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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PRELIMINARY BLOCK II CSM FLIGHT CREW ABBREVIATED CHECKLIST

Prepared by

**MISSION TRAINING SECTION
MISSION OPERATION BRANCH
FLIGHT CREW SUPPORT DIVISION**

THIS CHECKLIST REPLACES THE PRELIMINARY BLOCK II
CSM CHECKLIST, DATED JULY 14, 1967, FOR USE IN
CSM 103 AND ON.



**MANNED SPACECRAFT CENTER
HOUSTON, TEXAS**

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A

LIST OF EFFECTIVE PAGES

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Unnecessary tabs on dividers should be cut away
and discarded.

SECTION A. BACKUP CREW PRELAUNCH CHECKS

INGRESS AND STATUS CHECKS

	1	Verify Controls	
CDR		SECS PYRO (both) - SAFE	8
		SIVB/LM SEP - off (down)	2
		CSM/LM FINAL SEP - off (down)	
		CM/SM SEP (both) - off (down)	
ALL		ALL Audio Panel Switches (24)-OFF	9,10,6
		Ck PL Vent vlv safety pin installed & handle secure	
	2	CONNECT COMM/CABLES (3)	
	3	Audio Panel Intercom Check	
		MODE - PTT	9,10,6
		HF - OFF	
		S BAND - T/R	
		POWER - AUDIO/TONE	
		INTERCOM - T/R	
		VHF - T/R	
		AUDIO CONT - NORM	
		SUIT PWR - ON	
	4	C&WS Status Check	
CMP		C/W function - NORMAL	2
		C/W mode - CSM	
		C/W PWR - 2	
ALL		MASTER ALARM tone/lts (3) - on, PUSH	1,3,122
		C/W PWR - 1	
		MASTER ALARM tone/lts (3) - on, PUSH	
		C/W LAMP TEST - 1	
		LH MASTER ALARM 1t - on	
		LH stat/lts (17) - on	
		C/W function - BOOST	
		LH MASTER ALARM 1t - on	
		C/W function - NORMAL	
		LH MASTER ALARM 1t - on	
		C/W LAMP TEST - 2	
		LH MASTER ALARM 1t - out	
		LH stat lts (17) out	
		RH MASTER ALARM 1t - on	

PRELAUNCH CHECK

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BLK II

ALL

	RH stat lts (24) - on	2
	C/W LAMP TEST - OFF	
	RH MASTER ALARM lt - out	
	RH stat lts (24) - out	
	C/W function - BOOST	
5	ECS Valve Status Check	
	SURGE TK PRESS REL vlv - AUTO (CW)	375
	PLVC - NORMAL	376
	O2 DEMAND REG vlv - BOTH	380
	SUIT TEST vlv - OFF	
	GLY to RAD PRIM vlv - NORMAL	
	Cabin PRESS REL vlv (both) - BOOST ENTRY	325
	(Safety Latch - OFF)	
	GLY RSVR IN vlv - OPEN	326
	GLY RSVR OUT vlv - OPEN	
	GLY RSVR BYPASS vlv - CLOSE	
	DIRECT O2 vlv - CLOSE (CW)	7
	PRESS EQUAL vlv - CLOSED	Fwd hatch
	C/M PRESS DIFF vlv - TUNNEL VENT	12
	C/M PRESS DIFF - 0 psi	
	CABIN HT EXCH LOUVERS-Centered	
	PRIM CABIN TEMP vlv - COLD (CW)	303
	SEC CABIN TEMP vlv - COOL-MAX (CW)	
	DRINKING WATER SUPPLY vlv - OFF (CW)	304
	FOOD PREP WATER COLD vlv - release	305
	FOOD PREP WATER HOT vlv - release	306
	GLY TO RAD SEC vlv - NORMAL	
	PRIM ACCUM FILL vlv - OFF	379
	PRIM GLY ACCUM vlv - on (CCW)	378
	Open coolant attenuation panel	
	SUIT CKT RET SHUT OFF vlv - CLOSE (CW)	381
	SUIT HT EXCH PRIM GLY vlv - FLOW (CCW)	382
	SUIT FLOW REL vlv - OFF	
	PRIM GLY EVAP TEMP IN vlv - max cool (CCW)	
	SUIT HT EXCH SEC GLY vlv - FLOW	
	EVAP WATER CONT vlv (both) - AUTO	
	WATER ACCUM vlv (both) - RMTE	
	Close coolant attenuation panel	
	Open LiOH attenuation panel	
	CO2 canister divert vlv (both) - center	350
	Close LiOH attenuation panel	
	MAIN REG vlv - BOTH	351

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CMP	WATER/GLY TK PRESS vlv (both) - BOTH	351
	EMER CABIN PRESS vlv - OFF	
	CABIN REPRESS vlv - close (CCW)	
	WASTE TK SERVICING vlv - CLOSE	352
	PRESS REL vlv - BOTH	
	POTABLE TK IN vlv - OPEN	
	WASTE TK IN vlv - AUTO	
	TOP OFF SURGE TANK, IF REQUIRED:	
	02 PRESS IND sw - SURGE TANK	2
	02 PLSS vlv - FILL	326
	CRYO TK PRESS 02 1 - 865-935 psia	2
	02 PRESS IND sw - TANK 1	
	02 PLSS vlv - ON	326
	02 S/M SUPPLY vlv - ON	
	02 SURGE TK vlv - ON	

6 ECS/Cryogenic Status Check

CRYO TK PRESS H2 (both) - 225 - 260 psia	
CRYO TK PRESS 02 (both) - 865 - 935 psia	
CRYO TK QTY H2 (both) - 100%	
CRYO TK QTY 02 (both) - 100%	
CABIN FANS (both) - on	
H2 HTRS (both) - AUTO	
02 HTRS (both) - AUTO	
H2 FANS (both) - AUTO	
02 FANS (both) - AUTO	
ECS INDS sw - PRIM	
ECS RAD TEMP PRIM IN - 73-110°F	
ECS RAD TEMP PRIM OUT - 30-50°F	
GLY EVAP TEMP OUT - 30-50°F	
GLY EVAP STEAM PRESS-0.25 psia (pegged)	
GLY DISCH PRIM PRESS - TBD	
SUIT TEMP - TBD	2
CABIN TEMP - 70-80°F	
SUIT PRESS - ambient	
CABIN PRESS - ambient	
PART PRESS CO2 - 0.0 mm Hg	
ECS RAD FLOW CONT - AUTO	
ECS RAD TB - gray	
ECS RAD FLOW CONT - PWR	
ECS RAD MAN SEL - close (center)	
ECS RAD HTR - PRIM 1	
ECS RAD HTR SEC - OFF	

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CMP      02 FLOW ind - 0.2 lb/hr (pegged)
        02 ΔP ind sw - SUIT CAB
          02 ΔP - TBD
        GLY ACCUM QTY - TBD
        H2O QTY IND sw - WASTE
        H2O QTY - TBD
        H2O QTY IND sw - POT
        H2O QTY - TBD
        POT H2O HTR - OFF
        SUIT CKT H2O ACCUM AUTO - man (center)
        SUIT CKT HEAT EXCH - ON
        SEC COOL LOOP - RESET for 45 secs min
                                then off (center)
        SEC COOL LOOP PUMP - off (center)
        GLY EVAP TEMP IN - MAN
        GLY EVAP STEAM PRESS - MAN
        GLY EVAP STEAM PRESS - INCR for 45 secs
        GLY EVAP STEAM PRESS - DECR for
                                8.5 ± 0.5 secs
        GLY EVAP H2O FLOW - off (center)
        CABIN TEMP - MAN
        CABIN TEMP cont - max decr

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7 EPS Status Check

LMP

FC RAD sw (3) - NORM

FC RAD TB (3) - gray

FC HTRS (3) - auto (up)

FC PURGE (3) - OFF

FC REACS sw (3) - on (center)

FC REACS TB (3) - gray

MN BUS A - FC 1&2-center, FC 3 - OFF

MN BUS A TB (3) - FC 1&2-gray, FC 3-BP

MN BUS A - RESET, then center

MN BUS B - FC 1 - OFF, FC 2&3 - center

MN BUS B TB (3) - FC 1-BP, FC 2&3-gray

MN BUS B-RESET, then center

FC IND sw - 1, 2, 3

FC FLOW H2 - 0.018 - 0.161 lbs/hr

FC FLOW O2 - 0.140 - 1.276 lbs/hr

FC MOD TEMP SKIN - 385 - 460°F

FC MOD TEMP COND EXH - 157.5 - 172.5°F

FC TB (5) - gray

BAT CHARGE - OFF

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LMP DC IND sw - FC 1, 2, 3 3
 DC AMPS - TBD
 DC IND sw - MAIN BUS A, B
 DC VOLTS - 27 - 31 vdc
 CB BAT RLY BUS (both) - OPEN 5
 DC IND sw - BAT BUS A, B, BAT C 3
 DC VOLTS - 35 - 37.4 vdc
 DC AMPS - <3 amps
 DC IND sw - PYRO BAT A, B
 DC VOLTS - 36.9 - 37.4 vdc
 DC AMPS - zero
 DC IND sw - MAIN BUS A
 INV 1 - MNA
 INV 2&3 - OFF
 AC BUS 1 - INV 1-on (up), INV 2&3 - OFF
 AC BUS 1-RESET, then on (center)
 AC BUS 2 - INV 1-on (up), INV 2&3 - OFF
 AC BUS 2-RESET, then on (center)
 AC IND sw - BUS 1&2, ϕ A, B, C
 AC VOLTS - 113 - 117 vac

8 SPS Status Check

SPS PRPLNT TK TEMP - 100° F max
 SPS PRPLNT TK PRESS FUEL - 165-185 psia
 SPS PRPLNT TK PRESS OXID - 165-185 psia
 SPS PRESS IND sw - He, N2A, N2B
 SPS PRPLNT TK PRESS He - 4400 psia max
 SPS PRPLNT TK PRESS-N2 A&B - 2500 $\pm$ 300 psia
 SPS ENG INJ vlv ind (4) - CLOSE
 OXID FLOW vlv TB (both) - gray
 OXID FLOW vlv (2) - NORM and PRIM
 PUG MODE - norm (center)
 SPS He vlv TB (both) - BP
 SPS He vlv (both) - AUTO
 SPS LINE HTRS - off (center)
 SPS PRESS IND sw - He

9 RCS Status Check

CMP SM RCS SEC PRPLNT TB (4) - BP 2
 SM RCS He 1 TB (4) - BP
 SM RCS He 2 TB (4) - BP
 SM RCS PRIM PRPLNT TB (4) - BP

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BLK II

CMP

RCS IND sw - SM A, B, C, D
 SM RCS TEMP PKG - ambient
 SM RCS PRESS He - 4000 - 4350 psia
 SM RCS PRESS MANF - 192 - 207 psia
 SM RCS PRPLNT QTY - 100%
 CM RCS PRPLNT (both) - on (up)
 CM RCS PRPLNT TB (both) - gray
 RCS CMD - OFF
 RCS IND sw - CM A, B
 CM RCS TEMP He - 60 - 90°F
 CM RCS PRESS He - 4000 - 4450 psia
 CM RCS PRESS FUEL - 25-105 psia
 CM RCS PRESS OXID - 25-105 psia

2

10
 CDR

EMS Prelaunch Test
 Open EMS GTA Cover
 GTA sw - UP
 CB EMS (both) - CLOSE
 EMS FUNCTION - OFF
 EMS MODE- STBY
 EMS FUNCTION - ΔV
 Adjust Nomenclature & Alpha Numeric
 Brightness (as approp)
 Wait 5 secs
 EMS MODE - AUTO
 Adjust GTA pot until ΔV/Range least
 significant digit changes <1/10 secs
 EMS FUNCTION - ΔV set
 Slew ΔV Counter to +1586.8
 EMS FUNCTION - ΔV TEST
 SPS THRUST LT - ON
 ΔV Counter decreases (10 secs)
 SPS THRUST LT - OFF (at ΔV ≈ -0.1 FPS)
 ΔV Counter - stops at -20.8 ± 20.7 FPS
 EMS MODE - STBY
 EMS FUNCTION - EMS TEST 1 (Wait 5 secs)
 EMS MODE - AUTO (wait 10-sec)
 Check ind lts - off
 RANGE Counter - 0.0
 SLEW scroll until display index is
 superimposed upon notch in the self-test
 pattern
 EMS FUNCTION - EMS TEST-2 (wait 10 sec)

8
 1

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 BLK II

CDR

EMS .05G 1t - ON (all others out)

1

EMS FUNCTION - EMS TEST-3

EMS .05G 1t - ON

EMS G <.2 1t - ON (10 sec after .05G 1t)

Set RANGE counter to 58 ± 0.0 NM

EMS FUNCTION -- EMS TEST-4

EMS .05G 1t - ON (all others out)

G-V trace within test pattern for 10 secs,
then stops at lower right cornerRANGE counter counts toward zero for 10 sec,
then stops at 0 ± 0.2

EMS FUNCTION - EMS TEST-5

EMS .05G 1t - ON

EMS G >.2 1t - ON (10 sec after .05G 1t)

RANGE counter - 0.0

Scribe traces vertical line $\approx 9g$ to $\approx 0.22 \pm 0$.
and stops (trace within test pattern)

EMS FUNCTION - RNG SET

EMS MODE - STBY

Scribe traces vert line from 0.22g to
 $0 \pm 0.1g$ and stops

All 1ts - out

EMS FUNCTION - EMS TEST 1

Slew scroll to superimpose display index on
alignment notch of first un-numbered self
test pattern

EMS FUNCTION - OFF

EMS MODE - STBY

Return GTA toggle - DOWN

Secure GTA Cover

WARNING

The GTA switch is used for
ground tests only and must
be set off (down) and door
closed for proper flight
operation of the EMS.

BACKUP CREW PANEL CHECKS

11 THC - LOCKED
RHC - LOCKED

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12	LH MDC Side Panels	
CDR	CB Panel 8 - all closed except:	8
	CB SECS ARM BAT A - OPEN	
	CB SECS ARM BAT B - OPEN	
	CB SECS A LOGIC BAT A - OPEN	
	CB SECS B LOGIC BAT B - OPEN	
	PL VENT - OFF	
	PL DYE MARKER - OFF	
	PL BCN 1t - OFF	
	PL HF ANT DEPLOY - OFF	
	FLOAT BAG (3) - VENT	
	SECS LOGIC (both) - OFF	
	EDS PWR - OFF	7
	TVC SERVO PWR (both) - OFF	
	FDAI PWR - OFF	
	SCS/HAND CONT PWR - BOTH	
	SCS ELEC PWR - OFF	
	BMAG PWR (both) - WARMUP	
13	Main Display Console Panel 1	
	Altimeter - check	1
	CMC ATT - IMU	
	g METER - check reading 1g	
	FDAI SCALE - 5/1	
	FDAI SELECT - 1/2	
	FDAI SOURCE - CMC	
	ATT SET - GDC	
	FDAI error & rate ind (6) - zero	
	FDAI - R=163 , P=90 , Y=0	
	DET - 00:00	
	MAN ATT (3) - RATE CMD	
	LIMIT CYCLE - OFF	
	ATT DEADBAND - MIN	
	RATE - HIGH	
	DIRECT RCS - OFF	
	SCS CHANNEL (4) - OFF	
	SC CONT - SCS	
	CMC MODE - FREE	
	LV/SPS IND sw - α	
	LV/SPS IND sw - SII/SIVB	
	LV TK PRESS-SIVB OXID	
	LV TK PRESS-SIVB FUEL	
	BMAG MODE (3) - RATE 2	

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BLK II

CDR SPS THRUST - NORMAL
 ΔV THRUST A&B (both) - OFF (guarded)
 SCS TVC PITCH & YAW - RATE CMD
 GMBL MOT (4) - OFF
 SCS LOGIC - BUS 3
 ELS LOGIC - OFF (guarded)
 ELS - AUTO
 CM PRPLNT JETT LOGIC - OFF
 CM PRPLNT JETT DUMP - OFF (guarded)
 CM PRPLNT JETT PURGE - OFF
 IMU CAGE - OFF (down and guarded)
 EMS ROLL - OFF
 .05G sw - OFF
 LV/SPS IND sw - GPI
 TVC GMBL DRIVES PITCH & YAW - AUTO
 FCSM (both) - RESET/OVERRIDE
 EVENT TIMER RESET sw - Center
 EVENT TIMER START sw - Center

14 Main Display Console Panel 2 2
 CMP MSN TIMER ind - reads zero
 MSN TIMER sw - STOP
 UP TLM - TBD
 FLT RCDR - off (center)
 CM RCS PRESS - OFF (down and guarded)
 SIVB/LM SEP - OFF (guarded)
 SM RCS HEATERS (4) - OFF
 RCS TRNFR - SM
 EDS AUTO - OFF
 PRPLNT DUMP - AUTO
 2 ENG OUT - AUTO
 LV RATES - AUTO
 TWR JETT (both) - off (down and guarded)
 LV GUIDANCE - IU
 LV STAGE - OFF (guarded)
 LV XLUNAR Inject - SAFE
 MAIN RELEASE - off (down and guarded)
 LMP S BAND ANT ind - TBD

15 Main Display Console Panel 3
 VHF ANT - SM-LEFT
 S BAND XPNDR - PRIM
 S BAND PWR AMPL - PRIM

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LMP

S BAND PWR AMPL - HIGH 3
 PWR AMPL TB - BP (after 90 sec)
 S BAND MODE VOICE - VOICE
 S BAND MODE PCM - PCM
 S BAND MODE RNG - RANGING
 S BAND AUX TAPE - off (center)
 S BAND AUX TV - off (center)
 UP TLM sws (2) - DATA and NORM
 TAPE MOTION TB - BP
 S BAND ANT (2) - A and OMNI
 VHF AM A - SIMPLEX
 VHF AM B - off (center)
 VHF AM RCV ONLY - off (center)
 VHF BCN - OFF
 HF PWR - OFF
 HF SSB sw - SSB
 FC REACS vlv - NORM
 H2 PURGE LINE HTR - OFF
 TAPE RCDR motion - REWIND (allow tape to fully
 rewind before proceeding)
 TAPE RCDR - PCM/ANLG
 TAPE RCDR mode - RECORD
 TAPE RCDR motion - STOP (center)
 PWR SCE - NORM
 PWR PMP - NORM
 TLM INPUTS-PCM - HIGH
 TLM INPUTS - BIOMED LEFT

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16 RH MDC Side Panels

FC PUMPS 1 - AC1 5
 FC PUMPS 2 - AC2
 FC PUMPS 3 - AC2
 G&N PWR - AC1
 MN BUS TIES (both) - OFF
 BAT CHGR - AC1
 NONESS BUS - MN B
 CB Panel 5 - all closed except:
 CB BAT RLY BUS (both) - open
 CB INST SCI EQUIP SEB (both) - open
 SPS GAUGING - AC 1 4
 TELCOM GP 1 - AC1
 TELCOM GP 2 - AC2
 ECS GLY PUMPS - OFF

BLK II

LMP SUIT COMPR (both) - OFF
 CB Panel 4 - all closed
 CB Panel 229 - all closed

4

17 RHEB

RH COAS pwr - OFF 228
 Panel 227:
 Connectors (3) - Covered
 Switches (2) - OFF
 CB Panel 275 - all closed except
 CB MN A BAT C - open
 CB MN B BAT C - open
 CB FLT & PL BAT BUS A,B & BAT C (3) - open
 CB Panel 276, 277, and 278 -
 all closed

EQUIPMENT BAYS

18 Fwd Equipment Bay

CMP MSN TIMER ind - reads zero
 MSN TIMER sw - STOP
 DET - zeroed
 EVENT TIMER RESET sw - Center
 EVENT TIMER START sw - Center

19 LEB

UTIL Connector Covered
 UTIL PWR - OFF 100
 FLOOD LT sws - TBD
 G/N PWR OPTICS - OFF
 G/N PWR IMU - on (up)
 RNDZ XPNDR - OFF
 SYS TEST (2) - 5A 101
 SYS TEST ind - 1.1-1.5 vdc
 SYS TEST (2) - 6-A
 CM RCS HTRS - OFF
 URINE DUMP HTR - HTR A
 OPTICS MODE - ZERO 122
 OPTICS SPEED - HI
 OPTICS COUPLING - DIRECT
 OPTICS TRUN - SLAVE TO SXT
 CONDITION LAMPS - ON
 UP TLM - ACCEPT
 SCI/UTIL Connector covered and UTIL 163
 pwr OFF

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JMP	UTIL Connector covered and UTIL pwr OFF	162
20	RHEB	
	CB panel 225&229 - all closed	
	CB panel 226 - all closed except:	
	CB FC REACS (3) - OPEN	
	CB panel 250 - all closed except:	
	CB PYRO A BAT BUS A TO PYRO BUS TIE - OPEN	
	CB PYRO B BAT BUS B TO PYRO BUS TIE - OPEN	
	CB BAT C TO BAT BUS A - OPEN	
	CB BAT C TO BAT BUS B - OPEN	
	WASTE MGT OVBD DRAIN vlv - OFF	251
	BAT VENT vlv - VENT	252
	<u>BACKUP CREW PRE-EGRESS</u>	
	21 Secondary Glycol Loop Check	
JMP	ECS INDS sw - SEC	2
	SEC COOL LOOP PUMP - AC 1	
	ECS RAD TEMP SEC IN - 73-100°F	
	ECS RAD TEMP SEC OUT - 73-100°F	
	GLY EVAP SEC TEMP OUT - 73-110°F	
	GLY EVAP SEC STEAM PRESS - 0.25 psia (pegged)	
	GLY DISCH SEC PRESS - TBD	
	GLY ACCUM SEC QTY - TBD	
	SEC COOL LOOP PUMP - AC2	
	GLY DISCH SEC PRESS - TBD	
	SEC COOL LOOP PUMP - off (center)	
	ECS INDS sw - PRIM	
	22 Primary Glycol Loop Activation	
JMP	ECS GLY PUMP 2 - AC1	4
	GLY DISCH PRIM PRESS - TBD	2
	GLY ACCUM PRIM QTY - TBD	
	ECS GLY PUMP 1 - AC1	4
	GLY DISCH PRIM PRESS - TBD	2
	ECS RAD FLOW CONT AUTO sw - 2	
	ECS RAD TB - indicates 2	
	ECS RAD FLOW CONT - AUTO	
	ECS RAD TB - gray	
	23 Suit Circuit Positive Pressure	
JMP	Suit Flow vlv (3) - OFF	300,301,302
JDR	DIRECT 02 vlv - OPEN (CCW)	7
JMP	Until 02 FLOW - 0.4 - 0.5 lb/hr	2
	24 SUIT PWR sws (3) - OFF	9,10,6
	Disconnect COMM cables	

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BLK II

SECTION B. PRIME CREW PRELAUNCH
CHECKSINGRESS AND STATUS CHECKS

CDR	1	SECS PYRO (both) - SAFE (unlocked)	8
ALL		SUIT PWR sw (3) - OFF	9,10,6
		CONNECT CM 02 & COMM/CABLES (3)	
		SUIT PWR sw (3) - ON	9,10,6
CMP		SUIT FLOW vlv(3)-SUIT FULL FLOW	300,301,302
		SUIT CKT H2O ACCUM - AUTO 1	2
	2	Audio Panel Intercom Check	
		MODE-INTERCOM/PTT	9,10,6
		HF - OFF	
		S BAND - T/R	
		POWER - AUDIO/TONE	
		INTERCOM - T/R	
		VHF AM - T/R	
		AUDIO CONT - NORM	
	3	PGA and Pressure Suit Circuit Check	
		SUIT COMPR 2 - AC 1	4
		SUIT COMPR stat/lt - out	2
		O2 FLOW - 0.4 - 0.5 lb/hr	
		O2 ΔP ind - TBD	
		O2 ΔP ind sw - SUIT COMP	
		O2 ΔP ind - 0.7 - 0.9 psi	
		SUIT TEMP - 45 - 55° F	
		SUIT PRESS - 14.9 psia	
		PART PRESS CO2 - 0.0 - 7.6 mm Hg	
		SUIT COMPR 1 - AC1	
		SUIT COMPR 2 - OFF	4
		O2 ΔP - 0.7 - 0.9 psi	2
		O2 ΔP ind sw - SUIT CAB	
		O2 ΔP ind-TBD	
CDR, LMP		Connect restraints	
CDR		SUIT TEST vlv - PRESS	380
LMP		O2 FLOW HI stat/lt - on	2
ALL		MASTER ALARM tone/lts (3) - on	1,3,122
		O2 FLOW - 1 lb/hr (pegged)	

B. PRIME CREW
PRELAUNCH CHECKS

1701

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BLK 11

Changed

B. PRIME CREW
PRELAUNCH CHECKS

LMP	SUIT PRESS - 17 psia max (peg ~40 sec)	2
	PGA PRESS ind - 4.1-4.5 psig	
	Disconnect return O2 hose at suit	
CMP	SUIT FLOW vlv (3)-OFF for 1 min	300,301,302
ALL	PGA PRESS ind - 0.5 psig decay in 1 MIN	
	Connect return O2 hose to suit	
CMP	SUIT FLOW vlv (3) - SUIT FULL FLOW	
CDR	SUIT TEST vlv - DEPRESS	380
LMP	SUIT PRESS - 14.9 psia	2
CDR	SUIT TEST vlv - OFF	380
	O2 FLOW - 0.4 to 0.5 lbs/hr	
CMP	Connect Restraints	

4 Initiate Dual Inverter Operation

A	Standby Inverter (No. 3) Check	
LMP	AC BUS 2 RESET - OFF	3
	INV 3 - MNB	
	INV 1 AC BUS 2 - OFF	
	INV 3 AC BUS 2 - on	
	AC BUS 2 RESET - on (center)	
	AC IND sw - BUS 1&2, ϕ A, B, C	
	AC VOLTS - 113 - 117 vac	

B Dual Inverter (no. 1 & 2) Ops

	AC BUS 2 RESET - OFF
	INV 2 - MNB
	INV 3 AC BUS 2 - OFF
	INV 2 AC BUS 2 - ON
	AC BUS 2 RESET - on (center)
	INV 3 - OFF
	AC IND sw-BUS 1&2, ϕ A, B, C
	AC VOLTS - 113-117 vac

5 Cabin Closeout and Purge TBD

6 EDS checkout and Countdown Test

Verify/set controls after test

CDR	EDS PWR - OFF	7
CMP	EDS AUTO - OFF	2
	2 ENG OUT - AUTO	
	LV RATES - AUTO	

7 RCS Status Check

CMP RCS IND sw - SM A, B, C, D

SM RCS TEMP PKG - ambient

SM RCS PRESS He - 4000 - 4350 psia

SM RCS PRESS MANF - 192 - 207 psia

SM RCS PRPLNT QTY - 100%

RCS IND sw - CM A, B

CM RCS TEMP He - 60 - 90°F

CM RCS PRESS He - 4000 - 4450 psia

CM RCS PRESS FUEL - 25-105 psia

CM RCS PRESS OXID - 25-105 psia

-60:00 G&C VERIFICATION

CDR 8 FDAI PWR - BOTH

SCS ELEC PWR - GDC/ECA

BMAG PWR (both) - ON

9 GDC Alignment

FDAI SELECT - 1

FDAI SOURCE - ATT SET

ATT SET dials (3) - (R=163°, P=90°, Y=0°)

GDC ALIGN PB - push

ATT SET dials (3) - Adjust Until:

Roll & Yaw error needles - Full Left

Pitch - Full Down

FDAI SELECT - 2

Verify same indication as FDAI 1

GDC ALIGN PB - Push until FDAI 2 error
needles null

ATT SET dials (3) - (R=163°, P=90°, Y=0°)

Verify FDAI 2 ATT err needles:

Roll & Yaw-Full Right, Pitch-Full Up

FDAI SELECT - 1

Verify FDAI 1 ATT err needles:

Roll & Yaw-Full Right, Pitch-Full Up

GDC ALIGN PB - PUSH

Verify FDAI 1 BALL - R=163°, P=90°, Y=0°

BLK II

Basic Date Aug. 18, 1967

Changed

WARNING

CDR	SECS PYRO (both) - SAFE	8
	SECS LOGIC (both) - OFF	
10	Gimbal Drive and Trim Check	
	SC CONT - SCS	1
	SCS TVC (both) - RATE CMD	
	TVC GMBL DRIVES (both) - AUTO	
LMP	MN BUS TIES (both) - ON	5
CDR	TVC SERVO PWR 1 - AC1/MNA	1
	TVC SERVO PWR 2 - AC2/MNB	
	RHC #1 - UNLOCKED	
	CB GMBL MOT (4) - CLOSE	8
	Primary TVC Check	
	GMBL MOT PITCH 1 - START - ON	1
	GMBL MOT YAW 1 - START - ON	
	Verify Trim Control	
	Verify MTVC	
	SCS TVC (both) - AUTO	
	Secondary TVC check	
	GMBL MOT PITCH 2 - START-ON	
	GMBL MOT YAW 2 - START-ON	
	THC - CW	
	Confirm Trim Control	
	Verify MTVC	
	GMBL MOT PITCH 2 - OFF	
	GMBL MOT YAW 2 - OFF	
	Verify <u>NO</u> MTVC	
	THC - Neutral	
	Set GPI to Trim Setting P <u> </u> ^o , Y <u> </u> ^o	
	GMBL MOT PITCH 1 - OFF	
	GMBL MOT YAW 1 - OFF	
	RHC - LOCKED	
	MN BUS TIES (both) - OFF, then AUTO	5
	TVC SERVO PWR (both) - OFF	7
11	SM-RCS GROUND FIRING TESTS	
CMP	SM RCS He 1 (4) - ON	2
	SM RCS He 1 TB (4) - gray	
	SM RCS He 2 (4) - ON	
	SM RCS He 2 TB (4) - gray	

Basic Date Aug. 18, 1967
Channel

BLK II

CMP

SM RCS PRIM PRPLNT (4) - ON	2
SM RCS PRIM PRPLNT TB (4) - gray	
SM RCS SEC PRPLNT TB (4) - BP	
RCS IND sw - SM A, B, C, D	
SM RCS PRESS MANF - 190-210 psia	
CB PITCH MNB - OPEN	8
CB YAW MNA - OPEN	
CB YAW MNB - OPEN	
SCS CHANNEL PITCH & YAW - A	1
RCS CMD - ON	

CAUTION: Each jet should be fired only once
and for a duration of one second
or less

RHC - PULSE + PITCH - GND checks Jet C-1	
fires	
PULSE - PITCH - GND checks Jet A-2	
fires	

CB PITCH MNA - OPEN	8
CB YAW MNB - CLOSE	

RHC - PULSE + YAW - GND checks Jet D-1	
fires	
PULSE - YAW - GND checks Jet B-2	
fires	

RCS CMD - OFF	2
SCS CHANNEL ROLL (2) - A	1
CB PITCH MNA - CLOSE	8
CB PITCH MNB - CLOSE	
CB YAW MNA - CLOSE	

RHC - Move in all 6 directions - GND VERIFY	
<u>NO</u> FIRING	

SCS CHANNELS (4) - OFF	1
RHC - LOCKED	
FDAI 1 - Verify err needles Roll right,	
Pitch down, Yaw left	

BLK II
Basic Date Aug. 18, 1967
Changed _____

CDR FDAI SELECT - 1/2 1
 FDAI SOURCE - CMC
 FDAI 1 BALL (R=163°, P=90°, Y=0°)
 ENTRY EMS ROLL - ON
 GDC ALIGN PB - PUSH & HOLD
 MOVE YAW ATT SET DIAL until EMS
 LIFT VECTOR moves to UP position
 GDC ALIGN PB - Release
 ENTRY EMS ROLL - OFF
 YAW ATT SET dial - zero
 GDC ALIGN PB - Push until FDAI 2 BALL cages
 at R=163°, P=90°, Y=0°

-30:00

CDR 12 EDS PWR - ON 7
 ALL SHOULDER HARNESS - LOCKED
 CB SECS ARM (both) - CLOSE 8
 CB SECS LOGIC (both) - CLOSE
 SECS LOGIC (both) - ON
 SECS PYRO (both) - ARM

Before

-20:00

13 Set ΔV
 EMS FUNCTION - ΔV SET 1
 SET ΔV counter - 3000 FPS
 EMS FUNCTION - ΔV

14 PRPLNT DUMP - AUTO
 ELS - AUTO
 FDAI ball - R=163°, P=90°, Y=0°
 BMAG MODE (3) - RATE 1
 GDC ALIGN PB - PUSH

LAUNCH PREPARATION

15 LCC Confirm Launch Ready

-15:00 FDAI SCALE - 5/5 1

CDR RATE - HIGH
 CDR,CMP RHC (both) - ARMED
 CDR DIRECT RCS - OFF
 SCS CHANNEL B/D ROLL, PITCH, YAW - A

Basic Date Aug. 18, 1967
 Changed

BLK II

CDR	-10:00	TVC SERVO PWR 1 - AC 1/MNA	7
		TVC SERVO PWR 2 - AC 2/MNB	
		CM PROP JETT LOGIC - LOGIC	2
		CMC MODE-AUTO	
		SC CONT - SCS	1
ALL		MODE - INTERCOM/PTT	6,9,10
LMP		S BAND PWR AMPL - HIGH	3
		S BAND MODE - RANGING	
CDR		FCSM A-SPS A	1
		FCSM B-SPS B	
	-05:00	SPS THRUST - NORMAL	
		Δ V THRUST A&B (both) - OFF (guarded)	
		LV/SPS IND sw - α	
		LV/SPS IND sw - SII/SIVB	
		EDS AUTO - AUTO	2
		LV RATES - AUTO	
		2 ENG OUT - AUTO	
CMP		RCS CMD - OFF	
		LV STAGING - OFF	

16 G&C Preparation

UP TLM - ACCEPT

CMP -03:00 Verify P02

Key V75 do not key ENTR

CDR GDC align PB - push

1

17 Systems Preparation

LMP -01:15 FC REACS vlv - LATCH

3

CMP GLY TO RAD PRIM vlv - BYPASS

377

GLY DISCH PRIM PRESS - TBD

2

GLY ACCUM PRIM QTY - TBD

TAPE RCDR mode - RECORD

LMP TAPE RCDR motion - FWD

3

TAPE motion TB - gray

MN BUS TIES (both) - on (up)

5

CMP -00:45 FLT RCDR - RECORD

2

READY FOR S-IB IGNITION

basic Date 11/11/61
Changed

SECTION C. BOOST-INSERTION & SEPARATION

BOOST

-00:03 Ignition
 -00:01 L/V ENGINES lts (8) - out
 00:00 LIFT OFF lt - on

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
 X LIFTOFF VERIFIED:

CDR 00:30 LIFT OFF LIGHT off - PUSH
 00:30 NO AUTO ABORT LIGHT on - PUSH
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

DET start auto-report
 MET start auto
 P11 auto

CMP

XXXXXXXXXXXXXXXXXXXXXXXXXXXXX
 X NO P11-Key ENTER
 START DET & MET
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

VO6 N62

VI	XXXXX. FPS
H DOT	XXXXX. FPS
H PAD	XXXX.X NM

CDR

+00:10 Roll Program - report
 Pitch Program - report
 +00:27 Roll complete - report
 +00:50 Monitor α to T +01:40
 Rate limit change to
 5°/sec-report

LMP

CABIN PRESSURE DECREASING

CDR

XXXXXXXXXXXXXXXXXXXXXXXXXXXXX
 X NO PRESSURE DECREASE:
 CABIN PRESS RELIEF vlv - DUMP
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

CMP

+01:01 PRPLNT DUMP - RCS CMD
 C/M RCS PRPLNT TB (both) - gray

00:00

$\pm 3^\circ/\text{SEC P,Y}$
 $\pm 20^\circ/\text{SEC R}$

MODE IA

ATT ERROR
 $\pm 5^\circ \text{ P,Y}$

$\pm 5^\circ/\text{SEC P,Y}$
 $\pm 20^\circ/\text{SEC R}$

01:01

C. BOOST-INSERTION
& SEPARATION

BASIC Date Aug. 10, 1967
 Changed

DLN 11

P11

C-2

CDR

+01:01 Roger MODE IB

+01:17 MAX Q

CMP

+01:40 2 ENG OUT - OFF

L/V RATES - OFF

EDS AUTO - OFF (NO AUTO ABORT LT ON)

CDR

+01:50 Roger MODE IC

R3 = 0016.5 NM

+02:10 GO NO GO FOR STAGING - report

+02:23 INBOARD CUTOFF - report

+02:26 OUTBOARD CUTOFF - report

+02:31 SIB staging - report

+02:33 SIVB Ign command - 1t on

+02:40 SIVB 65% - 1t out

LMP

GLY EVAP STEAM PRESS - AUTO

GLY EVAP H2O FLOW - AUTO

SEC COOL LOOP - EVAP TBD SECS

SEC COOL LOOP - RESET, then

off (center) after TBD SECS

CABIN TEMP-AUTO

CDR

+02:42 GMBL MOT (4) - START - ON

CMP

+02:46 TWR JETT (both) - ON (TFF >1+20)

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

PERFORM EMERG PROC, pg 16-3

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

CDR

Report Twr Jett & MODE II

+03:10 Guidance Initiate - report

+03:23 Guidance Good

+04:00 Report status

+05:00 Report status

+06:00 Report status

+07:00 Report status

+08:00 Report status

+09:00 Go for orbit

100% α
12° Roll
error

01:01

MODE IB

01:50

MODE IC

±5°/SEC
P,Y

02:46

MODE II

09:21

C. BOOST-INSERTION
& SEPARATIONBasic Date Aug. 18, 1967
Changed

X II

CDR

+09:21 Report/Confirm
COI

MODE III

MODE IV

+09:51 FIXED ΔV MODE I BRAVO

09:51

+09:53 SECO - report

REENTRY

INSERTION

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
X
THC - CCW - NEUT within 1 sec
X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

CMP

RECORD:

VI _ _ _ _ . FPS
H DOT _ _ _ _ . FPS
H PAD _ _ _ _ . NM

Key V37E00E

Key V82E

FL V06 N44

HA XXXX.X NM
HP XXXX.X NM
TFF XXBXX MIN-SEC

PRO (exits if HP <50 NM)

FL V06 N32 (TF HP)

HRS:MIN:SEC XXX:XX:XX.XX

PRO

SECO + 40 sec

Status from gnd

FIXED ΔV
MODE I
BRAVO

22:39

POSTORBITAL INSERTION CHECK

1 Status Checklist

CDR GMBL MOTS (4) - OFF
LMP MN BUS TIES (both) - OFF
CDR ΔV THRUST A&B (both) - OFF
 DIRECT RCS - OFF
 SCS CHANNELS (4) - OFF

1

5

1

Basic Date Aug. 10, 1971
Changed _____

JUN 11

CDR	CM PRPLNT JETT LOGIC - OFF	1
	SECS PYRO (both) - SAFE	8
	SECS LOGIC (both) - OFF	
	TVC SERVO PWR (both) - OFF	7
	EDS PWR - OFF	
	CB ELS BAT (both) - open	8
	CB FLOAT BAG (3) - open	
	FCSM (both) - RESET/OVERRIDE	1
CMP	CB FC REACS (3) - open (verify)	226
LMP	FC REACS vlv - NORM	3
	TAPE RCDR motion-off (center)	
CMP	FLT RCDR - off (center)	2
LMP	SM RCS HTRS (4) - PRIM	
	C/W function - NORMAL	
ALL	MODE - as desired	6,9,10
	Couch to docking position	
CMP 2	Enter 2-1 data	
	LAT _____ LONG _____ GETI PERM _____	
	GETI _____ ΔV _____	
CDR 3	Perform SCS ATT Ref Comp Ck, pg 2-4	
4	MOUNT ORDEAL BOX	
	Perform Ordeal Init pg 2-7	
CMP 5	Perform SM RCS Mon Ck, pg 15-1	
6	Perform CM RCS Mon Ck, pg 15-2	
LMP 7	Perform EPS Per Verif #1,2,3,4,&5, pg 15-2,3	
8	Perform ECS Mon Ck, pg 15-4	
9	CABIN ATMOSPHERE CHANGEOVER (If Required)	
ALL	A. PGA Verification Check pg 15-9	
	B. CM PRESSURE DUMP	
CMP	CABIN FANS (both) - OFF	2
	O2 PLSS vlv - FILL	326
CDR	CABIN PRESS REL vlv (lower)-DUMP	325
	(Safety Latch Off)	

Basic Date Aug. 18, 1967
 BLK
 Channel

CDR

CABIN PRESS - 3.0-3.25 psia	2
CABIN PRESS REL vlv (lower)-	325
BOOST ENTRY	
O2 FLOW - >0.45 lb/hr	2
CABIN PRESS - <u>></u> 3.5 psia	
CABIN PRESS REL vlv (lower)-DUMP	325
CABIN PRESS - 0.0 psia (within 6 min)	2
CABIN PRESS REL vlv (both)-NORMAL	325
(Safety Latch On)	

C CM NORMAL REPRESSURIZATION

CMP

O2 PRESS IND sw - SURGE TANK	2
RAPID REPRESS vlv - OPEN	02 Unit
Insert T-handle in O2 PLSS vlv	326
CRYO TK PRESS O2 1-150 psia min	2
O2 PLSS vlv - OFF	326
CABIN PRESS - 3.0 psia (in 1 minute)	2
RAPID REPRESS vlv - CLOSE	02 Unit
CABIN REPRESS vlv - OPEN (CW)	351
CRYO TK PRESS O2 1-300 psia	2
CABIN PRESS - 4.0-4.2 psia	
EMER CABIN PRESS vlv - 1(momentarily)	351
O2 Flow - Increased Flow	2
EMER CABIN PRESS vlv - 2(momentarily)	351
O2 Flow - Increased Flow	2
EMER CABIN PRESS vlv - OFF	351
CABIN PRESS - >4.6 psia	2
EMER CABIN PRESS vlv - NORMAL	351
(momentarily)	
O2 Flow - No Increased Flow	2
EMER CABIN PRESS vlv - OFF	351
CABIN REPRESS vlv - CLOSE (CCW)	
CABIN FANS (both) - ON	2

D CM O2 SUPPLY REFILL

CRYO TK PRESS O2 1-300 psia	2
O2 PLSS vlv - FILL	326
CRYO TK PRESS O2 1 - 865-935 psia	2
O2 PRESS IND sw - TANK 1	
O2 PLSS vlv - ON	326

basic Date _____
Changed _____

10	ECS Postinsertion Configuration	
CDR	CB PL VENT - open	8
	CABIN PRESS REL vlv (both) - NORMAL	325
	(Safety Latch - ON)	
CMP	GLY TO RAD SEC vlv - NORMAL	377
	GLY TO RAD PRIM vlv - NORMAL	
LMP	ECS RAD TEMP PRIM OUT - below	2
	ECS RAD TEMP PRIM-IN	
	XXX	
	If Not:	
CMP	GLY TO RAD PRIM vlv - BYPASS	377
	recheck in 5 minutes	
	XXX	
CMP	Open Coolant attenuation panel	
	EVAP WATER CONT SEC vlv - OFF	382
	Close Coolant attenuation panel	
	DRINKING WATER SUPPLY vlv - ON (CCW)	304
LMP	ECS RAD TB - gray	2
	ECS RAD HTR - PRIM 1	
	GLY EVAP TEMP IN - AUTO	
11	Perform SPS Mon Ck, pg 15-1	3
12	OPTICS DUST COVER JETT PROCEDURE	
	OPTICS MODE - DIRECT	122
	OPTICS SPEED - HI	
	Cont stick-hardover right until ejection	
	(SXT-30°, SCT-100°)	
	<u>CSM SEPARATION FROM SIVB</u>	
1	Separation Preparation	
CMP	POO	2
CDR	DIRECT RCS - ON	1
	SC CONT - SCS	
	BMAG MODE (3) - RATE 2	
LMP	TAPE RCDR mode - RECORD	
	TAPE RCDR motion - FWD	3
	TAPE motion TB - gray	
CDR	FDAI PWR - BOTH	7
	TVC SERVO PWR 1 - AC1/MNA	
	CB EDS (3) - CLOSED (verify)	8
	EDS PWR - ON	7

Basic Date Aug. 18, 1967

Channel

BLK II

CDR	CB CM/SM TRNFR (both) - CLOSE (verify)	8
	ΔV counter - TBD FPS	1
	ATT SET dials - R=0° or 180°, P=0°, Y=0°	
	FDAI SELECT - 1	
	FDAI SOURCE - ATT SET	
	ATT SET - GDC	
	GDC ALIGN PB - push	
	FDAI SELECT - 1/2	
	BMAG MODE (3) - ATT 1 RATE 2	
	THC - ARMED & CW	
	RHC - ARMED	
	SECS LOGIC (both) - ON	8
	SECS PYRO (both) - ARM	
	RATE - LOW	1
CMP 2	Key V37E 47E (Thrust Monitor)	2
	FL V16 N83 Delta V (CSM)	
	$\Delta V_X, \Delta V_Y, \Delta V_Z$ XXXX.X FPS	
	3 Separation Procedures	
CDR	EMS MODE - AUTO	1
	EMS FUNCTION - ΔV	
	EVENT TIMER RESET sw - RESET	
CMP, CDR	00:00 DIRECT ULLAGE PB - push & hold, EVENT TIMER	
	START sw - START	
CDR	00:01 CSM/LV SEP PB - push & hold	
	L/V ENG 1 lt-out	2
CMP	00:04 DIRECT ULLAGE PB - release at $\Delta V = 1$ FPS	1
CDR	CSM/LV SEP PB - release	
CDR	SCS CHANNELS B&D ROLL, PITCH, YAW - A or B	
	THC - CCW (4.0 sec min)	
CMP	RCS CMD - ON (verify)	2
CDR	THC - CW & +X - Hold for $\Delta V = 1$ FPS	
	or 3 secs (note rates)	
CDR	NOTE RATES: YAW SHOULD BE ____°/sec	
	IF OTHERWISE, ASSUME JET FAILURE	

CDR	DAMP RATES	
CMP	RCS CMD - ON (verify)	2
CDR	SCS CHANNELS (4) - A or B	1
01:13	THC - MINUS X 1½ sec	
01:15	Pitch up at 5°/sec	
CMP	PRO	2
	FL V50 NO7 (Request P00)	
4	Postseparation Checks	
LMP	TAPE RCDR mode - off (center)	3
CDR	EDS PWR - OFF	7
	TVC SERVO PWR 1 - OFF	7
	SECS PYRO (both) - SAFE	
	SECS LOGIC (both) - OFF	8
	CB SECS ARM (both) - open	
	CB SECS LOGIC (both) - open	
	CB RCS CM/SM TRNFR (both) - open	
	CB EDS (3) - open	
	DIRECT RCS - OFF	1
	CM PRPLNT JETT LOGIC - OFF	
CMP	URINE DUMP HTR - HTR A	101
	CB PYRO A SEQ A - OPEN	250
	CB PYRO B SEQ B - OPEN	
LMP	5 Perform EPS Per Verif #3,4,&5, pg 15-2,3	
6	Postseparation ECS Configuration	
CDR	GLY RSVR BYPASS vlv - OPEN	326
	GLY RSVR OUT vlv - CLOSE	
	GLY RSVR IN vlv - CLOSE	
LMP	GLY ACCUM PRIM QTY - TBD	
CMP	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX X PRIM ACCUM FILL vlv - ON X	379
LMP	GLY ACCUM PRIM QTY - TBD	2
CMP	PRIM ACCUM FILL vlv - OFF	379
LMP	GLY DISCH PRIM PRESS - TBD	2
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
	SUIT CKT RET SHUT OFF vlv - OPEN (CCW)	381
CMP	7 Readout and record critical eraseable memory values TBD	

Basic Date Aug. 18, 1967

Channel

BLK II

SECTION D. ABORT PROCEDURES

MODE I-A ABORT

(00:00 to 01:01)

(pad to 25K)

MANUAL BACKUP

CDR	00:00	AUTO or THC-CCW	X	CM/SM SEP (both) - ON
		*BECO (after T+00:40)	X	
		*DET reset, start	X	DET-RESET-START
CMP		*CM RCS press	X	CM RCS PRESS - ON
		*RCS trans	X	RCS TRNFR - CM
LMP		*ENT bat to mn bus	X	
		(If bus ties-AUTO)	X	
CDR		*CM/SM umb dfce	X	CM/SM SEP (both) - ON
CMP		*CM RCS ox dump	X	PRPLNT DUMP - AUTO
		*CM RCS vlv close	X	CM RCS PRPLNT(both)-OFF
CDR		*CM/SM sep	X	CM/SM SEP (both) - ON
		*LE & PC mtr fire	X	LES MTR FIRE PB - PUSH
	00:05	*CM RCS fuel dump	X	
	00:11	*Canard deploy	X	
	00:14	*ELS logic arm	X	ELS LOGIC - ON
		*LES twr jett	X	
		*a.Twr nuts det	X	1. TWR JETT (both) - ON
CMP		*b.SCS RCS disable	X	2. RCS CMD - OFF
		*c.Twr jett mtr fire	X	
CDR		*Apex cover jett	X	APEX COVER JETT PB - PUSH
	00:16	*Drogues deploy	X	DROGUE DEPLOY PB - PUSH
	00:18	*CM RCS He Purge	X	CM RCS He DUMP PB - PUSH
			X	CM PRPLNT JETT DUMP-ON
			X	CM PRPLNT JETT PURGE-ON
		Ck Alt <u>ABOVE</u> 3300' ind	X	IF <u>BELOW</u> 3300' ind:
			X	MAIN DEPLOY PB - PUSH
	00:28			
IF	<10K'	*Mains deploy		
		MAIN DEPLOY PB - PUSH		

1

D. ABORTS
MODE I-A

Basic Date Aug. 18, 1967
Changed

BLK II

LMP	VHF AM A - SIMPLEX	3
	VHF AM - T/R	6
	VHF BCN - ON	3
	VHF ANT - RECY	
	Transmit voice (VHF AM) reporting:	
	Position	
	Mains disreefed	
	Miss dist (if appl)	
	Crew status	
	CB FLT & PL BAT BUS A,B & BAT C(3)-CLOSE	275
	CB FLT & PL MNA & B (2) - OPEN	
CDR	FLOOD - POST LDG	8
	FLOOD DIM - 1 or 2	
CMP	Verify RCS ind - CM A	2
CDR	DIRECT 02 vlv - OPEN (CCW)	7
CMP	CM RCS PRESS He - zero	2
CDR	CM PRPLNT JETT LOGIC - OFF	1
CMP	CM RCS PRPLNT (both) - OFF	2
LMP	MN BUS TIES (both) - OFF	5

WARNING

Do not perform next step
above 600 feet as cabin
negative pressure may
become too high.

600' CABIN PRESS REL vlv (both)-CLOSE (S.L.-OFF) 325

LANDING

Postlanding check pg 14-1

Basic Date Aug. 18, 1967

Changed

BLK II

MODE I-B ABORT
 (01:01 to 01:50)
 (25K to 100K)

MANUAL BACKUP

CDR	00:00	AUTO or THC-CCW	X	CM/SM SEP (both) - ON	
		*BECO	X		
		*DET reset, start	X	DET-RESET-START	
CMP		*CM RCS press	X	CM RCS PRESS - ON	
		*RCS Trans	X	RCS TRNFR - CM	
CDR		*CM/SM umb dfce	X	CM/SM SEP (both) - ON	
		*CM/SM sep	X	"	
		*LE mtr fire	X	LES MTR FIRE PB - PUSH	
CMP			X		
	00:01	*SCS/RCS enable	X	RCS CMD - ON	
CDR			X		
	00:11	*Canard deploy	X	CANARD DEPLOY PB - PUSH	
	00:14	*ELS logic arm	X	ELS LOGIC - ON (<50K)	
	40K'	TWR JETT (both) - ON	X		
CMP			X		
	24K'	*SCS RCS disable	X	RCS CMD - OFF	
CDR		*Apex cover jett	X	APEX COVER JETT PB - PUSH	
		*Drogues deploy	X	DROGUE DEPLOY PB - PUSH	
	23.5K'	CABIN PRESS increasing	X	If not incr by 17K':	
			X	CABIN PRESS REL -	
			X	DUMP (S.L.-OFF)	
	10K'	*Mains deploy	X	MAIN DEPLOY PB - PUSH	
		MAIN DEPLOY PB - PUSH			1
	00:00	DET-RESET-START			
	00:15	DIRECT 02 vlv - OPEN (CCW)			7
		CM PRPLNT JETT DUMP - DUMP (burn is audible)			
		RCS IND sw - CM A			
		CM RCS PRESS He - decreasing			
		XXX			
		RCS IND sw - CM B			
		CM RCS PRESS He - decreasing			
		If not decreasing or jets not firing			
CDR,LMP		RHC (both) - FIRE ALL RCS JETS EXCEPT			
		PITCH (until jets stop firing or			
		He PRESS stops decreasing)			
		XXX			

Basic Date Aug. 18, 1967
Changed

BLK II

MODE I-B

MODE I-B

LMP	VHF AM A - SIMPLEX	3
	VHF AM - T/R	6
	VHF BCN - ON	3
	VHF ANT - RECY	
	Transmit voice (VHF AM) reporting:	
	Position	
	Mains disreefed	
	Miss dist (if appl)	
	Crew status	
CDR	CM PRPLNT JETT PURGE - PURGE (for 30 sec after burnoff)	1
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
	X CM RCS He DUMP PB - PUSH X	
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
LMP	CB FLT & PL BAT BUS A,B & BAT C(3)-CLOSE	275
	CB FLT & PL MNA & B(2) - OPEN	
CDR	FLOOD - POST LDG	8
	FLOOD DIM - 1 or 2	
CMP	RCS IND - CM A	2
	CM RCS PRESS He - zero	
CDR	CM PRPLNT JETT LOGIC - OFF	1
CMP	CM RCS PRPLNT (both) - OFF	2
	CM RCS PRPLNT TB (both) - BP	
LMP	MN BUS TIES (both) - OFF	5

WARNING

Do not perform next step
above 600 feet as cabin
negative pressure may
become too high.

600' CABIN PRESS REL vlv (both)-CLOSE (S.L.-OFF) 325

LANDING

Postlanding check pg 14-1

Basic Date Aug. 18, 1967
Changed

BLK II

D-5
MODE I-C ABORT
 (01:50 to 02:46)
 (100K to 300K)

MANUAL BACKUP

CDR	00:00	AUTO or THC-CCW	X	CM/SM SEP (both) - ON
		*BECO	X	
		*DET Reset, start	X	DET-RESET-START
CMP		*CM RCS press	X	CM RCS PRESS - ON
		*RCS trans	X	RCS TRNFR - CM
CDR		*CM/SM umb dfce	X	CM/SM SEP (both) - ON
		*CM/SM sep	X	"
		*LE mtr fire	X	LES MTR FIRE PB - PUSH
CMP			X	
	00:01	*SCS/RCS enable	X	RCS CMD - ON
CDR			X	
	00:11	*Canard deploy	X	CANARD DEPLOY PB - PUSH
	00:14	*ELS logic arm	X	ELS LOGIC - ON (<50K)
		Pitch Rates Excessive:	X	<u>PILOT OPTION:</u> If RATES
		DIRECT RCS - ON	X	NOT EXCESSIVE & FDAI
		ROLL to 90°	X	ATT REF GOOD:
		DAMP RATES W/YAW	X	TWR JETT sw (both)-ON
		THRUSTERS	X	DAMP RATES
		ROLL HEADS DOWN	X	MNVR TO ENT ATT
		DIRECT RCS - OFF	X	.05G sw - ON
		Set 5°/sec pitchup	X	EMS FUNCTION - ENTRY
		rate	X	EMS MODE - AUTO
		MAN ATT PITCH-ACCEL	X	EMS ROLL -- ON
		CMD	X	FLY MAX LIFT ENTRY
			X	AT 50 K':
			X	GO TO EARTH LDG,
			X	pg 13-1
	40K'	TWR JETT (both) - ON	X	
CMP			X	
	24K'	*SCS RCS disable	X	RCS CMD - OFF
CDR		*Apex cover jett	X	APEX COVER JETT PB - PUSH
		*Drogues deploy	X	DROGUE DEPLOY PB - PUSH
	23.5K'	CABIN PRESS increasing	X	If not incr by 17K':
			X	CABIN PRESS REL -
			X	DUMP (S.L.-OFF)
	10K'	*Mains deploy	X	MAIN DEPLOY PB - PUSH
		MAIN DEPLOY PB - PUSH		1
	00:00	DET-RESET-START		
	00:15	DIRECT 02 vlv - OPEN (CCW)		7

MODE I-C

Basic Date Aug. 18, 1967
 Changed

BLK 11

CM PRPLNT JETT DUMP - DUMP (burn is audible)

RCS IND sw - CM A

CM RCS PRESS He - decreasing

XXX

RCS IND sw - CM B

CM RCS PRESS He - decreasing

If not decreasing or jets not firing:

CDR,LMP

RHC (both) - FIRE ALL RCS JETS EXCEPT

PITCH (until jets stop firing or

He PRESS stops decreasing)

XXX

LMP

VHF AM A - SIMPLEX

3

VHF AM - T/R

6

VHF BCN - ON

3

VHF ANT - RECY

Transmit voice (VHF AM) reporting:

Position

Main chutes disreefed

Miss distance (if appl)

Crew status

CDR

CM PROP JETT PURGE - PURGE (for 30 sec
after burnoff)

1

XXX

CM RCS He DUMP PB - PUSH

XXX

LMP

CB FLT & PL BAT BUS A,B & BAT C(3)-CLOSE

275

CB FLT & PL MNA & B (2) - OPEN

CDR

FLOOD - POST LDG

8

FLOOD DIM - 1 or 2

CMP

RCS IND - CM A

2

CM RCS PRESS He - zero

CDR

CM PRPLNT JETT LOGIC - OFF

1

CMP

CM RCS PRPLNT (both) - OFF

2

CM RCS PRPLNT TB (both) - BP

LMP

MN BUS TIES (both) - OFF

5

WARNING

Do not perform next step
above 600 feet as cabin
negative pressure may
become too high.

600' CABIN PRESS REL vlv (both)-CLOSE (S.L.-OFF) 325
LANDING

Postlanding check pg 14-1

Basic Date Aug. 18, 1967

Changed

BLK II

MODE I-C

MODE II SPS ABORTS

(02:46 to 09:21)

MANUAL BACKUP

CDR

00:00 THC-CCW

X

*DET reset, start

X DET-RESET-START

*BECO

X Request gnd cutoff

*Direct Ullage

X DIRECT ULLAGE PB - PUSH

00:03 *Adapter sep

X CSM/LV SEP PB - PUSH

CMP *RCS/SCS enable

X RCS CMD - ON

CDR LV/SPS IND sw - GPI

X

SC CONT - SCS(verify)

X THC -- CW

THC - UNLOCK, NEUT

X

EMS MODE - AUTO

X

00:06 THC +X TRANSLATION

X RATES HIGH:

X ΔV THRUST A&B (both)-

X NORMAL

X THRUST ON PB - PUSH

X or SPS THRUST - DIRECT

00:08 RATES PERMITTING:

 ΔV THRUST A&B (both) - OFF

1

SPS THRUST - NORMAL

00:23 TERMINATE +X TRANSLATION

00:23 START MNVR TO ENT ATT($R=0^\circ$, $P=126^\circ$, $Y=0^\circ$)

TEST CM RCS (Time permitting)

CMP RCS TRNFR - CM

2

CDR TEST ROLL JETS - no fire

CM RCS PRESS - ON

CMP RCS IND - CM A then B (287-302 psig)

CDR TEST ROLL JETS - fire

SCS CHANNEL (4) - OFF

1

CMP RCS TRNFR - SM

2

CDR CM/SM SEP (both) - ON

After sep:

CM RCS press - on (verify)

RCS Trans - CM (verify)

B/D ROLL, PITCH & YAW - A

1

CMP C/W mode - CM

Basic Date Aug. 18, 1967

Changed

BLK II

MODE II

CDR FDAI SCALE - 50/15/50/10 1
 ATT DEADBAND - MAX
 Note TFF _____
 DSKY - TBD

01:40 COMPLETE MNVR TO ENTRY ATTITUDE
 R = 0° , P = 126° , Y = 0° (lift vector up)
 Set up for ring A (if desired)

A/C ROLL - OFF 1
 B/D ROLL - A
 SCS CHANNEL PITCH & YAW - A
 CB SCS A/C ROLL 1 & 2 MNA & B (4) - OPEN 8
 CB SCS B/D ROLL 1 MNA - CLOSE
 CB SCS B/D ROLL 2 MNA - OPEN
 CB SCS B/D ROLL 1 MNB - OPEN
 CB SCS B/D ROLL 2 MNB - OPEN
 CB SCS PITCH MNA - CLOSE
 CB SCS PITCH MNB - OPEN
 CB SCS YAW MNA - CLOSE
 CB SCS YAW MNB - OPEN

BMAG MODE (3) - RATE 2 1
 EMS .05G 1t on
 .05G sw - ON
 EMS MODE - STBY
 EMS FUNCTION - ENTRY
 EMS MODE - AUTO
 EMS ROLL - ON
 MAINTAIN FULL LIFT

50K' Proceed to Earth Landing Phase, pg 13-1

MODE II

Basic Date Aug. 18, 1967
 Changed

BLK II

MODE III SPS ABORTS

(09:21 to Insertion)

MANUAL BACKUP

CDR

00:00 THC-CCW X
 *DET reset, start X DET-RESET-START
 *BECO X Request gnd cutoff
 *Direct ullage X DIRECT ULLAGE PB - PUSH
 00:03 *Adapter sep X CSM/LV SEP PB - PUSH
 LMP *RCS/SCS enable X RCS CMD - ON
 CDR LV/SPS IND sw - GPI X
 SC CONT - SCS(verify) X THC - CW
 THC-UNLOCK, NEUT X
 EMS MODE - AUTO X
 00:06 THC +X TRANSLATION X RATES HIGH:
 X ΔV THRUST A&B (both)-
 X NORMAL
 X THRUST ON PB - PUSH
 X or SPS THRUST - DIRECT

00:08 RATES PERMITTING:

V THRUST A&B (both) - OFF 1

SPS THRUST - NORMAL

DSKY - TBD

00:23 TERMINATE +X TRANSLATION

00:24 MNVR TO RETRO ATTITUDE

R = 180° , P = 201° , Y = 0°

OBTAIN RETRO UPDATE

CHECK GIMBAL ANGLES & MTVC

CMP

01:50 DIRECT ULLAGE PB - PUSH & HOLD

 ΔV THRUST A&B (both) - NORMAL

02:05 THRUST ON PB - PUSH

XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

X SPS THRUST - DIRECT X

XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

DIRECT ULLAGE PB - RELEASE (ign + 1 sec)

 ΔV counter = desired value:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

BURN R=0 on DSKY

XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

 ΔV THRUST A&B (both) - OFF

or SPS THRUST - NORMAL

Basic Date Aug. 18, 1967
Changed

BLK II

MODE III

CDR MNVR TO SEP ATTITUDE
 (R = 180°, P = 290°, Y = 0°)
 TEST CM RCS (Time Permitting)

CMP RCS TRNFR - CM 2
 CDR TEST ROLL Jets - No Fire
 CMP RCS CM PRESS - ON
 RCS IND - CM A then B (287-302 psig)
 CDR TEST ROLL JETS - fire
 SCS CHANNEL (4) - OFF 1
 CMP RCS TRNFR - SM 2
 CDR CM/SM SEP (both) - ON
 After sep:
 CM RCS press - on (verify)
 RCS Trans - CM (verify)
 B&D ROLL, PITCH, & YAW - A 1
 CMP C/W mode - CM 2
 CDR FDAI SCALE - 50/15/50/10 1
 ATT DEADBAND - MAX
 Note TFF
 MNVR TO ENTRY ATTITUDE
 R = 240°, P = 110°, Y = 0°
 Set up for ring A (if desired)
 A/C ROLL - OFF
 B/D ROLL - A
 SCS CHANNEL PITCH & YAW - A
 CB SCS A/C ROLL 1 & 2 MNA & B (4) - OPEN 8
 CB SCS B/D ROLL 1 MNA - CLOSE
 CB SCS B/D ROLL 2 MNA - OPEN
 CB SCS B/D ROLL 1 MNB - OPEN
 CB SCS B/D ROLL 2 MNB - OPEN
 CB SCS PITCH MNA - CLOSE
 CB SCS PITCH MNB - OPEN
 CB SCS YAW MNA - CLOSE
 CB SCS YAW MNB - OPEN
 BMAG MODE (3) - RATE 2 1
 EMS .05G 1t on
 .05G sw - ON
 EMS MODE - STBY
 EMS FUNCTION -- ENTRY
 EMS MODE - AUTO
 EMS ROLL - ON
 FLY HALF LIFT ENTRY

Basic Date Aug. 18, 1967
 Changed

BLK II

BLK II
Basic Date Aug. 18, 1967
Changed

D-11
MODE IV SPS INSERTION
(09:21 to Insertion)

MANUAL BACKUP

CDR
00:00 THC-CCW X
*DET reset, start X DET-RESET-START
*BECO X Request gnd cutoff
*Direct ullage X DIRECT ULLAGE PB - PUSH
00:03 *Adapter sep X CSM/LV SEP PB - PUSH
CMP *RCS/SCS enable X RCS CMD - ON
CDR LV SPS IND sw - GPI X
CDR SC CONT - SCS(verify) X THC - CW
THC - UNLOCK, NEUT X
EMS MODE - AUTO X
00:06 THC +X TRANSLATION X RATES HIGH:
X ΔV THRUST A&B (both)-
X NORMAL
X THRUST ON PB - PUSH
X or SPS THRUST - DIRECT
00:08 RATES PERMITTING:
 ΔV THRUST A&B (both) - OFF 1
SPS THRUST - NORMAL
00:20 TERMINATE +X TRANSLATION
MNVR TO INSERTION ATTITUDE:
R = 180° , P = Var $^\circ$, Y = 0°
OBTAIN INSERTION UPDATE
CHECK GIMBAL ANGLES & MTVC
CMP
01:50 DIRECT ULLAGE PB - PUSH & HOLD
 ΔV THRUST A&B (both) - NORMAL
02:50 THRUST ON PB - PUSH
XXXXXXXXXXXXXXXXXXXXXXXXXXXXX
X SPS THRUST - DIRECT X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXX
DIRECT ULLAGE PB - RELEASE (ign +1 sec)
 ΔV counter = desired value
 ΔV THRUST A&B (both) - OFF
or SPS THRUST - NORMAL

CMP

RECORD:

VI	— — — — — .	FPS
H DOT	— — — — — .	FPS
H PAD	— — — — — .	NM

Key V37E 00E

Key V82E

FL V06 N44

HA	XXXX.X	NM
HP	XXXX.X	NM
TFF	XXBXX	MIN-SEC

PRO (exits if HP <50)

FL V06 N32 (TF HP)

HRS:MIN:SEC	XXX:XX:XX.XX
-------------	--------------

PRO

SECO +40 sec

Status from gnd

POSTORBITAL INSERTION CHECK pg C-3

Basic Date Aug. 18, 1967
 Changed _____

BLK II

MODE IV

FIXED ΔV MODE I BRAVORETRO GRADE

(09:51 to 22:30)

MANUAL BACKUP

CDR

00:00 THC-CCW X
 *DET reset, start X DET-RESET-START
 *BECO X Request gnd cutoff
 *Direct ullage X DIRECT ULLAGE PB - PUSH

00:03 *Adapter sep X CSM/LV SEP PB - PUSH

CMP *RCS/SCS enable X RCS CMD - ON

SC CONT - SCS (verify) X THC - CW

THC - UNLOCK, NEUT X

00:06 THC +X TRANSLATION

00:23 TERMINATE +X TRANSLATION

MNVR TO RETRO ATTITUDE:

R=180°, P=148°, Y=14° (BEF, heads up)

OBTAIN TIG & RETRO UPDATE

CDR LV/SPS ind sw - GPI

CHECK GIMBAL ANGLES & MTVC

00:15 START ULLAGE

ΔV THRUST A&B (both) - NORMAL

THRUST ON PB - PUSH

XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

X SPS THRUST - DIRECT X

XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

00:01 TERMINATE ULLAGE (ign + 1 sec)

ΔV counter = desired value for 400 FPS burn

ΔV THRUST A&B (both) - OFF

or SPS THRUST - NORMAL

CDR MNVR TO SEP ATTITUDE:

(R=°, P=°, Y=°)

TEST CM RCS (Time Permitting)

CMP RCS TRNFR - CM

2

CDR TEST ROLL Jets - No Fire

RCS CM PRESS - ON

CMP RCS IND - CM A then B (287-302 psig)

CDR TEST ROLL JETS - fire

SCS CHANNEL (4) - OFF

1

CMP RCS TRNFR - SM

2

CDR CM/SM SEP (both) - ON

9

Basic Date Aug. 18, 1967

Changed

BLK II

After sep:

CMP	CM RCS press - on (verify)	2
CDR	RCS Trans - CM (verify)	

	B&D ROLL, PITCH, & YAW - A	1
--	----------------------------	---

CMP	C/W mode - CM	2
-----	---------------	---

CDR	FDAI SCALE - 50/15/50/10	1
-----	--------------------------	---

ATT DEADBAND - MAX

Note TFF

MNVR TO ENTRY ATTITUDE:

R=60°, P=45°, Y=14°

(BEF, HEADS DOWN, LIFT VECTOR SOUTH)

OBTAIN ROLL, PITCH, YAW UPDATE

Set up for ring A (if desired)

A/C ROLL - OFF

B/D ROLL - A

SCS CHANNEL PITCH & YAW - A

CB SCS A/C ROLL 1 & 2 MNA & B (4) - OPEN	8
--	---

CB SCS B/D ROLL 1 MNA - CLOSE

CB SCS B/D ROLL 2 MNA - OPEN

CB SCS B/D ROLL 1 MNB - OPEN

CB SCS B/D ROLL 2 MNB - OPEN

CB SCS PITCH MNA - CLOSE

CB SCS PITCH MNB - OPEN

CB SCS YAW MNA - CLOSE

CB SCS YAW MNB - OPEN

BMAG MODE (3) - RATE 2	1
------------------------	---

EMS .05G 1t on

.05G sw - ON

EMS MODE - STBY

EMS FUNCTION - ENTRY

EMS MODE - AUTO

EMS ROLL - ON

FLY HALF LIFT ENTRY

50K' Proceed to Earth Landing Phase pg 13-1

MODE I BRAVO

Basic Date Aug. 18, 1967
 Changed

BLK II

SECTION 1. G&N GEN

VERB LIST (Decimal)

Regular Verbs

- 01 Display Oct Compnt 1 (R1)
- 02 Display Oct Compnt 2 (R1)
- 03 Display Oct Compnt 3 (R1)
- 04 Display Oct Compnt 1, 2 (R1, R2)
- 05 Display Oct Compnt 1, 2, 3
(R1, R2, R3)
- 06 Display Decimal (R1 or R1, R2 or
R1, R2, R3)
- 07 Display DP Decimal - Test Only
(R1, R2)
- 11 Monitor Oct Compnt 1 (R1)
- 12 Monitor Oct Compnt 2 (R1)
- 13 Monitor Oct Compnt 3 (R1)
- 14 Monitor Oct Compnt 1, 2 (R1, R2)
- 15 Monitor Oct Compnt 1, 2, 3
(R1, R2, R3)
- 16 Monitor Decimal (R1 or R1, R2 or
R1, R2, R3)
- 17 Monitor DP Decimal - Test Only
(R1, R2)
- 21 Load Compnt 1 (R1)
- 22 Load Compnt 2 (R2)
- 23 Load Compnt 3 (R3)
- 24 Load Compnt 1, 2 (R1, R2)
- 25 Load Compnt 1, 2, 3 (R1, R2, R3)
- 27 Display Fixed Memory
- 30 Request Executive
- 31 Request Waitlist
- 32 Recycle Prog
- 33 Proceed Without DSKY inputs
- 34 Terminate Function
- 35 Test Lights
- 36 Request Fresh Start
- 37 Change Prog (Major Mode)

Basic Date Aug. 18, 1967

Changed _____

BLK II

 R03, 30, 31, 32, 34, 63
 1. G&N GENERAL

Extended Verbs

40 Zero (ICDU or OCDU)
 41 Coarse Align (ICDU or OCDU)
 42 Fine Align IMU
 43 Load IMU ATT Error meters
 44 Pulse Torque Gyros
 46 Establish G&C Control
 48 Load A/P Data (R03)
 49 Start Auto ATT MNVR
 50 Please Perform
 51 Please Mark
 53 Please perform alt LOS mark
 55 Increment CMC Time (Decimal)
 56 Terminate Tracking (P20)
 57 Start Rendezvous TRK DATA Process R-22
 58 Reset DAP HOLD FLAG TO MINUS ONE
 59 Please Perform Calibration Mark
 60 Set N22 = N20
 61 Select mode 1
 62 Select mode 2
 65 Verify Prelaunch Align Optics (CSM)
 67 Start CSM/Saturn Integ Test (CSM)
 68 CSM Stroke Test on (CSM)
 69 CSM Stroke Test off (CSM)
 70 Update Liftoff Time
 71 Univ Update-BLOCK ADR
 72 Univ Update-SINGLE ADR
 73 Update CMC Time (Octal)
 74 Initialize erasable dump via downlink
 75 Backup Liftoff
 76 Min impulse command mode
 77 Rate command and attitude hold mode
 78 Update prelaunch azimuth
 80 Update LM State Vector
 81 Update CSM State Vector
 82 Request Orbit Param Disp (R30)
 83 Request REND Param Display (R31)
 84 Start Target Delta V (R32)
 85 Request REND Param Display No.2 (R34)
 89 Request REND Final ALT Routine (R63)
 91 Compute Banksum

R03,30,31,32,34,63
 1. G&N GENERAL

Basic Date Aug. 18, 1967
 Channed

BLK II

- 92 Operate Selected System Test
- 93 Scan Inbits
- 99 Emergency Engine Shutdown

NOUN LIST (Decimal)

Normal Nouns

01	Specify Machine Address (Fract)	.XXXXX	
02	Specify Machine Address (Whole)	XXXXX.	
03	Specify Machine Address	XXX.XX	DEG
05	Angular Error/Diff (R1)	XXX.XX	DEG
06	Option Code (R1 & R2)	OCTAL	
07	Change of Prog (R1) (used with V50)	XXXXX.	
08	Alarm Data	OCTAL	
09	Alarm Codes	OCTAL	
10	Channel to be Specified(R1)	OCTAL	
14	Inbit Message	OCTAL	
15	Increment Machine Address (R1)	OCTAL	
19	Enable Trim (used with V50 only) (retains N22 displays)	XXX.XX XXX.XX XXX.XX	DEG DEG DEG
20	Present ICDU Angles Roll	XXX.XX	DEG
	Pitch	XXX.XX	DEG
	Yaw	XXX.XX	DEG
21	PIPA PULSES X	XXXXX.	Pulses
	Y	XXXXX.	Pulses
	Z	XXXXX.	Pulses
22	New ICDU Angles Roll	XXX.XX	DEG
	Pitch	XXX.XX	DEG
	Yaw	XXX.XX	DEG
23	Delta ICDU Angles Roll	XXX.XX	DEG
	Pitch	XXX.XX	DEG
	Yaw	XXX.XX	DEG
24	Delta CMC Clock Time	00XXX.	HRS
		000XX.	MIN
		0XX.XX	SEC
25	Checklist (used with V50)	XXXXX. XXXXX. XXXXX.	

26	Prio/Delay, ADRES, BBCON	OCTAL	
27	Self-Test on/off sw	XXXXX.	
30	Target Code	XXXXX.	
	(Gyrocompassing verification)	XXXXX.	
32	Time to Perigee	00XXX.	HRS
		000XX.	MIN
		0XX.XX	SEC
33	Time of Ignition (GETI)	00XXX.	HRS
		000XX.	MIN
		0XX.XX	SEC
34	Time of Event	00XXX.	HRS
		000XX.	MIN
		0XX.XX	SEC
35	Time from Event	00XXX.	HRS
		000XX.	MIN
		0XX.XX	SEC
36	Time of CMC Clock	00XXX.	HRS
		000XX.	MIN
		0XX.XX	SEC
37	GETI-TPI	00XXX.	HRS
		000XX.	MIN
		0XX.XX	SEC
38	GETI-MID	00XXX.	HRS
		000XX.	MIN
		0XX.XX	SEC
39	Delta Time of Transfer	00XXX.	HRS
		000XX.	MIN
		0XX.XX	SEC

Mixed Nouns

40	TF GETI/TFC	XXBXX.	MIN-SEC
	VG	XXXX.X	FPS
	Delta V (Accumulated)	XXXX.X	FPS
41	Target Azimuth	XXX.XX	DEG
	Elevation	XX.XXX	DEG
	Ident	0000X	
42	Apogee Alt	XXXX.X	NM
	Perigee Alt	XXXX.X	NM
	Delta V (Required)	XXXX.X	FPS

Basic Date Aug. 18, 1967

Channel

BLK II

43	Lat	XXX.XX DEG (+ North)
	Long	XXX.XX DEG (+ East)
	Alt	XXXX.X NM
44	Apogee Alt	XXXX.X NM
	Perigee Alt	XXXX.X NM
	TFF	XXBXX MIN-SEC
45	Marks	XXXXX.
	TF GETI of next burn	XXBXX. MIN-SEC
	MGA	XXX.XX DEG
46	Autopilot Config (R1&R2)	OCTAL
47	IX	XXXXX. SLUG-FT SQ/100
	(IY + IZ)/2	XXXXX. SLUG-FT SQ/100
	Weight	XXXXX. LB
48	Pitch Trim	XXX.XX DEG
	Yaw Trim	XXX.XX DEG
	TLX	XXXXX. FT-LBS/ 100
49	Delta R	XXXX.X NM
	Delta V	XXXX.X FPS
50	SPLERROR	XXXX.X NM
	PERIGEE	XXXX.X NM
	TFF	XXBXX. MIN-SEC
53	RANGE	XXXX.X NM
	RANGE RATE	XXXX.X FPS
	PHI	XXX.XX DEG
54	Range	XXX.XX NM
	Range Rate	XXXX.X FPS
	Theta	XXX.XX DEG
55	ELEVATION	XXX.XX DEG
58	Delta V-TPI	XXXX.X FPS
	Perigee Alt (TPI)	XXXX.X NM
	Delta V-TPF	XXXX.X FPS
59	Delta V-MID	XXXX.X FPS
	TF GETI (MID)	XXBXX. MIN-SEC
	Delta V-TPF	XXXX.X FPS
60	G Max	XXX.XX G
	V Pred	XXXXX. FPS
	Gamma EI	XXX.XX DEG

BASIC DATE AUG. 18, 1967
Changed

BLK II

61	Impact Lat	XXX.XX	DEG
	(+ North)		
	Impact Long	XXX.XX	DEG
	(+ East)		
	Head Up/Down	+/-00001	
	(+ Heads up)		
62	VI-Inertial Vel Mag	XXXXX.	FPS
	H Dot-Alt Rate Change	XXXXX.	FPS
	H-Alt Above Pad Radius	XXXX.X	NM
63	R TGO, RNG 297,431 Ft	XXXX.X	NM
	To Splash		
	V IO, Predicted Iner	XXXXX.	FPS
	Vel		
	TTE, time from 297,431 Ft	XXBXX	MIN-SEC
64	Drag Acceleration	XXX.XX	DEG
	VI, Inertial Velocity	XXXXX.	FPS
	R TGO, Range to Splash	XXXX.X	NM
65	Sampled CMC Time	00XXX.	HRS
	(fetched in interrupt)	000XX.	MIN
		0XX.XX	SEC
66	Beta, CMD Bank Angle	XXX.XX	DEG
	Cross Range Error	XXXX.X	NM
	Down Range Error	XXXX.X	NM
67	R TGO, Range to Target	XXXX.X	NM
	Lat, Present Position	XXX.XX	DEG
	(+ North)		
	Long, Present Position	XXX.XX	DEG
	(+ East)		
68	Beta, CMD Bank Angle	XXX.XX	DEG
	VI, Inertial Vel.	XXXXX.	FPS
	H Dot, Alt Rate Change	XXXXX.	FPS
70	Star Code	00XXX.	
	LMK Data	XXXXX.	
	HOR Data	000XX.	
82	Delta VX (lcl vert)	XXXX.X	FPS
	Delta VY (lcl vert)	XXXX.X	FPS
	Delta VZ (lcl vert)	XXXX.X	FPS
83	Delta VX (Body Control	XXXX.X	FPS
	Axis)		
	Delta VY (Body Control	XXXX.X	FPS
	Axis)		
	Delta VZ (Body Control	XXXX.X	FPS
	Axis)		

Basic Date Aug. 18, 1967
Channel

BLK II

84	Delta VX (Other Vehicle)	XXXX.X	FPS
	Delta VY (Other Vehicle)	XXXX.X	FPS
	Delta VZ (Other Vehicle)	XXXX.X	FPS
85	VGX (Body Control Axis)	XXXX.X	FPS
	VGY (Body Control Axis)	XXXX.X	FPS
	VGZ (Body Control Axis)	XXXX.X	FPS
86	VGX (1cl vert)	XXXX.X	FPS
	VGY (1cl vert)	XXXX.X	FPS
	VGZ (1cl vert)	XXXX.X	FPS
87	Mark Data - Shaft (R1)	XXX.XX	DEG
	Trunnion (R2)	XX.XXX	DEG
89	Landmark - Lat	XX.XXX	DEG
	(+ North)		
	Long/2	XX.XXX	DEG
	(+ East)		
	Alt	XXX.XX	NM
91	OCDU Angles Shaft (R1)	XXX.XX	DEG
	Trunnion (R2)	XX.XXX	DEG
92	New OCDU Angles Shaft (R1)	XXX.XX	DEG
	Trunnion (R2)	XX.XXX	DEG
93	Delta Gyro Angles X Gyro	XX.XXX	DEG
	Y Gyro	XX.XXX	DEG
	Z Gyro	XX.XXX	DEG
95	Pref att ICDU angles	XXX.XX	DEG
		XXX.XX	DEG
		XXX.XX	DEG
96	+X axis att ICDU angles	XXX.XX	DEG
		XXX.XX	DEG
		XXX.XX	DEG
97	System Test Inputs	XXXXXX.	
		.XXXXXX	
		XXXXXX.	
98	System Test Results	XXXXXX.	
		.XXXXXX	
		XXXXXX.	
99	Engine Enable	XXBXX	MIN-SEC
	(used with V 50 only)	XXXX.X	FPS
	(retains N 40 displays)	XXXX.X	FPS

Basic Date Aug. 18, 1967
 Changed _____

BLK II

STAR LISTNO.STAR NAME (Numerical)

1	Alpheratz
2	Diphda
3	Navi
4	Achernar
5	Polaris
6	Acamar
7	Menkar
10	Mirfak
11	Aldebaran
12	Rigel
13	Capella
14	Canopus
15	Sirius
16	Procyon
17	Regor
20	Dnoces
21	Alphard
22	Regulus
23	Denebola
24	Gienah
25	Acrux
26	Spica
27	Alkaid
30	Menkent
31	Arcturus
32	Alphecca
33	Antares
34	Atria
35	Rasalhague
36	Vega
37	Nunki
40	Altair
41	Dabih
42	Peacock
43	Deneb
44	Enif
45	Fomalhaut

Basic Date Aug. 18, 1967

BLK II

STAR NAME (Alphabetical)	NO.
Acamar	(θ Eridani) 6
Achernar	(α Eridani) 4
Acrux	(α Crucis) 25
Aldebaran	(α Tauri) 11
Alkaid	(η Ursae Majoris) 27
Alphard	(α Hydrae) 21
Alphecca	(α Coronae Bor.) 32
Alpheratz	(α Andromedae) 1
Altair	(α Aquilae) 40
Antares	(α Scorpii) 33
Arcturus	(α Bootis) 31
Atria	(α Trianguli Austr.) 34
Canopus	(α Carinae) 14
Capella	(α Aurigae) 13
Dabih	(β Capricorni) 41
Deneb	(α Cygni) 43
Denebola	(β Leonis) 23
Diphda	(β Ceti) 2
Dnoces	(ι Ursae Majoris) 20
Enif	(ϵ Pegasi) 44
Fomalhaut	(α Picis Austr.) 45
Gienah	(γ Corvi) 24
Menkar	(α Ceti) 7
Menkent	(θ Centauri) 30
Mirfak	(α Persei) 10
Navi	(γ Cassiopeiae) 3
Nunki	(σ Sagittarii) 37
Peacock	(α Pavonis) 42
Polaris	(α Ursae Minoris) 5
Procyon	(α Canis Minoris) 16
Rasalhague	(α Ophiuchi) 35
Regor	(γ Velorum) 17
Regulus	(α Leonis) 22
Rigel	(β Orionis) 12
Sirius	(α Canis Majoris) 15
Spica	(α Virginis) 26
Vega	(α Lyrae) 36

Basic Date Aug. 18, 1967
 Changed _____

BLK. 11

V50 N25 CHECKLIST CODES

<u>R1 Code</u>	<u>ACTION</u>	<u>FUNCTION</u>
00011	Key in	Auto Optics Pos Option
00012	Key in	Target Data
00014	Key in	Fine Align Option
00015	Perform	Star Acquisition
00016	Key in	Terminate Mark Option
00017	Perform	Additional Sightings
00025	Perform	Backup Star Sighting (P53, P54)
00026	Perform	Terminate Backup Marking (P53, P54)
00031	Key in	Engine On Option
00035	Perform	CMC Thrusting Preparation
00036	Perform	Thrust Terminate
00037	Perform	Trim Finished, Please Terminate R03
00041	Switch	CM/SM Sep to Up
00060	Switch	ISS to ON
00061	Switch	IMU Power Down
00062	Switch	CMC Power Down
00200	Key in	Zero AEA Clock Option
00201	Switch	RR Mode to Automatic
00202	Key in	Sighting Check Option
00203	Switch	S/C Control to CMC, Mode to AUTO, THR cont to AUTO
00204	Key in	Engine Gimbal Option (Enable, OFF)
00205	Perform	Man Acquisition of RR
00400	Switch	SPS Ready to on
00401	Switch	S/C Control to CMC
00402	Switch	Saturn Control to S/C
00403	Switch	Optics to Man or Zero

V04 N06 OPTION CODES

<u>R1 Code</u>	<u>Purpose</u>	<u>Input for R2</u>
00001	Specify State Vector to be Updated	1 = LM 2 = CSM
00002	Specify Acquisition Mode	1 = AUTO 2 = MANUAL

Basic Date Aug. 18, 1967
Channel

BLK II

Basic Value 100.00
Changed

Basic Value 100.00
Changed

Basic Value 100.00
Changed

Basic Value 100.00
Changed

Basic Value 100.00
Changed

Basic Value 100.00
Changed

```
00216  Bad PIPA Reading
00217  Bad Return From Stall Routines
```

Rendezvous Alarms

```

00401  *Desired Gimbal Angles Yield Gimbal
                                Lock
00404  Target Out of View(90 DEG TEST)
00405  Two Stars Not Available
00406  REND Navigation Not Operating
00407  Target Out of View (38 DEG TEST)
00420  Third Call to Orbital Integration
00421  W-Matrix Overflow
00525  Delta Theta >3 DEG
00526  Range >400 Miles
00611  No TIG For Given ELEV Angle
00700  ΔR, ΔV exceed threshold

```

Computer Hardware Malfunctions

```
01102 CMC Self Test Error
01103 *Unused CCS Branch Executed
01104 *Delay Routine Busy
01105 Downlink Too Fast
01106 Uplink Too Fast
01107 Phase Table Failure. Assume
      Erasable Memory is Destroyed
01110 Restart with No Active Phase
01111 Restart with Active Phase
```

List Overflows (All Aborts)

```

01201  *Executive Overflow - No Vac. Areas
01202  *Executive Overflow - No Core Sets
01203  *Waitlist Overflow - Too Many Tasks
01206  *Second job attempts to go to sleep via
        kybd and display program
01207  *No Vac. Area for Marks
01210  *Two Programs Using Device At Same
                                Time
01211  Illegal Interrupt of Extended Verb
01301  *Arccos-Arcsin Input Angle Too Large
                                (Abort)

```

Basic DateAug. 18, 1967

BLK II

01302 *SQRT Called With Negative Argument
(Abort)

Display Alarms

01407 VG Increasing
01410 Thrust too low for cross prod steering
01426 IMU Unsatisfactory
01427 IMU Reversed

Keyboard and Display Program

01501 *Keyboard and Display Alarm During
Internal Use (NVSUB). Abort
01502 *Illegal Flashing Display
01520 V37 Request Not Permitted at This
Time
01550 V46 Inoperative When TVC DAP is on

System Test Alarms

01602 Bad Optics During Verification

DAP Display Alarms

01703 Less than 45 Secs to Ignition
01704 GNC Auto Mode Not Selected
01705 DAP Hold Flag Not Set to Minus One
01706 Stage Verify Discrete Does Not Agree
With Noun 46
01707 Checklist 203 Not Performed

* Generates restart. 00401 in certain
cases will generate a restart.

Basic Data
Changed

P00 - CSM-CMC IDLING PROGRAM

- Purp: (1) Indicates CMC is in no control or computation operation requiring coordination with other crew tasks
- (2) Permits manual attitude maneuvers with minimum concern for GNCS
- (3) Maintains CMC in readiness for entry into most programs

Key V37E 00E

P05 - CSM GNCS STARTUP PROGRAM

Purp: To transfer the ISS/CMC from the standby to the operate condition

LMP	1	G/N PWR - AC1	5
	2	STBY lt-ON (if not, go to step 3) PRO PB - PUSH until STBY lt out RESET PB - PUSH Key V46E	
	3	Key V37E 05E	
	4	FL V50 N25 (Pls perf) R1 00060 (ISS turn on)	
CDR	Accept	CB SCS LOGIC PWR (4) - CLOSE	8
		SCS/HAND CONT PWR - BOTH	7
		SCS LOGIC - BUS 3	1
		FDAI PWR - BOTH	7
		CMC MODE - FREE	1
		FDAI SELECT - 1/2	
CMP		G/N PWR IMU - ON	100
		NO ATT Lt - ON (90 sec)	
		ENTR (4 sec after NO ATT lt off)	

Reject PRO

5 FL V50 N07
V37E__E

Basic Date Aug. 18, 1967

BLK II

P06 - CSM GNCS POWER DOWN PROGRAM

Purp: To transfer the ISS/CMC from the
operate to the standby condition.

1 Key V37E 06E

2 POSS

FL V50 N25

00061 (ISS power down)

Accept: CMC MODE - FREE
G/N POWER IMU - OFF
ENTR

Reject: PRO

3 FL V50 N25

00062 (CMC power down)

Accept: SC CONT - SCS
ENTR
Push PRO until STBY lt - ON
CMC blanks DSKY displays

Reject: PRO

4 FL V50 N07

RCS DAP ACTIVATION PROCEDURE

(To be done first time DAP is
started or after a FRESH START)

1 CMC MODE - FREE

2 Key V01 N46E

Insure left digit is 1

3 Key V46E

1707

Basic Date Aug. 10, 1964

Changed

PLAN 11

CSM - DAP DATA LOAD PROCEDURE (R03)

CMP 1 V48E

2 FL V04 N46
 R1-ABCDE
 R2-ABCDE

3 Load data

	Vehicle Config.	Quad A/C for + $\ddot{X}$	Quad B/D for + $\ddot{X}$	Err Deadband	Rate Select
R1	0 = DAP off 1 = CSM 2 = CSM & LM 3 = CSM & SIVB	0 = No A/C 1 = A/C	0 = No B/D 1 = B/D	0 = $\pm 0.5^\circ$ 1 = $\pm 5.0^\circ$	0 = $0.05^\circ/\text{sec}$ 1 = $0.2^\circ/\text{sec}$ 2 = $0.5^\circ/\text{sec}$ 3 = $4.0^\circ/\text{sec}$
	Roll Quad Select	Quad A Fail	Quad B Fail	Quad C Fail	Quad D Fail
R2	0 = A/C 1 = B/D	0 = Fail 1 = No Fail	0 = Fail 1 = NoFail	0 = Fail 1 = No Fail	0 = Fail 1 = No Fail

Accept: PRO

Reject: Load desired data

4 FL V06 N47
 IX

(IY + IZ)/2

WT

Accept: PRO

Reject: Load desired data

5 FL V06 N48
 PITCH TRIM
 YAW TRIM
 TLX

XXXXX. SLUG FT
 SQ/100

XXXXX. SLUG FT
 SQ/100

XXXXX. LB

XXX.XX DEG

XXX.XX DEG

XXXXX. FT

LB/100

Accept: PRO

Reject: Load desired data

Basic Date Aug. 18, 1967

BLK II

CSM - ORBIT PARAMETER DISPLAY (R30)

CMP 1 Key V82E

2 FL V06 N44

HA

XXXX.X NM

HP

XXXX.X NM

TFF

XXBXX MIN-SEC

PRO (exits if HP <50 NM)

3 FL V06 N32 (TF HP)

HRS:MIN:SEC

XXX:XX:XX.XX

PRO

CSM - RENDEZVOUS PARAMETER DISPLAY #1 (R31)

CMP 1 Key V83E

2 FL V06 N54 (MON)

RANGE

XXX.XX NM

RANGE RATE

XXXX.X FPS

THETA (HOR/CSM + X)

XXX.XX DEG

PRO

CSM - TARGET ΔV (R32)

Purp: To load the CMC with ΔV applied to the LM
to enable updating of LM state vector.

CMP 1 Key V84E

2 FL V06 N84

 ΔV (OV) X,Y,Z

XXXX.X FPS

Accept: PRO

Reject: Load desired data

3 FL V06 N33 (GETI)

HRS:MIN:SEC

XXX:XX:XX.XX

Accept: PRO

Reject: Load desired data

Basic Date Aug. 10, 1967
Changed

CSM - RENDEZVOUS PARAMETER DISPLAY #2 (R34)

CMP 1 Key V85E

2 FL V06 N53 (MON)

RANGE	XXX.XX	NM
RANGE RATE	XXXX.X	FPS
PHI (STAR LOS/HOR)	XXX.XX	DEG

PRO

CSM - RENDEZVOUS FINAL ATTITUDE (R63)Purp: (1) To calculate GIMBAL ANGLES to point
CSM +X axis at LM(2) To call att mnvr routine (R60)
(During P00 only)

CMP 1 Key V89E

2 FL V06 N22 (Final Gimbal Angles)

ROLL, PITCH, YAW XXX.XX DEG

Accept: PRO

Reject: V34E

(Terminate R63 if not in P00 or
if R60 not desired)

(R60 - Attitude Maneuver)

3 FL V50 N25

00203 (CMC - AUTO request)

CDR Accept: SCS CHANNELS (4) - ON

CMC MODE - AUTO

SC CONT - CMC

CMP ENTR

Reject: Select control as desired
PRO

CMP 4 V06 N22 (Final GIMBAL ANGLES)

ROLL, PITCH, YAW XXX.XX DEG

Monitor auto maneuver on FDAI or
perform maneuver with RHCBasic Date Aug. 18, 1967
Channel

BLK II

- 5 FL V50 N19 (Perform ATT TRIM MAN.
enable)

CDR

Accept: SCS CHANNELS (4) - ON
CMC MODE - AUTO
SC CONT - CMC

CMP

ENTR - Ret to step 4
Reject: Select control as desired
PRO

MEASUREMENT AND LOADING OF PIPA BIAS

CDR

1 DET 00:00

1

- 2 S/C RATES $<0.1^\circ/\text{sec}$
CMC MODE - AUTO
SC CONT - CMC

CMP

- 3 Key V25 N21E,E,E,E V06 N21
00:00 ENTER, Start DET (simultaneous)

X PIP

FINAL

INITIAL

BIAS (1727)

- 4 Rcd PIPA counts

R1 X Axis PIPA

R2 Y Axis PIPA

R3 Z Axis PIPA

Y PIP

FINAL

INITIAL

BIAS (1731)

04:16

- 5 ENTER

6. Rcd PIPA counts

Z PIP

R1 X Axis PIPA

R2 Y Axis PIPA

R3 Z Axis PIPA

FINAL

INITIAL

BIAS (1733)

- 7 Measure P BIAS X(Y,Z)

$$\frac{N_F - N_I}{100}$$

100

Basic Date Aug. 10, 1961

Changed

DLN 11

8 Check present P BIAS X(Y,Z)

Key V06 N01E

~~1727E~~ 1716P BIAS X R1 = $\pm$ ~~1731E~~ 1720P BIAS Y R1 = $\pm$ ~~1733E~~ 1722P BIAS Z R1 = $\pm$ 9 If measured and present BIAS terms differ by more than ± 26400 , adjust PIPA bias correction (Step 10)

(0.6 ampere)

MP 10 Key V21 N01E

17XXE (Applicable PIPA)

 E (Measured Value)

11 Key V37E 00E

The following CMC procedures to be provided
at a later date:

DSKY TESTAGC SELF CHECKFLAGBIT CHECKSMANUAL COMPUTER RESTARTBRINGING UP IMU WITH CMC NOT ON

04300.

Basic Date Aug. 18, 1967

BLK II

Changed

SECTION 2. G&C BASIC

SCS POWER UP

CDR	SCS CHANNELS (4) - OFF	1
	BMAG MODE (3) - RATE 2	
	CMC MODE - FREE	
	SC CONT - CMC	
	CB SCS LOGIC PWR (4) - CLOSE	8
	SCS LOGIC BUS 3 - ON	1
	FDAI PWR - BOTH (104 watts)	7
	SCS/HAND CONT PWR - BOTH	
	SCS ELEC PWR - GDC/ECA (170 watts)	
	BMAG PWR (both) - ON (110 watts)	

SCS POWER DOWN

	EMS FUNCTION - OFF	1
	EMS MODE - STBY	
	CMC ATT - IMU	
	FDAI SCALE - 5/1	
	FDAI SELECT - 1/2	
	FDAI SOURCE - ATT SET	
	ATT SET - IMU	
	MAN ATT (3) - MIN IMP	
	LIMIT CYCLE - OFF	
	ATT DEADBAND - MAX	
	RATE - LOW	
	DIRECT RCS - OFF	
	SCS CHANNELS (4) - OFF	
	CMC MODE - FREE	
	BMAG MODE (3) - RATE 2	
	SPS THRUST - NORMAL	
	ΔV THRUST A&B (both) - OFF (guarded)	
	SCS TVC (both) - RATE CMD	
	GMBL MOT (4) - OFF	
	EMS ROLL - OFF	
	.05G sw - OFF	
	LV/SPS IND sws - Pc/GPI	
	TVC GMBL DRIVES PITCH & YAW - AUTO	
	FCSM (both) - RESET/OVERRIDE	
	SCS LOGIC BUS 3 - OFF	

Basic Date Aug. 10, 1970 /

Changed

DTN 711

CDR BMAG PWR (both) - WARMUP (38 watts) 7
 SCS ELEC PWR - OFF
 SCS/HAND CONT PWR - OFF
 FDAI PWR - OFF
 TVC SERVO PWR (both) - OFF

CMC DAP ATTITUDE MANEUVER

- 1 The Following Are Required:
 - CMC - ON pg 1-14
 - IMU - ON pg 1-14
- 2 Load RCS DAP pg 1-16
 - SC CONT - CMC 1
 - CMC MODE - AUTO
 - MAN ATT (3) - RATE CMD or MIN IMP
 - BMAG MODE (3) - RATE 2
 - SCS CHANNELS (4) - ON
- 3 Key V49E (from P00 only)
- 4 FL V06N22
 - R, P, Y XXX.XX DEG
- 5 Key V25E - Load desired gimbal angles
 - PRO
- 6 FL V50N25 (CMC - AUTO request)
 - 00203
 - Accept: ENTER
 - Reject: PRO
- 7 V06N22 (Final Gimbal Angles)
 - R, P, Y XXX.XX DEG

Monitor Auto Maneuver on FDAI or
 perform maneuver with RHC

Basic Date Aug. 18, 1967
 Channel

BLK II

CMP 8 FL V50N19 (Perform ATT trim maneuver
enable)

Accept: ENTR - Ret to step 7

Reject: PRO - EXIT

```
*****
* POSS FL V50 N25 (CMC AUTO      *
*                               *
*           00203                *
*           Accept:  ENTR        *
*           Reject:  PRO         *
*****
```

GDC ALIGNMENT TO IMU GIMBAL ANGLES

1 The Following Are Required:

IMU - ON pg 1-14
SCS - ON pg 2-1

CDR 2 LIMIT CYCLE - ON
RATE - LOW
ATT DEADBAND - MIN
SC CONT - SCS
MAN ATT (3) - RATE CMD
SCS CHANNELS (4) - ON
BMAG MODE (3) - ATT 1 RATE 2

3 FDAI SELECT-1
FDAI SOURCE - ATT SET
ATT SET - IMU
ATT SET dials - null FDAI 1 err needles
ATT SET - GDC
GDC ALIGN PB - push until FDAI 1
aligns to ATT SET dials

Basic Date Aug. 18, 1967
Changed

DLN 11

1

BLK II

- SCS - ON pg 2-1

```

CDR          LIMIT CYCLE - ON
              RATE - LOW
              ATT DEADBAND - MIN
              SC CONT - SCS
              MAN ATT (3) - RATE CMD
              SCS CHANNELS (4) - ON
              BMAG MODE (3) - ATT 1 RATE 2

```

- CMP Key V06 N20 (pres IMU angs)

- $$R = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, P = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, Y = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

- $$R = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}, \quad P = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}, \quad Y = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

- $$R = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, P = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, Y = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

- $$R = \quad 0, \quad P = \quad 0, \quad Y = \quad 0$$

- 5 Key V37E 00E

PRECISE WOBBLE MODE

- CDR 1 The Following Are Required:
- BMAG PWR 2 - ON 7
 - SCS ELEC PWR - ECA
 - SCS/HAND CONT PWR - ON
 - FDAI PWR - ON
 - CB SCS LOGIC PWR (4) - CLOSE 8
 - SCS LOGIC BUS 3 - ON 1
 - SC CONT - SCS
 - BMAG MODE (3) - RATE 2
 - SCS CHANNELS (4) - ON
- 2 Maneuver S/C to desired attitude
- 3 Establish pitch up & yaw right rates of 0.01-0.02°/sec.
- 4 Initiate +0.5°/sec roll rate

BACKUP CDC AND/OR IMU ALIGNMENT

- 1 The Following Are Required:
- SCS - ON pg 2-1
- LMP 2 Record the following data from MSFN
- ATTITUDE SET dials (step 3)
 - R = °, P = °, Y = °
 - Boresight star data (step 5)
 - Boresight star
 - SPA °
 - SXP ° (Prefer 0° and 0°)
- CMP Nav stars (step 6)
- Primary star (50° mark on R line of SCT reticle)
 - Secondary star (R line)
- CDR 3 SC CONT - SCS 1
- RATE - HIGH
 - SCS CHANNELS (4) - ON
 - BMAG MODE (3) - ATT 1/RATE 2

Basic Date Aug. 10, 1961
Changed

DLN 11

4 Cage IMU

JDR FDAI SELECT - 1
 FDAI SOURCE - ATT SET
 ATT SET - IMU
 ATT SET DIALS - Set to 0° , 0° , 0°
 Maneuver S/C to Null FDAI 1 Error Needles
 IMU CAGE - ON and hold (springloaded)

5 Acquire Boresight star

Maneuver S/C to position the boresight star
 at the COAS reticle coordinates recorded
 in step 2.
 ATT DEADBAND - MIN
 RATE - LOW

6 Precise S/C orientation with SCT

JDR G/N PWR OPTICS - ON 100
 MP Set optics shaft to 180° and trunnion to 7.5°
 Roll S/C and maintain boresight star in
 COAS reticle
 MP Null S/C rate as the 2 Nav
 stars appear in the SCT field of view
 JDR MAN ATT (3) - MIN IMP
 MP Position Primary star on 50° mark of R line
 with the RHC
 JDR MAN ATT ROLL & PITCH - RATE CMD
 (on signal from CMP)
 MP Yaw S/C with RHC to position Secondary star
 on R line
 JDR MAN ATT YAW - RATE CMD
 (on signal from CMP)

7 GDC Alignment

ATT SET Dials - Set to Values Recorded in
 Step 2
 ATT SET - GDC
 GDC ALIGN PB - Push and hold until error
 needles null on FDAI 2
 MP Verify Primary star is on 50° mark and
 Secondary star is on R line
 Repeat if necessary

Basic Date Aug. 18, 1967
 Channed

BLK II

CDR MAN ATT (3) - MIN IMP 1
 CMP Adjust S/C attitude with RHC
 CDR GDC ALIGN PB - Push

8 Manuever to ΔV Attitude
 CDR ATTITUDE SET dials - set to 0° , 0° , 0°
 Maneuver S/C to R 0° , P 0° , Y 0° and null
 error needles on FDAI 1
 IMU CAGE - release when FDAI 1 needles are
 nulled

ORDEAL INITIALIZATION

1 The Following Are Required:
 CMC - ON (for 3A & 6A) pg 1-14
 IMU - ON pg 1-14
 SCS - ON pg 2-1

CDR 2 SC CONT - CMC 1
 CMC MODE - HOLD or AUTO if in P20
 SCS CHANNELS (4) - ON

or SC CONT - SCS
 BMAG MODE (3) - ATT 1/RATE 2

ORDEAL panel:

FDAI 2 or 1 - ORB RATE
 ORDEAL PWR sw - EARTH (10 watts)
 MODE - HOLD/FAST

3 Obtain altitude setting

A. Orbit Parameter Display Routine
 V82E

Record apogee and perigee and
 calculate average

or B. Ground Track Determination Program
 V37E21E

Record altitude for 10 minute intervals
 of the present orbit and calculate
 average

Basic Date Aug. 10, 1957
 Changed

PLAN 11

CDR or C. MSFN

If CMC is in STANDBY, obtain altitude setting from MSFN

4 Adjust ALT SET dial to proper altitude

5 Damp Vehicle Rates

6 Obtain Θ

A. Rendezvous Parameter Display Routine
V83E

B. MSFN

If CMC is in STANDBY, obtain Θ from MSFN
Maneuver to point +X at the horizon

CDR 7 Slew FDAI to proper angle with the
SLEW switch on the ORDEAL panel

8 Set MODE switch to SLOW/OPR

9 Adjust FDAI precisely with the SLEW switch

10 Repeat Steps 6 through 9 as Required

Basic Date Aug. 18, 1967

Channel

BLK II

SCS Jet Select Matrix

ROLL CB GROUP	ROLL CHANNEL B/D SW		ROLL CHANNEL A/C SW DEADFACED, CM/SM SEP & LES ABORTS	
	B/D A	B/D B	A/C A	A/C B
ROLL 1	$+ \phi \overset{b}{\textcircled{9}} \text{A(A)}$ $+ \ddot{Z}$	$+ \phi \overset{b}{\textcircled{9}} \text{B(A)}$ $+ \ddot{Z}$	$+ \phi \overset{a}{\textcircled{13}} \text{A}$ $+ \ddot{Y}$	$+ \phi \overset{a}{\textcircled{13}} \text{B}$ $+ \ddot{Y}$
ROLL 2	$- \phi \overset{d}{\textcircled{10}} \text{A(B)}$ $- \ddot{Z}$	$- \phi \overset{d}{\textcircled{10}} \text{B(B)}$ $- \ddot{Z}$	$- \phi \overset{c}{\textcircled{14}} \text{A}$ $- \ddot{Y}$	$- \phi \overset{c}{\textcircled{14}} \text{B}$ $- \ddot{Y}$
ROLL 2	$+ \phi \overset{d}{\textcircled{11}} \text{A(B)}$ $- \ddot{Z}$	$+ \phi \overset{d}{\textcircled{11}} \text{B(B)}$ $- \ddot{Z}$	$+ \phi \overset{c}{\textcircled{15}} \text{A}$ $- \ddot{Y}$	$+ \phi \overset{c}{\textcircled{15}} \text{B}$ $- \ddot{Y}$
ROLL 1	$- \phi \overset{b}{\textcircled{12}} \text{A(A)}$ b	$- \phi \overset{b}{\textcircled{12}} \text{B(A)}$ b	$- \phi \overset{a}{\textcircled{16}} \text{A}$ a	$- \phi \overset{a}{\textcircled{16}} \text{B}$ a

PITCH CHANNEL SW		YAW CHANNEL SW	
PITCH A	PITCH B	YAW A	YAW B
$+ \theta \overset{c}{\textcircled{1}} \text{A(A)}$ $+ \ddot{X}$	$+ \theta \overset{c}{\textcircled{1}} \text{B(A)}$ $+ \ddot{X}$	$+ \psi \overset{d}{\textcircled{5}} \text{(7)B(B)}$ $+ \ddot{X}$	$+ \psi \overset{d}{\textcircled{5}} \text{(7)A(B)}$ $+ \ddot{X}$
$- \theta \overset{a}{\textcircled{2}} \text{A(A)}$ a	$- \theta \overset{a}{\textcircled{2}} \text{B(A)}$ a	$- \psi \overset{b}{\textcircled{6}} \text{(6)B(B)}$ b	$- \psi \overset{b}{\textcircled{6}} \text{(6)A(B)}$ b
$+ \theta \overset{a}{\textcircled{3}} \text{B(B)}$ $- \ddot{X}$	$+ \theta \overset{a}{\textcircled{3}} \text{A(B)}$ $- \ddot{X}$	$+ \psi \overset{b}{\textcircled{7}} \text{(5)A(A)}$ $- \ddot{X}$	$+ \psi \overset{b}{\textcircled{7}} \text{(5)B(A)}$ $- \ddot{X}$
$- \theta \overset{c}{\textcircled{4}} \text{B(B)}$ c	$- \theta \overset{c}{\textcircled{4}} \text{A(B)}$ c	$- \psi \overset{d}{\textcircled{8}} \text{(8)A(A)}$ d	$- \psi \overset{d}{\textcircled{8}} \text{(8)B(A)}$ d

LEGEND

ROTATION = $\phi \theta \psi$ TRANSLATION = $\ddot{X} \ddot{Y} \ddot{Z}$

DC BUSS = A B

CM SYSTEM = (A) (B)

RCS QUAD = a b c d

ENGINE NO = $\textcircled{1} - \textcircled{16}$

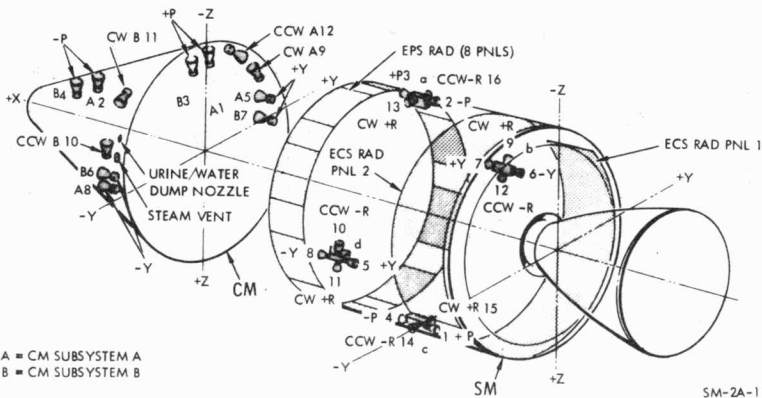
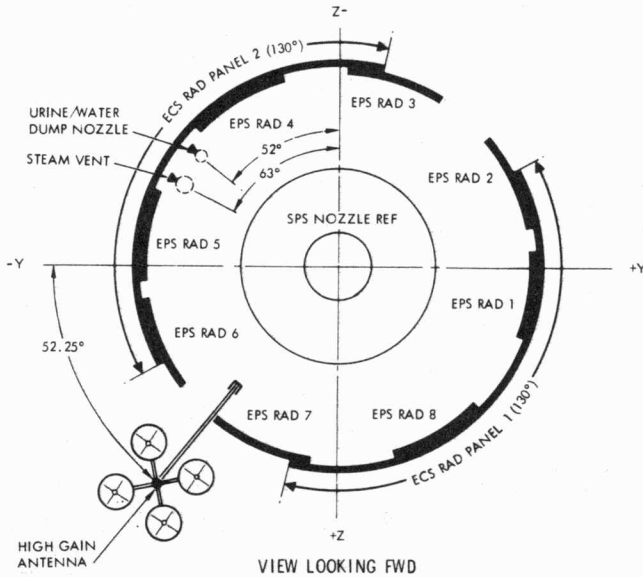
CM ENGINE NO (CM/SM TRNFR) = (5) (6)

(7) (8)

Basic Data 4-10-71

Changed

RCS Engine, Vent, and Radiator Location



A = CM SUBSYSTEM A
B = CM SUBSYSTEM B

SM-2A-1135B

Basic Date Aug. 18, 1967
Channel

BLK II

ULLAGE SETUP			
To Use	Channel Sw		Open SCS CB's
	Pitch	Yaw	
<u>2 Jet</u> Quad A/C Pitch jets 1&2 = +X (Stability = Yaw 7&8)	A	A	PITCH-MNB YAW-MNB
	B	B	PITCH-MNA YAW-MNA
	A	B	PITCH-MNB YAW-MNA
	B	A	PITCH-MNA YAW-MNB
<u>2 Jet</u> Quad B/D Yaw jets 5&6 = +X (Stability = Pitch 3&4)	A	A	PITCH-MNA YAW-MNA
	B	B	PITCH-MNB YAW-MNB
	A	B	PITCH-MNA YAW-MNB
	B	A	PITCH-MNB YAW-MNA
<u>4 Jet</u> +X = 1&2, 5&6 (3&4, 7&8 inactive)	A	A	PITCH-MNB YAW-MNA
	B	B	PITCH-MNA YAW-MNB
	A	B	PITCH-MNB YAW-MNB
	B	A	PITCH-MNA YAW-MNA

Basic Date Aug. 18, 1967
 Changed _____

SECTION 3. COAST

P20 - CSM-RENDEZVOUS NAV PROGRAM

Purp: (1) To control CSM att and optics for
acq of LM in SXT and to point CSM
transponder at LM.

(2) To update CSM or LM state vector.

The Following Are Required:

IMU - ON pg 1-14	
CMC - ON pg 1-14	
SCS - ON pg 2-1	
SCS CHANNELS (4) - ON	1
SC CONT - CMC	
CMC MODE - AUTO	
G/N PWR OPTICS - ON	100
OPTICS MODE - MAN	122
OPTICS MODE - Zero	

CMP 1 Key V37E 20E

2 POSS FL V50 N25
R1-00203 (Sel CMC - AUTO)

Accept	SC CONT - CMC	1
	CMC MODE - AUTO	
	ENTR	
	Select Control	

Reject PRO

NOTE: To display final gimbal angles for the
initial maneuver:

PRO

In step 4: Key V16N22E
SC CONT - CMC
CMC MODE - AUTO
V58E

Basic Date Aug. 18, 1967
Changed

BLK II

P20, 21, 22, 23, 27
3. COAST

P20, 21, 22, 23, 27
3. COAST

3 FL V04 N06

R1-00001 (option code for state
vector to be updated)

R2-0000X (assumed option code)

00001 = LM

00002 = CSM

Accept PRO

Reject V22E - Load Desired OPTION CODE

4 (R61 - Preferred Tracking Attitude)

```
*****
* POSS PROG ALARM *
* If SC control selected *
* not CMC-AUTO or if RHC *
* b.o. sw activated or *
* THC twisted CW (alarm *
* 01705) *
*****
```

Monitor maneuver

5 (R52 - Auto Optics Positioning)

For Auto Optics:

OPTICS MODE - CMC

```
*****
* POSS PROG ALARM *
* If TRUN >38°(alarm *
* 00407) *
* V05 N09E *
* A. MNVR to acquire LM *
* PRO *
*or B. S/C CONT - CMC *
* V58E *
*****
```

6 IF MORE MARKS DESIRED:

V57E (Calls R22, R21)

FL V51

Basic Date Aug. 18, 1967

Channel

X II

OPTICS MODE - MAN 122
 MARK (at least 10 SEC Spacing)
 After MARK Computation:
 POSS FL V06 N49
 ΔR XXXX.X NM
 ΔV XXXXX. FPS

Accept Mark Data: Wait 5 sec - PRO
 Reject Data: V32E
 To Terminate MARKS: ENTR
 OPTICS MODE - CMC 122

NOTE: To change update option:
 V80E - LM
 V81E - CSM

- 7 Terminate Program 100
 G/N PWR OPTICS - OFF
 A. If another program besides P20
 is in process:
 V56E (selecting other program).
 or B. If no other program is in
 process:
 V37E 00E

P21 - CSM-GND TRK DETERMINATION

Purp: To provide LAT, LONG, ALT at a
 specified time

The Following is Required:

CMC - ON pg 1-14

- CMP 1 Key V37E 21E
- 2 FL V06 N34 (Load T Lat, Long)
 HRS:MIN:SEC XXX:XX:XX.XX
- Accept: PRO
 Reject: V25E - load desired T (LAT, LONG)

3 FL V06 N43

LAT (+NORTH)

XXX.XX DEG

LONG (+EAST)

XXX.XX DEG

ALT

XXXX.X NM

A. Recycle: V32E (Parameters 10 min later)

or B. Terminate: V34E

4 FL V50 N07

V37E XXE

P22 - CSM-ORBITAL NAV PROGRAM

- Purp: (1) To manually or automatically track a known LMK (also manually track an unknown LMK)
- (2) To calculate and display orbit parameters based on sighting marks
- (3) To designate unknown LMKs or update coordinates of known LMK

The Following Are Required:

CMC - ON pg 1-14

IMU - ON pg 1-14

G/N PWR OPTICS - ON

OPTICS MODE - MAN

OPTICS MODE - ZERO

100

122

1 Key V37E 22E

2 FL V06 N22

R3 - MAX MGA

XXX.XX DEG

Accept:

If MAX. MGA $< 60^{\circ}$ & IMU aligned
in past 3 HRS:

PRO

IF IMU REALIGNMENT DESIRED:

Reject: V37E 52E (Calls P52 IMU

Realign Program)

Ret to step 1

Basic Date Aug. 18, 1967

Channed

BLK II

- 3 Select LMK from charts
Maneuver to acq LMK

- 4 PERFORM ORDEAL INITIALIZATION pg 2-7

SIVB Attached:

SCS CHANNELS (4) - OFF

CMP

Load RCS DAP

SC CONT - CMC

CDR

CMC MODE - AUTO

MONITOR SIVB MANEUVER

SIVB TAKEOVER:

KEY V46E

LV GUID - CMC

RHC - MNVR SIVB TO SIGHTING ATT

LV GUID - IU

SIVB Separated:

CMP

Load RCS DAP

CDR

SCS CHANNELS (4) - ON

SC CONT - CMC

CMC MODE - HOLD

RHC - ARMED

CMP

ESTABLISH ORBITAL RATE:

RHC - Align X_{SC} Along Loc Hor SEF, Heads Up
(shaft axis in orb plane and $\approx 30^\circ$
fwd of local vert)

CMC MODE - FREE

RHC or MIN IMP CONT - Pitch to offset orb rate,
Roll to avoid shaft axis
<10° of LMK

- 5 FL V50 N25 (pls key in)
R1-00011 (R52 Auto optics pos option)

Accept: OPTICS MODE - CMC
ENTR

Reject: PRO-Go to step 8

(R52 - Auto Optics pos option)

- 6 FL V06 N43 (LMK identity)

LAT (+NORTH) XXX.XX DEG

LONG (+EAST) XXX.XX DEG

ALT XXXX.X NM

BASIC DATE Aug. 18, 1967
Changed

BLK 11

Accept: OPTICS MODE - CMC 122
 PRO
 or OPTICS MODE - MAN (Select R53)
 PRO - Go to Step 8
 Reject: V25E-Load desired data

 * POSS PROG ALARM *
 * FL V05 N09 (Error Code) *
 * R1 00404 (TRUN >90°) *
 * 1. MNVR CSM to acq LMK *
 * PRO - Go to step 7 *
 or2. V32E-Sel new LMK-Go to
 * step 6 *
 or3. V34E-Terminate Program
 * *
 *OR POSS PROG ALARM *
 * If TRUN >38° (alarm code *
 * 00407) *
 * MNVR TO ACQ LMK *
 *or V25 N89E - Load New *
 * LMK Coords *

7 V06 N92
 R1-SHAFT XXX.XX DEG
 R2-TRUNNION XX.XXX DEG
 When ready: OPTICS MODE - MAN

NOTE: To regain AUTO OPTICS positioning
 select OPTICS MODE - CMC

8 FL V51 N43 (Pls Mark)
 LAT XXX.XX DEG
 LONG XXX.XX DEG
 ALT XXXX.X NM
 MARK

After Sufficient Marks: ENTR or After
 Five Marks:

FL V50 N25
 R1-00016 (Terminate Marks)
 ENTR

Basic Date Aug. 18, 1967

Channed

BLK II

9 FL V05 N70 (LMK Data)

R2 ABCDE

A = 1 For known LMK

A = 2 For unknown LMK

B = 1 If LMK coords stored

B = 2 If LMK coords not stored

CD = LMK ID No

E = 1 For earth LMK

E = 2 For LUNAR LMK

Accept: PRO

Reject: Load desired data

10 If unstored known LMK:

FL V06 N89

LOAD: LAT XX.XXX DEG

LONG/2 XX.XXX DEG

ALT XXX.XX NM

Accept: PRO

Reject: V25E - Reload Data

If unknown LMK and only 1 MARK accepted,
go to step 12

11 FL V06 N49 (2 displays for each MARK)

 ΔR XXXX.X NM ΔV XXXX.X FPS

Accept: PRO

Reject: V34E

12 FL V05 N70 (LMK ID)

R2 XXCDX

DISPLAY LMK Coordinates: PRO

Do NOT display LMK coordinates:

V34E - Go to step 14

Basic Date Aug. 10, 1957
Changed

PLAN 11

13 FL V06 N89

LAT

XX.XXX DEG

LONG/2

XX.XXX DEG

ALT

XXX.XX NM

Record data

Store in CMC: PRO

Do not store: V34E

14 FL V50 N25 (Pls perf)

R1 00017 (Add sightings)

Accept: ENTR-Ret to step 5

Reject: PRO

15 FL V50 N07

V37E XXE

G/N PWR OPTICS - OFF

100

P23 - CSM-CISLUNAR MIDCOURSE NAVIGATIONMEASUREMENT PROGRAMPurp: (1) To obtain the angle between a nav star
and the lunar horizon or lunar LMK

(2) To obtain time of mark

IF CMC CONTROL:

The Following Are Required:

CMC - ON pg 1-14

FDAI PWR - BOTH

7

SC CONT - CMC

1

CMC MODE - FREE

SCS CHANNELS (4) - ON

G/N PWR OPTICS - on

100

OPTICS MODE - MAN

122

OPTICS MODE - ZERO

Basic Date Aug. 18, 1967

Changed

BLK II

CMP

IF SCS CONTROL:

The Following Are Required:

	CMC - ON pg 1-14	
	SCS-ON pg 2-1	
	MAN ATT (3) - MIN IMP	
	SC CONT - SCS	
	SCS CHANNELS (4) - ON	
	MOVE RHC to LEB	
CMP	G/N PWR OPTICS - on	100
	OPTICS MODE - MAN	122
	OPTICS MODE - ZERO	
	RHC - ARMED	LEB
	Maneuver - Perf star-LMK acq	

1 Key V37E 23E

2 FL V59 (Perform OPTICS Calib)
OPTICS MODE - MAN

Accept: Center Moon in SCT
ACQ lunar LMK in SXT
Superimpose SLOS & LLOS
MARK

122

Reject: PRO - Go to step 4

CMP	3 FL V06 N87	
	TRUN (R2)	XX.XXX DEG

Accept: PRO

Reject: V32E-Ret to step 2 (Recalib)

4 FL V51 (Pls Mark)
Acquire star LMK
Select LMK

RHC or MIC - Center LMK in SCT
Select star

122

Optics hand Cont - Center star in SCT
Perform sighting mark
Check star-LMK or horizon in SXT FOV
OPTICS COUPLING - RESOLVED

Basic Data Page 102
Changed

Superimpose Images on R-line
MARK

5 FL V06 N87

SHAFT

XXX.XX DEG

TRUN

XX.XXX DEG

Record

Verify data on downlink

PRO

6 FL V06 N34 (T MARK)

HRS:MIN:SEC

XXX:XX:XX.XX

Record

PRO

7 FL V50 N25 (Pls perf)

R1 00017 (Add sightings)

Accept: ENTR-Ret to step 2

Reject: PRO

8 FL V50 N07

V37E XXE

9 OPTICS MODE - ZERO

G/N PWR OPTICS - OFF

Basic Date Aug. 18, 1967
Channel

BLK II

P27 - CSM-CMC UPDATE PROGRAM

Purp: To enter data in CMC via
uplink or by crew input

The Following Is Required:

CMC - ON pg 1-14

AUTO UPDATE:

- CMP 1 UP TLM sw (both) - ACCEPT
UPLINK ACTY 1t - ON

Update complete:

UPLINK ACTY 1t - OUT

UP TLM sw - BLOCK

VOICE TRANSMISSION UPDATE:

- 1 Key V70E (LIFTOFF TIME)
or V71E (LOAD DATA BLOCK)
or V72E (LOAD SINGULAR DATA)
or V73E (OCTAL TIME INCREMENT)

2,140

- 2 CMC Displays P27

- 3 FL V21 N01 (Index load)
R1 Blank
R2 Unchanged
R3 Upbuff

Key in Index word (Displayed in R1)

V34E to Terminate P27 when desired

- 4 FL V21 N01 (Data Load)
Blank
Unchanged
AAAAA (calcuated machine address)

Key in data for Update

XXXXXE

Terminate: V34E (CMC will not use data)

(Repeat step 4 as required)

Basic Data Aug. 10, 1971
Changed

5 FL V21 N02 (Octal Ident)

Blank

Unchanged

AAAAA

Accept update: PRO

Reject update: Load Octal Identifier of
location of word to be
corrected.

Return to step 4

6 POO

TIME UPDATE:

1 Key V55E

2 FL V21 N24 (V25)

Load Delta Time R1 hrs

±XXXXXE

R2 min

±XXXXXE

R3 sec

±XXX.XXE

3 CHECK UPDATED AGC TIME

V16 N36E

V37E 00E

ERASEABLE MEMORY UPDATE:

1 Key V37E 00E

2 For sequential addresses

V21 N01E

Load First Address

XXXXE

Load First Data Word

XXXXXE

N15E Verify address

increments by one

Load Second Data Word

XXXXXE,E

Load Third Data Word

XXXXXE,E

Continue until last address

in sequence is filled

Basic Date Aug. 18, 1967
Channel

BLK II

MP

3 FOR NON-SEQUENTIAL ADDRESSES

V21 N01E

Load First Address	XXXXXE
Load First Data Word	XXXXXE,E
Load Second Address	XXXXXE
Load Second Data Word	XXXXXE,E

4 TO VERIFY DATA LOADED IN SEQUENTIAL ADDRESS

V01 N01E

Load First Address	XXXXXE
Check First Data Word in R1	
N15E	
Check Second Data Word in R1	
ENTER	
Check Third Data Word in R1	
ENTER	

5 TO VERIFY DATA LOADED IN NON-SEQUENTIAL ADDRESSES

V01 N01E

Load Address of Data Word	XXXXXE
to be verified	
Check Data Word in R1	

BINARY - OCTAL CONVERSION TABLE

000	-	0
001	-	1
010	-	2
011	-	3
100	-	4
101	-	5
110	-	6
111	-	7

SECTION 4. ALIGNMENTS

P51 - CSM-IMU ORIENT DETERMINATION

Purp: To determine the inertial
orientation of the IMU

The Following Are Required:

CMC - ON pg 1-14

IMU - POWERED UP pg 1-14

SCS - POWERED UP pg 2-1

G/N PWR OPTICS - ON

OPTICS MODE - MAN

OPTICS MODE - ZERO (15 secs)

BMAG MODE (3) - RATE 2

SCS CHANNELS (4) - ON

4. ALIGNMENTS

CMP 1 Key V37E 51E

2 FL V50 N25 (Pls perf)
R1-00015 (Star acq)

CDR A. If desired, MNVR CSM to position
IG axis in preferred direction.
PRO

CMP V41 N22 (Coarse align)
ICDU X,Y,Z 000.00 DEG

NO ATT 1t - ON, then OFF
Ret to step 2

CDR B. MNVR CSM to acq. two nav. stars
in docking window

CMP Pitch up with RHC until nav stars
appear in SCT
ENTR

(R53 - Sighting Mark)
3 FL V51 N70 (Pls Mark Star #1)
OPTICS MODE - MAN
Optics cont - center star in SXT
MARK

Changed

- 4 FL V50 N25 (Pls Key in)
R1-00016 (Term Mark Option)

Accept: ENTR

Reject: MARK REJECT PB - push

- CMP 5 FL V01 N70
V21E - Load STAR CODE
PRO

(R53 - Sighting Mark)

- 6 FL V51 N70 (Pls mark Star #2)
Optics cont - center star #2 in SXT
MARK

- 7 FL V50 N25 (Pls Key in)
R1 00016 (Term Mark Option)

Accept: ENTR

Reject: MARK REJECT PB - Push

- 8 FL V01 N70
V21E - Load STAR CODE
PRO

(R54 - Star Data Test)

- 9 V06 N05 (10 sec)
R1 000.XX DEG (Star angle diff)

Data good (Angle $<0.05^\circ$)

- or FL V06 N05
R1 000.XX DEG (Star angle diff)

Data bad (Angle $>0.05^\circ$)

Accept: PRO

Reject: V37E XXE (New Prog)

- 10 FL V50 N07
V37E XXE
G/N PWR OPTICS - OFF

CMD

P51,52
4. ALIGNMENTS

Basic Date Aug. 18, 1967

Chinnand

BLK II

P52 CSM IMU REALIGN PROGRAM

Purp: To align IMU to a known orientation; PREFERRED, NOMINAL, or REFSMMAT.

The Following Are Required:

CMC - ON	pg 1-14	
IMU - POWERED UP	pg 1-14	
SCS - POWERED UP	pg 2-1	
G/N PWR OPTICS - ON		100
OPTICS MODE - MAN		122
OPTICS MODE - ZERO (15 secs)		
BMAG MODE (3) - RATE 2		
SCS CHANNELS (4) - ON		

1 V37E 52E

2 FL V04 N06 (Option Code)

R1 00005 (IMU orien code)

R2 0000X (CMC assumed option -
1 = PREF, 2 = NOM,
3 = REFSMMAT)

Accept: PRO

Reject: V22E-Load desired option
If PREFERRED selected go to 4
If REFSMMAT selected go to 6

```
*****
* POSS FL V05 N09 (error code) *
*   R1-00215 (pref. Orien. not*
*   defined)                      *
*   Choose NOMINAL or REFSMMAT*
*   Orientation: V32E             *
*   Or                             *
*   Select program to define     *
*   PREFERRED orientation:       *
*   V37E XXE                     *
*****
```

3 FL V06 N34 (GET Align)

HRS:MIN:SEC

XXX:XX:XX.XX

Accept: PRO

Reject: V25E-Load desired GET (Align)

4 FL V06 N22

R, P, Y

XXX.XX DEG

(Angs for PRES SC/desired IMU)

CMP

Check MGA

Accept: PRO (R50)

Reject: Maneuver using RHC

V32E - Ret to step 4

or Select new program

(R50 - Coarse Align)

5 Monitor completion of coarse alignment

NO ATT lt - on (45 secs)

FDAI BALL FOLLOWS IMU

NO ATT lt - off

6 FL V50 N25 (pls Perf)

R1 00015 (Star acq)

CDR

MNVR CSM to acq. two nav stars in
docking window

CMP

Pitch up with RHC until nav stars
appear in SCT

ENTR

```

*****
* POSS PROG ALARM                      *
* FL V05 N09                          *
* 00405 (Two stars not                *
*      available in SCT)*
* Maneuver to acquire Stars *
* Repeat star computation - *
* V32E                               *
*or Bypass star computation - *
* PRO                                *
*****

```

Basic Date Aug. 18, 1967
Changed

BLK II

(R52 - Auto Optics Pos-Star #1
 7 FL V01 N70
 R1 000XX (star code)
 OPTICS MODE - CMC
 or OPTICS MODE - MAN

Accept: PRO
 Reject: V21E-Load Desired Star Code
 PRO

```
*****
* POSS PROG ALARM *
* FL V05 N09 *
* 00404 (TRUN >90°) *
* 1. MNVR vehicle to enable *
* acquisition *
* PRO *
*Or 2. V32E - Ret to step 8 *
* for new star *
*Or 3. V34E - Terminate *
* Program *
* POSS PROG ALARM *
* If TRUN >38° (alarm code *
* 00407 is stored) *
*****
```

8 V06 N92
 SHAFT (desired angle) XXX.XX DEG
 TRUN (desired angle) XX.XXX DEG

When ready: OPTICS MODE - MAN

NOTE: To regain AUTO OPTICS positioning
 select OPTICS MODE - CMC

(R53 - Sighting Mark - Star #1)
 9 FL V51 N70 (Pls mark)
 R1 000XX (Star code)

Optics Cont - Center Star #1 in SXT
 MARK

CMP

Basic Date Aug. 18, 1967
 Changed

BLK II

- 10 FL V50 N25 (Pls Key in)
 R1 00016 (Term mark option)

Accept ENTR
 Reject MARK REJECT PB - push

- 11 FL V01 N70
 R1 000XX (Star #1 Code)

Accept PRO
 Reject V21E-Load Desired Star Code
 PRO

(R52 - Auto Optics Pos - Star No. 2)

- 12 FL V01 N70
 R1 000XX (Star #2 Code)
 OPTICS MODE - ZERO (15 secs)
 OPTICS MODE - CMC
 Or OPTICS MODE - MAN

Accept: PRO
 Reject: V21E - Load Desired Star Code
 PRO

```
*****
* POSS PROG ALARM *
* FL VO5 NO9 *
* 00404 (TRUN>90°) *
* 1. MNVR vehicle to enable *
* acquisition *
* PRO *
*Or 2. V32E-Ret to step 13 *
* for new star *
*Or 3. V34E-Terminate *
* Program *
* POSS PROG ALARM *
* If TRUN >38° (alarm code *
* 00407 is stored)*
*****
```

Basic Date Aug. 18, 1967
 Channed

BLK II

CMP 13 V06 N92

SHAFT (desired angle) XXX.XX DEG

TRUN (desired angle) XX.XXX DEG

When Ready: OPTICS MODE - MAN

NOTE: To regain AUTO OPTICS positioning
select OPTICS MODE - CMC

(R53 - Sighting Mark - Star No. 2)

14 FL V51 N70 (Pls mark)

R1 000XX (Star code)

Optics Cont - Center Star #2 in SXT
MARK

15 FL V50 N25 (Pls Key in)

R1 00016 (Term mark option)

Accept ENTR

Reject MARK REJECT PB - push

16 FL V01 N70

R1 000XX (Star Code)

Accept PRO

Reject V21E-Load Desired Star Code
PRO

(R54 - Star Data Test)

17 V06 N05 (10 Sec)

R1-000.XX DEG (Star Angle diff)

Data good (Angle $<0.05^{\circ}$)

or FL V06 N05

R1-000.XX (Star angle diff)

Data bad (Angle $>0.05^{\circ}$)

Accept PRO

Reject V37E XXE (New prog)

BASIC Data
Changed

- (R55 - Gyro Torquing)
- CMP 18 FL V06 N93 (Δ Gyro torq angles)
X, Y, Z XX.XXX DEG
- Accept PRO(Gyros torqued)
Reject V32E-Ret to step 7
- 19 FL V50 N25 (Pls Key in)
R1 00014 (Fine align check)
- Accept ENTR-Ret to step 7
Reject PRO
- 20 FL V50 N07 (Change prog)
Key V37E XXE
- 21 G/N PWR OPTICS - OFF

Basic Date Aug. 18, 1967

Channel

BLK II

P53 - CSM - BACKUP IMU ORIENTATIONDETERMINATION PROGRAM

Purp: To determine the orientation of the IMU
using a backup optical device (COAS).

The Following Are Required:

CMC - ON pg 1-14
IMU - POWERED UP pg 1-14
SCS - POWERED UP pg 2-1
SC CONT - SCS
MAN ATT (3) - MIN IMP
SCS CHANNELS (4) - ON

1 Key V37E 53E

2 FL V50 N25
00015

A. If desired maneuver CSM to position
IG axis in preferred direction.

PRO

V41 N22 (Coarse align)

ICDU X,Y,Z 000.00 DEG

NO ATT 1t - ON, then OFF

Ret to step 2

B. MNVR CSM to acquire two nav. stars in FOV
ENTR

(R56 - ALT LOS Sighting Mark for Star #1)

3 FL V06 N92 (Alternate LOS optics angles)

SHAFT 000.00 DEG

TRUN XX.XXX DEG

Accept: PRO

Reject: Load desired angles

4 FL V50 N25

00025 (Perform Sighting Mark-Star #1)

Center Star #1 in COAS reticle

ENTR

Basic Date Aug. 10, 1961
Changed

DLN 11

- 5 FL V50 N25
00026 (Terminate backup marking)
Accept: ENTR
Reject: PRO - Return to step 4
- 6 FL V01 N70
V21E - Load Star Code
PRO

(R56 - ALT Sighting Mark for Star #2)
- 7 FL V06 N92
SHAFT 000.00 DEG
TRUN XX.XXX DEG
Accept: PRO
Reject: Load desired angles
- 8 FL V50 N25
00025 (Perform Sighting Mark - Star #2)
Center Star #2 in COAS reticle
ENTR
- 9 FL V50 N25
00026 (Terminate backup marking)
Accept: ENTR
Reject: PRO - Return to step 8
- 10 FL V01 N70
V21E - Load Star Code
PRO

(R54 - Star Data Test)
- 11 V06 N05 (10 SECS)
R1 - Star Angle Diff 000.XX DEG
(Data Good, Angle $<0.05^{\circ}$)
- or FL V06 N05
Star Angle Diff 000.XX DEG
(Data Bad, Angle $>0.05^{\circ}$)

Accept: PRO
Reject: V37EXXE (New Prog)
- 12 FL V50 N07 (Change Prog)
Key V37EXXE

Basic Date Aug. 18, 1967

BLK II

P54 - CSM - BACKUP IMU REALIGN PROGRAM

Purp: To align IMU to a known orientation;
 PREFERRED, NOMINAL, or REFSMMAT, using
 backup optical device (COAS)

The Following Are Required:

CMC - ON pg 1-14

IMU - POWERED UP pg 1-14

SCS - POWERED UP pg 2-1

SC CONT - SCS

MAN ATT (3) - MIN IMP

SCS CHANNELS (4) - ON

1 Key V37E 54E

2 FL V04 N06

R1 00005 (Option Code ID - IMU
 Orientation)

R2 0000X (Option Code)

00001 = PREFERRED

00002 = NOMINAL

00003 = REFSMMAT

Accept: PRO

Reject: V21E-Load desired option
 If PREFERRED selected go to 4
 If REFSMMAT selected go to 6

```
*****
* POSS PROG ALARM                      *
* FL V05 N09                          *
*   00215 (Pref. Orien. not          *
*     defined)                        *
*                                     *
* Choose NOMINAL or REFSMMAT         *
* Orientation:  V32E                  *
* or                                                    *
* Select Program to define           *
* PREFERRED orientation:             *
*   V37E XXE                          *
*****
```

Basic Date Aug. 18, 1967
 Changed _____

BLK 11

3 FL V06 N34 (GET align)

HRS:MIN:SEC

XXX:XX:XX.XX

Accept: PRO

Reject: Load desired GET (Align)

4 FL V06 N22

ROLL, PITCH, YAW

XXX.XX DEG

(Angles for present SC/desired IMU)

Accept: PRO (R50)

Reject: Maneuver using RHC

V32E - Recycle to step 4

Or Select New Program

(R50 - Coarse Align)

5 Monitor completion of coarse alignment

NO ATT 1t - ON, then OFF

6 FL V50 N25

00015 (Perform Star Acquisition)

Maneuver CSM to acquire suitable stars for
COAS sighting.

ENTR

```
*****
* POSS PROG ALARM                *
* FL V05 N09                     *
*   00405 (Two stars not        *
*   available in SCT)           *
* NOTE: Not applicable for      *
*   COAS sighting-PRO          *
*****
```

(R51 - Fine Align)

(R56 - Alternate LOS sighting mark) for star #1

7 FL V06 N92 (Alternate LOS optics angles)

SHAFT

000.00 DEG

TRUN

XX.XXX DEG

Accept: PRO

Reject: Load desired angles

Basic Date Aug. 18, 1967

BLK II

- 8 FL V50 N25
00025 (Perform Sighting Mark - Star #1)
Center Star #1 in COAS reticle
ENTR
- 9 FL V50 N25
00026 (Terminate backup marking)
Accept: ENTR
Reject: PRO - Return to step 8
- 10 FL V01 N70
V21E - Load Star Code
PRO
- (R56 - Alternate LOS sighting mark - Star #2)
- 11 FL V06 N92 (alternate LOS optics angles)
SHAFT 000.00 DEG
TRUN XX.XXX DEG
- Accept: PRO
Reject: Load desired angles
- 12 FL V50 N25
00025 (Perform Sighting Mark - Star #2)
Center Star #2 in COAS reticle
ENTR
- 13 FL V50 N25
00026 (Terminate backup marking)
Accept: ENTR
Reject: PRO - Return to step 12
- 14 FL V01 N70
V21E - Load Desired Star Code
PRO

BASIC Date Aug. 18, 1967
Changed

DLN 11

(R54 - Star Data Test)

15 V06 N05 (10 SECS)

STAR ANGLE DIFF

000.XX DEG

(Data Good, Angle $<0.05^{\circ}$)

or FL V06 N05

STAR ANGLE DIFF

000.XX DEG

(Data Bad, Angle $>0.05^{\circ}$)

Accept: PRO

Reject: V37EXXE (New Prog)

(R55 - GYRO TORQUING)

16 FL V06 N93

 Δ GYRO ANGLES X,Y,Z

XX.XXX DEG

Accept: PRO (GYROS are torqued)

Reject: V32E-Go to step 7

17 FL V50 N25

00014 (Fine Align Check)

Accept: ENTR - Return to step 7

Reject: PRO

18 FL V50 N07 (Change Prog)

Key V37EXXE

Basic Date Aug. 18, 1967
Changed

BLK II

SECTION 5. PRETHRUST

INITIAL VEHICLE PREPARATION

- CMP 1 GETI-8 hrs
ECS Verif #3, pg 15-7 (Deorb only)
- 2 PERFORM P27 UPDATE pg 3-10
- 3 GETI - 3 hrs
PERFORM PLATFORM ALIGNMENT P51(if req) pg 4-1
- 4 PERFORM PRELIM P30 UPDATE (if req) pg 5-4
- LMP 5 Tape recorder & COMM setup
Dump & Rewind tape recorder 3
Set COMM MODE
- 6 PROP SYS Per Verif #1 & 2, pg 15-1
- 7 EPS Per Verif #3 & 4, pg 15-2,3
- ALL 8 PGA Verif #9, pg 15-9
- CDR 9 EMS Δ V TEST
CB EMS MNA & B (both) - close
EMS MODE - STBY (wait 10 sec min)
EMS FUNCTION - Δ V SET
EMS MODE - AUTO
Set Δ V counter to 1586.5
EMS FUNCTION - Δ V TEST
EMS SPS THRUST lt - on ($\approx$ 10 sec)
 Δ V counts down thru zero to $\approx$ -20
EMS SPS THRUST lt - out (at Δ V = 0)
EMS MODE - STBY
EMS FUNCTION - Δ V SET
SET Δ V COUNTER to burn Rdg
- CDR 10 FOR:
ORB CHANGE (G&N OPER) - P30 pg 5-4
ORB CHANGE (G&N INOP)- pg 6-1

11 ECS MON VERIF #1, pg 15-4
02 STORAGE REFILL PROC pg 15-7

12 PYRO BATTERY PREPARATION
CMP CB PYRO A SEQ A - CLOSE 250
CB PYRO B SEQ B - CLOSE
XXX
LMP If pyro BAT A (or B) checks <35 vdc
CB PYRO A (B)-SEQ A (B) - open
CB PYRO A (B)-BAT BUS A (B) TO PYRO
TIE - close
XXX

CMP 13 CB MN A-BAT C - close 275
CB MN B-BAT C - close

LMP 14 PROP SYS Per Verif #3, pg 15-2

CDR 15 EMS DEORBIT TEST
CB EMS MNA&B (both) - close 8
EMS FUNCTION - OFF 1
EMS MODE - STBY
EMS FUNCTION - EMS TEST-1
Slew scroll to start of test pattern
(wait 5 sec minimum)
EMS MODE - AUTO (wait 10 sec)
Check ind lts - off
RANGE counter - 0.0
CDR EMS FUNCTION - EMS TEST-2 (wait 10 sec) 1
EMS .05G 1t - on (all others out)
EMS FUNCTION - EMS TEST-3
EMS .05G 1t - on
EMS G<.2 1t - on (10 sec after .05G 1t)
Set RANGE counter to 58 NM
EMS FUNCTION - EMS TEST-4
EMS .05G 1t - on (all others out)
G-V trace within test pattern for 10 secs
then stops at lower right corner
RANGE counter counts toward zero for
10 sec, then stops at ~0
EMS FUNCTION - EMS TEST-5
EMS .05G 1t - on

P30,34,35

5. PRETHRUST

Basic Date Aug. 18, 1967

Changed

BLK II

EMS G>.2 1t - on (10 sec after .05G 1t)
 RANGE counter - 0.0

Scribe traces vertical line $\approx 9g$ to
 $\approx .2g$ and stops within test pattern

ALIGN SCROLL TO ENTRY PATTERN

EMS FUNCTION - RNG SET

G-V traces vertical line $\approx 0.22g$ to
 0 ± 0.19 and stops.

Set ΔV counter to +1586.8

EMS FUNCTION (CCW) - ΔV Test

SPS THRUST 1t - ON

ΔV counter decreases (10 secs)

SPS THRUST 1t - OFF at ≈ -0.1 on ΔV
 counter

ΔV counter stops at -20.8 ± 20.7

16 CM RCS ENGINE PRE-HEATING
 (TIG-30 MIN)

- | | | |
|----------------------------|-----------------------------------|-----|
| A. CM RCS HTRS - OFF | | |
| CDR | CB RCS CM/SM TRNFR (both) - close | 8 |
| | CM PRPLNT JETT LOGIC - on | 1 |
| | SYS TEST - 5 C, D | |
| CMP | SYS TEST - 6 A, B, C, D | 101 |
| B. If Any Reading <4.8 VDC | | |
| | SYS TEST - lowest rdg | |
| | CM RCS HTRS - ON until DC volts = | |
| | 4.8 vdc or 20 minutes | |
| | CM RCS HTRS sw - OFF | |

ALL 17 DEORBIT (G&N INOP) - pg 6-7
 CM RCS DEORBIT & ENTRY - TBD

Basic Date Aug. 18, 1967
 Changed

P30 - CSM EXTERNAL ΔV

- Purp: (1) To accept targeting parameters
(GETI and impulsive ΔV (1cl vert)
at GETI) from source external to
the CMC
- (2) To calculate ΔV required and other
I.C. for mnvrs.

CMP 1 Key V37E 30E

2 FL V06 N33 (GETI)
HRS:MIN:SEC XXX:XX:XX.XX

Accept: Record
PRO

Reject: V25E-Load desired GETI

3 FL V06 N82 (ΔV at 1cl vert at TIG)
 ΔV (1cl Vert) X, Y, Z XXXX.X FPS

Accept: PRO

Reject: V25E-Load desired ΔV (1cl vert)

4 FL V06 N42 (Thrusting Parameters)
HA XXXX.X NM
HP XXXX.X NM
 ΔV XXXX.X FPS

Coordinate parameters with GND

Accept: PRO

Reject: Reselect P30 or P27
Load New Parameters

5 FL V16 N35 (TF GETI)
HRS: MIN:SEC XXX:XX:XX.XX

Set DET

Accept: PRO

Reject: Select desired program

Basic Date Aug. 18, 1967
Changed

BLK II

CMP 6 FL V16 N45

Blank

TF GETI

MGA (at thrust)

XXBXX MIN-SEC

XXX.XX DEG

Accept: PRO

Reject: Select IMU realign Prog, P52

7 FL V50 N07 (Sel Prop sys)

Go to:

	SCS ORBIT CHANGE,	pg 6-1
or	SCS DEORBIT & ENTRY,	pg 6-7
or	G&N SPS ORBIT CHANGE, P40	pg 6-13
or	G&N SPS DEORBIT & ENTRY, P40	pg 6-13
or	G&N RCS ORBIT CHANGE, P41	pg 6-21
or	G&N RCS DEORBIT & ENTRY, P41	pg 6-21

Basic Date Aug. 18, 1967
Changed _____

BLK II

P34 - CSM PRE-THRUST TPI

Purp: To calc ΔV required and I.C. for TPI
given GETI (TPI) or E (TPI) and
transfer duration.

MP 1 Key V37E 34E

2 FL V04 N06 (Option Code)

R1 00003 (TPI OPTION CODE)

R2 0000X (assumed option code)

00001-load GETI (TPI)

00002-load E

LOAD GETI TPI

Accept: PRO

Reject: V22E-Load desired option

3 A. If GETI Load Desired (00001):

FL V06 N37 GETI (TPI)

HRS:MIN:SEC

XXX:XX:XX.XX

Accept: Record

PRO

Reject: V25E-Load desired GETI (TPI)

MP or B. If E Load Desired (00002):

FL V06 N55 (Elev Ang)

R2 = E (TPI)

XXX:XX DEG

Accept: Record

PRO

Reject: V22E - Load desired E

```
*****
* POSS PROG ALARM                      *
* FL V05 N09 (error code)              *
* R1 00611 (GETI impossible)*          *
*                                     *
* V32E-Ret to step 3B,                 *
*   adjust E                           *
*****
```

Basic Date Aug. 18, 1967
Channel

BLK II

4 FL V06 N39 (ΔT Transfer)

HRS:MIN:SEC

XXX:XX:XX.XX

Accept: Record

PRO

Reject: V25E-Load desired ΔT Trans

```
*****
* POSS PROG ALARM                      *
* FL V05 N09 (error code)              *
* R1 00607 (hyperbolic vel.)*         *
*                                     *
* V32E-Recycle to step 2,              *
*      adjust parameters                *
*****
```

5 A. If GETI LOADED (00001 accepted):

FL V06 N55

R2 = E (TPI)

XXX.XX DEG

Record

PRO

or B. If E Loaded (00002 accepted):

FL V06 N37 GETI (TPI)

HRS:MIN:SEC

XXX:XX:XX.XX

Record

PRO

6 FL V06 N58

ΔV TPI

XXXX.X FPS

HP TPI

XXXX.X NM

ΔV TPF

XXXX.X FPS

Record

PRO

CMP 7 FL V16 N35 TF GETI (TPI)

HRS:MIN:SEC

XXX:XX:XX.XX

Set DET for TF GETI

PRO-Go to step 9 (final cycle)

Basic Date Aug. 18, 1967
Changed _____

BLK 11

8 If final cycle not selected:

FL V16 N45

N

TF GETI (TPI)

Blank

000XX. MARKS

XXBXX MIN-SEC

Check data with ground

Reject: If parameters unsatisfactory
 or TF GETI <-7 MIN: Reselect
 P34 and Reload new Data

A. Final Comp Cycle Desired

(No later than TF GETI = -8 MIN):

PRO - Ret to step 5

or B. Final Comp Cycle not Desired:

V32E-Ret to step 5

NOTE: If P20 is running Mark Data
 Processing (R22) may be initiated
 at any time by keying V57E

P20 IN PROGRESS:

More Marks Desired:

V57E (Calls R22, R21)

FL V51

OPTICS MODE - MAN

OPTICS SPEED - LO

MARK (10 sec spacing)

After MARK Computation:

FL V06 N49

 ΔR ΔV

XXXX.X NM

XXXXX. FPS

Use Mark Data: PRO

Reject Data: V32E

To Term MARKS: ENTR

OPTICS MODE - CMC

Ret to step 8

Basic Date Aug. 18, 1967
 Changed

BLK II

CMP 9 FL V16 N45

N

000XX. MARKS

TF GETI (TPI)

XXBXX. MIN-SEC

MGA

XXX.XX DEG

Update DET

Record N & MGA

PRO

10 FL V50 N07 (Sel prop sys)

V37E XXE

P40 (SPS) pg 6-13

P41 (RCS) pg 6-23

P35 - CSM-PRE-THRUST TPM PROGRAM

Purp: To calc ΔV required and I.C. for next
MCC during active CSM rendezvous

CMP 1 Key V37E 35E

2 FL V16 N35 (TF INT)

HRS:MIN:SEC

XXX:XX:XX.XX

Set DET

PRO

3 FL V16 N45

N

000XX. MARKS

TF INT

XXBXX. MIN-SEC

N/A

NOTE: If TF INT <-20 MIN Select P47.

If P20 is running Mark Data

Processing (R22) may be initiated at
any time by keying in V57E

```
*****
* POSS PROG ALARM          *
* FL V05 N09                *
*      00607 (hyperbolic    *
*                      vel.)*
* Key V37E 35E adjust input*
*                      parameters*
*****
```

Basic Date Aug. 18, 1967
Changed _____

BLK II

V57E (Calls R22, R21)
 FL V51
 OPTICS MODE - MAN
 OPTICS SPEED - LO
 MARK (10 SEC spacing)
 After MARK Computation:
 FL V06 N49

ΔR	XXXX.X	NM
ΔV	XXXXX.	FPS

Use Mark Data: PRO

Reject Data: V32E

To Terminate Marks: ENTR
 OPTICS MODE - CMC

WHEN READY: PRO

4 FL V16 N45

N	000XX.	MARKS
TF GETI (MID)	XXBXX.	MIN-SEC
MGA	XXX.XX	DEG

Record
 PRO

5 FL V06 N59

ΔV MID	XXXX.X	FPS
TF GETI MID	XXBXX.	MIN-SEC
ΔV TPF	XXXX.X	FPS

If MCC Burn not required:
 V32E-Recycle to step 2.

If MCC Burn Required:
 SET DET
 PRO

Basic Date Aug. 18, 1967
 Channed

BLK II

5-11/12

6 FL V50 N07 (sel prop sys)
V37EXXE
P40 (SPS) pg 6-13
P41 (RCS) pg 6-21

Basic Date Aug. 18, 1967

Changed _____

DLN 11

SECTION 6. THRUST

SCS ORBIT CHANGESCS ΔV PREPARATION

The Following Are Required:

IMU - ON pg 1-14

CMC - ON pg 1-14

SCS - ON pg 2-1

- | | | | |
|--------|---|--|---|
| CMP | 1 | Obtain ΔV parameters
SELECT POO | |
| CDR | 2 | SCS CHANNELS (4) - ON
FDAI SELECT - 1/2
Maneuver to ΔV attitude
BMAG MODE (3) - ATT 1 RATE 2
MAN ATT (3) - RATE CMD
SC CONT - SCS | |
| | 3 | Set DET | 1 |
| CDR | 4 | Check Boresight Star | |
| | 5 | VERIFY: | |
| -12:00 | | CB STAE/CONT SYS (18) - CLOSE | 8 |
| | | CB SCS (6) - CLOSE | |
| | | CB GMBL MOT CONT (4) - CLOSE | |
| | | FCSM A - SPS A | |
| | 6 | EMS Prep | |
| CDR | | EMS FUNCTION - ΔV SET | 1 |
| | | Set ΔV counter | |
| | | EMS FUNCTION - ΔV | |
| CMP | 7 | If P47 (Thrust Monitor)
Key V37E 47E (POSS PO5/P51)
FL V16 N83 (CSM ΔV Comp's-1 min later)
VX,VY,VZ XXXX.X FPS | 2 |
| | | Check ΔV for PIPA BIAS
Until Thrust Applied | |

8 Ullage Select
CDR SCS CHANNEL PITCH & YAW - A

1

To use * Open CB's

2 Jet * SCS PITCH MNB
Quad A/C * SCS YAW MNB
(No ATT hold *
in Pitch) *

2 Jet * SCS PITCH MNA
Quad B/D * SCS YAW MNA
(No ATT hold *
in Yaw) *

4 Jet (No * SCS PITCH MNB
ATT Hold) * SCS YAW MNA

4 Jet with * All CB's
ATT hold * Closed

SCS THRUSTING PROCEDURES

1 Ignition Preparation
-05:00 GIMBAL DRIVE AND TRIM CHECK
SCS TVC (both) - AUTO
TVC GMBL DRIVES PITCH & YAW - AUTO
MN BUS TIES (both) - ON
TVC SERVO PWR 1 - AC1/MNA
TVC SERVO PWR 2 - AC2/MNB
SCS/HAND CONT PWR - 2
RHC #1 - UNLOCKED

Secondary TVC Check
GMBL MOT PITCH 2 - START - ON
GMBL MOT YAW 2 - START - ON
SCS CHANNELS PITCH & YAW - OFF
THC - CW
Confirm Trim Control on GPI
Verify MTVC
THC Neutral
Verify NO MTVC
SCS CHANNELS PITCH & YAW - ON
SCS/HAND CONT PWR - BOTH

141,40,41

6. THRUST
SCS ORBIT CHANGE

Basic Date Aug. 18, 1967

BLK II

CDR Primary TVC Check 1
 GMBL MOT PITCH 1 - START - ON
 GMBL MOT YAW 1 - START - ON
 Confirm & Set Trim Control on GPI
 ATT DEADBAND - MIN
 DIRECT RCS - ON

CMP
 -02:00 Report TTI = 2 min
 CDR ΔV THRUST A - NORMAL 1
 FDAI SCALE - 5/5
 THC - ARMED

LMP
 -00:30 TAPE RCDR mode - RECORD 3
 TAPE RCDR motion - FWD
 FLT RCDR - RECORD 2
 EMS MODE - AUTO
 NOTE PIPA bias (V32E rezeroes registers)

CDR
 -00:20 Start 2 Jet Ullage
 -00:15 Start 4 Jet Ullage
 XX
 X No Ullage:
 DIRECT ULLAGE PB - push
 RHC - control attitude
 FDAI 1 - error $<1^0$
 +00:01 DIRECT ULLAGE PB -- release
 XX

2 Ignition
 00:00 THRUST ON PB - push for ignition 1
 EMS SPS THRUST 1t - on
 XX
 If no ignition: check ECO 1t
 If ECO 1t ON, TBD
 XX

Changed

CDR

XXXXXXXXXXXXXXXXXXXXX
 MTVC takeover:
 THC - CW
 RHC - CONTROL S/C
 ΔV THRUST A-OFF
 XXXXXXXXXXXXXXXXXXXXX

3 Monitor SPS Operation

LMP

Pc = 95 - 105 psia
 SPS ENG INJ VLV A (both) - OPEN
 SPS He VLV TB (both) - gray
 SPS PRPLNT TK PRESS FUEL-165-185 psia
 SPS PRPLNT TK PRESS OXID-165-185 psia

1
3

CMP

4 Monitor Engine Cutoff

DET = thrust duration
 ΔV counter = 0
 BACKUP CUTOFF WITH ΔV THRUST A sw - OFF
 EMS SPS THRUST lt - out
 Pc = 0

1

LMP

SPS ENG INJ VLV A (both) - CLOSE
 SPS He VLV TB (both) - BP

3

CMP

 *Note: Key V82E (R30): *
 * V06 N44 *
 * HA XXXX.X NM *
 * HP XXXX.X NM *
 * TFF XXBXX MIN-SEC*
 *PRO (exits if HP <50 NM) *
 * *
 * FL V06 N32 (TF HP) *
 * HRS:MIN:SECS XXX:XX:XX.XX *
 * *
 * PRO *

PRO

FL V50 N07
 Key V37E 00E

2

Basic Date Aug. 18, 1967

BLK II

	5	Set Controls After Tailoff	
CDR		GMBL MOT (4) - OFF	1
		MAN ATT (3)-ACCEL CMD	
LMP		MN BUS TIES (both) - OFF	5
CMP		FLT RCDR - off (center)	2
CDR		EMS FUNCTION - OFF	
		EMS MODE - STBY	
		TVC SERVO PWR 1 - OFF	
		TVC SERVO PWR 2 - OFF	7
		THC - neutral, LOCKED	
		FCSM A - RESET/OVERRIDE	
		CB GMBL MOT CONT (4) - OPEN	8
		Record ΔV counter	
ECO + 10'		TAPE RCDR motion - stop (center)	
LMP		Charge batteries pg 15-3	3

170/

Basic Date Aug. 10, 1961

Changed _____

PLAN 1.1

SCS DEORBIT THRUSTING PROCEDURES

SCS DEORBIT
THRUSTING

SCS DEORBIT RETRO PREPARATION

The Following Are Required:

IMU - ON pg 1-14

CMC - ON pg 1-14

SCS - ON pg 2-1

CMP 1 Obtain ΔV parameters
Select P00

CDR 2 SCS CHANNELS (4) - ON
FDAI SELECT - 1/2

1

Maneuver to retro attitude

$$R = \frac{\text{ }^{\circ}}{\text{ }^{\circ}}, P = \frac{\text{ }^{\circ}}{\text{ }^{\circ}}, Y = \frac{\text{ }^{\circ}}{\text{ }^{\circ}}$$

$$(R = \frac{\text{ }^{\circ}}{\text{ }^{\circ}}, P = \frac{\text{ }^{\circ}}{\text{ }^{\circ}}, Y = \frac{\text{ }^{\circ}}{\text{ }^{\circ}} \text{ for RCS})$$

BMAG MODE (3) - ATT 1 RATE 2

MAN ATT (3) - RATE CMD

SC CONT - SCS

3 Set DET

CDR 4 Check Boresight Star

5 Verify:

CB STAB/CONT SYS (18) - CLOSE

8

CB SCS (6) - CLOSE

CB GMBL MOT CONT (4) - CLOSE

FCSM A - SPS A

CDR 6 EMS preparation
EMS FUNCTION - ΔV SET
Set ΔV counter
EMS FUNCTION - ΔV

1

CMP 7 If P47 (Thrust Monitor)

Key V37E 47E

2

FL V16 N83 (ΔV comp's-1 min later)

VX, VY, VZ

XXXX.X FPS

Check ΔV for PIPA BIAS
until thrust applied

1700/

Aug. 10,

DLK 11

Changed

SCS DEORBIT
THRUSTING

8 Ullage Select

CDR

SCS CHANNEL PITCH & YAW - A

1

To Use	*	Open CB's

2 Jet	*	SCS PITCH MNB
Quad A/C	*	SCS YAW MNB
(No ATT hold*		
in pitch)	*	

2 Jet	*	SCS PITCH MNA
Quad B/D	*	SCS YAW MNA
(No ATT hold*		
in yaw)	*	

4 Jet (No	*	SCS PITCH MNB
ATT hold)	*	SCS YAW MNA

4 Jet with	*	All CB's
ATT hold	*	Closed

9 IF RCS Thrust go to pg 6-11

IF SPS THRUSTING PROCEDURES

1 Ignition Preparation

-05:00

CDR

GIMBAL DRIVE AND TRIM CHECK

SCS TVC (both) - AUTO (verify)

SC CONT - SCS (verify)

TVC GMBL DRIVES PITCH & YAW - AUTO

DIRECT RCS - ON (verify)

MN BUS TIES (both) - ON

TVC SERVO PWR 1 - AC1/MNA

TVC SERVO PWR 2 - AC2/MNB

SCS/HAND CONT PWR - 2

RHC #1 - UNLOCKED

Secondary TVC Check

GMBL MOT PITCH 2 - START - ON

GMBL MOT YAW 2 - START - ON

SCS CHANNELS PITCH & YAW - OFF

THC - CW

Confirm Trim Control on GPI

Verify MTVC

1

Basic Date Aug. 18, 1967
Channel

BLK II

CDR

THC Neutral

1

Verify NO MTVC

SCS CHANNELS PITCH & YAW - ON

SCS/HAND CONT PWR - BOTH

Primary TVC Check

GMBL MOT PITCH 1 - START - ON

GMBL MOT YAW 1 - START - ON

Confirm & Set Trim Control on GPI

DIRECT RCS - ON

ATT DEAD BAND - MIN

2 ALIGN GDC to IMU

Set ATT SET dials to sep values

R=____⁰, P=____⁰, Y=____⁰

CMP

-02:00

Report TTI = 2 minutes

CDR

 Δ V THRUST A - NORMAL

FDAI SCALE - 5/5

THC - ARMED

LMP

-00:30

TAPE RCDR mode - RECORD

3

TAPE RCDR motion - FWD

FLT RCDR - RECORD

2

EMS MODE - AUTO

1

NOTE PIPA bias (V32E rezeroes registers)

CDR

-00:20

Start 2 Jet Ullage

-00:15

Start 4 Jet Ullage

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

No ullage:

CDR

DIRECT ULLAGE PB - PUSH

RHC -- CONTROL ATTITUDE

FDAI 1 - error <1⁰

+00:01 DIRECT ULLAGE PB - RELEASE

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Basic Date Aug. 10, 1971
Changed

DLN 11

JDR	3	Ignition	
00:00		THRUST ON PB - push for ignition	
		EMS SPS THRUST 1t - on	
		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
		If no ignition: check ECO 1t	2
		If ECO 1t ON, TBD	
		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
		MTVC takeover	
		THC - CW	
		RHC - CONTROL S/C	
		ΔV THRUST A - OFF	
		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
	4	Monitor SPS Operation	
		Pc = 95 - 105 psia	
MP		SPS ENG INJ VLV A (both) - OPEN	3
		SPS He VLV TB (both) - gray	
		SPS PRPLNT TK PRESS FUEL-165-185 psia	
		SPS PRPLNT TK PRESS OXID-165-185 psia	
	5	Monitor Engine Cutoff	
MP		DET = Thrust duration	1
		ΔV counter = 0	
		BACKUP CUTOFF WITH ΔV THRUST A sw - OFF	
		EMS SPS THRUST 1t - out	
MP		Pc = 0	1
		SPS ENG INJ VLV A (both) - CLOSE	3
		SPS He VLV TB (both) - BP	
MP		PRO	2
		FL V50 N07	
		Key V37E 00E	
		Report engine cutoff	
	6	Set Controls After Tailoff	
JDR		GMBL MOT (4) - OFF	1
		LIMIT CYCLE - OFF	
		ATT DEADBAND - MAX	
		TVC SERVO PWR 1 - OFF	

Basic Date Aug. 18, 1967
 Changed

BLK II

6-11/12

CDR	TVC SERVO PWR 2 - OFF	7
	THC - neutral, LOCKED	
	CB GMBL MOT CONT (4) - OPEN	8
CMP	FLT RCDR - off (center)	2
ECO+10'	TAPE RCDR motion - stop (center)	3

7 GO TO SCS ENTRY PROCEDURES, pg 12-7

RCS THRUSTING PROCEDURES

CDR	1 Ignition Preparation	
-05:00	LIMIT CYCLE - OFF	1
	Hand Controllers Armed	

LMP		
-00:30	TAPE RCDR mode - RECORD	3
	TAPE RCDR motion - FWD	

CDR	EMS MODE - AUTO	1
-----	-----------------	---

	2 Ignition	
00:00	THC - +X	
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
	X DIRECT ULLAGE PB - PUSH X	
	DIRECT RCS - ON	
	RHC - CONTROL ATTITUDE	
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	

	ΔV counter = 0	
	Record ΔV counter	2

	THC - neutral, LOCKED	
CMP	PRO	
	FL V50 N07	
	Key V37E 00E	
CDR	Set ATT SET dials to sep values	1
	R=____ ⁰ , P=____ ⁰ , Y=____ ⁰	

3 GO TO SCS ENTRY PROCEDURES, pg 12-7

Basic Date Aug. 10, 1961
Changed

PLAN 11

P40 - CSM-SPS THRUSTING PROGRAM

- Purp: (1) To compute pref CSM att and IMU orient
for a SPS thrust mnvr
(2) To mnvr the CSM to the thrusting att
(3) To control the SPS during GNCS mnvr

The Following Are Required:

IMU - ON pg 1-14
CMC - ON pg 1-14
SCS - ON pg 2-1
EMS MODE - STRY
EMS FUNCTION - ΔV SET
SET ΔV COUNTER
EMS FUNCTION - ΔV

CMP

Load DAP (R03) - pg 1-16
Establish GNCS ullage select during DAP
data load (V48E)

2

FL V04N46

R1 - ABCDE
R2 - ABCDE

Under G&N Cont.

*

To Use

* Load

4 Jets (with attitude * R1 - 111XX
hold) * R2 - X1111

2 Jets Quad A/C (with * R1 - 110XX
attitude hold) * R2 - X0000

2 Jets Quad B/D (with * R1 - 101XX
attitude hold) * R2 - X0000

CMP 1 Key V37E 40E

2

2 FL V06 N86

 ΔV (lcl vert) X, Y, Z

XXXX.X FPS

Record
PRO

2. G/N SPS THRUSTING
(P40)

Basic Date Aug. 18, 1967
Changed

BLK 11

- 3 FL V06 N22 (Preferred Vehicle Attitude)
R, P, Y XXX.XX DEG

Record

CMP

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

IMU orientation unsatisfactory:

MG (R3) >45° (orbit change)

or >20° (deorbit)

SELECT P52-Upon Comp, RESELECT P40

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

2

A.ALIGN GDC

CDR

Maintain Attitude Hold

FDAI SELECT - 1

FDAI SOURCE - ATT SET

ATT SET - IMU

ATT SET dials - null FDAI 1 err needles

ATT SET - GDC

GDC ALIGN PB - push until FDAI 1

aligns to ATT SET dials

FDAI SELECT - 1/2

1

B.IMU ALIGNMENT SATISFACTORY

PRO

2

(R60 - Attitude maneuver)

- 4 FL V50 N25 (Pls sw)

R1 00203 (A/P control to G&N,

Mode to AUTO)

Accept: SC CONT - CMC

CMC MODE - AUTO

ENTR

NOTE: For Manual Takeover, Actuate RHC or
select SCS Control

Reject: Select control as desired
PRO

2. G/N SPS THRUSTING
(P40)

Basic Date Aug. 18, 1967
Changed

BLK II

- 5 V06 N22 (Final GIMBAL ANGLES)
ROLL, PITCH, YAW XXX.XX DEG

CDR Monitor auto maneuver on FDAI or
perform maneuver with RHC

- 6 FL V50 N19 (Perform ATT TRIM MAN.
enable)

CDR Accept: Align S/C to desired roll att
SC CONT - CMC 1

CMC MODE - AUTO

CMF ENTR-Ret to step 5 2

Reject: Select control as desired
PRO

- 7 POSS FL V50 N25
R1-00203 (CMC - AUTO request)

CDR Accept: SC CONT - CMC 1

CMC MODE - AUTO

CMF ENTR 2

Reject: Select control as desired
PRO

- 8 FL V50 N25 (Pls key in)
R1 00204 (ENABLE GIMBALS OPTION)

Ignition Preparation

LMP Verify COMM mode set

CDR Verify DET set

Check Boresight Star

Verify:

CB STAB/CONT SYS (18) - CLOSE 8

CB SCS (6) - CLOSE

CB GMBL MOT CONT (4) - CLOSE

Basic Date Aug. 10, 1971
Changed

11 11 11

NOTE: TO DISABLE THE FORWARD FIRING JETS DURING ULLAGE
CONFIGURE:

```

The SCS      *
Channel Switch *   Open CB's
*****
Pitch   Yaw   *   Pitch   Yaw
*****
      B      A      *   MNA      MNA
*****
      A      B      *   MNB      MNB

```

-05:00

A. GIMBAL DRIVE AND TRIM CHECK

FL V50 N25

R1-00204

SC CONT - CMC

CMC MODE - AUTO

SCS TVC (both) - RATE CMD

TVC GMBL DRIVES PITCH & YAW - AUTO

MN BUS TIES (both) - ON

TVC SERVO PWR 1 - AC1/MNA

TVC SERVO PWR 2 - AC2/MNB

SCS/HAND CONT PWR - 2

RHC #1 - UNLOCKED

Secondary TVC Check

GMBL MOT PITCH 2 - START - ON

GMBL MOT YAW 2 - START - ON

SCS CHANNELS PITCH & YAW - OFF

THC - CW

Verify MTVC

Confirm Trim Control on GPI

THC - Neutral

Verify NO MTVC

SCS CHANNELS PITCH & YAW - ON

Primary TVC Check

GMBL MOT PITCH 1 - START - ON

GMBL MOT YAW 1 - START - ON

Accept: ENTR

Monitor GIMBAL DRIVE test
sequence on GPI dials

Basic Date Aug. 18, 1967
Changed

BLK II

Test sequence:

(Each display 1 sec duration)

	PITCH	YAW
1.	0 DEG	0 DEG
2.	2 DEG	0 DEG
3.	-2 DEG	0 DEG
4.	0 DEG	0 DEG
5.	0 DEG	2 DEG
6.	0 DEG	-2 DEG
7.	0 DEG	0 DEG

Reject: PRO

Observe indication of bell driving to
TRIM position

SCS/HAND CONT PWR - BOTH

Verify Thrusting Attitude

DIRECT RCS - ON

MAN ATT (3) - RATE CMD

BMAG MODE (3) - ATT 1 RATE 2

* POSS PROG ALARM *

* FL V05 N09 *

* R1-01703 (TF GETI 45 SEC) *

* *

* A. Do steps 9 and 10 pro- *

* cedures *

* Slip GETI to 45 SEC from *

* time PRO is pressed: *

* PRO (when ready) *

*Or B. Terminate: V34E *

* FL V50 N07 *

* V37E XXE *

CDR

FOR DEORBIT - SET ATT SET DIALS TO SEP VALUES

R=____°, P=____°, Y=____°

Basic Date Aug. 10, 1961
Changed

PLAN 11

CMP	9	V06 N40 (MON)	2
		TF GETI	XXBXX MIN-SEC
		VG	XXXX.X FPS
		ΔVM	XXXX.X FPS
CDR		Update DET	1
CMP		Test C/W lamps	
		EMS MODE - AUTO	
CDR	10	Report TTI = 2 min	
		FCSM - SPS A	
-02:00		ΔV THRUST A - NORMAL	
		THC - ARMED	
		RHC (both) - ARMED	
		DIRECT RCS - ON	
CMP	11	Check ΔVM for PIPA BIAS (< .2 FPS in 5 sec)	2
LMP			
-00:30		TAPE RCDR mode - RECORD	3
		TAPE RCDR motion - FWD	
CMP		FLT RCDR - RECORD	2
	12	THC	
-00:20		Start 2 Jet Ullage	
-00:15		Start 4 Jet Ullage	
		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
		X No Ullage: X	
CDR		DIRECT ULLAGE PB - push	
		RHC - CONTROL ATTITUDE	
		FDAI 1 - error <1 ⁰	
+00:01		DIRECT ULLAGE PB - release	
		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
CMP	13		
-00:05		FL V50 N99 (Engine on Enable)	
		Verify Ullage Translation	
		Accept ENTR	
		Reject V34E	
		V37E XXE	

Basic Date Aug. 18, 1967

BLK II

CMP 14 Ignition

00:00 V06 N40 (MON)

2

TFC

XXBXX MIN-SEC

VG

XXXX.X FPS

ΔVM

XXXX.X FPS

EMS SPS THRUST 1t - ON

Monitor Thrusting:

CDR

Pc = 95 - 105 psia

LMP

SPS ENG INJ VLV A (both) - OPEN

SPS He VLV TB (both) - gray

SPS PRPLNT TK PRESS FUEL-165-185 psia

SPS PRPLNT TK PRESS OXID-165-185 psia

XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

X THRUST FAILURE: TBD X

XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Monitor SPS Engine Cutoff:

CMP

DET = Thrust duration

1

R3 = VM (R1 & R2 = 0)

2

BACKUP CUTOFF WITH THRUST A sw-OFF

1

15 FL V16 N40(ENGINE CUTOFF)

2

TFC (decreasing)

XXBXX. MIN-SEC

VG (decreasing)

XXXX.X FPS

ΔVM (increasing)

XXXX.X FPS

CDR

EMS SPS THRUST 1t - out

1

ΔV THRUST A - OFF

Report engine off

CMC MODE - FREE

SET CONTROLS AFTER TAILOFF:

EMS MODE - STBY

CDR

Record ΔV counter

2

Pc = 0

1

LMP

SPS ENG INJ VLV A (both) - CLOSE

3

SPS He VLV TB (both) - BP

CDR

GMBL MOT (4) - OFF

1

TVC SERVO PWR 1 - OFF

TVC SERVO PWR 2 - OFF

7

CMP

FLT RCDR - off (center)

2

Basic Date 1956. 10. 10.
Changed

MP	CO+10	TAPE RCDR mode - off (center)	3
MP		PRO	2
16	FL V06 N85 (MON)		
		VG (CONT) X, Y, Z	XXXX.X FPS
		CB PITCH & YAW - CLOSE	
		Nullout VG components w/THC/RHC	
		PRO	
17	FL V06 N44		
		HA	XXXX.X NM
		HP	XXXX.X NM
		TFF	XXBXX MIN-SEC
JDR		Set DET (Deorbit)	1
MP		PRO-Go to Step 19 if HP < 50 NM	
18	FL V06 N32 (TF HP)		
		HRS:MIN:SEC	XXX:XX:XX.XX
		PRO	
MP	19	FL V50 N07	2
		Set Controls	
MP		MN BUS TIES (both) - OFF	5
		(orb chan only)	
		BMAG MODE (3) - RATE 2	
		THC Neutral, Locked	
JDR		EMS FUNCTION - OFF	1
		EMS MODE - STBY	
		FCSM A - RESET/OVERRIDE	
		CB SPS GMBL MOT (4)-OPEN (orb chan only)	8
MP		Charge batteries (orb chan only)	3
20	GO TO G&N ENT PROC, pg 12-1 (G&N Deorb only)		

Basic Date Aug. 18, 1967
Changed

BLK II

P41 - CSM-RCS THRUSTING PROGRAM

- Purp: (1) To compute pref IMU orien and CSM att for RCS thrust
- (2) To display GIMBAL ANGLES which would result if present IMU orien used for thrust
- (3) To mnvr CSM to thrust att
- (4) To provide displays for manual TRANS mnvr in ATT HOLD MODE

The Following Are Required:

- IMU - ON pg 1-14
- CMC - ON pg 1-14
- SCS - ON pg 2-1
- LOAD DAP (R03) pg 1-16

CMP 1 Key V37E 41E

2

2 FL V04 N06

- R1 00004 (OPTION CODE FOR TRANS, axis)
- R2 0000X (CMC Assumed Option)

00001 = +X

00002 = -X

00003 = +Y

00004 = -Y

00005 = +Z

00006 = -Z

Accept: PRO

Reject: V22E, Load desired axis code

3 FL V06 N85

VG (CSM) X, Y, Z XXXX.X FPS

Accept: PRO

Reject: V32E-Ret to step 2
Reload new option

CMP 4 FL V06 N22 (FINAL GIMBAL ANGLES)

R, P, Y XXX.XX DEG

Record

3. G/N RCS THRUSTING
(P41)

Basic Date Aug. 10, 1961
Changed

DLN 11

XXX

IMU orientation unsatisfactory:
 CMP MG (R3) >45° (X thrust axis sel) 2
 SELECT P52
 Upon completion, RESELECT P41
 or Sel another thrust axis
 V32E-Ret to step 2

XXX

A. ALIGN GDC

CDR Maintain Attitude Hold
 FDAI SELECT - 1 1
 FDAI SOURCE - ATT SET
 ATT SET - IMU
 ATT SET dials - null FDAI 1 error needles
 ATT SET - GDC
 GDC ALIGN PB - push until FDAI 1
 aligns to ATT SET dials
 FDAI SELECT - 1/2

B. IMU ALIGNMENT SATISFACTORY

CMP PRO 2

5 FL V06 N86
 VG (1cl vert) X, Y, Z XXXX.X FPS

Record
 PRO

(R60-Attitude Maneuver)

CMP 6 FL V50 N25 (Pls sw) 2

R1 00203 (A/P control to G&N,
 Mode to AUTO)

CDR Accept SC CONT-CMC 1

CMC MODE - AUTO

CMP ENTR 2

For Manual Takeover, Actuate RHC
 or select another control
 mode/system

Reject SEL Control as desired
 PRO

3. G/N RCS THRUSTING
 (P41)

Basic Date Aug. 18, 1967
 Changed

BLK II

7 V06 N22 (FINAL GIMBAL ANGLES)
R, P, Y XXX.XX DEG

CDR Monitor auto maneuver on FDAI or
perform maneuver with RHC

CMP 8 FL V50 N19 (Perform ATT TRIM enable)

CDR Accept Align S/C To Desired Roll Att
SC CONT - CMC 1

CMP ENTR-Ret to step 7 2

CDR Reject Select control as desired
PRO

-05:00 Ignition preparation

LMP Verify COMM mode 3

CDR Verify DET set 1

CMP Test C/W lamps 2

CDR Check Boresight Star
MAN ATT (3) - RATE CMD
BMAG MODE (3) - ATT 1 RATE 2
If Thrusting is along X-axis

CDR EMS FUNCTION - ΔV SET 1

Set ΔV counter

EMS FUNCTION - ΔV

FOR DEORBIT: Set ATT SET dials to sep values

R=____°, P=____°, Y=____°

-02:00 Report TF GETI = 2 MIN

THC - ARMED

RHC (both) - ARMED

LMP

-00:30 TAPE RCDR mode - RECORD 3

TAPE RCDR motion - FWD

CMP FLT RCDR - RECORD 2

CDR EMS MODE - AUTO (If Thrusting Along X-axis) 1

Basic Date Aug. 18, 1967

Changed

BLK 11

CMP 9
 -00:15 FL V06 N85 2
 VG (CSM) X, Y, Z XXXX.X FPS
 Check VG for PIPA BIAS
 (< .2 FPS in 5 SEC)

 CDR
 00:00 NULLOUT COMPONENTS W/THC/RHC

 CMP PRO

 EMS FUNCTION - OFF
 EMS MODE - STBY
 Record ΔV counter 1
 LMP TAPE RCDR mode - off (center) 3
 CMP FLT RCDR - off (center) 2
 THC - neutral, LOCKED
 RHC (both) - LOCKED

 LMP OBTAIN ORBITAL DATA FROM GROUND

 (R30 - Orbital Parameter Display)
 10 FL V06 N44
 HA XXXX.X NM
 HP XXXX.X NM
 TFF XXBXX MIN-SEC

 CDR Set DET (deorbit) 1
 CMP PRO-Go to Step 12 if HP < 50 NM 2

 CMP 11 FL V06 N32 (TF HP)
 HRS:MIN:SEC XXX:XX:XX.XX

 PRO

 12 FL V50 N07

 13 GO TO G&N ENT PROC, pg 12-1 (G&N Deorb only)

Basic Date Aug. 18, 1967

BLK II

BLK II Basic Date Aug. 18, 1967
Changed _____

			7. RENDEZVOUS
--	--	--	---------------

7. RENDEZVOUS

7-2

PLK II

Basic Date Aug. 18, 1967
Changed

SECTION 8. LM ACTIVE RENDEZVOUS

P74-CSM-LM TRANSFER PHASE INITIATION TARGETING

Purp: To calculate ΔV and other control conditions needed by the LGC for LM execution of TPI Mnv, given:

- (1) GETI (TPI) or E of CSM/LM
LOS at GETI (TPI)
- (2) Time for ΔT TRANS.

CMP 1 Key V37E 74E

- 2 FL V04 N06 (Option Code)
R1 00003 (OPTION CODE for Assumed
TPI Data Load)
R2 0000X (CMC assumed option)
00001-load GETI (TPI)
00002-load E

Accept: PRO

Reject: V22E-Load OPTION CODE

- 3 A. If Load GETI (TPI) selected (00001):
FL V06 N37 (GETI-TPI)
HRS:MIN:SEC XXX:XX:XX.XX

Accept: Record

PRO-Go to step 4

Reject: V25E-Load desired GETI

- or B. If Load E selected (00002):

FL V06 N55

R2 = E(elev angle) XXX.XX DEG

8. LM ACTIVE
RENDEZVOUS

Basic Date Aug. 18, 1967
Changed

BLK 11

Accept: Record
PRO
Reject: V22E-Load desired E

```
*****
* POSS PROG ALARM *
* FL V05 N09 (Error Code) *
* R1 00611 (no GETI for *
*          given E) *
* *
* V32E *
* RSET-Ret to step 3B, *
*          adjust E *
*****
```

CMP 4 FL V06 N39 (ΔT TRANS)
HRS:MIN:SEC XXX:XX:XX.XX

Accept: Record
PRO
Reject: V25E-Load desired ΔT TRANS

```
*****
* POSS PROG ALARM *
* FL V05 N09 (Error Code) *
* R1 00607 ( $\Delta T$  TRANS gives *
*          Hyperbolic CSM *
*          Vel.) *
* *
* V32E *
* RSET-Ret to step 2, *
*          adj parameters *
*****
```

5 FL V06 N84 (V along LM axes)
 ΔV (OV) X, Y, Z XXXX.X FPS

Record
PRO

- 6 A. If Load GETI (TPI) selected (00001):
 FL V06 N55
 R2 = E(elev angle) XXX.XX DEG

Record

PRO-Go to step 7

- or B. If Load E Selected (00002):

FL V06 N37 (GETI TPI)

HRS:MIN:SEC

XXX:XX:XX.XX

Record

PRO

CMP 7 FL V06 N58

ΔV TPI

XXXX.X FPS

HP TPI

XXXX.X NM

ΔV TPF

XXXX.X FPS

Record

PRO

- 8 FL V16 N35 (TF GETI)

HRS:MIN:SEC

XXX:XX:XX.XX

Record

Set DET

PRO

- 9 If Final Comp Cycle Not Selected:

FL V16 N45

2,1

N

000XX. MARKS

TF GETI

XXBXX MIN-SEC

N/A

Accept: PRO (No later than TF GETI = 17 MIN)-CMC Recycles to step 5-8

NOTE: PRO SELECTS FINAL COMP CYCLE

Reject: If time short or data unsatisfactory, V32E and return to step 5

Basic Date Aug. 18, 1967
 Changed _____

BLK II

Or Reselect P74 and adjust input
 parameters
Or If more MARKS Desired:
 V57E (Calls R22, R21)
 FL V51
 OPTICS MODE sw - MAN
 MARK (at least 10 SEC spacing)
 After MARK computation:
 POSS FL V06 N49
 ΔR XXXX.X NM
 ΔV XXXXX. FPS
 Use MARK Data: PRO

 Reject Data: V32E
 To Terminate MARKS: ENTR
 OPTICS MODE sw - CMC

10 FL V50 N07
 V37E XXE

Basic Date Aug. 18, 1967

Channel

BLK II

P75 - CSM-LM TRANSFER PHASE TARGETING
(MIDCOURSE) PROGRAM

- Purp: (1) To calculate ΔV and other initial conditions required by the LGC for LM execution of TP Midcourse correction
- (2) To compute parameters needed by LM to enter final rendezvous phase

CMP 1 Key V37E 75E

2 FL V16 N35 (TF INT)
 HRS:MIN:SEC

XXX:XX:XX.XX

Transmit value to LM
 Set DET
 PRO

3 FL V16 N45
 N
 TF INT
 BLANK

000XX. MARKS
 XXBXX MIN-SEC

Accept: PRO

Reject: If P20 in Process and more MARKS

Desired:

V57E (Calls R22, R21)

FL V51

OPTICS MODE sw - MAN

MARK (at least 10 SEC Spacing)

After MARK Computation:

POSS FL V06 N49

ΔR

XXXX.X NM

ΔV

XXXXX. FPS

Use Mark Data: PRO

Reject Data: V32E

To Terminate MARKS: ENTR

OPTICS MODE sw - CMC

Basic Date Aug. 18, 1967
 Changed

PLAN 11

or If TT INT 10 min, advise LM
to select P47 & complete
RENDEZVOUS manually.

```
*****
* POSS PROG ALARM          *
* FL V05 N09 (Error Code) *
* R1 00607 (Hyperbolic CSM*
*                      Vel.) *
* V32E                     *
* RSET                     *
*****
```

4 FL V06 N84

ΔV (Lcl Vert) X, Y, Z XXXX.X FPS

Record
PRO

5 FL V06 N38 (GETI-MID)

HRS:MIN:SEC XXX:XX:XX.XX

Record
PRO

CMP 6 FL V06 N59

ΔV -MID XXXX.X FPS
TF GETI XXBXX MIN-SEC
 ΔV -TPF XXXX.X FPS

Record
Set DET

Accept: PRO-Trnsmt MNVR prmtrs to LM
Reject: V32E-(Midcourse burn req)-Go to Step 2

7 FL V50 N07

V37E XXE

Basic Date Aug. 18, 1967

BLK II

SECTION 9. DOCKING and SEPARATION

CSM DOCKING TO LM/SIVB

(See pg 9-5 & 9-6 for targs & acq lights)

CDR	1	Install COAS	
	2	Verify/set controls	
		CB SECS-ARM (both) - CLOSE	8
LMP		CB PYRO A-SEQ A - CLOSE	250
		CB PYRO B-SEQ B - CLOSE	
CDR		SECS-PYRO (both) - ARM	8
CMP		DOCK PROBE-EXTD/REL - EXTD/REL-OFF	2
		PROBE TB (both) - gray	
	3	Perform docking Mnvr (TBD)	
		DOCK PROBE-RETR-PRIM - 1	
		DOCK PROBE-EXTD/REL - RETRACT	
CDR		SECS-PYRO (both) - SAFE	8
	4	Secure latches (12) & umbs (4), pg 10-1	
CMP	5	L/M PWR - CSM	2
	6	Secure ablative hatch & Fwd press hatch #6 & 7, pg 9-3	

CSM/LM SEPARATION FROM S-IVB

	1	Verify/set Controls	
CDR		CB SECS-ARM (both) - CLOSE	8
LMP		CB PYRO A-SEQ A - CLOSE	250
		CB PYRO B-SEQ B - CLOSE	
CDR		SECS-PYRO (both) - on	8
		SIVB/LM-SEP - on	9
	2	CSM/LM Sep Mnvr from S-IVB	

	3 Set Controls	
CDR	SECS-PYRO (both) - SAFE	8
	THC - LOCKED	
	CB SECS-ARM (both) - OPEN	
LMP	CB PYRO A SEQ A - OPEN	250
	CB PYRO B SEQ B - OPEN	

PERFORM TUNNEL TRANSFER PREP pg 10-1

PERFORM CREW TRANSFER IVA (CSM to LM) TBD

SECURING TUNNELS FOR SEPARATION

CMP	1 Disconnect power to LM	2
	L/M PWR - center	
	2 Disconnect & Stow Vehicle Electrical Umbilicals (2)	
	3 Install Docking Drogue in LM Tunnel	
	Assemble A, G, & M tools	
	Lock docking drogue	
	4 Install Docking Probe	
	Push probe into drogue to engage capture latches	
	Rotate probe for gross orientation	
	Push collar latch handle forward	
	Pull collar latch handle out to disengage detent	
	Rot collar latch handle CCW til detent	
	Connect probe electrical umbilicals (2)	
	Assemble tools A, G, & M	
	Align probe attenuators (3)	
	Rotate probe tension links (3) until link foot is transverse to probe axis	
	Set tool A	
	Rotate probe torque shaft CW until torque breaks	

9. DOCKING &
SEPARATIONS

Basic Date Aug. 18, 1967
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BLK II

CMP	5	Disengage CM/LM Docking Latches Assemble tools A, G, & M Disengage latches (12)	2
	6	Install CM Forward Ablative Hatch Raise manual latches with flipup stops (3) Position ablative hatch against stops Secure hatch	
	7	Install CM Forward Pressure Hatch Wipe hatch seal & seal seating surface Secure hatch Stow operating handle LIGHTS-TUNNEL - OFF	
	8	Adjust LM/Tunnel Pressure PRESS EQUAL vlv - CLOSED C/M PRESS DIFF vlv - TUNNEL VENT	12
		<u>CSM SEPARATION FROM LM</u>	
CMP	1	Verify/set controls DOCK PROBE-EXTD/REL - EXTD/REL	2
	2	Verify LM Translation From CSM	
		<u>CSM DOCKING TO LM</u>	
LMP	1	Install Docking Targ (RH rend window)	
	2	Verify/set Controls	
CDR		CB SECS-ARM (both) - CLOSE	8
		CB PYRO A-SEQ A - CLOSE	250
		CB PYRO B-SEQ B - CLOSE	
		SECS-PYRO (both) - ARM	8
CMP		DOCK PROBE-EXTD/REL - EXTD/REL - OFF	2
		DOCK TARGET - as required	

Basic Date Aug. 12, 1959
Changed

PLAN 11

CDR	3	Monitor LM Docking Mnvr	2
	4	DOCK PROBE-RETR-PRIM - 2 DOCK PROBE-EXTD/REL - RETRACT	
	5	Set Controls	
		SECS-PYRO (both) - SAFE	8
LMP		CB PYRO A-SEQ A - OPEN	250
		CB PYRO B-SEQ B - OPEN	
CDR		CB SECS-ARM (both) - OPEN	8
		DOCK TARGET - OFF	2

PERFORM TUNNEL TRANSFER PREPARATION pg 10-1

PERFORM CREW TRANSFER IVA (LM TO CSM) TBD
or EVA pg 11-1(TBD)

SECURE TUNNELS FOR SEPARATION pg 9-2

CSM FINAL SEPARATION FROM LM

1 Verify/set controls

CDR		CB SECS-ARM (both) - CLOSE	8
LMP		CB PYRO A-SEQ A - CLOSE	250
		CB PYRO B-SEQ B - CLOSE	
CDR		SECS-PYRO (both) - ARM	8
		CSM/LM-FINAL SEP - ON	9

2 CSM sep Mnvr from LM (TBD)

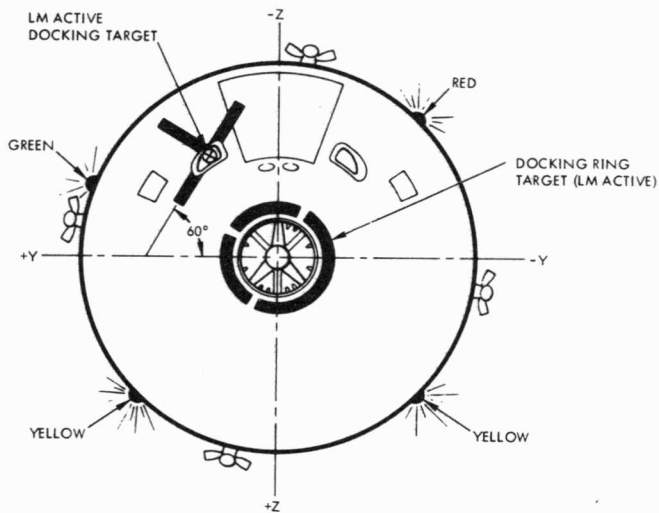
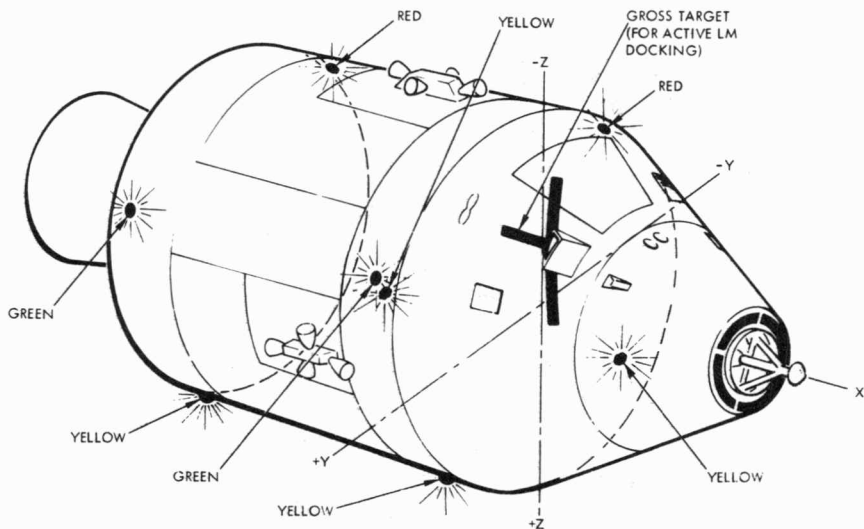
3 Set controls

		SECS-PYRO (both) - SAFE	8
		CB SECS-ARM (both) - OPEN	
LMP		CB PYRO A-SEQ A - OPEN	250
		CB PYRO B-SEQ B - OPEN	

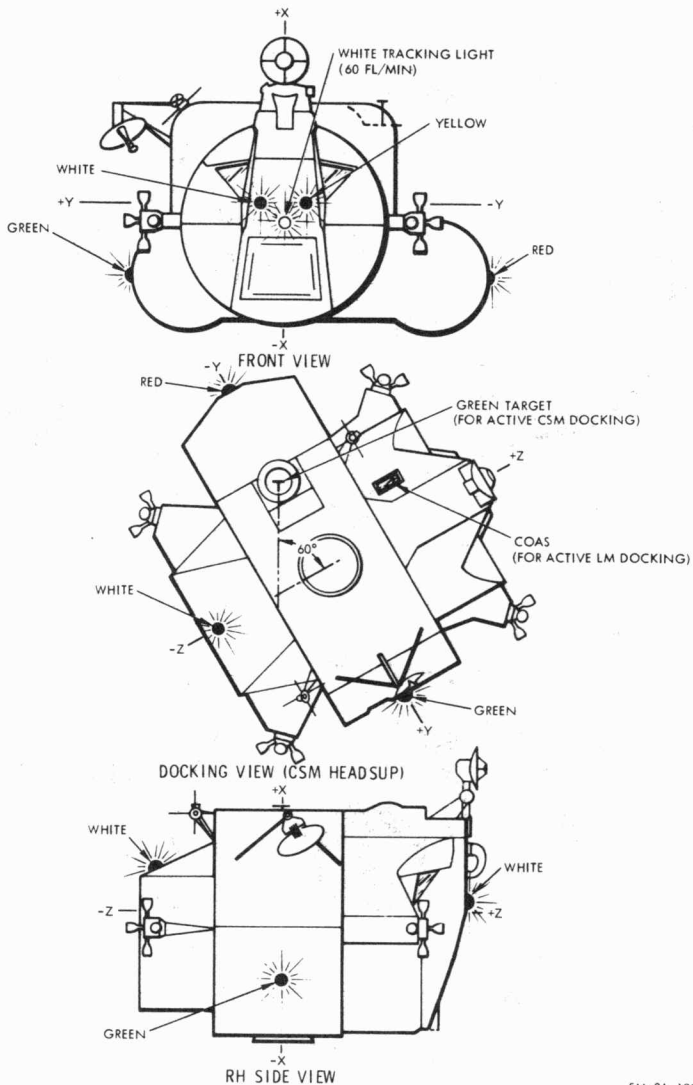
Basic Date Aug. 18, 1967

BLK II

CSM Target and Acquisition Lights



LM Target and Acquisition Lights



5M-2A-1304A

Basic Date Aug. 18, 1967
Changed

BLK II

SECTION 10. CREW TRANSFER IVA

TUNNEL TRANSFER-CSM TO LMTUNNEL TRANSFER PREPARATION

- ALL 1 Pressurize Tunnel/LM
- | | |
|------------------------------------|-----|
| PGAs - on | |
| SUIT CKT RET SHUT-OFF vlv - C (CW) | 381 |
| EMER CABIN PRESS vlv - NORMAL | 351 |
| C/M PRESS DIFF vlv - LM | 12 |
| PRESS EQUAL vlv - OPEN | |
| C/M PRESS DIFF vlv ind - 0 psi | 12 |
| CABIN-PRESS - 5±2 psi | 2 |
- 2 Remove CM FWD Pressure Hatch
- LIGHTS TUNNEL - on (up)
 - Fwd press hatch handle - oper pos
 - Depress plunger & rot press hatch
 - oper handle 90° (CW)
 - Remove press hatch
- 3 Remove CM Fwd Ablative Hatch
- Disc instr umbilical & stow
 - Fwd ablative hatch handle oper pos
 - Rot ablative hatch handle 90°(CW)
 - Remove ablative hatch
- Backup:
- Assemble tools A & G
 - Tool assy locked in hatch recep
 - Rotate tool assy CW
 - Remove ablative hatch
 - Disassemble tool assy
- 4 CM/LM Final Latching
- Assemble tools A, G, & M
 - Latches locked with tool assy (12)

CMP 5 Connect LM Elect Umbs to CSM Systems
 Disengage umbilical connector
 Draw umbilical across docking interface
 Connect umbilical to tunnel recep
 Repeat for second umbilical
 LM PWR sw - CSM

2

6 Remove Docking Probe
 Depress plunger on probe body
 Tool A in probe preloaded torque
 shaft socket
 Rot shaft CCW til hook engages roller
 Remove tool A
 Disengage probe elect umbs & stow (2)
 Rot tens' links (3) 90° CCW with tool F
 Assemble tools A, G, & M
 Probe attenuators locked (3)
 Insert tool H into probe assy socket
 Rot collar latch handle to detent
 Pull latch handle aft
 Attach tool A to tool H
 Rotate tool assy CW
 Pull collar latch handle aft
 Remove probe

7 Remove Docking Drogue
 Assemble tools A, G, & M
 Unlock drogue locking lever
 Remove docking drogue

8 Secure Veh Elect Umbs in LM Tunnel

9 Open LM Hatch

CREW TRANSFER IVA TBD

10. CREW TRANSFER IVA

Basic Date Aug. 18, 1967
 Channed

BLK II

BLK II

Basic Date Aug. 18, 1967
Changed _____

11-1

D. C. SCHULTZ
Bldg. 4, Room 250
Ext. 4371

11. EVA

BLK II

Basic Date Aug. 18, 1967
Changed _____

SECTION 12. ENTRY

CONFIGURE ECS for SEP & ENTRY

ALL	PGAs - closed	
	Water Wings - donned	
	SUIT CKT RET SHUTOFF vlv - CLOSE (CW)	381
	EMER CABIN PRESS vlv - OFF	351
	Urine Dump HTR - OFF	
	GLY TO RAD PRIM vlv - BYPASS	377
CDR	CABIN PRESS REL vlv (both) - BOOST ENTRY	325
	O2 S/M SUPPLY vlv - OFF	326

G&N ENTRY PROCEDUREEMS PRE-ENTRY SET-UP

CDR	EMS MODE - STBY
	EMS FUNCTION - CCW to RNG SET
	Set Range Counter for range-to-go
	(Range-to-go after .05G) (MSFN)
	EMS FUNCTION- Vo SET
	Align scroll Vo to display index (MSFN)
	EMS FUNCTION - ENTRY
	FDAI 2 - ORB RATE

P61 MANEUVER TO CM/SM SEP ATT

The Following Are Required:

	CMC - ON pg 1-14
	IMU - ON pg 1-14
	SCS - ON pg 2-1
	DIRECT RCS - ON
	SCS CHANNELS (4) - ON

12. ENTRY
G/N ENTRY

Basic Date _____
Changed _____

P61

12-2

CMP 1 Key V37E 61E

```

*****
* POSS PROG ALARM *
* FL V05 N09 (10 SEC display) *
* R1-01427 (IMU Reversed, zero *
*          ROLL ON FDAI is *
*          LIFT DOWN) *
*Or POSS FL V05 N09 (10 SEC *
*          display) *
* R1-01426 (IMU Unsatis V X R *
*          - - *
*          Not within 30 DEG of*
*          -YSM or +YSM) *
*RSET *
*****

```

CMP 2 FL V06 N60

```

G MAX          XXX.XX G
V PRED         XXXXX. FPS
GAMMA EI       XXX.XX DEG

```

Record
PRO

3 FL V06 N63

```

RTGO          XXXX.X NM
VIO           XXXXX. FPS
TFE (49 NM)   XXBXX MIN-SEC

```

Record

~~XX~~

If Range-To-Go and Vo Not Available From GND:

CDR

EMS MODE - STBY

1

EMS FUNCTION - CCW to RNG SET

Set RANGE counter for range-to-go
(Range-to-go after .05G)

EMS FUNCTION - Vo SET

Align scroll Vo to display index

EMS FUNCTION - ENTRY

~~XX~~

PRO

101,02,03,04,0/
12. ENTRY
G/N ENTRY

Basic Date Aug. 18, 1967

BLK II

(R60-Attitude Maneuver)

CMP	4	FL V50 N25 (Pls sw)	2
		RI-00203 (S/C CONT to CMC)	
CDR		Accept: SC CONT - CMC	1
		CMC MODE - AUTO	
CMP		ENTR	2
CDR		Reject: Select control as desired	
CMP		PRO	

5 V06 N22 (Final Gimbal Angles for SEP)
R, P, Y XXX.XX DEG

Monitor auto maneuver on FDAI or
perform maneuver with RHC

LMP	6	Set COMM - T/C Basic except;	
		VHF ANT - RECY	3
		VHF AM-RCV ONLY - A	
		S BAND ANT - as required	
		S BAND PWR AMPL - HIGH	

CMP	7	FL V50 N19 (Perf ATT TRIM MAN enable)	2
CDR		Accept SC CONT - CMC	1
		CMC MODE - AUTO	
CMP		ENTR-Ret to step 5	2
CDR		Reject Select control as desired	1
		PRO	2

CMP	8	P62 Auto or Key V37E 62E	
-----	---	--------------------------	--

Basic Date _____
Changed _____

P62-CSM-CM/SM SEPARATION and PRE-ENTRY MANEUVER

The Following Are Required:

CMC - ON pg 1-14

IMU - ON pg 1-14

SCS - ON pg 2-1

CMP 1 CMC displays P62 2
 Or
 Key V37E 62E

```

*****
* POSS PROG ALARM *
* FL V05 N09 (10 sec display) *
* R1-01427 (IMU Reversed, zero *
* ROLL ON FDAI is *
* LIFT DOWN) *
*or POSS FL V05 N09 (10 sec *
* display)*
* R1-01426 (IMU Unsatis V X R *
* - - *
* Not within 30 DEG of*
* -YSM or +YSM) *
* RSET *
*****

```

2 FL V50 N25
 00041 (Perform SEP checklist)

LMP 3 MN BUS TIES (both) - ON 5
 CMP
 -01:00 FLT RCDR - RECORD 2
 LMP TAPE RCDR motion -FWD 3
 TAPE RCDR mode - record
 ALL MODE - INTERCOM/PTT 9,10,6
 Set up for CM/RCS Ring A
 A/C ROLL - OFF 1
 B/D ROLL - A
 SCS CHANNEL PITCH & YAW - A
 CB SCS A/C ROLL 1 & 2 MNA&B (4) - open 8
 CB SCS B/D ROLL 1 MNA - close
 CB SCS B/D ROLL 2 MNA - open
 CB SCS B/D ROLL 1 MNB - open

Basic Date Aug. 18, 1967

Changed

BLK II

CDR CB SCS B/D ROLL 2 MNB - open 8
 CB SCS PITCH MNA - close
 CB SCS PITCH MNB - open
 CB SCS YAW MNA - close
 CB SCS YAW MNB - open
 CB SECS ARM (both) - close
 CB SECS LOGIC (both) - close
 SECS LOGIC (both) - on
 CB ELS BAT (both) - close
 SECS PYRO (both) - ARM
 CMP PRPLNT DUMP - RCS CMD 2
 RCS TRNFR - CM
 CDR Test roll - no fire
 CMP CM RCS PRESS - on (up)
 RCS IND sw - CM A then B
 CM RCS PRESS He-4000-4450 psia
 CM RCS PRESS MANF - 285-302 psia
 CDR Test roll jets - fire
 CMP RCS TRNFR - SM

4 Separation

CMC MODE - FREE
 CDR CM/SM SEP (both) - ON (up) 2
 After SEP:
 C/W mode - CM
 RCS TRANS - CM (verify)
 CMP ENTR (when adeq sep is achieved)
 CMC MODE - AUTO
 CDR B/D ROLL, PITCH, YAW (3) - A or B 1
 CM PRPLNT JETT LOGIC - OFF
 FL V06 N61 2
 IMPACT LAT (+NORTH) XXX.XX DEG
 IMPACT LONG (+EAST) XXX.XX DEG
 HEADS UP/DOWN +00001/-00001

Accept: PRO

Reject: V25E-Reload Data

5 V06 N22 (Desired final gimbangs at EI)

R, P, Y XXX.XX DEG

Basic Data Changed

CDR MNVR or Monitor MNVR ($4^{\circ}/\text{sec}$) to ENT ATT:
 SPS (R= $\frac{0}{\text{---}}$, P= $\frac{0}{\text{---}}$, Y= $\frac{0}{\text{---}}$)
 RCS (R= $\frac{0}{\text{---}}$, P= $\frac{0}{\text{---}}$, Y= $\frac{0}{\text{---}}$)
 EMS MODE - AUTO

1

6 Set COMM

LMP A4 RCV ONLY A COMM mode
 S BAND PWR AMPL - HIGH
 VHF ANT-RECY
 VHF BCN-ON

3

7 P63 (Auto when CDU Drive complete)

BMAG MODE (3) - RATE 2

EMS ROLL - ON

Align RSI using YAW ATT SET

dial & GDC Align

Align #2 Ball in Roll with ROLL ATT SET

dial & GDC Align

P63 CSM ENTRY INITIALIZATION

1 CMC Displays P63

CMP V06 N64 (MON)

2

G

XXX.XX G

VI

XXXXX. FPS

R TO TARG

XXXX.X NM

CDR 2 CHECK R3 Agrees with EMS
 Range Counter at .05G

1

3 P64 (Auto at 0.05G)

P64 CSM-POST 0.05G PROGRAM

1 CMC Displays P64

CMP V06 N68 (MON)

2

BETA (Varies)

XXX.XX DEG

VI (Decreasing)

XXXXX. FPS

H DOT (Nominal)

XXXXX. FPS

2 .05G sw - on

FDAI SCALE - 50/15

EMS .05G Lt - ON

MAN ATT ROLL - ACCEL CMD

Basic Date Aug. 18, 1967

BLK II

CDR MAN ATT PITCH & YAW - RATE CMD 1
 Check RSI & BALL for Lift Vector
 Check G-V plot within limits

3 P67 (Auto at 0.2G)

P67 CSM-ENTRY FINAL PHASE (G = 0.2)

1 CMC Displays P67
 EMS ind - .2G (if 10 secs since .05G)

CMP 2 V06 N66 2
 · BETA (Varies) XXX.XX DEG
 CROSS RANGE ERR (Nominal) XXXX.X NM
 DOWN RANGE ERR (Decreasing) XXXX.X NM

CDR Fly Roll CMD
 MON PSI ON EMS & BALL 1

CMP 3 FL V06 N67 (V Rel = 1000 FPS, 65K') (MON) 2
 RANGE TO GO XXXX.X NM
 LAT. PRES. POS (+NORTH) XXX.XX DEG
 LONG. PRES. POS (+EAST) XXX.XX DEG

CDR If R1 = -, L up. If R1 = +, L down
 MONITOR ALTIMETER 1

4 Go to Earth Landing Phase at 50K', pg 13-1

12001

Aug. 10,

Basic Date Changed

JUN 11

SCS ENTRY PROCEDURES

CDR The Following Are Required: 1

SCS - ON pg 2-1

SCS CHANNELS (4) - ON

FDAI SELECT - as desired

FDAI SOURCE - as desired

SC CONT - SCS

BMAG MODE (3) - ATT 1 RATE 2

DIRECT RCS - ON

ATT DEADBAND - MAX

RATE - HIGH

LIMIT CYCLE - OFF

ORDEAL - As desired

EMS PRE-ENTRY PREPARATION

CDR EMS MODE - STBY

EMS FUNCTION - CW to RNG SET

Set RANGE Counter for range-to-go

(Range-to-go after .05G) (MSFN)

EMS FUNCTION - Vo SET

Align scroll Vo to display index (MSFN)

EMS FUNCTION - ENTRY

CM/SM SEPARATION PREPARATION

CDR 1 Set ATT SET to SEP ATT:

R=____°, P=____°, Y=____°

2 Perform SCS MNVR to SEP ATT

3 Maneuver complete:

MAN ATT (3) - RATE CMD

4 Set Controls for Sep & Entry

CMP FLT RCDR - RECORD 2

LMP MN BUS TIES (both) - ON 5

LMP SET COMM T/C basic except:

VHF ANT - RECY 3

VHF AM-RCV ONLY - A

S BAND ANT (both) - as req'd

S BAND PWR AMPL - HIGH

TAPE RCDR mode - RECORD

TAPE RCDR motion - FWD

SCS ENTRY

Basic Date Aug. 18, 1967
Changed _____

BLK II

CDR SET ATT SET to ENTRY ATT: 1
 SPS R= $\frac{0}{0}$, P= $\frac{0}{0}$, Y= $\frac{0}{0}$
 RCS R= $\frac{0}{0}$, P= $\frac{0}{0}$, Y= $\frac{0}{0}$

5 CM/RCS Preparation

Set up for CM/RCS Ring A

A/C ROLL - OFF

B/D ROLL - A

SCS Channel PITCH & YAW - A

CB SCS A/C ROLL 1 & 2 MNA&B (4) - open 8

CB SCS B/D ROLL 1 MNA - close

CB SCS B/D ROLL 2 MNA - open

CB SCS B/D ROLL 1 MNB - open

CB SCS B/D ROLL 2 MNB - open

CB SCS PITCH MNA - close

CB SCS PITCH MNB - open

CB SCS YAW MNA - close

CB SCS YAW MNB - open

CB SECS LOGIC (both) - close

CB SECS ARM (both) - close 8

SECS LOGIC (both) - on

CB ELS BAT (both) - close

SECS PYRO (both) - ARM

CMP PRPLNT DUMP - RCS CMD 2

RCS TRNFR - CM

CDR Test roll jets - no fire

CM RCS PRESS - on (up)

RCS IND sw - CM A then B

CM RCS PRESS He - 4000-4450 psia

CM RCS PRESS MANF - 285-302 psia

Test roll jets - fire

CMP RCS TRNFR - SM 2

SCS ENTRY

Basic Date Aug. 18, 1967
Channelled

BLK II

CM/SM SEPARATION PROCEDURE

- CMP 1 CM/SM SEP (both) - ON (up) 2
 After SEP:
 C/W mode - CM
 RCS TRANS - CM (verify)
- 2 Set Controls 1
 SCS CHANNELS (3) - ON
 CM PRPLNT JETT LOGIC - OFF
- LMP A4 RCV ONLY A COMM Mode 3
 S BAND PWR AMPL - HIGH

POSTSEPARATION PROCEDURES

- CDR 1 PERFORM SCS MNVR to ENTRY ATT
- 2 Maneuver Complete:
 MAN ATT(3) - RATE CMD
 FDAI Scale - 50/15/50/10
- 3 Entry Procedures 1
 EMS MODE - AUTO
 DET - monitor for .05G time
 .05G EMS .05G 1t - on
 BMAG MODE (3) - RATE 2
 .05G sw - ON
 EMS ROLL - on
 MAN ATT PITCH & YAW - RATE CMD
 .05G+10 Check EMS RSI for Lift Vector
 Check G-V plot within limits
 CMP FLT RCDR - off (center) 2
- 4 Go to Earth Landing Phase, pg 13-1

Basic Date Aug. 10, 1977
 Changed

CM RCS RETRO AND ENTRY
(TBD)

12-14

BLK II

Basic Date Aug. 18, 1967
Changed _____

SECTION 13. EARTH LANDING PHASE

CDR			
50K'	ELS LOGIC - on		1
CMP	ELS AUTO - AUTO		2
	FLT RCDR - RECORD		
CDR	Report CM stable		
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
	CM UNSTABLE		
	RCS CMD - OFF		2
CDR	<45K' APEX COVER JETT PB - PUSH		1
	DROGUE DEPLOY PB - PUSH		
	(2 sec after apex cover jett)		
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
24K'	Apex cover jett (auto)		
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
CDR	APEX COVER JETT PB - PUSH		1
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
	Drogue parachutes deployed (auto)		
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
	DROGUE DEPLOY PB - PUSH		
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
CMP			
23.5K'	Cabin Pressure increasing		2
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
CDR	If not increasing by 17K':		325
	CABIN PRESS REL vlv (lower) - DUMP		
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
10K'	Main parachutes deployed (auto)		
CDR	MAIN DEPLOY PB - push (within 1 sec)		1
CMP	Report RANGE TO GO, LAT, LONG		2
	Key PRO, FL V50 N07: V37E 00E		
CDR			
00:00	DET-RESET-START		1
	DIRECT 02 vlv - OPEN (CCW)		7
	CM PRPLNT JETT LOGIC - on (up)		1
00:15	CM PRPLNT JETT DUMP - on (burn audible)		

CMP	RCS IND sw CM A	2
	CM RCS PRESS He - DECREASING	
	XXX	
	RCS IND sw - CM B	
	CM RCS PRESS He - DECREASING	
	If Not Decreasing or Jets Not Firing:	
	RHC (both) - FIRE ALL RCS JETS	
	EXCEPT PITCH (until Jets	
	stop firing or He press	
	stops decreasing)	
	XXX	
LMP	VHF AM A - SIMPLEX	3
	VHF AM - T/R	6
	VHF BCN - ON	3
	VHF ANT - RECY	
CDR	VHF AM - T/R	9
LMP	Transmit voice (VHF AM) reporting:	
	Position	
	Main chutes disreefed	
	Miss distance	
	Crew status	
CDR	CM PRPLNT JETT PURGE - on (up) (for 30 secs	1
	after burnoff)	
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
	CM RCS He DUMP PB - PUSH	
	RHC (both) - ZERO He press -	
	NO PITCH	
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
LMP	CB FLT & PL BAT BUS A,B & BAT C (3) - CLOSE	275
	CB FLT & PL MNA & B(2) - OPEN	
CDR	FLOOD POST LDG	
	FLOOD DIM - 1 or 2	

Basic Date Aug. 18, 1967
 Channed

BLK II

CMP	CM RCS PRESS He - zero	2
CDR	CM PRPLNT JETT LOGIC - OFF	1
CMP	CM RCS PRPLNT (both) - OFF	2
	CM RCS PRPLNT TB (both) - BP	
LMP	MN BUS TIES (both) - OFF	5

WARNING

Do not perform next step
above 600 feet as cabin
negative pressure may
become too high

600'	CABIN PRESS REL vlv (both) - CLOSE	325
------	------------------------------------	-----

LANDING

Postlanding Check pg 14-1

100'

Basic Date

Changed

100'

SECTION 14. POSTLANDING

14. POSTLANDING

STABILIZATION, VENTILATION, COMMUNICATIONS

1 Stabilization after landing

CDR	ELS AUTO - AUTO	2
	MAIN RELEASE - on (up)	
	SECS PYRO (both) - SAFE	8
	SECS LOGIC (both) - OFF	
LMP	CB PYRO A SEQ A - OPEN	250
	CB PYRO B SEQ B - OPEN	
	TAPE RCDR Mode - off (center)	3
	TAPE RCDR motion - stop (center)	
CMP	FLT RCDR - off (center)	2
CDR	CB PL VENT - close	8
	CB FLOAT BAG (3) - Close	

XXX
X

FLOATING INVERTED:

FLOAT BAG (3) - FILL
VHF BCN - OFF
VHF AM - OFF
FLOAT BAG (3) - OFF 2 Min After Upright
VHF BCN - ON
VHF AM A - SIMPLEX

XXX
X

After 10 Min Cooling Period:

FLOAT BAG (3) - FILL 7 Min
FLOAT BAG (3) - OFF

2 Post Stabilization and Ventilation

LMP	CB MNA BAT BUS A & BAT C (2) - open	275
	CB MNB BAT BUS B & BAT C (2) - open	
	CB FLT & PL BAT C - open	
	XXX X	
	EACH HR - CHECK D-C VOLTS > 27.5 V	3
	If Not:	
	CB FLT & PL-BAT BUS A&B (2)-OPEN	275
	CB FLT & PL BAT C - CLOSE	
	GO TO LOW POWER CHECKLIST pg 14-2	
	XXX X	
	CB FLT BUS MNA&B (both) - open	225
CDR	PL VENT - HIGH	8
	PL BCN LT - on	

Changed

	3	Post Landing Communications	
LMP		S BAND XPNDR - OFF	3
		PWR SCE - off (center)	
		PWR PMP - off (center)	
		VHF AM A - SIMPLEX	
		VHF BCN - ON (verify)	
		VHF ANT-RECY (verify)	
		Connect survival transceiver	
		to Ant cables if required	
ALL		MODE - INTERCOM/PTT	9,10,6
LMP		VHF AM A&B (both) - off (center)	3
		Transmit intermittently for 2 min:	
		Call sign	
		Computer readout	
		Crew status	

LOW POWER PROCEDURES

LMP		VHF BCN - OFF	3
		FLOOD FIXED - OFF	
CDR		VHF-AM - REC	9
CDR,LMP		COUCH LIGHTS - OFF	8,5
CDR		POSTLANDING VENT SYS: minimize use	8
CMP		SURV RADIO - plug into VHF BCN ANT cable	
		CONN & turn radio on in BCN mode	

EGRESS PROCEDURES

CMP		Side Hatch opened	
		Power Down S/C	
ALL		Water Wings on	

STABLE I

ALL		Helmet removed	
		Disconnect umbilicals	
		Neck dam on	
CMP		Center couch - 264° position	
CDR,LMP		Armrests folded	
ALL		Connect raft yellow lanyard No. 1 to	
		water & hardware rucksack	
CDR		Connect raft white lanyards to suits	
		Connect raft to S/C, if desired, with	
		green lanyard	

CMP Side Hatch opened
 Egress with liferaft
 LMP Put hardware kit out
 LMP, CDR Egress

STABLE II

ALL Remove helmets
 Disconnect umbilicals
 Release footstraps
 Release restraint harness
 Couch seat pans (3) - 170° position
 Neck dams on

CMP Arm rests folded
 Survival kits removed from stowage

CDR Connect liferaft mainline to CDR or S/C

CMP Connect first white lanyard from
 liferaft to suit

LMP Connect second white lanyard from
 liferaft to suit

CDR Connect third white lanyard from
 liferaft to suit

LMP Connect rucksacks together to yellow
 lanyard on raft bag

CMP PRESSURE EQUALIZATION vlv - OPEN
 Fwd press hatch handle - oper pos
 Depress plunger & rotate hatch handle
 approx 90° (CW)
 Stow pressure hatch
 Fwd ablative hatch handle - oper pos
 Disconnect instrumentation umbilical

CDR PLVC - OPEN
 PL VENT - LOW
 CB PL VENT - open

CMP Rot ablative hatch hand approx 90° (CW)
 Stow ablative hatch
 Exit feet first with raft; when clear
 of S/C inflate water wings and raft

LMP Put rucksack down tunnel after CMP
 Exit feet first; when clear of S/C
 inflate water wings

CDR Exit feet first; when clear of S/C
 inflate water wings

15. SYSTEMS MANAGEMENT

PROPULSION SYSTEMS PERIODIC VERIFICATION

LMP

3

CMP

2

- 3 CM RCS Monitoring Check
 CMP CM RCS PRPLNT TB (both) - gray
 RCS IND sw - CM A,B
 CM RCS He TEMP - 60-90°F
 CM RCS PRESS He - 4000-4450 psia
 CM RCS PRESS FUEL - 25-200 psia
 CM RCS PRESS OXID - 25-200 psia

WARNING

If CM RCS F or OX MANIFOLD
 pressure is >207 psia:

CM RCS PRPLNT (both) - OFF

After CM RCS Activation:

CM RCS PRESS FUEL - 285-302 psia
 CM RCS PRESS OXID - 285-302 psia

EPS PERIODIC VERIFICATION AND TESTS

- 1 Cryogenic Pressure-Quantity Check
 CRYO TK PRESS H2 (both) 225-260 psia
 02 PRESS IND sw - SURGE TANK
 CRYO TK PRESS 02 1 - 865-935 psia
 02 PRESS IND sw - TANK 1
 CYRO TK PRESS 02 (both) - 865-935 psia
 CRYO TK QTY H2 (both) - record
 CRYO TK QTY 02 (both) - record

- 2 FC Power Plant Check
 LMP FC RAD TB (3) - gray
 FC HTRS (3) - auto (up)
 FC REACS TB (3) - gray
 FC IND sw - 1, 2, 3
 FC FLOW H2 - 0.018-0.161 lb/hr
 FC FLOW 02 - 0.140-1.276 lb/hr
 FC MOD TEMP SKIN - 390-460°F
 FC MOD TEMP COND EXH 155-175°F
 FC TB (5) - gray

- 3 D-C Voltage-Amperage Check
 MN BUS A TB (3) - FC 1&2-gray, FC 3-BP
 MN BUS B TB (3) - FC 1-BP, FC 2&3-gray
 DC IND sw - FC 1, FC 2, & FC 3

LMP	DC AMPS - Record	3
	DC IND sw - MAIN BUS A, B	
	DC VOLTS - 27-31 vdc-Record	
	MN BUS TIES (both) - OFF	5
	DC IND sw - BAT BUS A, B, & BAT C	
	DC VOLTS - 34-38 vdc	3
	DC AMPS - 0 to 3 amps	
	CB PYRO A SEQ A - CLOSE	250
	CB PYRO B SEQ B - CLOSE	
	DC IND sw - PYRO BAT A, B	
	DC VOLTS - 36.9-37.4 vdc	3
	DC AMPS - zero	
CMP	CB PYRO A SEQ A - OPEN	250
	CB PYRO B SEQ B - OPEN	
LMP	DC IND sw - MAIN BUS A	3

4 A-C Voltage Check

AC IND sw - BUS 1&2, ϕ A,B,C

AC Volts - 113-117 vac

5 Battery Charging

MN BUS TIES (both) - OFF

5

Verify:

CB PYRO A BAT BUS A to PYRO TIE - OPEN 250

CB PYRO B BAT BUS B to PYRO TIE - OPEN

CB BAT C to BAT BUS A - OPEN

CB BAT C to BAT BUS B - OPEN

DC IND sw - BAT CHARGER

3

BAT CHARGE - A, B, or C

DC VOLTS - 35-40 vdc

DC AMPS - 2.0-0.4 amps

BAT CHARGE - OFF at 0.4 amps

DC IND sw - MAIN BUS A

6 Fuel Cell Power Plant Purging

A. 02 PURGING

FC IND sw - 1, 2, or 3

FC PURGE-1, 2, or 3 - 02 (2 min.)

FC FLOW-02 Flow incr 0.6 lb/hr

(may exceed C/W limits)

FC PURGE-1, 2, or 3 - OFF

Basic Date AUG. 10, 1961
Changed _____

DATA 11

BLK II

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7  H2 or O2 Quantity Balance Correction
   A.  On low quantity tank:
       H2 or O2 HTRS - OFF
   B.  When tank quan balanced:
       H2 or O2 HTRS - AUTO

```

8 Fuel Cell Load Disconnect

A. Fuel cell disconnect:

PRIOR TO DISCONNECT:

INSURE THAT AT LEAST ONE FUEL CELL IS
POWERING EACH MAIN BUS.

B. Fuel cell to bus connection:

CONNECT DESIRED FUEL CELL to
DESIRED MAIN BUS

9 Inverter Changeover

WARNING

1. Insure at least one inverter on each AC bus at all times (if available)
2. Inverter lockout will result if all three AC bus ties for the same bus are on simultaneously.

ECS PERIODIC VERIFICATION AND TESTS

- 1 ECS Monitoring Check
 02 PRESS IND sw - SURGE TANK
 CRYO TK PRESS 02 1 - 865-935 psia
 02 PRESS IND sw - TANK 1
 ECS RAD TB - gray or #2

LMP	ECS IND sw - PRIM	2
	ECS RAD TEMP PRIM IN - 65-105°F	
	ECS RAD TEMP PRIM OUT - 20-102°F	
	GLY EVAP PRIM TEMP OUT - 40-50.5°F	
	GLY EVAP PRIM STEAM PRESS-.097-.135 psia	
	GLY DISCH PRIM PRESS - TBD	
	SUIT TEMP - 45-55°F	
	CABIN TEMP - 70-80°F	
	SUIT PRESS - 4.7-5.3 psia	
	CABIN PRESS - 4.8-5.2 psia	
	PART PRESS CO2 - 0.0-7.6 mm Hg	
	O2 FLOW - 0.2-0.45 lb/hr	
	O2 ΔP ind sw - SUIT COMP	
	O2 ΔP - 0.3-0.4 psid	
	GLY ACCUM PRIM QTY - TBD	
	If <TBD %	
CMP	PRIM ACCUM FILL vlv - ON	379
LMP	GLY ACCUM PRIM QTY - TBD	2
CMP	PRIM ACCUM FILL vlv - OFF	379
	H2O QTY IND sw - POT	
LMP	H2O QTY (POT) - TBD	2
	H2O QTY IND sw - WASTE	
	H2O QTY (WASTE) - TBD	
2	ECS Redundant Component Check	
CMP	ECS INDS sw - PRIM	2
	SUIT COMPR - Switch to Redundant Compressor	
	O2 ΔP ind sw - SUIT COMP	
	O2 ΔP - 0.3-0.4 psi	
	IF SUITED:	
CDR	O2 DEMAND REG vlv - 1	380
	PERFORM PGA VERIFICATION CK pg 15-9	
	O2 DEMAND REG vlv - 2	
	REPEAT PGA VERIFICATION CK pg 15-9	
	O2 DEMAND REG vlv - BOTH	380
CMP	MAIN REG vlv - 1	351
	EMER CABIN PRESS vlv - 1	
	EMER CABIN PUSH TO TEST PB - PUSH	
LMP	O2 FLOW - increase	2
	O2 press - 90-110 psig (from MSFN)	
CMP,LMP	MAIN REG vlv - 2	351
	EMER CABIN PRESS vlv - 2	

Basic Data
Changed

CMP	EMER CABIN-PUSH TO TEST PB - PUSH	351
LMP	O2 FLOW - increase	
	O2 press - 90-110 psig (from MSFN)	
CMP	MAIN REG vlv - BOTH	351
	EMER CABIN PRESS vlv - BOTH (OFF if suited)	
LMP	SUIT CKT-H2O ACCUM-AUTO - redundant accum	2
	MONITOR O2 FLOW FOR WATER ACCUM STROKING	
CDR	URINE DUMP HTR - redundant heater	101
	URINE DUMP NOZZLE TEMP - No Significant change (From MSFN)	
CMP	Open coolant attenuation panel	
	EVAP WATER CONT SEC vlv - AUTO	382
LMP	ECS IND sw - SEC	2
	GLY EVAP STEAM PRESS - MAN	
	GLY EVAP STEAM PRESS - INCR for 45 secs min	
	ECS RAD HTR PRIM - off (center)	
	ECS RAD HTR - SEC	
	SEC COOL LOOP PUMP - AC 1	2
	GLY DISCH SEC PRESS - TBD psig	
	GLY ACCUM SEC QTY - TBD	
	SEC COOL LOOP EVAP - EVAP	
	ECS GLY PUMPS - OFF	4
	After 5 minutes:	
	ECS RAD TEMP SEC-65-102°F	
	ECS RAD TEMP SEC OUT - 40-102°F	
	GLY EVAP SEC TEMP-OUT - 40-50.5°F	
	SEC COOL LOOP PUMP - AC 2	
	GLY DISCH SEC PRESS - TBD psig	
	SEC COOL LOOP EVAP - RESET for 45 secs min, then OFF	
	ECS RAD HTR SEC - OFF	
	ECS IND sw - PRIM	
	SEC COOL LOOP PUMP - off (center)	
	GLY EVAP STEAM PRESS - AUTO	
	ECS GLY PUMPS - redundant pump	4
	GLY DISCH PRIM PRESS - TBD psig	2
	GLY ACCUM PRIM QTY - TBD %	
	ECS RAD HTR - redundant PRIM heater	
CMP	EVAP WATER CONT SEC vlv - OFF	382
	Close coolant attenuation panel	

Basic Date Aug. 18, 1967
Channel

BLK II

3	O2 STORAGE REFILL PROCEDURE	
LMP	O2 PRESS IND sw - SURGE TANK	2
	CRYO TK PRESS O2 1 - <865 psia	
CDR	O2 PLSS vlv - FILL	326
LMP	CRYO TK PRESS O2 1 - >865 psia	2
CDR	O2 PLSS vlv - ON	326
LMP	O2 PRESS IND sw - TANK 1	2

- 4 LIOH FILTER REPLACEMENT
- NOTE: PRESS THE MANUAL BLEED VALVE PRIOR
TO UNLOCKING THE LATCHING HANDLE

5	Cabin Cold-Soak Operation	
CMP	Open coolant attenuation panel	
	SUIT HT EXCH SEC GLY vlv - FLOW	382
	EVAP WATER CONT SEC vlv - AUTO	
	Close coolant attenuation panel	
	GLY TO RAD SEC vlv - BYPASS	377
LMP	CABIN TEMP - MAN	2
CMP	PRIM CABIN TEMP vlv - COLD (CW)	303
	SEC CABIN TEMP vlv - TBD	
LMP	SUIT CKT HEAT EXCH - BYPASS	2
	ECS IND sw - SEC	
	SEC COOL LOOP - EVAP	
	SEC COOL LOOP PUMP - AC 1	
	GLY DISCH SEC PRESS - TBD	
	GLY ACCUM SEC QTY - TBD	
	GLY EVAP SEC TEMP OUT - TBD	
	ECS IND sw - PRIM	

6	Debris Screen Check	
CMP	Check cabin fans inlet screen	
	Open coolant attenuation panel	
	Ck SUIT CKT RET SHUTOFF vlv screen	381
	If debris is present:	
LMP	CABIN FANS (both) - OFF	2
CMP	SUIT CKT RET SHUTOFF vlv - CLOSE (CW)	381
	Clean screens	
	SUIT CKT RET SHUTOFF vlv - OPEN (CCW)	
LMP	CABIN FANS (both) - on	2
CMP	Close coolant attenuation panel	

1701

Aug 10, 1971

Basic Data Aug 10, 1971

Changed

Aug 11, 1971

7 PGA/Shirtsleeve Mode Change

ALI.

A. ECS SHIRTSLEEVE CONFIGURATION:

EMER CABIN PRESS vlv - BOTH	351
02 hoses disconnected at suit	
& return hose plugged	
SUIT CKT RET vlv - OPEN (CCW)	381
SUIT PWR - OFF (ON after COMM connected)	

B. ECS PGA CONFIGURATION:

SUIT PWR - OFF (ON after COMM connected)	
Remove plug from 02 return hose	
& connect hoses to suit	
SUIT CKT RET vlv - CLOSE (CW)	381
EMER CABIN PRESS vlv - OFF	

8 Cabin Repressurization

A. NORMAL REPRESS (Approx 30 min)

CABIN PRESS REL vlv (both) - NORMAL	325
(Safety Latch on)	
02 PRESS IND sw - SURGE TANK	2
RAPID REPRESS vlv - OPEN	02 Unit
Insert T handle in 02 PLSS vlv	326
CRYO TK PRESS 02 ind - 150 psia min	2
02 PLSS vlv - OFF	326
CABIN PRESS - 3.0 psia (in 1 min)	2
RAPID REPRESS vlv - OFF	02 Unit
CABIN REPRESS vlv - OPEN (CW)	351
02 PLSS vlv - FILL	326
CABIN PRESS - 5 psia	
CABIN REPRESS vlv - CLOSE (CCW)	351
02 PRESS IND sw - TANK 1	2

B. BACKUP REPRESS (approx 52 min.)

CDR	CABIN PRESS REL vlv (both) - NORMAL	325
CMP	EMER CABIN PRESS vlv - BOTH	351
	CABIN REPRESS vlv - OPEN (CW)	
	02 PRESS IND sw - SURGE TANK 2	
	SURGE TANK PRESS - 150 psia min	
	EMER CABIN PRESS vlv - OFF	351
	CABIN REPRESS vlv - adjust to 150 psia	
		min
LMP	CABIN PRESS - 5 psia	2
CMP	CABIN REPRESS vlv - close (CCW)	351

Basic Date Aug. 18, 1967

BLK II

9 PGA Verification Check

CDR	SUIT TEST vlv - PRESS	380
IMP	O2 FLOW HI stat/lt - on	2
ALL	MASTER ALARM tone/lts - on, PUSH	1,3,122
	PGA press ind - 4.1-4.5 psig	
	Disconnect return O2 hose at suit	
CMP	Suit Flow vlv(3)-OFF for 1 min	300,301,302
	PGA press ind - 0.5 psig decay (in 1 min)	
	CONNECT return O2 hose to suit	
ALL	PGA SLEEVE ind - normal decay	
CMP	Suit Flow vlv (3) - SUIT FULL FLOW	
CDR	SUIT TEST vlv - DEPRESS, then OFF	380

10 Hygrometer Operation

	UTIL PWR - OFF	
	Connect to UTIL PLUG	162,163,227
	UTIL PWR - PWR	
	SW - AMB	
	Extend sensor in sample area, record	
	SW - DEW	
	Record reading in sample area	
	If surface temperature required:	
	SW - AMB	
	Press sensor unit against surface	
	(approx 1 min)	
	SW - OFF	
	UTIL PWR - OFF	227,162,163

C&WS PERIODIC VERIFICATION

CMP	C/W LAMP TEST - 1
	MASTER ALARM lt - on
	LH stat/lt (17) - on
	C/W LAMP TEST - 2
	MASTER ALARM lt - out
	LH stat/lt (17) - out
	MASTER ALARM lt - on
	RH stat/lt (24) - on
	C/W LAMP TEST - OFF
	MASTER ALARM lt - out
	RH stat/lt (24) - out

basic Date Aug. 10, 1957
Changed

S/C POWER DOWN CONFIGURATION

1 Panel 1

CDR

FDAI SELECT - 1 or 2
SCS LOGIC BUS 3 - OFF

2 Panel 7

FDAI PWR - OFF
SCS/HAND CONT PWR - OFF
SCS ELEC PWR - OFF
BMAG PWR (both) - WARM UP
ALL HAND CONTROLLERS - LOCKED

3 Panel 2

CMP

ONLY ONE CABIN FAN ON

4 Panel 3

LMP

S BAND XPNDR - OFF
VHF AM RCV ONLY - off (center)
VHF AM A - DUPLEX
VHF AM B - off (center)
VHF BCN - OFF

5 Panels 6, 9, 10

MODE - VOX
S BAND - OFF
INTERCOM - OFF
VHF - T/R

6 Panel 227

RH UTIL PWR (both) - OFF

7 Panel 162

LEB UTIL PWR - OFF

8 Panel 163

LEB UTIL PWR - OFF

9 Panel 228

COAS PWR - OFF

10 Panel 327

COAS PWR - OFF

Basic Date Aug. 18, 1967
Channel

BLK II

SYSTEMS TEST Switches (2)	SYSTEMS TEST-DC VOLTS Indicator				
	System		Sensor Range	Nominal Range	
	Function	Measurement No.		System	Display (Volts)
1A	FC 1 N2 REG PRESS	SC 2060 P	Zero/75 psia	51 - 56 psia	3.4 - 3.75
1B	FC 2 N2 REG PRESS	SC 2061 P	Zero/75 psia	51 - 56 psia	3.4 - 3.75
1C	FC 3 N2 REG PRESS	SC 2062 P	Zero/75 psia	51 - 56 psia	3.4 - 3.75
1D	FC 1 O2 REG PRESS	SC 2066 P	Zero/75 psia	59 - 67 psia	3.95 - 4.45
2A	FC 2 O2 REG PRESS	SC 2067 P	Zero/75 psia	59 - 67 psia	3.95 - 4.45
2B	FC 3 O2 REG PRESS	SC 2068 P	Zero/75 psia	59 - 67 psia	3.95 - 4.45
2C	FC 1 H2 REG PRFSS	SC 2069 P	Zero/75 psia	58 - 66 psia	3.85 - 4.4
2D	FC 2 H2 REG PRESS	SC 2070 P	Zero/75 psia	58 - 66 psia	3.85 - 4.4
3A	FC 3 H2 REG PRESS	SC 2071 P	Zero/75 psia	58 - 66 psia	3.85 - 4.4
3B	FC 1 RAD OUT TEMP	SC 2087 T	-50/+300°F	-10 - +90°F	0.6 - 2.0
3C	FC 2 RAD OUT TEMP	SC 2088 T	-50/+300°F	-10 - +90°F	0.6 - 2.0
3D	FC 3 RAD OUT TEMP	SC 2089 T	-50/+300°F	-10 - +90°F	0.6 - 2.0
4A	BAT COMPARTMENT PRESS (MANIF)	CC 0188 P	Zero/18 psia	<1 psia	<0.2
4B	BAT RELAY BUS VDC	CC 0232 V	Zero/+45 vdc	25 - 36.5 vdc	3.7 - 4.1
4C	OPEN	NONE			
4D	CSM TO LM CURRENT MONITOR	CC 2962 C	Zero/+10 amps	0.4- 7.6 amps	0.2 - 3.8
5A	SPS OXIDIZER LINE TEMP	SP 0049 T	Zero/+200°F	+45 - +55°F	1.1 - 1.3

SYSTEMS TEST Switches (2)	SYSTEMS TEST-DC VOLTS Indicator				
	System		Sensor Range	Nominal Range	
	Function	Measurement No.		System	Display (Volts)
5B	OPEN	NONE			
5C	CM/RCS -P ENG INJECTOR TEMP SYS B	CR 2110 T	-50/+50°F	TBD	TBD
5D	CM/RCS +Y ENG INJECTOR TEMP SYS B	CR 2116 T	-50/+50°F	TBD	TBD
6A	CM/RCS CCW ENG INJECTOR TEMP SYS A	CR 2114 T	-50/+50°F	TBD	TBD
6B	CM/RCS -P ENG INJECTOR TEMP SYS A	CR 2100 T	-50/+50°F	TBD	TBD
6C	CM/RCS -Y ENG INJECTOR TEMP SYS A	CR 2103 T	-50/+50°F	TBD	TBD
6D	CM/RCS CW ENG INJECTOR TEMP SYS B	CR 2119 T	-50/+50°F	TBD	TBD
XPNDR A	XMTR POWER OUTPUT - RRT	ST 0711 V	NONE	0 - 5 vdc	0 - 5
XPNDR B	AGC SELF TEST - RRT	ST 0710 V	NONE	0 - 5 vdc	0 - 5
XPNDR C	FREQUENCY LOCKUP - RRT	ST 0712 X	NONE	4.5 <u>±</u> 0.5 vdc	4.5 <u>±</u> 0.5
XPNDR D	AGC NORMAL SIGNAL - RRT	ST 0719 V	NONE	0.0 <u>±</u> 0.1 vdc	0.0 <u>±</u> 0.1

SECTION 16. EMERGENCY PROCEDURES

FLIGHT EMERGENCY PROCEDURES

FIRE/SMOKE IN CM

A. UNSUITED:

ALL	DON EMERGENCY OXYGEN MASK	
	DIRECT 02 vlv - CLOSE (verify)	7
CMP	CABIN FANS (both) - OFF	2
LMP	SUIT COMPRS - OFF	4
	ALL ECS CONTROLS/SWITCHES - OFF	
ALL	DETERMINE VALIDITY OF SUIT LOOP	
	DON PGA	
CDR	DIRECT 02 vlv - OPEN (CCW)	7
ALL	AFTER ALL CREWMEN ARE SUITED:	
CMP	CABIN REPRESS vlv - CLOSE (CCW) (Verify)	351
	EMER CABIN PRESS vlv - OFF	
CDR	CABIN PRESS REL vlv (lower) - DUMP	325
ALL	ISOLATE FIRE SOURCE & REMOVE ELECT	
	POWER FROM THE AFFECTED SUBSYSTEM(S)	
	NOTIFY GROUND	

B. SUITED:

CDR	DIRECT 02 - OPEN (CCW)	7
CMP	CABIN FANS (both) - OFF	2
LMP	SUIT COMPRS - OFF	4
CMP	CABIN REPRESS vlv - CLOSE (CCW) (Verify)	351
CDR	CABIN PRESS REL vlv (lower) - DUMP	325
ALL	ISOLATE FIRE SOURCE & REMOVE ELECT	
	POWER FROM THE AFFECTED SUBSYSTEM(S).	
	NOTIFY GROUND	

Basic Date Aug. 18, 1967
Changed _____

BLK 11

16. EMERGENCY
PROCEDURES

CONTAMINATION IN CM1 Unsited Crewman Don PGAs

CDR	2	DIRECT 02 vlv - OPEN (CCW)	7
	3	Cabin Dump Unnecessary:	
CMP		SUIT CKT RET SHUTOFF vlv - CLOSE (CW)	381
CDR		DIRECT 02 vlv - close (CW)	7
	4	Cabin Dump Necessary:	
		DIRECT 02 vlv - close (CW)	
CMP		EMER CABIN PRESS vlv - OFF	351
		CABIN REPRESS vlv - close (CCW)	
CDR		CABIN PRESS REL vlv (lower) - DUMP	325
LMP		SUIT CKT RET SHUTOFF vlv - CLOSE (CW)	381

CONTAMINATION IN SUIT1 Set Controls

CDR		DIRECT 02 vlv - OPEN (CCW)	7
LMP		SUIT COMPRS - OFF	4

CABIN DECOMPRESSIONA. UNSUITED

ALL		DON EMERGENCY OXYGEN MASK	
		DON PGAs	
		AFTER ALL CREWMEN ARE SUITED:	
CMP		EMER CABIN PRESS vlv - OFF	351
		CABIN PRESS vlv - CLOSE (CCW)	
		NOTIFY GROUND	

B. SUITED

CMP		EMER CABIN PRESS vlv - OFF	351
		CABIN PRESS vlv - CLOSE (CCW)	

16. EMERGENCY PROCEDURES

Basic Date Aug. 18, 1967
Changed

BLK II

TWR JETT FAILURE

CDR A. TWR CUT/NO JETT MOTOR FIRE
 LES MOTOR FIRE PB - PUSH
 (a) Twr Jett Successful - cont mission
 (b) Twr Jett NOT Successful:
 THC-CCW (Shutdown SIVB)
 THC - NEUT, UNLOCK
 THC -X Translation
 ("back away from LET")
 PERFORM Mode II ABORT

CDR B. NO RESPONSE TO TWR JETT SWITCHES
 SECS LOGIC (both) - ON (verify)
 SECS PYRO (both) - ARM (verify)
 EDS PWR - ON (verify)
 CB EDS BAT A, B, C, (3) - CLOSE (verify)
 CB SECS ARM (both) - CLOSE (verify)
 CB SECS LOGIC (both) - CLOSE (verify)
 ATTEMPT TWR JETT AGAIN
 (a) Twr Jett Successful - Cont mission
 (b) Twr Jett NOT Successful:
 PERFORM Mode I-C ABORT
 (ELS 24K BARO sw may Jett Twr)

STUCK SM or CM RCS THRUSTERS

CDR 1 DIRECT RCS - OFF
 SCS CHANNEL (4) - OFF
 DIRECT RCS - ON

2 STABILIZE S/C - If not poss, Go to B.

CDR A. ELECTR FAILURE ISOLATION:
 CB SCS A/C ROLL 1 MNA - OPEN(RJ 13,16)
 CB SCS A/C ROLL 1 MNB - OPEN(RJ 13,16)
 CB SCS B/D ROLL 1 MNA - OPEN(RJ 9,12)
 CB SCS B/D ROLL 1 MNB - OPEN(RJ 9,12)
 CB SCS A/C ROLL 2 MNA - OPEN(RJ 14,15)
 CB SCS A/C ROLL 2 MNB - OPEN(RJ 14,15)
 CB SCS B/D ROLL 2 MNA - OPEN(RJ 10,11)
 CB SCS B/D ROLL 2 MNB - OPEN(RJ 10,11)
 CB SCS PITCH MNA - OPEN(RJ 1,2)
 CB SCS PITCH MNB - OPEN(RJ 3,4)

Basic Date Aug. 18, 1967
 Changed _____

BLK II

CB YAW MNA - OPEN (SM RJ 7,8) (CM RJ 5,8)

CB YAW MNB - OPEN (SM RJ 5,6) (CM RJ 6,7)

SCS CHANNEL (4) - A or B

CLOSE above CBs one at a time to isolate
failed eng

NOTIFY GROUND

B. MECH FAILURE ISOLATION:

SM RCS SEC PRPLNT (4) - OFF

or SM RCS PRIM PRPLNT (4) - OFF

or CM RCS PRPLNT (both) - OFF

Turn Applicable PRPLNT Switches ON one
at a time to isolate failed QUAD.

NOTIFY GROUND

PAD EMERGENCY EGRESS

(From Access Arm Retract to Liftoff)

MAKE EGRESS DECISION

REQUEST ACCESS ARM

If possible:

SECS LOGIC (both) - OFF (down)

SECS PYRO (both) - OFF (down)

SCS/HAND CONT PWR - OFF (CCW)

SCS ELECT PWR - OFF (CCW)

RATCHET RELEASE HATCH LATCHES

RELEASE RESTRAINTS

DISCONNECT UMBILICALS

PUSH OPEN HATCH

EGRESS (when access arm in place)

RELEASE RESTRAINTS

DISCONNECT UMBILICALS

EGRESS

RELEASE RESTRAINTS

DISCONNECT UMBILICALS

EGRESS

CONNECT PORTABLE VENTILATORS TO SUITS OR

REMOVE HELMETS IF NO TOXIC GAS IS PRESENT

ENTER ELEVATOR

ENTER M113 Van

Basic Date Aug. 18, 1967

Changed

BLK II