BOTH BMAGS IN PITCH OR YAW AXIS LOSS OF EITHER TVC SERVO LOOP (CHECKED PRE-SPS BURNS)	11-26 11-29
		LOSS OF EITHER TWO SERVO LOOP (CHECKED PRE-SPS BORNS)	11-29
		LOSS OF BOTH FDAT'S	11-35
	· ·	LOSS OF AC 2 PHASE A	11-36
		GROUND AT EITHER SPS SOL DRIVER OUTPUT AND UNABLE TO REMOVE	11-39
		LOSS OF CMC	11-45
		LOSS OF NAV DSKY (CMC WARNING RELAY)	11-47
		LOSS OF ISS	11-48
		LOSS OF OPTICS SUBSYSTEM	11-49
		LOSS OF OPTICS CDU D/A (CHECK PRE-SPS BURN)	11-50
		SUSTAINED PRESSURE DECAY IN SPS FUEL OR OX TANK	12-25
		LOSS OF ONE GN2 TANK PRESSURE	12-26
		LOSS OF ONE BANK OF BALL VALVES	12-27
		LOW FUEL OR OX FEED LINE TEMPS (SPS)	12-29
		LOW PU VALVE TEMP AND UNABLE TO INCREASE	12-30
		ENGINE FLANGE OVERTEMP DURING A BURN	12-31
		THRUST CHAMBER PRESSURE BELOW 70 PSI	12-32
		LOSS OF ULLAGE CAPABILITY	12-33
		FUEL/OXIDIZER ΔP GREATER THAN 20 PSI	
			12-34
		LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION	12-34 12-35 13-23
A	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED	12-35 13-23 OLLOWING FAILURES. THE NEX
A	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFF
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A	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN O ₂ MANIFOLD LEAK LOSS OF ONE MAIN O ₂ REGULATORS LOSS OF PRIMARY RADIATOR	12–35 13–23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFF RULE 6–21 6–25 6–28
A	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN O ₂ MANIFOLD LEAK LOSS OF PRIMARY RADIATOR LOSS OF PRIMARY RADIATOR LOSS OF PRIMARY COOLANT LOOP	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFF 6-21 6-25 6-28 6-29 6-35
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A	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN O ₂ MANIFOLD LEAK LOSS OF PRIMARY RADIATOR LOSS OF PRIMARY COOLANT LOOP LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY LOOP LEAK OF GLYCOL COOLANT	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFF 6-21 6-25 6-28 6-29 6-35 6-35 6-35 6-36 6-36 6-36 6-38
A	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN 02 MANIFOLD LEAK LOSS OF ONE MAIN 02 REGULATORS LOSS OF PRIMARY RADIATOR LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY RADIATOR LOSS OF SECONDARY RADIATOR LOSS OF SECONDARY RADIATOR LOSS OF SECONDARY RADIATOR LOSS OF SECONDARY LOOP LEAK OF GLYCOL COOLANT FAILURE OF BOTH H ₂ O ACCUMULATOR	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFFS 6-21 6-25 6-28 6-29 6-35 6-35 6-35 6-36 6-36 6-36 6-38 6-46
A	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN 02 MANIFOLD LEAK LOSS OF ONE MAIN 02 REGULATORS LOSS OF PRIMARY RADIATOR LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY ADDIATOR LOSS OF SECONDARY ADDIATOR LOSS OF SECONDARY ADDIATOR LOSS OF SECONDARY LOOP LEAK OF GLYCOL COOLANT FAILURE OF BOTH H20 ACCUMULATOR LOSS OF POTABLE OR WASTE H20 TANK	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFF 6-21 6-25 6-28 6-29 6-35 6-35 6-35 6-36 6-36 6-36 6-38 6-46 6-47
A	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN O ₂ MANIFOLD LEAK LOSS OF ONE MAIN O ₂ REGULATORS LOSS OF PRIMARY RADIATOR LOSS OF PRIMARY COLANT LOOP LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY LOOP LEAK OF GLYCOL COOLANT FAILURE OF BOTH H ₂ O ACCUMULATOR LOSS OF POTABLE OR WASTE H ₂ O TANK LOSS OF ANY CRYO TANK	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFFS 6-21 6-25 6-28 6-29 6-35 6-35 6-36 6-36 6-36 6-36 6-38 6-46 6-47 7-15
A	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN O ₂ MANIFOLD LEAK LOSS OF PRIMARY RADIATOR LOSS OF PRIMARY RADIATOR LOSS OF PRIMARY COOLANT LOOP LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY LOOP LEAK OF GLYCOL COOLANT FAILURE OF BOTH H ₂ O ACCUMULATOR LOSS OF POTABLE OR WASTE H ₂ O TANK LOSS OF TWO FUEL CELLS	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFF 6-21 6-25 6-28 6-29 6-35 6-35 6-35 6-36 6-36 6-36 6-36 6-38 6-46 6-47 7-15 8-25
4	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN 02 MANIFOLD LEAK LOSS OF ONE MAIN 02 REGULATORS LOSS OF PRIMARY RADIATOR LOSS OF PRIMARY COOLANT LOOP LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY RADIATOR LOSS OF POTABLE OR WASTE H ₂ 0 TANK LOSS OF POTABLE OR WASTE H ₂ 0 TANK LOSS OF ANY CRYO TANK LOSS OF ONE FUTERY, MAIN, OR BATTERY RELAY BUS	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFF 6-21 6-25 6-28 6-29 6-35 6-35 6-36 6-36 6-36 6-36 6-36 6-38 6-46 6-47 7-15 8-25 8-50
A	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN 02 MANIFOLD LEAK LOSS OF ONE MAIN 02 REGULATORS LOSS OF OR MAIN 02 REGULATORS LOSS OF PRIMARY RADIATOR LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY RADIATOR LOSS OF SECONDARY RADIATOR LOSS OF SECONDARY RADIATOR LOSS OF SECONDARY RADIATOR LOSS OF POTABLE OR WASTE H ₂ 0 TANK LOSS OF ANY CRYO TANK LOSS OF ANY CRYO TANK LOSS OF ONE BATTERY, MAIN, OR BATTERY RELAY BUS LOSS OF TWO INVERTERS	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFF 6-21 6-25 6-28 6-29 6-35 6-35 6-35 6-36 6-36 6-36 6-36 6-36
A	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN 02 MANIFOLD LEAK LOSS OF ONE MAIN 02 REGULATORS LOSS OF PRIMARY RADIATOR LOSS OF PRIMARY COOLANT LOOP LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY RADIATOR LOSS OF POTABLE OR WASTE H ₂ 0 TANK LOSS OF POTABLE OR WASTE H ₂ 0 TANK LOSS OF ANY CRYO TANK LOSS OF ONE FUTCH LCELLS LOSS OF ONE BATTERY, MAIN, OR BATTERY RELAY BUS	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFF 6-21 6-25 6-28 6-29 6-35 6-35 6-36 6-36 6-36 6-36 6-36 6-38 6-46 6-47 7-15 8-25 8-50
	2-26	LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN 02 MANIFOLD LEAK LOSS OF ONE MAIN 02 REGULATORS LOSS OF OR MAIN 02 REGULATORS LOSS OF PRIMARY RADIATOR LOSS OF SECONDARY EVAPORATOR LOSS OF SECONDARY RADIATOR LOSS OF SECONDARY RADIATOR LOSS OF SECONDARY RADIATOR LOSS OF SECONDARY RADIATOR LOSS OF POTABLE OR WASTE H ₂ 0 TANK LOSS OF ANY CRYO TANK LOSS OF ANY CRYO TANK LOSS OF ONE BATTERY, MAIN, OR BATTERY RELAY BUS LOSS OF TWO INVERTERS	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFF 6-21 6-25 6-28 6-29 6-35 6-35 6-35 6-36 6-36 6-36 6-36 6-38 6-46 6-47 7-15 8-25 8-50 8-57
мі		LOSS OF HELIUM SOURCE PRESSURE (SPS) LOSS OF ONE PITCH, ONE YAW OR TWO ROLL THRUSTERS IN THE SAME DIRECTION LOI WILL BE INHIBITED AND ENTRY ACCOMPLISHED IN THE NEXT BEST PTP FOR THE F BEST PTP COULD INCLUDE A CIRCUMLUNAR FLIGHT DEPENDANT ON INFLIGHT ANALYSIS OF: A. FLIGHT TIME REMAINING B. ABORT MANEUVER REQUIRED C. SYSTEMS REDUNDANCY REMAINING LOSS OF CABIN INTEGRITY FIRE OR SMOKE IN THE CABIN O ₂ MANIFOLD LEAK LOSS OF ONE MAIN O ₂ REGULATORS LOSS OF ONE MAIN O ₂ REGULATORS LOSS OF PRIMARY RADIATOR LOSS OF SECONDARY RADIATOR LOSS OF FRIMARY COLANT FAILURE OF BOTH H ₂ O ACCUMULATOR LOSS OF POTABLE OR WASTE H ₂ O TANK LOSS OF TWO THE CELLS LOSS OF TWO TINVERTERS LOSS OF ONE AATTERY, MAIN, OR BATTERY RELAY BUS LOSS OF ONE A/C BUS	12-35 13-23 OLLOWING FAILURES. THE NEX OF THE FAILURE AND TRADEOFF 6-21 6-25 6-28 6-29 6-35 6-35 6-36 6-36 6-36 6-36 6-36 6-36

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Â	2-26 (CONT)	LOSS OF ALL DOWN VOICE (CREW NOT UPDATED WITH FLYBY PAD) LOSS OF ALL UP VOICE (CREW NOT UPDATED WITH FLYBY PAD) SMJC ACTIVATED PREMATURELY ACTIVATED DROGUE CHUTE DEPLOY CIRCUIT LOSS OF BOTH BMAGS IN YAW OR ROLL LOSS OF DIRECT RCS CONTROL, BOTH RHC'S (CHECK ONCE POST-TLI) LOSS OF DIRECT RCS CONTROL, PITCH AND YAW LOSS OF ONE QUAD LEAK DOWNSTREAM OF HELIUM ISOLATION VALVE (SM-RCS) SM-RCS PACKAGE TEMP <70°F LOSS OF HELIUM SOURCE PRESS-ONE RING CM-RCS ARMED	9-16 9-19 10-16 10-20 11-26,28 11-33 13-20 13-21 13-22 14-15 14-17
A	2-27	TRANSEARTH INJECTION WILL BE PERFORMED AT THE NEXT BEST OPPORTUNITY FOR THE F	OLLOWING FAILURES:
		02 MANIFOLD LEAK LOSS OF PRIMARY RADIATOR LOSS OF PRIMARY COOLANT LOOP LEAK OF GLYCOL COOLANT LOSS OF POTABLE OR WASTE H20 TANK LOSS OF POTABLE OR WASTE H20 TANK LOSS OF POTABLE OR WASTE H20 TANK LOSS OF ONE MAIN OR BATTERY BUS LOSS OF NOE MAIN OR BATTERY BUS LOSS OF DOTH RMACS IN PITCH OR YAW LOSS OF BOTH BMACS IN PITCH OR YAW LOSS OF BOTH BMACS IN PITCH OR YAW LOSS OF BOTH REMATURELY LOSS OF BOTH REAT A TITUDE CONTROL IN PITCH AND YAW LOSS OF BOTH FDAI'S LOSS OF BOTH FDAI'S LOSS OF AC 1 PHASE A LOSS OF AC 2 PHASE A LOSS OF AC 2 PHASE A LOSS OF OTH CLUSS OF ACTOR WAINING RELAY) LOSS OF OPTICS COU D/A (CHECKED PRE-SPS BURNS) SUSTAINED PRESSURE DECAY IN SPS FUEL OR OX TANK LOSS OF ONE GNAL TANK PRESSURE FAILURE OF ONE BANK OF BALL VALVES DURING LOI PU VALVE TEMP LOW AND UNABLE TO INCREASE LEAK OR LOSS OF ONE CHM-ROS HE QUAD SM-RCS PACKAGE TEMP LOW AND UNABLE TO INCREASE LOSS OF ONE PITCH, ONE YAW, OR TWO ROLL THRUSTERS IN SAME DIRECTION LEAK IN OR LOSS OF ONE CM-RCS RING ARMING OF CM-RCS	RULE $6-28$ $6-35$ $6-35$ $6-35$ $6-35$ $6-35$ $6-35$ $6-35$ $6-35$ $6-35$ $6-35$ $6-35$ $6-35$ $6-35$ $6-35$ $6-35$ $6-47$ $8-24$ $8-57$ $10-16$ $11-26$ $11-28$ $11-29$ $11-32$ $11-32$ $11-33$ $11-34$ $11-35$ $11-36$ $11-39$ $11-45$ $11-45$ $11-45$ $11-45$ $12-25$ $12-25$ $12-27$ $12-35$ $13-22$ $13-22$ $13-23$ $14-15$
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3 GROUND INSTRU-MENTATION REQUIREMENTS

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MISSION RULES

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REV	ITEM					GENERAL			
	3-1	GEN	ERAL						
		Α.	THE FOLLOWING			DEFINE THE MCC/MSF	N REQUIREMENTS WHICH	MUST BE MET	BEFORE A
		в.	WHEN A SPECIN AND/OR SOFTWA MANDATORY STA	ARE INTERF	FACE REQUIRED TO	RATIONAL CAPABILITY O PROVIDE THE MANDA	Y IS DEFINED AS A MAN ATORY OPERATIONAL CAP	DATORY ITEM, ABILITY ARE	THE HARDWARE TO ASSUME A
		c.	WHERE REDUNDA	ANCY EXIST	ts for mandator	Y ITEMS, A BACKUP (CAPABILITY IS CONSIDE	RED HIGHLY I	DESIRABLE.
	÷.						١		
		RUI 3-4	LES 3-2 THROUGH + ARE RESERVED	•					
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				MISSION RULES			
REV	RULE	CONDITION/MALFUNCTIO	N PHASE	RULING		CUES/NOTES/COM	IENTS
	3-5	COMPUTER					
		A. MOC (IBM 360/75)	PRELAUNCH	MANDATORY		TO PROCESS MANDATOR PARAMETERS AND TRAJ	
		B. DSC (IBM 360/75)	PRELAUNCH	HIGHLY DESIRABLE		AN SSC (IBM 360/75) ABLE AS BACKUP TO TH DSC.	
		C. CCATS (UNIVAC 494) ONLINE D. CCATS (UNIVAC 494) STANDBY	PRELAUNCH	1 MANDATORY AND 1 HIGHLY	DES IRABLE		
		E. RTACF - 2	PRELAUNCH	1 HIGHLY DESIRABLE			
	3-6	COMMAND					
		A. MOCR TOGGLE SWITCH (BOTH A AND B)	IES				
		1. BSE ABORT REQU	JEST PRELAUNCH	HIGHLY DESIRABLE			
		2, FIDO ABORT REC	QUEST PRELAUNCH	HIGHLY DESIRABLE			
		3. FD ABORT REQUE	ST PRELAUNCH	HIGHLY DESIRABLE			
		B. MOCR COMMAND PANEL	.s				
	1	1. EECOM	PRELAUNCH	HIGHLY DESIRABLE			
		2. GUIDO	PRELAUNCH	HIGHLY DESIRABLE			
		3. BSE	PRELAUNCH	HIGHLY DESIRABLE			
		C. MOCR CONSOLE/SITE SELECT CAPABILITY					
		1. RTC CONSOLE (C 2. CCATS CMD CONS MED	PRELAUNCH	1 HIGHLY DESIRABLE			
		D. FC/M&O SWITCHING CAPABILITY				· · · · · ·	
		1. FLIGHT DIRECTO 2. CCATS CMD MED	PRELAUNCH	1 HIGHLY DESIRABLE			
	3-7	TELEMETRY					
		A. CONSOLE DISPLAY (D EVENTS, ANALOGS)	D/TV, PRELAUNCH	MANDATORY		FOR DISPLAY OF MAND PARAMETERS.	ATORY S/V
		B. PCM GROUND STATION	NS (4) PRELAUNCH	1 OF 4 MANDATORY, 1 HIGHL DESIRABLE	Y.Y	FOR DISPLAY OF MAND EVENTS AND ANALOGS.	
		C. RECORDING AND PLAY	ИBACK				
		1. ALDS	PRELAUNCH	BOTH DESIRABLE			
		2. MSFN D. FM/FM GND STATION	PRELAUNCH	1 of 2 mandatory			
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		•		MISSION RULES			
REV	RULE	CONDITION/MALFUNCTIO	N PHASE	RULING		CUES/NOTES/COMM	ENTS
A	3-8	TRAJECTORY A. TRAJECTORY DATA PR CESSING	0-				
		1. AVAILABILITY O INDEPENDENT TR JECTORY DATA SOURCES (IPR, TRACK) FROM L/ T+10 MIN.	USB	MANDATORY		 A) INDEPENDENT VEF OF L/V NAVIGATI B) PROTECT AGAINST OF LAUNCH ENVEL 	ON. VIOLATIO
		2. IU AND CMC TM VECTORS FROM L TO INSERTION F 60 SEC.	./0	BOTH MANDATORY	c	RBIT GO /N O GO	
		B. RTCC - DATA SELECT CAPABILITY	PRELAUNCH	MANDATORY			
		C. TRACKING DATA RECORDING	PRELAUNCH	DESIRABLE			
				-			
A	3-9	A. BUS A1	PRELAUNCH	MANDATORY	l	ININTERRUPTABLE POWE	R FOR:
						PCM AND FM GROUNNO. 2. D/TV CONVERTERS (SWITCHABLE) MOC MITE "A" CP "A" D/TV DATA DISTRI 1/2 OF RTCC CIM BUS A2) CMD CIM (SWITCHABUS A2) CMD DDD'S	BUTION
		B. BUS A ₂	PRELAUNCH	MANDATORY		ININTERRUPTABLE POWE	R FOR:
						. PCM AND FM G/S'S NO. 1 AND BM-DAD 2. DSC 5. MITE "B" 4. CP "B" 5. 1/2 OF RTCC CIM	
		C. BUS B ₁	PRELAUNCH	MANDATORY	· F	20 SECONDS INTERRUPT FOR: . PLOTBOARDS (POWE 2. FIDO SSR CONSOLE 5. PD/SDD	R)
		D. BUS B2	PRELAUNCH	MANDATORY	1		
						SYS SSR CONSOLES	(POWER)
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A	3-10	DIS	PLAY					
		Α.	MOCR D/TV CHANNELS	PRELAUNCH	10 OF 36 MANDATORY			
			NO, OF POSITION CHANNELS					
			RETRO 1 FIDO 1 GUIDO 1 EECOM 1			н 		
			GNC 1 RTCC 1 BOOSTER 4					
		Β.	TRAJECTORY DISPLAY					
			1. FDO LAUNCH DIGITALS	PRELAUNCH	MANDATORY ON D/TV		FOR CONTINGENCY ORBIT MANEUVER DATA AND T	
			2. y VS V	PRELAUNCH	MANDATORY ON 1 OF 4:			
					 (A) 10 X 20 SCRIBER PLOT (B) D/TV (C) RTCC PLOTBOARD (D) SSR PLOTBOARD 	TER	FROM SELECTED TRACKIN SOURCE.	IG DATA
	a de la composición d		3. RFO LAUNCH DIGITALS	PRELAUNCH	MANDATORY ON D/TV		MONITOR FOR MODES II	AND IB
			4. Y _{EI} VS V _{EI}	PRELAUNCH	MANDATORY OF 1 OF 2:		MONITOR FOR G-LIMIT N	/IOLATION.
					(A) D/TV(B) SSR PLOTBOARD			
			5. φ VS λ	PRELAUNCH	MANDATORY ON 1 OF 2:		MONITOR FOR CROSS-RAM	GE LIMITS.
				a sta	(A) RTCC PLOTBOARD(B) SSR PLOTBOARD			
	14 1		6. T _{FF} VS R _{IP}	PRELAUNCH	HIGHLY DESIRABLE ON 1 OF	2:	MONITOR FOR ABORT MOD	ES II, III
				-	(A) D/TV(B) SSR PLOTBOARD			
			7. h VS d	PRELAUNCH	HIGHLY DESIRABLE ON 10 X SCRIBER PLOTTER.	20		
			8. _{Yi} VS Vi (CMC DYNAMIC STATUS)	PRELAUNCH	HIGHLY DESIRABLE ON 10 X SCRIBER PLOTTER.	10	MONITOR FOR L/V AND S TION PERFORMANCE (GU SYSTEM ANALYSIS - COM WITH TRACKING).	IDANCE
			9. WEDGE ANGLE MONITOR	PRELAUNCH	HIGHLY DESIRABLE ON D/TV		MUNITOR FOR L/V AND STION PERFORMANCE.	5/C NAVIGA
			10. GUIDO ANALOG CHART RECORDERS ONE AND TWO	PRELAUNCH	MANDATORY ON TV		CMC/IU GUIDANCE LAUNC	CH ANALOGS
		c.	ADEG CHANNELS 90-93	PRELAUNCH	HIGHLY DESIRABLE		FOR DSC DISPLAYS	
		D.	VSM	PRELAUNCH	MANDATORY		FOR DISPLAY CAPABILIT	Y
		Е.	AUX VSM	PRELAUNCH	HIGHLY DESIRABLE			
		F.	EIDOPHORS (3)	PRELAUNCH	2 HIGHLY DESIRABLE			
		NOT	E: INDIVIDUAL FLIGHT CO MANDATORY PARAMETERS	TROLLERS WI	LL BE RESPONSIBLE FOR REPO HT DIRECTOR.	RTING LOS	OF DISPLAY CAPABILIT	Y OF
MI	ISSION	RE\	/ DATE	· · · · · · · · · · · · · · · · · · ·	SECTION		GROUP	PAGE
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				MISSION RULES		
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COM	MENTS
A	3-11	TIMING		1 MANDATORY	MCC TIMING STANDARD	
		A. MITE (2)	PRELAUNCH	I MANDATORY	MANDATORY RTCC/CCAT	
Α	3-12	COMMUNI CATIONS				
		A. MOCR				
		1. FD LOOP 2. AFD CONF LOOP	PRELAUNCH	1 OF 2 MANDATORY	FOR MISSION CONTROL	
		3. MOCR SYS 1 & 2 4. MOCR DYN	PRELAUNCH	ALL HIGHLY DESIRABLE		
		5. A/G 1 LOOP 6. A/G 2 LOOP	PRELAUNCH	1 OF 2 MANDATORY TO T-3+0;	7 MCC/CREW COMMUNICAT T-3+07 MILA CAN MAN IF REQUIRED.	
		B. MCC/LAUNCH COMPLE	ĸ			
		1. 121 - CLTC 2. 111 - CVTS 3. 212 - MSTC 4. ALL OTHER MCC, LAUNCH COMPLE:		1 OF 3 MANDATORY, OTHER HIGHLY DESIRABLE DESIRABLE	FOR TERMINAL COUNT OF MCC - PAD ACTIVI	
		LOOPS C. MCC/RSO				
		1. FD LINE TO RSC 2. RSO PRIVATE L 3. CAPE 111 RSO	INE PRELAUNCH	1 OF 3 MANDATORY, OTHER HIGHLY DESIRABLE	FOR TRAJECTORY VERI AND BOOSTER SAFING	FICATION
		D. MISCELLANEOUS				
		1. BSE TM MONITOL LOOP 2. CIF/USB LOOP		DESIRABLE	USED FOR MONITORING VEHICLES SUBSYSTEM	
-		E. MCC/REMOTED SITES TO THE MSFN SITES		1 LINE MANDATORY, 1 HIGHLY DESIRABLE	FOR MISSION CONTROL	AND A/G
	1					
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		RULES 3-13 THROUGH 3-16 ARE RESERVED				
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					MISSION RULES			
A. GSPC UNIVAC 494 (2) COMMUNICATIONS COMMUNICATIONS PRECESSOR PRECAUNCH 1 MANDATORY A. ONE UNIVAC 494 (2M PERCON ALL RECESSOR (2) SERVERS NOC AND CSPC B. WED (UNIS KERDE) LINES (3) SERVERS NOC AND CSPC PRECAUNCH (3) SERVERS NOC AND CSPC PRECAUNCH (3) SERVERS NOC AND CSPC 1 MANDATORY B. ETHER LINE CAN BE SUITURE 10 EITHER UNIVAC 494. A. J-18 SSC (2) SERVERS NOC AND CSPC PRECAUNCH (2) SIX LOW-SPEED GAD) 1 OF 3 HIGHLY DESIRABLE 1. FOR ACQ MESSAGE, LOW-SPEE OVD. A. J-18 SSC (IRCUTS SETTIONED (2) SIX LOW-SPEED GAD) PRECAUNCH (1) OF 5 MANDATORY (2) MILA VER ANTENNA (2) MILA VER ANTENNA (3) MILA VER ANTENNA (3) MILA VER ANTENNA (3) MILA VER ANTENNA (3)	REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COMM	ENTS
A. GSPC UNIVAC 494 (2) COMMUNICATIONS COMMUNICATIONS PRECESSOR PRECAUNCH 1 MANDATORY A. ONE UNIVAC 494 (2M PERCON ALL RECESSOR (2) SERVERS NOC AND CSPC B. WED (UNIS KERDE) LINES (3) SERVERS NOC AND CSPC PRECAUNCH (3) SERVERS NOC AND CSPC PRECAUNCH (3) SERVERS NOC AND CSPC 1 MANDATORY B. ETHER LINE CAN BE SUITURE 10 EITHER UNIVAC 494. A. J-18 SSC (2) SERVERS NOC AND CSPC PRECAUNCH (2) SIX LOW-SPEED GAD) 1 OF 3 HIGHLY DESIRABLE 1. FOR ACQ MESSAGE, LOW-SPEE OVD. A. J-18 SSC (IRCUTS SETTIONED (2) SIX LOW-SPEED GAD) PRECAUNCH (1) OF 5 MANDATORY (2) MILA VER ANTENNA (2) MILA VER ANTENNA (3) MILA VER ANTENNA (3) MILA VER ANTENNA (3) MILA VER ANTENNA (3)	A	3-17	GSFC					
A 3-18 SSC I. THREE TEXT CIRCUITS BETWEEN MCC AND GSFC I. OF 3 HIGHLY DESIRABLE I. FOR ACQ MESSAGE, LOW-SPEE CRO. A 3-18 SSC TELEMETRY A.1. TEL IV 30-FT ANTENNA 2. CIF UVF ANTENNA 3. MILA VF ANTENNA 3			A. GSFC UNIVAC 494 (2) COMMUNICATIONS	PRELAUNCH	1 MANDATORY	-	ALL NECESSARY FU	NCTIONS,
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A 3-18 XSC DELEMETRY 2. SIX LOW-SPEED GUUD CIRCUITS PRELAUNCH 1 OF 6 MANDATORY 2. FOR RECEPTION OF LOW-SPEE RADAR DATA. A 3-18 KSC DELEMETRY A.1. TEL IV 30-FT ANTENNA 2. CIF VYE ANTENNA 3. MILA VYE ANTENNA 3. MILA VYE ANTENNA 3. MILA VYE ANTENNA 4. C. CASTS PRELAUNCH 1 OF 3 MANDATORY FOR S-11 VYE TM BOTH DESIRABLE THESE ANTENNAS CAN BE SWITCHED TO MILA OR CIF FACILITIES. D. USB ANTENNAS 1. MILA 2. MMADY PRELAUNCH DESIRABLE TO SUPPORT ONLY CSM DATA SOURCE. COMAND THIS CAPABILITY IS DEFINED INDER KSC/MSFN COMMAND RULE 3-19 FOR LAUNCH COVIRAGE. TO SUPPORT ONLY CSM DATA SOURCE. MISSION END UNDER KSC CAPABILITY THE REQUIREMENT OF RULE 3-8. PRELAUNCH HIGHLY DESIRABLE MANDATORY THE REQUIREMENT OF RULE 3-12 COMUNICATIONS. MISSION END UNDER REV DATE SECTION GROUP PAGE PAGE MISSION A 1 12/11/68 GROUND INSTRUMENTATION REQUIREMENTS SPECIFIC - GSFC/KSC/MSFN 3-6		· .		EN .		75		
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APOLLO 8 A 12/11/68 GROUND INSTRUMENTATION REQUIREMENTS SPECIFIC - GSFC/KSC/MSFN 3-6		ISSION			SECTION		GROUP	PAGE
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				MISSION RULES		·	
ΕV	RULE	CONDITION/MALFUNCTIO	N PHASE	RULING		CUES/NOTES/COM	ENTS
	3-19	LAUNCH PHASE					
		KSC/MSFN SITES (SITES FROM LIFTOFF THROUGH		VARIABLE LAUNCH AZIMUTH) 60 SECONDS.	MUST PROVI	DE THE FOLLOWING CAP	ABILITIES
		CMD USB	PRELAUNCH	HIGHLY DESIRABLE			
		TM					
		CSM-USB MILA ALDS	PRELAUNCH	1 OF 2 MANDATORY			
		S-II VHF MILA ALDS	PRELAUNCH	1 OF 2 MANDATORY			
		S-IVB VHF MILA ALDS	PRELAUNCH	1 OF 2 MANDATORY			
		IU (S-BAND OR CCS) M	ILA LDS PRELAUNCH	1 OF 2 MANDATORY			
		TRACKING					
		C-BAND	PRELAUNCH		MINUTEC		
		USB	FRELAUNCH	1 OF 2 MANDATORY TO T+10	MINUTES		
	· .	A/G COMMUNICATIONS					
		USB	PRELAUNCH	MANDATORY			
		VHF SIMPLEX A	PRELAUNCH	HIGHLY DESIRABLE			
	2.1			· ·			
A .	3-20	GENERAL ORBITAL COVER	AGE				
				LITY OF PROVIDING THE MCC		M MISSION CONTROL SU	PPORT
		CMD USB	PRELAUNCH	HIGHLY DESIRABLE			
		<u>TM</u> VHF	PRELAUNCH	MANDATORY			
		USB	PRELAUNCH	MANDATORY			
	1.1	TRACK C-BAN	D PRELAUNCH	HIGHLY DESIRABLE			
		USB	PRELAUNCH	MANDATORY			
		A/G COMMUNICATIONS					
		VHF		HIGHLY DES IRABLE			
		USB	PRELAUNCH	MANDATORY			
	3-21	HSK, GDS, MAD	e de la composición d				
		IT IS MANDATORY 2 OF	3 OF THESE SITES	FOVIDE THE FOLLOWING CAPAE	BILITIES:		
		TM USB	PRELAUNCH	MANDATORY		TO COVER TRANSLUNAR	COAST A
		TRACK USB	PRELAUNCH	MANDATORY		LPO.	
		VOICE USB	PRELAUNCH	MANDATORY			
		RULES 3-22 THROUGH 3-24 ARE RESERVED.					
N	IISSION	REV DATE		SECTION		GROUP	PAG
AP	OLLO 8	A 12/11/68	GROUND INSTRUME	NTATION REQUIREMENTS	SPECIFIC	- GSFC/KSC/MSFN	3-7
	Imag the	m 291 (AUG 65)					

REV	RULE	C	ONDITION/MALFUNCTI	ON T	PHASE	RULING		CUES/NOTES/COM	IENTS
NLV		1		i		KOEANO		,	
	3-25		METER NETWORK SITE		PRELAUNCH	HIGHLY DESIRABLE			
		в.	CRO CYI		PRELAUNCH	1 OF 2 HIGHLY DESIRABLE		•	
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	OLLO 8	FIN	AL 11/7/68 (AUG 6δ)	GROUN	D INSTRUMEN	TATION REQUIREMENTS	SPECIFIC	- SPAN	3-8

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4 TRAJECTORY AND GUIDANCE

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EV	ITEM	MISSION RULES							
-•1	i								
	4-1	THE LAUNCH PHASE WILL BE TERMINATED FOR THE FOLLOWING	CONDITIONS:						
		A. VIOLATION OF VEHICLE BREAKUP LINE.							
Ì		B. $T_{FF} \leq 1 + 40$ AND DECREASING AFTER TOWER JETTISON.							
		C. VIOLATION OF ENTRY "G" LIMIT.							
		D. VS INCREASING.							
		E. OVERSPEED CONDITIONS AT INSERTION.							
·									
	4-2	THE LES WILL NOT BE JETTISONED UNTIL MODE II CAPABIL	TY IS ESTABLISHED BY T _{FF} >1	+ 20 AND INCREASING.					
	4-3	AFTER ACHIEVING "S-IVB TO ORBIT" CAPABILITY, EARLY ST	AGING WILL BE EXECUTED FOR	PREMATURE S-II SHUTDOWN					
		OR FAILURES AS OUTLINED IN SECTION 5.							
	4-4	MODE II, III, IV, AND APOGEE KICK							
		A. THE GROUND IS PRIME FOR ABORT MODE DETERMINATION	AND MANEUVER COMPUTATION.						
		B. MANEUVERS WILL BE INTERRUPTED WHEN T _{FF} = 1 + 40 Å	ND DECREASING.						
		C. MODE IV MANEUVERS WILL BE INTERRUPTED IF THE CURF	RENT ALTITUDE IS 75 NM, DECRE	ASING AND h_{0} <400K FT.					
		D. IF ENTERING, UTILIZE LIFT TO AVOID LAND. UNAVOID	DABLE LAND LANDING USE RL 90	۰.					
		E. MAXIMUM NUMBER OF SPS RESTART ATTEMPTS IS TWO.							
		F. IF NO SLA SEP OR IF SPS FAILS:							
		1. h_{p} <40 - EXECUTE CM/SM SEPARATION BY T _{FF} = 1	+ 40.						
		2. 40 < h_{D} <75 - GROUND WILL DECIDE TO USE SM RG		CE h TO 40 NM.					
		р		P					
Α	4-5	MODE III ABORTS							
		A. PREDICTED T _{FF} AFTER SPS CUTOFF <1 + 40.							
		1. FULL LIFT IP ON WATER - DO NOT BURN.	- 1 - 40 - DL 000						
		2. G\$N GO AND FULL LIFT IP ON LAND - BURN TO T							
		3. G&N NO-GO AND FULL LIFT IP ON LAND - BURN A I	REDUCED AV TO OBTAIN T	ER C/O AND RL 90°.					
		B. IF ∆T _B <u><</u> 2 SECONDS, DO NOT BURN.							
		C. IF IGNITION OCCURS AFTER GETI +10 SECONDS, BURN U $\Delta R = 0$, RL 90°)	JNTIL GEN $\Delta R = 0$, RL 55°. (IF UNABLE TO BURN					
	4-6	THE SPACECRAFT CMC WILL BE NO-GO FOR ABORT MANEUVER	DETERMINATION AND MONITORING	FOR THE FOLLOWING:					
	4-0								
		A. CMC PROGRAM FAILURE.							
		B. RTCC AND CMC T _{FF} DIFFERENCE >40 SECONDS.							
м	I ISSION	C. CONFIRMED ERROR IN S/C PLATFORM VELOCITY COMPONE REV DATE SECTION	NTS OF >50 FPS IN X OR 100 F	PS IN Z.					
cu		A 12/11/68 TRAJECTORY AND GUIDANCE	LAUNCH	4–1					

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MISSION RULES

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EV ITEM					
4-7	THE O	RBIT IS "GO"	IF h _p <u>≥</u> 75 №		
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	RULE 4-19	NUMBERS 4-8 ARE RESERVED	THROUGH		
MISSION	1	DATE	SECTION	GROUP	PAGE
POLLO 8	FINAL	11/7/68	TRAJECTORY AND GUIDANCE	LAUNCH	4-2

MISSION RULES

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and a sur-				MISSION I						
V	ITEM									
1	4-20	EARTH	ORBITAL AL	TITUDE CONSTRAINTS:						
		A. R	EAL-TIME MIS	SSION PLANNING						
		P	PERIGEE – 85 NM MINIMUM, MAXIMUM h IS DETERMINED BY THE AMOUNT OF SM-RCS AVAILABLE FOR HYBRID DEORBIT.							
		в. С	ONTINGENCY							
		Р	ERIGEE - 75	NM MINIMUM (VIOLATIONS WILL BE	CORRECTED ASAP)					
		I	Fh _p <75 NM	AND MANEUVER TO RAISE h IS NOT	POSSIBLE.					
		1	• 40 < h	<75 ~ EXECUTE SPS RETROGRADE ASA	PUNTIL n <40. IF NO SPS USE SM-R	cs.				
		2	• h _p <40 -	CM/SM SEP RETRO WILL RECOMMEND	ENTRY PROFILE.					
	4-21	THE S	EPARATION M	ANEUVER FOR CONTINGENCY CSM SEPA	RATION FROM S-IVB IS:					
		А. І	MPENDING S-	IVB EXPLOSION - 4 SECONDS SPS AS	AP. (7000 FEET SEPARATION IN 200 S	ECONDS.)				
	B. ATTITUDE RATES ≥5 DEG/SEC - 20 SECONDS RCS ASAP.									
C. YAW ATTITUDE > <u>60 DEG</u> - <u>20</u> SECONDS RCS ASAP.										
		PRIOR TO RETRO, 5 FPS RCS RETROGRA	DE WITH LINE ON							
1	4-22	SPACECRAFT COMPUTER TIMING UPDATES ARE REQUIRED FOR SET ERRORS GREATER THAN <u>.1</u> SECONDS.								
	4-23	TIME	BETWEEN EPO	RETROFIRE GETI AND 400K MUST BE	>9 MINUTES. IF NOT, RETARGET FOR	NEXT PTP.				
	4-24	IF SP	PS EPO RETRO	FIRE AT _B <u><7</u> SECONDS, USE SCS AUT	ο τνς.					
	4-25	PLANN	ied g \$ n and s	SCS RETROFIRE MANEUVERS WILL BE	UPDATED IF:					
		А. Т	HE COMPUTED	RETROFIRE POSITION CHANGES BY >	0.50 DEG LONGITUDE PRIOR TO GETI -	30 MINUTES.				
		в. т	HE COMPUTED	RETROFIRE POSITION CHANGES BY >	2 DEG LONGITUDE AFTER GETI - 30 MIN	IUTES.				
4	4-26	IF A	G&N FAILURE	IS DETECTED PRIOR TO RETROFIRE,	CREW USES SCS ΔV MODE WITH AN EMS	ENTRY.				
,	4-27	IF SP	S FAILS AFT	ER EPO RETROFIRE IGNITION OR NO	SLA SEP:					
		A. h	. >75 NM - 1	RETARGET FOR NEXT BEST PTP USING	THE RCS.					
		B. h	- p <75 NM - 1	REMAIN IN RETRO ATTITUDE AND BUF	N SM RCS USING FOLLOWING PRIORITY:					
		1	BURN AV I	RESIDUALS.						
		2	BURN MAX	IMUM SM AV AVAILABLE.						
		3	BURN CM I ALL THRU	RCS TO $h_p = 40$ NM IF SM RCS $\Delta V N$ STING AT T _{FF} = 7 MINUTES.	NOT SUFFICIENT TO OBTAIN 40 NM. IF	h _p <40 NM TERMINATE				
	SION	REV	DATE	SECTION	GROUP	PAGE				
	0101		+			- AGL				

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4-28 THE GAN IS NO-GO FOR ENTRY IF: A. CHC VALUE OF DOMEANEE BRGR (AP - R1) AT 126 DIFFERS 34100 INF FROM GRADD VALUE OF 34115 NM FROM BY SECOND PRONTY. B. CHC VALUE OF DOMEANEE BRGR (AP - R1) AT 126 DIFFERS 34100 INF FROM GRADD VALUE OF 34115 NM FROM BY SECOND BANK ANGLE AND RETIRE SECOND BANK ANGLE AND RETIRE BY SECOND BANK ANGLE AND YALL BY SECOND BANK ANGLE BY SECOND FILL 4 -30 THE S/C LIFT-OFF REFSHART WILL BE USED FOR BOTH TLI OPPORTUNITIES. A. CONTINUE MISSION TEXCUTE AND			•		MISSION RULES	_		
A. OK VALUE OF DOMRANKE BECKE OMARY VALUE. CREW FAILOVER BECKE OMARY VALUE. CREW FAILOVER BECKE OMARY VALUE. CREW FAILOVER SECON PANDINT. B. V AND V AT MORK ARE CUTSIDE CORRID.R. GROUND WILL PROVIDE ENTRY PROFILE. 4-29 THERE WILL BE ND BOOSTER NA/IGATION OR TARGET UPDATES FOR EITHER TLI OPPORTUNITY. 4-30 THE OK STATE VECTOR WILL BE UPDATED PLOR TO TULI WITH BEST MSFN VECTOR. 4-31 A PROPERLY OPERATING GEN COC + JND AD 5-IVB INERTIAL GUIDANCE SYSTEM ARE MANDATORY FOR TLI. A +-32 THE MAXIMUM ALLOWABLE MISAL COMENT RAT BETWEEN THE IU AND IMU IS 0.6 DEG/ R. IN ANY AXIS. 4-33 THE S/C LIFT-OFF REFSMAT WILL BE USED FOR BOTH TLI OPPORTUNITIES. A. CONTINUE MISSION FUEL RESERVES 31000 FPS. 4-34 DISPERSED S-IVB TLI CUTOPF. A. PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVES 31000 FPS. A. CONTINUE MISSION EXECUTE MIDCURES CORRECTIONS CON- SISTER'S WITH LUNAR ORBIT MISSION, ULAWE VARY WITH DAILY MINON, AND TLI. B. PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVES 31000 FPS. B. 1. ORDIT NUEL RESERVES 3500 FPS. 1. CONTINUE MISSION FUEL RESERVES 31000 FPS. 2. PREDICTED END OF LUNAR CREDIT FISSION FEE BETURN FLYSY MISSION FUEL RESERVES 3500 FPS. 1. CONTINUE MISSION FUEL RESERVES 31000 FPS. 2. PREDICTED END OF LUNAR CREDIT FISSION FEE BETURN FLYSY. 1. CONTINUE MISSION FUEL RESERVES 31000 FPS. 3. PREDICTED END OF LUNAR FLYSY MISSION FUEL RESERVES 3500 FPS. 2. PREDICTED NO OF LUNAR ROOT MISSION OR DIRECT ARORT. 1. PREDICTED END OF LUNAR FLYSY MISSION FUEL RESERVES 3500 FPS. 3. P	REV	RULE	CONDITION/MALFUNCT	ION PHASE	RULING	CL	JES/NOTES/COMME	NTS
8. V AND Y AT 460K ARE OUT SIDE CORRID R. GROUND WILL PROVIDE ENTRY PROFILE. Image: Constant of the constant of		4-28	A. CMC VALUE OF DON BACKUP CHART VAN	NRANGE RROR (RP -	RT) AT .2g DIFFERS >±100 N TO EMS ENTRY AS FIRST PRIC	M FROM GROUND VALI RITY OR GROUND BAI	UE OF >±115 NM NK ANGLE AND RE	FROM
4-30 THE ORC STATE VECTOR WILL BE UPDATED PIOR TO TLI WITH BEST MSEN VECTOR. 4-31 A PROPERLY OPERATING GEN (CMC + IMU) ALD S-IVB INERTIAL GUIDANCE SYSTEM ARE MANDATORY FOR TLI. A 4-32 THE MAXIMUM ALLOWABLE MISAL GAMENT RAT BETMEEN THE IU AND IMU IS 0.6 DEG/ TR IN ANY AXIS. 4-33 THE S/C LIFT-OFF REFSMAT MILL BE USED FOR BOTH TLI OPPORTUNITIES. 4-34 DISPERSED S-IVB TLI CUTOFF. A. PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVES _DIDU FPS. A. CONTINUE MISSION: EXECUTE MISSION FUEL RESERVES ARE AFTER EXCUTE MISSION FUEL RESERVES _DIDU FPS. B. PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVES _DIDU FPS. A.D. RESERVES _DIDU FPS. B. PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVES ARE AFTER EXCUTE MISSION FUEL RESERVES _DIDU FPS. A.D. RESERVES _DIDU FPS. A.D. B. PREDICTED END OF LUNAR OR DIT RESERVES _DIDU FPS. A.D. I. CONTINUE MISSION, FUEL RESERVES ARE AFTER EXCOUNTE MISSION FUEL RESERVES _DIDU FPS. A.D. I. PREDICTED END OF LUNAR FLYSY MISSION FUEL RESERVES _DIDU FPS. A.D. I. PREDICTED END OF CLUNAR FLYSY MISSION FUEL RESERVES _DIDU FPS. A.D. PREDICTED END OF FS. J. PREDICTED END OF FS. I. CONTINUE MISSION RULE RESE					R. GROUND WILL PROVIDE EN	ITRY PROFIE.		
4-31 A PROPERLY OPERATING GEN (CC + IMU) ALD S-IVE INERTIAL GUIDANCE SYSTEM AR MANDATORY FOR TLI. A 4-32 THE MAXIMUM ALLOWABLE MISAL GUMENT RAT BETWEEN THE IU AND IMU IS 0.6 DEG/ R IN ANY AXIS. 4-33 THE S/C LIFT-OFF REFSMAT W LL BE USED FOR BOTH TLI OPPORTUNITIES. A. 4-34 DISPERSED S-IVB TLI CUTOFF. A. A-34 DISPERSED S-IVB TLI CUTOFF. A. CORDIT MISSION FUEL RESERVES 2000 OF LUNAR ORBIT MISSION. EXECUTE MISSION FUEL RESERVES ARE AFTER EXECUTE MISSION. B. PREDICTED END OF LUNAR ORBIT MISSION. B. B. PREDICTED END OF LUNAR ORBIT MISSION, FUEL RESERVES 2000 FPS. AND: PREDICTED END OF LUNAR ORBIT MISSION, FUEL RESERVES 2000 FPS. AND: I. CONTINUE MISSION; EXECUTE MISSION; FUEL RESERVES 2000 FPS. 1. PREDICTED END OF LUNAR ORBIT MISSION, FUEL RESERVES 2000 FPS. I. CONTINUE MISSION; EXECUTE MISSION; EXECUTE MISSION; FUEL RESERVES 2000 FPS. 2. PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVES S. SIDIO FPS. I. CONTINUE MISSION; EXECUTE MISSION FUEL RESERVES S. SIDIO FPS. 2. PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVES S. SIDIO FPS. I. CONTINUE MISSION; EXECUTE ARE RETURN FLIPTY MISSION CRAPATER EXECUTE ARE RETURN FLYBY. 2. PREDICTED END OF LUNAR ORBIT MISSION OR DIRECT ARESERVES SIDIO FPS. I. CONTINCENT ARE RESERV		4-2 9	THERE WILL BE NO BO	OSTER NA/IGATION OF	TARGET UPDATES FOR EITHER	TLI OPPORTUNITY.		
A 4-32 THE MAXIMUM ALLOWABLE MISAL GRMENT RAT BETWEEN THE IU AND IMU IS 0.6 DEG/ % IN ANY AXIS. 4-33 THE S/C LIFT-OFF REFSMAT WILL BE USED FOR BOTH TLI OPPORTUNITIES. A. PRODUCTO END OF LUNAR ORBIT MISSION: EXECUTE MIDCOURSE CORRECTIONS CONSISTENT WITH LUNAR ORBIT A. END OF LUNAR ORBIT MISSION FUEL RESERVES .21000 FPS. A. CONTINUE MISSION: EXECUTE MIDCOURSE CORRECTIONS CONSISTENT WITH LUNAR ORBIT A. END OF LUNAR ORBIT MISSION FUEL RESERVES .21000 FPS. B. B. B. B. B. B. B. B. B. 4.500 FT/SEC IS RESERVED ADOF LUNAR OR DIT MISSION; EXECUTE MIDCOURSE CORRECTIONS OF DADY MOLE AND: B. B. 4.500 FT/SEC IS RESERVED ARE ATTER EXECUTION OF EAP MCC, LUC CATUAL, VALVES VARY WITH DATIT MISSION FUEL RESERVES .2000 FPS. B. B. B. 4.500 FT/SEC IS RESERVED ARE ATTER EXECUTE MIDCOURSE CORRECTIONS FOR FREE RETURN FLYBY. CACTUAL VALVES VARY WITH DATIONS, END OF LUNAR OR DIT MISSION FUEL RESERVES ARE ATTER EXECUTION OF FUEL RESERVES ARE ATTER EXECUTE MIDCOURSE CORRECTIONS FOR FREE RETURN FLYBY. B. CONTINUE MISSION; EXECUTE MIDCOURSE CORRECTIONS FOR FREE RETURN FLYBY. B. CONTINUE MISSION; EXECUTE ADD OF LUNAR OR DIT MIDCOURSE CORRECTIONS FOR FREE RETURN FLYBY. B. CONTINUE MISSION FUEL RESERVES ARE ATTER EXECUTE MIDCOURSE CORRECTIONS FOR FREE RETURN FLYBY. CONTINUE MISSION FUEL RESERVES ARE ATTER EXECUTE ADD OF LUNAR OR DIT MID THISTON OR DIRECT ADD THE ADD FLI CONTINUE MISSION FUEL RESERVES ARE ATTER EXECUTE ADD		4-30	THE CMC STATE VECTOR	R WILL BE UPDATED F	IOR TO TLI WITH BEST MSFN	VECTOR.		
4-33 THE S/C LIFT-OFF REFSMAT WILL BE USED FOR BOTH TLI OPPORTUNITIES. 4-34 DISPERSED S-IVB TLI CUTOFF. A. CONTINUE MISSION: EXECUTE MIDCOURSE CORRECTIONS CONSISTEMENT WITH LIMAR ORBIT A. PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVES > 1000 FPS. A. CONTINUE MISSION: EXECUTE MIDCOURSE CORRECTIONS CONSISTEMENT WITH LIMAR ORBIT B. PREDICTED END OF LUNAR ORBIT MISSION. B. B. B. B. PREDICTED END OF LUNAR ORBIT MISSION. B. B. B. I. PREDICTED END OF LUNAR ORBIT MISSION, FUEL RESERVES ARE AFTER EXECUTION OF FUEL RESERVES > 1000 FPS. B. B. 1. PREDICTED END OF LUNAR ORBIT MISSION, FUEL RESERVES ARE AFTER EXECUTE MIDCOURSE CORRECTIONS FOR FOR CONTINUEM VISION FUEL RESERVES > 5500 FPS. 1. CONTINUE MISSION; EXECUTE MIDCOURSE CORRECTIONS FOR FOR FOR FUEL RESERVES > 5500 FPS. 2. PREDICTED END OF LUNAR FLYEY MISSION FUEL RESERVES ARE AFTER EXECUTION OR DIRECT ABORT. 2. PREPORM ALTERNATE EARTH ORBIT MISSION OR DIRECT ABORT. MISSION FUEL RESERVES SCONFESS SS00 FPS. 2. PREPORM ALTERNATE EARTH ORBIT MISSION OR DIRECT ABORT. MISSION REV DATE SECTION GROUP PAGE MISSION REV DATE SECTION GROUP <t< td=""><td></td><td>4-31</td><td>A PROPERLY OPERATING</td><td>G G&N (CHC + IMU) /</td><td>ND S-IVB INERTIAL GUIDANCE</td><td>SYSTEM ARE MANDAT</td><td>ORY FOR TLI.</td><td></td></t<>		4-31	A PROPERLY OPERATING	G G&N (CHC + IMU) /	ND S-IVB INERTIAL GUIDANCE	SYSTEM ARE MANDAT	ORY FOR TLI.	
4-34 DISPERSED S-IVB TLI CUTOFF. A. PREDICTED END OF LUMAR ORBIT MISSION FUEL RESERVES >1000 FPS. A. CONTINUE MISSION: EXECUTE MIDCOURSE CORRECTIONS CON- SISTENT WITH LUMAR ORBIT MISSION. A. END OF LUMAR ORBIT MISSI FUEL RESERVES ARE ATER EXECUTION OF BAP MCC, LC CIRCULATION, AND TEI. CACTUAL VALVES VARY WITH DAILY WINDOW. B. PREDICTED END OF LUMAR ORBIT MISSION FUEL RESERVES <1000 FPS.	А	4-32	THE MAXIMUM ALLOWAB	LE MISAL ^I GNMENT RAT	BETWEEN THE IU AND IMU IS	0.6 DEG/HR IN AN	Y AXIS.	
A. PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVES >1000 FPS. A. CONTINUE MISSION: EXECUTE MIDCOURSE CORRECTIONS CON- SISTENT WITH LUNAR ORBIT MIDSIONS CON- SISTENT WITH LUNAR ORBIT MISSION. A. END OF LUNAR ORBIT MISSI FUEL RESERVES ARE AFTER EXECUTION OF BAP MCC, LC CIRCULATION, AND TEL. (ACTUAL VALVES VARY WITH DAILY MINDOW.) B. PREDICTED END OF LUNAR ORBIT MISSION FUEL RESERVES (1000 FPS. AND: B. B. 4500 FT/SEC IS RESERVED FOR CONTINGENCY ABORT SITUATIONS. END OF LUW FIVEW MISSION FUEL RESERVES ARE AFTER EXECUTE MIDCOURSE CORRECTIONS FOR FUEL RESERVES >5500 FPS. B. 4500 FT/SEC IS RESERVED OUT OF GROUPS AND FUEL RESERVES ARE AFTER EXECUTE MIDCOURSE CORRECTIONS FOR FUEL RESERVES >5500 FPS. 1. PREDICTED END OF LUNAR FLYBY MISSION FUEL RESERVES <5500 FPS.		4-33	THE S/C LIFT-OFF REF	FSMMAT WILL BE USED	FOR BOTH TLI OPPORTUNITIES	5.		
ORBIT MISSION FUEL RESERVES <1000 FPS. AND: FOR CONTINGENCY ABORT SITUATIONS. END OF LUNA FUEL RESERVES ARE AFTER EXECUTE LUNAR FLYBY MISSION FUEL RESERVES >5500 FPS. 1. CONTINUE MISSION; EXECUTE MIDCOURSE CORRECTIONS FOR FREE RETURN FLYBY. 1. CONTINGENT UPON CHEC OUT OF GROUND CAPA- BILITY TO COMPUTE LARGE INITIAL MCC. 2. PREDICTED END OF LUNAR FLYBY MISSION FUEL RESERVES <5500 FPS.		4-34	A. PREDICTED END OF ORBIT MISSION F	F LUNAR UEL	MIDCOURSE CORRECTIONS SISTENT WITH LUNAR OF	G CON- FU RBIT EXI CII (Ar	EL RESERVES ARE ECUTION OF BAP RCULATION, AND CTUAL VALVES VA	E AFTER MCC, LOI, TEI.
LUNAR FLYBY MISSION FUEL RESERVES >5500 FPS. MIDCOURSE CORECTIONS FOR FREE RETURN FLYBY. OUT OF GROUND CAPA- BILITY TO COMPUTE LARGE INITIAL MCC. 2. PERFORM ALTERNATE EARTH UNAR FLYBY MISSION FUEL RESERVES <5500 FPS.			ORBIT MISSION F	JEL	В.	FOI SI FL RE TI (A	R CONTINGENCY A TUATIONS. END YBY MISSION FUE SERVES ARE AFTE ON OF FLYBY MCC CTUAL VALVES VA	ABORT OF LUNAR EL ER EXECU- C ONLY.
LUNAR FLYBY MISSION FUEL RESERVES <5500 FPS.			LUNAR FLYBY FUEL RESERV	MISSION	MIDCOURSE CORRECT	IONS FOR	OUT OF GROUND BILITY TO COM	d capa- Mpute
APOLLO 8 A 12/11/68 TRAJECTORY AND GUIDANCE EARTH ORBIT AND TLI 4-4			LUNAR FLYBY FUEL RESERVI	MISSION	ORBIT MISSION OR			
APOLLO 8 A 12/11/68 TRAJECTORY AND GUIDANCE EARTH ORBIT AND TLI 4-4			• •					
APOLLO 8 A 12/11/68 TRAJECTORY AND GUIDANCE EARTH ORBIT AND TLI 4-4								
APOLLO 8 A 12/11/68 TRAJECTORY AND GUIDANCE EARTH ORBIT AND TLI 4-4					SECTION			DACE
REC/TSC Form 291 (AUG 68)								+-4

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				MISSION RULES		
REV	RULE	CONDITION/MALFUNCTION	N PHASE	RULING	CUES/NOTES/C	OMMENTS
	4-35	DIFFERENCE IN CMC AND I PLATFORM VELOCITY COMPO NENTS OR TOTAL VELOCITY AT INSERTION: A. VIOLATION OF ANY OF)-	A. TLI IS NO-GO.		
		FOLLOWING: $\Delta \dot{x} > 34.8$ FPS	1112			
		ΔX > <u>94.8</u> FPS ΔY > <u>64.2</u> FPS		· · · ·		
		ΔZ > <u>86.6</u> FPS	· · ·			
		ΔV _T > <u>32.4</u> FPS				
		B. FOR ANY OF THE FOLLOWING:		B. TLI IS TEMPORARILY NO	O-GO. B. REFER TO ORBI PARAMETERS (P.	
		<u>7.4</u> < ΔX < <u>34.8</u>				
		<u>44.6</u> < ΔY < <u>64.2</u>				
		<u>27.0</u> < ΔZ < <u>86.6</u>				
		<u>13.0</u> < 2V _T < <u>32.4</u>				
		C. VIOLATION OF ANY OF FOLLOWING ORBITAL D SION PARAMETERS AT GET = 1 HR 45 MIN.		C. TLI IS NO-GO.	C. IU COMPARED T	O MSFN.
		ΔΑ > <u>17,400</u> FT				
		ΔW > <u>31.2</u> FT/SEC		l		
		∆W > <u>26,400</u> FT				
	4-36	DIFFERENCE IN MSFN AND DOWNRANGE POSITION (AR > <u>103,500</u> FT. AT GET = 5 MIN.	IU ,) 55	TLI IS NO-GO.		
		·				
			.			
		RULES 4-37 THROUGH 4-45 ARE RESERVED.				
MI	SSION	REV DATE		SECTION	GROUP	PAGE
APC	DLLO 8	INAL 11/7/68	TRAJECTORY AND G	GUIDANCE	EARTH ORBIT AND TLI	4-5
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REV	ITEM	
	4-46	THE CMC WILL BE NO-GO FOR MANEUVER CONTROL FOR ANY OF THE FOLLOWING:
		A. COMPUTER PROGRAM FAILURE.
		B. CMC/IMU ALIGNMENT DISCREPANCY (FOR MANEUVER EXECUTION, MONITORING, AND ORBIT DETERMINATION.
		 SEXTANT STAR CHECK: AUTO OPTICS POSITIONING DOES NOT PLACE SELECTED STAR IN FIELD OF VIEW OF SXT.
		2. HORIZON CHECK ERROR >4 DEG FOR RETROFIRE FROM EPO.
	4-47	MODE III, MODE IV, APOGEE KICK OR EPO RETROFIRE WILL BE COMPLETED BY MANUAL TAKEOVER FOR ANY OF THE FOLLOWING:
		A. ATTITUDE EXCURSIONS >5 DEG.
		B. V _G INCREASING.
	4–48	LOI (ONE & TWO), TEI, TLC ABORTS AND LUNAR ORBIT ABORTS WILL BE COMPLETED BY MANUAL TAKEOVER FOR ANY OF THE FOLLOWING:
		A. ATTITUDE EXCURSIONS >10 DEG.
		B. ATTITUDE RATES ≥10 DEG/SEC. } EXCLUDING START TRANSIENTS
А	4-49	MIDCOURSE CORRECTIONS, LOI AND LUNAR ORBIT CIRCULARIZATION WILL BE TERMINATED AFTER MANUAL TAKEOVER AND RATE DAMPING FOR ATTITUDE RATES >10 DEG/SEC.
	÷	
} .	}	
	4	
1		
		RULES 4-50 THROUGH 4-55 ARE RESERVED.
M	ISSION	REV DATE SECTION GROUP PAGE
1	LLO 8	A 12/11/68 TRAJECTORY AND GUIDANCE MANEUVER 4-6
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MISSION RULES

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A 4–56	CONDITION/MALFUNCTIO		RULING	CUES/NOTES/CC	OMMENTS
A 4–56	NOMINAL EXECUTION POI				
	 A. TLI C/O + 6 HRS. B. TLI C/O + 25 HRS. C. LOI - 22 HRS. D. LOI - 8 HRS. 			THE MANEUVER EXEC CRITERIA (RULE 4- APPLIED TO MANEUV LATED AT THESE PO EARLIEST MCC IS A +4 HRS.	57) WILL BE ERS CALCU- DINTS.
4-57	TRANSLUNAR MIDCOURSE CORRECTION EXECUTION CRITERIA. A. FIRST MCC <3 FPS TLI C/O +6 HRS.	AT	A. DO NOT EXECUTE MCC AT TIME	PLANNED A. THREE FPS IS VELOCITY UNCEI TIME OF MANEU TATION.	RTAINTY AT
	B. ALL SUBSEQUENT MC 1. $\Delta V_{MCC} < 1$ FPS 2. 1 FPS $\leq \Delta V_{MCC}$ 3. $\frac{5}{FPS} = FPS < \Delta V_{MCC}$ 4. $\Delta V_{MCC} > 10$ FPS	≤ < ¹⁰	 B. 1. DO NOT EXECUTE MC PLANNED TIME. (ELAST MCC) 2. CONSIDER LATER MC TO ALLOW ΔV > 5 FP 3. EXECUTE MCC WITH PLANNED TIME. 4. SCHEDULE EARLIER TIME TO ALLOW RED IN ΔV. 	XCEPTION- MSFN TRAC TAINTY AF 2. <u>5</u> FPS IS IMPULSE; SPS AT MCC	KING UNCER- TER 20 HRS. SPS MINIMUM MAY BE RCS AT
4-58	THE G&N WILL BE THE F	RIMARY MODE OF EX	CUTING TRANSLUNAR MIDCOURS	E CORRECT ONS: (A) RCS (B)	SPS > <u>7</u> SEC.
4-59	THE RESIDUALS OF ALL	TRANSL NAR MCC'S	TILL BE TRIMMED TO .2 FPS I	N ALL AXE	
A 4~60	PERILUIDINE ALTITUDES BE OVER THE L'UNAR LANDIN		NM WILL BE CONSIDERED IN	ORDER TO ETAIN MINIMUM MISS	DISTANCE
	REV DATE		SECTION	GROUP	PAGE
MI SS ION					

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		, .	· · ·	MISSION RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
A	4-61	A "GO" FOR LOI REQUIRES A. COMMITMENT TO AT LE 4 HOURS IN LPO.			Α.	THIS PROVIDES O TRACKING POST-L CALCULATION OF	OI FOR
		B. ADEQUATE FUEL REMAN FOR SUBSEQUENT MISS OPERATIONS.	INING 510N		В.	INCLUDES LOI, C ZATION, TEI, AN	IRCULARI- D RESERVES.
		C. hpc >50 NM					
Α	4-62	PREMATURE LOI SHUTDOWN:					
		A. RESULTING APOLUNE <≈ <u>9000</u> NM AND PERILUNE >25 NM		A. EVALUATE TEI/CIRCUL	ARIZATION A.	(CORRESPONDING APOLUNE ALTITUD ≈8900 NM-CONIC	E IS
		B. RESULTING APOLUNE >≈ <u>9000</u> NM	В	B. DO DIRECT RETURN AB ASAP.	ORT BURN		
		C. RESULTING h_p <25 N	4	C. PERFORM MANEUVER(S) h_p >40 NM ASAP.	TO RAISE		
A	463	THE MAXIMUM ALLOWABLE SHIFT IN THE LINE OF APSIDES OF RESULTANT LUNAR PARKING ORBIT IS ±30 DEG.					
A		RULES 4-64 THROUGH 4-75 ARE RESERVED.					
MI	SSION	REV DATE	F	SECTION		ROUP	PAGE
APC	DLLO 8		RAJECTORY AND GU	······································			
		221 (AUC 68)			TRANSLUNAR C	UAST	4-8

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			DITION/MALFUNCTI		PHASE		RULING	•	CUES/NOTES/COM	MENTS
		THE C	IRCULARIZATION M							
				ANEUVEI	WILL NOT 8	E TARGETED	TO REMOVE	ANY OUT-OF-PLAN	E VELOCITY.	
	4-77	A "GC REQUI	" FOR CIRCULARIZ	ATION			·			
		Comm 1 Hours LPO	TMENT TO AT LEAS IN <u>60</u> NM CIRCUL	AR <u>4</u>					THIS PROVIDES ONE R TRACKING POST-CIRCU FOR CALCULATION OF	LARIZAT ION
	4-78		R ORBIT ALTITUDE RAINTS							
		F	REAL-TIME MISSION PLANNING - PERILU 50 NM MINIMUM.							
		M -	CONTINGENCY (VIOL MUST BE CORRECTED • PERILUNE <u>25</u> NM MINIMUM.							
							×			
										·
			5 4-79 THROUGH 4- RESERVED.	-85						
MISS	STON	REV	DATE			SECT ION				
APOLLO			11/7/68	TPΔ.%=	CTORY AND			LUNAR OR	GROUP	PAGE 4-9
			AUG 68)							

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		MISSION RULES										
REV	ITEM											
	4-86	TRANSEARTH MCC'S WILL BE TARGETED TO ACHIEVE ENTRY CONDITIONS AS FOLLOWS:										
		A. IF V _{FI} <u>>30,000</u> FPS <u>OR</u> G&N NO-GO, USE STEEP TARGET LINE.										
		B. IF $V_{EI} < \frac{30,000}{100}$ FPS and G&N GO, USE SHALLOW TARGET LINE.										
А	4-87	TRANSEARTH MCC PHILOSOPHY.										
		A. TEC MCC WILL NOT USE LANDING POINT CONTROL UNLESS THE LANDING POINT IS UNACCEPTABLE.										
		B. MCC'S WITH AV LESS THAN TWICE MSFN HORIZONTAL VELOCITY ACCURACY WILL NOT BE EXECUTED.										
		2 X MSFN \approx 2 FPS BEFORE EI-50 HRS 2 X MSFN \approx 1 FPS AFTER EI-50 HRS										
		C. IF YEI IS OUTSIDE THE ENTRY CORRIDOR BY > MSFN ACCURACY, EXECUTE MCC ASAP (EXCEPTION: FIRST TEC MC										
		D. LAST MCC WILL BE SCHEDULED NO LATER THAN EI-2 HOURS.										
		E. THE G&N WILL BE THE PRIMARY MODE OF EXECUTING ALL TEC MCC'S. (A) RCS (B) SPS > 7 SEC.										
		F. MCC'S > <u>12</u> FPS WILL USE SPS IF PRACTICAL.										
		G. THE X-AXIS RESIDUALS OF SPS MCC'S WILL BE TRIMMED TO WITHIN .2 FPS.										
	4-88	TEC MCC'S FOR LANDING AREA CONTROL:										
		A. PRIOR TO EI- <u>24</u> HRS: WILL BE EXECUTED FOR RECOVERY ACCESS VIOLATIONS, UNACCEPTABLE WEATHER AT SPLASH, OR IF ANY PART OF THE OPERATIONAL FOOTPRINT IS ON LAND.										
		B. AFTER EI- <u>24</u> HRS: WILL NOT BE EXECUTED.										
	4-89	ENTRY CONDITIONS WILL BE CONTROLLED TO AVOID HEAT SHIELD LIMITATIONS.										
	4-90	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 <25,500 FPS.										
	4-91	WEATHER AVOIDANCE WITH AERODYNAMIC LIFT WILL NOT BE ATTEMPTED UNLESS THE G&N IS OPERATIONAL, OR EMS-INDICATED VELOCITY < <u>25,500</u> FT/SEC.										
	4-92	PREDICTED ENTRY CORRIDOR VIOLATION AFTER LAST MCC OPPORTUNITY (EI-2 HRS):										
		A. UNDERSHOOT LINE EXCEEDED: GROUND ADVISE CREW TO FLY FULL LIFT UNTIL PEAK G IS PASSED THEN FLY G&N.										
		B. OVERSHOOT LINE VIOLATED: GROUND ADVISE CREW TO FLY NEGATIVE LIFT TO 2 G'S FOLLOWED BY <u>4</u> G CONSTANT G ENTRY.										
M	ISSION	REV DATE SECTION GROUP PAGE										
A D C	LLO 8	A 12/11/68 TRAJECTORY AND GUIDANCE TRANSEARTH AND ENTRY 4-10										

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NASA — Manned Spacecraft Center

SECONSERVICES

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REV	ITEM						
	4-93		E EMS INDIC	ATES A SKIP CONDITION, NEGATIVE	LIFT SHOUL	D BE ACHIEVED PRIOR TO VERI	FYING THE EMS
	4–94		HE EMS INDIC	ATES AN UNDERSHOOT CONDITION EXI SS CHECKS.	STS, FULL	LIFT SHOULD BE ACHIEVED PRI	OR TO VERIFYING
A	4-95	THE	SEN IS NO-GO	DURING ENTRY IF:			
				DIFFERS FROM GROUND VALUE BY GR	EATER THAN	±800 FPS.	
			-	D ₁ DIFFERS FROM GROUND VALUE BY	•		
				CTORY TO VIOLATE THE OFFSET LIMI			*
		D. (AUSES TRAJE	CTORY TO VIOLATE ONSET LIMITS (G	ON EMS S	CROLL.	
		E. 1	F G&N TRIM	ATTITUDES AT CM/SM SEPARATION DI	FFER FROM I	HORIZON MONITOR ATTITUDE BY	>5 DEGREES.
		F. I	F THE G&N T	RIM ATTITUDES AT .05G DIEFERS FR	OM THE GROU	UND VALUES BY >5 DEGREES.	
		G. I	F CMC FAILS	TO SEQUENCE FROM P63 TO P64 AT	RET .05G ±	5 SEC.	
- X							
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1							
	· · .						
			6 4-96 THROUG	GH 4-100			
м	ISSION	REV	DATE	SECTION		GROUP	PAGE
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MISSION RULES

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REV	ITEM	
	4-101	IF SAFING CANNOT BE CONFIRMED BY THE BRSO OR OTHER NASA TELEMETRY SOURCES, 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, NON- INTERFERENCE WITH OTHER COMMAND FUNCTIONS, AND TELEMETRY DISPLAY AVAILABILITY. AT THE AGREED TIME FIDO WILL STATE, "COMMAND CLEAR, RSO SEND SAFE". UPON CONFIRMATION, THE RSO WILL STATE, "SAFING CONFIRMED".
		TRACKING SOURCES:
	4-102	AT LEAST TWO VEHICLE POSITION DATA SOURCES ARE <u>MANDATORY</u> BEFORE LAUNCH FOR EACH PHASE OF POWERED FLIGHT TO ENABLE THE RANGE SAFETY OFFICER TO DETERMINE IF THE SPACE VEHICLE IS NORMAL OR VIOLATES ESTABLISHED INFLIGHT SAFETY CRITERIA.
	4-103	DATA FROM TWO (2) OF THE FOLLOWING THREE (3) RADARS ARE <u>MANDATORY</u> BEFORE LAUNCH (OTHER HIGH DESIRABLE): BERMUDA FPS-16, BERMUDA FPQ-6, AND GRAND TURK TPQ-18.
	4-104	XY, XZ, AND IP PLOTS AT BERMUDA USING INPUTS FROM EITHER THE BDA FPS-16 OR BDA FPQ-6 RADAR ARE MANDATORY FOR LAUNCH. OTHER IS <u>HIGHLY DESIRABLE</u> .
	4-105	ODOP DATA TO THE CAPE KENNEDY RTCS FOR IP COMPUTATION AND RSO DISPLAY DURING FIRST STAGE BURN IS <u>HIGHLY DESIRABLE</u> .
		AIRBORNE SYSTEMS:
	4-106	TWO OPERATIONAL RANGE SAFETY COMMAND RECEIVERS ON EACH LAUNCH BOOSTER STAGE (THE S-IC, S-II AND THE S-IVB) ARE <u>MANDATORY</u> FOR LAUNCH. THE RANGE SAFETY SUPERVISOR (CRSS) WILL DETERMINE IF THE RECEIVERS ARE OPERATING PROPERLY FOR LAUNCH.
	4-107	THE IU C-BAND BEACON SYSTEM (2 BEACONS) IS MANDATORY FOR LAUNCH.
		COMMAND/CONTROL:
	4-108	THE NASA BERMUDA DRS COMMAND/CONTROL SYSTEM IS MANDATORY FOR LAUNCH.
	4-109	RANGE SAFETY COMMANDS ("ARM/MFCO" AND "DESTRUCT/PD") WILL HAVE MANDATORY PRECEDENCE OVER ALL OTHER COMMANDS. TIMERS IN THE RSO CONSOLE WILL PROVIDE A 4 SECOND TIME DELAY BETWEEN "ARM/MFCO" AND "DESTRUCT/PD".
		COMMUNICATIONS:
	4-110	TWO PRIVATE, INDEPENDENT, GEOGRAPHICALLY DIVERSIFIED COMMUNICATION LINKS BETWEEN THE RSO AND BRSO ARE MANDATORY.
	4-111	TWO OF THE FOLLOWING THREE COMMUNICATIONS LINKS ARE MANDATORY BETWEEN THE RSO AND FD/FIDO:
		A. RSO LOOP (CAPE 111).
		B. RSO PRIVATE LINE (GREENPHONE/YELLOWPHONE).
		C. FLIGHT DIRECTOR'S LOOP.
MI	SSION	REV DATE SECTION GROUP PAGE
-	OLLO 8 SG Form	FINAL 11/7/68 TRAJECTORY AND GUIDANCE RANGE SAFETY 4-12

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REV	ITEM 4-112	A COMMUNICATIONS LINK BETWEEN RSO AND RANGE SAFETY SUPERVISOR (CRSS) AT THE LAUNCH CONTROL CENTER IS MANDATORY.
A	4-113	HIGHLY DESIRABLE.
	4-114	TELEMETRY: IU TELEMETRY DATA (ONBOARD GUIDANCE PARAMETERS) TO THE RTCS ARE HIGHLY DESIRABLE FROM T+0 UNTIL
		S-IVB CUTOFF FOR IP COMPUTATION AND RSO DISPLAY.
	4–115	TELEMETRY REQUIREMENTS TO BE DISPLAYED FOR THE RSO AND BRSO ARE <u>HIGHLY DESIRABLE</u> . FOR LAUNCH VEHICLE AND SPACECRAFT HARDWARE ENTRIES AND APPROPRIATE CATEGORIES, REFERENCE THE FOLLOWING ITEMS:
		(1) FOR RSO DISPLAY: TO BE DETERMINED
		(2) FOR BRSO DISPLAY: TO BE DETERMINED
		WEATHER:
	4-116	ANNUAL PROFILE WIND RESTRICTION TO BE DETERMINED.
	4-117	MINIMUM RANGE SAFETY CEILING AND VISIBILITY TO BE DETERMINED.
		RULES 4-118 THROUGH 4-120 ARE RESERVED.
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5-1 See GENERAL RULES A. BSE GENERALIZED SWITCH SELECTOR COMMAD CAMABILITY EXISTS: 1. WHEN CREW ENABLES IU COMMAD SYSTEM (EXCEPT AS NOTED BELOW IN ITEM D) 2. AFTER TET + 20 ANDRES 3. AFTER SPACECART SEPARATION EXCEPT AS NOTED BELOW IN ITEM D) 4. AFTER SPACECART SEPARATION EXCEPT AS NOTED IN ITEM D. 5. BSE WAS NO WAVGATION UPDATE OR TARGET URDATE CAPABILITY. 0. BSE WAS NO COMMO CAPABILITY DURING FORKED BURN SPACES, WETHER IT IS MANED OR UNAMED, TEREFORE, DURING AN UNAMADE BURN THRE IS NO ANY TO CIT THE LAUNCH VEHICLE OFF. c. BSE WAS NO COMMO CAPABILITY DURING FORKED BURN SPACES, WETHER IT IS MANED OR UNAMED, TEREFORE, DURING AN UNAMADE BEN THRE IS NOT A SAFE DISTANCE ANAY FROM THE LAUNCH VEHICLE OFF. c. THERE ARE NO CONDITIONS IS SOUTH SPECIATION PRICE TO THE INITIATE OR TLI INHIBIT IN THE FOR ANY CONFIRMED MALTINGTON IN THE LAUNCH VEHICLE WHICH BENNESS STATES. THAN SERSING (3), CONDITION CONFIRMED MALTINGTON IN THE LAUNCH VEHICLE WHICH BERLIES TO STATED. THAN SERSING (3), CONDITING LEDDING TO A SUPERITY TLIL OUTOF CAME HE BURNE IS STATED. THAN IS PERCENT FROMABILITY OF AUTOMACE UTOFF, l. A CATASTROPHIC MAZARD. THE SAUDITION A CONTINUE AS EASTRAT THE DAVIN OF THE STATE. THE SAUDICAPESISTICS (3), CONDITING LEDDING TO THE SAUDI INVOLVED TO THE SAUDICAPESISTIC TO SAVE CUTOFF, THE SAUDICAPE AND SEC SAUDI AND NATIONE IMA AND LOX LULAGE PRESSNESS. JS COMBADILITY LEDING RAVE ANT THAN AND LOX LULAGE PRESSNESS. JS COMPATION TAGE AS THE SAUDI INVOLVED AND NATIONE THE AND LOX LULAGE PRESSNESS. JS SAUDICAPESISTICS TO SAVE UTORF, THE SAUDICAPESISTICS TO SAVE UTORSTIC MARCES, MERE SAUDICAPESISTICS TO SAVE UTORSTIC THE SAUDICAPESISTI	EV	ITEM				
 A. BES GENERALIZED SWITCH SELECTOR COMMAD CARABILITY EXISTS: I. MEEN CREW ENABLES IU COMMAND SYSTEM (EXCEPT AS NOTED BELOW IN ITEM D) 2. AFTER 157 + 20 MINUTES 3. AFTER SPACEDART SERVATION EXCEPT AS NOTED IN ITEM D. 8. BES MANDATE CARABILITY EXISTS FOR TBY MANEURES ONLY. 5. BES MAN DATE CARABILITY EXISTS FOR TBY MANEURES ONLY. 5. BES MAN DAVICATION UPDATE OR TARGET UPDATE CARABILITY. 9. DES HAS NO NAVICATION UPDATE OR TARGET UPDATE CARABILITY. 9. DES HAS NO COMMON CARABILITY DELINE FORERED BURN PRACES, METHER IT IS MANED OR UMMANED, HEREFORE, DERING AN UMMANED MENT THERE IS NO MAY TO CUT THE LAUNCH VENCLE OFF. 6. THERE ARE NO CONDITIONS FOR WHICH A UMMANED BESTART ATTEMET WILL BE TERNINATED BY THE BSE, EXCEPT IF THE SPACEDART IS NOT A SAFE DISTANCE MAY FROM THE UAUNCH VENICLE. 7. A SAFE DISTANCE BETWEEN THE SPACEDART TAD S-TUD/U IS DEFINED AS 7000 FT. 6. BES WILL RECOMEND A SPACECRAFT SEPARATION PRICIN TO THE INTER DATI INHIBIT IN TB6 FOR ANY COMPILAND ANALYANCTION IN THE LUNCH VENICLE WHICH RESULTS IN: 1. A CATASTROPHIC HAZARD, 2. INSUFFICIENT COMMANGES TO ASSURE A 55 PERCENT PROBABILITY OF UDDANCE CUTOFF, 3. OR, FUNCTIONAL CONDITIONS LEADING TO A DEFINITE REDICTION OF LESS THAN ID RECENT PROBABILITY OF ADDING ANALYTICA ATABULATION AND TOR LINE HIS STATED. M. THE PRICE TO NO S-UPS INCIDIANT OF ADDING TO AN DEARY VERICLE ONE DISTANCE VER CUTOFF, THE SPACEDART TO NOLT THE STATT THE UNALLY SECOND BUIL CARABILITY OF ADDING ANALYTICA TO AN ADDING AND ADDING AND ADDING LING AND LONG LUNCE PROBABILITY OF ADDING ATTEMENT TO LING AND SECOND BUIL CARABILITY OF ADJUST VERTICATION HE SUMMAND ADDING ADDING	-	 5_1	BSE			
 WHEN CREW ENABLES IU COMMAND SYSTEM (EXCEPT AS NOTED BELOW IN ITEM D) AFTER T57 + 20 MINUTES AFTER SPACECRAFT SEPARATION EXCEPT AS NOTED IN ITEM D. BES MAN ENVER UPORTE CAPABILITY EXISTS FOR TS7 WARVERS ONLY. BES HAS NO ANVIGATION UPDATE OR TARGET UPDATE CAPABILITY. BES HAS NO CAMPADILITY DENTS FOR TS7 WARVERS, WETHER IT IS WANED OR UNWARNED, THEREFORE, DURING AN UMANINED DRIN THERE IS NO WAY TO CUT THE LAUNCH VEHICLE OFF. THERE ACED COUNTIONS FOR WHICH A UNAWARED BERN THERE IS NO WAY TO CUT THE LAUNCH VEHICLE OFF. THERE ACED COUNTIONS FOR WHICH A UNAWARED BERN THERE IS NO WAY TO CUT THE LAUNCH VEHICLE. A SAFE DISTANCE BETWEEN THE SPACECRAFT AND S-TV0/U IS DEFINED AS 7000 FT. BES WILL RECOMEND A SPACECARFT SEPARATION PRIOR TO T66 INITIATE OR TLI INHIBIT IN T66 FOR ANY CONFIRMED MARINED AS PACECRAFT SEPARATION PRIOR TO T66 INITIATE OR TLI INHIBIT IN T66 FOR ANY CONFIRMED MARINED A SPACECRAFT SEPARATION PRIOR TO T66 INITIATE OR TLI INHIBIT IN T66 FOR ANY CONFIRME DATIONAL CONTITIONS LEADING TO A DEFINITE PROBABILITY OF GUIDANCE CUTOFF, OR, FLAKTONNI TO A FALLER TO RESTART THE PRINK MILL NOT BE CONSIDERED. IN ASSESSING (3), CONDITION SEADING TO A DEFINITE PROBABILITY OF GUIDANCE CUTOFF, OR, FLAKTONNI TO A FALLER TO RESTART THE DENSING WILL TO GUIDANCE CUTOFF, IN DEF OR DATIONAL CONTITIONS LEADING TO A DEFINITE PROBABILITY OF UND ECONSIDERED. IN THE SPACECRAFT SHOULD IMMEDIATELY GO TO A SAFE DISTANCE (7000 FT) FROM THE S-TV0/IU. IN THE SPACECRAFT SHOULD IMMEDIATELY GO TO A SAFE DISTANCE (7000 FT) FROM THE S-TV0/IU. IF HE SPACECRAFT SHOULD IMMEDIATELY GO TO A SAFE DISTANCE (7000 FT) FROM THE S-TV0/IU. IF HE SPACECRAFT SHOULD IMMEDIATE TO ANY THE HOLOWING: S-3 S-ICL LOSS OF TRUST S-3 S-ICL LOSS OF TRUST MILL BE RECOMPRENDED FOR THE FOLOWING: S-3 S-I	`	5-1		·	1616.	
 AFTER T57 + 20 MINUTES AFTER SPACEGRAFT SEPARATION EXCEPT AS NOTED IN ITEM D. BSE MANEUVER UPDATE CAPABILITY EXISTS FOR T67 MANEUVERS ONLY. BSE HAS NO NOVIATION UPDATE OR TARGET UPDATE CAPABILITY. BSE HAS NO NOVIAND CAPABILITY DURING POWERDE BURNS HARSES, WETHER IT IS MANED OR UNMANNED, THERFORE, DURING AN UNMANNED BRITARN THERE IS NO MAY TO CUT THE LAUKON VEHICLE OFF. THERE ARE NO CONJITIONS FOR WHICH A LUMANNED BESTART ATTEMPT WILL BE TERNINATED BY THE BSE, EXCEPT IF THE SPACECHAFT IS NOT A SAFE DISTANCE MAY FROM THE LUMANN VEHICLE. A SAFE DISTANCE BETWEEN THE SPACECRAFT AND S-IV8/IU IS DEFINED AS 7000 FT. BSE WILL RECOMEND A SAFACECRAFT AND S-IV8/IU IS DEFINED AS 7000 FT. A CATASTROPHIC HEZAD, INSUFFICIENT CONSIMULALS TO ASSURE A 95 PERCENT PROBABILITY OF GUIDANCE CUTOFF, OR, FUNCTONAL CONDITIONS LEADING TO A DEFINITE REDICTION OF LESS THAN ID PERCENT PROBABILITY OF GUIDANCE CUTOFF, OR, FUNCTONAL CONDITIONS LEADING TO A DEFINITE REDICTION OF LESS THAN ID REFECTI ROBADILITY OF ACHEVING A SATISFACTORY T.I. CUTOFF ORCE THE DRAIN IS STARTED. IN ASSESSING (3), COUNTING LUMANNE AS ATTAGATORY T.I. CUTOFF ORCE THE DRAIN SIS STARTED. IN ASSESSING (3), COUNTING LUMANNE AND DESTART THE DOWN TO A GAPE DISTANCE (COUD FT) FORM THE S-NOVALU IS REQUERD. THE SAFACECANT TIL INDIG THE STARTED WILL NOT BE CONSIDERED. IN THE EVENT OF NO S-IVE IGNITION AT RESTART DRE WALL NOT BE CONSIDERED. IN THE EVENT OF NO S-IVE IGNITION AT RESTART THE EVENT IN THE INDIGUE TO THE SAFARTED WILL BE RECOMEDTED TO THE SAFARTED. IN THE EVENT ON THE SAFARTED WILL NOT BE SEPARATED WILL DOT THE S-NOVALU IS SEQUED FRANT THE INDIGUE RECOMED FOR THE SAFARTED. IN THE EVENT ON THE SAFART THE LOCE ONE RECOMED TO THE SAFARTED. IN THE EVENT ON THE OR THE SAFART THE LOCENDE TO THE SAFARTED. ADORT DURING LANGCH PHASE WILL BE RECOMM			~•			
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 B. BSE MANELVER UPDATE CAPABILITY EXISTS FOR TB/ MANELVERS ONLY. C. BSE HAS NO NAVIGATION UPDATE OR TARGET UPDATE CAPABILITY. D. BSE HAS NO NAVIGATION UPDATE OR TARGET UPDATE CAPABILITY. D. BSE HAS NO NAVIGATION UPDATE OR TARGET UPDATE CAPABILITY. D. BSE HAS NO NAVIGATION UPDATE OR TARGET UPDATE CAPABILITY. D. BSE NUL BECOMED CAPABILITY DRING. POMENDE BERN THREE IS NO MAY TO CUT THE LANGH VEHICLE OFF. E. THERE ARE NO CONDITIONS FOR WHICH A UNAANED RESTART ATTEMPT WILL BE TEXTINATED BY THE BSE, EXCEPT IF THE SPACECARFT IS NOT A SAFE DISTANCE MAY FROM THE LAUNCH VEHICLE. F. A SAFE DISTANCE BETWEEN THE SPACECARFT AND S-IVD/IU IS DEFINED AS 7000 FT. G. BSE WILL BECOMEDD A SPACECARFT SEPARATION PRICE TO TBE INITIATE OR TLI INHIBIT IN TBE FOR ANY CONFIRMED MALFUNCTION IN THE LAUNCH VEHICLE WHICH RESULTS IN: I. A CATASTROPHIC HRZARD, I. INSUFFICIENT CONSUMABLES TO ASSURE A 95 PERCENT PROBABILITY OF GUIDANCE CUTOFF, J. OR, FUNCTIONAL CONDITIONS LEADING TO A DEFINITE PREDICTION OF LESS THAN IS PERCENT PROBABILITY OF ACHTEVING A SATISFACTORY TIL CUTOFF ONCE THE DAVINE WILLING TO MARCES, IF SEMARTION IS REQURED Y TO A FAILURE TO RESTART OR AN EARLY SECOND BURN S-IVB CUTOFF, THE SPACECART SHALL DAVID AND MONITOR LIP, AND LON CULLAGE PRESSUESS. IF SEMARTION IS REQURED TO NO S-IVB INDIA TO AND MONITOR LIP, AND LON CULLAGE PRESSUES. IF SEMARTION IS REQURED TO THE SOLUTION TO BE SEPARATED UNTIL NOSTITOW AFTER TBE INVITATE BUT PRIOR TO THE S-IVD/IU AND MONITOR LIP, AND LON CHARGE RESOVERS. IF SEMARTION THAT HE AND SECOND DURIL CAPABILITY SHOLD REPERANCE S-ISS STILL AND CULLAGE PRESSUES. IF SEMARTION TO THE S-IN THE CHARGE ANTE ANTICAL BURCHTANT SHALL PLATTORM FAILURE - ACTUATION THE SEPARATION TO THE SECONFERDED UNTLE NOSTITOW AFTER TBE S-IVD/II NO THE SECONFERMED UNTLE SSTITUTATE BUT PRIOR TO SEE SATEST AND THE SERIES FROM TO S-IVB TO ORBIT CAPABILITY S-IS S-IL LONG OF THRUTH LIPLER FACTURE HEROWERDED FOR THE FOLLOWING:<						
 C. BSE HAS NO NAVIGATION UPDATE OR TARGET UPDATE CAPABILITY. D. BSE HAS NO COMMAD CAPABILITY DURING POMERED BURNS PHASES, WHETHER IT IS MANED OR UNWANNED, THREERORE, DURING AN UNMANED BURNT THREE IS NO MAY TO CUT THE LANDON VEHICLE OFF. E. THERE ARE NO CONDITIONS FOR WHICH A UNMANED RESTART THREMPT NILL BE TERNINATED BY THE BSE, EXCEPT IF THE SPACECRAFT IS NOT A SAFE DISTANCE MAY FROM THE LANNCH VEHICLE. F. A SAFE DISTANCE BETWEN THE SPACECRAFT AND S-IVE/UI IS DEFINED AS 7000 FT. G. BSE WILL BECOMMEDD A SPACECRAFT SEPARATION PRIOR TO THE INTINATE OR TILL INHIBIT IN THE FOR ANY CONFIRMED MALFUNCTION IN THE LANNCH VEHICLE WHICH RESULTS IN: A CATASTROPHIC HAZARD, INSUFFICIENT CONSUMABLES TO ASSURE A 59 PERCENT PROBABILITY OF GUIDANCE CUTOFF, G. R. INSUFFICIENT CONSUMABLES TO ASSURE TO A SUMME THE DEDICTION OF LESS THAN IS PERCENT PROBABILITY LEADING ONLY TO A FAILURE TO RESTART THE ENGINE WILL NOT BE CONSIDERED. HIN THE EVENT OF ND S-IVE IGNITION AT RESTART TOR AN EARLY SECOND BURN S-IVE CUTOFF, THE SPACETORY TILL CUTOFF OWE THE DRAINE WILL NOT BE CONSIDERED. HIN THE EVENT OF ND S-IVE IGNITION AT RESTART TOR AN EARLY SECOND BURN S-IVE CUTOFF, THE SPACETORY TILL NOT BE SEPARATED. IN THE EVENT OF ND S-IVE IGNITION AT RESTART TOR AN EARLY SECOND BURN S-IVE CUTOFF, THE SPACECRAFT SHOULD BREADED TO THE S-IVE/DUI AND KONITOR LUP, AND LOX ULLAGE PRESSURES. IF SEPARATION IS REQURED. THE SPACECRAFT SHOULD BREADED TO THE S-IVE/DUI NOT BE SEPARATED WITL POSITIVE WEIFICATION HAS BEEN RECEIVED BY THE GROUND OR ORDER DESPINES THAT THE LAUCE HAS RECYCLED TO THES OR TABLE. J. FE SPACECRAFT SULL INHEIDT SHITCH IS SET IN THE INHIBIT POSITION AFER TES LIVE TO THE S-IVE/DUI DO THE S-IVE/DUI DO THES SAFTES. J. ADROTTON LUANCH PHASE WILL BE RECOMMENDED FOR THE FOLLOWING: J. S-IJ S-IN LONGO OF THRUST J. SALESSON DURING LAND AND THE RECOMENDED FOR THE FOLLOWING: J. S-IJ S-IN LUANCH PHASE WILL BE			_			
 D. BSE HAS NO COMMOND CAPABILITY DURING POWERED BURNS PHASES, WHETHER IT IS MANNED OR UNMANNED, THEREFORE, DURING AN UNMANNED REXT THERE IS NO MAY TO CUT THE LAUNCH VEHICLE OFF. E. THERE ARE NO COMDITIONS FOR WHICH A UNMANNED RESTART ATEMPT WILL BE TERMINATED BY THE BSE, EXCEPT IF THE SPACEDART IS NOT A SAFE DISTANCE MANY FROM THE LAUNCH VEHICLE. F. A SAFE DISTANCE BETMEEN THE SPACECRAFT AND S-IVB/IU IS DEFINED AS 7000 FT. G. BSE WILL RECOMMEND A SPACECRAFT SEPARATION PRIOR TO TB6 INITIATE OR TL1 INHIBIT IN TB6 FOR ANY COMFERED MALFUNCTION IN THE LAUNCH VEHICLE WHICH RESULTS IN: I. A CATASTROPHIC HAZARD, I. INSUFFICIENT CONSUMABLES TO ASSURE A 95 PERCENT PROBABILITY OF GUIDANCE CUTOFF, J. OG, FUNCTIONAL CONDITIONS LEADING TO A DEFINITE PREDICTION OF LESS THAN ID PERCENT PROBABILITY OF ACHIEVING A STATEACTORY TIL CUTOFF FORE THE REGINE ISTATED. IN ASSESSING (3), CONDITION LEADING ONLY TO A FAILURE TO RESTART THE DESINE WILL NOT BE SCHNSTED. H. IN THE EVENT OF NO S-IVB IGNITION AT RESTART OR AN EARLY SECOND BURN S-IVB CUTOFF, THE SPACECOMT IS REQUIRED. THE SPACECRAFT SHOULD IMMEDIATELY GO TO A SAFE DISTANCE (700 TOF) FROM THE S-IVB/IU. I. THE SPACECRAFT TIL INHIST SWITCH IS SET IN THE MILL NOT BE CONSIDERED. H. IN THE EVENT OF NO S-IVB IGNITION AT RESTART OR AN EARLY SECOND BURN S-IVB SOUTOFF, THE SPACECOMT IS REQUIRED, THE SPACECOMETHED FOR THE FOLLOWING: S-3-3 S-1/2 LOSS OF THRUST J. FINE SPACECRAFT SUBJEMENT HAIL IN THE SE SEPARATION MAY BEEN RECEIVED BY THE GROUND OC RORE ORDER PROR TO S-IVB TO ORBIT CAPABILITY S-11 LINGS OF TRUST IS THAT THE LINC CHAS RECVILED TO SOUTO RESTART SEPARATION HILL SET IN THE MILBIT SOUTICE THE SOUTIE RESTARE (700 TOF). S-3 S-1/2 LOSS OF THRUST ON THO OR PRORE ENSINES PRIOR TO S-IVB TO ORBIT CAPABILITY S-11 LINGS OF TRUST ON THE SEPARATION OR THE LINC CHAS RECVILE DO RESTART MILL BE RECOMMENDED FOR THE SOUTIES S-11 LINGS OF THRUST ON THE SEPARATION OR THE RECOMMENDED FRIOR T				· · · ·		
 THEREFORE, DURING AN UNANNED BURN THERE IS NO MAY TO CUT THE LAUKCH VEHICLE OFF. E. THERE ARE NO CONDITIONS FOR WHICH A UNANNED RESTART ATTOMY WILL BE TERMINATED BY THE BSE, EXCEPT IF THE SPACECRAFT IS NOT A SAFE DISTANCE AMENT FROM THE LUNCH VEHICLE. F. A SAFE DISTANCE BETWEEN THE SPACECRAFT SEPARATION PRIOR TO TB6 INITIATE OR TLI INHIBIT IN TB6 FOR ANY CONFERVED MALTUNCTION IN THE LAUNCH VEHICLE WHICH RESULTS IN: I. A CATASTROPHIC HAZARD, I. INSUFFICIENT CONSUMBLES TO ASSURE A 95 PERCENT PROBABILITY OF GUIDANCE CUTOFF, G. OR, FUNCTIONAL CONDITIONS LEADING TO A DEFINITE PREDICTION OF LESS THAN IN A SPESSING (3), CONDITION LEADING TO A FAILURE TO RESTART THE DEGINE IS TARTED. IN ASSESSING (3), CONDITION LEADING ONLY TO A FAILURE TO RESTART THE ENGINE WILL NOT BE CONSIDERED. H. IN THE EVENT OF NO S-IVB IGNITION AT RESTART TO A NARAY SECOND BURS S-IVB CUTOFF, THE SPACECONT IS REQUIRED. THE SPACECART SHOLD IMMEDIATELY GO TO A SAFE DISTANCE (200 TOFF, START THE SIGNITION IS REQUIRED. THE SPACECART SHOLD IMMEDIATELY GO TO A SAFE DISTANCE (200 TOFF, THE SPACECART SHOLD IMMEDIATELY GO TO A SAFE DISTANCE (200 TOFF, THE SHOFT) RCM THE S-IVAVIU. I. THE SPACECART SHOLD IMMEDIATELY GO TO A SAFE DISTANCE (200 TOFF, THE SPACECART SHOLD IMMEDIATELY GO TO A SAFE DISTANCE (200 TOFF). J. BORT DURING LAUNCH PHASE WILL BE RECOMMENDED FOR THE FOLLOWING: S-3 S-IC LOSS OF THRUST J. BORT DURING LAUNCH PHASE WILL BE RECOMMENDED FOR THE FOLLOWING: S-3 S-IC LOSS OF THRUST J. BORT DURING LAUNCH PHASE WILL BE RECOMMENDED FOR THE FOLLOWING: S-3 S-IC LOSS OF THRUST S-11 S-111 GURING SYSTEM FAILURE - ACTUATOR HARDOVER INBOARD PRIOR TO S-IVB TO ORBIT CAPABILITY S-12 S-110 LOSS OF THRUST TWO CR MORE EMAINES AFTER S-IVB TO ORBIT CAPABILITY S-13 S-11 LOSS OF THRUST THO CR MORE EMAINES AFTER S-IVB TO ORBIT CAPABILITY S-14 DOSS DOSS OF THRUST THO CR MORE EMAINES AFTER S-IVB TO ORBIT CAPABI						
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 TO T66 + 9 MIN 20 SEC, SPACECRAFT WILL NOT BE SEPARATED UNTIL POSITIVE VERIFICATION HAS BEEN RECEIVED BY THE GROUND OR CREW DISPLAYS THAT THE LVOC HAS RECYCLED TO TBS OR TB6C. J. ABORT DURING LAUNCH PHASE WILL BE RECOMMENDED FOR THE FOLLOWING: 5-3 S-1C LOSS OF THRUST 5-14 LAUNCH VEHLOLE INERTIAL PLATFORM FAILURE - ATTITUDE REFERENCE 5-15 S-11 LOSS OF THRUST ON TWO OR MORE ENGINES PRIOR TO S-IVB TO ORBIT CAPABILITY 5-16 S-11 SECOND PLANE SEPARATION FAILURE - ACTUATOR HARDOVER INBOARD PRIOR TO S-IVB TO ORBIT CAPABILITY 5-18 COLD HELIUM SHUTOFF VALVES FAIL OPEN 5-20 S-IVB LOSS OF THRUST K. S-11/S-IVB EARLY STAGING WILL BE RECOMMENDED FOR THE FOLLOWING: 5-15 S-11 LOSS OF THRUST TWO OR MORE ENGINES AFTER S-IVB TO ORBIT CAPABILITY BUT PRIOR TO TB3 + 5 MIN 35 SEC 5-17 S-11 ACTUATOR HARDOVER INBOARD AFTER S-IVB TO ORBIT CAPABILITY L. SPACECRAFT SEPARATION OR TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED FOR THE FOLLOWING: 5-22 S-IVB FIRST BURN LONGER THAN 3 MIN 03 SEC 5-51 LOSS OF ATTITUDE CONTROL DURING TB5, TB6, OR TB7 PRIOR TO RESTART 5-53 INERTIAL PLATFORM FAILURE 5-66 LOSS OF S -IVB HYDRAULICS M. SPACECRAFT SEPARATION OF TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED UNLESS COMMAND ACTION I SUCCESSFUL FOR THE FOLLOWING: 5-66 LOSS OF S-IVB HYDRAULICS M. SPACECRAFT SEPARATION OF TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED UNLESS COMMAND ACTION I SUCCESSFUL FOR THE FOLLOWING: 5-40 J-2 ENSINE MAIN LOX VALVE FAILS TO CLOSE AT 5-IVB TO OPEN IN TB5 5-55 S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS +36 OR -26 PSID 			н.	SHOULD REMAIN ATTACHED TO THE S-IVB/IU AND MONITOR LH	2 AND LOX ULLAGE PRESSURES, IF	SEPARATION
 5-3 S-IC LOSS OF THRUST 5-14 LAUNCH VEHICLE INERTIAL PLATFORM FAILURE - ATTITUDE REFERENCE 5-15 S-II LOSS OF THRUST ON TWO OR MORE ENGINES PRIOR TO S-IVB TO ORBIT CAPABILITY 5-16 S-II SECOND PLANE SEPARATION FAILS TO OCCUR 5-17 S-II GIMBAL SYSTEM FAILURE - ACTUATOR HARDOVER INBOARD PRIOR TO S-IVB TO ORBIT CAPABILITY 5-18 COLD HELIUM SHUTOFF VALVES FAIL OPEN 5-20 S-IVB LOSS OF THRUST K. S-II/S-IVB EARLY STAGING WILL BE RECOMMENDED FOR THE FOLLOWING: 5-15 S-II LOSS OF THRUST TWO OR MORE ENGINES AFTER S-IVB TO ORBIT CAPABILITY BUT PRIOR TO TB3 + 5 MIN 35 SEC 5-17 S-II ACTUATOR HARDOVER INBOARD AFTER S-IVB TO ORBIT CAPABILITY L. SPACECRAFT SEPARATION OR TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED FOR THE FOLLOWING: 5-22 S-IVB FIRST BURN LONGER THAN 3 MIN 03 SEC 5-10 LOSS OF ATTITUDE CONTROL DURING T65, T66, OR TB7 PRIOR TO RESTART 5-51 LOSS OF ATTITUDE CONTROL DURING T65, T66, OR TB7 PRIOR TO RESTART 5-51 LOSS OF ATTITUDE CONTROL DURING T05, T66, OR TB7 PRIOR TO RESTART 5-52 S-IVB FIRST BURN LONGER THAN 3 MIN 03 SEC 5-53 LOSS OF ATTITUDE CONTROL DURING T65, T66, OR TB7 PRIOR TO RESTART 5-54 CATUATOR HARDOVER 5-66 LOSS OF S-IVB HYDRAULICS M. SPACECRAFT SEPARATION OF TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED UNLESS COMMAND ACTION I SUCCESSFUL FOR THE FOLLOWING: 5-46 J-22 ENSINE MAIN LOX VALVE FAILS TO CLOSE AT S-IVB CUTOFF 5-49 S-IVB COLD HELINM SHUTOFF VALVES FAIL TO CLOSE 5-10 S CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 5-50 S-IVB CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 5-50 S-IVB CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 5-50 S-IVB CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 5-50 S-IVB CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 5-50 S-IVB CONTINUOUS VENT SYSTEM (CVS)			Ι.	TO TB6 + 9 MIN 20 SEC, SPACECRAFT WILL NOT BE SEPARAT	ED UNTIL POSITIVE VERIFICATION H	'E BUT PRIOR HAS BEEN
 S-14 LAUNCH VEHICLE INERTIAL PLATFORM FAILURE - ATTITUDE REFERENCE S-11 LOSS OF THRUST ON TWO OR MORE ENGINES PRIOR TO S-IVB TO ORBIT CAPABILITY S-16 S-11 SECOND PLANE SEPARATION FAILS TO OCCUR S-17 S-11 GIMBAL SYSTEM FAILURE - ACTUATOR HARDOVER INBOARD PRIOR TO S-IVB TO ORBIT CAPABILITY S-18 COLD HELIUM SHUTOFF VALVES FAIL OPEN S-20 S-1VB LOSS OF HYDRAULIC FLUID S-21 S-1VB LOSS OF THRUST K. S-11/S-IVB EARLY STAGING WILL BE RECOMMENDED FOR THE FOLLOWING: S-15 S-11 LOSS OF THRUST TWO OR MORE ENGINES AFTER S-IVB TO ORBIT CAPABILITY BUT PRIOR TO TB3 + 5 MIN 35 SEC S-17 S-11 ACTUATOR HARDOVER INBOARD AFTER S-IVB TO ORBIT CAPABILITY L. SPACECRAFT SEPARATION OR TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED FOR THE FOLLOWING: S-22 S-IVB FIRST BURN LONGER THAN 3 MIN 03 SEC S-51 LOSS OF ATTITUDE CONTROL DURING TB5, TB6, OR TB7 PRIOR TO RESTART S-53 URE TIAL PLATFORM FAILURE S-65 ACTUATOR HARDOVER SPACECRAFT SEPARATION OF TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED UNLESS COMMAND ACTION I SUCCESSFUL FOR THE FOLLOWING: S-66 LOSS OF S-IVB HYDRAULICS M. SPACECRAFT SEPARATION OF TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED UNLESS COMMAND ACTION I SUCCESSFUL FOR THE FOLLOWING: S-46 J-2 ENGINE MAIN LOX VALVE FAILS TO CLOSE AT S-IVB CUTOFF S-49 S-IVB COLD HELIOM SHUTOFF VALVES FAIL TO CLOSE S-105 CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 S-50 S-IVB COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS +36 OR -26 PSID 			J.	ABORT DURING LAUNCH PHASE WILL BE RECOMMENDED FOR THE	FOLLOWING:	
 5-15 S-II LOSS OF THRUST TWO OR MORE ENGINES AFTER S-IVB TO ORBIT CAPABILITY BUT PRIOR TO TB3 + 5 MIN 35 SEC 5-17 S-II ACTUATOR HARDOVER INBOARD AFTER S-IVB TO ORBIT CAPABILITY L. SPACECRAFT SEPARATION OR TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED FOR THE FOLLOWING: 5-22 S-IVB FIRST BURN LONGER THAN 3 MIN 03 SEC 5-51 J-2 ENGINE CONTROL DURING TB5, TB6, OR TB7 PRIOR TO RESTART 5-52 INB FIRST BURN LONGER THAN 3 MIN 03 SEC 5-53 INERTIAL PLATFORM FAILURE 5-64 LOSS OF S-IVB HYDRAULICS M. SPACECRAFT SEPARATION OF TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED UNLESS COMMAND ACTION IN SUCCESSFUL FOR THE FOLLOWING: 5-46 J-2 ENGINE MAIN LOX VALVE FAILS TO CLOSE AT S-IVB CUTOFF 5-49 S-IVB CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 5-55 S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS +36 OR -26 PSID 		÷		5-14 LAUNCH VEHICLE INERTIAL PLATFORM FAILURE - ATTIT 5-15 S-II LOSS OF THRUST ON TWO OR MORE ENGINES PRIOR 5-16 S-II SECOND PLANE SEPARATION FAILS TO OCCUR 5-17 S-II GIMBAL SYSTEM FAILURE - ACTUATOR HARDOVER IN 5-18 COLD HELIUM SHUTOFF VALVES FAIL OPEN 5-20 S-IVB LOSS OF HYDRAULIC FLUID	TO S-IVB TO ORBIT CAPABILITY	CAPA BILITY
TB3 + 5 MIN 35 SEC 5-17 S-11 ACTUATOR HARDOVER INBOARD AFTER S-IVB TO ORBIT CAPABILITY L. SPACECRAFT SEPARATION OR TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED FOR THE FOLLOWING: 5-22 S-IVB FIRST BURN LONGER THAN 3 MIN 03 SEC 5-51 LOSS OF ATTITUDE CONTROL DURING TB5, TB6, OR TB7 PRIOR TO RESTART 5-57 J-2 ENGINE CONTROL BOTTLE PRESSURE LESS THAN 400 PSIA 5-58 INERTIAL PLATFORM FAILURE 5-65 ACTUATOR HARDOVER 5-66 LOSS OF S-IVB HYDRAULICS M. SPACECRAFT SEPARATION OF TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED UNLESS COMMAND ACTION IN SUCCESSFUL FOR THE FOLLOWING: 5-46 J-2 ENGINE MAIN LOX VALVE FAILS TO CLOSE AT S-IVB CUTOFF 5-49 S-IVB COLD HELIUM SHUTOFF VALVES FAIL TO CLOSE 5-50 S-IVB CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 5-50 S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS +36 OR -26 PSID			к.	S-II/S-IVB EARLY STAGING WILL BE RECOMMENDED FOR THE	FOLLOWING:	
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 5-22 S-IVB FIRST BURN LONGER THAN 3 MIN 03 SEC 5-51 LOSS OF ATTITUDE CONTROL DURING TB5, TB6, OR TB7 PRIOR TO RESTART 5-57 J-2 ENGINE CONTROL BOTTLE PRESSURE LESS THAN 400 PSIA 5-58 INERTIAL PLATFORM FAILURE 5-65 ACTUATOR HARDOVER 5-66 LOSS OF S-IVB HYDRAULICS M. SPACECRAFT SEPARATION OF TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED UNLESS COMMAND ACTION IN SUCCESSFUL FOR THE FOLLOWING: 5-46 J-2 ENGINE MAIN LOX VALVE FAILS TO CLOSE AT S-IVB CUTOFF 5-49 S-IVB COLD HELIUM SHUTOFF VALVES FAIL TO CLOSE 5-50 S-IVB CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 5-55 S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS +36 OR -26 PSID 				5-17 S-II ACTUATOR HARDOVER INBOARD AFTER S-IVB TO OR	BIT CAPABILITY	
 5-51 LOSS OF ATTITUDE CONTROL DURING TB5, TB6, OR TB7 PRIOR TO RESTART 5-57 J-2 ENGINE CONTROL BOTTLE PRESSURE LESS THAN 400 PSIA 5-58 INERTIAL PLATFORM FAILURE 5-65 ACTUATOR HARDOVER 5-66 LOSS OF S-IVB HYDRAULICS M. SPACECRAFT SEPARATION OF TLI INHIBIT PRIOR TO RESTART WILL BE RECOMMENDED UNLESS COMMAND ACTION IN SUCCESSFUL FOR THE FOLLOWING: 5-46 J-2 ENGINE MAIN LOX VALVE FAILS TO CLOSE AT S-IVB CUTOFF 5-49 S-IVB COLD HELIUM SHUTOFF VALVES FAIL TO CLOSE 5-50 S-IVB COLTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 5-55 S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS +36 OR -26 PSID 			L.	SPACECRAFT SEPARATION OR TLI INHIBIT PRIOR TO RESTART	WILL BE RECOMMENDED FOR THE FOL	LOWING:
SUCCESSFUL FOR THE FOLLOWING: 5-46 J-2 ENGINE MAIN LOX VALVE FAILS TO CLOSE AT S-IVB CUTOFF 5-49 S-IVB COLD HELIUM SHUTOFF VALVES FAIL TO CLOSE 5-50 S-IVB CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 5-55 S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS +36 OR -26 PSID				5-51 LOSS OF ATTITUDE CONTROL DURING TB5, TB6, OR TB7 5-57 J-2 ENGINE CONTROL BOTTLE PRESSURE LESS THAN 400 5-58 INERTIAL PLATFORM FAILURE 5-65 ACTUATOR HARDOVER		·
5-49 S-IVB COLD HELIUM SHUTOFF VALVES FAIL TO CLOSE 5-50 S-IVB CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 5-55 S-IVB STAGE COMMON BULKHEAD DELTA PRESSURE REACHES OR EXCEEDS +36 OR -26 PSID			м.		WILL BE RECOMMENDED UNLESS COM	1AND ACTION IS
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EV	ITEM					
`	5-1 (CONT)		5-64 9 5-67 v	5-IVB COLD HELIUM SPHERE PRESSURE LOW (5-IVB LH2 TANK ULLAGE PRESSURE LOW J-2 ENGINE START BOTTLE PRESSURE HIGH 5-IVB LOX TANK ULLAGE PRESSURE LOW	<600 PSIA)	
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MISSION RULES

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EV.	RULE	CONDITION/MALFUN	ICTION PHASE	RUL ING	CUES/NOTES/COMMENTS
	5-3	S-IC STAGE LOSS OF	F THRUST LAUNCH		<u>CUES</u> :
		A. ANY SINGLE EN	GINE PRIOR	A. CONTINUE MISSION	1. THRUST OK SWITCHES
		то твз.		BSE INFORM FLIGHT AND FI	
		B. ANY TWO OR MO	RE ENGINES		K40-115, K42-115, K43-11 K45-115, K46-115)
				B.1. ABORT	
			DEACTIVA- WO ENGINES ATIC ABORT	BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST	2. THRUST CHAMBER PRESSURE (D8-101, D8-102, D8-103, D8-104, D8-105)
	· .	2. AFTER DEA OF TWO EN	GINES OUT	2. <u>CONTINUE MISSION</u>	3. LONGITUDINAL ACCELERATIO (VA2-603)
		AUTOMATIC	ABORT.	BSE INFORM FLIGHT AND CAPCOM ADVISE CREW OF TIAL OVERRATE CONDITIO	POTEN- 4. FINAL THRUST OK CUTOFF
					NOTE:
					CREW MAY DEACTIVATE AUTOMATI ABORT AFTER TB1 + 120 SEC.
	5-4	LOSS OF THRUST - I (THIS RULE APPLIES		CONTINUE MISSION	<u>CUES</u> :
		THE UNIQUE CASE O THRUST LOSS BETWEE SECONDS)	FENGINE 3	BSE INFORM FLIGHT AND FIDO. FLIGHT INFORM RSO.	1. ENGINE 3 THRUST CHAMBER PRESSURE LESS THAN 500 PSIA (D8-103)
		A. VOICE COMM WI	TH RSO	A.1. FLIGHT CONFIRM ENGINE VIA RSO PRIVATE LINE.	SWITCHES OFF (K39-115,
				2. FLIGHT CONFIRM NO OTHE KNOWN ANOMALIES BY LIG ACTIVATION AND VOICE R	HT 3. ENGINE 3 FINAL THRUST OK
		B. NO VOICE COMM	WITH RSO	B. FLIGHT CONFIRM ENGINE 3	
				AND NO OTHER KNOWN ANOMA BY LITE ACTIVATION.	
					2. CONFIRMATION OF NO OTHER KNOWN ANOMALIES WILL BE BASED ON:
					A. ENGINE CHAMBER PRES- SURE ABOVE 500 PSI AND HOLDING
					B. THRUST OK SWITCHES O
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MISSION RULES

				MISSION RULES	· · · · ·	
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			<i>x</i> .			
	5-5	S-IC STAGE GIMBAL SYS	TEM LAUNCH	CONTINUE MISSION	c	UES:
		FAILURE		BSE INFORM FLIGHT AND FID	o '1	. ACTUATOR POSITION EXCEEDS
		ANY SINGLE ACTUATOR H				±5 DEG (VG1-101, VG1-102
		OVER - ANY ENGINE - P OR YAW				VG1-103, VG1-104, VG2-10 VG2-102, VG2-103, VG2-104
		(TB1 + 0 SEC TO TB3 +			2	. ROLL ATTITUDE RATE EXCEED
		0 SEC)			а. С	5 DEG PER SEC (VR12-602, VR15-602)
					5	. ROLL ATTITUDE ERROR EXCEEDS 5 DEG (VH69-602,
						VH56-603)
					N	DTES:
					1	AUTOMATIC ABORT BY LES
						WHEN ATTITUDE RATE LIMIT IS EXCEEDED PRIOR TO AUTO
						MATIC ABORT DEACTIVATION.
					2	. MANUAL ABORT BY LES WITH TWO CUES:
						A. ROLL ATTITUDE LIMIT
						-5 DEG
	1. S. S.					B. Q-BALL AP - 3.2 PSID
						C. PITCH OR YAW RATE -4
						DEG/SEC
		•				
·						
						·
				- -		
	· · · ·					
		RULES 5-6 THROUGH	1			· · ·
		5-11 ARE RESERVED.				
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MISSION RULES

					MI	SSION RULES			······		
REV	RULE	CONDITION/MALFUNCT	ION	PHASE		RULING			CL	JES/NOTES/COM	MENTS
A	5-12	LOSS OF ATTITUDE CON	ITROL	LAUNCH	CON	TINUE MISSION			<u>s</u> :		
		A. S-IC BURN			Α.	BSE INFORM FLIGHT AND	FIDO.	Α.	S-I	C BURN	
						CAPCOM ADVISE CREW OF ING LOSS OF ATTITUDE			1.	ANGULAR RATE 2 DEG/SEC (VR7-603, VF VR12-603, VF VR15-603, VF	R11-603, R13-603,
							• .		2.	ATTITUDE ERR 4 DEG (H69-602, H7 H71-602, H54 H55-603, H56	0-602, -603,
						· · · ·			3.	ACTUATOR POS CATES HARDOV OR ERRATIC A (VG1-101, VG VG1-103, VG1 VG2-103, VG2 VG2-101, VG2	/ER (+5 DEG) ACTUATOR (S) 1-102, -104, -104,
		B. S-II BURN			в.	BSE INFORM FLIGHT AND	FIDO.	в.	S-I	I BURN	
						CAPCOM ADVISE CREW OF ING LOSS OF ATTITUDE (1.	ANGULAR RATE 5 DEG/SEC (VR7-603, VF VR11-603, VF VR13-603, VF	8-603, 12-603,
									2.	ATTITUDE ERR 10 DEG (H69-602, H7 H71-602, H54 H55-603, H56	0-602, -603,
									3.	ACTUATOR POS CATES HARDOV OR ERRATIC A (G8-201, G8- 203, G8-204, G9-202, G9-2 G30-201-204, 204)	YER (+5 DEG) ACTUATOR(S) -202, G8- G9-201, 203, G9-204,
			н. Н						4.	S-II BURN MO REMAINS OFF (K90-602)	
				1 1					5.	S-IC BURN MO REMAINS ON A (K89-602)	
		C. S-IVB FIRST AND	SECOND		с.	BSE INFORM FLIGHT AND	FIDO.	c.	S-I	VB BURN	
		BURN				CAPCOM ADVISE CREW OF ING LOSS OF ATTITUDE			1.	ANGULAR RATE 5 DEG/SEC (R7-603, R8 603, R12-603 R15-603)	-603, R11-
				•					2.	ATTITUDE ERF 3.5 DEG (H69-602, H7 H71-602, H54 H55-603, H56	70-602, H-603,
								3			
MI	SSION	REV DATE			SECT	ION		G	ROUP		PAGE
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MISSION RULES

		· · ·		MISSION RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
A	5-12 (CONT ¹ D)		LAUNCH			 ACTUATOR PO CATES SUSTA OVER OR ERR/ TION (<u>+6</u> DEC G2-401, G1-4 	INED HARD- ATIC OPERA- G) (G1-401,
						4. S-IVB BURN M DISCRETE REM STAGING (K20	MAINS OFF A
					<u>N</u>	IOTES:	
						REW WILL ABORT ON E IMITS:	ESTABLI SHED
		•			1	. S-IC BURN	
						A. PITCH OR YAN ±4 DEG/SEC	NRATE -
						B. ROLL RATE -	±20 DEG/SE
						C. ROLL ERROR -	- ±5 DEG
						D. Q-BALL AP -	3.2 PSID
					. 2	. S-II AND S-IVB E	BURN
						A. PITCH OR YAN <u>±10</u> DEG/SEC	
						B. ROLL RATE -	*20 DEG/SE
1	5-13	INERTIAL PLATFORM FAILU	RE- LAUNCH	CONTINUE MISSION	<u>c</u>	CUES:	
		ACCELEROMETER		BSE INFORM FLIGHT AND FID	00. 1	. GUIDANCE STATUS	
-				CAPCOM ADVISE CREW OF PRO DEGRADED ORBIT.	BABLE	(MODE CODE 24) H BITS D26 AND D2 ACCEL SET TO "O BITS D24 AND D2 ACCEL SET TO "O BITS D22 AND D2 ACCEL SET TO "O	5 FOR Z NE" 3 FOR X NE" 1 FOR Y
					2	2. ACCELEROMETER P Y, OR Z) INDICA EXCESS OF 0.5 DI REMAINS CONSTAN (H10-603, H11-6)	TES IN EG OR T AT ZERO
					Ā	NOTES:	
					. 1	. NO EFFECT ON VEH JECTORY DURING S BURN	
		- -				 LVDC SWITCHES TO MODE AND UTILIZE PUTED F/M PROFIL FAILED AXIS DUR S-IC, S-II, AND 	ES A PRECOM LE FOR ING THE
M	ISSION		<u> </u>	SECTION	·	· ·	
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MISSION RULES

· · ·	MISSION RULES						
REV	RULE	CONDITION/MALFUNCTION	PHASE	RUL ING	CUES/NOTES/COMMENTS		
A	5-14	LAUNCH VEHICLE INERTIAL PLATFORM FAILURE - ATTITUDE REFERENCE			CUES: 1. GUIDANCE STATUS WORD -		
		A. PRIOR TO TB1 + 50 SEC		A. <u>ABORT</u> BSE INFORM FLIGHT, FI GUIDO. BSE TRANSMIT			
		B. AFTER TB1 + 50 SEC BUT PRIOR TO TB1 + 100 SEC		REQUEST AT 50 SEC B. <u>ABORT</u> BSE INFORM FLIGHT, FI GUIDO. BSE TRANSMIT			
		C. AFTER TB1 + 100 SEC		REQUEST (REF NOTE 3)	GIMBAL SET TO "ONE"		
				BSE INFORM FLIGHT, FI GUIDO. (REF NOTE 4)			
					3. ATTITUDE ERROR CONSTANT FOR FAILED AXES (H69-602, H70-602, H71-602)		
					4. GUIDANCE REFERENCE FAILUR (D04) MODE CODE 26 BIT 8 SET TO "ONE" (H60-603)		
					NOTES:		
					1. THE LVDC/LVDA WILL HOLD THE LADDER SIGNALS AT THE LAST PREVIOUS VALID VALUE		
				· · ·	2. ATTITUDE CONTROL WILL BE LOST IN THE FAILED AXES		
					3. CREW PERFORM MANUAL ABORT ON THE TWO GUIDANCE FAILU LIGHTS. (REF RULING B)		
					4. MANUAL ABORT WHEN FIDO LIMITS ARE EXCEEDED. (REF RULING C)		
A	5-15	S-II LOSS OF THRUST			CUES:		
		A. ANY SINGLE ENGINE – FAILURE TO ATTAIN THRUST OR LOSS OF THRUST PRIOR TO NOMINAL		A. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND	A.1. THRUST OK SWITCHES OFF FDO (K285-201 THROUGH 205) (K286-201 THROUGH 205)		
		S-II CUTOFF B. ANY TWO ENGINES FAILURE TO ATTAIN THRUST OR			2. THRUST CHAMBER PRESSURE ZERO (D13-201 THROUGH 205)		
		LOSS OF THRUST		B.1. ABORT	3. LONGITUDINAL ACCELERA- TION (A2-603)		
		PITCH OR YAW EXCEED 10°/SEC OR ATTITUDE ERROR EXCEEDS 40°.		BSE INFORM FLIGHT A MIT ABORT REQUEST	(CUES A.1, A.2, A.3)		
					B. ANGULAR RATE (R7-602, R8-602, R11-602, R13-602, R12-602, R15-602)		
					C. ATTITUDE ERRORS (H54-603, H55-603, H56-603, H69-602, H70-602, H71-602)		
					D. COMMAND ANGLES AND GIMBAL ANGLES (H60-603)		
5. A					· · · · · · · · · · · · · · · · · · ·		
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REV RULE CONTINUE VIEW PHAGE RULING CLES/NOTES/COMENTS A 5-15 B.2. PRIOR TO LOW LEVEL TO YOUT TO LOW LEVEL TO YOUT TO INFECT C SAME AS 5.1 A A AVAILAR AMES IN PITOL OR WAY DO- CEED & ORGER CONSTRUCT A. MOONT TO CEED & ORGER CONSTRUCT C. SAME AS A.1, 2, AND 3 ABOVE A. MOONT TO CEED & ORGER CONSTRUCT A. MOONT TO CEED & ORGER CONSTRUCT C. SAME AS A.1, 2, AND 3 ABOVE A. MOONT TO CEED & ORGER CONSTRUCT ABOVE 5 -16 SECOND FLAW END AND TRUCT FLOW TO TO THE FLIGHT AND TO REAL Y TAGEN RECOVERT FLIGHT AND				·	MISSION RULES		
CONTROL SENSE APR (38:05 GET) FV UNIT. OUR FREEZE + 3 SEC (VARIABLE TIME) A. AQUET DESE INFORM FLIGHT AND SEC APA ATTEL IN LEVEL THAN 40 EV SEC APA ATTEL ON LEVEL SEC APA ATTEL ON LEVEL SE	REV	RULE	CONDITION/MALFUNCTION	PHASE	RUL ING	CUES	/NOTES/COMMENTS
PITCH OR YM REC CEDE & REG/SEC OF ATTITUE ENKIR EXCELSES NP. BSE INFORM FLIGHT AND TRANSMIT AGART REQUEST AT CEL PRECE PLUS S SECTOR. BSE INFORM FLIGHT AND RECOMPOSE EARLY STACE BSE INFORM FLIGHT AND RECOMPOSE EARLY STACE BSE INFORM FLIGHT AND RECOMPOSE EARLY STACE EVENTS BSE INFORM FLIGHT AND RECOMPOSE EARLY STACE BSE INFORM FLIGHT AND RECOMPOSE EARLY STACE INFORM FLIGHT AND FROM RECOMPOSE EARLY STACE BSE INFORM FLIGHT AND FROM RECOMPOSE EARLY STACE INFORM FLIGHT AND FROM RECOMPOSE EARLY STACE BSE INFORM FLIGHT AND FROM RECOMPOSE EARLY STACE AND RECOMPOSE EARLY STACE BSE INFORM FLIGHT AND FROM RECOMPOSE EARLY STACE AND RECOMPOSE EARLY STACE BSE INFORM FLIGHT AND FROM RECOMPOSE EARLY STACE BSE INFORM FLIGHT	A		SENSE ARM (8:05 GET) FLY UNTIL CHI FREEZE))		2. SAME	AS B.1
PITCH OR YAW ARE LESS TANA 4 DEC SEC AD ATTITUCE ERROR 15 LESS THAN 400 BSE INFORM FLIGHT AND RECOMEND EARLY STATUNG AT CHI PREZE PLAS S SECURD AT CHI PREZE PLAS S SECURD AT CHI PREZE PLAS S SECURD ARM (5:05 GET) CONTINUE MISSION BSE INFORM FLIGHT AND TO GREIT CAPABILITY 1. PRIOR TO S-VIB TO GREIT CAPABILITY 3. CONTINUE MISSION BSE INFORM FLIGHT AND TO GREIT CAPABILITY C.1. ABORT DSE INFORM FLIGHT AND TO GREIT CAPABILITY C.1. ABORT DSE INFORM FLIGHT AND TO GREIT CAPABILITY C.1. ABORT DSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST C. SAME AS A.1, 2, AND 3 ABOVE 5-16 S-11 SECOND PLANE SEPARA- TION FAILS TO OCCUR AT TBS + 31 SEC LAUNCH ABORT DSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST. GREW MIST ABORT TON TAILS TO OCCUR AT TBS + 31 SEC LAUNCH ABORT DSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST. GREW MIST ABORT CET) CUES: 1. SECOND PLANE SEPARATION INFORM SECOND SECOND PLANE SEPARATION INFORM SECOND CET) CUES: 1. SECOND PLANE SEPARATION INFORM SECOND SECOND PLANE SEPARATION INFORM SECOND PLANE SEPARATION INFORM SECOND SECOND SECOND PLANE SEPARATION INFORM SECOND SECOND SECOND SECOND S			PITCH OR YAW EX- CEED 4 DEG/SEC OF ATTITUDE ERROR		BSE INFORM FLIGHT TRANSMIT ABORT RE AT CHI FREEZE PLU	QUEST	
ARM (8:05 GET) C. THERE OR NOBE ENGINES I. PRIOR TO S-IVB TO ORBIT CAMBILITY TO CARDILITY BUT PRIOR TO LOBU LEVEL SENSE ARM (8:05 GET) 3. AFTER LOW LEVEL SENSE ARM (8:05 GET) 3. AFTER LOW LEVEL SENSE ARM (8:05 GET) 4. ABORT BSE INFORM FLIGHT AND FDO. 5-16 S-11 SECOND PLANE SEPARA- TION FALLS TO OCCUR AT TB3 + 31 SEC 4. ABORT BSE INFORM FLIGHT AND FDO. 4. ABORT BSE INFORM FLIGHT AND FDO. 5. GUIDANCE MORE ON ALL SEPARA- TION FALLS TO OCCUR AT TB3 + 31 SEC 4. ABORT GET) 4. ABORT GET) 4. ABORT BSE INFORM FLIGHT AND FDO. 5. GUIDANCE MORE MORE 1 AND TRANSMIT ABORT REQUEST AND TRANSMIT ABORT REQUEST AND TRANSMIT BSE INFORM FLIGHT AND TRANSMIT BSE INFORM FLIGHT AND FDO. 5. GUIDANCE MORE MORE 1 AND TRANSMIT BSE INFORM FLIGHT AND TRANSMIT BSE I			PITCH OR YAW ARE LESS THAN 4 DEG/ SEC AND ATTITUDE ERROR IS LESS		BSE INFORM FLIGHT RECOMMEND EARLY S AT CHI FREEZE PLU	TAGING	
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TO ORBIT CAPABILITY ABOVE ABOVE 2. AFTER S-IVB TO ORBIT CAPABILITY BUT PRIOR TO LOW LEVEL SENS ARM (8:05 GET) 2. EARLY STAGE BSE INFORM FLIGHT AND FROM RECOMMEND EARLY STAGING ABOVE 3. AFTER LOW LEVEL SENSE ARM (8:05 GET) 3. CONTINE MISSION BSE INFORM FLIGHT AND FROM BSE INFORM FLIGHT AND TRANSMIT ABOVE CUES: 5-16 S-11 SECOND PLANE SEPARATION TION FAILS TO COUR AT TB3 + 31 SEC LAUNCH ABORT BSE INFORM FLIGHT AND TRANSMIT ABOVE CUES: 1. SECOND PLANE SEPARATION TION FRIST LAUNCH ABORT BSE INFORM FLIGHT AND TRANSMIT AT APPROXIMATELY 28 VOLTS (HID-207) CUES: 1. MANUAL ADDRT PCUENT TO TB3 + 56 SEC (NOM S'26" CUES: 1. SECOND PLANE SEPARATION INDICATION BUS VOLTAGE REMAINS ZERO (H60-603) 3. IONTITION BUS VOLTAGE REMAINS ZERO (H60-603) SOUTHOR BUS VOLTAGE REMAINS APPROXIMATELY 28 VOLTS (H12-207) 4. RECIRCULATION BUS VOLTAGE REMAINS APPROXIMATELY 28 OVOLTS (H11-207) NOTES: 1. MANUAL ABORT BY OREM WITH MISSION. PROBABLE SUBSEQUENT LOSS O VEHICLE DUE TO EXCESSIVE TEMPERATURE. MISSION. REV DATE			C. THREE OR MORE ENGINES				
S-16 S-11 SECOND PLANE SEPARA- TION FAILS TO OCCUR AT TB3 + 31 SEC LAUNCH ABORT BSE INFORM FLIGHT AND FDD. CUES: S-16 S-11 SECOND PLANE SEPARA- TION FAILS TO OCCUR AT TB3 + 31 SEC LAUNCH ABORT BSE INFORM FLIGHT AND FRANSMIT PRIOR TO TB3 + 56 SEC (NOM 3'26" CUES: S-16 S-11 SECOND PLANE SEPARA- TION FAILS TO OCCUR AT TB3 + 31 SEC LAUNCH ABORT BSE INFORM FLIGHT AND TRANSMIT PRIOR TO TB3 + 56 SEC (NOM 3'26" CUES: S-17 SCONT PLANE SEPARA- TION FAILS TO OCCUR AT TB3 + 31 SEC LAUNCH ABORT BSE INFORM FLIGHT AND TRANSMIT PRIOR TO TB3 + 56 SEC (NOM 3'26" CUES: S-18 SCONT PLANE SEPARA- TION FUELSE LAUNCH BSE INFORM FLIGHT AND TRANSMIT PRIOR TO TB3 + 56 SEC (NOM 3'26" CUES: S-19 SCONT PLANE SEPARA- TION FRUELSE LAUNCH BSE INFORM FLIGHT AND TRANSMIT PRIOR TO TB3 + 56 SEC (NOM 3'26" CUES: S-19 SCONT PLANE SEPARA- TION FRUELSE LAUNCH ABORT SECONT PLANE SUBSCOLLARE SUBSCOLLARE SUBSCOLLARE PREVAINS APPROXIMATELY 28 VOLTS (H12-207) SCONT PLANE SUBSCOLLARE SUBSCOLLATION BUS VOLTAGE PREVAINS APPROXIMATELY 28 VOLTS (H12-207) NOTES: MISSION REV DATE SECTION GROUP					BSE INFORM FLIGHT AND	ABOVE	S A.1, 2, AND 3
S-16 S-11 SECOND PLANE SEPARA- TION FAILS TO OCCUR AT TB3 + 31 SEC LAUNCH ABORT BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST. CORE MUST ABORT PRIOR TO TB3 +56 SEC (NOM 3'26'' 1. SECOND PLANE SEPARATION INDICATION SHOWS NO SEPARATION (M86-206) 2. GUIDAVEC MODE WORD 1 MODE GET) 2. GUIDAVEC MODE WORD 1 MODE CODE 25 BIT DIS REMAINS ZERO (H60-603) 3. IENTION BUS VOLTAGE REMAI AT ATPROXIMATELY 28 VOLTS (M125-207) 3. IENTION BUS VOLTAGE REMAI AT ATPROXIMATELY 28 VOLTS (M125-207) 4. RECIRCULATION BUS VOLTAGE REMAINS APPROXIMATELY 56 VOLTS (M111-207) NOTES: 1. MISSION REV DATE			CAPABILITY BUT PRIOR TO LOW LEVEL SENSE		BSE INFORM FLIGHT AND		
TION FAILS TO OCCUR AT TB3 + 31 SEC BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST. CREW MUST ABORT PRIOR TO TB3 + 56 SEC (NOM 3'26'' 1. SECOND PLANE SEPARATION INDICATION SHOWS NO SEPARATION (M86-206) 2. GUIDANCE MODE WORD 1 MODE CODE 25 BIT DIS REMAINS ZERO (H60-603) 2. GUIDANCE MODE WORD 1 MODE CODE 25 BIT DIS REMAINS ZERO (H60-603) 3. IGNITION BUS VOLTAGE REMAI AT APPROXIMATELY 28 VOLTS (M125-207) 3. IGNITION BUS VOLTAGE REMAINS APPROXIMATELY 56 VOLTS (M111-207) NOTES: 1. MANUAL ABORT BY CREW WITH ONBOARD INDICATION. 2. PROBABLE SUBSEQUENT LOSS O VEHICLE DUE SUSSEQUENT LOSS O VEHICLE DUE DE CECESSIVE TEMPERATURE. MISSION REV DATE SECTION GROUP PAGE						FDO.	
TB3 + 31 SEC BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST. CREW MUST ABORT PRIOR TO TB3 +56 SEC (NOM 3'26'' GET) 1. SECOND PLANE SEPARATION INDICATION SHOWS NO SEPARATION (M6E-206) 2. GUIDANCE MODE WORD 1 MODE CODE 25 BIT D15 REMAINS ZER (H60-603) 2. GUIDANCE MODE WORD 1 MODE CODE 25 BIT D15 REMAINS ZER (H60-603) 3. TGNITION BUS VOLTAGE REMAI AT APPROXIMATELY 28 VOLTS (M125-207) 4. RECIRCULATION BUS VOLTAGE REMAINS APPROXIMATELY 56 VOLTS (M111-207) NOTES: 1. MANUAL ABORT BY CREW WITH ONBOARD INDICATION. 2. PROBABLE SUBSEQUENT LOSS O VEHICLE DUE TO EXCESSIVE TEMPERATURE. MISSION REV DATE SECTION GROUP PAGE		5-16	S-II SECOND PLANE SEPARA-	LAUNCH	ABORT	CUES :	
2. GUIDANCE MODE WORD 1 MODE CODE 25 BIT D15 REMAINS ZERO (H60-603) 3. IGNITION BUS VOLTAGE REMAIN AT APPROXIMATELY 28 VOLTS (M125-207) 4. RECIRCULATION BUS VOLTAGE REMAINS APPROXIMATELY 56 VOLTS (M111-207) NOTES: 1. MANUAL ABORT BY CREW WITH ONBOARD INDICATION. 2. PROBABLE SUBSEQUENT LOSS O VEHICLE DUE TO EXCESSIVE TEMPERATURE. MISSION. REV DATE SECTION GROUP PAGE					ABORT REQUEST. CREW MUST A PRIOR TO TB3 +56 SEC (NOM 3	BORT INDICA	TION SHOWS NO
AT APPROXIMATELY 28 VOLTS (M125-207) A. RECIRCULATION BUS VOLTAGE REMAINS APPROXIMATELY 56 VOLTS (M111-207) NOTES: 1. MANUAL ABORT BY CREW WITH ONBOARD INDICATION. 2. PROBABLE SUBSEQUENT LOSS O VEHICLE DUE TO EXCESSIVE TEMPERATURE. MISSION REV DATE SECTION GROUP PAGE						CODE 2	5 BIT D15 REMAINS
MISSION REV DATE SECTION GROUP PAGE						AT APP	ROXIMATELY 28 VOLTS
MISSION REV DATE SECTION GROUP PAGE						REMAIN	IS APPROXIMATELY
MISSION REV DATE SECTION GROUP PAGE						NOTES:	
2. PROBABLE SUBSEQUENT LOSS O VEHICLE DUE TO EXCESSIVE TEMPERATURE. MISSION REV DATE SECTION GROUP PAGE							
MISSION REV DATE SECTION GROUP PAGE		· .				2. PROBAE VEHICL	BLE SUBSEQUENT LOSS OF E DUE TO EXCESSIVE
						TEMPER	AIURE.
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MISSION RULES

	MISSION RULES						
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS		
• A	5-17	S-II STAGE GIMBAL SYSTEM FAILURE ANY SINGLE ACTUATOR HARDOVER (INBOARD).	LAUNCH		CUES: 1. YAW ACTUATOR POSITION EX- CEEDS +6 DEGREES (VG8-201		
		A. PRIOR TO S-IVB TO ORBIT CAPABILITY.		A. <u>ABORT</u> BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST.	THROUGH 204) (G30-201 THROUGH 204).		
		B. AFTER S-IVB TO ORBIT CAPABILITY.		B. <u>EARLY STAGE</u> BSE INFORM FLIGHT AND RECOM- MEND EARLY STAGING.	EXCEEDS +6 DEGREES (G9-201 THROUGH 204) (G31-201 THROUGH 204).		
					 ROLL ATTITUDE ERROR EXCEED 5 DEG (VH69-602 AND VH56-603). 		
					 ROLL ATTITUDE RATE EXCEED 3 DEG/SEC (VR12-602 AND VR15-602). 		
					NOTE:		
					IF ANY ACTUATOR POSITION IS LOST, THIS RULE WILL NOT BE IMPLEMENTED FOR THE ENGINE AND PLANE AFFECTED.		
A	5-18	S-IVB COLD HELIUM SHUTOFF VALVE(S) FAIL OPEN			CUEC 1		
		A. PRIOR TO LAUNCH ESCAPE		A 4800T	CUES:		
		TOWER (LET) JETTISON		A. <u>ABORT</u> BSE INFORM FLIGHT AND TRANSMIT ABORT REQUEST	A. LOX ULLAGE PRESSURE AT 50 PSIA OR SATURATED AT UPPEI LIMIT (D179-424; D180-424)		
		B. AFTER LAUNCH ESCAPE TOWER (LET) JETTISON		B. <u>EARLY STAGE</u> BSE INFORM FLIGHT AND RECOMMEND EARLY STAGING	B.1. COLD HELIUM DISCHARGE PRESSURE GREATER THAN 300 PSIA (D105-403)		
		C. AFTER THE S-II DEPLE- TION CUTOFF SENSORS ARMED (TB3 + 5 MIN 30 SEC)		C. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT	 LOX ULLAGE PRESSURE AT VENT VALVE RELIEF SETTIN (NOMINAL 44 PSIA) AND RELIEVING (D179-424; D180-424) 		
					 COLD HELIUM BOTTLE PRESSURE DECAYING (D16- 425; D263-405) 		
2					C. SAME AS B.1, 2, AND 3 ABOVE.		
					NOTES:		
					 ACTION REQUIRED TO AVOID EXCEEDING LOX OVER PRESSUR STRUCTURAL LIMITS AND POSITIVE (+) ΔP COMMON BULKHEAD LIMITS. 		
				•	2. THIS RULE WILL NOT BE IM- PLEMENTED IF TWO OF THE THREE COLD HELIUM PRESSURE		
					MEASUREMENTS AND/OR ONE OF TWO LOX ULLAGE PRESSURE MEASUREMENTS ARE LOST.		
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MISSION RULES

REV RALE CONTINUMALITACTION PHASE RALING CUISANDTE-ACCOMENTS 5-19 S-TUB SCHE ALTITOR MEDIATION INDICTIENT IN TO FIRST BURN. LAUNCI OMITINUE MISSION DESTINGTING TO FIRST BURN. LAUNCI OMITINUE MISSION DESTINGTING TO FIRST BURN. CLESS LAUNCI OR EXAMPLE AND FILO DESTINGTING TO FIRST BURN. LAUNCI DESTINGTING DESTINGT				MISSION RULES			
A 5-20 S-IVB LOSS OF STAGE HYDRULIC FULID COMPINED PRIOR TO FIRST BURN. AGORT COMPARED CONTIGN AFTER S-IVB IORITION. Image: Contign and the set of the	REV RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
A 5-20 S-1VB LIDSS OF STAGE CONCERNING ADVISE CREW OF IMPENDING CONCERNING ADVISE CREW OF IMPENDING PRIOR TO FIRST BURN A ADORT CONCERNING CONCERNING ADVISE CREW OF IMPENDING CONCERNING ADVISE CREW OF IMPENDING CREW CREW PRICED ADVISE CREW CREW CREW CREW PRICED ADVISE TO ADVISE CREW CREW CREW PRICED ADVISE TO ADVISE TO ADVISE CREW CREW PRICED ADVISE TO ADVISE TO ADVISE CREW CREW PRICED ADVISE TO ADVISE TO ADVISE CREW CREW PRICED ADVISE ADVISE ADVISE TO ADVISE CREW CREW PRICED ADVISE ADVISE ADVISE TO ADVISE CREW CREW PRICED ADVISE ADVISE ADVISE ADVISE TO ADVISE	5-19		LAUNCH	CONTINUE MISSION		CUES:	
A 5-21 S-1VB STAGE LOSS OF THRUST A FORMULIC FLUTO CONFIRMED B SCOMMINAL S-11 STAGES CUTOF 15 49 SECONDS ON RECOMPEND ADORT. TIME BASE 14 CEALLY SET INFORM FLIGHT AND FLIDO AND RECOMPEND ADORT. IMPORAULIC RESERVOIR ULLAGE ENGINE ON. B. CONTINUE MISSION B. S/C SEPARATED AND APS B. CONTINUE MISSION I. BSE INFORM FLIGHT AND FLIDO AND IMPEDIATELY AFTER SPACE- SEND APS ULLAGE ENGINE ON. I. DESE INFORM FLIGHT AND FLIDO IMPEDIATELY AFTER SPACE- SEND APS ULLAGE ENGINE ON. I. DESE INFORM FLIGHT AND FLIDO IMPEDIATELY AFTER SPACE- SEND APS ULLAGE ENGINES NOS. I AND 2 OFF. S/C SPACECRAFT B. CONTINUE MISSION I. S-IVB FIRST BURN IS EX- TENDED LONGER THAN 3 MIN D3 SEC S/C SPACECRAFT BES INFORM FLIGHT AND FIDO AND RECOMPENDED SPACECRAFT SEPARATION BES INFORM FLIGHT AND FIDO AND RECOMPENDED SPACECRAFT BES INFORM FLIGHT AND FIDO AND RECOMPENDED SPACECRAFT		TO FIRST BURN.		CAPCOM ADVISE CREW OF IMPO OVERATE CONDITION AFTER IGNITION. CREW EXECUTE MANUAL ABORT ESTABLISHED LIMIT AFTER S	ENDING S-IVB ON	OR GREATER (G1-403, G2-403) 2. ENGINE ACTUATOR TO OR GREATER TH PSIA. (D44-403, D45-4) <u>NOTE</u> : THE RATE LIMITS WHI WILL ABORT DURING S PITCH OR YAW RA) AP EQUALS HAN 3300 03) CH THE CREW -IVB FLIGHT
A. FAILS TO ATTAIN THRUST BY TB4 + 10 SECONDS (NOMINAL S-11 STAGES CUTOFF IS GET 8 MIN- UTES 49 SECONDS OR TIME BASE 44 (CARLY STAGING SEQUENCE) PLUS 15 SECONDS A. <u>ABORT</u> 1. THRUST CHAMBER PRESSURE ZERO (D1-401) B. S/C SEPARATED AND APS ULLAGE ENGINE ON. B. <u>OONTINUE MISSION</u> 1. THRUST CHAMBER PRESSURE ZERO (AL-401) B. S/C SEPARATED AND APS ULLAGE ENGINE ON. B. <u>OONTINUE MISSION</u> 1. THRUST CHAMBER PRESSURE ZERO (A2-603) A. 5-22 S-IVB FIRST BURN IS EX- TENDED LONGER THAN 3 MIN 03 SEC B. <u>S/C SPACECRAFT</u> BSE INFORM FLIGHT AND FIDO AND RECOMMENDER SPACECRAFT SEPARATION BSE SEND APS ULLAGE ENSINES NOS. 1 AND 2 OFF. 4. THE BASE 5. IS INITIATI MODE CODE 25, BIT D2 ST TO 1. (H60-603) A. 5-22 S-IVB FIRST BURN IS EX- TENDED LONGER THAN 3 MIN 03 SEC S/C SPACECRAFT BEE INFORM FLIGHT AND FIDO AND RECOMMENDED SPACECRAFT SEPARATION PRIOR TO RESTART CUES: 1. S-IVB FIRST BURN TIME NOTE: CURRENT PLANNING IS TO ASSU PROPELLANT QUANTITIES REQU TO ACHIEVE SATISFACTORY TLI GUIDANCE CUTOFF IN NEAR REA TIME SIMULATIONS.	A 5-20	HYDRAULIC FLUID CONFIRMED		BSE INFORM FLIGHT AND FID		 HYDRAULIC SYSTELLESS THAN 1700 403) HYDRAULIC RESERLEVEL APPROXIMA PERCENT. (L7-4 HYDRAULIC RESERPRESSURE APPROX 	VOIR OIL TELY ZERO 03) VOIR IMATELY
A 5-22 S-IVB FIRST BURN IS EX- TENDED LONGER THAN 3 MIN 03 SEC S/C SPACECRAFT BSE INFORM FLIGHT AND FIDO AND RECOMMENDED SPACECRAFT SEPARATION PRIOR TO RESTART 1. S-IVB FIRST BURN TIME I. S-IVB FIRST BURN TIME NOTE: RULES 5-23 THROUGH 5-24, ARE RESERVED REV DATE	A 5-21	 A. FAILS TO ATTAIN THRUST BY TB4 + 10 SECONDS (NOMINAL S-II STAGES CUTOFF IS GET 8 MIN- UTES 49 SECONDS) OR TIME BASE 4A (EARLY STAGING SEQUENCE) PLUS 15 SECONDS B. S/C SEPARATED AND APS 		BSE INFORM FLIGHT AND RECOMMEND ABORT. IMMEDIATELY AFTER SPA SEPARATION BSE SEND A ENGINES NOS. 1 AND 2 0 B. <u>CONTINUE MISSION</u> 1. BSE INFORM FLIGHT 2. IMMEDIATELY AFTER CRAFT SEPARATION	CECRAFT PS ULLAGE OFF. AND FIDO. SPACE- BSE	 THRUST CHAMBER I ZERO (D1401) THRUST OK SWITCI (K14-401, K157 LONGITUDINAL AC ZERO (A2-603) TIME BASE 5 IS MODE CODE 25, B 	HES - OFF 401) CELERATION INITIATED. IT D2 SET
MISSION REV DATE SECTION GROUP PAGE	A 5-22	TENDED LONGER THAN 3 MIN 03 SEC RULES 5-23 THROUGH		NOS. 1 AND 2 OFF. <u>S/C SPACECRAFT</u> BSE INFORM FLIGHT AND FID RECOMMENDED SPACECRAFT SE	0 AND	1. S-IVB FIRST BUR <u>NOTE</u> : CURRENT PLANNING IS PROPELLANT QUANTITI TO ACHIEVE SATISFAC GUIDANCE CUTOFF IN N	TO ASSESS ES REQUIRED TORY TLI
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MISSION RULES

REV							
	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COMM	IENTS
	5-25	TIME BASE 5 OR TB7 FAIL TO INITIATE AT S-IVB CL		SPACECRAFT SEPARATION			
		OFF		BSE INFORM FLIGHT AND RECOMM IMMEDIATE SEPARATION TO A SA DISTANCE.	AFE	TIME OF TB INIT REMAINS AT PREV (H60-603)	
					2.	TIME-IN-TIME BAS CONTINUES TO COU (H60-603)	
					3.	GUIDANCE MODE W CODE 25) BIT D2 "ONE" FOR TB5 OF MODE WORD 2 (MOD BIT D20 NOT SET FOR TB7 (H60-60)	NOT SET TO R GUIDANCE DE CODE 26) TO "ONE"
					4.	ORBITAL SEQUENC TO INITIATE	ING FAILS
					NOT	<u>ES</u> :	
					1.	THIS CONDITION RESULT IN LOSS (SEQUENCING AND F AND YAW ATTITUDE	DF PITCH
					2.	THE LVDC WILL IN TB5 OR TB7 AFTER ANY TWO OF FOUR AFTER TB4 + 10 S + 15 SEC, OR TB0 44 SEC	RECEIVING FUNCTIONS, SEC, TB4A
						A. S-IVB ENGIN	E OUT "A"
						B. S-IVB ENGINE	e out "b"
						C. S-IVB VELOC	ITY CUTOFF
						D. ACCELEROMET THRUST INDI	
					· ·		
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		· · · · · ·					
		RULES 5–26 THROUGH 5–44 ARE RESER V ED					
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MISSION RULES

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REV	RULE	CONDITION/MALFUNCTION	N PHASE	RULING		CUES/NOTES/COM	
A	5-45	J-2 ENGINE MAIN FUEL (MFV) FAILS OPEN:	VALVE	A. CONTINUE MISSION		CUES:	
		A. FIRST S-IVB CUTO		 BSE INFORM FLIGHT (ASAP): PREVALVES AND REI OFF VALVE CLOSED NOTE 1) BSE ATTEMPT TO C' OPEN AND CLOSED. SUCCESSFUL, BSE S A. ENGINE MFV CI B. PREVALVE AND SHUTOFF VALVU IF COMMAND ACTION UNSUCCESSFUL, BSI A. ENGINE MFV OI B. RECIRC SHUTOI OPEN AFTER TI 9 SEC IF COMMAND ACTION SENT AFTER TB6 + 30 SEC, IMPLEMENT 	CIRC SHUT- (SEE YCLE MFV IF SEND: LOSED RECIRC ES OPEN N (A.2) E SEND: PEN FF VALVES B6 + 4 MIN N (A.3.B) 6 MIN	 MAIN FUEL VALVE (G004-401) MAIN FUEL VALVE (K118-401) FUEL PUMP INLET (D002-403) NOTE: IF THE MFV IS C LH₂ PUMP INLET WILL GO TO ZERC AFTER COMMAND A (A.1). 	PRESSURE
		B. SECOND S-IVB CUT	OFF	B. CONTINUE MISSION			·
	•			1. BSE INFORM FLIGH PREVALVES AND RE OFF VALVES CLOSE 2. PREVALVES AND RE SHUTDOWN VALVES TB7 + 2 HR 12 MI	CIRC SHUT- D CIRC OPEN AT		
A	5-46	J-2 ENGINE MAIN OXID VALVE(S) FAILS TO CL AT S-IVB CUTOFF.	OSE			CUES: 1. MAIN OXIDIZER V/ POSITION (G3-40) 2. MAIN OXIDIZER V/)
		A. FIRST S-IVB CUTO B. SECOND BURN CUTO		 A. <u>CONT INUE MISSION</u> 1. BSE INFORM FLIGH COMMAND (ASAP): PREVALVES AND REG SHUTOFF VALVES CI 2. BSE ATTEMPT TO CI OPEN AND CLOSED. SUCCESSFUL, BSE A. ENGINE MOV CI B. PREVALVE AND SHUTOFF VALVI 3. IF ATTEMPT OF CY IS UNSUCCESSFUL, S/C SEPARATION PI TB6. B. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AN 1. PREVALVES AND RE OFF VALVES OPEN 2 HR 12 MIN 	CIRC LOSED YCLE MOV IF COMMAND: LOSED RECIRC ES OPEN CLE MOV RECOMMEND RIOR TO D SEND: CIRC SHUT- D CIRC SHUT-	 MAIN OXIDIZER V/ (K120-401) LOX PUMP INLET F (D003-403) <u>NOTE</u>: A MANNED RESTART WII ATTEMPTED IF THE MOV CLOSED. 	PRESSURE
	5–47	S-IVB RANGE SAFETY S PROPELLANT DISPERSIO TEM INADVERTENTLY AR AFTER ORBITAL INSERT AND PRIOR TO SAFING.	N SYS- ORBITAL MS RESTART TON	SPACECRAFT SEPARATION BSE INFORM FLIGHT AND RE SPACECRAFT SEPARATION AN DRAWAL TO A SAFE DISTANC	DWITH-	<u>CUES</u> : 1. FIRING UNIT 1 R((M030-411) BETW AND 4.5 VOLTS.	
MI	ISSION	REV DATE	I	SECTION	I	GROUP	PAGE
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MISSION RULES

REV	RULE	CONDITION/MALFUNCTION	N PHASE	RULING	CUES/NOTES/CO	OMMENTS
		· · ·			2. FIRING UNIT 2 (M031-411) BE	TWEEN 2.4
					AND 4.5 VOLTS 3. RANGE SAFETY	
					1 ENABLE (N05 4. RANGE SAFETY	
					2 ENABLE (N05	2-411).
					5. RSO DISPLAY A SYSTEM STATUS VERIFICATION)	. (VOICE
					NOTES:	
					1. THE SPACECRAF QUEST LIGHT M NATED FOR A P DISPERSION SY CONDITION.	AY BE ILLUM ROPELLANT
					2. IF THE PROPEL SION SYSTEM A BOOST AND THE DOES NOT CUT PREMATURELY T SEND SAFE COM ORBITAL INSER CONDITION IND FAILURE HAS O THE RANGE SAF	RMS DURING J-2 ENGINE OFF HE RSO CAN MAND AFTER TION. THIS ICATES THE CCURRED IN
					CONTROLLER K- 3. EITHER CUE 1 SUFFICIENT FC	2 RELAY. OR CUE 2 IS
					TATION OF THI	S RULE.
					4. IF THE RANGE IS NOT SAFED PELLANT DISPE IS NOT ARMED, SAFETY SYSTEM SAFED AT THE OPPORTUNITY.	AND THE PRO RSION SYSTE THE RANGE I CAN BE
А	5-48	S-IVB AUXILIARY HYDRA	AULIC EARTH		CUES:	
		PUMP: A. FAILS TO TURN OFF	ORBITAL RESTART	A. CONTINUE MISSION	1. SYSTEM PRESSU 1700 PSIA (D4	
		TB5 + 4.1 SEC TB5 + 44 MIN 8 SE	EC	BSE INFORM FLIGHT AND	SEND: 2. RESERVOIR LEV 50 PERCENT (L	
х - с		TB5 + 1 HR 30 MIN 48 SEC TB5 + 3 HR 3 MIN	1	AUXILIARY HYDRAULIC P FLIGHT MODE OFF AS SO POSSIBLE.	PUMP	CURRENT
		TB7 + 4.1 SEC TB7 + 54 MIN 8 SE TB7 + 2 HR 17 MIN 03 SEC	EC		4. HYDRAULIC RES PRESSURE GREA 137 PSIA (D42	ERVOIR OIL TER THAN
		B. FAILS TO TURN ON		B. CONTINUE MISSION		
		1. S-IVB HYDRAU FLUID IS BELC		1. BSE INFORM FLIGHT	AND SEND <u>NOTE</u> :	
		PREDICTED TO BELOW <u>10</u> °F BE NEXT AOS.	DROP	AUXILIARY HYDRAUL FLIGHT MODE ON.	DRAULIC PUMP AFT NO. 2 BAT APPROXIMATELY	DEPLETES TERY IN '90 MIN AND
					OVERHEATS HYD IN APPROXIMAT	
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MISSION RULES

		MISSION RULES	
REV RULE	CONDITION/MALFUNCTION	PHASE RULING	CUES/NOTES/COMMENTS
	2. S-IVB AUXILIARY HYDRAULIC PUMP FAILS TO TURN ON AT TB6 + 3 MIN 39 SEC.	2. BSE INFORM FLIGH SEND: AUXILIARY HYDRAU FLIGHT MODE OFF.	I. SYSTEM PRESSURE BELOW ILIC PUMP 1700 PSIA (D41-403)
5-49	S-IVB COLD HELIUM SHUTOFF VALVES FAIL TO CLOSE AT A. TB5 + 1.4 SEC B. TB7 + 1.4 SEC	CONTINUE MISSION/SPACECR SEPARATION A. BSE INFORM FLIGHT AN 1. LOX TANK NPV VAL 2. LOX TANK FLIGHT ZATION SHUTOFF V CLOSED. IF (2) SUCCESSFU LOX NPV WHEN TAN IS BETWEEN 38-41 3. RECOMMEND SPACEC RATION IF LOX TA PRESSURE AT 48 P B. BSE INFORM FLIGHT AN 1. LOX TANK NPV VAL AFTER TB7 + 2 MII UNTIL THE ULLAGE IS BELOW 7 PSIA 2. RECOMMEND IMMEDI RATION IF LOX TA PRESSURE AT 48 P	Image: Construct of the service of
5-50	CONTINUOUS VENT SYSTEM (CVS) REGULATOR FAILS TO OPEN IN TB5 (TB5 + 50 SEC)	CONTINUE MISSION BSE INFORM FLIGHT AND SE	CUES: ND: 1. LH2 ULLAGE PRESSURE (D177-410, D178-410) 2. CVS NOZZLE PRESSURE (D181-409, D182-409)
MISSION	REV DATE	SECTION	GROUP PAGE

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REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
				1. CVS RELIEF OVERR OFF VALVE OPEN	IDE SHUT-	 CVS REGULATOR ((K154-411) 	
				IF UNSUCCESSFUL BSE:		NOTE:	
				 VENT THE LH₂ TAN TB6 TO A PRESSUR THE VALUE REQUIR TB6 INITIATE IF THE LH₂ BLOWD COMPLETED² WITHIN UTES PRIOR TO TB INITIATE SEND 	E BELOW ED FOR OWN IS 30 MIN-	1. IF THE CVS REG TO OPEN, THE LH TION TEMPERATUR CREASE ABOVE RE LIMITS TO INSUF PLETE BURN.	H2 SATURA- RE WILL IN- ESTART
				A. ULLAGE ENGIN	ES ON		
				AFTER 90 SEC SEND	OF ULLAGE		
				B. ULLAGE ENGIN	ES OFF		
				ULLAG ING SHO COMPLETED PR THE AMBIENT ZATION.	IOR TO		
				4. IF COMMAND ACTIO IS NOT SUCCESSFU TO TB6 + 42 SEC, RECOMMEND TLI IN	L PRIOR BSE		
A 5	5-51	LOSS OF ATTITUDE CONTROL	EARTH	SPACECRAFT SEPARATION		CUES :	
		A: DURING TB5 AND TB7	ORBITAL	A. BSE INFORM FLIGHT AN		1. THE DIFFERENCE	BETWEEN
				MEND S/C SEP.		COMMANDED ATTI AND ACTUAL VEH	
		B. FROM TB6 INITIATE TO TB6 + 9 MIN 10 SEC		B. <u>TLI INHIBIT</u>	DECOM	TUDE(THETA)IS THAN 5 DEG AND (H60-603)	
				BSE INFORM FLIGHT AN MEND TLI INHIBIT		2. ATTITUDE ERROR ARE EQUAL TO OF THAN 2.5 DEG IN AND YAW; 3.5 DE AND ARE NOT DEC (H69-602, H70-1 602, H54-603, H H56-603)	R GREATER N PITCH EG IN ROLL CREASING 602, H71-
						 THE VEHICLE AND ARE GREATER THU SEC AND ARE NOT (R7-603, R8-60) R12-603, R13-60 603) 	AN 2 DEG/ T DECREASI 3, R11-603
						 FLIGHT CONTROL NOT IN CORRECT (K20-602) 	
						5. LVDA ERROR MON TER BIT D26, D SET TO "ONES"	25 AND D24
						 ORBITAL STATUS CODE 28) BITS I OR (60-603) 	
						7. GUIDANCE FAILU (D04) (MODE COI D8 SET TO "ONE"	DE 26) BIT
MISS	SION	REV DATE		SECTION		GROUP	PAGE
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A 5-52 FAILURE TO TERMINATE APS ULLASE INFLICES) THEME FOR THE # STITULE CONTROL THE # STITULE TO THE STITULE STITULE TO THE STITULE THE # STITULE TO THE STITULE THE # STITULE TO THE STITULE THE # STITULE TO THE STITULE TO THE STITULE THE # STITULE TO THE STITULE TO THE STITULE TO THE STITULE THE # STITULE TO THE T				MISSION RULES			
A 5-52 FAILURE TO TERMINATE APS IS CRITICUE CONTROL BRITCH ATTIFUE CONTROL STATION CONTINUE MISSION A 5-52 FAILURE TO TERMINATE APS IS CRITICUE CONTROL STATION CONTINUE MISSION B FAILURE TO TERMINATE APS IS CRITICUE CONTROL AT 185 + 1 MIN 37 SEC AND TBG + 9 MIN 35 SEC CONTINUE MISSION D CONTINUE TO TERMINATE APS IS CRITICUE CONTROL AT 185 + 1 MIN 37 SEC AND TBG + 9 MIN 35 SEC CONTINUE MISSION D CONTINUE TO TERMINATE APS IS CRITICUE CONTROL TBG + 9 MIN 35 SEC CONTINUE MISSION A S-108 ULACE DRGINE NO. 1 AND CONTROL STATION CONTINUE MISSION A S-53 DI ECS WATER VALVE FAILS TO CITCLE OFFN AND CLOSED AND COLLARY TIRLE CONTROL THE INCOMPANIES CONTROL AMARE VALVE COSED AND COLLARY TIRLET CONTROL THE INCERTATION STERA AND CONTROL TERMINE TRUE MISSION A METRY VALVE CONTROL THE INCERTATION STERA AND CONTROL TRUE TO TERMINE THE PORTED TO BE CONTROL THE INCERTATION STERA AND CONTROL TRUE TO TERMINE THE PORTED TO BE 104PP CONTROL THE INCERTATION STERA AND CONTROL TRUE TO TERMINE THE PORTED TO BE 104PP CONTROL THE INCERTATION STERA AND CONTROL TERMINE STERA AND CONTROL TERMINE STERA AND CONTROL TERMINE TO TERMINE THE PORTED TO BE 104PP CONTROL THE INCERTATION STERA AND CONTROL TERMINE TO TERMINE	REV RULE	CONDITION/MALFUNCTION	PHASE.	RULING		CUES/NOTES/COM	MENTS
AT T65 + 1 MIN 27 SEC AND T66 + 9 MIN 33 SEC RESTART BSE INFORM FLIGHT AND SEND: 1. ULLAGE ENGINE NO. 1 AND BER PRESSURG CEATER THU 9 0 P31A (2020-414, 0221- 415) 5-53 JU ECS WATER VALVE FAILS TO CYCLE OPEN AND CLOSED. A. MATER VALVE CLOSED AND COCLANT INLET CONTROL THEMERATURE IS 64PF OR HIGHER, AND DICTED TO BE EQUAL TO OR GREATER THAN 1139F BEFORE THE REST SITE ADS GR, THE INCRITILE GIMBAL TEMPERATURE IS PREDICIDE TO BE EQUAL TO OR GREATER THAN 1139F BEFORE THE NEXT SITE ADS GR, THE INCRITILE GIMBAL TEMPERATURE IS PREDICIDE TO BE EQUAL TO OR GREATER THAN 1139F BEFORE THE NEXT SITE ADS GR, THE INCRITILE GIMBAL TEMPERATURE IS PREDICIDE TO BE EQUAL TO OR GREATER THAN 1129F BEFORE THE NEXT SITE ADS GR, THE INCRITILE GIMBAL TEMPERATURE IS PREDICIDE TO BE EQUAL TO OR GREATER THAN 1129F BEFORE THE NEXT SITE ADS. EARTH ONTIME HIGHT AND SEND: 1. ECS LOGIC INHIBIT COM- MAD (XS NO. 5) CUES: 1. WATER VALVE CLOSED/OPEN (C11-601) B. MITER VALVE OPEN MAD COCLANT INLET CONTROL TEMP IS SIGN OR LESS, AND COCLANT INLET CONTROL CAS NO. 5) SUBLINATER INLET TEMP (C31-603) B. MITER VALVE OPEN MAD COCLANT INLET CONTROL TEMP IS SIGN OR LESS, AND COCLANT INLET CONTROL CAS NO. 5) B. BSE INFORM FLIGHT AND SEND: 1. ECS LOGIC INHIBIT COM-MAD CAS NO. 5) CUESE CONTROL COM FLIGHT AND SEND: 1. ECS LOGIC INHIBIT COM-MAD CAS NO. 5) CUESE CONTROL CAS NO. 5) B. MITER VALVE OPEN MAD COCLANT INLET CONTROL CAS NO. 5) B. BSE INFORM FLIGHT AND SEND: 1. ECS LOGIC INHIBIT COM-MAD CAS NO. 5) CUESE CONTROL CAS NO. 5) B. MITER VALVE OPEN MAD COCLANT INLET CONTROL CAS NO. 5) B. BER INFORM FLIGHT AND SEND: 1. ECS LOGIC INHIBIT COM-MAD CAS NO. 5) MITER VALVE OPEN MAD COS COLAND TO CONTROL CAS NO. 5) <t< td=""><td>A 5-52</td><td></td><td>EARTH</td><td>CONT INUE MISSION</td><td></td><td> THE SLV YAW GII IS CRITICAL BE DEGREES. DURING PERIODS COM, CREW MAY / ATTITUDE CONTR OVER TO ALLOW OVER A GROUND S </td><td>YOND ±45 OF NO GND ATTEMPT OL SWITCH - SEPARATION</td></t<>	A 5-52		EARTH	CONT INUE MISSION		 THE SLV YAW GII IS CRITICAL BE DEGREES. DURING PERIODS COM, CREW MAY / ATTITUDE CONTR OVER TO ALLOW OVER A GROUND S 	YOND ±45 OF NO GND ATTEMPT OL SWITCH - SEPARATION
TO CYCLE OPEN AND CLOSED. OREITAL RESTART A. BSE INFORM FLIGHT AND SEND: 1. WATER VALVE CLOSED / AND COOLANT INLET CONTROL THE INERTIAL GIMBAL TEMPERATURE IS PRE- DICTED TO BE EQUAL TO OR GREATER THAN 115°F BEFORE THE NEXT SITE AOS OR, 1. WATER VALVE CLOSED/OPEN MAND (AS NO. 5) 1. WATER VALVE CLOSED/OPEN (G5-601) (G5-601) THE INERTIAL GIMBAL TEMPERATURE IS PREDICTED TO BE EQUAL TO OR GREATER THAN 115°F BEFORE THE NEXT SITE AOS OR, 2. WATER VALVE OPEN 3. OWM MODE CODE 27 BIT DB SET TO "U". B. WATER VALVE OPEN AND COOLANT INLET CONTROL TEMP IS SOF OR LESS, AND B. BSE INFORM FLIGHT AND SEND: 1. ECS LOGIC INHIBIT COM/WAND (AS NO. 5) B. WATER VALVE OPEN AND COOLANT INLET CONTROL TEMP IS SOF OR LESS, AND B. BSE INFORM FLIGHT AND SEND: 1. ECS LOGIC INHIBIT COM/WAND (AS NO. 5) THE INERTIAL GIMEAL TEMPERATURE IS PREDICTED TO BE 194°F OR LESS BEFORE THE NEXT SITE AOS. B. BSE INFORM FLIGHT AND SEND: 1. ECS LOGIC INHIBIT COM/WAND (AS NO. 5) THE INERTIAL GIMEAL TEMPERATURE IS PREDICTED TO DE 194°F OR LESS BEFORE THE NEXT SITE AOS. 2. WATER VALVE CLOSED 8. LVDA TEMP NO. 2 (C56-602) MISSION REV DATE SECTION GROUP PAGE		AT TB5 + 1 MIN 27 SEC AND		 A. S-IVB ULLAGE ENGINE 1 2 OFF. B. IF UNSUCCESSFUL, BSE FLIGHT OF IMPENDING 	NO. 1 AND	BER PRESSURE G 90 PSIA (D220- 415) 2. APS HELIUM SPHI DECREASING (D3)	REATER THAN 414, D221- ERE PRESSURE 5-414, D36-
Charles Contract Contra	5-53	 TO CYCLE OPEN AND CLOSED. A. WATER VALVE CLOSED AND COOLANT INLET CONTROL TEMPERATURE IS 64°F OR HIGHER, AND THE INERTIAL GIMBAL TEMPERATURE IS PRE- DICTED TO BE EQUAL TO OR GREATER THAN 115°F BEFORE THE NEXT SITE AOS OR, THE LVDC MEMORY TEM- PERATURE IS PREDICTED TO BE EQUAL TO OR GREATER THAN 112°F BEFORE THE NEXT SITE AOS. B. WATER VALVE OPEN AND COOLANT INLET CONTROL TEMP IS 55°F OR LESS, AND THE INERTIAL GIMBAL TEMPERATURE IS PRE- DICTED TO BE 104°F OR LESS BEFORE THE NEXT SITE AOS OR, THE LVDC MEMORY TEM- PERATURE IS PREDICTED TO BE 32°F OR LESS BEFORE THE NEXT SITE 	ORBITAL	 A. BSE INFORM FLIGHT AND 1. ECS LOGIC INHIBI MAND (AS NO. 5) 2. WATER VALVE OPEN B. BSE INFORM FLIGHT AND 1. ECS LOGIC INHIBI (AS NO. 5) 	D SEND:	 WATER VALVE CLC (G5-601; G6-60) ME/H₂O TEMP (C OMW MODE CODE SET TO "0". ST-124 INERTIAL TEMP (C34-603) SUBLIMATER INLL (C11-601) LVDC MEMORY TEM LVDA TEMP NO. 	1) 15-601) 27 BIT D8 L GIMBAL ET TEMP MP (C54-603) 1 (C55-603)
Charles Contract Contra	MISSION	REV DATE		SECT (ON		GROUP	PACE
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		=	-	MISSION RULES		
REV	RULE	CONDITION/MALFUNCTION	N PHASE	RULING	CUES/NOTES/COM	MENTS
5	554	ENGINE PUMP PURGE FAIL AT TB5 + 10 MIN 3 SEC	S ON EARTH ORBITAL RESTART	CONTINUE MISSION BSE INFORM FLIGHT AND SEN ENGINE PUMP PURGE OFF	CUES: ND: 1. ENGINE PUMP PL TOR FAILS TO D FROM ABOUT 100	ECREASE
					ABOUT 10 PSIA. 2. AMBIENT PNEUMA PRESSURE DECRE RATE OF 23 PSI (D236-403, D25 <u>NOTE</u> : IF NOT TERMINATED, WILL CAUSE THE DEP THE AMBIENT HELIUM SUPPLY AT THE RATE MIN.	(D50-403 TIC BOTTLE ASING AT A /MIN 6-403) THE PURGE LETION OF PNEUMATIC
	5-55	S-IVB STAGE COMMON BUL DELTA PRESSURE REACHES EXCEEDS: A. MINUS 20 PSID		CONTINUE MISSION A. BSE INFORM FLIGHT AND LH ₂ VENT VALVE OPEN IF UNSUCCESSFUL SEND:	2. LH ₂ PUMP INLET (D2-403)	8-410) PRESSURE
		 B. PLUS 30 PSID C. MINUS 26 PSID PLUS 36 PSID 		 LH2 LATCHING RELI OPEN LH2 VENT VALVE CL VALVES WILL BE CYCLED CLOSED OR LEFT OPEN T CLUDE REACHING SEPARA LIMITS. BSE INFORM FLIGHT AND LOX NPV VALVE OPEN IF SUCCESSFUL SEND: LOX VENT VALVE OF LOX NPV VALVE OPEN LOX VENT VALVE OF LOX NPV VALVE CLO VALVES WILL BE CYCLED CLOSED OR LEFT OPEN T CLUDE REACHING SEPARA LIMITS. BSE INFORM FLIGHT AND MEND SPACECRAFT SEPARA A SAFE DISTANCE. 	(D3-403) (D3-403) (OSED HOTES: OOPENED/ OPRE- TION DEFINED AS A F ULLAGE PRESSUR THAN THE LOX T PRESSURE. OSEND: 2. PLUS DELTA PRE DEFINED AS A L ULLAGE PRESSUR THAN THE FUEL PRESSURE. 2. PLUS DELTA PRE DEFINED AS A L ULLAGE PRESSUR THAN THE FUEL PRESSURE. 2. THE MINIMUM RE DISTANCE BETWE S-IVB AND THE S-IVB AND THE S 7000 FT. 10 PRE- TION 4. THE BULKHEAD W URALLY FAIL AT MATE LIMITS OF 32.5 PSID OR P	ESSURE IS UEL TANK E GREATER ANK ULLAGE SSURE IS OX TANK E. GREATE TANK ULLAGE COMMENDED EN THE SPACECRAFT ILL STRUCT THE ULTI- MINUS
A !	5-56	LOSS OF S-IVB STAGE PM MATIC PRESSURE A. PRIOR TO TB6 + 8 M 45 SEC REGULATOR C LET PRESSURE <320	1IN DUT-	A. <u>CONTINUE MISSION</u> IMPLEMENT FMR 5-62	CUES: 1. AMBIENT HELIUM PRESS (D256-40 2. CONTROL HELIUM DISCHARGE PRES PSIA (D014-403	3, D236-40 REGULATOR SURE 320
		<u></u>				
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MISSION RULES

A 3-57 S-TVB ENGINE CONTROL BOTTLE DOWN AT TEX + 0.7 SEC P. CONTINUE MISSION 1. BES INFORM FULCET AND INTER FORMUSIE VOTING MIN COOR AFTER F14 CERN MIN COOR F14 CERN MIN COOR AFTER F14 CERN MIN COOR AFTER F14 CERN MIN COOR F14 CERN				MISSION RULES		
A 5-57 S-1V8 ENGINE CONTROL BOTTLE EARTH CREAT AND YOUGH AND RECOMP EXCEEDED GEE FAR 5-55). DISCHARE TO THE THE DISCHARE CREATE LINES THAN 400 PSIA A. PRIOR TO TB6 EARTH CREATE TO Y - 5/20/7 TEMILINE THE LOC DUP IF BULKEREL DISCHARE LINES THE DISCHARE LINES THE LOC DUP IF BULKEREL DISCHARE LINES THE DISCHARE LINES	REV RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/CO	OMMENTS
A PRESSURE LESS THAN 400 PSIA A. PRIOR TO TB6 CREITAL RESTART A. SPACERAFT SEPARATION BSE INFORM FLIGHT AND RECOM- MEND S/C SEPARATION PRIOR TO TB6 ENGINE CONTROL BOTTLE PRESS (2019-401; D242-401) A 5-58 INERTIAL PLATFORM FAILURE- ACCELEROMETER A. AFTER TB6 INITIATE TO B0 TRICK TO TB6 + 9 MIN 10 SEC EARTH ORBITAL RESTART EARTH ORBITAL BSE INFORM FLIGHT AND RECOM- MEND TL1 INHIBIT BSE INFORM FLIGHT AND FICO. RESTART CUES: A AFTER TB6 INITIATE B0 TRICK TO TB6 + 9 MIN 10 SEC EARTH ORBITAL COVERAGE DURING BURND EARTH ORBITAL BSE INFORM FLIGHT AND FICO. RESTART CUES: B. AFTER TB6 + 9 MIN 20 SEC (FOR ALL GROUND COVERAGE DURING BURND EARTH ORBITAL BSE INFORM FLIGHT AND FICO. RESTART CUES: B. AFTER TB6 + 9 MIN 20 SEC (FOR ALL GROUND COVERAGE DURING BURND EARTH ORBITAL BSE INFORM FLIGHT AND FICO. RESTART CUES: B. CONTINUE MISSION COVERAGE DURING BURND BSE INFORM FLIGHT AND FICO. RECOMPTED F/M PROFILE FO COCALEROMETER FAILURE COCCELEROMETER FAILURE COCCELEROMETER FAILURE OCCELEROMETER FAILURE OCCCELEROMETER FAILURE OCCCELEROMETER FAILURE OCCELEROMETER FAILURE			-	1. BSE INFORM FLIGH CAPCOM ADVISE FL THAT PROPULSIVE MAY OCCUR AFTER MIN 2. AT TB7 + 2:20:27 THE LOX DUMP IF DELTA PRESSURE L	T AND IGHT CREW VENTING TB7 + 35 TERMINATE BULKHEAD IDISCHARGE PRE PSIA (D014-40 NOTE: LOSS OF S-IVB PNE RESULTS IN LOSS OF AND FUEL CHILLDON	SSURE 320 3, D247-403) EUMATICS DF LOX
5-59 LH, ULLAGE PRESSURE LESS PRICE TO RESTART CONTINUE MISSION BSE INFORM FLIGHT AND FIDD. RECOMMEND TLI HHIBIT PRICE TO TB6 + 9 MIN 20 SEC . GUIDANCE STATUS WORD - (MOD CODE 24) (H6D-603) BITS D26 AND D25 FOR X ACCEL SET TO "ONE" BITS D24 AND D23 FOR X ACCEL SET TO "ONE" BITS D24 AND D23 FOR X ACCEL SET TO "ONE" B. AFTER TB6 + 9 MIN 20 SEC (FOR ALL GROUND COVERAGE DURING BURN) B. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND FIDD 2. ACCELEROMETER FLIGHT O "ONE" B. ACTER TB6 + 9 MIN 20 SEC (FOR ALL GROUND COVERAGE DURING BURN) B. <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND FIDD 2. ACCELEROMETER FLIGHT O "ONE" B. ACTER TB6 + 9 MIN 20 SEC (FOR ALL GROUND COVERAGE DURING BURN) CONTINUE MISSION BSE INFORM FLIGHT AND FIDD 2. ACCELEROMETER FLICES IN EXCESS OF 0.5 DEG. (HG-6.5.1, H11-60.3, H12-60.3, H12-60.3) MILED AXIS DURING OR AFTER LAST STATESIDE PASS PRIOR TO RESTART CONTINUE MISSION BSE INFORM FLIGHT AND SEND 2. ACCELEROMETER FAILURE OCCURRING DURING TBS WILL NOT GE RECOGNIZED UNTIL TB6 INITIATED. MISSION RESIDEN REV DATE SECTION GROUP PAGE	A 5-57	PRESSURE LESS THAN 400 PS A. PRIOR TO TB6 B. FROM TB6 INITIATE TO	IA ORBITAL	BSE INFORM FLIGHT AN MEND S/C SEPARATION TB6 B. <u>TLI INHIBIT</u> BSE INFORM FLIGHT AN	ENGINE CONTROL BO (D019-401; D242-4 D RECOM- PRIOR TO	
5-59 LH2 ULLAGE PRESSURE LESS THÁN 15 PSIA DURING OR AFTER LAST STATESIDE PASS PRIOR TO RESTART CONTINUE MISSION BSE INFORM FLIGHT AND SEND 1. LH2 TANK ULLAGE PRESSURI (D177-410, D178-410) 1. CONTINUOUS VENT SYSTEM CLOSE 2. LH2 PUMP INLET PRESSURE (D002-403) 2. LH2 PUMP INLET PRESSURE (D002-403) MISSION REV DATE SECTION GROUP MISSION REV DATE SECTION SPECIFIC	A 5-58	ACCELEROMETER A. AFTER TB6 INITIATED BUT PRIOR TO TB6 + 9 MIN 10 SEC B. AFTER TB6 + 9 MIN 20 SEC (FOR ALL GROUNI	ORBITAL RESTART	BSE INFORM FLIGHT AN RECOMMEND TLI INHIBI TO TB6 + 9 MIN 20 SE B. <u>CONTINUE MISSION</u>	 GUIDANCE STAT (MOD CODE 24) BITS D26 AND ACCEL SET TO D24 AND D23 F SET TO "ONE" AND D21 FOR Y TO "ONE" ACCELEROMETER (X, Y, OR Z) IN EXCESS OF (HIG-6(3, H11 603) <u>NOTES</u>: LVDC SWITCHES MODE AND UTIL COMPUTED F/M FAILED AXIS D BURN. ACCELEROMETER OCCURRING DUR WILL NOT BE R 	(H60-603) D25 FOR Z "ONE" BITS OR X ACCEL BITS D22 ACCEL SET PICKOFFS INDICATES 0.5 DEG. -603, H12- TO A BACKUP IZES A PRE- PROFILE FOR URING S-IVB FAILURE ING TB5 ECOGNIZED
	5-59	THẤN 15 PSIA DURING OR AFTER LAST STATESIDE PASS		BSE INFORM FLIGHT AND SE 1. CONTINUOUS VENT SYST 2. CONTINUOUS VENT ORIF	ND EM CLOSE I. LH ₂ TANK ULLA (D177-410, D1 2. LH ₂ PUMP INLE (D002-403) <u>NOTES</u> : LOW PRESSURE MAY	GE PRESSURE 78-410) T PRESSURE RESULT IN
	MISSION	REV DATE		ISECTION	GROUP	PAGE
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REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
A	5-60	0 ₂ /H ₂ BURNER VOTING CIRCUIT FAILS TO DETECT A BURNER	EARTH ORBITAL	CONTINUE MISSION	<u>CUES</u> :
		FLAME-OUT OR T AT THE BURNER HAS FAILED TO IGNITE (TB6 + 48 SEC UNTIL TB6 +	RESTART •	BSE INFORM FLIGHT AND SEND: 1. BURNER SHUTDOWN	1. BNR CHAMBER DOME TEMPERA TURE INDICATES 0°F OR LET (C382-403)
		8 MIN 17 SEC)		2. CONTINUOUS VENT SYSTEM ORIFICE OPEN	2. BNR NOZZLE TEMPERATURE (C380-403)
				 CRYOGENIC REPRESSURIZATION OFF (THE THREE COMMANDS LISTED ABOVE ARE COMBINED UNDER ONE 	3. BNR GH2 INJECTOR TEMPERA TURE (C383-403)
				SW SEL LOAD)	4. AMBIENT REPRESS MODE SELECT (K195-404)
					5. BURNER PROPELLANT VALVE POSITIONS (K180-404, K192-404)
					NOTE:
					FAILURE CAUSED BY PROPELLANT VALVE FAILING TO OPEN.
A	5-61	COLD HELIUM \$PHERE PRESSURE LOW		CONTINUE MISSION	<u>CUES</u> :
		A. LESS T AN 1200 PSIA BUI GREATER THAN 600 PSIA		A.1. BSE INFORM FLIGHT AND SEND PRIOR TO TB6 INITIATE:	1. COLD HELIUM SPHERE PRESSURE (D016-425, D263-425)
		PRIOR TO TB6 INITIATE		BURNER LOX SHUTDOWN VALVES CLOSED	NOTES:
				2. IF COMMAND ACTION UNSUCCESS- FUL, BSE SEND IN TB6 (ASAP)	
				BURNER LOX SHUTDOWN VALVE CLOSED	A. 1200 PSIA FOR REPRES
		B. LESS THAN 600 PSIA PRIOR TO TB6 INITIATE		B. SPACECRAFT SEPARATION BSE INFORM FLIGHT AND RECOM- MEND SPACECRAFT SEPARATION PRIOR TO TB6 INITIATE.	B. 600 PSIA FOR BURN
		C. LESS THAN 600 PSIA AFTER TB6 + 8 MIN 20 SEC		C. TLI INHIBIT BSE INFORM FLIGHT AND RECOMMEND TLI INHIBIT.	
А	5-62	LH2 CHILLDOWN SYSTEM FAILS		CONTINUE MISSION	<u>CUES</u> :
		DURING RESTART PREPARATION	•	BSE INFORM FLIGHT AND AT TB6 + 8 MIN 45 SEC SEND:	1. LH ₂ PREVALVE OPEN (K111-404)
				 ENGINE READY BYPASS PREVALVES OPEN 	2. LH ₂ PREVALVE CLOSE (112-404)
				3. ENGINE START ON	3. LH, BLEED VALVE CLOSE (KI27-401)
					4. LH ₂ RECIRC. VALVE CLOSE (KI36-409)
					5. LH ₂ RECIRC. FLOW (F005- 404)
					6. LH ₂ PUMP INLET PRESS (D002-403)
		~			7. LH ₂ ULLAGE PRESSURE (D177-410, D178-410)
l	SSION	R EV DATE	L	SECT LON	GROUP PAGE
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MISSION RULES

	e	001017-01/04		MISSION RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE.	RULING	I	CUES/NOTES/COM	MENTS
						 LH₂ PUMP INLET (C003-404) IOTES: 	TEMP
					1	. START MAY BE O IF COMMAND ACT CESSFUL BUT MAI RESTART TO BE. 2. IF COMMAND ACT FUL AND FIRST INHIBITED, REC SPACECRAFT SEP. PRIOR TO SECON NITY.	ION UNSUC- NNED ATTEMPTED. ION SUCCESS BURN LATER DMMEND ARATION
A	5-63	LOX CHILLDOWN SYSTEM F		CONTINUE MISSION	<u>c</u>	CUES:	
				BSE INFORM FLIGHT	1	. LOX RECIRC FLO	W (F004-424
					2	2. LOX PUMP INLET 403)	TEMP (COO4
					3	LOX PREVALVE 0 403)	PEN (K109-
					L	+. LOX PREVALVE C 403)	LOSE (K110-
					iç.	LOX BLEED VALV (K126-401)	E CLOSE
					6	5. LOX RECIRC VAL (K139-424)	VE CLOSE
		4 				7. LOX ULLAGE PRE (D179-424, D18	
					8	B. LOX PUMP INLET (D003-403)	PRESSURE
	5-64	S-IVB LH ₂ TANK ULLAGE PRESSURE LOW				CUES:	
		A. LH ₂ VENT VALVE FAII OPEN PRIOR TO TB6	_S +	A. TLI INHIBIT	1	L. LH ₂ ULLAGE PRE (DI 7 7-410, D17	
		9 MIN		BSE INFORM FLIGHT AND SE	ND:	2. LH ₂ PUMP INLET (D002-403)	PRESSURE
				LH ₂ VENT VALVES CLOSE IF UNSUCCESSFUL, BSE REC		 FUEL VENT VALV (K017-410) 	E OPEN
		B. CONTINUOUS VENTS		TLI INHIBITED.		+. FUEL VENT VALV (K001-410)	E CLOSED
		SYSTEM (CVS) REGUL/ FAILS TO CLOSE AT + 6 MIN 17 SEC		BSE INFORM FLIGHT AN CVS REGULATOR CLOSE; UNSUCCESSFUL, BSE RE TLI INHIBIT.	IF !	5. CVS REGULATOR (K154-411)	CLOSED
		C. LH ₂ ULLAGE LESS TH	AN	C. TLI INHIBIT	6	5. CVS NOZZLE PRE REMAINS GREATE	
		MIN 10 SEC IF MANN		BSE INFORM FLIGHT AND RE TLI INHIBIT	COMMEND	3 PSIA (D181-4 409)	
A	5-65	S-IVB ACTUATOR CONFIRM	ED EARTH	TLI INHIBIT		QUES:	
7	ç0-ç	HARDOVER FROM TB6 INITIATE TO TB6 + 9 MII 10 SEC	ORBITAL	BSE INFORM FLIGHT AND RE		1. ACTUATOR POSIT DEGREES OR GRE G1-403; G2-401	ATER (G1-40
MI	SSION	REV DATE		SECTION	<u> </u>	GROUP	PAGE
	POLLO 8	A 12/11/68	BOOSTER		SPECIFIC		PAGE 5-20
		A 12/11/00					5-20

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NASA — Manned Spacecraft Center MISSION RULES

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		DUACE		
REV RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMMENTS
				2. ENGINE ACTUATOR △P EQUAL TO OR GREATER THAN 3300 PSIA (D44-403; D45-403) <u>NOTE</u> : BOTH INDIVIDUAL ACTUATOR POS TIONS MUST CONFIRM MALFUNCTI PRIOR TO RECOMMENDING S/C SEPARATION OR TLI INHIBIT.
A 5-66	 S-IVB LOSS OF ENGINE HYDRAULIC FLUID A. PRIOR TO TB6 B. FROM TB6 TO TB6 + 9 MIN 10 SEC IF MANNED 	EARTH ORBITAL RESTART	 A. <u>S/C SEPARATION</u> BSE INFORM FLIGHT AND RECOMMEND S/C SEPARATION PRIOR TO TB6 B. <u>TLI INHIBIT</u> BSE INFORM FLIGHT AND RECOMMEND TLI INHIBIT 	CUES: 1. HYDRAULIC SYSTEM PRESSUR LESS THAN 1700 PSIA (D41-403) 2. HYDRAULIC RESERVOIR OIL LEVEL APPROXIMATELY ZERO PERCENT. 3. HYDRAULIC RESERVOIR PRES SURE APPROXIMATELY ZERO PSIA (D42-403)
A 5-67	 START BOTTLE PRESSURE A. GREATER THAN 1500 PSIA (1-1/2 ORBITS) FOR FIRST OPPORTUNITY B. GREATER THAN 1500 PSIA (2-1/2 ORBITS) FOR SECOND OPPORTUNITY 		 A. BSE INFORM FLIGHT AND SEND: 1. START TANK VENT VALVE OPEN 2. START TANK VENT VALVE CLOSED IN 3 SECONDS 3. COMMAND ACTION UNSUCCESS- FUL RECOMMEND TLI INHIBIT B. CONTINUE MISSION/SPACECRAFT SEPARATION 1. START TANK VENT VALVE OPEN 2. START TANK VENT VALVE CLOSED IN 3 SECONDS 3. IF COMMAND ACTION UNSUCCESSFUL, RECOMMEND S/C SEP PRIOR TO TB6. 	CUES: 1. START BOTTLE PRESSURE (D017-401, D241-401)
5-68	LOX TANK ULLAGE PRESSURE LOW A. LOX VENT VALVES FAILS OPEN PRIOR TO TB6 + 9 MIN B. LOX ULLAGE PRESSURE LESS THAN <u>31</u> PSIA PRIOR TO TB6 + 9 MIN 10 SEC IF MANNED		 A. TLI INHIBIT BSE INFORM FLIGHT AND SEND: LOX VENT VALVE CLOSE IF UNSUCCESSFUL, BSE RECOMMEND TLI INHIBIT. B. TLI INHIBIT BSE INFORM FLIGHT AND RECOMMEND TLI INHIBIT 	CUES: 1. LOX ULLAGE PRESSURE (D17 424, D180-424) 2. LOX PUMP INLET PRESSURE (D003-403) 3. LOX VENT VALVE OPEN (K016-404) 4. LOX VENT CLOSED (K002-424) NOTES: 1. ULLAGE PRESSURE LESS THA
MISSION	REV DATE	·	SECTION	37 PSIA INDICATES A MAL- FUNCTION GROUP PAGE

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MISSION RULES

			MISSION RULES		
REV RULE	CONDITION/MALFUNCTIO	N PHASE	RULING		CUES/NOTES/COMMENTS
REV RULE 5-69	CONDITION/MALFUNCTIO S-IVB FAILURE TO ATTA THRUST BY TB6 PLUS 9 UTES 40 SECONDS OR LO OF THRUST PRIOR TO TL GUIDANCE CUTOFF	IN MIN- SS		OR 10 2. 2. 2. 2. 2. 2. 2. 3. 2. 3. 2. 3. 2. 3. 2. 3. 2. 3. 2. 3. 2. 3. 2. 3. 2. 3. 2. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5	
	RULES 5-70 THROUGH 5-90 ARE RESERVED				• • •
··· 1					
MISSION	REV DATE		SECTION	GR(DUP PAGE

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APOLLO 8

FINAL FLIGHT MISSION RULES

REVISION A

PREFACE

THIS DOCUMENT CONTAINS REVISION A TO THE FLIGHT MISSION RULES FOR APOLLO 8 AS OF DECEMBER 11, 1968. REVISION A IS A PAGE CHANGE REVISION AND THE PAGES SHOULD BE INSERTED IN ACCORDANCE WITH THE REVISION INSTRUCTION SHEET WHICH FOLLOWS THIS PAGE. THIS AND 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. HAROLD M. DRAUGHON, FLIGHT CONTROL OPERATIONS BRANCH, BUILDING 45, ROOM 640, PHONE HU3-4846.

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

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

APPROVED BY:

KRAFT. JR.

DIRECTOR OF FLIGHT OPERATIONS

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FINAL FLIGHT MISSION RULES

REVISION A

REVISION INSTRUCTION SHEET

UPDATE THIS DOCUMENT IN ACCORDANCE WITH THE FOLLOWING INSTRUCTIONS: REMOVE AND REPLACE THE FOLLOWING REVISED PAGES:

iii	3-6	6-1	7-4	10-1	12-2
iv	3-7	6-2	8-1	10-2	12-3
1-3	4-1	6-4	8-2	10-4	12-4
1-6	4-4	6-5	8-3	11-3	12-5
1-8	4–6	6-6	8-4	11-4	12-7
1-9	4-7	6-7	8-5	11-6	13-3
1-10	4-8	6-8	8-6	11-7	13-4
3-3	4-10	6-9	8-7	11-9	13-5
3-4	4-11	7-1	8-8	11-10	14-2
3-5	4-13	7-2	8-10	12-1	14-4

REMOVE AND REPLACE THE FOLLOWING REVISED SECTIONS:

2, 5, 9, 15, 16, APPENDIX B

ADD THE FOLLOWING NEW PAGES:

i iia 12-4A 12-5A

APOLLO 8

FINAL FLIGHT MISSION RULES

MISSION C'

PREFACE

THIS DOCUMENT CONTAINS THE FLIGHT MISSION RULES FOR APOLLO 8 AND CON-STITUTES THE FINAL DOCUMENTATION. THESE RULES WILL RECEIVE AN EXTENSIVE EVALUATION DURING THE SIMULATIONS PRIOR TO THE APOLLO 8 MISSION. SUBSE-QUENT REVISIONS TO THIS DOCUMENT WILL BE PRINTED ON DIFFERENT COLORED PAGES FOR EASY RECOGNITION. INFORMATION CONTAINED WITHIN THIS DOCUMENT REPRESENTS THE FINAL FLIGHT MISSION RULES FOR THE APOLLO 8 MISSION AS OF NOVEMBER 7, 1968.

IT IS REQUESTED THAT ANY ORGANIZATION HAVING COMMENTS, QUESTIONS, OR SUGGESTIONS CONCERNING THESE MISSION RULES CONTACT MR. HAROLD M. DRAUGHON, FLIGHT CONTROL OPERATIONS BRANCH, BUILDING 45, ROOM 640, PHONE HU3-4846.

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

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APPROVED BY:

CHRISTOPHER C. KRAFT, JR. DIRECTOR OF FLIGHT OPERATIONS

CONCURRED BY:

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GEORGE M. LOW MANAGER, APOLLO SPACECRAFT PROGRAM OFFICE

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R. SCOTT HAMNER MSFC, MISSION OPERATIONS OFFICE

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						MISS	ION RULES				
REV	RULE	CO	NDITION/MALFUNCTI	ON	PHASE		RULING			CUES/NOTES/COM	MENTS
А	5-91		LATCHING VENT VA	LVE	TRANSLUNAR	<u>CON</u>	TINUE MISSION		<u>CUES</u>	:	
			S TO OPEN AT:			BSE	INFORM FLIGHT AND SE	ND:		LH ₂ NPV NOZZLE F (D183-409, D184-	
			+ 2 SEC OR,			LH2	LATCHING VENT VALVE	OPEN			
			+ 1 HOUR OR,			IFι	INSUCCESSFUL SEND:			LH ₂ ULLAGE PRESS (D177-410, D178-	
		TB7	+ 2 HOURS 17 MIN	3 SEC		1.	LH2 LATCHING VENT VA	LVE CLOSE	NOTE	:	
						2.	LH2 VENT VALVE OPEN			OMMAND ACTION UN E MAY BE NON-PRO	
						3.	LH ₂ VENT VALVE CLOSE TB7 + 15 MIN OR TB7 15 MIN		,	ING DURING S/C S	
A	5-92		NON-PROPULSIVE V		TRANSLUNAR				<u>CUES</u>	:	
			TB7 + 1 SEC			А.	CONTINUE MISSION			LOX NPV NOZZLE F (D243-404, D244-	
							BSE INFORM FLIGHT AN	ID SEND:		LOX NPV OPEN DIS	SCRETE
							LOX NPV VALVE OPEN			(K198-424)	
					Ì		IF UNSUCCESSFUL SEND):		LOX NPV CLOSE D (K199-424)	ISCRE LE
							1. LOX NPV VALVE CL	.OSE		LOX ULLAGE PRES	
							AND			(D179-424, D180-	-424)
							2. LOX VENT VALVE (SIVE) OPEN FOR ⁴				
				ĺ			AND				
				l			3. LOX VENT VALVE O	LOSE			
		в.	TB7 + 2 HR 17 M	IN		В.	CONTINUE MISSION				
			03 SEC				BSE INFORM FLIGHT AN	ND SEND:			
							LOX NPV VALVE OPEN			.*	
					ĺ		IF UNSUCCESSFUL SEN	:			
							1. LOX NPV VALVE CL	.OSE			
							AND				
							2. LOX VENT VALVE (SIVE) OPEN	(PROPUL-			
	5-93	SPA	CECRAFT NOT SEPA	RATED	TRANSLUNAR	CON	TINUE MISSION		CUES	<u>.</u>	
		(4	TB7 + 1 HR 45 MIN MIN PRIOR TO DUM			BSE	INFORM FLIGHT AND SE	IND:	1.	S/C SEPARATION	
		ATT	ITUDE MANEUVER)			1.	TIME BASE UPDATE TO			FIRMED BY CAPCO	
							PROPELLANT DUMP UNT	IL S/C	2.	LVDC HAS NOT RE SEP DISCRETE.	
ļ						2.	IF UNSUCCESSFUL, BSE	E SEND:	NOT	(H60-603) 	
							PREVALVES AND RECIR CLOSED	VALVES		⊑; [TAL COMMAND SYS BLED AT TB7 + 20	
		II .									
мі	ISSION	REV	DATE]	SECTIO	N		GR()UP	PAGE
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NASA — Manned Spacecraft Center MISSION PULES

				MISSION RULES		
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COMMENTS
	5-94	LH2 TANK PRESSURE GREATE THAN 26 PSIA PRIOR TO	R TRANSLUNAR	CONTINUE MISSION	CUES:	
		INITIATION OF LOX DUMP (TB7 + 2 HR 12 MIN)		BSE INFORM FLIGHT AND SEN LH2 CONTINUOUS VENT RELIE RIDE S/O VALVE OPEN IF UNSUCCESSFUL, SEND: LH2 VENT VALVE OPEN AND C AS ² REQUIRED TO PROVIDE AN	F OVER- 2. L LOSED LH ₂	H2 ULLAGE PRESSURE D0177-410, D0178-410) H2 PUMP INLET PRESSURE D003-403)
	5-95	LOX DUMP FAILS TO INITIA AT TB7 + 2 HR 12 MIN 0 S		ULLAGE PRESSURE OF <18 PS PRIOR TO LOX DUMP INITIAT <u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND SEN ENGINE LOX VALVE OPEN	ION. ID: 1. M 2. M	IAIN LOX VALVE POSITION G003-401) IAIN LOX VALVE OPEN K120-401)
	5-96	FAILURE TO INITIATE COLD HELIUM DUMP	TRANSLUNAR	CONTINUE MISSION BSE INFORM FLIGHT AND SEN LOX PRESSURE S/O VALVE OF	PEN 2. C	OLD HELIUM BOTTLE PRES- URE (D016-425, D263-405) OLD HELIUM REGULATOR DIS HARGE PRESSURE (D105-403
	5-97	ENGINE START BOTTLE DUMP FAILS TO INITIATE	TRANSLUNAR	CONTINUE MISSION BSE INFORM FLIGHT AND SEN START BOTTLE VENT CONTROL OPEN	(DŐ17	TART BOTTLE PRESSURE -401, D241-401)
	5-98	S-IVB AMBIENT HELIUM DUM FAILS TO INITIATE	P TRANSLUNAR	<u>CONTINUE MISSION</u> BSE INFORM FLIGHT AND SEM ENGINE PURGE ON	2. A F	NGINE PUMP PURGE PRESSUR D050-403) MBIENT HELIUM SUPPLY RESSURE (D236-403, 2256-403)
А	5-99	ENGINE CONTROL BOTTLE DU FAILS TO INITIATE	IMP TRANSLUNAR	CONTINUE MISSION BSE INFORM FLIGHT AND SEN ENGINE HELIUM CONTROL VAL OPEN	PRESS	HE CONTROL HELIUM SPHERE SURE (D019-401, D242-401)
M!	ISSION	REV DATE		SECTION	GRO	UP PAGE
1		· · · · · · · · · · · · · · · · · · ·				5-24

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NASA — Manned Spacecraft Center MISSION RULES

C. NO. NAMES OF COMPLEX

				M1331O	N RULES			
REV	ITEM	*	<u>]</u>	INSTRUMENTAT	ION REQUI	REMENTS		
	5-100	MEAS DESCRIPTION	PCM	ONBOARD		TRANSDUCERS	CATEGORY	REFERENCE
		PRESS COMBUSTION CHAMBER	D8-101		•		HIGHLY DESIRABLE	5-3
		PRESS COMBUSTION CHAMBER	D8-102			.'	HIGHLY DESIRABLE	5-3
		PRESS COMBUSTION CHAMBER	D8-103				HIGHLY DESIRABLE	5-3,4
'		PRESS COMBUSTION CHAMBER	D8-104				HIGHLY DESIRABLE	5-3
		PRESS COMBUSTION CHAMBER					HIGHLY DESIRABLE	5-3
		POS PITCH ACTUATOR	VG1-101				HIGHLY DESIRABLE	5-5,12
	1.1	POS PITCH ACTUATOR	VG1-102				HIGHLY DESIRABLE	5-5,12
		POS PITCH ACTUATOR POS PITCH ACTUATOR	VGĪ-103 VG1-104				HIGHLY DESIRABLE HIGHLY DESIRABLE	5-5,12 5-5,12
		POS YAW ACTUATOR	VG1-104 VG2-101	•			HIGHLY DESIRABLE	
		POS YAW ACTUATOR	VG2-101 VG2-102	•			HIGHLY DESIRABLE	5-5,12
		POS YAW ACTUATOR	VG2-103	•			HIGHLY DESIRABLE	5-5,12
		POS YAW ACTUATOR THRUST OK PRESS SW NO. 1	VG2-104				HIGHLY DESIRABLE	5-5,12
		ENG NO. 3 THRUST OK PRESS SW NO. 2	К39-115				HIGHLY DESIRABLE	5-3,4
		ENG NO. 3	К40-115				HIGHLY DESIRABLE	5-3,4
		FINAL THRUST OK CUTOFF ENG NO. 1	к52-115				HIGHLY DESIRABLE	5-3
		FINAL THRUST OK CUTOFF ENG NO. 2	к53-115				HIGHLY DESIRABLE	5-3
		FINAL THRUST OK CUTOFF ENG NO. 3	к54-115				HIGHLY DESIRABLE	5-3,4
		FINAL THRUST OK CUTOFF				. 1		·
		ENG NO. 4 FINAL THRUSTOK CUTOFF	K55-115					5-3
		ENG NO. 5	K56-115				HIGHLY DESIRABLE	5-3
		E1 THRUST CHAMBER P E2 THRUST CHAMBER P	D13-201 D13-202				HIGHLY DESIRABLE HIGHLY DESIRABLE	5-15
1		EZ THRUST CHAMBER P E3 THRUST CHAMBER P	D13-202				HIGHLY DESIRABLE	5-15 5-15
		E4 THRUST CHAMBER P	D13-204				HIGHLY DESIRABLE	5-15
1.1		E5 THRUST CHAMBER P	D13-205				HIGHLY DESIRABLE	5-15
		POS YAW ACTUATOR	VG8-201				1 OF 2	5-12,16
1		POS YAW ACTUATOR	G30-201				MANDATORY	
		POS YAW ACTUATOR	VG8-202				1 OF 2	5-12,16
		POS YAW ACTUATOR	G30-202			· ·	MANDATORY	_ _ _ _ _ _ _ _ _ _
		POS YAW ACTUATOR	VG8-203				1 OF 2	5-12,16
		POS YAW ACTUATOR POS YAW ACTUATOR	G30-203 (VG8-204)				MANDATORY	E 10 10
		POS YAW ACTUATOR	G30-204				MANDATORY	5-12,16
.		POS PITCH ACTUATOR	G9-201)				1 OF 2	5-12,16
		POS PITCH ACTUATOR	G31-201				MANDATORY	,,
		POS PITCH ACTUATOR	G9-2021				1 OF 2	5-12,16
		POS PITCH ACTUATOR	G31-202				⁽ MANDATORY	
		POS PITCH ACTUATOR	G9-203}				1 OF 2	5-12,16
		POS PITCH ACTUATOR	G31-203'				MANDATORY	
		POS PITCH ACTUATOR	G9-204 }				1 OF 2	5-12,16
		POS PITCH ACTUATOR	G31-204					F 1F
		E1 M/S OK DEPRESS A E2 M/S OK DEPRESS A	K285-201 K285-202				HIGHLY DESIRABLE HIGHLY DESIRABLE	5-15 5-15
		EZ M/S OK DEPRESS A	K285-202 K285-203				HIGHLY DESIRABLE	5-15
		E4 M/S OK DEPRESS A	K285-204				HIGHLY DESIRABLE	5-15
		E5 M/S OK DEPRESS A	K285-205				HIGHLY DESIRABLE	5-15
		LH2 TANK ULLAGE P EDS 1				COMMON	HIGHLY DESIRABLE	NONE
		LH2 TANK ULLAGE P EDS 2		METER		COMMON	HIGHLY DESIRABLE	NONE
		E1 M/S OK DEPRESS B	K286-201				HIGHLY DESIRABLE	5-15
		E2 M/S OK DEPRESS B	K286-202				HIGHLY DESIRABLE	5-15
		E3 M/S OK DEPRESS B	K286-203				HIGHLY DESIRABLE	5-15
		E4 M/S OK DEPRESS B	K286-204				HIGHLY DESIRABLE	5-15
		E5 M/S OK DEPRESS B	K286-205				HIGHLY DESIRABLE	5-15
		SECONO SEP FIRING MON 1A RECIRC DC BUS VOLT		7				5-17
		IGNITION DC BUS VOLT	XM111-20 XM125-20				HIGHLY DESIRABLE HIGHLY DESIRABLE	5-17 5-17
		TEMP, FUEL PUMP INLET	XC3-403	,			HIGHLY DESIRABLE	5-62,45
		TEMP, OXID PUMP INLET		١			HIGHLY DESIRABLE	5-63
		TEMP, GOX/GH2 BNR LH2 NOZZLE	C380-403				HIGHLY DESIRABLE	5-60
		TEMP, BURNER CHAMBER DOME	C382-403				HIGHLY DESIRABLE	5-60
		TEMP, BURNER GH2 INJ	C383-403				HIGHLY DESIRABLE	5-60
		PRESS - THRUST CHAMBER	D1-401				HIGHLY DESIRABLE	5-21,69
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PRESS, GN, REG INLET XDI0-603 PRESS, WATER CONT VALVE CLOSED V65-601 POS, WATER CONT VALVE OPEN G6-601 ATT ERROR PITCH - LADDER OUTPUT VH54-603 ATT ERROR VAW - LADDER OUTPUT VH55-603 ATT ERROR ROLL - LADDER OUTPUT VH56-603 GUID COMPUTER OPERATION H60-603 ATT ERROR SIG ANG POS ROLL VH69-602 ATT ERROR SIG ANG POS YAW VH70-602 ATT ERROR SIG ANG POS PITCH VH71-602 COMP RESET PULSE NO. 1 GUID DECODER VU71-603 COMP RESET PULSE NO. 2 GUID COMPUTER SIG ANG POS PITCH VH71-602 COMP RESET PULSE NO. 2 GUID COMPUTER VH71-602 COMP RESET PULSE NO. 2 GUID COMPUTER VH71-602 COMP RESET PULSE NO. 2 GUID DECODER VU72-603 COMP RESET PULSE NO. 2 GUID DECODER VU72-603 GUID DECODER VU72-603 GUID DECODER VU72-603 GUID DECODER VU72-603 GUID DECODER VU72-603 GUID DECODER VU72-603 GUID DECODER VU72-603 GOUP 1 VR19-602 HIGHLY DESIRABLE S-12,1 S-12,1 COMP RESET PULSE NO. 2 GUID DECODER VU72-603 HIGHLY DESIRABLE S-12,1 COMP RESET PULSE NO. 2 GUID DECODER VU72-603 GROUP 1 VR19-602 HIGHLY DESIRABLE S-12,1 ANG VEL, PITCH EDS GROUP 2 VR19-602 HIGHLY DESIRABLE S-12,1 ANG VEL, PITCH EDS GROUP 3 ANG VEL, PITCH EDS GROUP 3 VR13-602 HIGHLY DESIRABLE S-12,1 ANG VEL, PICH EDS GROUP 3 VR13-602 HIGHLY DESIRABLE S-12,1 ANG VEL, POLL EDS GROUP 3 VR13-602 HIGHLY DESIRABLE S-12,1 ANG VE		•					
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GROUP 1 VR8-602 HIGHLY DESIRABLE 5-12,1 ANG VEL, YAW EDS GROUP 2 VR11-602 HIGHLY DESIRABLE 5-12,1 ANG VEL, ROLL EDS GROUP 2 VR12-602 HIGHLY DESIRABLE 5-5,12 ANG VEL, PITCH EDS GROUP 3 VR13-602 HIGHLY DESIRABLE 5-5,12 ANG VEL, ROLL EDS GROUP 3 VR13-602 HIGHLY DESIRABLE 5-5,12 GROUP 3 VR15-602 HIGHLY DESIRABLE 50,16		GROUP 1	VR7-602			HIGHLY DESIRABLE	5-12,15
GROUP 2 VR11-602 HIGHLY DESIRABLE 5-12,1 ANG VEL, ROLL EDS GROUP 2 VR12-602 HIGHLY DESIRABLE 5-5,12 ANG VEL, PITCH EDS GROUP 3 VR13-602 HIGHLY DESIRABLE 5-12,1 ANG VEL, ROLL EDS GROUP 3 VR13-602 HIGHLY DESIRABLE 5-5,12 ANG VEL, ROLL EDS GROUP 3 VR15-602 HIGHLY DESIRABLE 50,16		GROUP 1	VR8-602			HIGHLY DESIRABLE	5-12,15
ANG VEL, ROLL EDS GROUP 2 VR12-602 HIGHLY DESIRABLE 5-5,12 SO,16 ANG VEL, PITCH EDS GROUP 3 VR13-602 HIGHLY DESIRABLE 5-12,1 ANG VEL, ROLL EDS GROUP 3 VR15-602 HIGHLY DESIRABLE 50,16			VR11-602			HIGHLY DESIRABLE	5-12,15
ANG VEL, PITCH EDS GROUP 3 VR13-602 HIGHLY DESIRABLE 5-12,1 ANG VEL, ROLL EDS GROUP 3 VR15-602 HIGHLY DESIRABLE 50,16 HIGHLY DESIRABLE 50,16							5-5,12,
ANG VEL, ROLL EDS 5-5,12 GROUP 3 VR15-602 HIGHLY DESIRABLE 50,16							50,16
		ANG VEL, ROLL EDS				HIGHLY DESIRABLE	5-12,15 5-5,12,
ISSION REV DATE SECTION GROUP PAGE			VR15-602			HIGHLY DESIRABLE	50,16
	ISSION	REV DATE SECTION	۰		GROUP		PAGE

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6 ENVIRONMEN-TAL CONTROL SYSTEM

NASA — Manned Spacecraft Center MISSION RULES

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REV	ITEM	GENERAL
	6-1	LAUNCH
		LAUNCH WILL BE CONTINUED AS LONG AS THE SUIT CIRCUIT AND O2 SUPPLY WILL SUPPORT FLIGHT CREW DEMANDS AT LEAST ONE REV AND ENTRY INTO 2-1. THERE ARE NO COOLANT FAILURES FOR WHICH THE LAUNCH/INSERTION PHASE WILL BE TERMINATED.
	6-2	OTHER PHASES
		BACKUP SYSTEMS AND BACKUP COMPONENTS WILL BE USED FOR THE MOST RAPID PRACTICAL RETURN TO EARTH; NOT FOR MISSION CONTINUATION.
A	6-3	FLIGHT CREW WILL DON SUITS FOR THE FOLLOWING:
		A. CABIN PRESSURE CANNOT BE MAINTAINED ABOVE 4.5 PSIA.
		B. GLYCOL LEAKS IN COMMAND MODULE.
		C. FIRE, SMOKE, CONTAMINATION IN CABIN.
	6-4	THE FLIGHT CREW WILL DOFF SUITS (TIME AND CONDITIONS PERMITTING) FOR THE FOLLOWING:
		A. LOSS OF SUIT CIRCULATION.
		B. CONFIRMED LEAK OF GLYCOL IN SUIT CIRCUIT.
		C. FLIGHT PLAN OPTION AFTER TLI.
		RULES 6-5 THROUGH 6-9
		ARE RESERVED.
M1	ISSION	REV DATE SECTION GROUP PAGE
	LO 8	A 12/11/68 ENVIRONMENTAL CONTROL SYSTEM GENERAL SYSTEMS MANAGEMENT 6-1 292 (AUG 65)

2012-240

		MISSION RULES	
REV	ITEM	SYSTEMS MANAGEMENT	
А	6-10	Q2_SYSTEM	
		A. LIOH CANISTER WILL BE REPLACED EVERY 12 HOURS OR 7.6 MM Hg OF PCO2 WHICHEVER COMES FIRST	•
		B. SUIT FLOW RELIEF VALVE WILL REMAIN CLOSED FOR DURATION OF FLIGHT.	
		C. NORMAL CABIN REPRESSURIZATION WILL UTILIZE SURGE TANK PLUS REPRESS PACK.	
		D. SURGE TANK AND REPRESS TANK WILL BE RECHARGED SIMULTANEOUSLY.	
		E. THE PLSS VALVE WILL BE IN OFF POSITION FOR TLC, LO AND TEC.	
		F. SURGE TANK WILL BE ON LINE FOR DURATION OF FLIGHT.	
		G. THE SUIT CIRCUIT MUST BE PURGED OF ACCUMULATED HYDROGEN ONCE EVERY 6 HOURS FOR ONE MINUT WHEN ALL CREWMAN ARE SUITED AND THE SUIT CIRCUIT ISOLATED FROM THE CABIN.	E DURATION
	6-11	COOLANT MANAGEMENT	
		A. FOR SIMULTANEOUS PRIMARY AND SECONDARY LOOP OPERATIONS ONE RADIATOR WILL BE ISOLATED.	
		B. GLYCOL RESERVOIR WILL BE ON LINE FOR LAUNCH.	
		C. INDICATED GLYCOL ACCUMULATOR QUANTITY WILL BE MAINTAINED BETWEEN <u>30</u> PERCENT AND <u>70</u> PERCE (CORRESPONDS TO 26 AND 81 PERCENT ACTUAL).	NT.
		D, SECONDARY COOLANT WILL BE OFF FOR LAUNCH.	
		E. ADDITIONAL LOADS MAY BE ADDED TO MAINTAIN PRI RAD OUT T >-20°F	
A	6-12	H20 MANAGEMENT 1. WATER DUMPS WILL BE MANAGED TO ACCOMMODATE THE FOLLOWING GUIDLINES: A. MAXIMUM 90 PERCENT	
		B. LOI MINIMUM PERCENT.	
		C. ENTRY INTERFACE MINIMUM 80 PERCENT.	
		D. TRANSLUNAR COAST MINIMUM PERCENT.	
		E. TRANSEARTH COAST MINIMUM PERCENT.	
		2. IN THE EVENT THE WASTE WATER TRANSDUCER IS INOPERATIVE, WASTE WATER WILL BE DUMPED TO ZE TO GET A KNOWN STARTING POINT EACH TIME.	ERO IN ORDER
		RULES 6-13 THROUGH 6-19 ARE RESERVED.	
MI	SSION	REV DATE SECTION GROUP P	AGE

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NASA — Manned SpaceCFaft Center MISSION RULES

				MISSION RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING	ł		
	6-20	CABIN PRESSURE CANNOT E RELIEVED		CONTINUE MISSION		NORMAL RELIEF STAR T + <u>47</u> SECONDS	
	6-21	CABIN PRESSURE DECREASING AND/OR <4.5 PSIA			1		
		A. SUIT PRESSURE >3.5 PSIA	LAUNCH	A. CONTINUE MISSION			
			EPO	ENTER NEXT BEST PTP IF CARESTORED >4.5 PSIA	ABIN NOT	MALF <u>ECS 10</u>	
			TLC	ENTER NEXT BEST_PTP			
			LO	ENTER NEXT BEST PTP			
		B. SUIT PRESSURE <3.5 PSIA	LAUNCH	B. <u>ABORT ASAP</u>		MALF <u>ECS 8</u>	
			EPO	ENTER ASAP			
			TLC	ENTER ASAP			
			LO	ENTER ASAP			
			TEC	ENTER ASAP			
		C. LOSS OF SUIT CIRCU- LATION	LAUNCH	C. <u>ABORT ASAP</u> DIRECT 02 - OPEN <u>45</u> FROM LAUNCH SETTING VENTILATION		MALF <u>ECS 9</u> CORRESPONDS TO 12. CAPPROX 3 CFM/CREW	
			EPO	ENTER ASAP			
			TLC	ENTER ASAP			
			LO	ENTER ASAP			
			TEC	ENTER ASAP			
	6-22	LOSS OF SUIT CIRCULATIC CABIN STABLE AND >4.5 PSIA	DN LAUNCH	CONTINUE MISSION DIRECT O2 - OPEN <u>45</u> DI FROM LAUNCH SETTING FOR VENTILATION	EG SUIT	MALF <u>ECS 9</u>	
			EPO	ENTER NEXT BEST PTP WITH HOURS A. DOFF SUITS B. OPEN WASTE STOWAGE VI WASTE OVERBOARD DRAI OBTAIN BLEED FLOW C. DON FACE MASKS (AFTE	ENT OR N TO		
			TLC	ENTER ASAP			
			LO	ENTER ASAP			
		- -	TEC	ENTER ASAP			
						-	
	SS10N	REV DATE		SECTION		GROUP	PAGE
		FINAL 11/7/68 EN 291 (AUG 68)	VVIRONMENTAL CO	NIRUL SYSTEM	SPECIFIC-	-SUIT/CABIN	6-3

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		······		MISSION RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
	6-23	LOSS OF SURGE TANK OR RE- PRESS PACK (LEAK IN SYS-	ALL PHASES	CONTINUE MISSION			
		TEM RESULTING IN ISOLATIO	1	LEAK IN SURGE TANK. ISOL SURGE TANK AND PLACE PLSS TO FILL			
А	6-24	LOSS OF SURGE TANK AND REPRESS PACK (LEAK IN TANKS RESULTING IN ISO- LATION)	LAUNCH	CONTINUE MISSION			
		•	EPO	NO-GO FOR TLI			
					e e e e e e e e e e e e e e e e e e e		
	-		TLC	NO-GO FOR LOI			
			LO	CONTINUE MISSION			
	6-25	FIRE OR SMOKE IN COMMAND MODULE	LAUNCH	ABORT A. DECOMPRESS CABIN B. TROUBLESHOOT ELECTRIC SYSTEM PER FLIGHT CRE CHECKLIST BOOST FIRE PROCEDURES			
			EPO	A. TROUBLESHOOT/COMBAT F PER FLIGHT CREW CHECK EMERGENCY PROCEDURES B. ASSESS DAMAGE AND REM POWER FROM AFFECTED S C. <u>ENTER NEXT BEST PTP</u>	KLIST 10VE		
			TLC	ENTER NEXT BEST PTP			
			LO	ENTER NEXT BEST PTP			
А	6-26	CONTAMINATION IN CABIN	-				
			ALL PHASES	CREW MAY ELECT TO DECOMPA IF UNABLE TO CLEAR CONTAM MISSION MAY BE TERMINATED	IINATION,		
	6-27	LOSS OF SUIT INTEGRITY	LAUNCH	CONTINUE MISSION			
		1	EPO	NO-GO FOR TLI		MALF <u>ECS 9A</u>	
			TLC	ENTER NEXT BEST PTP			
			LO	ENTER NEXT BEST PTP			
	SSION	REV DATE		SECTION			
APOLI						GROUP	PAGE
		A 12/11/68 ENVI 291 (AUG 68)		NTROL SYSTEM	SPECIFIC-	SUIT/CABIN	6-4

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				Mission RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
	6-28	A. 02 MANIFOLD LEAKS >4 LBS/HR AND CABIN		A. CONTINUE MISSION			
		PRESSURE >4.5	EPO	ENTER NEXT BEST PTP			
			TLC	ENTER NEXT BEST PTP			
			LO	ENTER NEXT BEST PTP			
		B. 02 MANIFOLD LEAKS >4 LBS/HR AND CABIN PRESSURE <4.5	LAUNCH	B. ABORT ASAP		B. THERE ARE NO S FAILURES WHICH RESULT IN THIS	I WOULD
			EPO	ENTER ASAP			
			TLC	ENTER ASAP			
			LO	ENTER ASAP			
	6-29	LOSS OF ONE MAIN REGULA	TOR LAUNCH	CONTINUE MISSION			
			EPO	<u>NO+GO TLI</u>			
			TLC	ENTER NEXT BEST PTP			
			LO	ENTER NEXT BEST PTP			
А	6-30	BOTH MAIN REGULATORS FAILED CLOSED	LAUNCH	CONTINUE MISSION			
		FAILED CLOSED	EPO	ENTER NEXT BEST PTP			
			TLC	ENTER ASAP			
			LO	ENTER ASAP			
А	6-31	LOSS OF ONE SUIT	LAUNCH	CONTINUE MISSION		•	
		COMPRESSOR	EPO	NO-GO FOR TLI			
			TLC	CONTINUE MISSION		÷	
				,			
		RULES 6-32 THROUGH					
		6-34 ARE RESERVED.					
	SION	REV DATE		SECTION	1	GROUP	PAGE
APO	LO 8		VIRONMENTAL CO		SPECIFIC-S		6-5
-		291 (AUG 66)					0-5

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MISSION RULES

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REV	RULE	CO	NDITION/MALFUNCTION	N	PHASE	RULING		CUES/NOTES/COM	MENTS
A	6-35		MARY COOLANT LOOP I	ANT LOOP MAL-					
		Α.	LOSS OF EVAPORATOR	۲ ^۲	LAUNCH	A. CONTINUE MISSION		MALF <u>ECS 16</u>	
a.	•				EPO	CONTINUE MISSION ACTIVATE SECONDARY COOLAN WITH RADIATORS IN BYPASS TAIN EVAP OUT TEMP <60°F REQUIRED. WATER MANAGEME DICTATE DEACTIVATION AT F <45°F.	TO MAIN- AS ENT MAY	DO NOT ALLOW PRIM R TO DROP BELOW -20°F	
					TLC	NO-GO FOR LOI			
					LO	ENTER NEXT BEST PTP			
	. •	в.	LOSS OF RADIATORS (LEAK IN RADIATOR RESULTING IN ISOL TION)	s	EPO	 B. NO-GO FOR TLI 1. ACTIVATE SECONDAR 2. USE PRIMARY LOOP TION TO SECONDARY FOR G&N OPERATION 	IN ADDI- (LOOP	MALF <u>ECS 19</u>	
			•	[TLC	ENTER NEXT BEST PTP			
					LO	ENTER NEXT BEST PTP			
		с.	TOTAL LOSS OF LOO		LAUNCH	C. CONTINUE MISSION			
			(COMPLETE LOSS OF FLUID OR LOSS OF			1. ACTIVATE SECONDAR 2. ENTER PTP_4-4	RY LOOP		
					EPO	ENTER NEXT BEST PTP ACTIVATE SECONDARY LOOP			
					TLC	ENTER NEXT BEST PTP			
					LO	ENTER NEXT BEST PTP			
	6-36	<u>SEO</u>	ONDARY LOOP MALFUN	CTIONS					
-		Α.	LOSS OF EVAPORATO	R	EPO	A. <u>NO-GO FOR TLI</u>		MALF ECS 21	
,				[TLC	ENTER NEXT BEST PTP			
					LO	ENTER NEXT BEST PTP			
		В.	LOSS OF RADIATORS (LEAK IN RADIATOR RESULTING IN ISOL	s	EPO	B. <u>NO-GO FOR TLI</u> LOOP IS STILL OPERATI IN EVAPORATIVE MODE.	IONAL	MALF <u>ECS 26</u>	
				·	TLC	ENTER NEXT BEST PTP			
					LO	ENTER NEXT BEST PTP			
		c.	TOTAL LOSS OF LOO (COMPLETE LOSS OF FLUID OR LOSS OF	1	EPO	C. <u>NO-GO FOR TLI</u>		MALF <u>ECS 26</u>	
					TLC	ENTER NEXT BEST PTP			
					LO	ENTER NEXT BEST PTP			
	-it								
MI	SSION	REV	DATE			SECTION		GROUP	PAGE
	LO 8	A	12/11/68 (AUG 68)	ENVI	RONMENTAL C	CONTROL SYSTEM	SPECIFIC	C-COOLANT	6-6

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MISSION RULES

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			1		· · · · · · · · · · · · · · · · · · ·	MISSION RULES			
REV	RULE	CO	NDITION/MALFUNCTI	ON	PHASE	RULING		CUES/NOTES/COM	MENTS
A	6-37		5 OF ALL COOLING (AND SECONDARY	PRI-	LAUNCH	CONTINUE MISSION ENTER NEXT ATP OR PTP			
			·			MAXIMUM ORBIT TIME: 4 HF EMERGENCY POWER DOWN FOLL 1.5 HRS OF POWER UP FOR E	OWED BY		
					TLC	ENTER ASAP			
	6-38	CON COOL	FIRMED LEAK OF GL	YCOL	LAUNCH	CONTINUE MISSION			
		Α.	IN COMMAND MODUL	E	EPO	A. <u>ENTER NEXT BEST PTP</u> 1. DON SUITS 2. PURGE SUIT LOOP W DIRECT 0 ₂	VITH		
					TLC	ENTER NEXT BEST PTP			
					LO	ENTER NEXT BEST PTP			
	· .	в.	IN SUIT CIRCUIT		EPO	B. <u>ENTER NEXT BEST PTP</u> DO NOT DON SUITS FOR	ENTRY		
					TLC	ENTER NEXT BEST PTP			
				1	LO	ENTER NEXT BEST PTP			
			•	-					
		RULE 6-44	S 6-39 THROUGH ARE RESERVED.						
MIS	SSION	REV	DATE		L	SECTION	l	GROUP	PAGE
APO	LLO 8	A	12/11/68	ENVIRO	NMENTAL CON	TROL SYSTEM	SPECIFI	C-COOLANT	6-7

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MISSION RULES

REV RULE CONDITION/MALFUNCTION PHASE RULING CUES/NOTES/COME 6-45 EITHER URINE DUMP FROZEN OR BLOCKED ALL PHASES CONTINUE MISSION CUES/NOTES/COME 6-46 FAILURE OF BOTH WATER ACCMULATORS ON INCONTROL- LABLE HIGH SUIT CIRCUIT HUMIDITY EPO NO-GO FOR TLI. ENTER NEXT BEST PTF 6-47 LOSS OF POTABLE OR WASTE EPO NO-GO FOR TLI. ENTER NEXT BEST PTF 10 ENTER NEXT BEST PTF LO ENTER NEXT BEST PTF 10 ENTER NEXT BEST PTF LO	
0R BLOCKED PHASES 6-46 FAILURE OF BOTH WATER ACCUMULATORS OR UNCONTROL- EPO LABLE HIGH SUIT CIRCUIT TLC ENTER NEXT BEST PTP LO ENTER NEXT BEST PTP	ENTS
ACCUMULATORS OR UNCONTROL- LABLE HIGH SUIT CIRCUIT TLC ENTER NEXT BEST PTP Image: HUMIDITY LO ENTER NEXT BEST PTP Image: Comparison of the second secon	
6-47 LOSS OF POTABLE OR WASTE EPO NO-GO FOR TLI TLC ENTER NEXT BEST PTP LO ENTER NEXT BEST PTP 6-47 LOSS OF POTABLE OR WASTE EPO NO-GO FOR TLI TLC ENTER NEXT BEST PTP	
6-47 LOSS OF POTABLE OR WASTE EPO <u>NO-GO FOR TLI</u> TANK TLC <u>ENTER NEXT BEST PTP</u>	
TANK TLC <u>ENTER NEXT BEST PTP</u>	
LO ENTER NEXT BEST PTP	
RULES 6-48 THROUGH 6-54 ARE RESERVED	
U-JT AKE KESEKVEU	
MISSION REV DATE SECTION GROUP	PAGE

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	_			MISSION F	RULES		
ΞV	ITEM					······································	
			I	NSTRUMENTATION	REQUIREMENTS		
	6~55	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	REFERENC
		CABIN P SUIT P	CF0001P CF0012P	METER METER	COMMON	ONE OF THREE MANDATORY	6-21
		TANK BLADDER P	CF0120P				
		PRIM ACCUM QTY PRIM PUMP OUT P	CF0019Q CF0016P	METER METER	COMMON	ONE OF TWO MANDATORY	6-35, 6- 6-38
		POTABLE H ₂ O QTY WASTE H ₂ O QTY	CF0010Q CF0009Q	METER METER	COMMON	ONE OF TWO MANDATORY	6-45, 6- 6-47, 6-
		SEC STEAM P SEC EVAP OUT T	CF0073P CF0071T	METER METER	COMMON	ONE OF TWO MANDATORY	6-36
		SURGE TANK P	CF0006P	METER	COMMON	HIGHLY DESIRABLE	
		SEC ACCUM QTY	CF0072P	METER	COMMON	HIGHLY DESIRABLE	
		SEC PUMP OUT P	CF0070P	METER	COMMON	HIGHLY DESIRABLE	
		PRIM EVAP OUT T	CF0018T	METER	COMMON	HIGHLY DESIRABLE	
		PRIM STEAM P	CF00 3 4	METER	COMMON	HIGHLY DESIRABLE	
		ECS O2 FLOW	CF0035R	METER	COMMON	HIGHLY DESIRABLE	
		0 ₂ MANIFOLD P	CF0036P			HIGHLY DESIRABLE	
		SUIT COMP P	CF0015P	METER	COMMON	HIGHLY DESIRABLE	
		PRIM RAD OUT TEMP	P CF0020T	METER	COMMON	HIGHLY DESIRABLE	
		PRIM EVAP INLET	CF0181T			HIGHLY DESIRABLE	
		STEAM DUCT TEMP	CF0017T			HIGHLY DESIRABLE	
		SEC RAD OUT TEMP	• SF0236T	METER		HIGHLY DESIRABLE	
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11 9	SSION	REV DATE	SECTION		GROUP	w	PAGE
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7 CRYOGENICS

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				MISSION RULES		
REV	ITEM			GENERAL		
	7-1	OFT	RE ARE NO CR'	YO FAILURES FOR WHICH THE LAUNCH/INSERTION ESULTING IN THREE FUEL CELL FAILURES, ENTR APABLE OF SUPPORTING THE LAUNCH, ONE REV C	RY WILL BE PLANNED INTO PTP 2-1.	
	7–2	PHAS ENTR MISS ENTR	CRYOGENICS SES WILL BE I RY G ₂ TANKS. SION TERMINA RY BATTERY O	SYSTEM IS REQUIRED UP TO AND INCLUDING THE ENTERED INTO WITH FULL CONSUMABLES POTENTI IF THIS CAPABILITY IS POTENTIALLY JEOPAR TION PROCEDURES WILL BE ENACTED IN WHATEVE R ENTRY 0, USAGE IN FLIGHT AFTER LOSS OF R VAILABLE FOR ENTRY, LANDING, AND POSTLANDI	AL, THAT IS, FULLY CHARGED ENTR RDIZED BY CRYO SYSTEMS DEPLETION R TIME FRAME IS APPROPRIATE OR A RECHARGE CAPABILITY FROM THE CRYC	BATTERIES AND OR MALFUNCTION, AVAILABLE. ANY
	7-3		5 OF A CRYOGI A FOR H ₂ .	ENIC TANK IS DEFINED AS: PRESSURE CANNOT	BE MAINTAINED ABOVE 150 PSIA FOR	r O ₂ AND 100
A	7-4			MENT TO CONTINUE BEYOND A GO/NO-GO POINT I CS DEMANDS TO COMPLETE THE NOMINAL MISSION		N TO SUPPLY
			ES 7–5 THROU ARE RESERVE			
мт	SSION	REV	DATE	SECTION	GROUP	DACE
						PAGE
APC	LLO 8	Α	12/11/68	CRYOGENICS	GENERAL/SYSTEMS MANAGEMENT	7-1

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		MISSION RULES								
REV	ITEM			systems Mana	GEMENT					
А	7-10	CRYO MANAGEMENT								
		A. MANUAL PRESSURE CONTROL WILL BE USED AS REQUIRED TO MAINTAIN:								
		1.	TANK PRESSU	JRES GREATER THAN <u>750</u> PSIA O ₂ A	ND 200 PSIA FO	OR H2.				
				ALANCE OF <u>4</u> PERCENT O ₂ AND <u>3</u> PC		2				
		B. ADD	ITIONAL POWE	ER LOADS AND/OR ADDITIONAL FUEL BELOW THE RELIEF POINT OF TANK	CELL PURGES W	WILL BE USED A	AS REQUIRED TO MA			
		C. CRY	OFANS WILL	NOT BE ALLOWED TO OPERATE IN A			2, 2			
		MANUAL CYCLE CRITERIA: 1. TANK QTY >75 PERCENT EVERY 6 TO 8 HOURS FOR 3 TO 5 MINUTES.								
		2.	TANK QTY <	75 PERCENT EVERY 10 TO 14	HOURS FOR 3 TO	0 5 MINUTES.				
		3.	ANYTIME QT	Y READOUT APPEARS TO BE ERRONED	US AND VALID F	READOUT IS RE	QUIRED.			
	7-11	CRYO GA	¥GIN G							
		A, ONB	OARD CRYOGEN	NIC QUANTITY GAGING IS PRIME.	ACCURACY IS ±	2.65 PERCENT	(±8.84 LBS 0 ₂ , ±	.72 LBS H ₂)		
		PER	R TANK.				. –	-		
		B. MCC INS	C CALCULATED STRUMENTATION	QUANTITY USING PRESSURE VERSUS N PROBLEM.	TEMPERATURE	IS BACKUP, A	CCURACY IS UNKNOW	IN DUE TO		
1										
				:						
1										
			7-12 THROUGH RE RESERVED.							
	MISSION	REV	DATE	SECTION	GF	ROUP		PAGE		
	POLLO 8	A	12/11/68	CRYQGENI CS	0	GENERAL/SYSTE	MS MANAGEMENT	7-2		

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MISSION RULES

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REV	RULE 7-15	CONDITION/MALFUNCTI LOSS OF ONE O2 AND/C CRYO TANK (TANK PRES		RULING		CUES/NOTES/COMM	ENTS
	7-15	LOSS OF ONE O ₂ AND/O CRYO TANK (TANK PRES	DR H ₂ LAUNCH	CONTINUE MISSION			
		<150 O ₂ , <100 H ₂ RES TIVELY.	SSURĒ SPEC-	CONTINUE MIDDION			
			EPO	NO-GO FOR TLI			
			TLC	ENTER NEXT BEST PTP			
1			LO	ENTER NEXT BEST PTP			
	7-16	LOSS OF BOTH O_2 AND/ CRYO TANK (TANK PRES <150 O_2 , <100 H $_2$, RE TIVELY).	SSURE	CONTINUE MISSION ISOLATE SURGE TANK PRIOR 800 PSIA	то		
			EPO	ENTER NEXT BEST ATP OR PT MAXIMUM ORBIT TIME IS 4.7 FOR LOSS OF THREE FUEL CE	'5 HRS IF ELLS SM	3 FUEL CELLS ARE JJC'S WILL BE INOPE R CM/SM SEP.	LOST , RATIVE
		RULES 7-17 THROUGH					
		7-19 ARE RESERVED.					
MI	SSION	REV DATE		SECTION	I	GROUP	PAGE
	LO 8	<u>FINAL 11/7/68</u> 291 (AUG 68)	CRY0GENI CS		SPECIFIC-CR	RYO	7-3

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EV	ITEM	Par		MISSION RULES	97 y	· · · · · · · · · · · · · · · · · · ·	·····
<u> </u>			INSTRUM	MENTATION REQUIR	EMENTS		
	7-20	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	
		0 <mark>2</mark> TNK 1 QTY 0 ₂ TNK 2 QTY	SC0030Q SC0033Q	METER METER	COMMON }	ONE OF TWO MANDATORY	
		O_2 TNK 2 QTY O_2 TNK 1 P O_2 TNK 2 P	SC0033Q SC0037P SC0038P	METER METER METER	COMMON }	ONE OF TWO MANDATORY	
		H. TNK 1 QTY H2 TNK 2 QTY H2 TNK 1 P H2 TNK 2 P H2 TNK 2 P	SC0030Q SC0031Q SC0039P SC0040P	METER METER METER METER	COMMON } COMMON } COMMON }	ONE OF TWO MANDATORY ONE OF TWO MANDATORY	
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NASA — Manned Spacecraft Center MISSION RULES

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8 ELECTRICAL POWER SYSTEM

MISSION RULES RFV ITEM 8-1 LAUNCH LAUNCH WILL BE CONTINUED AS LONG AS SUFFICIENT ENERGY IS AVAILABLE TO PERFORM AN ENTRY INTO AT LEAST PTP 2-1. THERE MUST BE AT LEAST ONE MAIN BUS, ONE BATTERY BUS, AND ONE AC BUS OPERATIONAL TO CONTINUE. THERE ARE NO FUEL CELL FAILURES FOR WHICH THE LAUNCH PHASE WILL BE TERMINATED AS LONG AS THREE ENTRY 8-2 BATTERIES ARE REMAINING TO SUPPLY MAIN BUS LOADS. ALL PHASES 8-3 THE MISSION WILL BE CONTINUED AS LONG AS THE REQUIRED NUMBER OF FUEL CELLS ARE AVAILABLE AND ARE CAPABLE OF SUPPORTING MISSION REQUIREMENTS OF 75 TO 90 AMP (WITHOUT BATTERY SUPPLEMENT EXCEPT DURING SPS &V'S) AND THREE GOOD ENTRY BATTERIES REMAIN. А 8-4 BATTERY IS CONSIDERED FAILED IF: OUTPUT <3 AMPS WHEN CONNECTED TO MAIN BUS DURING LAUNCH OR SPS MANEUVERS. (NOMINAL BAT CURRENT FOR LAUNCH AND SPS MANEUVERS IS 6-15 AMPS). 8-5 AN AC BUS IS CONSIDERED FAILED IF ANY TWO PHASES CANNOT BE MAINTAINED >95 VOLTS. AN INVERTER IS CONSIDERED FAILED IF: 8-6 A. OUTPUT VOLTAGE ON ANY PHASE >130 VAC. B. OUTPUT VOLTAGE ON ANY TWO PHASES <95 VAC. А 8-7 FUEL CELL IS CONSIDERED FAILED FOR MISSION PLANNING IF: A. FUEL CELL OUTPUT <5 AMPS. B. FUEL CELL H2 LOOP IS CONTAMINATED WITH KOH. C. REGULATED H2 PRESSURE <36.7 PSIA. (CORRESPONDS TO N2 PRESSURE SHIFT DOWN TO 28.2 PSIA. FOR CRITICAL OPERATION, LOWER N2 PRESSURE CAN BE MANAGED BY TURNING OFF H20 TANK PRESSURE REGULATORS WHILE FC IS ONLINE). TLI MINIMUM PUGRE CAPABILITY IS BOTH OXYGEN AND HYDROGEN ON ONE FUEL CELL AND AT LEAST OXYGEN ON ANY OTHER А 8-8 FUEL CELL. RULES 8-9 THROUGH 8-14 ARE RESERVED. PAGE MISSION REV DATE SECTION GROUP 12/11/68 8-1 APOLLO 8 Α ELECTRICAL POWER SYSTEMS GENERAL/SYSTEMS MANAGEMENT

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REV	ITEM	SYSTEMS MANAGEMENT							
А	8-15	FUEL CELL MANAGEMENT A. FUEL CELL WILL BE "SHUTDOWN" FOR THE FOLLOWING: 1. SUSTAINED CURRENT OUTPUT LESS THAN 5 AMPS 2. FUEL CELL H ₂ LOOP IS CONTAMINATED WITH KOH. 3. REACTANT LEAKAGE JEOPARDIZING MISSION DURATION. B. FUEL CELL MAY BE "OPEN CIRCUITED" FOR THE FOLLOWING: 1. SKIN TEMP >475°F 2. TCE TEMP >200°F							
		 FAILURE OF H₂ PUMP OR GLYCOL PUMP FAILURE OF H₂ PUMP OR GLYCOL PUMP VOLTAGE MANAGEMENT UNABLE TO PURGE IF TIME-TO-GO GREATER THAN PREDICTED FUEL CELL LIFETIME. C. NORMAL FUEL CELL PURGE WILL BE EVERY <u>12</u> HRS O₂ AND EVERY <u>48</u> HRS H₂. D. ADDITIONAL PURGES WILL BE INITIATED AS OPERATIONAL CONDITONS DICTATE. 							
		 E. FUEL CELLS WILL NOT BE PURGED UNDER THE FOLLOWING CONDITIONS: 1. CONFIRMED HIGH PH. F. FUEL CELLS MAY BE PURGED TO PRECLUDE CRYOGENIC TANKS FROM VENTING. 							
	 G. EACH H₂ PURGE WILL BE PRECEDED BY 20 MINUTES OF H₂ VENT HEATER OPERATION. H. FC INLINE HEATERS WILL OPERATE IN "AUTO" CONTINUOUSLY. I. REACTANT VALVES WILL REMAIN OPEN <u>AT ALL TIMES</u> UNLESS THE FUEL CELL IS DECLARED NON-OPERATION J. FUEL CELL RADIATOR VALVES WILL REMAIN IN THE "NORMAL" OR OPEN CONFIGURATION UNLESS RADIATOR TEMPERATURE DECREASES BELOW -40°F. 								
А	8-16	 BUS MANAGEMENT A. ONE AND ONLY ONE FUEL CELL WILL BE TIED TO BOTH MAIN BUSES. B. INVERTERS WILL BE CONFIGURED SUCH THAT MAIN BUS A WILL SUPPLY AC BUS 1 AND MAIN BUS B WILL SUPPLY AC BUS 2. C. MAIN BUS VOLTAGE WILL BE MAINTAINED >26.2 VDC AND <31 VDC. ONE FUEL CELL MAY BE OPEN CIRCUITED FOR OPTIMUM VOLTAGE AND POWER MANAGEMENT. 							
		 D. MINIMUM MAIN BUS VOLTAGE WILL BE MAINTAINED TO BE COMPATIBLE WITH ONLINE OPERATION EQUIPMENT. 1. SPS <u>24.5</u> 2. PGNS <u>25.0</u> 3. AUTO SM-RCS <u>22.0</u> 4. AUTO CM-RCS <u>21.0</u> 5. DIRECT SM-RCS <u>21.0</u> 6. DIRECT CM-RCS <u>17.0</u> 7. INVERTERS <u>19.0</u> 							
	8-17	 8-17 <u>INVERTER MANAGEMENT</u> A. INVERTERS MAY BE REMOVED FROM LINE FOR ANY OF THE FOLLOIWNG REASONS: INVERTER TEMP ><u>190</u>°F SPACECRAFT LOAD MANAGEMENT 							
M	1ISSION	REV DATE SECTION GROUP PAGE							
AP	OLLO 8	A 12/11/68 ELECTRICAL POWER SYSTEMS GENERAL/SYSTEMS MANAGEMENT 8-2							

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REV	ITEM				, .	
	8-18	BATTER	Y MANAGEMENT			
		A. BA	TTERIES A AN	D B WILL BE USED TO SUPPLEMENT MAIN BUS 1	OADS FROM T-75 SECONDS TO INSERT	ION.
				D B WILL BE USED TO SUPPLEMENT MAIN BUS I EVENT THE BATTERY CHARGER FAILS TO MAIN		C WILL BE
		C. BA	TTERIES WILL	BE RECHARGED TBD.		
		D. T⊢	REE BATTERIE	S WILL BE TIED TO THE MAIN BUSES FOR ENTI	ΧΥ.	
			NTTERIES ARE	CONSIDERED TO HAVE 40 AMP-HR CAPABILITY	INFLIGHT AND 50 AMP-HR CAPABILITY	FOR POST-
				TTERY CHARGER CAPABILITY TO A SINGLE BAT , AND POSTLANDING.	TERY, THAT BATTERY WILL NOT BE US	ED EXCEPT FOR
				ALVE WILL REMAIN CLOSED UNLESS MANIFOLD BE ALLOWED TO TROUBLESHOOT A SUSPECTED I		VENTING
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			8-19 THROUGH ARE RESERVED.			
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				MISSION RULES		
REV	RULE	CONDITION/MALFUNCTION		RULING	CUES/NOTES/C	OMMENTS
	8-24	LOSS OF ONE FUEL CELL OUTPUT <5 AMPS	LAUNCH	CONTINUE MISSION		
			EPO	NO-GO FOR TLI		
				OPEN CIRCUIT FUEL CE RECONFIGURE REMAININ FUEL CELLS TO ONE FU PER MAIN BUS ONLY. IF FUEL CELL CANNOT STORED - PERFORM SHU	G TWO IEL CELL BE RE- MALF <u>EPS 5</u>	
	i		TLC	NO-GO FOR LOI		
			LO	ENTER NEXT BEST PTP		
Α	8-25	LOSS OF TWO FUEL CELLS OUTPUT <5 AMPS/FUEL CE		CONTINUE MISSION AFTER 2 + 00		
				 EDS AUTO/OFF TO OFF IF LOSS OF FC 1 AND TIE BAT C TO MAIN A IF LOSS OF FC 2 AND TIE BAT C TO MAIN B IF LOSS OF FC 1 AND TIE BAT C TO BOTH MA BUSES. 	3:	
			EPO	ENTER NEXT BEST PTP ONE BATTERY MAY BE USED TO S MENT REMAINING FC FOR G8 MENT PRIOR TO DEORBIT.	SUPPLE-	
			TLC	ENTER ASAP PERFORM "LOSS OF TWO F/C DOWN"	POWER	
			LO	ENTER ASAP		
Α	8-26	LOSS OF THREE FUEL CEL	LS			
	. .	A. OUTPUT <5 AMPS/FUE CELL	EL LAUNCH	A. <u>CONTINUE MISSION</u> 1. AFTER 2 + 00 EDS OFF TO OFF. 2. TIE BAT C TO BOT BUSES.	CM/SM SEP.	AT 22 VDC,
				3. POWER DOWN AT IN ENTER 2-1 IF FUE CANNOT BE RESTOR	EL CELLS	
		B. TOTAL OUTPUT CAPA INSUFFICIENT TO SU PORT DRIFTING FLIC LOADS.	JP-	B. <u>ENTER NEXT BEST PTP</u> MANIPULATION OF CYCL WILL BE ATTEMPTED TO TAIN VM >26.5.		HT REQUIRE-
		C. TOTAL OUTPUT CAPA <36 AMPS AT MAIN I VOLTAGE OF 26.5 V	BUS	C. PLAN ENTRY NEXT ATP BASED ON FUEL CELL C AND BATTERY ENERGY F	DUTPUT POWER TO SUPPO	ORT S/C SYS-
		 	<u> </u>	· · · · · · · · · · · · · · · · · · ·	<u> </u>	
MI	SSION	REV DATE	······	SECTION	GROUP	PAGE
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MISSION RULES

MISSION RULES

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REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	IENTS
A	8-27	LOSS OF THREE FUEL CELLS AND ONE BATTERY CURRENT <50 PERCENT OF EITHER TWO REMAINING BATTERIES	LAUNCH D EPO	ABORT ENTER NEXT BEST PTP OR A 2.4 HRS. PERFORM EMERGE DOWN.	ATP WITHIN NGY POWER	ASSUMES ALL THREE FU CURRENTS <5 AMPS/EAU BAT C TIED TO BOTH N SPS DEORBIT WITH SC ASSUMED.	CH AND MAINS.
	8–28	LOSS OF THREE FUEL CELLS	EARTH ORBIT	ENTER NEXT BEST ATP OR F PERFORM EMERGENCY POWER		2.4 HOURS LEFT IN OF SPS IGNITION.	RBIT BEFORE
		·					
							i. I
		RULES 8-29 THROUGH 8-35 ARE RESERVED.					
м	ISSION	REV DATE	1	SECTION		GROUP	PAGE
	POLLO 8	A 12/11/68	ELECTRICAL PO	OWER SYSTEMS	SPEC	FIC - FUEL CELLS	8-5

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REV RULE CONDITION/MURPHYCTOW PHASE RULING CUES/NOTES/COMPENTS A 8-35 LOSS OF ORE PTRY DATTEN LOSS OF ORE PTRY DATTENT TO MAIN BUS). LUNCH CONTINUE MISSION A. LOS ANT 0- TIE BAT C TO MAIN A C. IF BAT 8 - TIE BAT C TO MAIN A C. IF BAT 8 - TIE BAT C TO MAIN A C. IF BAT 8 - TIE BAT C TO MAIN A C. IF BAT 8 - TIE BAT C TO MAIN A C. IF BAT 8 - TIE BAT C TO MAIN A C. IF BAT 8 - TIE BAT C TO MAIN A C. IF BAT 8 - TIE BAT C TO MAIN A C. IF BAT 8 - TIE BAT C TO MAIN A C. IF BAT 8 - TIE BAT C TO MAIN A C. IF BAT 8 - TIE BAT C TO MAIN A C. IF BAT 8 - TIE BAT C TO MAIN BUS. PILEST DURING BAT. ATTEMPT TO TIE BAT C TO CORRECT ILI NO-GO FOR LOI LO A 8-37 LOSS OF THO DIFTY DATTEND INFO TO THE DATT. TIED TO MAIN BUS LUNCH LOW CONTINUE MISSION CONTINUE MISSION LOS AND - OFF PERFOR ONE BATTENY PROCEDURE FLOSS DURING SP: MARDARES ATTEMPT TO TIE BAT C TO BOTH MAINS A 8-38 LOSS OF BATTENY OLAGOR EPO CONTINUE MISSION LOS AND - OFF PERFOR ONE BATTENY PROCEDURE FLOSS DURING SP: MARDARES ATTEMPT TO TIE BAT C TO BOTH MAINS FLOSS DURING SP: MARDARES ATTEMPT TO TIE BAT C TO BOTH MAINS A 8-39 LOSS OF BATTENY OLAGOR EPO CONTINUE MISSION LOS AND AND A TO TIE CAT C TO BOTH MAINS FLOSS DURING SP: MARDARES ATTEMPT TO TIE BAT C TO BOTH MAINS FLOSS DURING SP: MARDARES ATTEMPT TO TIE BAT C TO BOTH MAINS A 8-59 LOSS OF BATTENY OLAGOR FLOSS DURING SP: MARDARES ATTEMPT TO TIE BAT C TO BOTH MAINS FLOSS DURING SP: MARDARES ATTEMPT TO TIE BAT C TO BOTH MAINS FLOSS DURING SP: MARDARES ATTEMPT TO			,		MISSION RULES			
A 8-37 LOSS OF ANY ONE ENTRY BATTERY EPO M-COOPER LOI LO FLOST DURINE SPS INMERING BAT. CONTINUE ON REPAINING BAT. LOC A 8-37 LOSS OF ANY ONE ENTRY BATTERY EPO M-COOPER LOI LO ENTER NEXT BEST PTP A 8-38 LOSS OF ANY ONE ENTRY BATTERY EPO M-COOPER LOI LO ENTER NEXT BEST PTP A 8-38 LOSS OF ANY ONE ENTRY BATTERY EPO M-COOPER LOI LO ENTER NEXT BEST PTP A 8-39 LOSS OF ANY ONE ENTRY IEE TO MAIN BUS EARCH EPO CONTINUE ANTERIES LAUNCH CONTINUE ANTERIES CONTINUE ON ENTRY BATTERIES PHASES LAUNCH A 8-39 LOSS OF BATTERY CHARGER EARCH FLOST DURINE SPS AMAEUNERS ATTERY TO THE BAT C TO BOTH PHASES ENTRY ENTRY ENTRY PROCEDURE PHASES IF OUT CONTINUE PHASE PHASE A 8-39 LOSS OF BATTERY CHARGER EPO CONTINUE PHASEN BATTERY BATTERY FLOST ON LOWEST ENTRY BAT- TERIES -GA APP-HKS IF OUT COLORST ENTRY BAT- TERIES -GA APP-HKS IF OUT COLORST ENTRY BAT- TERIES -GA APP-HKS	REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
A 8-37 LOSS OF ANY ONE ENTRY EPO NO-GO FOR LOI CONTINUE MISSION A 8-38 LOSS OF ANY ONE ENTRY EPO NO-GO FOR LOI EPO NO-GO FOR LOI A 8-38 LOSS OF ANY ONE ENTRY EPO NO-GO FOR LOI EPO NO-GO FOR LOI A 8-38 LOSS OF THO ENTRY PATTERIES LOUNCH EPO NO-GO FOR LOI EON JUNC AJN BUS. A 8-39 LOSS OF THO ENTRY PATTERIES LOUNCH ENTER NEXT BEST FTP IF LOSS DURING SPS MANEUVERS A 8-39 LOSS OF BATTERY OWNERE ALL ENTER NEXT BEST FTP IF LOSS DURING SPS MANEUVERS A 8-39 LOSS OF BATTERY OWNERE FILE ENTER NEXT BEST FTP IF LOSS DURING SPS MANEUVERS A 8-39 LOSS OF BATTERY OWNERE FTC ONTIME MISSION TLC NO-GO FOR LOI IF SUB OF TWO LONEST ENTRY PROCEDURE ATTERY TO THE BAT C TO BOTH A 8-39 LOSS OF BATTERY OWNERE FTC CONTINUE MISSION TLC NO-GO FOR LOI IF SUB OF TWO LONEST ENTRY PROCEDURE ATTERY TO THE BAT C TO BOTH RULES 8-40 THEOLOH IF SUB OF TWO LONEST ENTRY BAT- IF SUB OF THEOLOH ENDER MISSION REV DATE SECTION ENDER ENDE	А	-	(OUTPUT < 3 AMPS WHEN TIED	LAUNCH	A. EDS AUTO - OFF B. IF BAT A - TIE BAT C			
A 8-37 LOSS OF ANY ONE BNTRY BATTERY EPO LO NO-GO FOR LOI ENTER NEXT BEST PTP ATTEMPT TO THE BAT C TO CORRES PODING MAIN BUS. A 8-38 LOSS OF ANY ONE BNTRY BATTERY EPO LO NO-GO FOR LOI LO DITER NEXT BEST PTP A 8-38 LOSS OF TWO ENTRY BATTERIES (CUTIPUT C3 AMES) EACH WEEN THED TO MAIN BUS LAUNCH PHASES CONTINUE MISSION TOS AUTO - OFF PERFORM ONE BATTERY ENTRY INTO 2-1 PHASES IF LOSS DURING SPS MANEUNESS ATTEMPT TO THE BAT C TO BOTH MAINS A 8-39 LOSS OF BATTERY CHARGER EPO TIC CONTINUE MISSION NO-GO FOR LOI IF SUMO TWO CONEST ENTRY BATTERIES - GH AMP-HRS IF LOSS DURING SPS MANEUNESS ATTEMPT TO THE BAT C TO BOTH MAINS RULES 8-NO THROUGH 8-15 AME RESERVED. EVO CONTINUE MISSION NO-GO FOR LOI IF SUMO FOR LONEST ENTRY BATTERIES - GH AMP-HRS IF SUMO AMP-HRS MISSION RULES 8-NO THROUGH 8-15 AME RESERVED. SECTION GROUP PROE				EPO	NO-GO FOR TLI			
A 8-37 LOSS OF ANY ONE DITRY BATTERY EPO N→GO FOR LOI LO N→GO FOR LOI DIEN NEXT BEST PTP A 8-38 LOSS OF TWO ENTRY BATTERIES LOSS OF TWO ENTRY BATTERIES TIED TO MAIN BUS LAUNCH PAGES CONTINUE MISSION EOS AUTO - OFF PERFORM ONE BATTERY ENTRY INTO 2-1 ALL IF LOSS DURING SPS MANEUNERS ATTERY TO THE BAT C TO BOTH MAINS A 8-39 LOSS OF BATTERY CHARGER EPO CONTINUE MISSION TLC IF LOSS DURING SPS MANEUNERS ATTERY ENTRY PROCEDURE USING ONE BATTERY ENTRY PROCEDURE THE SUM OF TWO LONEST ENTRY BAT- TERIES -64 AMP-HRS IF LOSS DURING SPS MANEUNERS AMP-HRS MISSION RULES 8-40 THROUGH 8-45 ARE RESERVED. EPO CONTINUE MISSION TLC MISSION RULES 8-40 THROUGH 8-45 ARE RESERVED. SECTION GROUP PAGE				TLC	NO-GO FOR LOI		ATTEMPT TO TIE BAT	
A 8-38 LOSS OF TWO ENTRY BATTERIE LAUNCH CONTINUE MISSION EDS AUTO - OFF PERFORM ONE BATTERY ENTRY INTO 2-1 IF LOSS OF DATERY CHARGER ALL PHASES ENTER NEXT BEST PTP USING ONE BATTERY ENTRY INTO 2-1 PHASES IF LOSS DIR ING SPS MANEURES ATTEMPT TO TIE BAT C TO BOTH MAINS A 8-39 LOSS OF DATTERY CHARGER EPO CONTINUE MISSION TLC NO-GOR LOI IF SUM OF TWO LOWEST ENTRY BAT- TERIES - GN AME-HISSION IF LOSS DIR ING SPS MANEURES ATTEMPT TO TIE BAT C TO BOTH MAINS B 8-39 LOSS OF DATTERY CHARGER EPO CONTINUE MISSION TLC NO-GOR LOI IF SUM OF TWO LOWEST ENTRY BAT- TERIES - GN AME-HISSION IF LOSS OF MATERY CHARGER EPO MUES B-40 THROUGH B-45 ARE RESERVED. INC SECTION GROUP PROE				LO	ENTER NEXT BEST PTP			2
A 8-38 LOSS OF TWO ENTRY BATTERIES COUTING *3 AMPS) EACH WEN TIED TO MAIN BUS LAUACH PREPORM ONE BATTERY ENTRY INTO 2-1 ALL PHASES CONTINUE MISSION EDS AUTO - OFF PERFORM ONE BATTERY ENTRY INTO 2-1 USING ONE BATTERY ENTRY PROCEDURE IF LOSS DIRING SPS MMEUNERS ATTEMPT TO TIE BAT C TO BOTH MAINS A 8-39 LOSS OF BATTERY CHARGER EPO CONTINUE MISSION USING ONE BATTERY ENTRY PROCEDURE ATTEMPT TO TIE BAT C TO BOTH MAINS A 8-39 LOSS OF BATTERY CHARGER EPO CONTINUE MISSION TLC ND-GO FOR LOI IF SUM OF TWO LONEST ENTRY BAT- TERIES *64 AMP-HRS FIGURE *64 AMP-HRS MISSION RULES 8-40 THROUGH 8-45 ARE RESERVED. I SECTION GROUP PAGE	А	8-37	LOSS OF ANY ONE ENTRY	EPO	NO-GO FOR TLI			
A 8-38 LOSS OF TWO ENTRY BATTERIES LAUNCH CONTINUE MISSION EDS AUTO - OFF PERFORM ONE BATTERY ENTRY INTO 2-1 PLASES IF LOSS DURING SPS MANEUVERS ATTEMPT TO THE BAT C TO BOTH MAINS A 8-39 LOSS OF BATTERY CHARGER EPO TLC CONTINUE MISSION NG-GO FOR LOI IF SUM OF TWO LOWEST ENTRY BAT- TERIES - GH AMP-HRS IF LOSS DURING SPS MANEUVERS ATTEMPT TO THE BAT C TO BOTH MAINS B 8-39 LOSS OF BATTERY CHARGER EPO TLC CONTINUE MISSION TLC NG-GO FOR LOI IF SUM OF TWO LOWEST ENTRY BAT- TERIES - GH AMP-HRS B BULES 8-H0 THROUGH 8-H3 ARE RESERVED. RULES 8-H0 THROUGH SECTION GROUP PAGE			BATTERY	TLC	NO-GO FOR LOI			Ì
A 8-38 LOSS OF TWO ENTRY BATTERIES LAUNCH COUTENT 43 AMES) EACH WHEN TIED TO MAIN BUS LAUNCH PRECOM ONE BATTERY ENTRY INTO 2-1 PRECOM ONE BATTERY ENTRY INTO 2-1 PRECOM ONE BATTERY ENTRY PROCEDURE IF LOSS DURING SPS MANEUVERS INTERVETT TO TIE BAT C TO BOTH MAINS A 8-39 LOSS OF BATTERY CHARGER EPO TLC CONTINUE MISSION TLC If SUM OF TWO LOWEST ENTRY BAT- TERIES - 64 AMP-MRS If LOSS DURING SPS MANEUVERS INTERVET TO TIE BAT C TO BOTH MAINS MISSION RULES 8-40 THROUGH 8-43 ARE RESERVED. EV SECTION GROUP PAGE				LO				
A 8-39 LOSS OF BATTERY CHARGER EPO CONTINUE MISSION TLC NO-GO FOR LOI IF SUM OF TWO LOWEST ENTRY BATTERIES -64 AMP-HRS NO-GO FOR LOI IF SUM OF TWO LOWEST ENTRY BATTERIES -64 AMP-HRS RULES 8-40 THROUGH Image: Continue mission Image: Continue mission MISSION RULES 8-40 THROUGH Image: Continue mission Image: Continue mission Image: Continue mission MISSION REV DATE SECTION GROUP PAGE	A	8-38	(OUTPUT < 3 AMPS) EACH WHEN		<u>CONTINUE MISSION</u> EDS AUTO - OFF	′ INTO 2-1		
TLC IV-GO FOR LOI IF SUM OF TWO LOWEST ENTRY BAT- TERIES <64 AMP-HRS RULES 8-40 THROUGH 8-45 ARE RESERVED. MISSION REV DATE SECTION GROUP PAGE						PROCEDURE	ATTEMPT TO TIE BAT	
IF SUM OF TWO LOWEST ENTRY BAT- TERIES <64 AMP-HRS	А	8-39	LOSS OF BATTERY CHARGER	EPO	CONTINUE MISSION			
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NASA — Manned Spacecraft Center MISSION RULES

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MISSION RULES

MISSION RULES									
REV	RULE	CON	NDITION/MALFUNCTION	N	PHASE	RULING	•	CUES/NOTES/COMM	ENTS
	8–46		N BUS TIE MOTOR SW LURES ONE MOTOR SWITCH OPEN		LAUNCH	A. <u>CONTINUE MISSION</u> 1. IF MOTOR SW A/C BAT C TO MAIN BUS 2. IF MOTOR SW B/C	S A		
		в.	ONE OR BOTH MOTOR FAILED CLOSED	₹ SW	ALL PHASES ALL PHASES	BAT C TO MAIN BUS CONTINUE MISSION CLOSE ALTERNATE MOTOR SW MAIN BUS TIE CB'S AS MOTO SWITCHES B, CONTINUE MISSION USE CB'S AS MOTOR SW	S B AND USE DR	BATTERIES MUST BE CH THROUGH OPEN MOTOR S BAT RLY CB CLOSED FC CHARGING. B. IF BOTH MOTOR SW FAIL CLOSED, BAT	SW, LEAVE DR
	8-47		N BUS SHORTED CAUS		FIRAJES	USE CB 3 AS MOTOR SW	I I UNES.	CANNOT BE CHARGE REF MR 11-49	
		DIS	CONNECT FUEL CELL 2 DISCO NECTS FROM MAIN A)N-	LAUNCH	A. <u>CONTINUE MISSION</u> 1. PLACE EDS AUTO/O 2. FUEL CELL 2 TO BI 3. TIE BAT C TO MAII 4. INVERTER 3 TO AC 5. POWER DOWN MAIN 16. 6. TVC GIMBAL DRIVE 7. GIMBAL MOTOR CON (YAW 1, PITCH 1) OPEN FOLLOWING G MOTOR TURN ON.	JS A ONLY. N A. 2 MAIN A. 3. (P,Y)-1. TROL BAT A -		RSE DIS-
		В.	FUEL CELL 2 DISCO NECTS FROM MAIN E		ALL PHASES LAUNCH	ENTER NEXT BEST PTP IF B RESTORED B. CONTINUE MISSION 1. PLACE EDS AUTO/O 2. FUEL CELL 2 TO B 3. TIE BAT C TO MAI 4. INVERTER 3 TO AC 5. POWER DOWN MAIN 6. TVC GIMBAL DRIVE 7. GIMBAL MOTOR CON (YAW 2, PITCH 2) OPEN FOLLOWING G MOTOR TURN ON.	FF TO OFF. JS B ONLY. N B. -1 MAIN B. A. (P,Y)-2. TROL BAT B -	CONNECT DURING I	RSE DIS-
		с.	MAIN BUS SHORTED AMPS AND POWER CA BE REMOVED.		ALL PHASES LAUNCH ALL PHASES	ENTER NEXT BEST PTP IF B RESTORED C. ABORT ENTER NEXT BEST PTP CLOSE F/C REACTANTS VALV POWER DOWN SHORTED FUEL	ES TO	C. FAILURE TO DISCO FROM SHORTED BUS BY FC TO SHORTED GREY.	S INDICATED
M	ISSION	REV	DATE			SECTION		GROUP	 PAGE
ΔΡ	OLLO 8	A	12/11/68				SPECIEIC	- DC DISTRIBUTION	8-7
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MISSION RULES

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REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING	,	CUES/NOTES/COM	MENTS
A	8-48	A. BATTERY BUS SHORTED >5 AMPS	LAUNCH	 A. <u>CONTINUE MISSION</u> 1. EDS AUTO - OFF 2. OPEN ASSOCIATED I TO BAT BUS CB. 3. TIE BAT C TO ASSO MAIN BUS. 		>22 AMPS WILL CAUSE BUS VOLTAGE TO BE <u><</u> VOLTAGE DURING LAUN WILL BE ONLY CUE.	MAIN BUS
		· · · · · · · · · · · · · · · · · · ·	ALL PHASES	ENTER NEXT BEST PTP IF B RESTORED (SHORTED >5 AMP		MALF EPS SSR - 2 REMOVE POWER FROM B IF SHORTED <10 AMPS	POWER BUS
		B. BATTERY BUS SHORTED <5 AMPS	ALL PHASES	B. <u>CONTINUE MISSION</u> REMOVE POWER FROM BUS FOR MANEUVERS AND EN		JUST PRIOR TO ENTRY TAIN SECS REDUNDANC	
;				•			
	8-49	BATTERY RELAY BUS SHORTED	LAUNCH	CONTINUE MISSION			
			ALL PHASES	ENTER NEXT BEST PTP OPEN BATTERY BUS TO BATT BUS CB'S.	ERY RELAY		
	8-50	LOSS OF ONE BATTERY BUS, MAIN BUS, OR BATTERY RELA BUS, (SHORTED BUS WHICH CAN BE ISOLATED OR OPEN BUS.)	LAUNCH	CONTINUE MISSION			
			ALL PHASES	ENTER NEXT BEST PTP			
		RULES 8-51 THROUGH 8-55 ARE RESERVED.					
MIS	SSION	REV DATE	<u>L</u>	SECTION		GROUP	PAGE
APO	DLLO 8	A 12/11/68 ELEC	TRICAL POWER	SYSTEMS	SPECIFIC -	- DC DISTRIBUTION	8-8

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				MISSION RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	1ENTS
	8-56	LOSS OF ONE INVERTER	ALL PHASES	CONTINUE MISSION			
	8~57	LOSS OF TWO INVERTERS	LAUNCH	CONTINUE MISSION PLACE REMAINING INVERTER AC BUSES.	ON BOTH		
			ALL PHASES	ENTER NEXT BEST PTP			
	8-58	LOSS OF ONE AC BUS (TWO PHASES CANNOT BE MAINTA >95 VAC)		CONTINUE MISSION			
			ALL PHASES	ENTER NEXT BEST PTP		MALF EPS 1	
	8-59	LOSS OF BOTH AC BUSES	LAUNCH	ABORT MODE I OR MODE II			
				A. OPEN DIRECT 02 FOR SU VENTILATION. B. IF AFTER MODE II, <u>EN</u> <u>PTP</u>			
			EPO	ENTER NEXT BEST PTP OR AT 1-1/2 HOURS	TP WITHIN		
				DOFF SUITS			
		н 					
					-		
		RULES 8-60 THROUGH 8-65 ARE RESERVED.					
		· · · · · · · ·					
MI	SSION	REV DATE		SECTION		GROUP	PAGE
		i i i			SPECIEIC	- AC DISTRIBUTION	
_	LLO 8	297 (AUG 66)	ELECTRICAL POWER	5151EM5	SPECIFIC	- AC DISIRIBUTION	8-9

FEC/TSG Form 291 (AUG 68)

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MISSION RULES

					ON RULES			
REV	ITEM					(
Α	8-66	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION I	RULE REFERENCE
				MCHIC				
		AC BUS 1 YELLOW AC BUS 1 φ A VAC	CC0200V	MCWS METER	SEPARATE	HIGHLY DESIRABLE HIGHLY DESIRABLE		
	•	AC BUS 1ϕ A VAC		METER		HIGHLY DESIRABLE	8-5,8-58	
		AC BUS 1ϕ C VAC		METER		HIGHLY DESIRABLE		
		AC BUS 2 ¢ A VAC	CC0203V	METER	SEPARATE	HIGHLY DESIRABLE		
		AC BUS 2 & B VAC		METER		HIGHLY DESIRABLE	8-16C,8-	47
		AC BUS 2 ∳ C VAC AC BUS 2 YELLOW		METER		HIGHLY DESIRABLE HIGHLY DESIRABLE	,-	
		AC BUS 2 FELLOW		MCWS		HIGHLI DESIRADLE		
		MAIN BUS A VDC	CC0206V	METER	SEPARATE			
		MAIN BUS B VDC	CC0207V	METER	SEPARATE	1 OF 2 MANDATORY		
		BAT BUS A VDC	CC0210V	METER	SEPARATE	HIGHLY DESIRABLE	8-16C,8-	47
		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	CC0222C	METER	COMMON	2 OF 3 MANDATORY	8-27, 8-	36 8-38
		BAT C CURRENT	CC0224C	METER	COMMON		SEE NOTE	JU, 0-JU
		Bitt o content					011 1011	
		FC 1 CURRENT	SC2113C	METER	COMMON			
		FC 1 02 FL0	SC2141R	METER	COMMON	1 OF 3 MANDATORY	8-24, 8-3	25, 8-26
		FC 1 H ₂ FLO	SC2139R	METER	COMMON			
			6601146	METED	COMMONI			
		FC 2 CURRENT FC 2 O ₂ FLO	SC2114C SC2143R	METER METER	COMMON COMMON	1 OF 3 MANDATORY	8-24, 8-	25 8-26
		FC 2 H ₂ FLO FC 2 H ₂ FLO	SC2145R	METER	COMMON		0- 27, 0-	-/, 0-20
			0011.000					
		FC 3 CURRENT	SC2115C	METER	COMMON			
		FC 3 0 ₂ FLO	SC2143R	METER	COMMON	1 OF 3 MANDATORY	8-24, 8-	25, 8-26
		FC 3 H ₂ FLO	SC2141R	METER	COMMON			
		BAT CHARGER CURRENT	SC0215C	METER	COMMON	HIGHLY DESIRABLE	0 100 0	160 9 70
		BAT CHARGER CORRENT	3002190	METER	CONTION	HIGHET DESIKADEL	0-100, 0	-16D, 8-39
		FC 1 SKIN TEMP	SC2984T	METER	COMMON	HIGHLY DESIRABLE	8-15B	
		FC 2 SKIN TEMP	SC2085T	METER	COMMON	HIGHLY DESIRABLE	8-15B	
		FC 3 SKIN TEMP	SC2086T	METER	COMMON	HIGHLY DESIRABLE	8-15B	
		FC 1 COND TEMP	SC2081T	METER	COMMON	HIGHLY DESIRABLE	8-15B	
		FC 2 COND TEMP FC 3 COND TEMP	SC2082T SC2083T	METER METER	COMMON COMMON	HIGHLY DESIRABLE HIGHLY DESIRABLE	8-15B 8-15B	
			3020031		CONTION	HIGHLI DESIKADEL	8-198	
		FC 1 RAD OUT TEMP	SC2084T	METER	COMMON	HIGHLY DESIRABLE	8–15J	
		FC 2 RAD OUT TEMP	SC2085T	METER	COMMON	HIGHLY DESIRABLE	8–15J	
		FC 3 RAD OUT TEMP	SC2086T	METER	COMMON	HIGHLY DESIRABLE	8-15J	
		DAT MANIFOLD D		METED			0.17	
		BAT MANIFOLD P		METER		HIGHLY DESIRABLE	8-17	
		INVERTER 1	CC0175T	MCWS	COMMON	HIGHLY DESIRABLE	8-17	
		TEMP		neus	COMPON		0-17	
		INVERTER 2	CC0175T	MCWS	COMMON	HIGHLY DESIRABLE	8-17	
		TEMP						
		INVEDTED 7	CC01777	MCHIC	COMMON			
		INVERTER 3 TEMP	CC0177T	MCWS	COMMON	HIGHLY DESIRABLE		
		NOTE: USE BAT C IN	LIEU OF BATTE	ERY WITH LOS	ST INST.			
		1						
115	SION .	REV DATE SE	CT ION			GROUP		PAGE
				-				
٩PO	LLO 8	A 12/11/68	ELECTRICAL PC	WER SYSTEMS	3	INSTRUMENTATION REC	UIREMENTS	8-10
-		يريب المحيور برجيب بترجيب المعجب ويرجعوا						1

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9 COMMUNICA-TIONS/INSTRU-MENTATION

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			MISSION KULES
REV	ITEM		GENERAL
1	,	LAUNCH	
	9-1	THERE ARE NO COM TERMINATED.	MUNICATIONS/INSTRUMENTATION FAILURES FOR WHICH THE LAUNCH/INSERTION PHASE WILL BE
A	92	THERE ARE NO COM	MMUNICATIONS AND CERTAIN CRITICAL INSTRUMENTATION ARE REQUIRED FOR MISSION CONTINUATION. MUNICATIONS/INSTRUMENTATION FAILURES WHICH WILL REQUIRE ASAP OR ATP ENTRY. (CRITICAL IS THAT INSTRUMENTATION REQUIRED TO VERIFY GO/NO-GO CRITERIA.)
А	9–3	<u>TLC</u> TWO-WAY VOICE CO (NOMINALLY SECON	MM IS REQUIRED FOR MISSION CONTINUATION UNTIL A FREE RETURN TRAJECTORY IS INSURED. D MIDCOURSE PLUS MANEUVER PAD DATA FOR FLY BY.)
А	9-4	LOI WILL NOT BE	ATTEMPTED FOR LOSS OF TWO-WAY COMM.
		·	
MI	SSION	REV DATE	SECTION GROUP PAGE
AP	POLLO 8	A 12/11/68	COMMUNICATIONS/INSTRUMENTATION GENERAL/SYSTEMS MANAGEMENT 9-1

C. C. C. C. C.

A 9-5 <u>C</u> A 9-6 <u>C</u> A 9-7 <u>C</u>	WILL BE PRIME RECEND B. SPACECRAFT AND GROU DSE MANAG■MENT A. HBR WILL BE RECORD 1. LAUNCH 2. TLI 3. CSM/S-IVB SEP 4. SPS MANEUVERS 5. ENTRY CTE MANAGEMENT A. CTE WILL BE CONFIGU	L RECEIVE TRANSMIT IVE REMOTE TO MO JND WILL TRANSMI	T SIMULTANEOUSLY ON VHF AND			
A 9-6 <u>c</u> A 9-7 <u>c</u>	 A. VHF-AM SIMPLEX A (F WILL BE PRIME RECEINT B. SPACECRAFT AND GROUND DSE MANAGEMENT A. HBR WILL BE RECORDINATION IN THE ANALYSIS ANALONCH 2. TLI 3. CSM/S-IVB SEP 4. SPS MANEUVERS 5. ENTRY 	RECEIVE TRANSMIT IVE REMOTE TO MC JND WILL TRANSMI	C. I SIMULTANEOUSLY ON VHF AND			EPO. USB
4 9-7 <u>(</u>	 A. HBR WILL BE RECORDE 1. LAUNCH 2. TLI 3. CSM/S-IVB SEP 4. SPS MANEUVERS 5. ENTRY CTE MANAGEMENT A. CTE WILL BE CONFIGURE	ED DURING FOLLOW	' [NG :			
	A. CTE WILL BE CONFIGU					
		HOLD IS REQUIRED	GET FOR FLIGHT. CTE WILL		PDATED AFTER T-20 MIN	JUTES
	9-9 ARE RESERVED.			יר		
MISSION	REV DATE		SECTION		GROUP	PAGE

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				MISSION RULES		
REV	RULE	CONDITION/MALFUNCTIC	N PHASE	RULING	CUES/NOTES/COMMENTS	
А	9-10	LOSS OF LBR TM	ALL PHASES	CONTINUE MISSION		
A	9-11	LOSS OF HBR TM	ALL PHASES	CONTINUE MISSION		
Α	9-12	LOSS OF ALL TM	EPO	NO-GO FOR TLI ~ ENTER NEX	(T_BEST_	
				PTP		
			TLC	NO-GO FOR LOI		
A	9-13	LOSS OF RANGING	ALL PHASES	CONTINUE MISSION		
A	9-14	LOSS OF NORMAL DOWN	VOICE EPO	NO-GO_TLI		
			TLC	CONTINUE MISSION		
			LPO	CONTINUE MISSION		
A	9-15	LOSS OF DOWN VOICE B	ACKUP EPO	NO-GO TLI		
			TLC	CONTINUE MISSION		
			LPO	CONTINUE MISSION		
A	9-16	LOSS OF ALL REAL-TIM DOWN VOICE	E			
		A. CREW UPDATED WIT		NO-GO LOI		
		PAD	LO	CONTINUE MISSION ATTEMPT TO USE DSE FOR DI DOWN VOICE	ELAYED	
		B. CREW NOT UPDATED LOI -8 HR FLY BY NEUVER PAD		NO-GO FOR LOI EVALUATE DELAYED DOWN VO DSE IF UNSUCCESSFUL - ENTER I	DUMP VOICE REAL-TIME	1Р . ГСН
				BEST PTP		
Α	9-17	LOSS OF NORMAL UP VC	DICE EPO	NO-GO FOR TLI		
			TLC	CONTINUE MISSION		
			LO	CONTINUE MISSION		
А	9-18	LOSS OF UP VOICE BAC	KUP EPO	NO-GO FOR TLI		
			TLC	CONTINUE MISSION		
			LO	CONTINUE MISSION		
м	ISSION	REV DATE		SECTION	GROUP PA	AGE
APC	DLLO 8	A 12/11/68	COMMUNICATIONS/		GENERAL/SYSTEMS MANAGEMENT 9-3	

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				MISSION RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
A	9-19	LOSS OF ALL UP VOICE					
	:	A. CREW UPDATED WITH	TLC	NO-GO_LOI			
		LOI - 8 HR FLY BY PAD					
		B. CREW NOT UPDATED WITH LOI -8 HR FLY BY PAD	TLC	ENTER NEXT BEST PTP			
		· · ·					
A	9-20	MALFUNCTION OF ONE					
	2	TRANSPONDER					
		A. LOSS OF NORMAL AND BACKUP DOWN VOICE	EPO	NO-GO FOR TLI		AT LEAST ONE UP AND VOICE MODE VIA BOTH	
			TLC	CONTINUE MISSION		PONDERS (EXCLUDING VOICE MODE) IS REQU	COMMON
						TLI.	
		B. LOSS OF NORMAL AND BACKUP VOICE	EPO	NO-GO FOR TLI			
			TLC	CONTINUE_MISSION			
					:		
Α	9-21	LOSS OF FM DOWNLINK	ALL PHASES	CONTINUE MISSION			
А	9-22	LOSS OF ONE PMP POWER	EPO	NO-GO FOR TLI			
		SUPPLY	TLC	CONTINUE MISSION			
			LO	CONTINUE MISSION			
А	9-23	LOSS OF ALL VHF	ALL	CONTINUE MISSION		-	
			PHASES				
Α	9-24	LOSS OF THE UPDATE LINK	ALL PHASES	CONTINUE MISSION		-	
A	9-25	LOSS OF BOTH POWER	EPO	NO-GO FOR TLI			
		AMPLIFIERS	TLC	CONTINUE MISSION			
			LO	CONTINUE MISSION			
А	9-26	LOSS OF THE SCE	EPO	NO-GO FOR TLI			
			TLC	ENTER NEXT PTP			
A	9-27	LOSS OF TWO AUDIO CENTERS	EPO	NO-GO FOR TLI			
			TLC	CONTINUE MISSION			
			LO	CONTINUE MISSION			
	1						
							:
{							
мі	ISSION	REV DATE	L	SECTION	<u> </u>	GROUP	PAGE
AP	OLLO 8	A 12/11/68 COMMU	NICATIONS/I	NSTRUMENTATION	GENERAL/	SYSTEMS MANAGEMENT	9-4
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					MISSIO	N RULES			
EV	ITEM								
				<u> </u>	NSTRUMENTAT I	ON REQUIREMENTS		MISS	ON RULE
	9-28	MEAS D	DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY		ERENCE
		UDL VA	ALIDITY SIGNA	AL CT0262V			HIGHLY DESIRABLE		
		USB RE	ECEIVER AGC	CT0620E	METER	COMMON	HIGHLY DESIRABLE		
		USB RE	EC 🗄 ERROR	CT0640F			HIGHLY DESIRABLE		
		DSE TA	APE MOTION	CT0012X	ТВ		HIGHLY DESIRABLE		
		CTE TI	[ME	CT0145F			HIGHLY DESIRABLE		
		SCE +1	10 VDC	CT0018V			HIGHLY DESIRABLE		
		SCE +5	5 VDC	CT0017V			HIGHLY DESIRABLE		
		SCE +2	20 VDC	CT0015V			HIGHLY DESIRABLE		
		SCE -2	20 VDC	CT0016V			HIGHLY DESIRABLE		
		РСМ Н	I REF 85 PER	CENT CT0125V			HIGHLY DESIRABLE		
		РСМ Н	I REF 15 PER	CENT CT0126V			HIGHLY DESIRABLE		
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M	ISSION	REV	DATE	SECTION			GROUP		PAGE
	LLO 8 FSG Form	A	12/11/68	COMMUNICATIONS/	INSTRUMENTA	TION I	NSTRUMENTATION REQUIR	REMENTS	9-5

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10 SEQUENTIAL SYSTEM

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REV	ITEM				·	
				GENERAL		
Α	10-1	LAUNCH	L			
			ARE NO SEQUE /INSERTION	ENTIAL MALFUNCTIONS FOR WHICH THE FLIGHT OPHASE.	REW WILL INITIATE AN ABORT DURIN	NG THE
	10-2	LOSS O	F AN ENTRY I	BATTERY REQUIRES FLYING THE EDS OPEN LOOP.		
	10-3	ALL PH	ASES			
				NTIAL SYSTEM WILL BE CAUSE FOR TERMINATING WILL BE CONSIDERED FAILED FOR LOSS OF EIT		PTP. A
		FLIGHT		JENTIAL SYSTEM WILL BE PERFORMED WHILE IN ARM THE LOGIC BUSES AND THEN STANDBY FOR A		
	10-4	SEQUEN	TIAL LOGIC	BUS IS CONSIDERED FAILED IF:		
				DC AND UNABLE TO ACTIVATE RCS ENABLE AND S D0124X SYSTEM B).	LA SEP RELAYS (CD0170X AND CD012	23X SYSTEM A,
		B. LC	GIC BUS SHO	RTED >10 AMPS.		
	10-5			DERED FAILED IF:		
	10-5		IORTED >10 A			
		B. UN	IABLE TO PERI	FORM SLA SEP WITH SUSPECTED FAILED SYSTEM.		
{	ł					
			10-6 THROUG ARE RESERVED			
M	ISSION	REV	DATE	SECTION	GROUP	PAGE
APC	DLLO 8	A	12/11/68	SEQUENTIAL SYSTEM	GENERAL/MANAGEMENT	10-1

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REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
	10-10	LOSS OF BATTERY BUS A OR I					
			B LAUNCH	CONTINUE MISSION EDS AUTO/OFF - OFF		REF MR 8-36 EDS BECOMES OPEN LO	OP
			EPO	NO-GO FOR TLI USE BAT C TO POWER BAT BU NOT SHORTED.	US IF BUS		
			TLC	ENTER NEXT BEST PTP			
			LO	ENTER NEXT BEST PTP			
			ENTRY	CONTINUE MISSION REMAINING PORTION OF ENTI BE PERFORMED ON REMAINING			
	10-11	LOSS OF SEQUENTIAL LOGIC BUS A OR B	LAUNCH	CONT INUE MISSION PLAN ENTRY 3-1 IF BUS NO STORED.	T RE-		
			ALL PHASES	ENTER NEXT BEST PTP			
A	10-12	PYRO BUS A OR B ≤35 VDC	LAUNCH	CONTINUE MISSION			
			ALL PHASES	A. IF SHORTED >10 AMPS, <u>NEXT BEST PTP</u> .	ENTER	THIS ASSUMES PYRO B FIED >35 VDC PRIOR BUS. IF ENTRY BAT	TO ARMING
				B. IF UNSHORTED, ATTEMP USING SUSPECTED BUS (LIEU OF PYRO BAT, V SHOULD BE APPROXIMA	OLTAGE TELY EQUAL
				1. IF SLA SEP SUCCE CONTINUE MISSION		TO BAT BUS VOLTAGE.	
				2. IF SLA SEP UNSUCT POWER OTHER PYRO FUNCTION. <u>ENTER</u> <u>BEST PTP</u> .	BUS FOR		
-	10-13	TELEMETRY INDICATED AN ED VOTE INPUT 1, 2, OR 3. (CD0132X, CD0133X, AND CD0134X RESPECTIVELY)	5 LAUNCH	CONTINUE MISSION A. IF ANY ENTRY BAT <22 EDS AUTO/OFF - OFF		BATTERY C VOLTAGE C MONITORED ONBOARD.	AN ONLY BE
				B. ALL ENTRY BATS <22 M CORRESPONDING EDS CB OR 3 CLOSED.			
	10-14	LET JETTISON MOTOR DOES NOT FIRE	LAUNCH	CONTINUE MISSION ATTEMPT JETTISON PER CRE LIST PROCEDURE. IF UNSU CONTINUE INTO ORBIT.			
				10 ay 1			
 MIS	SION	REV DATE		SECTION		GROUP	PAGE

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MISSION I	RULES
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10-15 LOST GROUND TO RESISTOR NETWORK FOR LOGIC OR PYRO BUS VOLTS MEASUREMENTS. ALL PHASES CONTINUE MISSION CONT ARM AFFECTED SYSTEM UNLESS OTHER SYSTEM FAILS UNTIL CM/SM SEP. ARMING SYS 30 VDC WIN DO NOT ARM AFFECTED SYSTEM UNLESS OTHER SYSTEM FAILS UNTIL CM/SM SEP. ARMING SYS 30 VDC WIN NENT LOSS TELEMETRY 10-16 SMUC ACTIVATES PREMATURELY ID-16 ALL PHASES A. DO NOT ARM AFFECTED PYRO BUS. B. REMOVE POWER FROM AFFECTED MAIN BUS. (FUEL CELLS AND BATTERIES.) IF IN CONT ARMING OF BE POWERER BATTERIES.) 10-17 ACTIVATED CM-RCS PRESS CIRCUIT (CD0173X AND/OR CD0174X) ALL PHASES A. LL PHASES A. RELY ON GOOD SEQUENTIAL SYSTEM FOR CSM/S-IVB AND CM/SM SEP. B. REPOWER AFFECTED MAIN BUS AFTER CM/SM SEP. 10-18 ACTIVATED CM-RCS PRESS CIRCUIT (CD0173X AND/OR CD0174X) ALL PHASES CONTINUE MISSIÓN A. PRIOR TO CM-RCS PRESS: DO NOT ARM RESPECTIVE PYRO BUS. FOR BOTH INDICATIONS, PERFORM SLA SEP WITH SECS ARM CB'S OPEN. 10-18 ACTIVATED SLA DEPLOY CIR- CUIT (CD0123X AND/OR CD0124X) ALL PHASES CONTINUE MISSIÓN RESPECTIVE PYRO BUS. FOR BUS. FOR SUS. FOR BUS. FOR DNOT ARM RESPECTIVE PYRO BUS. FOR SLA SEP, ARM SUSPECTED BUS FIRST.	/NOTES/COMMENTS STEM WITH VOLTAGE VILL RESULT IN PERMA- OF ALL ANALOG / PARAMETERS. VITACT WITH MSFN, E LOG IC BUSES WILL WHICH MAIN BUS MUST ED DOWN. MAIN A IF CM/SM SEP EVENT. = SYSTEM B CM/SM ACTIVATED.
10-16 NETWORK FOR LOGIC OR PYRO BUS VOLTS MEASUREMENTS. PHASES OO NOT ARM AFFECTED SYSTEM UNLESS OTHER SYSTEM FAILS UNTIL CM/SM SEP. >30 VDC MI NEM LOSS TELEMETRY 10-16 SMJC ACTIVATES PREMATURELY ID NOT ARM UNTIL CM/SM SEP. ALL PHASES A. DO NOT ARM AFFECTED PYRO BUS. B. REMOVE POWER FROM AFFECTED MAIN BUS. (FUEL CELLS AND BATTERIES.) IF IN COMI ARMING OF BATTERIES.) 10-17 ACTIVATED CM-RCS PRESS CIRCUIT (CD0173X AND/OR CD0174X) ALL PHASES ALL PHASES CONTINUE MISSION AL SEP WITH SECS ARM CB'S OPEN. B. REPOWER AFFECTED MAIN BUS AFTER CM/SM SEP. STEM PRO CSM/S-IVB AND CM/SM SEP. 10-18 ACTIVATED SLA DEPLOY CIR- CUIT (CD0123X AND/OR CD0124X) ALL PHASES CONTINUE MISSION PRIOR TO SLA SEP: DO NOT ARM RESPECTIVE PYRO BUS. FOR SLA SEP, ARM SUSPECTED BUS FIRST. DETECTED / PRIOR TO SLA SEP: DO NOT ARM RESPECTIVE PYRO BUS. FOR SLA SEP, ARM SUSPECTED BUS FIRST. DETECTED / PHASES	NILL RESULT IN PERMA- GOF ALL ANALOG PARAMETERS. NTACT WITH MSFN, LOGIC BUSES WILL WHICH MAIN BUS MUST ED DOWN. MAIN A IF CM/SM SEP EVENT. SYSTEM B CM/SM
10-17 ACTIVATED CM-RCS PRESS CD0174X) ALL PHASES B. REMOVE POWER FROM AFFECTED BATTERIES.) ARMIN G OF INDICATE V BATTERIES.) 10-17 ACTIVATED CM-RCS PRESS CIRCUIT (CD0173X AND/OR CD0174X) ALL PHASES ENTER NEXT BEST PTP A. RELY ON GOOD SEQUENTIAL SYSTEM FOR CSM/S-IVB AND CM/SM SEP. B. REPOWER AFFECTED MAIN BUS AFTER CM/SM SEP. 10-17 ACTIVATED CM-RCS PRESS CD0174X) ALL PHASES CONTINUE MISSIÓN A. PRIOR TO CM-RCS PRESS: DO NOT ARM RESPECTIVE PYRO BUS. FOR BOTH INDICATIONS, PERFORM SLA SEP WITH SECS ARM CB'S OPEN. 10-18 ACTIVATED SLA DEPLOY CIR- CUIT (CD0123X AND/OR CD0124X) ALL PHASES CONTINUE MISSION PRIOR TO SLA SEP: DO NOT ARM RESPECTIVE PYRO BUS. OPEN. B. AT CM-RCS PRESS, ARM RESPEC- TIVE PYRO BUS. DETECTED / DRIOR TO SLA SEP: DO NOT ARM RESPECTIVE PYRO BUS. FOR SLA SEP, ARM SUSPECTED BUS FIRST. 10-19 ACTIVATED APEX JETTISON CIRCUIT (CD0230X AND) ALL PHASES ENTER NEXT BEST PTP DO NOT ARM PYRO BUSES UNTIL MAL- DETECTED /	LOGIC BUSES WILL WHICH MAIN BUS MUST D DOWN. MAIN A IF CM/SM SEP EVENT. SYSTEM B CM/SM
10-17 ACTIVATED CM-RCS PRESS CIRCUIT (CD0173X AND/OR CD0174X) ALL PHASES 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. 10-18 ACTIVATED SLA DEPLOY CIR- CUIT (CD0123X AND/OR CD0124X) ALL PHASES CONTINUE MISSION PRIOR TO SLA SEP: DO NOT ARM RESPECTIVE PYRO BUS. 10-19 ACTIVATED APEX JETTISON CIRCUIT (CD0230X AND ALL PHASES CONTINUE MISSION PHASES DETECTED / DO NOT ARM PYRO BUSES UNTIL MAL-	
CUIT (CD0123X AND/OR CD0124X) PHASES PRIOR TO SLA SEP: DO NOT ARM RESPECTIVE PYRO BUS. FOR SLA SEP, ARM SUSPECTED BUS FIRST. 10-19 ACTIVATED APEX JETTISON CIRCUIT (CD0230X AND ALL PHASES ENTER NEXT BEST PTP DO NOT ARM PYRO BUSES UNTIL MAL- DETECTED A	
CIRCUIT (CD0230X AND PHASES DO NOT ARM PYRO BUSES UNTIL MAL-	
	AT SECS POWER UP
10-20 ACTIVATED DROGUE CHUTE DEPLOY CIRCUIT (CE0001X AND/OR CE0002X) ALL PHASES ALL PHASES DO NOT ARM PYRO BUSES UNTIL MAL- FUNCTION HAS BEEN ISOLATED.	ANYT IME.
CIRCUIT (CD0003X AND/OR FUNCTION HAS BEEN ISOLATED. PRIOR TO	AT SECS POWER UP ENTRY. (WITH ELS) CB CLOSED.)
RULES 10-22 THROUGH 10-23 ARE RESERVED.	
MISSION REV DATE SECTION GROUP	PAGE
APOLLO 8 INAL 11/7/68 SEQUENTIAL SYSTEM SPECIFIC	10-3

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REV	ITEM			MISSION			
			INST	RUMENTATION	REQUIREMENTS		
A	10-24	MEAS DESCRIPTION	PCM	ONBOARD	TR AN SDUCERS		ISSION RULE REFERENCE
		SEQ LOGIC BUS A VOLTS SEQ LOGIC BUS B VOLTS	CD0200V CD0201V			HIGHET DESITIVADEE	10-4, 10-11 10-4, 10-11
		APEX JET A APEX JET B	CD0230X CD0231X				10-19 10-19
		DROGUE DEPLOY A DROGUE DEPLOY B	CE0001X CE0002X				10-20 10-20
		MAIN CHUTE DEPLOY A MAIN CHUTE DEPLOY B	CE0003X CE0004X				10-21 10-21
		PYRO BUS A VOLTS PYRO BUS B VOLTS	CD0005V CD0006V			1 OF 2 MANDATORY	10-5, 10-12 10-5, 10-12
		SLA SEP RELAY A SCS/RCS ACTIVATE A	CD0123X CD0170X				10-18 10-18
		SCS/RCS ACTIVATE B SLA SEP RELAY B	CD0171X CD0124X				10-18 10-18
		CM-RCS PRESS SIG A CM-RCS PRESS SIG B	CD0173X ÇD0174X			HIGHET DESITIVEEL	10-17 10-17
		CMSM SEP RELAY A CMSM SEP RELAY B	CD0023X CD0024X				
		CREW ABORT A CREW ABORT B	CD0130X CD0131X				
		EDS ABORT VOTE 1 EDS ABORT VOTE 2 EDS ABORT VOTE 3	CD0132X CD0133X CD0134X	 		- HIGHLY DESIRABLE	
		EDS ABORT A EDS ABORT B	CD0135X CD0136X			– HIGHLY DESIRABLE – HIGHLY DESIRABLE	
		MAIN CHUTE DISC A MAIN CHUTE DISC B	CE0321X CD0322X				
		EDS ABORT REQ A EDS ABORT REQ B	BS0080X BS0081X				
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MI	SSION	REV DATE SECTI	0N		10	ROUP	PAGE
	LLO 8	A 12/11/68 SEC	UENTIAL SYSTE			INSTRUMENTATION REQUIREMENT	5 10-4

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11 GUIDANCE AND CONTROL

ITEM REV GENERAL 11-1 LAUNCH THERE ARE NO FAILURES OF THE CSM GUIDANCE AND CONTROL SYSTEM WHICH ARE CAUSE FOR ABORT. 11 - 2EARTH ORBIT PHASE A. IN ORDER TO CONTINUE THE MISSION PAST THE NEXT BEST PTP, THE GUIDANCE AND CONTROL SYSTEMS MUST PROVIDE SPS CRITICAL BURN CAPABILITY AND ONE BACKUP DEORBIT METHOD (SM OR HYBRID). THE FOLLOWING MINIMUM CAPABILITIES MUST BE AVAILABLE: 1. ATTITUDE CONTROL: DIRECT RCS AND RATE DAMPING IN EACH AXIS. TVC (CRITICAL BURNS): ONE TVC SERVO LOOP IN EACH AXIS AND ONE TVC CONTROL MODE (ACCEL CMD 2. EXCLUDED). 3. <u>BACKUP DEORBIT</u>: AS LONG AS ENOUGH PROPELLANT IS AVAILABLE FOR AN SM DEORBIT, THE G&C SYSTEMS MUST PROVIDE THAT CAPABILITY. IF SM DEORBIT IS NOT POSSIBLE DUE TO LACK OF PROPELLANT OR A SYSTEMS FAILURE, THE G&C SYSTEMS MUST PROVIDE CAPABILITY FOR A HYBRID DEORBIT. (A) SM DEORBIT REQUIREMENTS: - TRANSLATION CAPABILITY - ONE OPERATIONAL FDAI - RATE DAMPING IN ALL THREE AXES (DAP OR SCS) (B) HYBRID DEORBIT REQUIREMENTS: - ALL SM DEORBIT REQUIREMENTS (RATE DAMPING MUST BE SCS) - OPERATIONAL, IMU, CMC, AND MAIN DSKY - TWO OPERATIONAL RHC'S в. IN ORDER TO PERFORM A NON-CRITICAL BURN AFTER THE STORAGE TANKS ARE EMPTY, THE G&C SYSTEMS MUST PROVIDE THE CAPABILITY TO EXECUTE AN ULLAGE MANEUVER BY EITHER CMC AUTO (RCS DAP), SCS AUTO, OR DIRECT ULLAGE. C. IN ORDER TO COMMIT TO THE TRANSLUNAR COAST PHASE, THE GUIDANCE AND CONTROL SYSTEMS MUST PROVIDE SPS NON-CRITICAL BURN CAPABILITY. THE FOLLOWING MINIMUM CAPABILITIES MUST ALSO BE AVAILABLE TO BE GO FOR TLI: 1. ATTITUDE CONTROL: DIRECT RCS AND RATE DAMPING IN EACH AXIS. TVC: TWO SERVO LOOPS AND BOTH GEN AND ONE SCS TVC CONTROL MODES (ACCEL CMD EXCLUDED). 2. GEN: CMC, IMU, AND MDC DSKY FULLY OPERATIONAL AND OPTICS CAPABLE OF ALIGNING PLATFORM. 3. 4. DISPLAYS: ONE OPERATIONAL FDAI. 5. ATTITUDE REFERENCE: REDUNDANT ATTITUDE SOURCES ARE REQUIRED FOR ENTRY. 11-3 TRANSLUNAR COAST IN ORDER TO CONTINUE THE MISSION PAST THE NEXT BEST PTP, THE GUIDANCE AND CONTROL SYSTEMS MUST PROVIDE THE FOLLOWING MINIMUM CAPABILITIES: ATTITUDE CONTROL: DIRECT RCS AND RATE DAMPING IN EACH AXIS. Α. RCS TRANSLATION: X-AXIS VIA AUTO COILS. в. ATTITUDE REFERENCE: REDUNDANT ATTITUDE REFERENCE SOURCES ARE REQUIRED FOR ENTRY. с. MISSION REV DATE SECTION GROUP PAGE FINAL GUIDANCE AND CONTROL APOLLO 8 11/7/68 GENERAL/SYSTEMS MANAGEMENT 11 - 1

MISSION RULES

REV	ITEM							
	11-4	<u>LOI, I</u>	LUNAR ORBIT	PHASES:				
		RE	EDUNDANT SPS	CONTROL OR N	NON-CRITICAL S	PS CAPABILITY IS	IF EITHER REDUNDANT ATTITUDE CON LOST. IN ADDITION, THE FOLLOWN CONTINUING LUNAR ORBIT.	
		1.	ATTITUDE	CONTROL: DIF	RECT RCS AND R	ATE DAMPING IN E	ACH AXIS.	
		2	. <u>TVC</u> : BOTI	H SERVO LOOPS	S AND TWO TVC	CONTROL MODES (A	CCEL CMD EXCLUDED).	
		3		G&N MUST BE E OF ALIGNING		ONAL WITH THE EX	CEPTION OF OPTICS AND NAV DSKY.	OPTICS MUST
		4.	RCS TRANS	LATION: "X"-	-AXIS VIA AUTO	COILS.		
							MUST PROVIDE THE CAPABILITY TO OR DIRECT ULLAGE.	EXECUTE AN
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			11-5 THROUG					
		11-14	ARE RESERVE	D.				
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	OLLO 8	FINAL	11/7/68	GUIDANCE	AND CONTROL		GENERAL/SYSTEMS MANAGEMENT	11-2

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REV	ITEM			MISSION RULES		
NL V	1164			SYSTEM MANAGEMENT		:
	11-15	PIPA AND IN AND 0.075 [RIG BIA DEG/HR	S WILL BE UPDATED WHEN ACTUAL BIASES DIFF RESPECTIVELY.	ER FROM VALUES IN CMC ERASABLE E	Y .02 FT/SEC ²
Α	11-16	AV COUNTER	DRIFT			
		SHOULD THE BIASED. TH	∆V COU IE TOLE	NTER DRIFT BE >.032 FT/SEC ² , AND BE REPEA RANCE SPREAD ON REPEATABILITY IS .03 FT/S	TABLE, SUBSEQUENT SETTINGS WILL EC ² .	BE SUITABLY
A	11–17	DAP INITIAL	IZATIO	<u>N</u>		
		MANEUVER AS	MONIT	LL BE UPDATED FOR EVERY SPS MANEUVER BASE ORED ON TELEMETRY, IF THE PREVIOUS MANEUV CONTROLLED THE CMC STORED VALUES WILL BE	'ER WAS SCS CONTROLLED. IF THE F	PREVIOUS REVIOUS
		CSM WT: WI	ILL BE	UPDATED WHEN ACTUAL VALUE DIFFERS F.ROM VA	NLUE IN CMC ERASABLE BY 1 PERCENT	•
		RULES 11-18				
		11-24 ARE F	KE SERVE	υ .		
 		<u> </u>		· · · · · · · · · · · · · · · · · · ·	·	
	ISSION	REV DATE	11/68	SECTION	GROUP	PAGE
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					MISSION RULES			
REV	RULE	CONDITION/MALFUNCT	ION	PHASE.	RULING		CUES/NOTES/COM	MENTS
T	11-25	LOSS OF BMAG 1 OR 2	IN:	LAUNCH	CONTINUE MISSION		MALF PROC: SCS 3,6	
		A. PITCH AXIS		ALL	A. <u>CONTINUE MISSION</u> DELETE SCS AUTO BURNS			
		B. YAW AXIS		ALL	B.1. <u>CONTINUE MISSION</u> DELETE SCS AUTO BUR	NS		
					 <u>CONTINUE MISSION</u> AFTER .05G RSI IS U REMAINING GYRO IS S FOR RATE. 		IF FAILURE IS YAW I IS LOST.	I, FDAI ROL
	11-26	LOSS OF BOTH BMAG 1 IN EITHER PITCH OR		LAUNCH	CONTINUE MISSION MTVC ACCEL CMD IS ONLY MC OR IV CAPABILITY.	DE III		
				EPO	ENTER NEXT BEST PTP			
				TLC	<u>NO GO FOR LOI</u> ENTER NEXT BEST PTP IF YA	W AXIS.	VIOLATES REDUNDANT TUDE REF CRITERIA.	ENTRY ATTI
				LO	PLAN TEI FOR NEXT OPPORTU	INITY		
				ENTRY	<u>CONTINUE MISSION</u> RSI AN D FDAI ROLL UNUSABI YAW AXIS FAILURE.	E WITH		
	11-27	LOSS OF ROLL BMAG A. NUMBER ONE		ALL	CONTINUE MISSION		MALF PROC: SCS 3.	5
					MANUAL ROLL ATTITUDE CONT REQUIRED IN ALL SCS MODES			
				ENTRY	CONTINUE MISSION NO SCS FDAI ROLL. RSI VA	ALID.		
		B. NUMBER TWO		ALL	CONTINUE MISSION USE OF ATT 1/RATE 2 AND 1 MAY PROVIDE RATE DAMPED A HOLD WHEN RCS DAP IS NOT (UNLESS FAILURE IS HARDON	ATTITUDE USED.	WITH A HARDOVER FA ATT 1/RATE 2 CONFIG NOT USABLE.	
				ENTRY	CONTINUE MISSION SELECTION OF RATE 1 WILL BOTH RSI AND SCS FDAI ROL			
А	11-28	LOSS OF BOTH ROLL E	BMAGS	LAUNCH	CONTINUE MISSION		THESE FAILURES VIO THREE-AXIS RATE-DA MENT FOR THE HYBRII	MPING REQU
				EPO	1. <u>NO GO FOR TLI</u> CONTINUE MISSION IF S AVAILABLE.	SM DEORBIT		
					2. <u>ENTER NEXT BEST PTP</u> IF SM DEORBIT NOT AVA	AILABLE		
				TLC	ENTER NEXT BEST PTP			
				LO	PLAN TEI FOR NEXT OPPORTU	JNITY		
				ENTRY	<u>CONTINUE MISSION</u> RSI AND FDAI ROLL UNUSAB	LE		
MI	SSION	REV DATE			SECTION		GROUP	PAGE
	LO 8	A 12/11/68	CUIDA	NCE AND COM	ITDO	SPECIFIC -		11-4

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MISSION RULES

				MISSION RULES		
REV	RULE	CONDITION/MALFUNCTIO	N PHASE	RULING	CUES/NOTES/COM	MENTS
	11-29	LOSS OF EITHER TVC SER LOOP IN EITHER PITCH O YAW AXIS.		NO GO FOR TLI. AS APPROPRIATE, SELECT 1 OR 2 ON TVC GMBL DR SWITCH.	FAILURE PROBABLY NOT PRE-TLI.	DETECTABLE
			TLC	NO GO FOR LOI.		
			LO	PLAN TEI FOR NEXT OPPORTUNITY.		
			TEC	CONTINUE MISSION. AS APPROPRIAT SELECT 1 OR 2 ON TVC GMBL DR SWITCH.	E,	
	11-30	LOSS OF BOTH TVC SERVO LOOPS	D LAUNCH	<u>CONTINUE MISSION</u> NO MODE III OR IV CAPABILITY. LIMITED LANDING POINT CONTROL IN MODE III OR IV WITH SM-RCS.	MALF PROC: SCS	_
			EPO	ENTER NEXT BEST PTP RCS DEORBIT.		
			TLC	NO GO FOR LOI.		
	11-31	LOSS OF PROPORTIONAL (TROL FROM:	CON-			
		A. EITHER RHC	ALL	A. <u>CONTINUE MISSION</u> USE REMAINING RHC	MALF PROC: SCS	
		B. BOTH RHC'S	ALL	B. <u>CONTINUE MISSION</u> USE DIRECT RCS OR ACCEL CMD FOR MANUAL MANEUVERS. NO MTVC CAPABILITY.		
	11-32	LOSS OF DIRECT RCS CO	NTROL		MALF PROC: SCS	
		A. EITHER RHC	ALL	A. CONTINUE MISSION		
		B. BOTH RHC'S	LAUNCH	B. CONTINUE MISSION		
			EPO	ENTER NEXT BEST PTP.		
			TLC	ENTER NEXT BEST PTP. NO GO FOR		
			LO	PLAN TEI FOR NEXT OPPORTUNITY.		
				92 -		
	SSION	REV DATE		SECTION	GROUP	PAGE
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MISSION RULES

				MISSION RULES		
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/CO	MMENTS
A	11-33	COMPLETE LOSS OF AUTO ATT TUDE CONTROL IN PITCH AND YAW CHANNELS.	- LAUNCH	CONTINUE MISSION	MALF PROC: SCS SUSPECTED FAILURE AUTO INHIBIT CIRCO	
		A. CONTROL IS REGAINED BY OPENING EMS CB'S	ALL	A. <u>CONTINUE MISSION</u> AFTER SM JETTISON EMS M/ RE-ENABLED WITHOUT LOSS AUTO RCS.		
		B. CONTROL IS REGAINED B' PLACING SPACECRAFT CONTROL SWITCH TO CMC.		B.1. <u>NO-GO FOR TLI</u> CONTINU MISSION IF SM DEORBIT CAPABILITY AVAILABLE.	MISED BY LACK OF A	
				2, <u>ENTER NEXT BEST PTP</u> II DEORBIT NOT AVAILABLE		
			TLC	NO-GO FOR LOI		
			LO	PLAN TEI FOR NEXT OPPORTUNI	<u>TY</u> .	
		C. CONTROL IS NOT RE- GAINED	EPO	C. <u>ENTER NEXT BEST PTP</u>	FAILURE VIOLATES M CAPABILITY CRITERI BOTH BACKUP DEORBI	A FOR
			TLC	ENTER NEXT BEST PTP NO-GO FOR LOI USE DIRECT ULLAGE AND DIREC	FAILURE VIOLATES R CRITERIA.	ATE DAMPIN
			LO	PLAN TEI FOR NEXT OPPORTUNI	<u>TY</u> ,	
	11-34	LOSS OF FLIGHT DIRECTOR ATTITUDE INDICATORS			MALF PROC: SCS	<u> </u>
		A. ONE	ALL	A. CONTINUE MISSION		
		B. BOTH	EPO	B. ENTER NEXT BEST PTP		
			TLC	NO-GO FOR LOI		
			LO	PLAN TEL FOR NEXT OPPORTUNI	<u>TY</u>	
А	11-35	LOSS OF AC1 ϕ A	LAUNCH	CONTINUE MISSION	LOSS OF AC1 ¢ A RE	SULTS IN
			EPO	ENTER NEXT BEST PTP	THE LOSS OF:	(0. 1. 00P
			TLC	NO-GO FOR LOI	A. REDUNDANT SERV POWER. B. PROPORTIONAL (
			LO	PLAN TEI FOR NEXT OPPORTUNI		
					C. FDAI #1 BALL F D. SCS ATTITUDE E E. GYRO ASSEMBLY (THEREFORE, LC AUTO TVC AND A	RROR. NO. 1 NSS OF SCS
					HOLD). F. SCS ATTITUDE C IMPULSE, RATE PSEUDO RATE.	ONTROL-MIN
					G. PROPORTIONAL C RHC #1 FOR TVC H. FDAI ROLL FOR I. GDC TOTAL ATT1	ENTRY. TUDE.
					J. FDAI LIGHTING K. 1/2 OF FP/GPI	
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NASA	-	Manned	Spacecraft	Center
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				MISSION RULES	
REV	RULE	CONDITION/MALFUNCTI	ON PHASE	RULING	CUES/NOTES/COMMENTS
A	11-36	LOSS OF AC2 \$ A		CONTINUE MISSION ENTER NEST BEST PTP NO-GO FOR LOI PLAN TEI FOR NEXT OPPORT	LOSS OF AC2 ¢ A RESULTS IN THE LOSS OF: A. REDUNDANT SERVO LOOP POWER. B. PROPORTIONAL CONTROL FROM BOTH RHC'S. C. FDAI #2 BALL POWER. D. GYRO ASSEMBLY 2. E. ALL SCS TVC CAPABILITY. F. RSI G. GDC TOTAL ATTITUDE H. 1/2 OF FP/GPI
		EARTH AND LUNAR (ORD	EAL)	CONTINUE MISSION	
	11-38	LOSS OF ENTRY MONITO SYSTEM	R ALL	CONTINUE MISSION	
-	11-39	GROUND AT EITHER SPS DRIVER OUTPUT AND UN TO REMOVE.		CONTINUE MISSION NO-GO FOR TLI USE OTHER SPS BANK FOR EN OPERATION.	REMOVAL MAY REQUIRE LOSS OF TVC DAP OR AV COUNTER.
			TLC	NO-GO FOR LOI	
		RULES 11-40 THROUGH 11-44 ARE RESERVED.			
M	ISSION	REV DATE	L	SECTION	GROUP PAGE
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MISSION	RULE

				MISSION RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
	11-45	LOSS OF COMMAND MODULE	LAUNCH	CONTINUE MISSION		MALF PROC: GEC	_
		COMPUTER	EPO	1. <u>NO-GO FOR TLI</u> . CONT MISSION IF SM DEORBI BILITY AVAILABLE.			
				2. <u>ENTER NEXT BEST PTP</u> DEORBIT NOT AVAILABL			
			TLC	NO-GO FOR LOI			
			LO	PLAN TEI FOR NEXT OPPORT	UNITY		
			ENTRY	FLY EMS ENTRY			
	11-46	LOSS OF MOC DSKY	ALL	CONTINUE MISSION		MALF PROC: G&C	
	_						_
	-						
	11-47	LOSS OF NAV DSKY					
		A. ENCODER OR DECODER	ALL	A. <u>CONTINUE MISSION</u>			
		B. CMC WARNING RELAY	LAUNCH	B. <u>CONTINUE MISSION</u>		B. CONSTITUTES LOSS G&N TVC, ENTRY (AND FINE ALIGN.	
			EPO	1. <u>NO-GO FOR TLI</u> . MISSION IF SM DE AVAILABLE.			
				2. <u>ENTER NEXT BEST</u> DEORBIT NOT AVAI		PIPA'S ARE REQUIRED SENSING IN HYBRID D	
			TLC	<u>NO-GO FOR LOI</u> .			
			LO	PLAN TEI FOR NEXT OPPORT	UNITY.		
			ENTRY	FLY EMS ENTRY			
	11-48	LOSS OF INERTIAL SUBSYS	TEM LAUNCH	CONTINUE MISSION		MALF PROC: G&C	<u>. </u>
			EPO	 <u>NO-GO FOR TLI</u>. CONT MISSION IF SM DEORBI ABLE. 			
				2. <u>ENTER NEXT BEST PTP</u> DEORBIT NOT AVAILABL	IF SM	VIOLATES HYBRID DEO MUM REQUIREMENTS.	RBIT MINI-
			TLC	NO-GO FOR LOI			
			LO	PLAN TEL FOR NEXT OPPORT	UNITY		
			ENTRY	FLY EMS ENTRY			
MI	SSION	REV DATE		SECTION		GROUP	PAGE
APO	LLO 8	FINAL 11/7/68	GUIDANCE AND CO	NTROL	SPECIFIC	; – G&N	11-8

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						MISSION RULES			
REV	RULE	CON	DITION/MALFUNCTIC	N	PHASE	RUL ING		CUES/NOTES/COM	ENTS
	11-49	LOSS	OF OPTICS SUBSYS	TEM	LAUNCH	NOT APPLICABLE		FOR THIS PURPOSE "LOS	
					EPO	NO-GO FOR TLI		OPTICS FOGGED OR COVE THAT CREW CANNOT SIGH	IT STARS,
					TLC	NO-GO FOR LOI		OR INOPERABLE IN MANU	JAL MODE,
					LO/TEC	CONTINUE MISSION			
Α	11-50	1.055	OF OPTICS SUBSYS		LAUNCH	NOT APPLICABLE		CONSTITUTES LOSS OF	CON TVC
	11~50	COUPL	ING DATA UNIT DI						BGIN TVC.
			ALOG CONVERTER.		EPO	NO-GO FOR TLI			
					TLC	NO-GO FOR LOI			
					LO	PLAN TEI FOR NEXT OPPORTUN	NITY		
İ									
								-	
			11~51 THROUGH ARE RESERVED.						
		11-79	THE NEGENVED.						
	ISSION	REV	DATE			SECTION		GROUP	PAGE
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				MISSION RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
	11-49	LOSS OF OPTICS SUBSYSTE	M LAUNCH	NOT APPLICABLE		FOR THIS PURPOSE "LO OPTICS FOGGED OR CON	
			EPO	NO-GO FOR TLI		THAT CREW CANNOT SIG	HT STARS,
			TLC	NO-GO FOR LOI		OR INOPERABLE IN MAIN	NUAL MODE.
			LO/TEC	CONTINUE MISSION			
	11-50	LOSS OF OPTICS SUBSYSTE		NOT APPLICABLE		CONSTITUTES LOSS OF	TVC DAP.
		COUPLING DATA UNIT DIGI TO ANALOG CONVERTER.	EPO	NO-GO FOR TLI			
			TLC	NO-GO FOR LOI			
			LO	PLAN TEI FOR NEXT OPPORT	UNITY		
	{					-	
{ .							
		RULE 11-51 THROUGH 11-59 ARE RESERVED.					
 м	ISSION	REV DATE		SECTION	1	GROUP	PAGE
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MISSION RULES

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				mij	SION RULES		
REV	ITEM						
А	11-60	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION RULE REFERENCE
		CMC DIGITAL DATA	CG0001V	-	-	MANDATORY	11-15/17
		PITCH GIMBAL POS 1 & 2 YAW GIMBAL POS 1 & 2	CH3517H CH3518H	GPI GPI	COMMON	1 of 2 mandatory 0/b other HD 1 of 2 mandatory 0/b other HD	11-29/30 11-29/30
		TM BIAS 2.5 VDC	CG1110V	-	-	HIGHLY DESIRABLE	11-48/49/50
		IMU HTR +28 VDC CMC OPERATE +28 VDC OPTX OPERATE 28 VAC	CG1513X CG1523X CG1533X	- - -	- -	HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE	11-48 11-45 11-49
		IG 1X RSVR OUT SIN IG 1X RSVR OUT COS MG 1X RSVR OUT SIN MG 1X RSVR OUT COS OG 1X RSVR OUT SIN OG 1X RSVR OUT COS	CG2112V CG2113V CG2142V CG2143V CG2172V CG2173V	FDAI FDAI FDAI FDAI FDAI FDAI	COMMON COMMON COMMON COMMON COMMON	HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE	11-48 11-48 11-48 11-48 11-48 11-48
		SHAFT CDU DAC OUT TRUNNION CDU DAC OUT	CG3721V CG3722V	-	-	HIGHLY DESIRABLE HIGHLY DESIRABLE	11-50 11-50
		CMC WARNING	CG5040X	CSW	COMMON	HIGHLY DESIRABLE	1145
		PITCH ATT ERROR YAW ATT ERROR ROLL ATT ERROR	CH3500H CH3501H CH3502H	FDAI FDAI FDAI	COMMON COMMON COMMON	HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE	11-25/26/27/2 11-25/26/27/2 11-25/26/27/2
		SCS PITCH BODY RATE SCS YAW BODY RATE SCS ROLL BODY RATE	CH3503H CH3504H CH3505H	FDAI FDAI FDAI	COMMON COMMON COMMON	HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE	11-25/26/27/2 11-25/26/27/2 11-25/26/27/2
		SCS TVC PITCH AUTO CMD SCS TVC YAW AUTO CMD MTVC PITCH CMD MTVC YAW CMD	CH3582 CH3583 CH3585 CH3586	- - -	- - -	HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE	11-2/4/29/ 11-2/4/29/ 11-2/4/29/ 11-2/4/29/
		FDAI ERROR 5 RATE 5 FDAI ERROR 50/15 PITCH DIFF CLUTCH CUR YAW DIFF CLUTCH CUR	CH3592 CH3593 CH3666 CH3667	- - -	- - -	HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE	11-25/26/27/ 11-25/26/27/ 11-29/30 11-29/30
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12 CSM SERVICE PROPULSION SERVICE

		·	MISSION RULES	· · · · · · · · · · · · · · · · · · ·							
REV	ITEM			•	_						
			GENERAL								
		-									
	12-1	LAUNCH									
		THERE ARE NO SPS FAILURES THAT ARE CONSIDERED CAUSE FOR ABORT.									
				,							
	12-2	ALL OTHER PHASES	<u>}</u> :								
		A. FAILURES AFF	FECTING THE SPS FALL INTO ONE OF THREE CATE	GORIES:							
			THAT CAUSE THE SPS TO BE UNSAFE. FAILURE FED BY ENTRY INTO THE NEXT BEST PTP.	S IN THIS CATEGORY CAUSE THE MIS	SION TO BE						
		2. FAILURES	5 THAT CAUSE THE SPS TO BE INOPERABLE OR UN								
		NECESSAF	HE MISSION TO BE TERMINATED OR ALTERED SUCH RY.	I THAT SUBSEQUENT SPS MANEUVERS A	RE NUI						
		BURNS EX	S WHICH DEGRADE THE CAPABILITY OF THE SPS T KCEPT CRITICAL BURNS BE INHIBITED. FAILURE SUCH THAT SUBSEQUENT SPS MANEUVERS ARE NOT	S IN THIS CATEGORY CAUSE THE MIS							
		NON-CRITICAL	E TANKS EMPTY, EITHER A TWO-JET OR FOUR-JE MANEUVERS. LACK OF CAPABILITY TO PERFORM CRITICAL BURN.								
			ES OR DEGRADATIONS ARE NOT CAUSE FOR TERMIN MINATED FOR SPS ANOMALIES OR DEGRADATIONS N								
	12-3	EARTH ORBIT PHAS	SE:								
		PERFORMING (RNS IN THIS PHASE ARE MODE IV, APOGEE KICK, CRITICAL BURNS, THE MISSION WILL BE <u>TERMIN</u>) TECHNIQUES.								
		B. IF THE SPS	IS INCAPABLE OF PERFORMING NON-CRITICAL BUI ALTERNATE MISSION WILL BE IMPLEMENTED. TH								
	{ .										
А	12-4	TRANSLUNAR COAS	T PHASE:								
		TO AVOID LU MANEUVERS A	NEUVERS IN THIS PHASE ARE TIME CRITICAL ABO VAR OR LAND IMPACT WHICH ARE OUTSIDE SM-RC: RE CONSIDERED NON-CRITICAL BECAUSE SUFFICIO RRECTIVE ACTION.	S CAPABILITY. HOWEVER, ONCE INIT	IATED, THESE						
		B. IF THE SPS	IS INCAPABLE OF PERFORMING NON-CRITICAL BU	RNS. FURTHER NON-CRITICAL BURNS A	ND LOI WILL						
		BE INHIBITE		·							
1	12-5	LUNAR ORBIT									
1											
		A. TEL IS THE (ONLY CRITICAL MANEUVER IN THIS PHASE.								
		B. IF THE SPS IS INCAPABLE OF PERFORMING NON-CRITICAL MANEUVERS, FURTHER NON-CRITICAL MANEUVERS WILL									
		BE INHIBITED.									
1											
1	}	}									
1	· ·										
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M	ISSION	REV DATE	SECTION	GROUP	PAGE						
APO	LLO 8	A 12/11/68	CSM SERVICE PROPULSION SYSTEM	GENERAL/SYSTEMS MANAGEMENT	12-1						

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I'		MISSION RULES	
RE.V	I TEM	4	
A	12-6	TRANSEARTH COAST:	
		A. CRITICAL MANEUVERS IN THIS PHASE ARE MIDCOURSE MANEUVERS ARE OUTSIDE SM-RCS CAPABILITY. HOWEVER, ONCE INITIATED T CRITICAL BECAUSE SUFFICIENT TIME IS AVAILABLE FOR ANALYSI	HESE MANEUVERS CAN BE CONSIDERED NON-
		,	
		RULES 12-7 THROUGH 12-14 ARE RESERVED.	
MI	SSION	REV DATE SECTION GRO	DUP PAGE
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REV	ITEM				,	
				SYSTEM MANAGEMENT		
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	12-15	PROPE	LLANT GAGING	<u>.</u>		
		A. P	RIME METHOD:	ONBOARD GAGING SYSTEM (1%)		
		в. в	ACKUP METHOD	:		
		1	. FLOW RATE	X BURN TIME (%)		
				ESSURE/TEMPERATURE (%)		
	12-16	PROPE	LLANT UTILIZ	ATION VALVE		
			U VALVE WILL POUNDS.	. BE USED TO CONTROL THE O/F MIXTURE RATIO	TO MAINTAIN PROPELLANT BALANCE	√ITHIN
	12-17	DUAL	BANK VS SING	LE BANK OPERATION		
				URNS WILL BE PERFORMED USING DUAL BANK OP	ERAT ION.	
	12-18	<u>, FEEDL</u>	INE HEATERS			
		THE S	PS PROPELLAN	IT FEEDLINE TEMPERATURES WILL BE MAINTAINE	D BETWEEN 45 AND 75°F MANUALLY.	
А	12-19	THE S SOLAR	PS PU VALVE RADIATION E	TEMPERATURE WILL BE MAINTAINED ABOVE <u>35</u> °F FFECTS.	BY CRIENTING THE SPACECRAFT FOR	OFTIMUM
		:				
		RULES	12-20 THROU	JGH 12-24 ARE RESERVED		
мт	SSION	REV	DATE	SECTION	GROUP	DACE
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MISSION RULES

					MISSION RULES			
REV	RULE	CONDITION/MALFUNCTIC	DN F	PHASE	RULING		CUES/NOTES/CO	MMENTS
A	12-25	SUSTAINED PRESSURE DE IN EITHER THE FUEL OF OXIDIZER TANK (COULD	R • •				MALF PROC: SPS 1	
		HELIUM OR FUEL OR OXIDIZER).		UNCH	CONTINUE MISSION		MANUAL PRESSURIZAT	
					 PLAN ENTRY INTO PTP 2- DEORBIT. 	-1. RCS	TANKS SHOULD BE CO PRIOR TO ANY REQUI BURN	
					 IF LAND IMPACT IS IMM AFTER ABORTING, REPRES MANUALLY AND PERFORM E AVOID LAND. 	SS	THIS RULING SUBJE PENDING INVESTIGA SERIOUSNESS OF LIC INTO SERVICE MODU	UID LEAKS
			EP	20	ENTER NEXT BEST PTP RCS DEORBIT			
			ΤL	.C	<u>NO-GO FOR LOI</u> INHIBIT NON CRITICAL SPS BURNS	4-		
			LC)	PLAN TEI ASAP			
			TE	EC	CONTINUE MISSION INHIBIT	NON-		
		A. DURING NON-CRITI(BURN	CAL AL	.L	A. TERMINATE BURN IF LOI ₁ REPRESS MANUA PERFORM 15 MIN ABORT.			
		B, DURING CRITICAL	BURN AL	-L	B. CONTINUE BURN		B. CRITICAL BURNS IV, APOGEE KIG AND TEI.	
Α	12-26	LOSS OF ONE GN ₂ TANK PRESSURE (<400 PSI).		AUNCH	CONTINUE MISSION			
			EP		CONTINUE MISSION		TRANSDUCER INDICAT BE VERIFIED WITHOU	
			TL		NO-GO FOR LOI		OPERATION.	
				DI 1	BE PREPARED TO SHUTDOWN S IF ALL BALL VALVES DO NOI IF OTHER GN ₂ TANK LEAKINK TERMINATE BURN AND PERFOR ABORT.	F OPEN.		
			LC)	PLAN TEL FOR NEXT OPPORT	JNITY.		
А	12-27	ONE BANK OF BALL VAL		AUNCH	CONTINUE MISSION			
		SPS BURN	EF	°0	CONTINUE MISSION		TRANSDUCER INDICA BE VERIFIED WITHOU	
			TL	.c	NO-GO FOR LOI		OPERATION.	
				^{DI} 1	BE PREPARED TO SHUTDOWN S IF ALL BALL VALVES DO NO IF OTHER GN2 TANK LEAKING TERMINATE BURN AND PERFOR ABORT.	Γ OPEN. 3,		
			LC	þ	PLAN TEI FOR NEXT OPPORT	JNITY.		
				·				
	C 1 ()							
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MISSION RULES										
REV	RULE	CONDITION/MALFU	NCTION	PHASE	RULING		CUES/N	DTES/COMME	NTS	
A	12-28	LOSS OF BOTH GN ₂ PRESSURES (<400	TANK PSI).	LAUNCH	CONTINUE MISSION ENTER NEXT BEST PTP RCS DEORBIT		MALF PROC:	SPS		
				ORBIT TLC	NO-GO FOR LOI NO ABORT					
				LUNAR ORBIT	ATTEMPT TEL					
				TEC	CONTINUE MISSION	ļ				
		1								
		1								
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MISSION RULES

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				MISSION RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING	·	CUES/NOTES/COM	1ENTS
A	12-29	FUEL FEEDLINE AND/OR OXIDIZER FEEDLINE TEMP <27°F AND UNABLE TO	LAUNCH	<u>Continue mission</u> Enter Next Best PTP		MALF PROC: SPS	-
		INCREASE.	ORBIT	RCS DEORBIT			
			LUNAR ORBIT	CAPABILITY ATTEMPT_TEI			
			TEC	CONTINUE MISSION			
А	12-30	PU VALVE TEMP <27°F AND UNABLE TO INCREASE VIA	TLC	NO-GO FOR LOI			
		SOLAR RADIATION.	LUNAR ORBIT	PLAN TEI FOR NEXT OPPORTU	<u>INITY</u> .		
			TEC	CONTINUE MISSION			
A	12-31	ENGINE FLANGE TEMP GOES HIGHER THAN 480°F DURING AN SPS BURN.	LAUNCH EARTH ORBIT	NOT APPLICABLE ENTER NEXT BEST PTP RCS DEORBIT			
		A. DURING NON-CRITICAL BURNS	ALL	A. <u>TERMINATE BURN</u> IF LOI ₁ , MODE 1, PERF ABORT.	FORM 15 MI	I	
		B. DURING CRITICAL BURNS	ALL	B. <u>CONTINUE BURN</u> INHIBIT FURTHER NON-CRITICAL		REF RULE <u>1-37</u> FOR CI BURNS	RITICAL
Α	12-32	THRUST CHAMBER PRESSURE <70 PSI CONFIRMED BY OTHER INSTRUMENTATION	LAUNCH EARTH ORBIT	NOT APPLICABLE ENTER NEXT BEST PTP RCS DEORBIT			
			TLC	<u>NO-GO FOR LOI</u> INHIBIT FURTHER BURNS			
		A. DURING NON-CRITICAL BURN	ALL	A. <u>TERMINATE BURN</u> IF LOI ₁ PERFORM 15 MI	IN ABORT.		
		B. DURING CRITICAL BURN	ALL	B. <u>CONTINUE BURN</u> AND INHIBIT FURTHER NON-(BURNS	CRITICAL	REF RULE <u>1-37</u> FOR C BURNS	RITICAL
	12-33	LACK OF ULLAGE CAPABILITY	LAUNCH EPO	NOT APPLICABLE NO-GO FOR TLI			
			TLC	NO-GO FOR LOI			
			LO/TEC	INHIBIT NON-CRITICAL MANE	EUVERS.		
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				SECTION		GROUP	PAGE
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MISSION RULES

			×	MISSION RULES		
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COM	MENTS
A	1234	AP BETWEEN FUEL AND	LAUNCH	CONTINUE MISSION		
		OXIDIZER TANK PRESSURES >20 PSI AND UNABLE TO DECREASE	EPO	ENTER NEXT BEST PTP RCS DEORBIT		
			TLC	NO-GO FOR LOI		
			ĻO ^a	ATTEMPT TEL		
		A. DURING NON-CRITICAL BURN	ALL	A · <u>TERMINATE BURN</u> IF LOI ₁ PERFORM 15 MIN AB	SORT.	
		B. DURING CRITICAL BURN	ALL	B. <u>CONTINUE BURN</u>	REF RULE 1-37 FOR C BURNS.	RITICAL
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MISSION RULES

MISSION RULES								
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING	CUES/NOTES/COMM	ENTS		
	12-35	LEAK OR COMPLETE LOSS OF HELIUM SUPPLY PRESSURE (BOTH HELIUM VALVES FAIL CLOSED.	DR .	CONTINUE MISSION				
·.			EPO	ENTER NEXT BEST PTP RCS DEORBIT	RULING SUBJECT TO C PENDING INVESTIGATI BLOWDOWN CAPABILITY	ION OF		
			TLC	NO-GO FOR LOI	BLOWDOWN AV REMAIN FUNCTION OF ULLAGE TIME OF FAILURE.			
			LO	PLAN TEI ASAP				
			TEC	1. <u>CONTINUE MISSION</u> 2. SPS MANEUVERS ALLOWE WITHIN BLOWDOWN CAPA				
		RULES 12-36 THROUGH 12- ARE RESERVED						
MI	SSION	REV DATE		SECTION	GROUP	PAGE		
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					MISSIO			
REV	ITEM						·	
	10 40			т	NSTRUMENTATION	REQUIREMENTS		
А	12-40			-				
		MEAS D	ESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION RULE REFERENCE
		0. TU	DDDD	6000070				KELENEITOE
		OX TK I OX SM/I	PRESS ENG INTERFAC	SP0003P E P SP0931P		COMMON	MANDATORY MANDATORY-1 OF 2	12-25/34
		FU TK I	DDECC	SP0006P	METER/C&2	COMMON		
			ENG INTERFAC				MANDATORY MANDATORY-1 OF 2	12-25/34
		SPS VI	V ACT PRESS-	PRI SP0600P	METER	COMMON	MANDATORY O/B	
			V ACT PRESS-			COMMON	MANDATORY 0/B MANDATORY 0/B ⁻¹ OF 2	12-26/28
		SPS FU	FEEDLINE TE	MP SP0048T	METER	COMMON	MANDATORY 1 05 0	10.00
		SPS OX	FEEDLINE TE	MP SP0049T	SYS TEST	COMMON	MANDATORY MANDATORY 1 OF 2	12-29
			J FLANGE TEM		W3C	COMMON	MANDATORY O/B MANDATORY O/B-1 OF 2	12-31
		SPS IN	J FLANGE TEM	IP 2 SP0062T	C&W	COMMON	MANDATORY O/B	12-51
		ENG CH	AMBER PRESS	\$P0661P	METER	COMMON	HIGHLY DESIRABLE	12-32
		НЕ ТК	PRESS	SP0001P	METER	SEPARATE	MANDATORY O/B	12-35
1		FULOX	VLV 1 POS	SP0022H	I DISPLAY	SEPARATE	HIGHLY DESIRABLE	12-27
			VLV 2 POS	SP00221		SEPARATE	HIGHLY DESIRABLE	12-27
			VLV 3 POS VLV 4 POS	SP0024H SP0025H		SEPARATE SEPARATE	HIGHLY DESIRABLE HIGHLY DESIRABLE	12-27 12-27
				51 00231	DISLAT	JEFARATE		12-27
1			1 QTY - AL AUX	SP06550	DISPLAY	COMMON	HIGHLY DESIRABLE	12-12
1		OX TK2	QTY	SP06560		COMMON	HIGHLY DESIRABLE	12-12
	{		1 QTY - AL AUX	SP06570) DISPLAY	COMMON	HIGHLY DESIRABLE	12-12
		FU TK	2 QTY	SP0658Q	DISPLAY	COMMON	HIGHLY DESIRABLE	12-12
]		V INLET T	SP0617T	т/м	-	MANDATORY	
			V OUTLET T	SP0618T		-	MANDATORY MANDATORY-1 OF 2	12-30
		ох тк н		SP0003	METER/C&W	COMMON	MANDATORY O/B	12-25
	}	FU TK F	PRESS AMBER PRESS	SP0006 SP0661	METER/C&W METER	COMMON	MANDATORY O/B-2 OF 3	12-25
1	l		DER TRESS	3F0001	METER	COMMON	MANDATORY O/B	12-32
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13 CSM SM-RCS SYSTEM

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MISSION RULES

ITEM GENERAL 13-1 LAUNCH 13-2 LAUNCH 13-4 LAUNCH 13-5 LAUNCH 13-6 LAUNCH 13-7 THE LOSS OF ONE QUAD, IN ITSELF, IS NOT NECESSARILY CAUSE FOR ABORT. 13-2 EARTH ORBIT PHASE A. LOSS OF ONE QUAD, IN ITSELF, IS NOT NECESSARILY CAUSE FOR EARLY TERMINATION OF THE MISSION. BE BURKED THE MISSION NEED NOT BE TERMINATED EARLY. HOWEVER, LOSS OF ONE QUAD NEL REQUIRE THE USE IS NOT NECESSARILY CAUSE FOR EARLY TERMINATION OF THE MISSION. B. LOSS OF TWO DADLOCHT QUADE WILL BESTROY THE CAMPALITY TO PERFORM MULTER PROVIDE S. LOSS OF TWO MAREQ MONT IS CAUSE FOR EMAY INTO THE NEXT BEST FTP. 1. LOSS OF TWO DADLOCHT QUADE WILL BESTROY THE CAMPALITY TO PERFORM MULTER PAREWERS. J. LOSS OF TWO DADLOCHT QUADE WILL BESTROY THE CAMPALITY TO PERFORM PRECISE 3-AXIS ATTITUDE CONSTIDELING CONST LOSS OF TWO DADLOCHT QUADE WILL BESTROY THE CAMPALITY TO PERFORM PRECISE 3-AXIS ATTITUDE CONST DELIDES SHI OR HYNERID DESTROY THE CAMPALITY TO PERFORM PRECISE 3-AXIS ATTITUDE CONST DELIDES CONTROL OR WILL BESTROY THE CAMPALITY TO PERFORM PRECISE 3-AXIS ATTITUDE CONST DE ROAD ON ADJACENT QUADE WILL DESTROY THE CAMPALITY TO PERFORM PRECISE 3-AXIS ATTITUDE CONST DE ROAD ONE ONO TO NOT, N ITSELF, CAUSE FOR PRETATION OF THE MISSION			
13-1 LAXEN 13-1 LAXEN 13-2 LAXEN 13-2 EARTH ORDIT OF FAILURES WHICH ARE CONSIDERED CAUSE FOR ADORT. 13-2 EARTH ORDIT PHASE A. LOSS OF ONE QUAD, IN ITSELF, IS NOT NECESSARILY CAUSE FOR ADORT. 13-2 EARTH ORDIT PHASE A. LOSS OF ONE QUAD, IN ITSELF, IS NOT NECESSARILY CAUSE FOR EARLY TERMINATION OF THE MISSION. 13-2 EARTH ORDIT PHASE A. LOSS OF ONE QUAD, IN ITSELF, IS NOT NECESSARILY CAUSE FOR EARLY TERMINATION OF THE MISSION. 13-4 EARTH ORDIT PHASE A. LOSS OF TWO CRUED, IN ITSELF, IS NOT NECESSARILY CAUSE FOR EARLY TERMINATION OF THE MISSION. 13-6 LOSS OF TWO RECEQUES IS CAUSE FOR ENTRY INTO THE CAUSE INTO CAUSE THE CAUSE INTO THE CAUSE INTO THE CAUSE THE CAUSE INTO THE CAUSE INTO THE CAUSE INTO THE CAUSE INTO ADJUNCT QUADS 14 LOSS OF TWO GROUPS ITS QUADS WILL DESTROY THE CAPABILITY TO PERFORM PRECISE 3-AXIS ATTITUDE 15-1 TRANSLIMAR COAST 13-5 TRANSLIMAR COAST 13-6 LOSS OF ONE QUAD IS NOT, IN ITSELF, CAUSE FOR TERMINATION OF THE MISSION. HOWEVER, COAST PHASE WILL BE TERMINATED BY ENTRY INTO THE NEXT BEST PTP. 13-5 TRANSLIMAR COAST 13-6 LOSS OF ONE QUAD IS CAUSE FOR IMMINI INTO THE NEXT BEST PTP. 13-6 LOSS OF ONE QUAD IS CAUSE FOR IMMINI INTO THE NEXT BEST PTP. 13-6 LOSS OF ONE QUA	REV	ITEM	
THE LOSS OF ONE QUAD IS NOT CAUSE FOR ADORT AND THERE ARE NO SINGLE FAILURES NOR ANY REASONABLE NELLISTIC COMBINITION OF FAILURES WHICH ARE CONSIDERE CAUSE FOR ADORT. 13-2 EARTH ORBIT PHASE 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 UNREWAVER. LOSS OF WE QUAD THE SPS CAN BE UNREWAVER. LOSS OF WE QUAD THE SPS. B. LOSS OF TWO OR MORE QUADS IS CAUSE FOR ENTRY INTO THE NEXT BEST PTP. 1. LOSS OF TWO OR MORE QUADS IS CAUSE FOR ENTRY INTO THE NEXT BEST PTP. 1. LOSS OF TWO OR MORE QUADS IS CAUSE FOR ENTRY INTO THE CAPABILITY TO PERFORM MEMOREMAND PRECIDES SH OR HYBRID DEORBIT. 2. LOSS OF TWO OR MORE QUADS IS CAUSE FOR ENTRY INTO THE CAPABILITY TO PERFORM RECIDES 3-AXIS ATTITUDE CONTROL AND PRECIDES SH OR HYBRID DEORBIT. 3. LOSS OF TWO OR MORE QUADS INCL DESTROY THE CAPABILITY TO PERFORM RECIDES 3-AXIS ATTITUDE CONTROL AND PRECIDES SH OR HYBRID DEORBIT. 13-3 TEAMSLIMPER COAST LOSS OF ONE QUAD IS NOT, IN ITSELF, CAUSE FOR TERMINATION OF THE MISSION. HOREVER, COAST PRECIDES 3-AXIS ATTITUDE CONTROL AND PRECIDES SH OR HYBRID DEORBIT. 13-4 LOS LOSS OF ONE QUAD IS CAUSE FOR INHIBITING LOI1, BECAUSE SUBSEQUENT FAILURE OF QUADS OR UNERTITIVE CONTROL ON ULAGE. 13-5 LURAR ORBIT LOSS OF ONE QUAD IS CAUSE FOR INHIBITING LOI1, BECAUSE SUBSEQUENT FAILURE OF QUADS OR ULTS IMPAIR ATTITUDE CONTROL ON ULAGE. 13-5 LURAR ORBIT LOSS ON ONE QUAD IS CAUSE FOR INHIBITING LOI1, BECAUSE SUBSEQUENT FAILURE OF Q		ļ	GENEKAL
13-2 EARTH ORBIT PHASE 13-2 EARTH ORBIT PHASE A. LOSS OF ONE QUAD, IN ITSELF, IS NOT NECESSARILY CAUSE FOR EARLY TERMINATION OF THE MISSION. THE GUIDELINE IS THAT AS LOG AS THE SPACEDART ATTITUDE CAN BE CONTROLLED AND THE SPS CAN BE LIBEE INTERTED. AND WAY LEAD TO EARLY MISSION TERMINATION SINCE THE CARBITLY TO REPORT SH OR HYBRID DECREMENT WILL BE AFFECTED. B. LOSS OF TWO OR MORE QUADS IS CAUSE FOR BUTRY INTO THE NEXT BEST PTP. 1. LOSS OF TWO OR MORE QUADS SILL DESTROY THE CARABILITY TO PERFORM MILLAGE MAREWERS AND WILL REQUIRE DELETION OF MOVED TO MOVED THE MAREWERS. SO GO WE QUAD IS CAUSE FOR THEM INTO THE MAREWERS. LOSS OF TWO ADJACENT QUADS PRECLUDES SM OR HYBRID DECREMIT. 13-3 TRANSLAME COAST CONTROL AND PRECLUDES SM OR HYBRID DECREMIT. 13-4 LOISS OF ONE QUAD IS CAUSE FOR TERMINATION OF THE MISSION. HOWEVER, CONTROL AND PRECLUDES SM OR HYBRID DECREMIT. 13-5 TRANSLAME COAST CONSIDERING THE EFFECTS OF POSSIBLE SUBSEQUENT GAID OF THE MISSION. HOWEVER, CONSIDERING THE EFFECTS OF POSSIBLE SUBSEQUENT FAILURES, THE TRANSLAWAR COAST PHASE WILL BE TERMINATED BY ENTRY INTO THE NEXT BEST PTP. 13-4 LOI LOSS OF ONE QUAD IS CAUSE FOR INHIBITING LOI_1, BECAUSE SUBSEQUENT FAILURES OF QUADS OR UETS IMPAIR ATTITUDE CONTROL OR ULLAGE. 13-5 LUMAR ORBIT LOSS ON ONE QUAD IS CAUSE FOR INHIBITING LOI_1, BECAUSE SUBSEQUENT FAILURE OF QUADS OR UETS IMPAIR ATTITUDE CONTROL OR ULLAGE. 13-5 LUMAR ORBIT LOSS ON ONE QUAD IS CAUSE FOR INHIBITING LOI_1, BECAUSE SUBSEQUENT FAILURE OF QUADS OR UETS IMPAIR ATTITUDE CONTROL OR ULLAGE. 13-5 LUMAR ORBIT LOSS ON ONE QUAD IS CAUSE FOR		13-1	LAUNCH
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 SPACERART ATTITUDE CAN BE CONTROLLED AND THE SPS CAN BE BURKED THE VISION RED TO BE TERMINATE DEARLY. MIXEVER, LOSS OF ONE QUAD WILL REQUIRE TILL BE INHIBITED. AND MAY LED TO EXACT MISSION TERMINATION SINCE THE CARABILITY TO PERFORM SIN GR MIRRING DEGNET MILL BE AFFECTED. 8. LOSS OF TWO OR MORE QUADS IS CAUSE FOR ENTRY INTO THE NEXT BEST PTP. 1. LOSS OF TWO ADJACENT QUADS WILL DESTROY THE CARABILITY TO PERFORM VELAGE MANEUVERS AND MILL REQUIRE DELETION OF NON-CRITICAL SPE MARUVERS. LOSS OF TWO ADJACENT QUADS PRECLUDES SH OR HIBRID DEGNET. 1. LOSS OF TWO OPED ADJACENT QUADS WILL DESTROY THE CARABILITY TO PERFORM PRECISE 3-AXIS ATTITUDE CONTROL AND PRECLUDES SH OR HIBRID DEGNET. 1. LOSS OF ONE QUAD IS NOT, IN ITSELF, CAUSE FOR TERMINATION OF THE MISSION. HOWEVER, CONSIDERING THE EFFECTS OF POSSIBLE SUBSEQUENT QUAD OR VET FAILURES, THE TRANSLAWAR COAST PHASE WILL BE TERMINATED BY UNTO THE NEXT BEST PTP. 1.3-4 LOI LOSS OF ONE QUAD IS CAUSE FOR INHIBITING LOIL, BECAUSE SUBSEQUENT FAILURE OF QUADS OR JETS IMPAIR ATTITUDE CONTROL OR ULLAGE. 1.3-5 LAMAR ORBIT LOSS ON ONE QUAD IS CAUSE FOR EARLY TERMINATION OF LIMAR ORBIT PHASE AND FOR INHIBITINE LOID. BECAUSE SUBSEQUENT FAILURE OF QUADS FOR EARLY TERMINATION OF LIMAR ORBIT PHASE AND FOR INHIBITINE LOID. BECAUSE SUBSEQUENT FAILURE OF QUADS FOR EARLY TERMINATION OF LIMAR ORBIT PHASE AND FOR INHIBITINE LOID. BECAUSE SUBSEQUENT FAILURE OF QUADS FOR EARLY TERMINATION OF LIMAR ORBIT PHASE AND FOR INHIBITINE LOID. BECAUSE SUBSEQUENT FAILURE OF QUADS FOR EARLY TERMINATION OF PHILDER OF PLIGHT. MISSION. REV DATE SECTION GROUP PAGE AROLLO & FINAL			REALISTIC COMBINATION OF FAILURES WHICH LEAD ONLY TO LOSS OF MULTIPLE QUADS. THEREFORE,
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 SPACEGRAFT ATTITUDE CAN BE CONTROLLED AND THE SPS CAN BE BUNKED THE SISTON RED TO BE RETAINTED EARLY. MISSION TERMINATION SINCE THE CARABILITY TO PERFORM SIM OF MISSIN DEGRETI AND LEAD TO EARLY MISSION TERMINATION SINCE THE CARABILITY TO PERFORM ILL BE IMMIBILED. AND MAN LEAD TO EARLY MISSION TERMINATION SINCE THE CARABILITY TO PERFORM MILL REQUIRE DELETION OR MORE QUADS IS CAUSE FOR ENTRY INTO THE NEXT BEST PTP. 1. LOSS OF TWO ADJACENT QUADS WILL DESTROY THE CARABILITY TO PERFORM ULLAGE MANEUVERS AND MILL REQUIRE DELETION OF NON-CRITICAL SPS MARLWARES. LOSS OF TWO ADJACENT QUADS PRECLUDES SH OR HIRRID DECRBIT. 1. LOSS OF TWO OR MORE QUADS IS CAUSE FOR TERMINATION OF THE MISSION. HOLE SAN OR HIRRID DECRBIT. 2. LOSS OF ONE QUAD DE NOT, IN ITSELF, CAUSE FOR TERMINATION OF THE MISSION. HOMEVER, CONTROL AND PRECLUDES SH OR HIRRID DECRBIT. 13-3 TRANSLAMME COAST LOSS OF ONE QUAD IS CAUSE FOR INHIBITING LOID. 13-4 LOI LOSS OF ONE QUAD IS CAUSE FOR INHIBITING LOID. 13-4 LOI LOSS OF ONE QUAD IS CAUSE FOR INHIBITING LOID. 13-5 LUMAR ORBIT LOSS ON ONE QUAD IS CAUSE FOR INHIBITING LOID. 13-5 LUMAR ORBIT MAY BE GIVEN TO A MANEUVER TO DECREASE THE REMAINING TIME CONTROL OR ULLAGE. CONSIDERATION MAY BE GIVEN TO A MANEUVER TO DECREASE THE REMAINING TIME CONTROL OR ULLAGE. CONSIDERATION MAY BE GIVEN TO A MANEUVER TO DECREASE THE REMAINING TIME CONTROL OR ULLAGE. CONSIDERATION MAY BE GIVEN TO A MANEUVER TO DECREASE THE REMAINING TIME OF PLIGHT.		13_2	EARTH ORBIT PHASE
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1. LOSS OF TWO ADJACENT QUADS WILL DESTROY THE CAPABILITY TO PERFORM ULLAGE MANEUVERS AND WILL REQUIRE DELETION OF NON-CRITICAL 95 MANEUVERS. LOSS OF TWO ADJACENT QUADS PRECLUDES 94 OR HYBRID DECREIT. 2. LOSS OF TWO OPPOSITE QUADS WILL DESTROY THE CAPABILITY TO PERFORM PRECISE 3-AXIS ATTITUDE CONTROL AND PRECLUDES 94 OR HYBRID DECREIT. 13-3 TEANSLUNAR COAST LOSS OF ONE QUAD IS NOT, IN ITSELF, CAUSE FOR TERMINATION OF THE MISSION. HOWEVER, CONSIDERING THE EFFECTS OF POSSIBLE SUBSEQUENT QUAD OR JET FAILURES, THE TRANSLUNAR COAST PHASE WILL BE TERMINATED BY ENTRY INTO THE NEXT BEST PTP. 13-4 LOI LOSS OF ONE QUAD IS CAUSE FOR INHIBITING LOI1, BECAUSE SUBSEQUENT FAILURE OF QUADS OR JETS IMPAIR ATTITUDE CONTROL OR ULLAGE. 13-5 LUMAR ORBIT LOSS ON ONE QUAD IS CAUSE FOR INHIBITING LOI1, BECAUSE SUBSEQUENT FAILURE OF QUADS OR JETS IMPAIR ATTITUDE CONTROL OR ULLAGE. 13-5 LUMAR ORBIT LOSS ON ONE QUAD IS CAUSE FOR EARLY TERMINATION OF LUNAR ORBIT PHASE AND FOR INHIBITING LOI2. BECAUSE SUBSEQUENT FAILURE OF QUADS OR JETS IMPAIR ATTITUDE CONTROL OR ULLAGE. CONSIDERATION MAY BE GIVEN TO A MANEUVER TO DECREASE THE REMAINING TIME OF FLIGHT. MISSION RULES 13-6 THROUGH 13-14 ARC RESERVED SECTION MISSION REV DATE SECTION GROUP PAGE APOLO 8 FINAL 11/7/68 CSM SMARCRES SYSTEM GENERAL/SYSTEMS MANAGEMENT			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
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13-3 TRANSLUMAR COAST LOSS OF ONE QUAD IS NOT, IN ITSELF, CAUSE FOR TERMINATION OF THE MISSION. HOWEVER, CONSIDERIST THE EFFECTS OF POSSIBLE SUBSEQUENT QUAD OR JET FAILURES, THE TRANSLUMAR COAST PHASE WILL BE TERMINATED BY ENTRY INTO THE NEXT BEST PTP. 13-4 LOI LOSS OF ONE QUAD IS CAUSE FOR INHIBITING LOI, BECAUSE SUBSEQUENT FAILURE OF QUADS OR UETS IMPAIR ATTITUDE CONTROL OR ULLAGE. 13-5 LUNAR ORBIT LOSS ON ONE QUAD IS CAUSE FOR EARLY TERMINATION OF LUNAR ORBIT PHASE AND FOR INHIBITING LOI2. BECAUSE SUBSEQUENT FAILURE OF QUADS OR JETS IMPAIR ATTITUDE CONTROL OR ULLAGE. CONSIDERATION MAY BE GIVEN TO A MANEUVER TO DECREASE THE REMAINING TIME OF FLIGHT. NISSION REV ERSERVED MISSION REV DATE SECTION GROUP PAGE APOLLO 8 FINAL 11/7/68 CSM SM-RCS SYSTEM GENERAL/SYSTEMS MANAGEMENT 13-1			WILL REQUIRE DELETION OF NON-CRITICAL SPS MANEUVERS. LOSS OF TWO ADJACENT QUADS
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MISSION RULES

REV.	ITEM						
					SYSTEM MANAGEMENT		
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	13-15			RTCC EQUATION (6%	,		
	. 19–19			-	PRESSURE/TEMPERATURE	(11%)	
		0, 1				(110)	
	13-16	OLIAD	PROPELLANT E				
	15-10						
		A. F A E N	ACCOMPLISHED BY CHOOSING S ANINTAINED WI	BY SELECTING TWO-JE SUITABLE JETS FOR AT ITHIN 15 POUNDS.	T +X AND -X TRANSLATI	ELLANT BALANCE. PROPELLANT BALANCI IONS WITH EITHER THE PITCH OR YAW (PELLANT DIFFERENCES BETWEEN QUADS)	VILL BE
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		RULES	3 13-17 THROU ARE RESERVE	JGH ED			
	ISSION	REV	DATE	SECTION		GROUP	PAGE
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				MISSION RULES			
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	MENTS
Α	1320	SUSTAINED LEAK IN HELIUM TANK			'	MALF PROC: RCS 2	
		A. ONE OR MORE QUADS	LAUNCH	CONTINUE MISSION		QUAD WILL REMAIN USA	
		B. ONE QUAD (ALL OTHER	EPO	NO-GO FOR TLI		HE MANIFOLD PRESSURE REAC 75 PSI.	
		QUADS NORMAL).	TLC	ENTER NEXT BEST PTP. NO-0	GO FOR		
			LO	PLAN TEI FOR NEXT OPPORTUN	NITY.		
		C. MORE THAN ONE QUAD	EPO	CONTINUE MISSION ENTER PRI LOSS OF HYBRID DEORBIT CAP			
			ALL OTHER	REF RULING B			
	13-21	SUSTAINED LEAK BELOW HE ISOLATION VALVE (COULD BE				MALF PROC: RCS 2A	
		HELIUM OR FUEL OR OXIDIZER A. ONE OR MORE QUADS	LAUNCH		1	QUAD WILL REMAIN USA HE MANIFOLD PRESSURE 75 PSI	
		B. ONE QUAD (ALL OTHER	EPO	CONTINUE MISSION.		75 751	
		QUADS NORMAL)					
			TLC	ENTER NEXT BEST PTP. NO-G	GO FOR		
			LO	PLAN TEI FOR NEXT OPPORTUN	<u>NITY</u> .		
		C. MORE THAN ONE QUAD	EPO	ENTER NEXT BEST PTP.			
·			ALL OTHER	REF RULING B			
	13-22	PACKAGE TEMP <70°F AND UNABLE TO INCREASE.	LAUNCH	NOT APPLICABLE	1	MALF PROC: RCS 1A	
		A. ONE QUAD (ALL OTHER QUADS NORMAL)	EPO	NO-GO FOR TLI.			
			TLC	ENTER NEXT BEST PTP. NO-G	GO FOR		
			LO	PLAN TEI FOR NEXT OPPORTUN	NITY.		
		B. MORE THAN ONE QUAD	EPC	ENTER NEXT BEST PTP			
			ALL OTHER	REF FULING A.			
MI	SSION	REV DATE	L	SECTION	1	GROUP	PAGE
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						MISSION RULES			
REV	RULE	CONE	DITION/MALFUNCTIO	N .	PHASE	RULING		CUES/NOTES/COMM	ENTS
A	13-23	THRU CLOG BURN	OF INDIVIDUAL STERS AS A RESULT GING, FREEZING, C OUT WHICH RESULT LOSS OF ONE PITCH ONE YAW OR TWO RC THRUSTERS IN THE DIRECTION.	IN: IN: HOR DLL	Launch Epo	NOT APPLICABLE 1. <u>CONTINUE MISSION</u> . 2. <u>TLI NO-GO</u>		SUBSEQUENT JET OR QU FAILURES DESTROY PRE ATTITUDE CONTROL FOR TRANSLATIONS AND SPS INITIATION.	CISE BOTH RCS
				1	TLC	LOI NO-GO			
					LO	PLAN TEI FOR NEXT OPPORTU	NITY.		
					TEC	CONSIDER MANEUVER TO DECR FLIGHT TIME.	EASE		
			LOSS OF +X THRUST ON ADJACENT QUADS		ALL	INHIBIT NON-CRITICAL SPS	BURNS	REF SPS RULE 15-20 LACK OF ULLAGE CAPAE	BILITY.
			LOSS OF ATTITUDE CONTROL IN ONE OF MORE AXES.	ξ.	EPO	ENTER NEXT BEST PTP			
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			C 17_94 TUPOLICU		-				
			S 13–24 THROUGH 9 ARE RESERVED.						
MI	SSION	REV	DATE	,,_		SECTION		GROUP	PAGE
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REV IT	_1'1						·		
					INSTRUM	ENTATION REQU	JIREMENTS		
A 13-		AS DES	SCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION RULE	
			K A PRESS /T RATIC A	SR5001P SR5025U	METER METER	COMMON COMMON	MANDATORY MANDATORY-1 OF 2	13-20/21 13-20/21	
			K B PRESS /T RATIO B	SR5002P SR5026U	METER METER	COMMON COMMON	MANDATORY MANDATORY 1 OF 2	13-20 13-20	
			K C PRESS /T RATIO C	SR5003P SR5027U	METER	COMMON	MANDATORY MANDATORY-1 OF 2	13-20 13-20	
			K D PRESS /T RATIO D	SR5004P SR5028U	METER METER	COMMON	MANDATORY MANDATORY-1 OF 2	13-20 13-20	
	SM SM	ENG F	PKG A TEMP PKG B TEMP PKG C TEMP PKG D TEMP	SR5065T SR5066T SR5067T SR5068T	METER/C&W METER/C&W METER/C&W METER/C&W	I COMMON I COMMON	HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE	13-22 13-22 13-22 13-22	
	SM SM	HE TH	K A TEMP K B TEMP K C TEMP K D TEMP	SR5013T SR5014T SR5015T SR5016T	METER METER METER METER	COMMON COMMON COMMON COMMON	HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE	13-20/21 13-20/21 13-20/21 13-20/21	
	. SM SM	HE MA	AN A PRESS AN B PRESS AN G PRESS AN D PRESS	SR 5729P SR 5776P SR 5817P SR 5830P	METER/C&W METER/C&W METER/C&W METER/C&W	I COMMON I COMMON	HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE HIGHLY DESIRABLE	13-21 13-21 13-21 13-21	
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14 CSM CM-RCS SYSTEM

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MISSION RULES

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REV	ITEM		GENERAL		
	14-1	LAUNCH			
		SINCE THE RE	LEAK IN OR THE LOSS OF HELIUM SUPPLY FR MAINING RING IS CAPABLE OF ABORT OR ENT TP <u>6-4</u> SINCE SYSTEMS ARE NO LONGER REDA	RY ATTITUDE CONTROL; THIS FAILURE W	
		JETTISON IS	LEAK IN OR THE LOSS OF HELIUM SUPPLY PF JUSTIFICATION FOR MODE I ABORT. AFTER E MISSION WILL BE TERMINATED AT THE NEX	TOWER JETTISON FLIGHT WILL BE CONTI	
			OR OXIDIZER TANK PRESSURE IN EITHER RI STRUMENTATION AND CANNOT BE VERIFIED.	NG IS NOT CAUSE FOR ABORT SINCE THE	EY ARE SINGLE
	14-2	ALL OTHER PHASES			
		ATTITUDE CON PRESSURE IN SM-RCS SPIN-	AK IN OR LOSS OF HELIUM PRESSURE IN ONE ITROL SYSTEM AND REDUCES THE AV AVAILABL BOTH CM-RCS RINGS DELETES ALL ENTRY AT UP PRIOR TO CM/SM SEP FOR EARTH ORBIT E RMINATING THE PHASE AND MISSION BY ENTR	E FOR CM-RCS DEORBIT. LOSS OF HEL: TIUDE CONTROL CAPABILITY REQUIRING NTRIES. THE LOSS OF ONE OR BOTH CM	IUM SUPPLY CONTINGENCY
			OR OXIDIZER TANK PRESSURE IN EITHER RI RE SINGLE POINTS OF INSTRUMENTATION AND		ON TERMINATION
			E CM-RCS RINGS, WHETHER THE PROPELLANY ING THE PHASE AND MISSION INTO THE NEXT		SED, IS CAUSE
	-				
		RULES 14-3 THROU 14-9 ARE RESERVE			
M	ISSION	REV DATE	SECTION	GROUP	PAGE
	LLO 8	FINAL 11/7/68	CSM CM-RCS SYSTEM	GENERAL SYSTEMS MANAGEMENT	14-1
		292 (AUG 68)			

	T				MISSIO	N RULES				
EV	ITEM				system Man	AGEMENT				
A	14-10	CM-RCS	3°F. WHICHEV	TROL WILL BE HEATED I TER COMES FIRST. F PROC: RCS 5.	IF THRUSTER	y for 20 mini (s) heater fi	JTES OR UNTIL UNCTION FAILS	THE LOWEST , CM-RCS IS	INDICATED STILL COM) TEMPERATURE ISIDERED
	14-11	ASAL THEOT	HER RING, T	CT IF THE HELIUM HE SYSTEMS MAY E ED THE RINGS CAP	BE INTERCONNE	CTED IF THE I	REMAINING PROP			
				· ·		•				
			14-12 THROL ARE RESERVE							
м	ISSION	REV	DATE	SECTION			GROUP		-	PAGE
	OLLO 8	A	12/11/68	CSM CM-RCS SY				YSTEMS MANA		14-2

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				MISSION RULES	an and a state of the state of the state of the state of the state of the state of the state of the state of the	
EV	RULE	CONDITION/MALFUNCTI	ON PHASE	RULING	CUES/NOTES/0	COMMENTS
	1 ⁴ 15	SUSTAINED LEAK IN OR COMPLETE LOSS OF HEL SUPPLY PRESSURE.			MALF PROC: NONE	
		A. ONE RING	LAUNCH	A. <u>CONTINUE MISSION</u> . PLAN ENTRY PTP		
		B. BOTH RINGS	LAUNCH	B.1. PRIOR TO TOWER JET MODE I.	T: ABORT	
				2. AFTER TOWER JETT: <u>MISSION</u> . <u>PLAN ENT</u>		
		C. ONE RING	ALL	C.1. TERMINATE PHASE		
				2. ENTER NEXT BEST P1 NORMAL ENTRY	<u>rp</u> .	
		D. BOTH RINGS	ALL	D.1. <u>TERMINATE PHASE</u> .		
				2. ENTER ASAP. CONTINGENCY SM-RCS PRIOR TO CM/SM SEP ING FROM EARTH ORE	IF ENTER-	
	14-16	LOSS OF FUEL OR OXIC TANK PRESSURE IN EIT RING.		CONTINUE MISSION.	MALF PROC: NONE	
	14-17	CM-RCS IS ARMED FOR REASON.	ANY ALL	A. <u>TERMINATE PHASE</u> .	MALF PROC: NONE	
		REASUN.		B. ENTER NEXT BEST PTP.		
		RULES 14-18 THROUGH 14-29 ARE RESERVED.				
MIS	SSION	REV DATE		SECTION	GROUP	PAGE
	OLLO 8	INAL 11/7/68	CSM CM-RCS		SPECIFIC - CM-RCS	14-3

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					MI	SSION RULES			
REV	ITEM				INSTRUMENT	ATION REQUIR	REMENTS	•	
А	14-30	MEAS D	ESCRIPTION	PCM O	NBOARD	TRANSDUCERS	CATEGORY	MISSION RULE REFERENCE	
	1. 20	CM HE	TK A PRESS		METER	COMMON	MANDATOR	Y 14-15	
ĺ		CM HE	TK B PRESS	CR0002P	METER	COMMON	MANDATOR	Y 14-15	
		CM HE CM HE	ТКА ТЕМР ТКВ ТЕМР		METER METER		HIGHLY DESIR HIGHLY DESIR		
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	OLLO 8	A	12/11/68	CSM CM-RCS	VOTEM			RUMENTATION REQUIREME	

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<u> </u>	1751	MISSION R		
EV	ITEM			
	15-1	PRELAUNCH		
		PRIOR TO COMMITTING TO LAUNCH, THE FOLLOWING COND	ITIONS MUST BE MET:	
		A. SATISFACTORY FLIGHT CREW PHYSIOLOGICAL STATUS		
		B. THE MINIMUM CABIN OXYGEN CONCENTRATION FOR LA	UNCH IS 60 PERCENT.	
		C. THE MINIMUM SUIT OXYGEN CONCENTRATION FOR LAU	NCH IS 95 PERCENT.	
	15-2	THE MAXIMUM ALLOWABLE CONCENTRATION OF PCO, ALLOW	ABLE FOR LAUNCH IS 5 MM HG.	
		2		
А	15-3	THE SUIT CIRCUIT MUST BE MAINTAINED AT LEAST 2 IN	. WATER PRESSURE ABOVE THE CABIN PRES	SURE. SUIT
		LOOP PURGE IS REQUIRED IF THE SUIT-TO-CABIN DELTA	PRESSURE REMAINS AT ZERO FOR A PERIC	D OF 5 MINUTES.
	15-4	THE POTABLE WATER PH MUST BE WITHIN 6.0 TO 8.0 SE	RVICING AND FINAL SAMPLING.	
	15-5	LAUNCH		
		THERE ARE NO MEDICAL REASONS FOR ABORTING DURING	THE LAUNCH PHASE OTHER THAN THOSE CON	DITIONS
		INTOLERABLE TO THE CREW.		
Α	15-6	EARTH PARKING ORBIT, TRANSLUNAR COAST, AND LUNAR	ORBIT	
		EARLY MISSION TERMINATION FOR MEDICAL REASONS FAL	L INTO TWO CATEGORIES:	
		A. ONSET OF CONDITIONS WHICH ADVERSELY AFFECT CR	EW SAFETY, HEALTH, OR FUNCTION AND PE	RFORMANCE.
		B. FAILURE OF SPACECRAFT SYSTEMS TO MAINTAIN A P	HYSIOLOGICALLY SAITSFACTORY ENVIRONME	ENT.
Å	15-7	WATER PALATABILITY		
		CREW EVALUATION OF THE DRINKING WATER TASTE WILL	BE THE BASIS FOR DETERMINING WATER PA	ALATABILITY,
		EVEN FOR KOH CONTAMINATION.		
		· · ·		
		RULES 15-8 THROUGH		
		15-14 ARE RESERVED		
мі	SSION	REV DATE SECTION	GROUP	PAGE
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20 A A A

A 15-15 UNREADABLE ELECTROCARDIO- GRAM LAUNCH CONTINUE MISSION CONTINUE MISSION ARTIFACTS AN LAUNCH A 15-16 ABNORMAL HEART RATE, RHYTHM, OR EKG LAUNCH CONTINUE MISSION EPO THE MCC SURC MO-GO FOR TLI LO THE MCC SURC EPO A 15-17 ABNORMAL RESPIRATORY RATE LAUNCH CONTINUE MISSION TLC THE MCC SURC MO-GO FOR LOI THE MCC SURC TIVE. A 15-17 ABNORMAL RESPIRATORY RATE LAUNCH CONTINUE MISSION TLC THE MCC SURC MO-GO FOR TLI CONTINUE MISSION THE MCC SURC TIVE. A 15-18 ONSET OF SERIOUS MEDICAL PROBLEM IN ANY CREWMAN LAUNCH CONTINUE MISSION EPO THER NEXT BEST PTP A 15-18 ONSET OF SERIOUS MEDICAL PROBLEM IN ANY CREWMAN LAUNCH CONTINUE MISSION EPO CONTINUE MISSION ENTER NEXT BEST PTP	
A 15-16 ABNORMAL HEART RATE, RHYTHM, OR EKG LAUNCH CONTINUE MISSION ORBIT THE MCC SURC CONTINUE MISSION EPO THE MCC SURC CONTINUE MISSION EPO A 15-16 ABNORMAL HEART RATE, RHYTHM, OR EKG LAUNCH CONTINUE MISSION NO-GO FOR LOI THE MCC SURC CORRECTIVE / TIC LO ENTER NEXT BEST PTP TEC ENTER NEXT BEST PTP ENTER NEXT BEST PTP THE MCC SURC CORRECTIVE / TIVE. A 15-17 ABNORMAL RESPIRATORY RATE LAUNCH CONTINUE MISSION NO-GO FOR TLI TLC THE MCC SURC MO-GO FOR TLI CORRECTIVE / TLC THE MCC SURC CORRECTIVE / TIVE. A 15-18 ONSET OF SERIOUS MEDICAL PROBLEM IN ANY CREWMAN LAUNCH CONTINUE MISSION ENTER NEXT BEST PTP CREW MAY ELE CONDITION IN	
A 15-16 ABNORMAL HEART RATE, RHYTHM, OR EKG LAUNCH CONTINUE MISSION EPO THE MCC SURG THE PROBLEM EPO A 15-16 ABNORMAL HEART RATE, RHYTHM, OR EKG LAUNCH CONTINUE MISSION EPO THE MCC SURG CORECTIVE A TIVE. A 15-17 ABNORMAL RESPIRATORY RATE LAUNCH CONTINUE MISSION EPO THE MCC SURG CORECTIVE A TIVE. A 15-17 ABNORMAL RESPIRATORY RATE LAUNCH CONTINUE MISSION EPO THE MCC SURG CORECTIVE A TEC A 15-17 ABNORMAL RESPIRATORY RATE LAUNCH CONTINUE MISSION EPO THE MCC SURG CORECTIVE A TIC A 15-18 ONSET OF SERIOUS MEDICAL PROBLEM IN ANY CREWMAN LAUNCH CONTINUE MISSION CONTINUE MISSION EPO CREW MAY ELE CONTINUE MISSION EPO	UTCHALD DOKING
A 15-17 ABNORMAL RESPIRATORY RATE LAUNCH CONTINUE MISSION THE PROBLEM A 15-18 ONSET OF SÉRIOUS MEDICAL LAUNCH CONTINUE MISSION THE ROBLEM A 15-18 ONSET OF SÉRIOUS MEDICAL LAUNCH CONTINUE MISSION CONTINUE, MISSION CORRECTIVE A TLC NO-GO FOR TLI CONTINUE MISSION THE MCC SURCE CORRECTIVE A TLC NO-GO FOR TLI CONTINUE MISSION THE MCC SURCE CORRECTIVE A TLC NO-GO FOR TLI CORRECTIVE A CORRECTIVE A TLC NO-GO FOR LOI THE PROBLEM	
A 15-17 ABNORMAL RESPIRATORY RATE LAUNCH CONTINUE MISSION THE MCC SURG EPO NO-GO FOR TLI EPO NO-GO FOR TLI EALY MISSIO TLC NO-GO FOR LOI TIVE. TIVE. LO ENTER NEXT BEST PTP TIVE. TEC ENTER NEXT BEST PTP ENTER NEXT BEST PTP A 15-18 ONSET OF SERIOUS MEDICAL PROBLEM IN ANY CREWMAN LAUNCH CONTINUE MISSION EPO CREW MAY ELE CONDITION IN EPO CONTINUE MISSION ENTER NEXT BEST PTP CREW MAY ELE CONDITION IN	GEON WILL EVALUATE AND MAY RECOMMEND ON TERMINATION IF ACTION IS INEFFEC-
A 15-18 ONSET OF SERIOUS MEDICAL PROBLEM IN ANY CREWMAN LAUNCH CONTINUE MISSION CONTENT NEXT BEST PTP TEC CREW MAY ELE CONTINUE MISSION EPO	
PROBLEM IN ANY CREWMAN EPO ENTER NEXT BEST PTP	GEON WILL EVALUATE AND MAY RECOMMEND ON TERMINATION IF ACTION IS INEFFEC-
TLC <u>ENTER NEXT BEST PTP</u> EARLY MISSIC	ECT TO ABORT IF NTOLERABLE. GEON MAY RECOMMEND DN TERMINATION IF ACTION IS INEFFEC-
THE CREW MAY ELECT TO ABORT IF CONDITION INTOLERABLE. B. IF CONDI MAY ELEC EPO ENTER NEXT BEST PTP IZE	UIT INTEGRITY ITIONS PERMIT CREW CT TO OVERPRESSUR- THREE SUITS CON-
A SELE A SELE INLE A LE IN	TED TO SUIT CIRCUIT T DEMAND REG TO SS POSITION. ITOR SUIT PRESS OULD REACH 9 PSIA 75 SEC). ECT SUIT DEMAND REC ET SEL VALVE TO OFF N SUIT PRESS CHES 9.0 PSIA. NTAIN SUIT OVER- SSURE BY OPENING ET SELECTOR VALVE NECESSARY. EF FUNCTION OF
DEMAN ISOLA THIS	ND REGULATOR IS ATED WHEN USING PROCEDURE.
MISSION REV DATE SECTION GROUP	PAGE
APOLLO 8 A 12/11/68 AEROMEDICAL SPECIFIC - PHYSIOLOG	GICAL 15-2

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	MISSION	RULES	

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		_				MISSION RULES			
RE.V	RULE	CO	NDITION/MALFUNCTIC	N	PHASE	RULING	•	CUES/NOTES/COM	MENTS
Α	15-20		TEMP EXCEEDS 101° ITE CORRECTIVE ACT					THE MCC SURGEON MAY EARLY MISSION TERMIN TREATMENT IS UNSUCCE	ATION IF
		Α.	IF DUE TO ILLNESS		LAUNCH	NOT APPLICABLE			
					EPO	ENTER NEXT BEST PTP			
					TLC	ENTER NEXT BEST PTP			
1					LO	ENTER NEXT BEST PTP			
			·		TEC	ENTER NEXT BEST PTP			
			IF RESULTANT FROM MAL OVERLOAD		LAUNCH	NOT APPLICABLE			
					EPO	ENTER NEXT PTP			
					TLC	ENTER NEXT PTP			
					LO	ENTER NEXT PTP			
					TEC	ENTER NEXT PTP			
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			S 15-21 THROUGH 6 ARE RESERVED.						
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				MISSION RULES		_	
REV	RULE	CONDITION/MALFUNCTION	PHASE	RULING		CUES/NOTES/COM	1MENTS
Α	15-27	INCREASE IN PCO ₂					-
		A. <u>></u> 7.6 MM HG	LAUNCH	CONTINUE MISSION			
			EPO	CONTINUE MISSION CHANGE LICH CANISTER			
			TLC	CONTINUE MISSION CHANGE LICH CANISTER		PCO2 SHOULD DECREAS 2 MM HG WITHIN 30 M	SE BELOW MINUTES.
			LO	CONTINUE MISSION CHANGE LICH CANISTER			
			TEC	CONTINUE MISSION CHANGE LIOH CANISTER			
		B. 27.6 MM HG AND UNABLE	LAUNCH	NOT APPLICABLE		PCO2 SENSOR TEST:	
		TO DECREASE	ALL	CONTINUE MISSION		A. ISOLATE SUIT CI	
			PHASES	1. OPEN SUITS AND BREATHE CABIN	FROM	DISCONNECTING S	
				2. CHANGE SECOND LIOH CAN	ISTER	B. SUIT CIR RET AL CLOSED.	IR VALVE
	1			3. TEST PCO ₂ SENSOR		C. CRACK O METERI TO OPEN.	ING VALVE
						D, PURGE FOR 30 SE	CONDS.
						E. CLOSED 02 METER	RING VALVE.
						F. IF ABOVE PROCED IN A PCO READI ZERO, THE PCO2 OPERATING PROPE	ING NEAR SENSOR IS
		C. ≥10 MM HG	LAUNCH	CONTINUE MISSION			
			EPO	ENTER NEXT BEST PTP			Ĩ
			TLC	ENTER NEXT BEST PTP			
			LO	ENTER NEXT BEST PTP			
			TEC	ENTER NEXT BEST PTP			
А	15-28	PCO2 INSTRUMENTATION	ALL	CONTINUE MISSION			
		FAILURE	PHASES	CONTINUE MISSION USE ONBOARD CO2 TAPES			
					-		
		RULES 15-29 THROUGH 15-34 ARE RESERVED,					
		· · ·					
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MI	SS 10N	REV DATE		SECTION	·	GROUP	PAGE
	LLO 8		EROMEDICAL		SPECIFIC	- EQUIPMENT	15-4
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v	ITEM			MISSION RULES	<u></u>	······································	
ł			INST	RUMENTATION REQUI	REMENTS		
	15-35	MEAS DESCRIPTION	PCM	ONBOARD	TRANSDUCERS	CATEGORY	MISSION RULE
		ELECTROCARDIOGRAM	CJ0060J	NOT DISPLAYED		MANDATORY	15-15/16
		ELECTROCARDIOGRAM	CJ0061J	NOT DISPLAYED		MANDATORY	15-15/16
		ELECTROCARDIOGRAM	CJ0062J	NOT DISPLAYED		MANDATORY	15-15/16
		CO2 PARTIAL PRESSURE	CJ0005P	METER	COMMON	MANDATORY	15-2/27/28
		SUIT CABIN DELTA PRE	SS CF0003P	NOT DISPLAYED		MANDATORY	15-3/19
		ORAL TEMPERATURE		ÇLINICAL THERMOMETËR		MANDATORY	15-20
		PNE OGRAM	CJ0200R	NOT DISPLAYED		HIGHLY DEŞIRABLE	15-17
		PNEUMOGRAM	CJ0201R	NOT DISPLAYED		HIGHLY DESIRABLE	15-17
		PNEUMOGRAM	CJ0202R	NOT DISPLAYED		HIGHLY DESIRABLE	15-17
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м	15510N	REV DATE SE	CTION		GROUP		PAGE
	OLLO 8	A 12/11/68				MENTATION REQUIREMEN	

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16 RECOVERY

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				MISSION RULES		
REV	RULE	CONDITION/MALFUNCTI	ON PHASE	RULING	CUES/NOTES/COMMENTS	
	16~1	LAUNCH SHALL OCCUR BE 30 MIN PRIOR TO SUNRI 30 MIN PRIOR TO SUNSE	SE AND	HIGHLY DESIRABLE	TO PROVIDE DAYLIGHT FOR A LAUNCH SITE RECOVERY OPER	
	16-2	LAUNCH SHALL OCCUR NO THAN 1 HOUR 30 MIN PR SUNSET.		HIGHLY DESIRABLE	TO PROVIDE 1 HOUR OF DAYL FOR LIGHT FOR CAMERA CAPS RECOVERY.	
A	16-3	RECOVERY CAPABILITY LAUNCH SITE AREA, LAU ABORT AREA, MID-PACIF RECOVERY ZONE.	INCH	- HIGHLY DESIRABLE		
		HIS ABILITY TO PERFO CAPABILITY IS PREDIC NECESSARY TO RE-EVAL SURFACE WINDS - CEILING -	RM THE RECOVERY OF TED WEATHER AT TIN UATE CAPABILITY AF 25 KNOTS 1500 FEET 3 NM	ARILY UPON THE LOCAL RECOVERY UNIT ERATION. ONE OF THE FACTORS WHICH E OF LANDING. GUIDELINES USED TO E:	IPETERMINES RECOVERY	
	16-4	MINIMUM OF 35 AMP-HOL CM POST-LANDING POWER AVAILABLE AT LANDING.	2	MANDATORY	TO PROVIDE FOR 18 HOURS O POST-LANDING POWER PLUS O UPRIGHTING.	
	16-5	RETAIN ∆V CAPABILITY LANDING POINT ±500 M UNTIL ENTRY -24 HOURS	1 [HIGHLY DES IRABLE		
MI	ISSION	REV DATE	B	SECTION	GROUP PA	GE
AP	OLLO 8	A 12/11/68	RECOVERY	GEN	ERAL 16	-1
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APPENDIXES

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A ACRONYMS AND SYMBOLS

EV I	TEM			MISSION RU			
		1		APPENDIX A			
				ACRONYMS AND SY	MBOLS		
		ACCEL ADEG AFD AFETR A/G ALDS AM AMP AOA AOH ASAP ATP AZUSA	ASSISTAN AIR FORC AIR-TO-G APOLLO L AMPLITUE AMPERES ANGLE OF APOLLO C AS SOON ALTERNAT	Y DISPLAY EQUIPMENT GROUP IT FLIGHT DIRECTOR E EASTERN TEST RANGE ROUND AUNCH DATA SYSTEM DE MODULATION	ECS EDS EECOM EI EPS ESE ETDM ETR	COMMUNICÁTIONS ENTRY INTERFACE ELECTRICAL POWER SYST ELECTRONIC SUPPORT EC	YSTEM ENTAL, AND EM UIPMENT
		BA BDA B/H BMAG BRSO BSE	SYSTEM BANK ANG BERMUDA BLOCK HO BODY MOU BERMUDA	I (ETR) SLE (MSFN REMOTED SITE)	F/A FC FCSM FD FDAI FDO FL FM FPS FQR	FORWARD/AFT FUEL CELL OR FLIGHT C FLIGHT COMBUSTION STA FLIGHT DIRECTOR FLIGHT DIRECTOR ATTIT FLIGHT DYNAMICS OFFIC FULL LIFT FREQUENCY MODULATION FEET PER SECOND FLIGHT QUALIFICATION	BILITY MONITOR UDE INDICATOR ER ER
		CASTS CCATS CCW CDP CDU CIF CLTC CM CMC C/O	SYSTEM COMMAND, SYSTEM COUNTERC COMMAND COUPLING CENTRAL CHIEF LA COMMAND	COMMUNICATIONS, AND TELEMETRY LOCKWISE DATA PROCESSOR DATA UNIT INSTRUMENTATION FACILITY UNCH VEHICLE TEST CONDUCTOR	G&C GDC GET GETI GMTLC G&N GNC GN2 GRR	GUIDANCE AND CONTROL GYRO DISPLAY COUPLER GROUND ELAPSED TIME GROUND ELAPSED TIME O GREENWICH MEAN TIME O GUIDANCE AND NAVIGATI GUIDANCE NAVIGATION C GASEOUS NITROGEN GUIDANCE REFERENCE RE	F LIFTOFF ON ONTROL
		CO2 CRYO CRO CSM CTE CVTS CW	Command Centeral	CS N (MSFN REMOTED SITE) SERVICE MODULE . TIMING EQUIPMENT HICLE TEST SUPERVISOR	H _a HF H2 HS	HEIGHT OF APOGEE HIGH FREQUENCY HEIGHT OF PERIGEE HERTZ HIGH-SPEED	
		DAP DCS DOD DRA DRS DSC DSC DSE DSKY D/TV	DIGITAL DEPARTME DISCRETE DATA REC DYNAMIC DATA STO DISPLAY	AUTO PILOT COMMAND SYSTEM INT OF DEFENSE RECOVERY AREA EIVING STATION STANDBY COMPUTER RAGE EQUIPMENT KEYBOARD TO TELEVISION	IGA IMU INST IN IP IRIG ISS IU	INNER GIMBAL AXIS INERTIAL MEASUREMENT INSTRUMENTATION INVERTER IMPACT POINT OR IMPAC INERTIAL RATE INTEGRA INERTIAL SUBSYSTEM INSTRUMENTATION UNIT	T PREDICTOR
MISS	ION	REV	DATE	SECTION		GROUP	DACE
		1					PAGE
APOLLO	Uδ	FINAL	11/7/68	APPENDIX A - ACRONYMS AND SYMB	ULS		A-1

MISSION RULES

EV ITEM						
	KSC	KENNEDY	SPACE CENTER	PSID PTC PTV PVT	POUNDS PER SQUARE INCH PASSIVE THERMAL CONTROL PITCH THRUST VECTOR PRESSURE-VOLUME-TEMPERA	
	LES LET LH2 LM LiOH L/O LOI LOI LOI LOX L/R LVDA LVDC	LAUNCH E LIQUID H LUNAR MO LITHIUM LIFTOFF LUNAR OR LIQUID O LEFT/RIG LAUNCH V	DULE HYDROXIDE BIT INSERTION XYGEN HT EHICLE DATA ADAPTER EHICLE DIGITAL COMPUTER	PYRO QTY RCS REFSMMAT RETRB RETRO RFO RHC RIP RL RL RR	PYROTECHNICS QUANTITY REACTION CONTROL SYSTEM REFERENCE STABLE MEMBER RETRO ELAPSED TIME TO R RETROFIRE OFFICER RETROFIRE OFFICER ROTATION HAND CONTROLLE RANGE OF IMPACT POINT ROLL LEFT ROLL RIGHT	MATRIX EVERSE BANK
	MCC MC&W MDAS MED MESC MFCO	MISSION CORREC MASTER C MEDICAL MANUAL E MASTER E MANUAL F	CONTROL CENTER, MID-COURSE	RS I RSO RTACF RTC RTCC	ROLL STABILITY INDICATO RANGE SAFETY OFFICER REAL-TIME AUXILIARY COM REAL-TIME COMMAND REAL-TIME COMPUTER COMP	PUTING FACILITY
	MGA MITE MOC MEO MSFN MSFN MTVC	MASTER I MISSION MAINTENA MANNED S CSM SPAC MANUAL T	NSTRUMENTATION TIMING EQUIPMEN OPERATIONS COMPUTER INCE AND OPERATIONS PACE FLIGHT NETWORK ECRAFT TEST CONDUCTOR HRUST VECTOR CONTROL	S/C SCE SCS SLA SLV SM SMJC SOL	SPACECRAFT SIGNAL CONDITIONING EQU STABILIZATION AND CONTR SUSTAINER ENGINE CUTOFF SPACECRAFT LM ADAPTER SATURN LAUNCH VEHICLE SERVICE MODULE SERVICE MODULE JETTISON SOLENOID	OL SYSTEM (S-IVB CUTOFF) CONTROLLER
	NCC NSR NM) CORRECTIVE MANUEVER TICAL MANEUVER . MILES	SPS SRO	SERVICE PROPULSION SYST SUPERINTENDENT RANGE OP	
	O/B ODOP OGA OXID		OOPPLER AND POSITION MBAL AXIS	TB TC TFI TDP TM TFF THC Tig TOK	TIME BASE TEST CONDUCTOR TELEMETRY AND COMMUNICA TRANSEARTH INJECTION TELEMETRY DATA PROCESSO TELEMETRY TIME OF FREE FALL THRUST HAND CONTROLLER TIME OF IGNITION THRUST OKAY	
	PCM PCO2 PIPA PLSS PO2 PPM PTP PUGS	PARTIAL PULSE IN ACCELE PORTABLE PARTIAL PARTS PE PREFERRE		TOK TLI TPF TPI TTY TVC	TRANSLUNAR INJECTION TERMINAL PHASE FINALIZA TERMINAL PHASE INITIATE TELETYPE THRUST VECTOR CONTROL	
	PROC	PROCEDU	<e.< td=""><td></td><td></td><td></td></e.<>			
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MISSION RULES

	T		MISSION RULES		
EV ITEM	U/D	UP/DOWN			
	UDL	UPDATA	LINK		
	UHF	ULTRA H	IIGH FREQUENCY		
	USB	UNIFIED	S-BAND		
					·
	Vgx		Y TO BE GAINED X-AXIS		
	Vgy Vgz		Y TO BE GAINED Y-AXIS Y TO BE GAINED Z-AXIS		
	VHF	VERY HI	GH FREQUENCY		
	VSM	VIDEO S	WITCHING MATRIX		
1	WBD	WIDE-BA	ND DATA		
			•		
	YTV	YAW THR	RUST VECTOR		
	SYMBOLS				
			L FLIGHT PATH ANGLE		
	Y _i Y _{EI}		AL FLIGHT PATH ANGLE AT ENTRY		
	1	INTER	RFACE		
	V _{EI}		AL VELOCITY AT ENTRY INTERFACE DE OR PHASE		
	λ	LONG ITU	JDE		
	d ±	DOWNRAN PLUS OF			
	>	GREATER	RTHAN		
			HAN VELOCITY IN INSERTION		
	ΔV _{INS} ΔTB		BURN TIME		
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REV	ITEM					
A		DIREC	TOR OF FLIGH	IT OPERATIONS	OPERATIONS SUPPORT	BRANCH
			AFT, C.C., u		FS4/FRERE, J.A.	
		SJ	OBERG, S.A.		SANBORN, S.D. (
			SE, R.G. ONS, W.E.		OJELETTO, G. (2	:)
					FLIGHT SOFTWARE BRA	NCH
			IT CONTROL D	VISION	FS5/STOKES, J.C. (3	
			ANZ, E.F. INNEY, G.S.		GIBSON, T.F., U GARMAN, J.R. (2	
			ARLESWORTH, RIFFIN, G.D.	C.E.	MISSION PLANNING AN	
		WI	NDLER, M.L.		BRANCH	ANALISIS
		FR	ANK, M.P.		FM/MAYER, J.P. (2)	
		FLIGH	T CONTROL OF	PERATIONS BRANCH	HUSS, C. (1) OWEN, D.H. (1)	
			OACH, J.W.		FM2/HARPOLD, J.	
			ARLAN, C.S. ENDELL, E.I	. (3)	FLIGHT_ANALYSIS BRA	NCH
		L	EWIS, C.R. ((3)	FM3/ALLEN, C. (14)	
			ALICK, P.L. PLATT, W.E. (
		G	ATLIN, W.P.	(2)	MATH PHYSICS BRANCH	-
		CSM S	YSTEMS BRAN	СН	FM4/MC PHERSON, J.C	(2)
		FC3/A	LDRICH, A.D.	. (1)	MISSION ANALYSIS BR	ANCH
			UTCHINSON, I LOVER, R.D.		FM5/BERRY, R. (10)	
		L	OE, T.R. (20))	RENDEZVOUS ANALYSIS	BRANCH
			/ILLOUGHBY, 8 8LAIR, W.L. (FM6/LINEBERRY, E.C.	(2)
			,		GUIDANCE AND PERFOR	MANCE BRANCH
			STEMS BRANCH	-	FM7/CASSETI, M.D. (
			HANNIGAN, J.E SAULTZ, J.E.	•		
			UDDY, D.R. ARLTON, R.L.		APOLLO TRAJECTORY S FM13/PARTEN, R. (1)	
					COLLINS, M. (1	
			IT DYNAMICS		LANDING AND RECOVER	
			BOSTICK, J.C BHAFFER, P.C		FL/HAMMACK, J.B. (8	
		L	LEWELYN, J.S	5. (4)	FL/SANDERSON, A. (W	
			PARKER, C.B. PAVELKA, E.L		DIRECTOR OF FLIGHT	CREW OPERATION
			ON SIMULATI		CA/SLAYTON, D.K. (2	?)
			ILLER, H.G.		ASTRONAUT OFFICE	
					CB/SHEPARD, A.B. (2	
				REQUIREMENTS BRANCH		
		FC//H	HOOVER, R.H.		FLIGHT CREW SUPPORT	DIVISION
		EXPER	RIMENTS SYST	EMS BRANCH	CF/NORTH, W.J. GRIMM, D.F.	
		FC8/B	BROOKS, M.F.	(2)	BILODEAU, J.W. DEMENT, M.E. (4))
		MSFC	FLIGHT CONT	ROL OFFICE	ALLEN, L.D. (4)	
		IMO	-F/HAMNER, R	.S. (20)	KRAMER, P.C. (5) WARREN, D.K. (3)	
		FLIGH	IT SUPPORT D	IVISION	WOODLING, C.H.	
			JNSEITH, L.C		KUEHNEL, H.A. (4 VAN BOCKEL, J.J.	(2)
		SYSTE	MS ENGINEER	ING BRANCH	O'NEILL, J.W. (5 FABER, S. (3)	5)
			ATTERFIELD,		MITCHELL, J. (CF	
					COLLINS, H.G. (C MC CAFFERTY, R.	
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MISSION RULES

					MISSION RULES	
REV	ITEM	1				
А				NEERING AND	JOHN F. KENNEDY SPACE CENTER	
		DEVELO	OPMENT (CON	T'D)	<u>NASA - MSOB</u> (CONT'D)	
			LUSE, M.		LO-OPN/DONNELLY, P. (1)	
			TREMONT, R.		LO-PLN-2/KNIGHT, G.W. (3)	
			YTON, M. RDINER, R.A		HARRINGTON, R.D. (1) LV/GRUENE, H DR. (1)	
		EG23/	COX, K.J.,		LO-TOM-1/HART, J. (15)	
			ELAM, F.		LS/WILLIAMS, J.J. (1)	
			/HANAWAY, J /WASSON, C.		LS-ENG-1/GASKIN, R. (4) LS-TOM-1/BUCKLEY, R.H. (4)	
			RICE, G. (1		WILLIAMS, F.T. (4)	
		50 /440			TS/CLARK, R.L. (5)	
			SHEEHY, R. OWNSEND, N.		AP-SYM/MOORE, A.H. (6) IN/SENDLER, K. (5)	
			00D, T.		SO/GORMAN, R. (3)	
			UMPHRIES, C		IS-TSM/CLARK, B. (1)	
			AMMOCK, W.R		PSK/MORSE, A.E. (1)	
			AMBERT, C.H EARY, D.	•	MISSION DIRECTORS OFFICE	
			ARAKULKO, W		MARSHALL SPACE FLIGHT CENTER	
	1	S	IMMONS, W.H		MSFC/I-MO-MGR, MISSION OPERATION	NS
			ELL, D.		OFFICE (30)	
			WENS, S. ROUT, J.B.			
			AUVEN, L.		OFFICE OF MANNED SPACEFLIGHT	
			TROUHAL, G.		MUELLER, G.E., DR.	
			SMITH, J. GLYNN, P.C.		PHILLIPS, S.C., MAJ. GEN. SCHNEIDER, W.C.	
			WEISS, S.P.		ALLER, R.O. (12)	
			PAULOSKY, J	.E.	,	
			ONEY, W.E. REDD, B.		DOD MSF SUPPORT OFFICE PAFB, FL	<u> </u>
		L123/	REDD, D.		OLSON, R.G., COL (5)	
		FLIGH	T SAFETY OF	FICE	FRESE, F.J., JR., COL. MC (2) ETOOP-2 PAFB FLA 32925(6)	
		MSC/S	A FRENCH, J	.C. (3)	LIUUI - 2 TAID ILA J2323(0)	
		SF/GR	EENWEEL, D.		MIT LABORATORIES BOSTON, MASS.	
		KSC/H	Y VAUGHN, N	.в.	NEVINS, J. (12)	
		DIREC	TOR OF SCIE	NCE AND	COPPS, E. (2)	
			CATIONS		NORTH AMERICAN ROCKWELL, DOWNEY	
		TG/MO	DISETTE, J.	(2)		_ CALI
			ATES, J.R.		VUCELIC, M., CODE AB54 (25) NB2/WILLIAMS, H.L.	
		TRW -	HOUSTON			
				(\mathbf{z})	LOCKHEED	
			TSON, R.L. ECHNICAL IN		LAC CO7/NOWAKOWSKI, J.	
				OPERATIONS (2)		
			ON, TEXAS	UCKWELL		
		пакма	N, H.A. (2)			
		GODDA	RD SPACE FL	IGHT CENTER		
			C.B. (9)			
		CODE	821.1			
			D FLIGHT OP			
		01412	IUN, REQUIR	EMENTS SECTION		
				SPACE CENTER		
			- MSOB			
				NTER, FLORIDA		
			I, HO/ASTRO BUS, K., DR			
			T/BARNETT,			
				LD, S. (1)		
			N/BLACKWOOD	,		
			TRONE, R.A. PYRAN, W.J.			
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C CHANGE CONTROL ÷

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εv	ITEM									
					ENDIX C					
				CHANG	E CONTROL					
		1.0		•						
		1.1 F	VRPOSE							
		F (RULES. THIS	OF THIS APPENDIX IS TO DELIN WILL INSURE THE PROPER COOR HE RATIONALE FOR MAKING THEM BETWEEN REVISIONS (INTERIM	DINATION OF CH), AND WILL PR	ANGES, PROVIDE A RECORD	OF PROPOSED CHANGES			
		1.2 6	FFECTIVITY			·				
		1	THE PROCEDURE	ES CONTAINED IN THIS APPENDI	X ARE APPLICAB	LE UPON PUBLICATION OF T	HIS DOCUMENT.			
		2.0 0	CHANGE PROCED	DURES						
		2.1 9	SUBMISSION OF	F CHANGES						
			DRIGINATING (DIRECTOR (AFI	NGES ARE SOLICITED FROM ANY OUTSIDE THE FLIGHT CONTROL T D). CHANGES ORIGINATING WIT PRIME MISSION OPERATIONS CON	EAM WILL BE SU HIN THE FLIGHT	BMITTED DIRECTLY TO THE CONTROL TEAM WILL BE SU	ASSISTANT FLIGHT			
		2.1.1	FORMAT							
			FIGURE C-1	SIRING TO SUBMIT A PROPOSED (FORM MUST BE TYPED). ADDI THE COMPLETED ORIGINAL FORM	TIONAL PAGES M	AY BE USED IF THE SPACE	PROVIDED IS NOT			
				LL REVIEW THE FORM FOR COMPL EQUIRED. THE ORIGINATOR WIL			, AND MAKE CORREC-			
		2.2 APPROVAL								
		2.2.1	COORDINATIO	<u>NC</u>						
			FORMAL CON	ATOR OF THE CHANGE MAY OBTAI CURRENCES OR DISAPPROVALS (V CURRENCES WILL BE INDICATED	ERBALLY OR BY	INITIATING) FROM THE NEC				
		2.2.2	SIGNOFF/DI	SAPPROVAL						
		UPON OBTAINING THE REQUIRED CONCURRENCES OR NEGATIVE COMMENTS, THE AFD WILL PRESENT THE CHANGE TO THE FLIGHT DIRECTOR FOR FINAL APPROVAL OR DISAPPROVAL. THE AFD MAY SIGN OFF O DISAPPROVE PROPOSED CHANGES IN THE ABSENCE OF THE FLIGHT DIRECTOR.								
		2.2.3 DISAPPROVED CHANGES								
		IF A CHANGE IS DISAPPROVED THE AFD WILL RETURN THE COPY TO THE ORIGINATOR. THE OR RETAINED FOR FUTURE REFERENCE.								
		2.3	PUBLICATION /	AND DISTRIBUTION OF INTERIM	CHANGES					
				GES WILL BE DISTRIBUTED TO A , PERTINENT NASA ORGANIZATIO						
			DEVELOPMENT							
		-	THE AFD WILL INTO COMPLET	COMPILE THE EFFECTIVE INTER E PAGE CHANGES TO THE BASIC L ERRORS IF THERE ARE NO OTH	DOCUMENT. ("P	EN AND INK" CHANGES MAY				
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REV	ITEM					
		3.2 A	PPROVAL			
		S D	INCE ALL INT	ERIM CHANGES WILL HAVE RECEIVED PRIOR CON THE AFD IN THE FLIGHT DIRECTOR'S ABSENCE)	CURRENCES AND APPROVAL, ONLY THE WILL BE REQUIRED TO APPROVE REV	FLIGHT ISIONS.
			UBLICATION			
		3.3.1	SCHEDULE			
			REVISIONS W	ILL BE MADE ON AN "AS REQUIRED" BASIS.		
		3.3.2	DISTRIBUTIO	N		
			REVISIONS W	ILL BE PRINTED AND DISTRIBUTED THROUGH TH	E NORMAL ADMINISTRATIVE CHANNELS	
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ITEM			4						
				NA		D SPACECRAFT C		ATE	
				M	ISSION RU	LE REQUEST/REV	VISION	AIE	
REV RUL	LE	CONDITION/MAL	FUNCTION	PHASE		RULING		t,	OTES/COMMENTS
			· ·						
1	1								
RATION	ALE:	DINEW TECHN	NICAL DATA		RIFICATION	i 🗋 Typogr	APHICAL ERROR	I	
RATION	ALE:	NEV TECH	NICAL DATA		RIFICATION	I TYPOGR	APHICAL ERROR	•	
	ALE : NATOR:				A	APPROVED:		APPROVED:	
ORIGI		NAME	ORGANIZA	ITION	EXT	APPROVED:	NT BRANCH CHIE	F	FLIGHT DIRECTO
ORIGI	NATOR:	NAME BSE:		ITION	A	APPROVED:	NT BRANCH CHIE		
ORIGI		NAME BSE:	ORGANIZA		EXT #	APPROVED:	NT BRANCH CHIE GNC:	EECOM:	
ORIGI	NATOR:	NAME BSE:	ORGANIZA		EXT #	APPROVED: COGNIZA RETRO:	NT BRANCH CHIE GNC: ANGE REQUEST	EECOM:	
ORIGI	NATOR:	NAME BSE:	ORGANIZA		EXT #	RETRO:	NT BRANCH CHIE GNC: ANGE REQUEST	EECOM:	
ORIGI	NATOR:	NAME BSE:	ORGANIZA		EXT #	RETRO:	NT BRANCH CHIE GNC: ANGE REQUEST	EECOM:	
ORIGI	NATOR:	NAME BSE:	ORGANIZA		EXT #	RETRO:	NT BRANCH CHIE GNC: ANGE REQUEST	EECOM:	
ORIGI	NATOR:	NAME BSE:	ORGANIZA		EXT #	RETRO:	NT BRANCH CHIE GNC: ANGE REQUEST	EECOM:	
ORIGI	NATOR:	NAME BSE:	ORGANIZA		EXT #	RETRO:	NT BRANCH CHIE GNC: ANGE REQUEST	EECOM:	
ORIGI	NATOR:	NAME BSE:	ORGANIZA FIDO: FIGURE (EXT #	RETRO:	NT BRANCH CHIE GNC: ANGE REQUEST	EECOM:	
ORIGI	NATOR:	NAME BSE:	ORGANIZA		EXT #	RETRO:	NT BRANCH CHIE GNC: ANGE REQUEST	EECOM:	
ORIGI	NATOR:	NAME BSE:	ORGANIZA FIDO: FIGURE (110N GUII C-1 MI	EXT #	RETRO:	NT BRANCH CHIE GNC: ANGE REQUEST	EECOM:	
ORIGI	NATOR:	NAME BSE:	ORGANIZA FIDO: FIGURE (110N GUII C-1 MI	EXT #	RETRO:	NT BRANCH CHIE GNC: ANGE REQUEST	EECOM:	

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