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NO

CREW PROCEDURES CHANGE REQUEST

INITIATED BY	ORGANIZATION	DATE
Michael R. Wash	CF24	7/9/69

CHANGE NUMBER	S/C EFFECTIVITY
ASD-18	107 & Subs

DOCUMENT AFFECTED

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DETAIL CHANGE IN EXACT WORDING

The attached launch and abort procedures represent an update to the Abort Summary Document. These procedures are consistent with the Apollo 11 crew checklist to date. Since the number of changes are extensive the entire procedures sections of the ASD are included.

REASON:

The changes to the documented procedures reflect earlier changes, final trajectory updates, and crew preference in arrangement and clarity as a result of final training sessions.

FAC ORM 602

(ACCESSION NUMBER) N70-76159 (THRU)

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REMARKS:

☑ APPROVED ☐ DISAPPROVED	COORDINATOR'S SIGNATURE	DATE
	P C Kramer	

FINAL DISPOSITION

☑ APPROVED ☐ DISAPPROVED	FCOD SIGNATURE	DATE SIGNED	SUSPENSE DATE
	[illegible]	7/9/69	

MSC Form 482 (Rev Jun 68) *(Previous editions are obsolete)*

ACKNOWLEDGMENTS

1. Nominal and abort trajectory curves and timelines were furnished by the Flight Analysis Branch of the Mission Planning and Analysis Division.

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1.0 INTRODUCTION

The Abort Summary Document has been prepared to provide a single reference source of Crew Procedures and information to be used during Saturn V nominal flight, abort, and abort entry training. The basic document reflects the control procedures to be used by the crew. Appendices A, B, and C supplement the controlled procedures for training purposes and are not under the control of this document.

Comments or changes should be direct to Mr. M. R. Wash or Mr. M. A. Rahman, Launch and Entry Procedures Section, CF24, utilizing Crew Procedures Change Request, Form 482, Revised.

This document, with current approved procedural changes, serves as the preliminary and final version of the Abort Procedures for all subsequent Missions.

2.0 APOLLO ABORT MODES

Pad to 42 Sec	Mode IA	LET Low Alt
42 Sec to 100,000 Ft (1 min 56 Sec)	Mode IB	LET Med Alt
100,000 Ft to LET JETT (1 min 56 Sec) (3 min 16 Sec)	Mode IC	LET High Alt
LET JETT to RFL=3200 NM (3 min 16 Sec) (10 min 08 Sec)	Mode II	Full Lift
RFL=3200 NM to RHL=3350 NM (10 min 08 Sec) (10 min 32 Sec)	Mode III CSM NO GO/ SLV Lofted	Half Lift
RHL=3350 NM to Insertion (10 min 32 Sec) (11 min 39 Sec)	Mode III CSM NO GO/ SLV Lofted	SPS Retro Half Lift
COI Capability to Insertion (2 burn) (9 min 60 Sec) (11 min 39 Sec)	Mode IV* CSM GO	SPS to Orbit

* For positive $\dot{h}$ and S-IVB Cutoff beyond the 5 min to apogee line (crew chart) an apogee kick maneuver would be recommended over the Mode IV. Single burn (fixed attitude) to orbit capability occurs at 10:16.

NOTE: RFL = Full Lift Landing Range (DSKY: ΔR = -400 NM)
RHL = Half Lift Landing Range (DSKY: ΔR = 0 NM)

Contingency Abort Mode Determination

Pad to TWR JETT	Mode I	LET
TWR JETT to 9 min 50 Sec	Mode II	Full Lift
9 min 50 Sec to Insertion	Mode III	SPS Retro +B=2(GET-10:20) Half Lift

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3.0 ABORT LIMITS

3.1 Rates

1. Pitch and yaw

L/O to T+2:00	4° per second
T+2:00 to S-IVB CO (Excluding staging)	9° per second

2. Roll

L/O to S-IVB CO	20° per second

3.2 Max Q Region

The following limits represent single cues and are restricted to the time period of 50 sec to 2 min.

1. Angle of Attach ($q\alpha$) - 100%
   Note: The $q\alpha$ abort cue is valid only when preceeded by one of the following cues.
2. Attitude error (roll, pitch, or yaw) - 5°
3. Single S-IC control engine failure occurring later than 50 sec into flight.
   Note: For control engine failures prior to 50 sec, the $q\alpha$ abort limit is not valid as an abort cue.
4. LV Guidance Failure

3.3 Platform Failure

1. During S-IC Powered flight the two cues for platform failure requiring an immediate switchover are:
   a. LV GUID LT - ON
   b. LV RATE LT - ON
2. After LV rate sw deactivation the primary cue is
   a. LV GUID LT - ON
   secondary cues
   b. FDAI Attitude
   c. LV Rates
   d. Ground conformation

3.4 Automatic Abort Limits (L/O until deactivation-normally T+2 min)

1. Rate	pitch - yaw	4.0° ± 0.5° per second
	roll	20.0° ± 0.5° per second

2. Any two engines failures
3. CM to IU breakup

3.5 Engine Failure (S-IC)

1. Single engine failure	Continue Mission
2. Simultaneous loss two or more engines	Abort

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3.6 Engine Failure (S-II)

1. Single engine failure - continue mission
2. Double engine failures - abort if LV control is lost (rates > 9°/sec) otherwise continue mission.
3. Three or more engine failures - abort if prior to S-IVB to Orbit Capability. Upstage immediately if the failures occur after S-IVB to Orbit Capability is achieved.*

*After S-II level sense arm (approx 8:15 GET) upstaging should not be attempted due to a possibility of inhibiting S-IVB engine start unless so advised by ground.

3.7 Engine Failure (S-IVB) - Abort (Mode II, III, or IV)

3.8 S-II Second Plane Separation Failure Immediate Abort on ground confirmation.

3.9 S-IVB Differential Tank Pressure Limits

ΔP (ORBITAL COAST)	LH2>LO =	26 psid
	LO2>LH =	36 psid
	LO2>	50 psia

4.0 BOOST TO ORBIT

PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
-00:09		LCC	IGNITION*	02	R1 00000 R1 00000 R3 00000	
+00:01		LCC	LIFT-OFF*	06 62	R1 XXXXX FPS XXXXX FPS XXXX.XFPS	umbilical Disconnect CMC to P11 DET & MET Start
		CDR	Clock Start*			
00:10		LCC	Clear Tower*			Above launch tower
00:12		CDR	Roll & Pitch Start*			Roll and Pitch program Start
00:30		CDR	Roll complete*			Roll program complete
00:42		MCC	Mode IB*			
		CMP	PRPLNT DUMP - RCS CMD			
00:50		CDR	Monitor α to T + 2:00			
00:55		CMP	Monitor Cabin pressure decreasing			No decrease by 17K' dump manually
01:56		MCC	Mode IC* (based on 100,000')		R3 0016.5NM	
02:00		CMP	EDS AUTO - OFF* EDS ENG - OFF EDS RATES - OFF			NO AUTO ABORT Lt-on
		CMP	α/Pc - Pc			
02:10		MCC	GO/NO Go for Staging*			
		CDR	GO/NO Go for Staging*			Systems status
02:15		CDR	INBOARD OFF*			#5 Eng Lt-on LIFTOFF LT-out NO AUTO ABORT Lt-out
02:40		CDR	OUTBOARD OFF*			#1-4 ENG LT-on
02:41		CDR	SIC/S-II STAGING*			Eng Lts(5)out
02:42			S-II IGNITION Command			Eng Lts(5)-on S-II SEP Lt-ON
02:44		CDR	S-II 65%*			Eng Lts (5)-out
03:11		CDR	Interstage JET*			S-II Sep Lt-out*
03:16(OCO+36		CMP	Key V82E	F 16 44	XXXX.X NM	
	sec)	CMP	TWR JETT(2)-ON*(IF TFF>1+20)		XXXX.X NM	Tower Jettison
		MCC	Mode II*		XXBXX M/S	

PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY		OPTION/EVENT
		CDR	MAN ATT (PITCH) - RATE CMD				
		CMP	Key Proceed	06 62	XXXXX	FPS	
					XXXXX	FPS	
					XXXX.X	NM	
03:21		CDR	Guidance Initiate*				IGM Start
03:15		LMP	Sec Cool Loop EVAP - OFF				
04:00		CDR	Report status*				
		MCC	Trajectory Status*				
05:00		CDR	Report Status*				
05:40		MCC	Upstage Capability to COI*				
06:00		CDR	Report Status*				
			GMBL MOT (4) - START - ON				
			Check GPI (momentarily)				Insure Angles Correct
06:15		LMP	OMNI ANT-D (AZ<96°)				
07:00		CDR	Report Status*				
07:40		CDR	INBOARD - OFF*				
08:00		CDR	Report Status*				
08:30		MCC	GO/NO GO for Staging*				Systems Status
		CDR	GO/NO GO For Staging				
09:00		MCC	MODE IV (2 burn)				V1≥21,800 FPS,h h 100 nm
09:11			S-II OFF				Eng lts(5)-on
09:12			S-II/S-IVB Staging				Eng lts(#1)-off
09:15			S-IVB Ignition				Eng lts(#1)-on
09:17		CDR	S-IVB 65%				Eng lts(#1)-off
		CDR	Report Status*				
10:16		MCC	Mode IV (1 burn)				VI ≥ 23400 FPS, hn 100 nm
		CDR	Mode IV				
10:00		MCC	REPORT STATUS*				
							Eng Lt(#1)-on
11:39		CDR	SECO*				
			INSURE ORBIT				
			Key V82E	F 16 44	XXXXX	NM	
					XXXX.X	NM	
					XXBXX	M/S	
11:49		MCC	Insertion*				

5.0 POST INSERTION & TLI

PROG TIME	STEP	STA	ACTION/ENTRY	V-N DISPLAY	REGISTER DISPLAY		OPTION/EVENT
	1		DSKY Displays	06 62	XXXXX.	FPS	
			VI,HDOT & HPAD		XXXXX.	FPS	
			Record values		XXXX.X	NM	
		CMP	KEY V82E				
			Monitor DSKY Display	F 16 44	XXXX.X	NM	
			HA,HP,& TFF		XXXX.X	NM	
					XXBXX	M/S	
BDA LOS 00:12:42			Record Values				
			PROCEED				
			Key V37E 00E				
			When CMC lt out				
			Key V66E				
			(Transfer SV into LM memory)				
			CMC MODE - FREE				
	2	CMP	Key V48E (Load DAP)	F 04 46	XXXXX		Load Desired DAP
			(Load R1 31102, R2 01111)		XXXXX		
					BLANK		
			PROCEED	F 06 47	XXXXX.	LB	Verify/
			CSM Weight		BLANK		Load desired DAP
					BLANK		
			PROCEED	F 06 48	XXX.XX	DEG	Verify/
			P Trim		XXX.XX	DEG	Load desired DAP
			Y Trim		BLANK		
			PROCEED				
			Key V46E (activates DAP)				
			Key V83E (check θ)	F 16 54	XXX.XX	NM	
					XXXX.X	FPS	
					XXX.XX	DEG	
			PROCEED				
			Unstow Checklist				
	3	CDR	GMBL MTRS (4) - OFF				
		LMP	MN BUS TIES (both) - OFF				
		CDR	TVC SERVO PWR (both) - OFF				
		CDR	ELS - MAN				
			CM RCS LOGIC - OFF				
			CAB PRESS REL vlv(both)-NORMAL/LATCHED				
			PLSS vlv - OFF				
			SECS PYRO ARM (both) - SAFE				

PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
			SECS LOGIC (both) - OFF			
			SECS ARM cb (2) - OPEN			
			FLOAT BAT cb (3) - open			
			ELS Bat cb (2) - open			
			PL VENT cb - open			
			DIR O2 - OFF (CW)			
			ROT CONTR PWR DIRECT - OFF			
			REPRESS PKG VLV - OFF			
			EMS FUNT - OFF			
			INSTALL COAS			
			MONITOR LV TANK PRESS			
			ΔP<36 psia (OXID > FUEL)			
			ΔP<26 psia (FUEL > OXID)			
			LOX TK PRESS >50 psia			
			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			
CYI AOS			x EMERGENCY CSM/LV SEPARATION		x	
00:16:29			x Coasting		x	
			x LV XLUNAR - SAFE		x	
			x SECS ARM cb (both) - close		x	
			x SECS LOGIC (both) - ON		x	
			x SECS PYRO ARM (both) - ARM		x	
			x ROT CONTR PWR DIRECT (both) - MNA/MNB		x	
			x SC CONT - SCS		x	
			x BMAG MODE (3) - ATT 1/RATE 2		x	
			x SCS TVC SERVO PWR 1 - AC1/MNA		x	
			x 2 - AC2/MNB		x	
			x (Continue through thrusting)		x	
			x		x	
			x THRUSTING (TLI)		x	
			x TRANS CONTR - CCW (4 Sec)		x	
			x MN BUS TIE (both) - ON		x	
			x GMBL MTRS (4) - ON (LMP Confirm)		x	
			x TRANS CONTR - NEUTRAL & +X		x	
			x ΔV THRUST A&B - NORMAL		x	
			x THRUST ON PB - PUSH		x	
			x TRANS CONTR +X - RELEASE		x	
			x ΔV THRUST A&B - OFF When Clear		x	
			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			
		CMP	SM RCS HTRS (4) - PRIM			
			CM RCS PRPLNT (both) - OFF			
			CM RCS PRPLNT tb (both) - BP			
			C/W function - NORMAL			
			BPC JETT KNOB - 180° from BPC JETT			
			GN2 VLV HNDL - pull			
			HATCH GEAR BOX - LATCH (verify)			
			ACTR HNDL SELECTOR - neutral			
			STRUT UNLOCK LANYARD (2) - stow			

PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
		LMP	STM/UR DUCT HTR cb (both) - close TLM INPUTS - LOW FC REACS vlv - NORM H2 PURGE LINE HTR - ON COAS/TUNL LTG MNB - CLOSE Unstow Checklist			
	4	CMP	SM RCS CHECK SM RCS SEC PRPLNT TB (4) - GRAY He 1&2 TB (8) - GRAY PRIM PRPLNT TB (4) - GRAY RCS IND SW - SM A,B,C,D PKG TEMP - 105-195° F (C/W 75°-205°) He PRESS - Record _____ MANF PRESS - 178-192 psi (C/W 145°-205°) He TK Temp - Record PRPLNT QTY - Record _____ When MANIF PRESS <150 psia RCS SEC FUEL PRESS A(B,C,D)-OPEN			
	5	CMP	CM RCS CHECK CM RCS PRPLNT TB (both) - BP RCS IND SW - CM 1,2 He TEMP - 60-90° F He PRESS - 4100-4200 psia MANIF PRESS - 25-105 psia (287-302 after activation) CM RCS HTRS - OFF (ON 20 min prior to pressurization if req'd)			
	6	CMP	C&W OPER CHECK C/W LAMP TEST - 1 (hold) M/A Pnl 1 - ON LH C/W lts (16) - ON C/W LAMP TEST - 2 (hold) M/A Pnl 1 - OFF LH C/W lts (16) - OFF M/A Pnl 3 - ON RH C/W lts (23) - ON C/W LAMP TEST - OFF (lts OFF) C/W CSM - CM CM RCS lt (both) - ON M/A Tone & Lts (3) - ON, RESET M/A tone & lts (3) - OFF C/W CSM - CSM CM RCS lts (both) - OFF			

PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
	7	CMP	CMP to LEB for MN REG CHECK			
			UNSTOW FROM R6:			
			TAPE			
			HELMET BAGS			
			ACCESSORY BAGS			
			MAIN REG B vlv - CLOSE			
			EMER CAB PRESS vlv - 1			
			PUSH TO TEST - PUSH (O2 FLOW INC)			
			MAIN REG B vlv - OPEN			
			MAIN REG A vlv - CLOSE			
			EMER CAB PRESS vlv - 2			
			PUSH TO TEST - PUSH (O2 FLOW INC)			
			MAIN REG A vlv - OPEN			
			EMER CAB PRESS vlv - BOTH (OFF if suited)			
			Unstow:			
			Tool E for CDR			
			Camera			
			Install optics eyepieces			
	8	ALL	SUIT CKT RET VLV - OPEN (Pulled)			
			REMOVE HELMETS & GLOVES			
		CDR	DIRECT ULLAGE CB (both) - open			
		LMP	Panel 278 cb 1&2 - open			
	9		SEC RAD LEAK Ck			
		CMP	Notify LMP when ready to commence			
			SEC GLY to RAD vlv - NORMAL			
			Allow 30 sec for LMP to monitor accum qty			
			SEC GLY to RAD vlv - BYPASS			
		LMP	Monitor SEC ACCUM QTY while CMP sets			
			SEC GLY TO RAD vlv to NORMAL 30 sec			
			then back to BYPASS			
+20:00	10	ALL	ECS POST INSERTION CONFIG			
		CMP	DRINKING WATER TURN ON			
			POT H2O HTR - MNA			
00:23:36		LMP	PCM BIT RATE - LOW			
			UP TLM CMD - RESET			
			VHF AM A - SIMPLEX			
			VHF AM B - OFF (ctr)			
			FC purge check			
			H2/O2 PURGE (6) - ON (mon)			
			Observe flow rate inc			
			reset MA as req'd)			
			H2 PURGE LINE HTR - OFF			
			SYS VERIF & MONITORING			
	11	LMP	EPS PER VERIF (If req'd)			
			Cryogenic Pressure - Quantity Check			
			H2 PRESS (both) - 225-260 psia			
			O2 PRESS (both) - 865-935 psia			

PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
			SURGE TK PRESS - 865-935 psia			
			H2 QTY (both) - record			
			O2 QTY (both) - record			
			CRYO FANS - OFF; ON as req'd			
			FC Power Plant Check			
			FC HTRS (3) - on (up)			
			FC REACT tb (3) - gray			
			FC IND sw - 1, 2, 3			
			H2 FLOW - 0.03-0.15 lb/hr			
			O2 FLOW - 0.25-1.2 lb/hr			
			MOD SKIN TEMP - 390-450° F			
			MOD COND EXH TEMP - 150-175° F			
			FC pH HI TB - gray			
			FC RAD TB (3) - gray			
			FC HTRS (3) - gray			
			FC REACS & RAD cb (6) - out all others in (Verify)			
			D-C Voltage-Amperage Check			
			MN BUS TIE (2) - OFF (verify)			
			FC MNA TB - 1&2 gray, 3 BP			
			FC MNB TB - 1 BP, 2&3 gray			
			FC 1,2,&3 (RECORD AMPS)			
			MAIN BUS A,B, (26.5-31 vdc-Record)			
			BAT BUS A, B, & BAT C (34-38 vdc <3 amp)			
			PYRO BAT A, B (36.5-37.5 vdc)			
			DC IND SEL - MNB			
			SYS TEST 4B (BAT RLY BUS - 3.4-4.1 vdc)			
			SYS TEST 4A (BAT COMPT PRESS) - <1.5 vdc (NA UNTIL 1st VENT)			
			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			
			x If >1.5: BAT VENT VLV - x			
			x VENT (to ∿0) then CLOSED x			
			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			
			A-C VOLTS - 113 to 117 all PHASES			
	12	LMP	BAT CHARGING			
			ECS RAD HTRS OVLD - close (verify)			
			MAIN BUS TIE A/C (B/C) - OFF			
			BAT BUS A&B PYRO BUS TIE cb - OPEN			
			BAT C BAT BUS A&B cb - OPEN			
			BAT RLY BUS BAT A(B) cb - OPEN			
			DC IND sw - BAT CHARGER			
			BAT CHARGE - A(B,C)			
			DC VOLTS - 37.5-40 vdc			
			DC AMPS - 2.0-0.4 amps			

PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
			BAT CHARGE - OFF at 39.5 vdc or 100% re-charge BAT RLY BUS BAT A(B) cb - closed SYS TEST 4A (BAT VENT <1.5) xxxxxxxxxxxxxxxxxxxxxxxxxxx x If >1.5: BAT VENT VLV -x x VENT (to ∿0) then CLOSEDx xxxxxxxxxxxxxxxxxxxxxxxxxxx			
	13	LMP	ECS MON CHECK CABIN ΔP - -1 to -3.5 in H2O O2 FLOW - 0.02-0.45 lb/hr (after changeover) O2 SURGE TANK PRESS - 865-935 psia REPRESS O2 >865 psia PRIM RAD tb - gray *If PRIM RAD tb - 2 * * ECS RAD FLOW AUTO CONT - 1 Until* * tb gray, then AUTO * ECS RAD TEMP PRIM IN - 67-97°F ECS RAD TEMP PRIM OUT - -20° to +63°F PRIM GLY EVAP TEMP OUT - 40-50.5°F PRIM GLY EVAP STEAM PRESS .1-.15 boiling, > .16 not boiling PRIM GLY DISCH PRESS - 40-52 psig SUIT TEMP - 45-55°F CABIN TEMP - 70-80°F SUIT PRESS/CABIN PRESS - 4.7-5.3 psia PART PRESS CO2 < 7.6 mm Hg			
	14	LMP	SPS PERIODIC VERIFICATION SPS PRPLNT TK TEMP - +45° to +75° F (If <45° F - SPS LINE HTR-A) (If >75° F SPS LINE HTRS - off (ctr)) SPS PRPLNT TK PRESS: He - 3900 psia max. N2A & B - 2900 psia max. SPS PRESS IND sw - He FUEL PRESS - 170-195 psia OXID PRESS - 170-195 psia SPS ENG INJ VLVS (4) - CLOSE SPS OX, FUEL & UNBAL QTY - record OXID FLOW VLV - PRIM SPS He VLV (both) - AUTO SPS He VLV TB (both) - BP			

PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
	15	CDR	ALIGN GDC TO IMU - CHECK GDC DRIFT FDAI SELECT - 1 FDAI SOURCE - ATT SET ATT SET - IMU Null error needles W/3 thbwls FDAI SELECT - 1/2 ATT SET - GDC GDC ALIGN - PRESS Record Drift BMAGS (3) - RATE 2			KEY V16 N20 ATT SET thbwls- adjust to IMU gmbl angs on DSKY ATT SET - GDC GDC ALIGN PB - PUSH, HOLD
	16	CDR	UNSTOW CAMERA BRACKET & ORDEAL			
	17	CDR	MOUNT ORDEAL BOX & Initialize ORDEAL INITIALIZATION (a) CMC - ON (Req) IMU - ON (Req) SCS - ON (Req) (b) ORDEAL panel: FDAI 2 or 1 - ORB RATE ORDEAL PWR sw - EARTH (10 watts) MODE - HOLD/FAST (c) Obtain altitude setting - V82E A. or B. or C. MSFN SUPPLY ALTITUDE If CMC is in STANDBY (d) Adjust ALT SET dial to proper altitude (e) Damp Vehicle Rates (f) Obtain A. Rendezvous Parameter Display Routine V83E or B. FROM MSFN If CMC is in STANDBY, hold +X at the horizon (g) Slew FDAI to proper angle with the SLEW switch on the ORDEAL panel (h) Set MODE switch to SLOW/OPR (i) Adjust FDAI precisely with the SLEW switch (j) Repeat Steps (f) through (i) as Required			

PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
	18	LMP	ECS REDUNDANT COMP CHECK			
	19	CMP	CONFIGURE CAMERAS			
TAN AOS 00:37:01			OPTICS DUST COVER JETT			
			OPTICS ZERO - OFF			
			G/N OPT PWR - ON			
			OPT MODE - MAN			
			OPT COUPLING CONT - DIRECT			
			OPT SPEED CONT - HI			
			OHC - MAX RIGHT - OBS EJECT thru eyepiece			
TAN LOS 00:42:35			MCCH - G/N STATUS Z Torquing angle _____			
SUNSET						
CRO AOS		CMP	IMU REFSMMAT Realign Check (P52)			
			Perform P-52, Step - 20 (if req'd) or Go to Step 21			
	20		IMU REALIGN PROGRAM P-52			
		LEB	Key V37E 52E			
			(a) DSKY displays P-52			Poss prog alarm Key V05 N09E R1 00210 (ISS not on) or R1 00220 (IMU orient unknown) F V37. Perform ISS start-up and/or P-51
			(b) IMU Orien Option Code (preferred is 00001)	F 04 06	00003 0000X BLANK	Poss F 05 09, R1 00215 Key V32E Recycle Step (b) Key V22E Load desired option
			PROCEED			
			(c) DSKY Displays R,P,Y	F 06 22	XXX.XX DEG XXX.XX DEG XXX.XX DEG	
			PROCEED			Select desired ATT CONTROL MODE MNVR S/C Key V32E
			(d) (Coarse Align Rou R-50) Verify Coarse Align Complt No ATT LT - ON then OFF Monitor Ball Motion			

PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
			(e) Target Acquisition	F 50 25	00015 BLANK BLANK	
			CMC Assists in Selection select desired Att Control Mode Mnvr S/C			Crew manually acquired targ ENTR
		LEB	PROCEED			
			Possible DSKY display (2 targets not available) Manvr S/C until suitable target acquired	F 05 09	00405	
		LEB	PROCEED			Key V32E Recycle Step (e)
			(f) Target Code	F 01 70	000XX BLANK BLANK	
		LEB	OPT MODE - CMC PROCEED			KEY V25E Load desired code
			<u>If target not a planet go to step (h)</u>			
			(g) Planet only X,Y,Z PL	F 06 88	.XXXXX .XXXXX .XXXXX	
			PROCEED			KEY V25E Load desired data
			(h) <u>Auto Opt Positioning Rou R-52</u> Desired opt angles SA,TA	06 92	XXX.XX DEG XX.XXX DEG	Poss F 05 09 00404(TA>90°) Mnvr to reduce TA PROCEED or Poss Prog alarm Key V05 N09E 00407(TA>50°) Key RLSE, Mnvr to reduce TA
			When sighting marks are desired			
		LEB	OPT MODE - MAN <u>Sighting Mark Rou R-53</u>			
			(i) Please mark center target in SXT MARK (on target)	F 51		

PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
			(j) Terminate marks	F 50 25	00016	
			PROCEED			Mark rej PB-PUSH Ret to step (i)
			(k) Target code (Targ code for PL 00)	F 01 71	000XX	
			PROCEED			Key V21E Load target code
			If target code other than 00, Ret to Step (f) for 2nd target			
			(l) Planet only X,Y,Z PL	F 06 88	.XXXXX .XXXXX .XXXXX	
			PROCEED			KEY V25E Load desired data
			Ret to Step (f) for 2nd target			
			Sighting Data Display Rou R-54			
			(m) Sighting ang diff	F 06 05	XXX.XX DEG BLANK BLANK	
			PROCEED			Key V32E go to step (o)
			Gyro Torquing Rou R-55			
			(n) Δ GYRO ANG X,Y,Z	F 06 93	XX.XXX DEG XX.XXX DEG XX.XXX DEG	
			PROCEED Gyros torqued			Key V32E
			(o) Fine Align Check	F 50 25	00014	
			PROCEED Ret to step (f)			ENTR
			(p) DSKY displays	F 37		
			(q) OPT ZERO - ZERO OR MAN RETICLE BRIGHTNESS - DIM G/N OPT PWR - ON (verify) G/N PWR - ON (verify)			

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PROG TIME	STEP	STA	ACTION/ENTRY *REPORT	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
	21	LMP	RETICLE BRIGHTNESS - DIM			
			STOW OPTICS EYEPIECES			
HSK AOS			REPORT GYRO TORQUING ANGLES			
00:59:30						
01:28:19			BACKUP COMM CHECK			
US AOS			S BD XPNDR - OFF (4 sec) - PRIM			
			PWR PMP - AUX			
			S BD AUX - DN VOICE BU			
			UP TLM DATA - UP VOICE BU			
			S BD VOL - UP			
			INITIAL CONTACT ON VHF A			
			RECEIVE GO FOR BU COMM CK ON VHF A			
			VHF VOL - DN			
			PERF BU COMM CK			
			VHF VOL - UP			
			S BD AUX TAPE - OFF			
			UP TLM DATA - DATA			
			PWR PMP - NORM			
			VOICE CK WITH MCCH (VHF VOL UP/DN)			
	22	CDR	SCS ATT Ref Comp CHECK			
			KEY V16 N20E			
			FDAI SELECT - 1			
			FDAI SOURCE - ATT SET			
			ATT SET - GDC			
			ATT SET dials - null FDAI 1 err needles			
			Key VERB when nulled (freeze display)			
			Record from DSKY:			
			R___,P___,Y___			
			Record ATT SET dials:			
			R___,P___,Y___			
			FDAI SEL - 1/2			
			EXTEND DOCKING PROBE			
			CB DOCK PROBE (2) - CLOSE (verify)			
			PROBE EXTD/REL - EXTD/REL until TB-BP			
			COPY TLI, TLI ABORT, & P37 PADS			
			TLI+10 MIN PITCH ANGLE			
			SV UPDATES (MCCH)			

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PROG TIME	STEP	STA	ACTION/ENTRY	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
	23	CDR	TRANSLUNAR INJECTION (TLI)			
			Preparations			
			SUIT CKT RET vlv - close (push)			
			Translunar sw-Inject (Verify)			
			EDS Power - On (Verify)			
			EMS cb (2) - Close			
			EMS Func. - Off (Verify)			
			EMS MODE - STBY			
			EMS FUNC - ΔV set/VHF RNG			
			Set ΔV ind. to +1586.8 fps			
			EMS MODE - NORMAL			
			EMS Funct. sw - ΔV Test			
			SPS THRUST LITE - on/off			
			ΔV IND decreases (10 sec)			
			SPS Thrust lite - ON/OFF (10 sec)			
			ΔV ind. Stops at -0.1 to -41.5			
			EMS MODE - STBY			
			EMS Func - ΔV SET/VHF RNG			
			Set ΔVC _____			
			EMS FUNC - ΔV			
			ALIGN GDC TO IMU - CHECK GDC DRIFT			Key V16 N20
			FDAI SELECT - 1			ATT SET thbwls-
			FDAI SOURCE - ATT SET			-adjust to IMU
			ATT SET - IMU			gmbl angs on
			Null error needles W/3 Thbwls			DSKY
			FDAI SELECT - 1/2			ATT SET - GDC
			ATT SET - GDC			GDC ALIGN PB -
			GDC ALIGN - PRESS			PUSH, hold
			FDAI Scale - 5/1			
			SECS ARM cb (2) - Close			
			SECS LOGIC cb (2) - Close			
			SECS LOGIC (Both) - ON (UP)			
			MSFN Confirm Go for PYRO ARM (If poss)			
			SECS PYRO (2) - ON (UP)			
			TRANS CONTROL PWR - ON (UP)			
			ROT CONTR PWR NORM (Both) - AC/DC			
			ROT CONTR PWR DIRECT (Both) - MNA/MNB			
			LV/SPS Ind - SII/SIVB (Verify)			
			LV GUID - IU (Verify)			
			DIRECT ULLAGE CB (2) - CLOSED			
			Set EVENT TIMER to 51:00			
			Begin MONITOR For TB6			
		CMP	RTN to Couch			
			KEY V83E			

PROG TIME	STEP	STA	ACTION/ENTRY	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
	24	ALL	Donn Helmets and Gloves			
(02:21:46)						
	25	CDR	TB 6 - SII SEP Lite ON (TIG 9 min 38 sec)			
			FDAI #2 ORB RATE at 180,0,0			
			SII SEP LITE OUT			
51:00			Start DET COUNTING UP			
			SCS CONT - SCS			
			LV TANK PRESS (4) - Check			
			ΔP<36 psia (OXID>FUEL)			
			ΔP<26 psia (FUEL>OXID)			
			LO2>50 psia			
	26	CMP	UP TLM CM - BLOCK			
			UP TLM IU - ACCEPT			
57:00			Key V37E 47E - Thrust Monitor			
			(Check Bias)			
			DSKY - P-47			
			(ΔV COMPONENTS)	F 16 83	XXXX.X FPS	
			ΔVX,Y,Z (CONT)		XXXX.X FPS	
					XXXX.X FPS	
			ORDEAL - 200/LUNAR			
			ORDEAL FDAI 1 - ORB RATE			
			FDAI 2 - INERTIAL			
			SLEW FDAI TO Pitch = 16°			
58:00			KEY N62E	F 16 62	XXXXX. FPS	
			VI,HDOT,HPAD		XXXXX. FPS	
					XXXX.X NM	
			Monitor VI at Cutoff			
	27	LMP	MN BUS TIE (2) - ON (UP)			

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PROG TIME	STEP	STA	ACTION/ENTRY	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
	28	CDR	EMS MODE - NORMAL			
			SCS TVC SERVO PWR 1 AC1/MNA			
			SCS TVC SERVO PWR 2 - OFF			
		CMP	TAPE RCDR - FWD/RCD/HBR/CMD/RESET			
58:36			SII SEP lite - ON			
58:38			SIVB ULLAGE Begins			
			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			
			x TLI Inhibit Signals will not x			
			x be honored after 59:42 x			
			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			
59:00			INSURE FDAI #1 Pitch=8°			
59:42			SII SEP lite-Off (TIG - 18 Sec)			
59:52			SIVB FUEL LEAD			
59:55			SIVB ULLAGE DISCONT			
			INSURE FDAI #1 Pitch=4°			
59:59			LV ENG 1 lite-on (TIG - 1 Sec)			
(02:31:24)			START ORDEAL TORQUING			
00:00			SIVB IGNITION (____:____:____GETI)			
00:02			LV ENG 1 lite-Off			
			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			
			x LV GUID FAIL - Fly LV x			
			x to P=0° on FDAI #1 and x			
			x HOLD FOR DURATION OF BURN x			
			x FLY YAW PROFILE FROM ONBOARD x			
			x CHART x			
			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			
01:00			Report Status			
02:00			Report Status			
03:00			Report Status			
04:00			Report Status			
05:00			Report Status			
			MONITOR BURN THRUST & ATTITUDE			
			LV TK PRESS _____			
05:48			SIVB SHUTDOWN (lt On)			
			xxxxxxxxxxxxxxxxxxxxxxxxxxx			
			x EMERGENCY SIVB CUTOFF x			
			x THC - CCW & NEUTRAL IN x			
			x 1 SEC x			
			x SII/SIVB sw - LV STAGE x			
			xxxxxxxxxxxxxxxxxxxxxxxxxxx			
			KEY VERB (FREEZE DISPLAY)			
			SIVB ATT HOLD 20 sec & BEGIN VENTING			
			SIVB MNVR TO ORB RT (HDS DN)(.3°/sec)			

PROG TIME	STEP	STA	ACTION/ENTRY	V-N DISPLAY	REGISTER DISPLAY	OPTION/EVENT
	29	CMP	Record VI_____			
			HDOT____			
			HPAD____			
			Key RLSE			
			Record ΔVX_____			
			ΔVY_____			
			ΔVZ_____			
			TVC SERVO PWR 1 - OFF			
			PCM BIT RATE - LOW			
			EMS MODE - STBY			
			EMS FUNC - OFF			
			SECS PYRO ARM (2) - SAFE			
			FDAI #1 - INERTIAL			
			PROCEED	F 37		
08:00			00E			
			WAIT TILL CMC ACTY LT OUT			
			V66E			
			CMP TO COUCH			
			CDR TO COUCH			

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6.0 POST ABORT PROCEDURES

6.1 LOW ALTITUDE MODE IA

Pad to 42 sec

(Pad to 10,000 feet)

DET			BACKUP PROCEDURE
00:00	1.	ABORT (MANUAL OR AUTOMATIC)	CM/SM SEP SW (2) - ON
		BECO (AFTER T + 00:30)	
		EVENT TIMER RESET	Reset and start manually at LES burnout
		CM RCS PRESSURIZE	CM RCS PRESS SW - ON
		RCS TRANS TO CM	RCS TRANS SW - CM
		ENTRY BAT TO MAIN BUS (IF IN AUTO)	
		CM/SM UMB DEADFACE	CM/SM SEP SW (2) - ON
		RCS OX DUMP	
		CM - RCS ISOLATION VALVES CLOSE	CM RCS PRPLNT SW (2) - ON
00:00.1		CM/SM SEPARATION	CM/SM SEP SW (2)
		LES AND PC MOTORS FIRE	LES MOTOR FIRE PB - press (PC motor will not fire)
00:01.8		CM/SM SEP PYRO DEADFACE	
00:05		CM RCS FUEL DUMP	
00:11		CANARDS DEPLOY	
00:14		TOWER JETT	TWR JETT SW (2) - ON
		DOCKING RING SEP	CSM/LM FINAL SEP (2) - ON
		ELS ARM AUTO	*ELS LOGIC SW - ON
		RCS AUTO SAFED AT TWR JETT	*RCS CMD SW - OFF
00:14.4		APEX COVER JETT	*APEX COVER JETT PB - press
00:16		DROGUE CHUTES DEPLOY	*DROGUE DEPLOY PB - press
00:18		RCS He PURGE	*CM RCS He DUMP PB - press
		xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx x AT 3700 FT INDICATED OR BELOW x x DEPLOY MAINS IMMEDIATELY. x x x x + ACTUAL MINIMUM ALTITUDE WILL x x BE SET WITH ALIDADE MARKER ON x x LAUNCH DAY. x xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	
00:28		MAIN CHUTES DEPLOY	*MAIN DEPLOY PB - press (If <10K')

*designates backup procedure normally performed by crew.

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6.2 MEDIUM ALTITUDE MODE IB

(42 sec to 100,000 ft)

(10,000 ft to 1 min 56 sec)

DET		BACKUP PROCEDURE
00:00	1. ABORT (MANUAL OR AUTOMATIC)	CM/SM SW (2) - ON
	BECO	
	EVENT TIMER RESET	Reset and start manually at LES burnout
	CM RCS PRESSURIZE	CM RCS PRESS SW - ON
	CM/SM UMB DEADFACE	CM/SM SEP SW (2) - ON
00:00.1	CM/SM SEPARATION	CM/SM SEP SW (2) - ON
	LES MOTOR FIRE	LES MOTOR FIRE PB - press
00:01	CM RCS ENABLES	RCS CMD SW - ON
00:01.8	CM/SM SEP PYRO DEADFACE	
00:11	CANARDS DEPLOY	*CANARD DEPLOY PB - press
00:14	ELS ARM AUTO	*ELS LOGIC SW - ON (IF BELOW 24K')
	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx TWR will jett at 14 sec if alt <37K' (barro's closed) xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	
24K'	TOWER JETT	*TWR JETT SW (2) - ON
	DOCKING RING SEP	CSM/LM FINAL SEP (2) - ON
	RCS DISABLED	*RCS CMD SW - OFF
	APEX COVER JETT	*APEX COVER JETT PB - press
24K+.4SEC		
24K+ 2SEC	DROGUE CHUTES DEPLOY	*DROGUE DEPLOY PB - press
23.5K'	2. VERIFY CABIN PRESSURE INCREASE	If not increasing by 17K' cabin press release valve - dump
10K'	MAIN CHUTES DEPLOY	*MAIN DEPLOY PB - press

*Designates backup function manually performed by crew

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6.3 HIGH ALTITUDE MODE IC

100,000 feet to TWR JETT

(1 min 56 sec to 3 min 16 sec)

DET		BACKUP PROCEDURE
00:00	1. ABORT (MANUAL OR AUTOMATIC)	CM/SM SEP SW (2) - ON
	BECO	
	EVENT TIMER RESET	Reset and start manually and LES burnout
	CM RCS PRESSURIZE	*CM RCS PRESS SW - ON
	RCS TRANS TO CM	*RCS TRANS SW - CM
	CM/SM UMB DEADFACE	CM/SM SEP SW (2) - ON
00:00.1	CM/SM SEPARATION	CM/SM SEP SW (2) - ON
	LES MOTOR FIRE	LES MOTOR FIRE PB - press
00:01	CM RCS ENABLED	*RCS CMD SW - ON
00:01.8	CM/SM SEP PYRO DEADFACE	
00:11	CANARDS DEPLOY	*CANARD DEPLOY PB - press
00:14	ELS LOGIC ARM	*ELS LOGIC SW - ON
	KEY V82E	Pilot Option if Platform GO & HA >33NM
	PLATFORM NO/FO OR HA<33NM	2. TWR JETT SW (2) - ON
	2. ESTABLISH 5°/SEC + PITCH RATE	3. MAN ATT SW(PITCH)-RATE CMD
	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	4. DAMP RATES
	x DAMP RATES IN YAW & ROLL x	5. MAN TO ENTRY ATT
	x DAMP + PITCH RATES BY ROLLING S/Cx	6. BMAG MODE SW (3)-ATT 1/ RATE 2
	x 90° AND USING YAW THRUSTERS x	7. EMS ENTRY/AUTO
	x ROLL HEADS DOWN & ESTABLISH x	8. At 0.5G LT-0.05G SW - ON
	x +5°/sec PITCH RATE x	9. FLY MAX LIFT
	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	10. PROCEED TO 24K'
	3. C/W MODE - CM	
24K'	TOWER JETT	*TWR JETT SW (2) - ON
	DOCKING RING SEP	*CSM FINAL SEP SW (2) - ON
	RCS DISABLE	*RCS CMD SW - OFF
	APEX COVER JETT	*APEX COVER JETT PB - press
24K+.4SEC		
24K+ 2SEC	DROGUE CHUTES DEPLOY	*DROGUE DEPLOY PB - press
23.5K'	9. VERIFY CABIN PRESSURE INCREASE	CABIN PRESS RELEASE - dump
10K'	10. MAIN CHUTES DEPLOY	(If not increasing by 17K')

*Designates backup functions manually performed by crew

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6.4 SPS MODE II

TWR JETT TO RFL <3200 NM (ΔR <-400 NM)

(3 min 16 sec to 10 min 08 sec)

DET		BACKUP PROCEDURE
00:00	1. ABORT THC - CCW	Warning: Steps (1) thru (16) must be completed within 1 min 40 seconds elapsed time.
	BECO	
	EVENT TIMER RESET	Reset and start manually
	DIRECT ULLAGE START	DIRECT ULLAGE PB - press
00:03	S-IVB/CSM SEP	*CSM/LV SEP PB - press
00:03.8	SCS STABILIZATION ENABLE	*RCS CMD - ON
00:05	2. THC NEUTRAL AND +X TRANS (MAINTAIN FOR 20 SEC)	
00:24	3. TERMINATE +X TRANS (THC - NEUTRAL)	FOR TIMES NEAR MODE II/III CROSSOVER DETERMINE ABORT MODE FROM ΔR DISPLAY
	4. V82E - N50E	
	5. START MANEUVER TO ENTRY ATT R=0°, P=120°, Y=0°	
	6. BMAG SW (3) - ATT 1/RATE 2	
	7. cb MNA & B and DATC - closed	
	8. TIME PERMITTING TRANS RCS TO CM AND CHECK	
	9. NOTE TFF, IF >2:00 YAW 45° before CM/SM SEP	
	10. CM/SM - SEP (2)	
	CM/SM DEADFACE	
	CM - RCS PRESS	*CM RCS PRESS SW - press
	CM/SM SEP	
	RCS TRANS - CM	
	11. CSM/LM FINAL SEP SW (2) - ON	
	12. CAUT & WARN - CM	
	13. EMS - ENTRY	
	14. EMS MODE - NORMAL	
	15. NOTE TFF (FOR ENTRY ATT TIME)	
01:40	16. COMPLETE MANEUVER CM TO FDAI ENTRY ATTITUDE R=0°, P=120° Y=0° (BEF, HEADS DOWN, LIFT VECTOR UP)	
	17. OBTAIN PITCH UPDATE	
	18. SET UP FOR SINGLE RING RCS	
	19. AT 0.05G LIGHT 0.05G SW - 0.05G	
	20. EMS ROLL SW - ON (ALIGN)	
	21. FLY MAX LIFT	
	22. KEY N62E monitor altitude	

*Designates backup function manually performed by crew

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6.5 SPS MODE III

RETROGRADE**

RFL >3200 NM (ΔR >-400 NM) to insertion

(10 min 08 sec) (11 min 53 sec)

DET		BACKUP PROCEDURE
00:00	1. ABORT THC - CCW	Warning: Steps (1) thru (14) must be completed within 2 min 05 sec elapsed time
	BECO	
	EVENT TIMER RESET	Reset and start manually
	DIRECT ULLAGE START	DIRECT ULLAGE PB - press
00:03	S-IVB/CSM SEP	*CSM/LV SEP PB - press
00:03.8	SCS STABILIZATION ENABLE	*RCS CMD - ON
	2. LV/SPS IND SW - GPI	
00:05	3. THC NEUTRAL AND +X TRANS (MAINTAIN FOR 20 SEC)	DIRECT ULLAGE PB - press
00:24	4. TERMINATE +X TRANS (THC - NEUTRAL)	
	5. V82E N50E	
	**NOTE: IF -400 NM<ΔR<0NM, No Retro burn required; substitute entry attitudes (step 27) for retro attitude (step 6) and proceed to step 17.	
	6. MANEUVER CSM TO RETRO ATTITUDE (FDAI APPROX R=180°, P=194°, Y=0°) SCRIBE LINE ON HORIZON, BEF, HEADS UP	
	7. OBTAIN RETRO UPDATE	
	8. SCS TVC (2) - AUTO	
	9. BMAG MODE SW (3) - ATT 1/RATE 2	
	10. RATE - LOW	
	11. CHECK MTVC AND GIMBAL ANGLES	
	12. EMS MODE - NORMAL	
	13. ΔV THRUST SWITCH (A) - NORMAL	
01:50	14. START ULLAGE (THC)	DIRECT ULLAGE PG - press
02:05	15. SPS THRUST - Push	
02:06	16. STOP ULLAGE (THC-NEUTRAL)	DIRECT ULLAGE PB - release
	17. THRUST TERMINATE AT ΔV REMAINING = DESIRED VALUE ΔV THRUST SW (2) - OFF	Burn ΔR = 0 on DSKY
	18. SET UP FOR SINGLE RING RCS	
	19. TIME PERMITTING TRANS RCS TO CM AND CHECK	
	20. RATE - HIGH	

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21. NOTE TFF, IF >2:00
    YAW 45° before CM/SM SEP
22. cb MNA & B BAT C (2) - closed
23. CM/SM SEP (2) - ON
    CM/SM DEADFACE
    CM/RCS PRESS *CM RCS PRESS SW - ON
    CM/SM SEP
    RCS CONTROL TRANS TO CM *RCS TRANS - CM
24. CSM/LM FINAL SEP SW (2) - ON
25. C/W MODE - CM
26. EMS MODE STBY
27. EMS FUNCTION - ENTRY
28. EMS MODE - NORMAL
29. MANEUVER CM TO FDAI ENTRY ATTITUDE
    R=0°, P=105°, Y=0°
    (BEF, HEADS DOWN, FULL LIFT)
30. OBTAIN ROLL, PITCH, AND YAW UPDATE
31. AT 0.05G LIGHT, 0.05G SW - ON
32. AT 0.2G LIGHT, ROLL LEFT 55°
33. EMS ROLL - ON (ALIGN)
34. FLY HALF LIFT
35. KEY N62E

*Designates backup functions manually performed by crew

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6.6 SPS MODE IV**

POSIGRADE

21,800 fps, $\dot{h} \sim +250$, $h \sim 100$ nm to insertion

(9 min 00 sec to 11 min 53 sec)

DET		BACKUP PROCEDURE
00:00	1. ABORT THC - CCW	Warning: Steps (1) thru (14) must be completed within 1 min 30 sec elapsed time
	BECO	
	EVENT TIMER RESET	Reset and start manually
	DIRECT ULLAGE START	DIRECT ULLAGE PB - press
00:03	S-IVB/CSM SEP	*CSM/LV SEP PB - press
00:03.8	SCS STABILIZATION ENABLE	*RCS CMD - ON
	2. LV/SPS IND SW - GPI	
00:05	3. THC NEUTRAL AND +X TRANS (MAINTAIN FOR 20 SEC)	DIRECT ULLAGE PB - press
00:24	4. TERMINATE +X TRANS (THC - NEUTRAL)	
	5. MANEUVER CSM TO INSERTION ATTITUDE (FDAI APPROX R=180°, P-347°, Y=0°) SCRIBE LINE ON HORIZON, SEF, HEADS DOWN	
	6. CHECK MTVC AND GIMBAL ANGLES	
	7. EMS MODE - AUTO	
	8. ΔV THRUST SWITCH (A) - NORMAL	
01:30	9. DIRECT ULLAGE PB - press	
	10. SPS THRUST - PUSH	
	11. STOP ULLAGE	
	12. FLY Vi,$\dot{h}$,h	KEY V82E
	13. ΔV THRUST SW (2) - OFF at Vi _____ (25570)	*Burn Hp>75 NM on DSKY for OFF NOMINAL ALTITUDES
	14. EMS MODE-STBY	
	15. GIMBAL MTRS (4) - OFF	
	16. TVC SERVO PWR (2) - OFF	
	17. INSERTION CHECKLIST	

*Designates backup functions manually performed by crew

**FOR G&N NO GO A FIXED ATTITUDE MODE IV will be employed based on ground supplied information. The burn will be performed 2:05 from abort initiation.

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6.7 APOGEE KICK

(Positive h and Beyond 5 min to Apogee Line)

DET		BACKUP PROCEDURE
00:00	1. Abort THC - CCW	
	BECO	
	EVENT TIMER RESET	
00:03	S-IVB/CSM SEP	CSM/LV Sep PB - PRESS
00:03.8	SCS STABILIZATION ENABLE	*RCS CMD - ON
	2. LV/SPS IND sw - GPI	
00:05	3. THC Neutral and (+)X TRANS (maintain for 20 sec)	DIRECT ULLAGE PB - press
00:24	4. TERMINATE +X TRANS (THC-Neutral)	
	5. Maneuver to INSERTION ATTITUDE (FDAI APPROX R=180°, P=347°, Y=0°) SCRIBE LINE ON HORIZON, SEF, HEADS DOWN	
	6. OBTAIN INSERTION UPDATE	
	7. BMAG MODE (3) - ATT 1/RATE 2	
	8. RATE - LOW	
	9. CHECK MTVC AND GIMBAL ANGLES	
	10. EMS MODE - AUTO	
.	11. ΔV THRUST sw (2) - NORMAL	
h=0	12. ULLAGE AND SPS THRUST PB - PRESS	
	13. V82E	
hp>75	14. ΔV THRUST sw (A) - OFF	
	15. EMS MODE - STBY	
	16. GIMBAL MTRS (4) - OFF	
	17. TVC SERVO PWR (2) - OFF	
	18. INSERTION CHECKLIST	

*Designates backup functions manually performed by the crew

7.0 TWR JETT FAILURE PROCEDURE

7.1 TWR CUT/NO JETT MOTOR FIRE (AUDIENCE)

1. Fire Main LES Motor Manually - LES Motor Fire PB - Press

   (a) If tower jettisons - continue mission
   (b) No response - carry LET Into Orbit

7.2 NO RESPONSE TO TWR JETT SWITCHES

1. Insure MESC & PYRO Arm Switches - ON (4)

2. Insure EDS Power Switch - ON (1)

3. Insure EDS CB's - ON (3)

4. Insure MESC Arm & Logic CB's - ON (4)

5. Attempt TWR JETT

   (a) TWR JETT Successful - Continue Mission
   (b) Not Successful - Carry LET Into Orbit

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8.0 ORBITAL COAST ABORT PROCEDURES

(ABORT FROM S-IVB)

ASSUME: S/C SWITCH POSITIONS ARE IN THE BOOST CONFIGURATION. VEHICLE STABILITY IS CONTROLLED BY S-IVB ATTITUDE CONTROL SYSTEM (IU).

			BACKUP PROCEDURE
	1.	ADAPT SEP PB - PUSH	THC - CCW
	2.	RCS CMD - ON	
	3.	THC UNLOCK AND +X START	DIRECT ULLAGE PB - push
	4.	S-IVB/GPI SW - GPI	
ABORT + 2 SEC	5.	ΔV THRUST SW (A) - NORMAL	
	6.	SPS THRUST - DIRECT ON	
	7.	STOP +X	Release DIRECT ULLAGE PB
GND SUPPLIED	8.	ΔV THRUST SW (2) - OFF	
(7000 ft)	9.	SPS THRUST - NORMAL	

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9.0 TLI BACKUP GUIDANCE PROCEDURES

EVENT	
TB5	KEY V46E
	GUIDANCE - CMC
	ORDEAL - 200/LUNAR
	KEY V16 N20E
	MANEUVER LV TO START ATTITUDE
	(R2 = 70.6°)
	NULL LV RATES
	ORDEAL FDAI #1 - ORB RATE
	ORDEAL MODE - FAST/HOLD
	SLEW FDAI #1 TO P=0°
TB6	S-II SEP LT - ON
51:00	S-II SEP LT - OFF
	START DET COUNTING UP FROM 51:00
57:00	KEY V37E V47E
	KEY N20E
58:00	INSURE FDAI #1=0 & R2=70.6°
58:20	ORDEAL MODE - OPERATE/SLOW
	(STARTS ORDEAL TORQUING)
	MANEUVER LV TO KEEP
	P=0°, Y=4.5° AND MAINTAIN THROUGHOUT BURN
58:36	S-II SEP LT - ON
	EMS MODE - NORMAL
58:38	LV ULLAGE START
59:42	S-II SEP LT - OFF (IGN - 18 sec)
59:59	ENG LT #1 - ON
00:00	IGNITION
00:02	ENG LT #1 - OFF
	FLY P=0°, Y=4.5°
05:48	CO on V1=_____

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