APOLLO 15

CSM CONTINGENCY CHECKLIST

PART NO.	S/N
SKB32100115-312	1001

CONTENTS

DATE 5/7/71

DATE 7/8/71

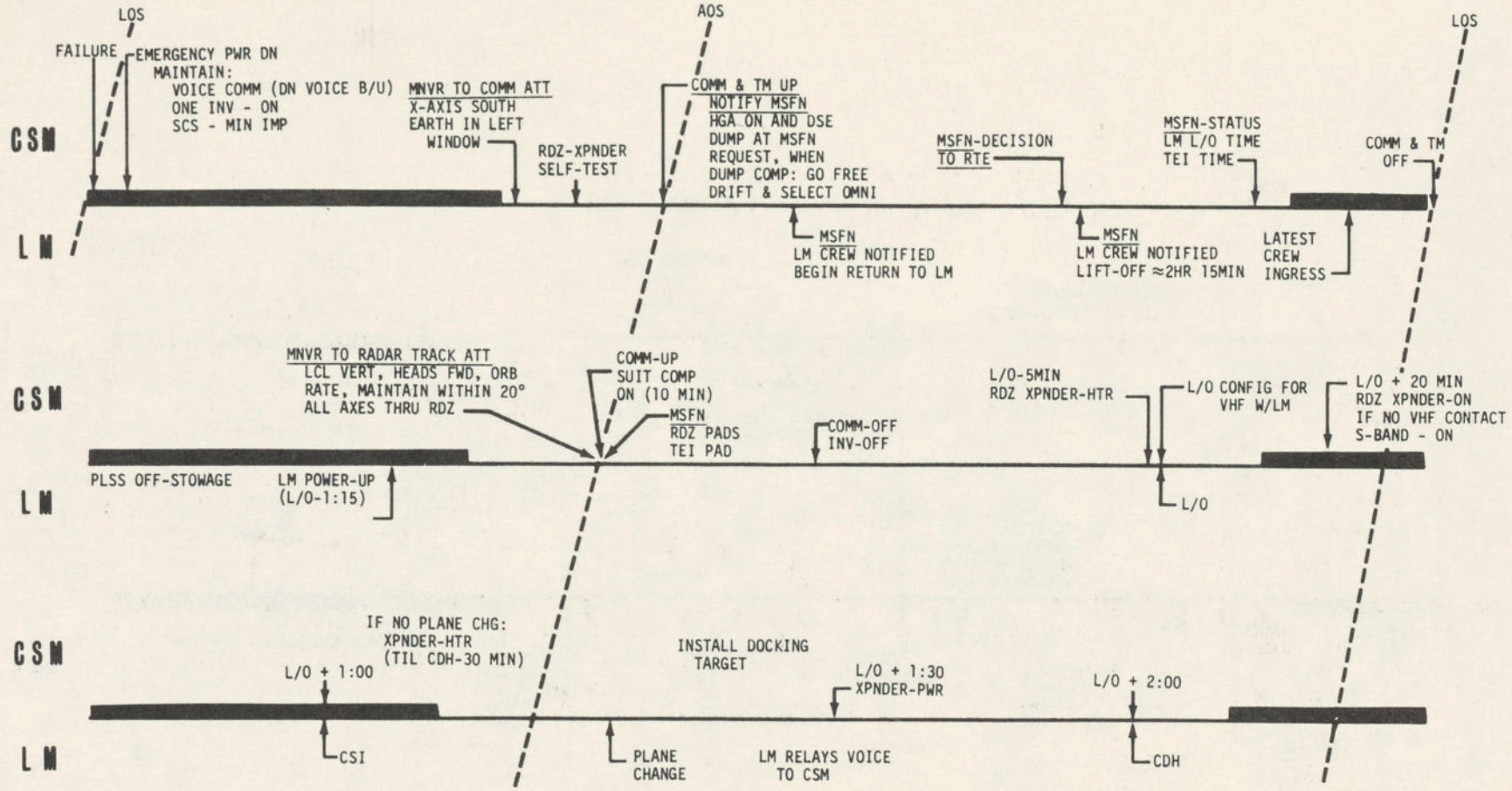
SCS w/G&N FAILED

CSM POWER CRITICAL LUNAR ORBIT

LM ON SURFACE

CSM POWER CRITICAL LUNAR ORBIT

DATE 3/22/71

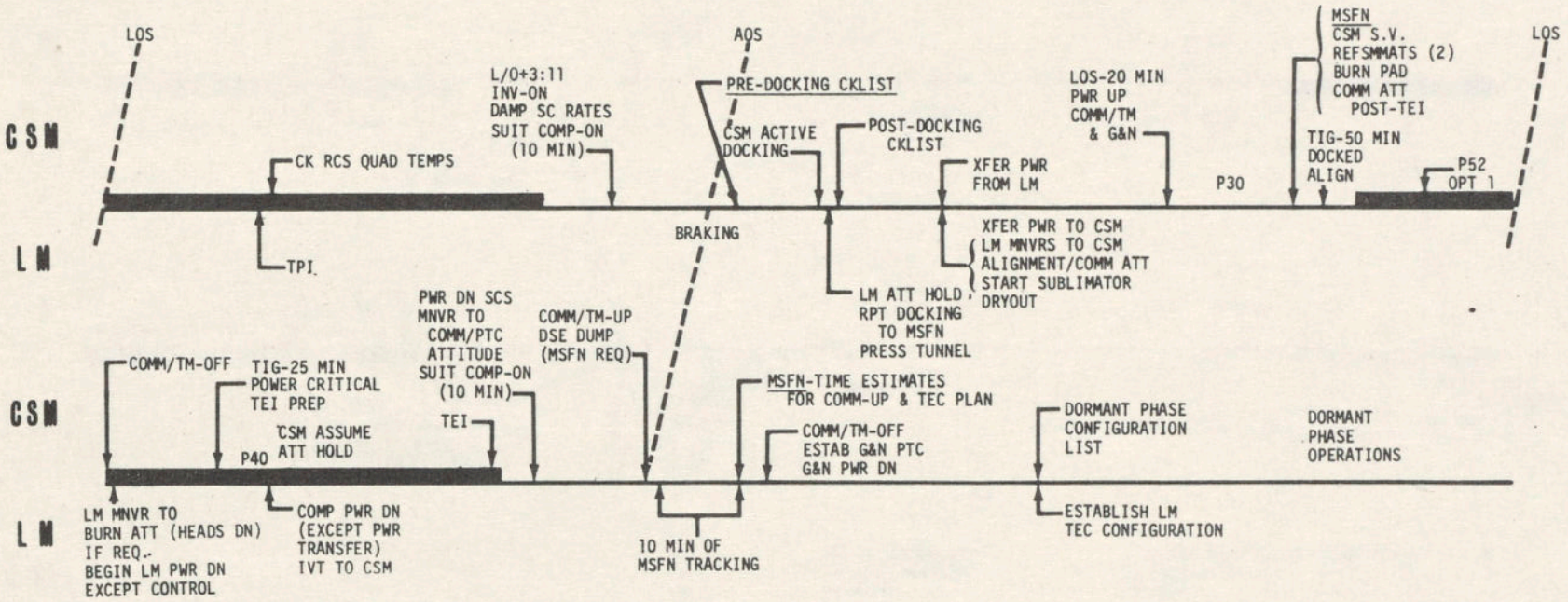


CSM POWER CRITICAL (LM ON SURFACE)

C
1-1

SCS w/G&N FAILED | SPS TEI - G&N/SCS CRIT | POST LM JETT | LM ON SURFACE

CSM POWER CRITICAL LUNAR ORBIT



CSM POWER CRITICAL (LM ON SURFACE)

C
1-2

DATE 3/22/71

CSM POWER CRITICAL LUNAR ORBIT
LM on Surface Rndz & TEI Prep

FAILURE — Perform EMERG PWR DOWN, pg EMER/1-6

Verify power on MNB

AC BUS PWR UP
INV 2 - MNB
INV 2 AC1 & AC2 - on (up)
AC1 & AC2 RSET - RSET, on
Verify AC volts > 110 vac

ENABLE MIN IMPULSE (CMC or SCS)
If AC Inverter on for COMM,
* use SCS min impulse *

CMC MIN IMPULSE (~ 3 amp)
PRO, push (~ 5 sec)
F37 00E
SC CONT - CMC/FREE
ROT CONTR PWR NORMAL 2 - AC/DC
AUTO RCS SELECT - single jet (MNB)

When min impulse not req'd:
AUTO RCS SELECT (all) - OFF
ROT CONTR PWR NORMAL 2 - OFF
V37E 06E
PRO, push (~ 5 sec) until DSKY blanks

or SCS MIN IMPULSE (~ 1 amp)
INV 2 - MNB (~ 5 amp)
cb SCS LOGIC BUS (4) - close
SCS ELEC PWR - ECA
ROT CONTR PWR NORMAL 2 - AC/DC
SC CONT - SCS
MAN ATT (3) - MIN IMP
AUTO RCS SELECT - single jet (MNB)

When min impulse not req'd:
AUTO RCS SELECT (all) - OFF
ROT CONTR PWR NORMAL 2 - OFF
cb SCS LOGIC BUS (4) - open
SCS ELEC PWR - OFF

DATE 3/22/71

MNVR TO COMM ATTITUDE
(+X south, earth out left window, provides continuous visual contact with surface and continuous OMNI coverage)

Perform RNDZ XPNDR SELF-TEST, pg S/1-22
then RNDZ XPNDR - OFF

AOS 1
L.O. -02:08

COMM/TM PWR UP
cb INST ESS MNB - close
PWR AMP - HIGH
S-BD MODE PCM - PCM
S-BD AUX - DN VOICE BU
SCE PWR - NORM
PCM BIT RATE - LOW
TELCOM GRP 1 & 2 - AC2
Select best OMNI
Check Quad Temps

At MSFN request:
UP TLM CMD - NORM
HGA PWR - on (up) (~ 6 min)
P = 0°, Y = 290° (earth out left window)
MSFN perform tape dump
HGA PWR - OFF
UP TLM CMD - OFF

LOS 1
L.O. -57 min

COMM/TM - OFF
INV 2 - OFF
PWR AMP - OFF
S-BD MODE PCM - OFF
SCE PWR - off (ctr)
TELCOM GRP 1 & 2 - OFF

cb INST ESS MNB - open
cb panel 5 ECS - all open

DATE 3/22/71

AOS 2 — MNVR TO RNDZ TRACK ATTITUDE
+X radially down at moon, head forward, zero yaw. Establish orb rate & hold att ±20° (horizon ~ 20° below local horizontal)

COMM PWR UP
INV 2 - MNB
TELCOM GRP 1 & 2 - AC2
Select best OMNI
PCM BIT RATE - HIGH
SUIT COMPRESSOR - ON (10 min)

COPY RNDZ & TEI PADS

VHF AM B - DUPLEX
Configure Audio Pnl for VHF,
Select VHF Antenna
Establish VHF with LM
INV 2 - OFF
TELCOM GRP 1 & 2 - OFF
SUIT COMPRESSOR - OFF

L.O. -5 min — cb RNDZ XPNDR FLT BUS - close
RNDZ XPNDR - HTR

L.O. — LM LIFT OFF

L.O. +20 min — RNDZ XPNDR - PWR
*If no VHF contact with LM *
* call MSFN on S-BD, pg C/1-4*

L.O. +50 min — RNDZ XPNDR - HTR
*If plane change req'd, *
* leave XPNDR on *

L.O. +01:00 — LM CSI BURN

L.O. +01:30 — RNDZ XPNDR - PWR

L.O. +02:00 — LM CDH BURN

Install DOCKING TARGET

DATE 3/22/71

C
1-6

CHECK RCS QUAD TEMPS
cb INST ESS MNB - close
If any Quad < 60°:
  RCS HTR - on until > 60°
  to heat B or D: FC2 MNA - on (up)
cb INST ESS MNB - open

Braking -10 min
L.O. + 03:11 DAMP SC RATES
INV 2 - MNB
SUIT COMPRESSOR - ON (10 min)
cb SCS LOGIC BUS (4) - close
SCS ELEC PWR - ECA
ROT CONTR PWR NORMAL 2 - AC/DC
FC 2 MNA - on (up)
BMAG PWR 1 - ON (wait 90 sec)
FDAI/GPI PWR - 1
BMAG MODE (3) - RATE 1
AUTO RCS SELECT (16) - MNA or MNB

PRE-DOCKING
BMAG PWR 2 - ON
  (wait 90 sec)
BMAG MODE (3) - ATT 1/RATE 2
MAN ATT (3) - RATE CMD
TRANS CONTR PWR - on (up)
DOCKING TARGET - BRIGHT
cb DOCK PROBE (2) - close
PROBE RETR (2) - OFF (verify)
PROBE EXTD/REL - RETR
cb SECS ARM - close
SECS LOGIC (2) - on (up)
SECS PYRO ARM (2) - ARM
RNDZ XPNDR - OFF

DOCKING
At capture:
  MAN ATT (3) - MIN IMP
  DOCK PROBE RETRACT - SEC-1

DATE 3/22/71

POST-DOCKING
SECS PYRO ARM (2) - SAFE
SECS LOGIC (2) - OFF
cb SECS ARM (2) - open
DOCKING TARGET - OFF
AUTO RCS SELECT (all) - OFF
RHC PWR NORMAL 2 - OFF
BMAG PWR (2) - OFF
FDAI/GPI PWR - OFF
SCS ELEC PWR - OFF
cb SCS LOGIC BUS (4) - open
INV 2 - OFF

Pressurize tunnel from LM
Open Hatch
VHF DUPLEX - OFF

AOS 4
L.O. +03:36 Report Docking from LM

LM TO CSM POWER TRANSFER
Connect LM/CSM Umbilicals
cb LM PWR 1 MNB - close
cb LM PWR 2 MNB - close
Verify total amperage < 25
After LM configured for PWR Transfer:
LM PWR - CSM

Note: LM/CSM Umbilical is "Hot"
Main Bus Voltage may be monitored by selecting MNB

cb G/N IMU HTR (2) - close (verify)

LM MNVR TO CSM ALIGN/COMM ATT AND HOLD

LOS -20 MIN COMM/TM PWR UP
INV 2 - MNB
TELCOM GRP 1 & 2 - AC2
Select best OMNI
S-BD MODE PCM - PCM
PCM BIT RATE - LOW
PWR AMP - HIGH

DATE 3/22/71

COPY TEI PAD UPDATE

G&N PWR UP
PRO, push (~ 5 sec) until STBY Lt off
F37 00E
Verify OMNI
UP TLM - CMD RSET, then NORM
UP TLM CM - ACCEPT (State Vector (V66),
Clock Increment,
Actual & Preferred(TEI)
REFSMMAT, TEI Burn Pad)

Perform P30 pg G/4-1
(229) cb TIMERS (2) - close
Set DET

TIG -50 min cb IMU (2) - close
G/N PWR IMU - on (up) (wait 90 sec)
Perform DOCKED IMU ALIGN
CM(OGA)r = 300° - LM LM OGA + ΔØ
CM(IGA)p = LM IGA +180°
CM(MGA)y = 360° - LM MGA

V41 N20E, OG____, IG____, MG____

V40E (free platform)
Set REFSMFLG:
V25 N7E, 77E, 10000E, 1E
Set DRIFTFLG:
V37E 51E, PRO, V37E 00E

DATE 3/22/71

```
*If G&N failed:                          *
*TIG-30 min                              *
*or sunset                               *
*    SCS PWR UP                          *
*    FC 2 MNA - on (up)                  *
*    SCS LOGIC BUS (4) - close           *
*    SCS ELEC PWR - GDC/ECA              *
*    BMAG PWR (2) - ON                   *
*      (wait 90 sec)                     *
*    FDAI/GPI PWR - 1                    *
*    FDAI SELECT - 1                     *
*                                        *
*    MNVR TO ALIGNMENT ATTITUDE          *
*    cb OPTICS (2) - close               *
*    G/N PWR - AC 2                      *
*    G/N PWR OPTICS - on (up)            *
*                                        *
*    ALIGN GDC                           *
*      (Use technique recommended by*
*         MSFN)                          *
*    G/N PWR (AC) - OFF                  *
*    G/N PWR OPTICS - OFF                *
*LOS                                     *
*    COMM/TM - OFF                       *
*    PWR AMP - OFF                       *
*    S-BD MODE PCM - OFF                 *
*    SCE PWR - off (ctr)                 *
*    TELCOM GRP 1 & 2 - OFF              *
*                                        *
*Go to SPS TEI (SCS w/G&N Failed),       *
*  pg C/1-25                             *
```

Sunset

```
cb OPTICS (2) - close
G/N PWR - AC 2
G/N PWR OPTICS - on (up)
OPT ZERO - OFF
OPT ZERO - ZERO (15 sec)
OPT ZERO - OFF
Perform P52 (option 1)
  MSFN supply optics angles for stars

G/N PWR OPTICS - OFF
G/N PWR (AC) - OFF
```

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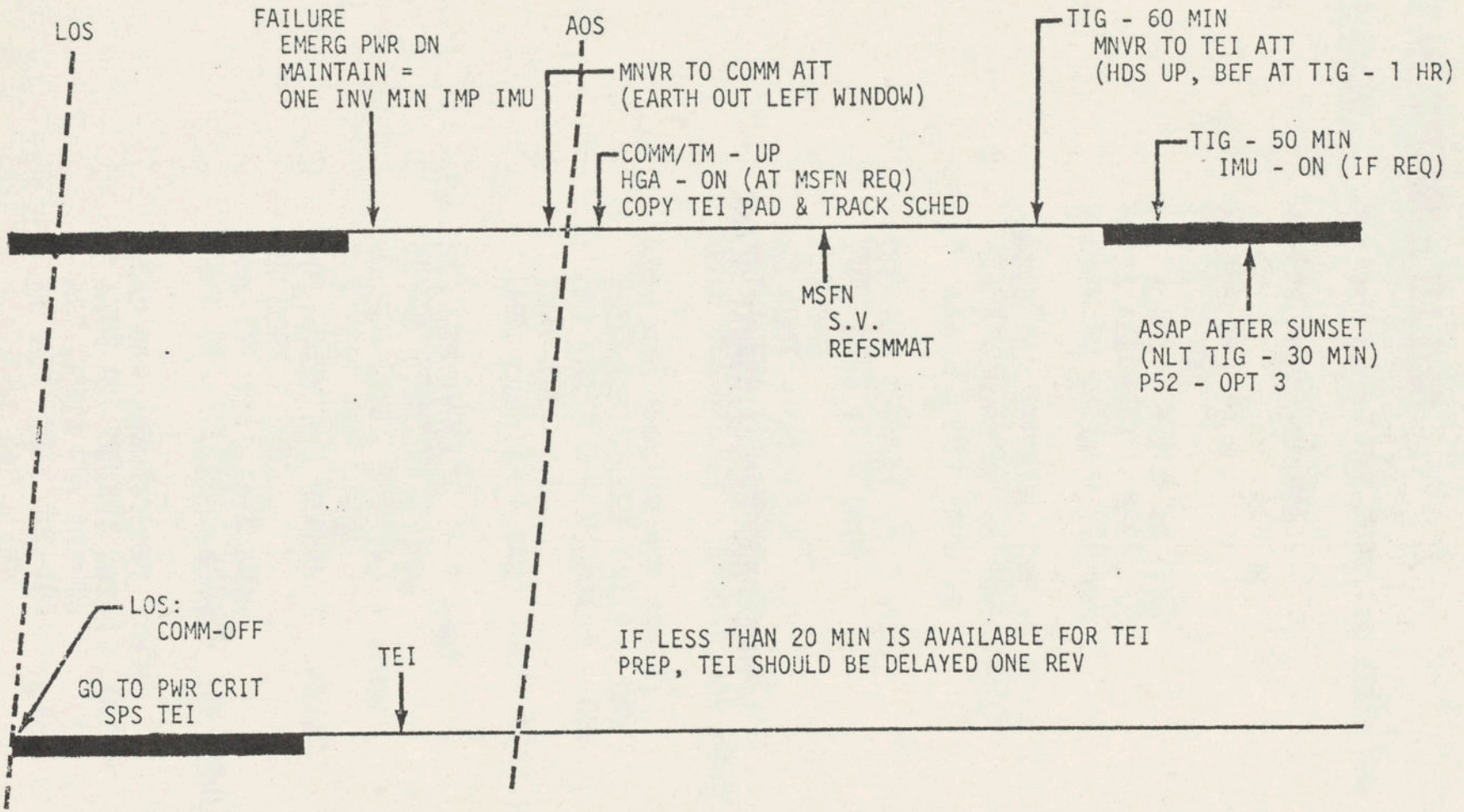
LOS 4	TELCOM GRP 1 & 2 - OFF S-BD MODE PCM - OFF PWR AMP - OFF
	LM MNVR TO BURN ATTITUDE *If LM JETTISON req'd: * * use LM JETT PROCEDURES, pg C/6-1*
TIG -30 min	DC IND SEL - MNA FC 2 MNA - on (up) DC volts > 26.5 vdc BMAG PWR 1 - WARMUP
	Go to SPS TEI (G&N/SCS), pg C/1-17

DATE 5/7/71

DATE 3/22/71



CSM POWER CRITICAL (POST LM JETTISON)

C
1-11

SCS w/G&N FAILED | SPS TEI - G&N/SCS CRIT | POST LM JETT | DORMANT CONFIG LIST

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POST LM JETTISON - TEI PREP

FAILURE — Perform EMERG PWR DOWN, pg EMER/1-6

Verify power on MNB

AC BUS PWR UP
INV 2 - MNB
INV 2 AC1 & AC2 - on (up)
AC1 & AC2 RSET - RSET, on
Verify AC volts > 110 vac

ENABLE MIN IMPULSE (CMC or SCS)
If AC Inverter on for COMM,
* use SCS min impulse *

CMC MIN IMPULSE (~ 3 amp)
PRO, push (~ 5 sec)
F37 00E
SC CONT - CMC/FREE
ROT CONTR PWR NORMAL 2 - AC/DC
AUTO RCS SELECT - single jet (MNB)

When min impulse not req'd:
AUTO RCS SELECT (all) - OFF
ROT CONTR PWR NORMAL 2 - OFF
V37E 06E
PRO, push (~ 5 sec) until DSKY blanks

or SCS MIN IMPULSE (~ 1 amp)
INV 2 - MNB (~ 5 amp)
cb SCS LOGIC BUS (4) - close
SCS ELEC PWR - ECA
ROT CONTR PWR NORMAL 2 - AC/DC
SC CONT - SCS
MAN ATT (3) - MIN IMP
AUTO RCS SELECT - single jet (MNB)

When min impulse not req'd:
AUTO RCS SELECT (all) - OFF
ROT CONTR PWR NORMAL 2 - OFF
cb SCS LOGIC BUS (4) - open
SCS ELEC PWR - OFF

DATE 3/22/71

MNVR TO COMM ATTITUDE
(earth out left window)

AOS 1

COMM/TM PWR UP
cb INST ESS MNB - close
PWR AMP - HIGH
S-BD MODE PCM - PCM
S-BD AUX - DN VOICE BU
SCE PWR - NORM
PCM BIT RATE - LOW
TELCOM GRP 1 & 2 - AC2
Select best OMNI
Check Quad Temps

At MSFN request:
UP TLM CMD - NORM
HGA PWR - on (up) (~ 6 min)
P = 0°, Y = 290° (earth out left window)
MSFN perform tape dump
HGA PWR - OFF
UP TLM CMD - OFF

COPY TEI PAD & TRACKING SCHEDULE

G&N PWR UP
PRO, push (~ 5 sec)
F37 00E
Verify OMNI
UP TLM - CMD RSET, then NORM
UP TLM CM - ACCEPT (State Vector (V66),
Clock Increment
Actual REFSMMAT,
TEI Burn Pad)

Perform P30 pg G/4-1
(229) cb TIMERS (2) - close
Set DET

DATE 3/22/71

Before sunset — MNVR TO APPROXIMATE TEI INERTIAL ATTITUDE
(Hds up, BEF ~ 1 hr before TIG)

TIG -50 min
cb IMU (2) - close
G/N PWR IMU - on (up) (wait 90 sec)

Set REFSMFLG:
V25 N7E, 77E, 10000E, 1E
Set DRIFTFLG:
V37E 51E, PRO, V37E 00E

*If G&N failed:
*TIG -30 min
*or sunset
* SCS PWR UP
* FC 2 MNA - on (up)
* SCS LOGIC BUS (4) - close
* SCS ELEC PWR - GDC/ECA
* BMAG PWR (2) - ON
* (wait 90 sec)
* FDAI/GPI PWR - 1
* FDAI SELECT - 1
*
* MNVR TO ALIGNMENT ATTITUDE
* cb OPTICS (2) - close
* G/N PWR - AC 2
* G/N PWR OPTICS - on (up)
*
* ALIGN GDC
* (Use technique recommended by MSFN)
* G/N PWR (AC) - OFF
* G/N PWR OPTICS - OFF
*LOS
* COMM/TM - OFF
* PWR AMP - OFF
* S-BD MODE PCM - OFF
* SCE PWR - off (ctr)
* TELCOM GRP 1 & 2 - OFF
*
*Go to SPS TEI(SCS w/G&N failed),
* pg C/1-25

DATE 3/22/71

LOS	PWR AMP - OFF S-BD MODE PCM - OFF SCE PWR - off (ctr) TELCOM GRP 1 & 2 - OFF
	cb INST ESS MNB - open
TIG -30 min or sunset	DC IND SEL - MNA FC 2 MNA - on (up) DC volts > 26.5 vdc BMAG PWR 1 - WARMUP cb SCS LOGIC BUS (4) - close FDAI/GPI PWR - 1
	cb OPTICS (2) - close G/N PWR - AC 2 G/N PWR OPTICS - on (up) OPT ZERO - OFF OPT ZERO - ZERO (15 sec) OPT ZERO - OFF Perform P52 (option 3) (expect long gyro torque) Repeat P52
	G/N PWR OPTICS - OFF G/N PWR (AC) - OFF
	Go to SPS TEI (G&N/SCS), pg C/1-17

DATE 5/7/71

SPS TEI - G&N/SCS

Assumes CSM POWER CRITICAL TEI PREP has been performed

+35:00 (-25:00) **P40 - SPS THRUSTING**

- Prethrust Program Complete
- FLOOD Lts - as req'd
- CMC & ISS - on
- Cycle CRYO FANS
- TEST C/W LAMPS
- SPS GAUGING - AC1
- PUGS MODE - NORMAL
- OXID FLOW vlv - PRI
- CMC MODE - FREE
- AUTO RCS SELECT (16) - as req'd
- LOAD DAP (Check roll jets)
  - (A=1 & total mass in R1 of N47)
- ROT CONTR PWR NORM (2) - AC/DC
- Set DET
- V37E 00E

- LM GO TO FREE
- SC CONT - CMC/AUTO

1 **MNVR TO PAD BURN ATT**
V49E

2 **SXT STAR CHECK**

- G/N PWR OPTICS - on (up)
- G/N PWR - AC2
- OPT ZERO - OFF, then ZERO (15 sec)
- OPT ZERO - OFF
- OPT MODE - CMC

CHECK SXT STAR (V41 N91E)

- OPT ZERO - ZERO
- G/N PWR OPTICS - OFF
- G/N PWR (AC) - OFF

3 V37E 40E
(TFI available via N40, N45 or N35)

DATE 3/22/71

C
1-18

4 F 50 18 REQUEST MNVR TO FDAI RPY ANGLES (.01°)
(AUTO) SC CONT - CMC/AUTO
PRO

5 06 18 AUTO MNVR TO FDAI RPY ANGLES (.01°)

6 F 50 18 REQUEST TRIM MNVR TO FDAI RPY ANGLES
ALIGN S/C ROLL (.01°)

+50:00m
(-10:00)

cb INV PWR 1 MNA - close
cb INV CONT 1 - close
INV 1 - MNA
INV 2 AC1 - OFF
INV 1 AC1 - on (up)
cb SCS LOGIC BUS (4) - close
SCS ELEC PWR - GDC/ECA
BMAG PWR (2) - ON
FDAI/GPI PWR - BOTH
GDC ALIGN

TVC CHECK & PREP

(8) cb STAB CONT SYS (all) - close
cb SPS (12) - close
Perform EMS ΔV TEST & NULL BIAS CHECK, pg G/2-5, if desired
Set ΔVC
EMS FUNC - ΔV
MAN ATT (3) - RATE CMD
ATT DB - MIN
RATE - LOW
TRANS CONT PWR - ON
SCS TVC (2) - RATE CMD
ΔV CG - CSM (with or without A/S)
TVC GMBL DRIVE P&Y - AUTO

+54:00m
(-06:00) (275) cb MNA BAT BUS A - close (verify)
cb MNB BAT C - close
cb MNB BAT BUS B - close (verify)
(5) cb BAT CHGR A&B (2) - close (verify)
MN BUS TIE (2) - ON
FC 2 MNB - OFF
TVC SERVO PWR #1 - AC1/MNA
TVC SERVO PWR #2 - AC2/MNB

DATE 3/22/71

ROT CONTR PWR NORMAL (2) - AC
ROT CONT PWR DIRECT (2) - OFF
BMAG MODE (3) - ATT1/RATE 2
SC CONT - SCS
RHC #2 - ARMED

55:00m (-05:00) PRIMARY TVC CHECK
GMBL MOT P1-Y1 - START/ON (LMP Cnfrm)
Verify TRIM CONTROL & SET
Verify MTVC
IF SCS: SCS TVC (2) - AUTO
SC CONT - CMC (SCS)
THC - CW
Verify NO MTVC

SEC TVC CHECK
GMBL MOT P2-Y2 - START/ON (LMP Cnfrm)
Set GPI TRIM
Verify MTVC
THC NEUTRAL
Verify NO MTVC
Verify GPI returns to 0,0(CMC)
or trim (SCS)
ROT CONT PWR NORM (2) - AC/DC
ROT CONT PWR DIRECT (2) - MNA/MNB
(TRIM) BMAG MODE (3) - RATE 2
PRO
BMAG MODE (3) - ATT1/RATE 2 (verify)
ENTR

DATE 3/22/71

7 F 50 25 00204 GMBL TEST OPTION
(ACCEPT) SC CONT - CMC (verify)
PRO

Monitor GPI Response:
00,02,-02,00,02,-02,00, Trim

*TEST FAIL: *
*SC CONT - SCS *
SCS TVC (2) - AUTO

(REJECT) ENTR

8 06 40 TFI, VG, ΔVM (min-sec,.1fps)
PROG ALARM - TIG Slipped
*V5N9E 01703 *
*KEY RLSE TO 8 *

FDAI SCALE - 5/5
RATE - HIGH
UPDATE DET
SPS He vlvs (2) - AUTO (verify)

58:00
(-02:00)
ΔV THRUST A(B) - NORMAL
THC - ARMED
RHC (2) - ARMED
(5) cb INST ESS (2) - close
SCE PWR - NORM
TELCOM GRP 1 & 2 - AC2
TAPE RCDR - HBR/RCD/FWD/CMD RESET
Check N2 A and N2 B

59:25
(-00:35) DSKY BLANKS

59:30 (AVE G ON)
(-00:30) EMS MODE - NORMAL

06 40 TFI, VG, ΔVM (min-sec,.1fps)
CHECK PIPA BIAS < 2fps for 5 sec

59:XX ULLAGE
(-00:XX)

*If no ULLAGE: *
* DIR ULLAGE PB - PUSH*
* Control Att with RHC*

MONITOR ΔVM (R3) COUNTING UP

DATE 3/22/71

59:55
(-00:05)
F 99 40 ENG ON ENABLE REQUEST
(AUTO IGN) PRO AT TFI > 0 Sec
(BYPASS IGN) ENTR to 11 (perform switching in 10)
EXIT - V37E 00E

9 00:00 IGN *IF SCS: THRUST PB - PUSH*

06 40 TFC, VG, ΔVM (min-sec,.1fps,.1fps)

*F 97 40 SPS Thrust fail *
*ΔV THRUST B(A) - NORMAL *
*(RESTART) PRO to IGN *
(RECYCLE) ENTR to TIG-05sec

SPS THRUST Lt - ON
00:03 ΔV THRUST B(A) - NORMAL
IF SCS: +X & THRUST PB - PUSH
MONITOR THRUSTING
Pc 95-105 psia
EMS COUNTING DOWN
SPS INJ VLVS (4) - OPEN
SPS He vlvs tb - gray
SPS FUEL/OXID PRESS - 170-195 psia
PUGS - BALANCED

00:XX ECO

10 F 16 40 TFC (STATIC), VG, ΔVM (min-sec,.1fps)
ΔV THRUST A&B - OFF
VERIFY THRUST OFF
SPS INJ VLVS (4) - CLOSED
SPS He vlvs tb (2) - bp
GMBL MTRS (4) - OFF (LMP Confirm)
TVC SERVO PWR 1&2 - OFF

DATE 3/22/71

FC 2 MNB - on (up)
(275) cb MNA BAT BUS A - open
cb MNB BAT C - open
cb MNB BAT BUS B - open
PRO

11 F 16 85 VG XYZ (CM) (.1fps)
NULL RESIDUALS
RECORD ΔV COUNTER & RESIDUALS ΔVC _____
EMS FUNC - OFF VGX _____
EMS MODE - STBY VGY _____
RHC & THC - LOCKED VGZ _____
ATT DB - MAX
TRANS CONT PWR - OFF
ROT CONTR PWR DIRECT (2) - OFF
cb DIRECT ULLAGE (2) - open
cb SPS P1 & Y1 - open
BMAG MODE (3) - RATE 2
PCM BIT RATE - LOW
TAPE RCDR - off (ctr)
PRO

12 F 37 V82E

13 F 16 44 HA,HP,TFF (.1nm,min-sec)

PRO

14 F 37 00E

When COMP ACTY lt out:
V66E

DATE 3/22/71

INV 1 AC1 - OFF
INV 2 AC1 - on (up)
INV 1 - OFF

SUIT COMPRESSORS - ON (10 min each hr)

MNVR TO COMM/PTC ATT
V49E
Load GMBL angles, PRO
PRO (start mnvr)
V16 N20E (monitor mnvr)
ENTR (completion of mnvr)

Perform EMERG PWR DOWN, Pg EMER/1-6:
except COMM & G&N

AUTO RCS SELECT - single jet
(allow rates to damp for 20 min)

AOS

COMM/TM PWR UP (10 min track)
PWR AMP - HIGH
S-BD MODE PCM - PCM
S-BD AUX - DN VOICE BU

At MSFN request:
UP TLM CMD - NORM
HGA PWR - on (up) (~ 6 min)
MSFN perform tape dump
HGA PWR - OFF
UP TLM CMD - OFF

COMM/TM - OFF
INV 2 - OFF
SCE PWR - off (ctr)
TELCOM GRP 1 & 2 - OFF
PWR AMP - OFF

Set up G/N PTC

Complete EMERG PWR DOWN, Pg EMER/1-6

Establish DORMANT CONFIGURATION, Pg C/2-1

DATE 3/22/71

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DATE 3/22/71

SPS TEI-SCS w/G&N FAILED

Assumes TEI PREP
has been performed

MNVR TO BURN ATTITUDE

FLOOD LTS - as req'd

50:00
(-10:00)

POWER UP 2nd INVERTER

INV 1 - MNA
INV 2 AC1 - OFF
INV 1 AC1 - on (up)

Perform EMS ΔV TEST & NULL BIAS
CHECK, pg G/2-5, if desired
Set ΔVC
EMS FUNC - ΔV

TVC CHECK & PREP

(8) cb STAB CONT SYS (all) - close
cb SPS (12) - close
MAN ATT (3) - RATE CMD
LIMIT CYCLE - ON
ATT DB - MIN
RATE - LOW
TRANS CONT PWR - ON
BMAG MODE (3) - ATT 1/RATE 2
SCS TVC (2) - RATE CMD
ΔV CG - CSM (with or without A/S)
TVC GMBL DRIVE P&Y - AUTO
AUTO RCS SEL (RING 2) - MNB

(275) cb MNA BAT BUS A - close (verify)
cb MNB BAT C - close
cb MNB BAT BUS B - close (verify)
(5) cb BAT CHGR A&B (2) - close (verify)

DATE 3/22/71

54:00 (-06:00)		MN BUS TIE (2) - ON FC 2 MNB - OFF TVC SERVO PWR #1 - AC1/MNA TVC SERVO PWR #2 - AC2/MNB ROT CONTR PWR NORMAL (2) - AC ROT CONT PWR DIRECT (2) - OFF RHC #2 - ARMED
55:00 (-05:00)		PRIMARY TVC CHECK GMBL MOT P1-Y1 - START/ON (LMP Cnfrm) Verify TRIM CONTROL & SET Verify MTVC SCS TVC (2) - AUTO THC - CW Verify NO MTVC
		SEC TVC CHECK GMBL MOT P2-Y2 - START/ON (LMP Cnfrm) Set GPI TRIM Verify MTVC THC NEUTRAL Verify GPI returns to trim Verify NO MTVC ROT CONT PWR NORMAL (2) - AC/DC ROT CONT PWR DIRECT (2) - MNA/MNB FDAI SCALE - 5/1 LIMIT CYCLE - OFF UPDATE DET SPS He vlvs (2) - AUTO (verify) Check N2 A and N2 B
58:00 (-02:00)		ΔV THRUST A (B) - NORMAL THC - ARMED RHC (2) - ARMED
	(5)	cb INST ESS (2) - close SCE PWR - NORM TELCOM GRP 1&2 - AC2 TAPE RCDR - HBR/RCD/FWD/CMD RESET Check N2 A and N2 B
59:30 (-00:30)		EMS MODE - NORMAL

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59:XX (-00:XX)	ULLAGE
00:00	THRUST ON PB - PUSH SPS THRUST Lt - ON
00:03	ΔV THRUST B (A) - NORMAL ULLAGE & THRUST ON PB - PUSH
00:XX	ECO

ΔV THRUST A&B - OFF
GMBL MTRS (4) - OFF (LMP Confirm)
TVC SERVO PWR 1&2 - OFF
FC 2 MNB - on (up)
cb MNA BAT BUS A - open
cb MNB BAT C - open
cb MNB BAT BUS B - open

RECORD ΔVC _____
EMS FUNC - OFF
EMS MODE - STBY
ATT DB - MAX
TRANS CONT PWR - OFF
ROT CONTR PWR DIRECT (2) - OFF
BMAG MODE (3) - RATE 2
PCM BIT RATE - LOW
TAPE RCDR - off (ctr)

INV 1 AC1 - OFF
INV 2 AC1 - on (up)
INV 1 - OFF

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SUIT COMPRESSORS - ON (10 min ea hr)

MNVR TO COMM/PTC ATT

Perform EMERG PWR DOWN, Pg EMER/1-6:
except COMM & SCS

AUTO RCS SELECT - single jet
(allow rates to damp for 20 min)

AOS

COMM/TM PWR UP (10 min track)
PWR AMP - HIGH
S-BD MODE PCM - PCM
S-BD AUX - DN VOICE BU

At MSFN request:
UP TLM CMD - NORM
HGA PWR - on (up) (~ 6 min)
MSFN perform tape dump
HGA PWR - OFF
UP TLM CMD - OFF

COMM/TM - OFF
INV 2 - OFF
SCE PWR - off (ctr)
TELCOM GRP 1&2 - OFF
PWR AMP - OFF

Set up SCS PTC, pg G/8-3
(use couples for roll rate)

Complete EMERG PWR DOWN,
pg EMER/1-6

Establish DORMANT CONFIGURATION,
pg C/2-1

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SCS MCC - SPS ΔV

CSM POWER CRITICAL COASTING

DORMANT CONFIG LIST

SCS w/G&N FAILED

CSM POWER CRITICAL COASTING

LM ON SURFACE

CSM POWER CRITICAL COASTING

DORMANT CONFIGURATION LIST

PANEL 13 (ORDEAL)
FDAI sw (2) - INRTL
EARTH/LUNAR - PWR OFF
ALT SET - 60
LTG - OFF
MODE - HOLD/FAST
SLEW - off (center)

PANEL 15
COAS PWR - OFF
UTIL PWR - OFF
PL BCN LT - off (center)
PL DYE MARKER - off (down)(guarded)
PL VENT - OFF

PANEL 325
CAB PRESS RELF vlv (2) - NORMAL
PRIM GLY TO RAD vlv - BYPASS (pull)

PANEL 326
REPRESS PKG vlv - OFF
SM O2 SUPPLY vlv - OPEN
SURGE TK O2 vlv - OFF
GLY RSVR IN vlv - CLOSE
GLY RSVR BYPASS vlv - OPEN
GLY RSVR OUT vlv - CLOSE

PANEL 380
O2 DEMAND REG vlv - OFF
SUIT TEST vlv - OFF
SUIT CKT RET vlv - open (pull)

PANEL 7
EDS PWR - OFF
SCS TVC SERVO PWR #1 & #2 (2) - OFF
FDAI/GPI PWR - OFF
LOGIC 2/3 PWR - ON
SCS ELEC PWR - OFF
SCS SIG CONDR/DR BIAS 1 & 2 (2) - OFF
BMAG PWR (2) - OFF
DIRECT O2 vlv - close

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PANEL 8
cb Panel 8 - see diagram C/4-3
AUTO RCS SEL (16) - OFF
INT NUM LT - OFF
INT INTGL LT - OFF
INT FLOOD LT - OFF
FLOOD LTS DIM - 1
FLOOD LTS FIXED - OFF
FLOAT BAG (3) - OFF (locked)
SECS LOGIC (2) - OFF (locked)
SECS PYRO ARM (2) - SAFE (locked)

PANEL 9, 6, 10
MODE (3) - INTERCOM/PTT
PAD COMM (3) - OFF
S BD (3) - T/R
PWR (3) - OFF
INTERCOM (3) - T/R
VHF AM (3) - T/R
AUDIO CONT (3) - NORM
SUIT PWR (3) - OFF

PANEL 1
EMS FUNC sel - OFF
EMS MODE - STBY
CMC ATT - IMU
FDAI SCALE - 5/1
FDAI SEL - 1/2
FDAI SOURCE - ATT SET
ATT SET - GDC
MAN ATT ROLL, PITCH & YAW (3) - MIN IMP
LIM CYCLE - on (up)
ATT DBD - MAX
RATE - LOW
TRANS CONTR PWR - OFF
RHC PWR NORM (2) - OFF
RHC PWR DIR (2) - OFF
SC CONT - SCS
CMC MODE - FREE
BMAG MODE ROLL, PITCH & YAW (3) - RATE 2
SPS THRUST - NORMAL (lock)
ΔV THRUST (2) - OFF (down) (guarded)
SCS TVC PITCH & YAW (2) - RATE CMD

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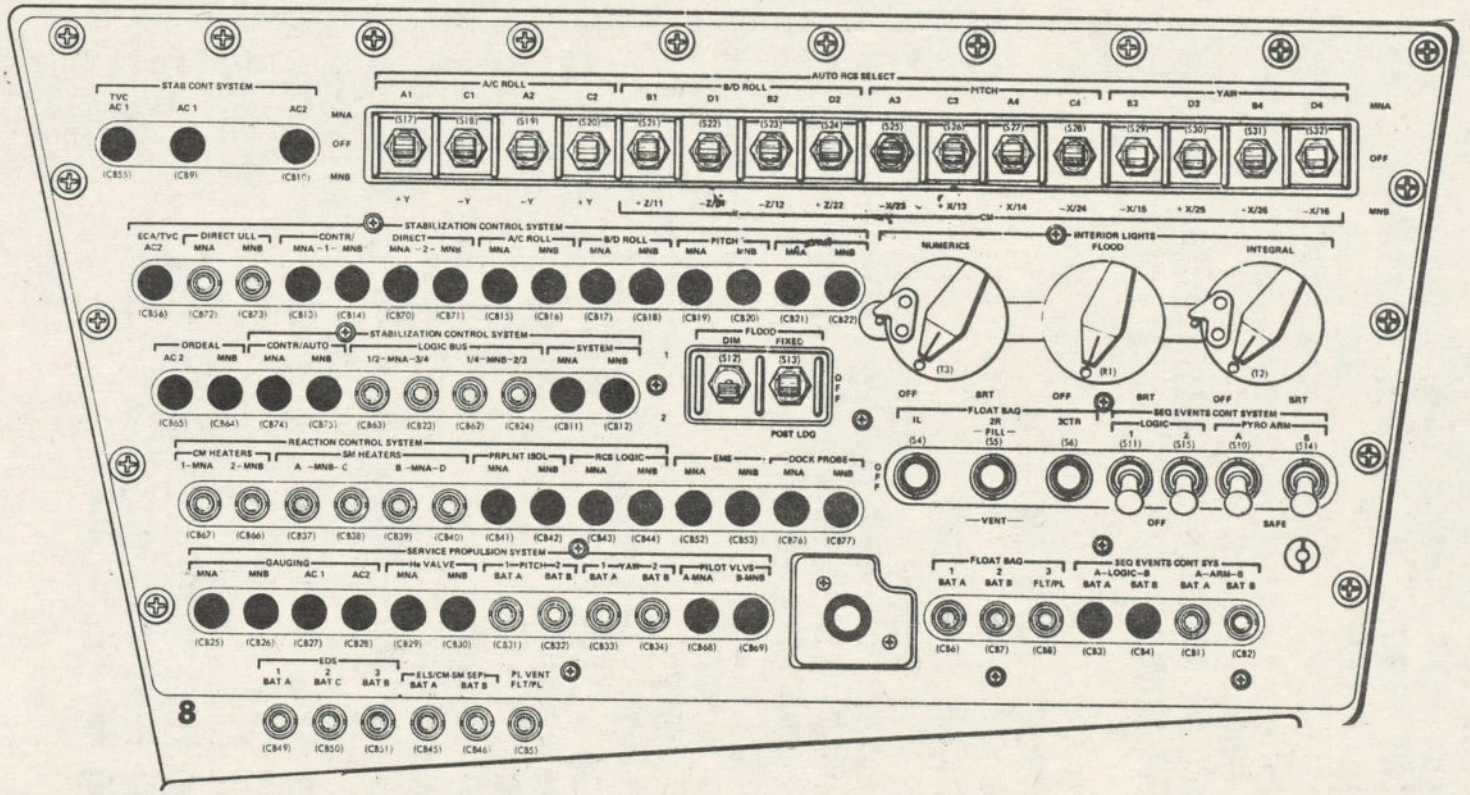

● - CLOSE

◎ - OPEN

C
2-3

SCS MCC - SPS ΔV | SCS MCC - PREP | CR. | MCC TIMELINE | SCS MCC SPS MIN PWR ΔV

1 SPS GMBL MOT PITCH & YAW (4) - OFF
2 ΔV CG - CSM
3 ELS LOGIC - OFF (down) (guarded)
4 ELS AUTO - MAN
5 CM RCS LOGIC - OFF
6 CM PRPLNT DUMP - OFF (down) (guarded)
7 CM PRPLNT PURG - off (down) (guarded)
8 EMS ROLL - OFF
9 .05G sw - OFF
10 α/Pc IND sw - Pc
11 LV/SPS IND SII/SIVB - GPI
12 TVC GMBL DR PITCH & YAW (2) - AUTO
13 EVNT TMR STRT - STOP
14
15 PANEL 2
16 PRPLNT DUMP - RCS CMD
17 EDS AUTO - OFF
18 SM RCS HTRS (4) - OFF
19 UP TLM CM - BLOCK
20 PROBE EXTD/REL - OFF (guarded)
21 DOCK PROBE RETR PRIM & SEC (2) - OFF
22 EXT RUN/EVA LT - OFF
23 EXT RNDZ LT - OFF
24 TUNL LT - OFF
25 LM PWR - OFF
26 PL VENT vlv - push (lock)
27 C/W NORM - ACK
28 C/W CSM - CSM
29 C/W PWR - 1
30 MSN TMR - STOP
31 CAB FANS - OFF
32 CRYO PRESS IND - SRG/3
33 O2 QTY IND - 3
34 H2 HTRS (2) - OFF
35 O2 HTRS (3) - OFF
36 H2 FANS (3) - OFF
37 ECS RAD FLOW AUTO CONT - AUTO
38 ECS RAD FLOW CONT PWR - off (center)
39 ECS RAD MAN SEL - RAD 1
40
41
42
43
44

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1 ECS RAD PRIM HTR - off (center)
2 ECS RAD SEC HTR - OFF
3 POT H2O HTR - OFF
4 SUIT CKT H2O ACCUM AUTO - OFF
5 SUIT CKT HT EXCH - off (center)
6 SEC COOL LOOP EVAP - off (center)
7 SEC COOL LOOP PUMP - off (center)
8 GLY EVAP TEMP IN - MAN
9 GLY EVAP STM PRESS AUTO - MAN
10 GLY EVAP H2O FLOW - off (center)
11 CAB TEMP - MAN
12 HI GAIN ANT TRACK - MAN
13 HI GAIN ANT BEAM - WIDE
14 HI GAIN ANT PWR - OFF
15 HI GAIN ANT SERVO ELECT - PRIM
16
17 PANEL 3
18 FC HTRS (3) - OFF
19 SPS QTY TEST - off (center)
20 OXID FLOW VLV INCR - as desired
21 OXID FLOW VLV PRIM - PRIM
22 PUG MODE - PRIM
23 FC PURG (3) - OFF
24 FC 1, 2 & 3 MN BUS A (3) - OFF
25 MN BUS A & B RSET (2) - OFF
26 FC 1, 2 & 3 MN BUS B (3) - OFF
27 SPS PRESS IND sw - He
28 SPS LINE HTRS - off (center)
29 SPS He vlv (2) - AUTO
30 S BD XPNDR - PRIM
31 S BD PWR AMPL PRIM - PRIM
32 S BD PWR AMPL HI - off (center)
33 S BD MODE VOICE - VOICE
34 S BD MODE PCM - off (center)
35 S BD MODE RNG - RNG
36 S BD AUX TAPE - DN VOICE BU
37 S BD AUX TV - off (center)
38 UP TLM DATA - DATA
39 UP TLM CMD - OFF
40 S BD SQUELCH - OFF
41 VHF RNG - OFF
42 VHF BCN - OFF
43 VHF AM RCV ONLY - off (center)
44

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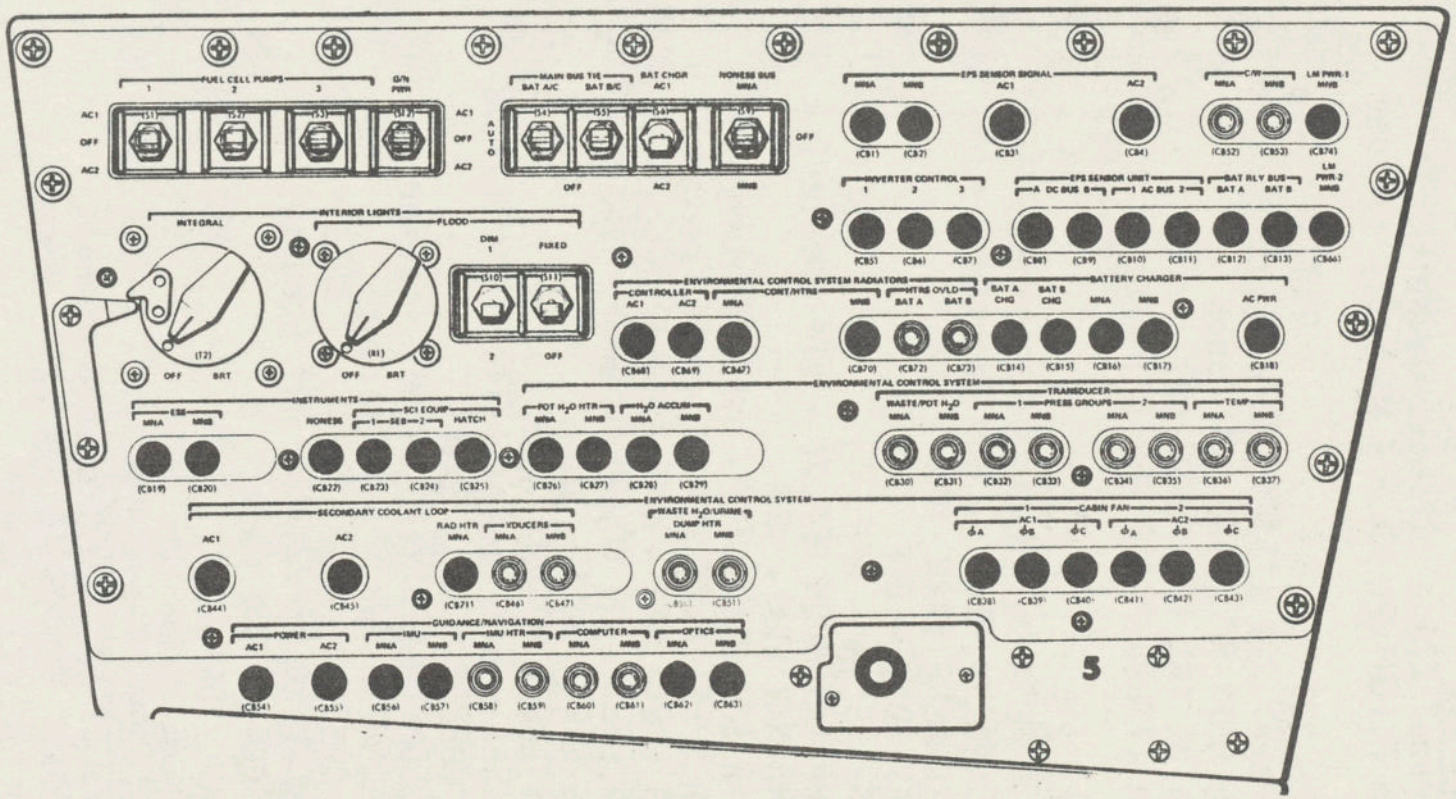
1 VHF AM A & B (2) - off (center)
2 FC REACS vlv - NORMAL
3 H2 PURG LINE HTR - OFF
4 TAPE RCDR PCM - PCM/ANLG
5 TAPE RCDR RCD - off (center)
6 TAPE RCDR FWD - off (center)
7 SCE PWR - off (center)
8 PMP PWR - off (center)
9 PCM BIT RATE - LOW
10 AC INV (9) - OFF
11 AC 1 & 2 RSET (2) - OFF
12 DC IND sel - FC 2
13 BAT CHARGE sel - OFF
14
15 PANEL 16
16 DOCK TRGT - OFF
17 UTIL PWR - OFF
18 COAS PWR - OFF
19
20 PANEL 5
21 FC 1, 2 & 3 PUMPS (3) - OFF
22 G/N PWR - OFF
23 MN BUS TIE BAT A/C - BAT A/C
24 MN BUS TIE BAT B/C - BAT B/C
25 BAT CHGR - AC 1
26 NONESS BUS - OFF
27 INT INTGL LT - OFF
28 INT FLOOD LT - OFF
29 INT FLOOD LT DIM - 1
30 INT FLOOD LT FIXED - OFF
31 cb Panel 5 - see diagram C/4-7
32
33 PANEL 4
34 SPS GAUGING - OFF
35 TELCOM GRP 1 & 2 (2) - OFF
36 GLY PUMPS - OFF
37 SUIT COMPR 1 & 2 (2) - OFF
38 cb Panel 4 - all closed
39
40 PANEL 278
41 cb Panel 278 - all open
42 SM PWR SOURCE - (center) (if AUX BAT configured)
43 EXPERIMENT COVERS (2) - off (center)
44

DATE 5/7/71

DATE 3/22/71



● - CLOSE

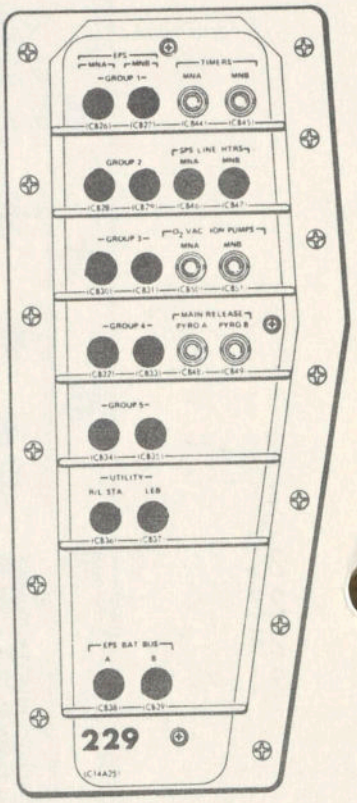
◎ - OPEN

C
2-7

PANEL 276
cb Panel 276 - all open

PANEL 275
cb Panel 275 - all open except:
  cb FLIGHT/PL MN A & MN B (2) - close

PANEL 229
cb Panel 229 all closed except:
  cb MAIN REL PYRO (2)- open
  cb 02 VAC ION PUMPS (2) - open
  cb TIMERS MNA & MNB (2) - open



PANEL 230
MAP CAMERA ON - OFF
MAP CAMERA TRACK - off (center)
MAP CAMERA IMAGE MTN - OFF
LASER ALTR - OFF
DATA SYS ON - OFF
GAMMA RAY BOOM DEPLOY - off (center)
GAMMA RAY EXP - OFF
GAMMA RAY GAIN STEP - off (center)
MASS SPECT BOOM DEPLOY - off (center)
MASS SPECT EXP - off (center)
MASS SPECT ION SOURCE - OFF
MASS SPECT MULT - LOW
MASS SPECT DSCRM - LOW
SUB SAT - off (center)
PAN CAMERA MODE - STBY
PAN CAMERA SELF TEST - off (center)
PAN CAMERA PWR - off (center)
PAN CAMERA - MONO
PAN CAMERA EXPOSURE - off (center)
α/X DR - α OFF
X-RAY - OFF

PANEL 225
cb Panel 225 - all closed except:
  cb FLT BUS MNA & MNB (2) - open
  cb CTE (2) - open

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PANEL 226, 250
cb Panel 226 & 250 - see diagrams right

PANEL 251
WASTE MGMT OVBD DRAIN vlv - OFF

PANEL 252
BAT VENT vlv - CLOSED
WASTE STOWAGE VENT vlv - CLOSED

PANEL 181
cb Panel 181 - all open
CRYO 3 AC PWR - OFF
SM/AC PWR - OFF
DOOR JETT - OFF (down) (guarded)
LOGIC PWR (2) - OFF

PANEL 201
AC UTIL PWR - OFF

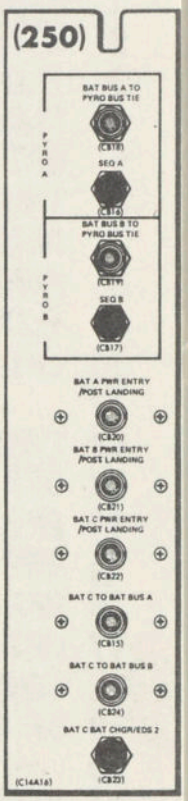
PANEL 12
LM TUNL VENT vlv - OFF

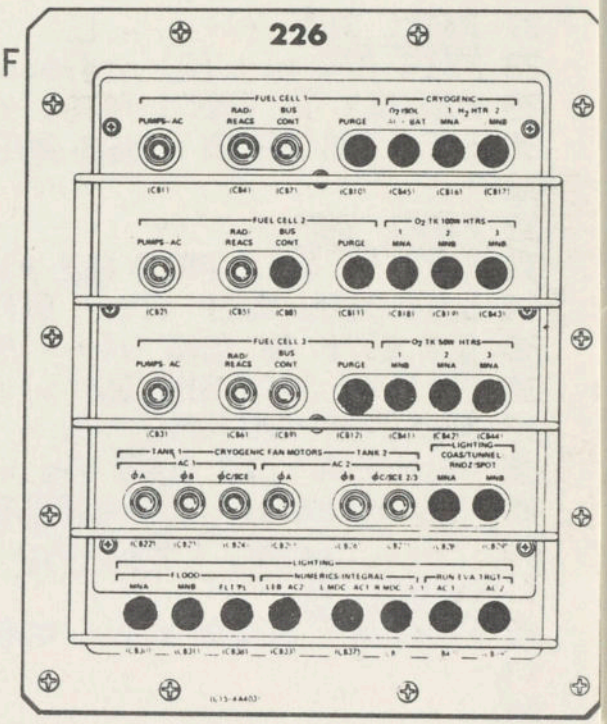
PANEL 300, 301, 302
SUIT FLOW vlv (3) - FULL FLOW

PANEL 304
DRNK H2O SUPPLY vlv - OFF

PANEL 306
MSN TMR - STOP
EVNT TMR STRT - STOP

PANEL 101
CM RCS HTRS - OFF
UR DUMP - OFF
WASTE H2O DUMP - OFF





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PANEL 100
UTIL PWR - OFF
FLOOD LTS DIM - 1
FLOOD LTS FIXED - OFF
OPT PWR - OFF
IMU PWR - OFF
RNDZ XPNDR - OFF
NUMERICS LT - OFF
FLOOD LTS - OFF
INTGL LT - OFF

PANEL 122
OPT ZERO - ZERO
OPT TELTRUN - SLAVE TO SXT
ORT COUPLING - RSLV
OPT MODE - MAN
OPT SPEED - LO
COND LAMPS - OFF
UP TLM - ACCEPT

PANEL 352
WASTE TK SERVICING vlv - CLOSE
PRESS RELF vlv - 2
POT TK IN vlv - OPEN
WASTE TK IN vlv - AUTO

PANEL 351
MAIN REG vlv (2) - close
H2O/GLY TK PRESS REG vlv - OFF
EMER CAB PRESS vlv - BOTH

PANEL 382
SUIT HT EXCH PRIM GLY vlv - FLOW (CCW)
SUIT FLOW RELF vlv - OFF
GLY EVAP IN TEMP vlv - MIN (CCW)
SUIT HT EXCH SEC GLY vlv - FLOW (CCW)
SEC EVAP H2O CONT vlv - AUTO
PRIM EVAP H2O CONT vlv - AUTO
H2O ACCUM vlv (2) - RMTE

PANEL 378
PRIM GLY ACCUM vlv - open (CCW)

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PANEL 379
PRIM ACCUM FILL vlv - OFF (CW)

PANEL 375
SURGE TK PRESS RELF vlv - open (CW)

PANEL 376
PLVC - NORMAL (up)

PANEL 377
GLY TO RAD SEC vlv - BYPASS (CCW)

PANEL 600
EMER O2 vlv - close

PANEL 602
REPRESS O2 RELF vlv - open (CW)

PANEL 601
REPRESS O2 vlv - close (guarded)

PANEL 603
EVA STA O2 SUPPLY - OFF

PANEL 604
SUIT PRESS ALARM - OFF

FWD HATCH
PRESS EQUAL vlv - close
ACTR HNDL sel - stow/check locked

SIDE HATCH
CAB PRESS DUMP vlv - close (CW)
GEAR BOX sel - LATCH
ACTR HANDLE sel - UNLATCH
LOCK PIN REL KNOB - LOCK
LOCK PIN ind - flush
GN2 VLV HANDLE - outboard
BPC JETT KNOB - ~~toward BPC JETT~~
180° FROM BPC JETT DECAL

DATE ~~3/22/77~~ 7/13/77

DORMANT CONFIG LIST

CSM POWER CRITICAL COASTING

SCS w/G&N FAILED

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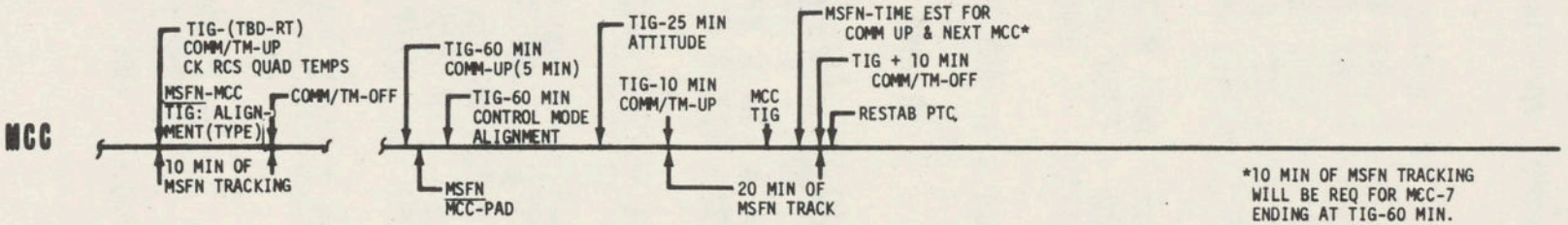
DATE 3/22/71



MCC _____
COMM(TRACKING) __ __:__ __:__ __
TIG __ __:__ __:__ __

MCC _____
COMM(TRACKING) __ __:__ __:__ __
TIG __ __:__ __:__ __

MCC _____
COMM(TRACKING) __ __:__ __:__ __
TIG __ __:__ __:__ __

MCC _____
COMM(TRACKING) __ __:__ __:__ __
TIG __ __:__ __:__ __

C
2-13

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SCS MCC - PREPARATION

Assumes DORMANT CONFIGURATION, pg C/2-1

TIG-1:00 hr

(5) cb C/W (2) - close
(250) cb BAT A,B&C PWR ENTRY/PL (3) - close
(275) cb INVERTER POWER (4) - close
(276) cb INST PWR CONT (4) - close
(225) cb CTE (2) - close
(229) cb TIMERS (2) - close

FC 2 MNA - on (up)
MNA RSET - RSET, on
BMAG 1 - WARMUP

If MNB not powered by LM
  FC 2 MNB - on (up)
  MNB RSET - RSET, on

AC BUS PWR UP
INV 2 - MNB
INV 2 AC1 & AC2 - on (up)
AC1 & AC2 RSET - RSET, on

COMM PWR UP Pg C/2-33, 1A

Check Quad Temps
If any Quad < 60°:
  cb SM RCS HTRS (4) - close
  RCS HTR - on until > 60°
  Then, cb SM RCS HTRS (4) - open

COPY BURN & ALIGNMENT PADS
Set DET

COMM - OFF
TELCOM GRP 1 & 2 - OFF
PMP PWR - off (ctr)

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SCS PWR UP
cb SCS LOGIC (4) - close
SCS ELEC PWR - GDC/ECA
BMAG PWR (2) - ON
(wait 90 sec)
FDAI/GPI PWR - 1
FDAI SELECT - 1
ROT CONTR PWR NORMAL 2 - AC/DC
AUTO RCS SEL (RING 1) - MNA

TIG - 50 min MNVR TO ALIGNMENT ATTITUDE

ALIGN GDC
(Use technique recommended by MSFN)

TIG - 25 min MNVR TO BURN ATTITUDE

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SCS MCC - SPS ΔV

Assumes SCS MCC PREPARATION has been performed

FLOOD LTS - as req'd

50:00 (-10:00)
SIG CONDR/DRIVER BIAS PWR - AC1
SCE PWR - NORM
PMP PWR - NORM
TELCOM GRP 1 & 2 - AC1
PWR AMP - HIGH

POWER UP 2nd INVERTER

INV 1 - MNA
INV 2 AC1 - OFF
INV 1 AC1 - on (up)

Perform EMS ΔV TEST & NULL BIAS CHECK, pg G/2-5, if desired
Set ΔVC
EMS FUNC - ΔV

TVC CHECK & PREP

(8) cb STAB CONT SYS (all) - close
cb SPS (12) - close
MAN ATT (3) - RATE CMD
LIMIT CYCLE - on (up)
ATT DB - MIN
RATE - LOW
TRANS CONT PWR - ON
BMAG MODE (3) - ATT 1/RATE 2
SCS TVC (2) - RATE CMD
ΔV CG - CSM (with or without A/S)
TVC GMBL DRIVE P&Y - AUTO
AUTO RCS SEL (RING 2) - MNB

54:00 (-06:00)
cb MNA BAT BUS A - close
cb MNB BAT C - close
cb MNB BAT BUS B - close
FC 2 MNB - OFF
TVC SERVO PWR #1 - AC1/MNA
TVC SERVO PWR #2 - AC2/MNB
ROT CONTR PWR NORMAL (2) - AC
ROT CONT PWR DIRECT (2) - OFF
RHC #2 - ARMED

DATE 3/22/71

55:00	PRIMARY TVC CHECK
(05:00)	GMBL MOT P1-Y1 - START/ON (LMP Cnfrm)
	Verify TRIM CONTROL & SET
	Verify MTVC
	SCS TVC (2) - AUTO
	THC - CW
	Verify NO MTVC
	SEC TVC CHECK
	GMBL MOT P2-Y2 - START/ON (LMP Cnfrm)
	Set GPI TRIM
	Verify MTVC
	THC NEUTRAL
	Verify GPI returns to trim
	Verify NO MTVC
	ROT CONT PWR NORMAL (2) - AC/DC
	ROT CONT PWR DIRECT (2) - MNA/MNB
	FDAI SCALE - 5/1
	LIMIT CYCLE - OFF
	UPDATE DET
	SPS He vlvs (2) - AUTO (verify)
	Check N2 A and N2 B
58:00	
(-02:00)	ΔV THRUST A (B) - NORMAL
	THC - ARMED
	RHC (2) - ARMED
59:30	
(-00:30)	EMS MODE - NORMAL
59:XX	
(-00:XX)	ULLAGE
00:00	THRUST ON PB - PUSH
	SPS THRUST Lt - ON
00:03	ΔV THRUST B (A) - NORMAL
	ULLAGE & THRUST ON PB - PUSH
00:XX	ECO
	ΔV THRUST A&B - OFF
	GMBL MTRS (4) - OFF (LMP Confirm)
	TVC SERVO PWR 1&2 - OFF

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FC 2 MNB - on (up)
cb MNA BAT BUS A - open
cb MNB BAT C - open
cb MNB BAT BUS B - open

INV 1 AC1 - OFF
INV 2 AC1 - on (up)
INV 1 - OFF

RECORD ΔVC _____
EMS FUNC - OFF
EMS MODE - STBY
ATT DB - MAX
TRANS CONT PWR - OFF
ROT CONTR PWR DIRECT (2) - OFF
BMAG MODE (3) - RATE 2
PCM BIT RATE - LOW
PWR AMP - OFF

Set up SCS PTC, pg G/8-3
(Use couples for roll rate)

MSFN TRACKING (10 min)

Perform EMERG PWR DOWN, pg EMER/1-6

Establish DORMANT CONFIGURATION, pg C/2-1

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SCS SPS MIN PWR ΔV

Assumes SCS MCC PREPARATION has been performed

FLOOD LTS - as req'd

Perform ΔV TEST, pg G/2-5

50:00 (-10:00)

Set ΔVC
EMS FUNC - ΔV

TVC CHECK & PREP

(8) cb STAB CONT SYS (all) - close
cb SPS (12) - close
MAN ATT (3) - RATE CMD
LIMIT CYCLE - on (up)
ATT DB - MIN
RATE - LOW
TRANS CONT PWR - ON
BMAG MODE (3) - ATT 1/RATE 2
SCS TVC (2) - RATE CMD
ΔV CG - CSM
TVC GMBL DRIVE P&Y - 1
AUTO RCS SEL (RING 2) - MNB

54:00 (-06:00)

cb MNA BAT BUS A - close
cb MNB BAT C - close
cb MNB BAT BUS B - close
FC 2 MNB - OFF
TVC SERVO PWR #1 - AC1/MNA
ROT CONTR PWR NORMAL (2) - AC
ROT CONT PWR DIRECT (2) - OFF
SC CONT - SCS
RHC #2 - ARMED

DATE 3/22/71

55:00	PRIMARY TVC CHECK
(05:00)	GMBL MOT P1-Y1 - START/ON (LMP Cnfrm)
	Verify TRIM CONTROL & SET
	Verify MTVC
	SCS TVC (2) - AUTO
	THC - CW
	Verify MTVC
	THC NEUTRAL
	Verify GPI returns to trim
	Verify NO MTVC
	ROT CONT PWR NORMAL (2) - AC/DC
	ROT CONT PWR DIRECT (2) - MNA/MNB
	FDAI SCALE - 5/1
	LIMIT CYCLE - OFF
	UPDATE DET
	SPS He vlvs (2) - AUTO (verify)
	Check N2 A and N2 B
58:00	
(-02:00)	ΔV THRUST A (B) - NORMAL
	THC - ARMED
	RHC (2) - ARMED
59:30	
(-00:30)	EMS MODE - NORMAL
59:XX	
(-00:XX)	ULLAGE
00:00	THRUST ON PB - PUSH
	SPS THRUST Lt - ON
00:03	ΔV THRUST B (A) - NORMAL
	ULLAGE & THRUST ON PB - PUSH
00:XX	ECO
	ΔV THRUST A&B - OFF
	GMBL MTRS (4) - OFF (LMP Confirm)
	TVC SERVO PWR 1&2 - OFF
	FC 2 MNB - on (up)
	cb MNA BAT BUS A - open
	cb MNB BAT C - open
	cb MNB BAT BUS B - open

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RECORD ΔVC _____
EMS FUNC - OFF
EMS MODE - STBY
ATT DB - MAX
TRANS CONT PWR - OFF
ROT CONTR PWR DIRECT (2) - OFF
BMAG MODE (3) - RATE 2

Set up SCS PTC, pg G/8-3
(Use couples for roll rate)

MSFN TRACKING (10 min)

Perform EMERG PWR DOWN, pg EMER/1-6

Establish DORMANT CONFIGURATION,
pg C/2-1

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SCS MCC - RCS ΔV

Assumes SCS MCC PREPARATION has been performed

FLOOD LTS - as req'd
Perform ΔV TEST, pg G/2-5

50:00 (-10:00)	Set ΔVC EMS FUNC - ΔV MAN ATT (3) - RATE CMD LIMIT CYCLE - on (up) ATT DB - MIN RATE - LOW TRANS CONT PWR - ON BMAG MODE (3) - ATT 1/RATE 2 SC CONT - SCS RHC #2 - ARMED ROT CONT PWR NORMAL (2) - AC/DC ROT CONT PWR DIRECT (2) - MNA/MNB UPDATE DET AUTO RCS SEL (RING 2) - MNB
58:00 (-02:00)	THC - ARMED LIMIT CYCLE - OFF
59:30 (-00:30)	EMS MODE - NORMAL
00:00	THC - +X and hold
00:XX	THC - release
	RECORD ΔVC ____ EMS FUNC - OFF EMS MODE - STBY ATT DB - MAX TRANS CONT PWR - OFF ROT CONTR PWR DIRECT (2) - OFF BMAG MODE (3) - RATE 2

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Set up SCS PTC, pg G/8-3
(Use couples for roll rate)

MSFN TRACKING (10 min)

Perform EMERG PWR DOWN, pg EMER/1-6

Establish DORMANT CONFIGURATION,
pg C/2-1

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DORMANT SYSTEMS MANAGEMENT

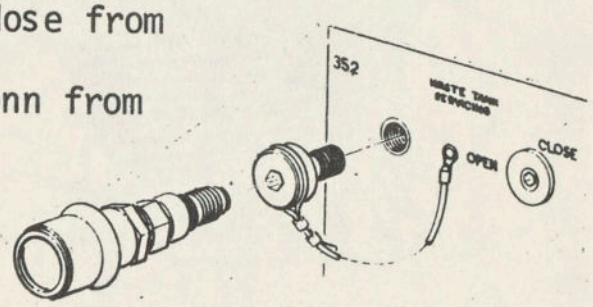
ECS

1 WATER PRESSURIZATION

MAIN REG vlv (either) - open
H2O/GLY TK PRESS REG vlv - BOTH, 1 or 2
To withdraw water cycle SURGE TK
  O2 vlv as required
Water tank pressure will bleed ovbd 0.04 lb/hr after
  tank isolation (1 hr full tk, 9 hrs empty tk)

2 WASTE WATER TRANSFER CM TO PLSS

Install H2O Adapter Assy on Waste Tank Service Port
Connect Urine Dump Hose to H2O Adapter Assy
PLSS H2O SHUTOFF & RELIEF vlv - CLOSE (verify)
Connect Urine Dump Hose to PLSS H2O FILL conn
  Use Filter if Urine Dump Hose is Contaminated
Connect Urine Bag conn to PLSS H2O DRAIN conn
  Cut hole in Urine Bag to Provide Vent
Pressurize CM Water Tanks (as above)
WASTE TK SERVICING vlv - OPEN (3 min) - CLOSE
SURGE TK O2 vlv - OFF
Disconnect Urine Dump Hose from
  PLSS H2O FILL conn
Disconnect Urine Bag conn from
  PLSS H2O DRAIN conn



3 SUIT COMPRESSOR OPERATION

Configure for AC & DC MNA BUS POWER
SUIT COMPRESSOR 1 - AC 1 or AC 2
cb ECS PRESS GRP 2 MNA - CLOSE (Pnl 5)
Monitor CO2 PP <~7.5 (~15 min-ON/60 min-OFF)
Monitor Cabin Pressure (Maintain >3.0 psia)

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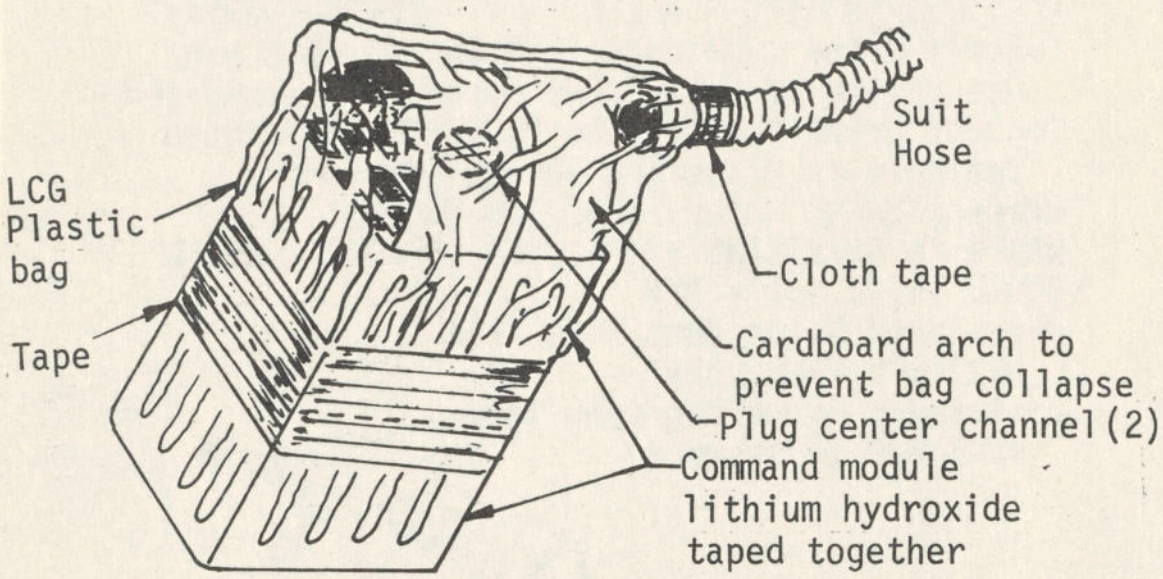
4 CM LiOH CANISTER UTILIZATION (IN CM)

Refer to Diagram C/2-27
Tape LM CDR Red Hose to CM Center Blue Hose
Tape LM LMP Red Hose to CM Right Blue Hose
Firmly butt together to minimize leaks
Install O2 Hose Coupling on CM Center Red Hose
Install O2 Hose Coupling on CM Right Red Hose
Install O2 Hose Coupling interconnecting CM
Left Red and Blue Hoses
SUIT RETURN vlv - OPEN (Pull)
Remove LM LiOH Canister from ARS
Activate LM Suit Compressor

5 CM LiOH CANISTER UTILIZATION (LM BOX)

Refer to Diagram Below



6 METABOLIC MAKEUP WITH OPS O2

Verify OPS O2 conn Locked in STOWAGE PLATE
Cycle OPS ACTUATION LEVER as required
Flow Rate ~0.3 lb/hr.

7 OPS QUICK BLEED DOWN

Verify OPS O2 ACTUATION LEVER - OFF
Unstow OPS O2 conn from O2 conn STOWAGE PLATE
Restrain Hose and DIRECT INTO OPEN VOLUME
CAUTION: Flow Rate ~250 lb/hr at 5880 psi
Cycle OPS ACTUATION LEVER as required

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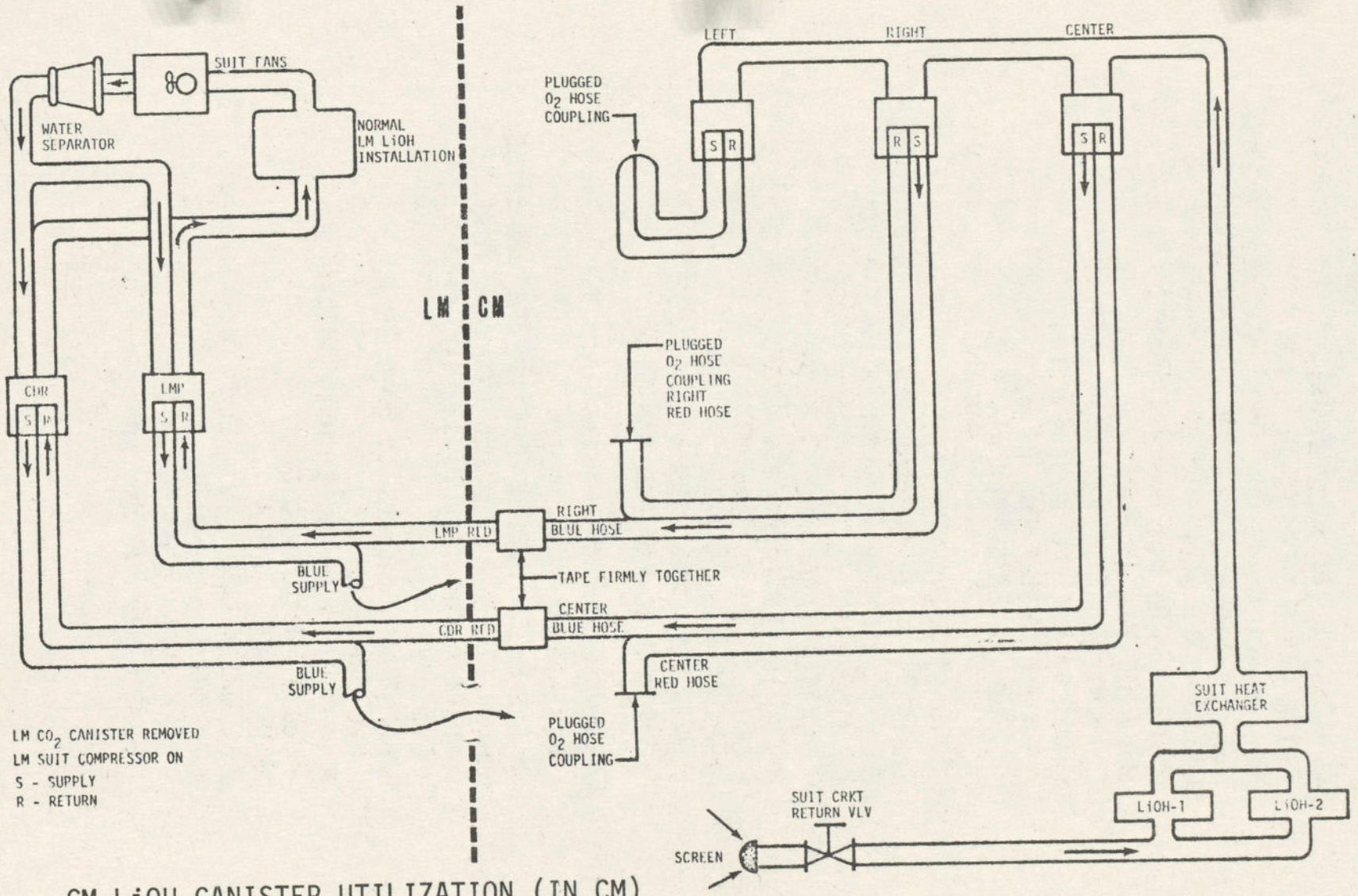

CM LiOH CANISTER UTILIZATION (IN CM)

C
2-27

COMM | CSM POWER CR. | G&C | EPS

8 USE OF H2O BAG

H2O BAG FILL (POTABLE WATER)
- DRINK WATER SUPPLY vlv - OFF
- Disconnect Water Gun from Hose Assy & Stow
- Connect H2O Bag Assy QD to Hose Assy
- DRINK WATER SUPPLY vlv - ON (~8 min)
- CAUTION: Do Not Overfill Bag (< Taut)
- When H2O Bag is full
  - DRINK WATER SUPPLY vlv - OFF
  - Disconnect H2O Bag and Stow
  - Connect Water Gun to Hose Assy
  - DRINK WATER SUPPLY vlv - ON

H2O BAG FILL (WASTE WATER)
- Install Female QD on Waste Tank Service Port
- Connect H2O Bag Assy QD to Female QD
- CAUTION: If Waste H2O Qty < 10%
  - POTABLE TANK INLET - CLOSE
- WASTE TK SERVICING vlv - OPEN (~8 min)
- CAUTION: Do Not Overfill Bag (< Taut)
- When H2O Bag is Full
  - WASTE TK SERVICING vlv - CLOSE
  - Disconnect H2O Bag and Stow

H2O BAG DUMP
- Configure for MNB POWER
- cb ECS WASTE H2O/URINE DUMP HTR MNB-CLOSE
- Remove H2O vlv from H2O Bag Hose Assy QD
- Connect Urine Line Filter to Urine Transfer Hose
- Connect Urine Transfer Hose QD to H2O Bag Hose Assy QD
- Attach Urine Transfer Hose/Filter to Waste Management QD
- URINE DUMP - HTR B
- OVBD DRAIN DUMP vlv - DUMP (~ 5-10 min)
- When H2O Bag is empty
  - OVBD DRAIN DUMP vlv - OFF
  - Stow Empty H2O Bag in U1

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9 HARD SUIT TRANSFER TO LM
(Does not require dormant config)

LMP Transfer to LM w/CM hoses
Activate LM EPS & ECS as reqd.
Activate LM VHF SIMPLEX A
CMP Activate VHF SIMPLEX A
LMP Transfer to LM ECS
CMP (on cue) SUIT FLOW vlv (LMP, pnl 300) - OFF
LMP Disconnect CM hoses
Transfer OPS and CM hoses to CM
Establish LM Att reference & control mode
Transfer Attitude Control to LM
CDR Verify Surge Tk & Repress Pkg full & isolated
CMP Assist CDR in switching to LMP hoses
SUIT FLOW vlv (LMP, pnl 300) - SUIT FULL FLOW
SUIT FLOW vlv (CDR, pnl 301) - OFF
Disconnect CDR's hoses & install interconnect
CDR & CMP Reconfigure CSM
AUTO RCS SEL (16) - OFF
LM Power Transfer to CSM(C/2-35)(ASC Stage Only)
RHC PWR DIR (2) - OFF
Purge FC O2 & H2
SCS Power Down (EMER/1-7)
IMU & CMC to Standby (Descent Stage Attached)
HGA POWER - OFF
S BD ANT OMNI - OMNI B
S BD ANT - OMNI
SM RCS HTRS (4) - OFF
Dump Waste & Pot H2O Tks

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Transfer items per CSM/LM Transfer List (C/2-32)
CDR assist CMP to don OPS
Transfer to LM w/CM (LMP) hoses
LMP Connect LM hoses to CDR
CMP (on cue) SUIT FLOW vlv (LMP, Pnl 300) - OFF
LMP Disconnect CDR from CM hoses
Transfer CM hoses to CM
CMP Install Interconnect on LMP hoses
Tape LMP hoses in Tunnel area
Reconfigure Suit Loop
Activate OPS (do not purge)
Remove most used LiOH cann
SUIT CKT H2O ACCUM - OFF
cb C/W (2) - OPEN (Pnl 5)
VHF AM A - OFF
Activate PGA PURGE vlv at 4 lb/hr
SUIT COMPR 1 & 2 (2) - OFF
SUIT FLOW vlv (CMP, Pnl 302) - OFF
Disconnect CM hoses and install Interconnect
CMP Transfer to LM and close Hatch
PGA PURGE vlv - max flow
When LM cabin press = 3.0 psia
OPS O2 ACTUATION LEVER - OFF
Remove Helmet and Disconnect OPS
OPS O2 ACTUATION LEVER - ON (deplete)

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10 HARD SUIT TRANSFER TO CSM
(Does not require dormant config)

CMP Verify OPS prior to cabin depress
Transfer to CM w/OPS (purge 4 lb/hr)
Verify CM Suit Loop Press
Attach CMP hoses
SUIT FLOW vlv (CMP, Pnl 302) - SUIT FULL FLOW
SUIT COMPR 1 - AC 1
VHF AM A - SIMPLEX
Check PART PRESS CO2
PGA PURGE vlv - OFF (install pin)
Transfer CM LMP (Pnl 300) hoses to LM
SUIT CKT H2O ACCUM - AUTO 1
Install LiOH cann in empty compartment
OPS O2 ACTUATION LEVER - OFF
LMP Assist CDR in switching to CM LMP hoses
CMP (on cue) SUIT FLOW vlv (LMP, Pnl 300) - SUIT FULL FLOW
CDR Transfer to CM
CMP Assist CDR in connecting to CM CDR hoses
SUIT FLOW vlv (CDR, Pnl 301) - SUIT FULL FLOW
SUIT FLOW vlv (LMP, Pnl 300) - OFF
Reconfigure CSM
cb C/W (2) - CLOSE (Pnl 5)
SM RCS HTRS (4) - ON
Perform CMC Powerup (G/2-2)
Perform IMU Powerup (G/2-1)
Transfer Alignment to CM (G/7-10)
Perform SCS Powerup (G/2-4)
Transfer items per LM/CSM Transfer List (C/2-32)
LMP Transfer to CM LMP hoses
CMP (On cue) SUIT FLOW vlv (LMP, Pnl 300) - SUIT FULL FLOW
Verify quad temps > 55°F
CDR Transfer S/C Control to CSM
AUTO RCS SEL (16) - as req'd
LMP Complete LM closeout
Transfer to CM & close hatch
Establish CM Power as required

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11 CSM/LM TRANSFER LIST

CM LiOH cann (2/day)
Meals (9/day)
Water Bags, filled (TBD/day)
Hygiene Equipment
- Towels
- Tissue Dispenser
- Urine Bags, empty
- Fecal Bags
- Medical Kit

Inflight Coverals w/Comm Carriers
Booties
Tape, Plastic Bags, etc
Pens, scissors, penlights, etc
FDF Documents

12 LM/CSM TRANSFER LIST

FDF Documents
Pens, scissors, penlights, etc
Tape, Plastic Bags, etc
Medical Kit
Water Bags, filled
Unused CM LiOH cann
Lunar surface return items
Cameras, magazines, etc

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COMM

1A BASIC ACTIVATION (VOICE/RANGING)

CONFIGURE FOR AC & DC BUS POWER
cb FLT BUS MNA & MNB (2) - CLOSE (Pnl 225)
UP TLM CMD RESET - RESET then OFF
TELCOM GRP 1 & 2 (2) - AC1 or AC2 [OFF]
POWER PMP - NORM [OFF]
PCM BIT RATE - HIGH
PWR - AUDIO/TONE [OFF]
SUIT PWR - ON
Verify S/C Attitude and Select Best OMNI
S BD NORMAL PWR AMPL - as required [OFF]

1B TM (FOLLOWS BASIC ACTIVATION)

S BD PWR AMPL - HIGH [OFF]
S BD MODE PCM - PCM [OFF]
PCM BIT RATE - LOW
PROVIDE ADDITIONAL TM
  SCE PWR - NORM [OFF]
  cb ECS XDUCER PRESS GRP 1&2 MNA(B)(2)-CLOSE(Pnl 5)
  cb ECS XDUCER TEMP MNA(B) - CLOSE (Pnl 5)
  cb ECS SEC COOL LOOP XDUCER MNA(B) - CLOSE(Pnl 5)
  cb ECS RAD CONT/HTRS MNA(B) - CLOSE (Pnl 5)
  cb ECS WASTE/POT H2O MNA(B) - CLOSE (Pnl 5)
  cb INSTR PWR CONT (4) - CLOSE (Pnl 276)
  cb BAT C PWR ENTRY/PL - CLOSE (Pnl 250)

2 VOICE RECORD (NO XMTR)

CONFIGURE FOR AC & DC BUS POWER
cb FLT BUS MNA(B) - CLOSE (Pnl 225)
UP TLM CMD RESET - RESET then OFF
TELCOM GRP 1 - AC1 or AC2
POWER PMP - NORM [OFF]
TAPE RECORDER RECORD - RECORD [OFF]
TAPE RECORDER FWD - FWD [OFF]
PWR - AUDIO/TONE
SUIT PWR - ON
To add PCM Record See "PROVIDE ADDITIONAL TM" Above

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EPS

1 INITIAL MAIN BUS TIES CLOSURE

cb BAT A & B PWR ENTRY/PL (2) - CLOSE (Pnl 250)
cb MAIN A BAT BUS A - CLOSE (Pnl 275)
cb MAIN B BAT BUS B - CLOSE (Pnl 275)
Verify BAT BUS A & B VOLTS 31.5 - 38.0
MAIN BUS TIE BAT A/C - BAT A/C
Check BAT BUS A AMPS and MNA VOLTS
MAIN BUS TIE BAT B/C - BAT B/C
Check BAT BUS B AMPS and MNB VOLTS
TO OPEN BUS TIES:
  cb MAIN A BAT BUS A - OPEN (Pnl 275)
  cb MAIN B BAT BUS B - OPEN (Pnl 275)
  cb BAT A & B PWR ENTRY/PL (2) - OPEN (Pnl 250)

2 LM PWR TRANSFER TO CSM

After LM Configured for PWR TRANSFER
Do NOT Connect LM to CSM if CSM load >25 AMPS
If load >25 AMPS or Unable to keep LM PWR
  Transfer loads to MNA
LM PWR - CSM

3 BATTERY A(B) CHARGING

cb BAT A(B) PWR ENTRY/PL - CLOSE (Pnl 250)
cb INVERTER PWR 2 MAIN B - CLOSE (Pnl 275)
MAIN BUS TIE BAT A/C(B/C) - OFF [A/C(B/C)]
BAT CHGR - AC2
AC INVERTER 2 - MNB
AC INVERTER 2 AC BUS 2 - on (up)
AC BUS 2 RESET - RESET - ON [OFF]
BATTERY CHARGE sel - A(B) [OFF]
DC INDICATOR sel - BAT CHARGER [FC2]
To Terminate Procedure, Reverse Procedure

4 BATTERY C CHARGING

Replace First Line of BAT A CHARGING with:
  cb BAT C PWR ENTRY/PL - CLOSE (Pnl 250)
  cb BAT C TO BAT BUS A - CLOSE (Pnl 250)
Charge through BAT A Procedure

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5 USE OF AUX BATTERY

cb BAT B PWR ENTRY/PL - CLOSE (Pnl 250)
SM PWR SOURCE - AUX BAT (mom) (Pnl 278)
FUEL CELL 2 - desired main bus
Verify MAIN BUS VOLTS >26.5
Monitor FC 2 AMPS

6 AC POWER

cb BAT A PWR ENTRY/PL - CLOSE (Pnl 250)
cb INVERTER PWR 2 MAIN B - CLOSE (Pnl 275)
AC INVERTER 2 - MN B
AC INVERTER 2 AC BUS 1 & 2 (2) - on (up)
AC BUS 1&2 RESET (2) - RESET - ON [OFF]
Verify AC VOLTS >110

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G&C

1 DISPLAY RATE (SCS) (FDAI SCALE = 5/1 w/o LOGIC BUS)
Configure for AC2 & MNB BUS POWER
BMAG POWER 2 - ON [OFF]
FDAI/GPI POWER - 2 [OFF]

2 DISPLAY ATTITUDE (SCS)
Configure for AC1 & 2 and MNB BUS POWER
BMAG POWER 2 - ON [OFF]
cb SCS LOGIC BUS MNB 2/3 - CLOSE (Pnl 8)
cb SCS LOGIC BUS MNB 1/4 - CLOSE (Pnl 8)
FDAI SELECT - 2 [1/2]
FDAI/GPI POWER - 2 [OFF]
SCS ELECTRONICS PWR - GDC/ECA [OFF]

3 DISPLAY ATTITUDE (G&N)
Configure for AC2 & MNB BUS POWER
cb SCS LOGIC BUS MNB 2/3 - CLOSE (Pnl 8)
cb SCS LOGIC BUS MNB 1/4 - CLOSE (Pnl 8)
FDAI/GPI POWER - 2 [OFF]
FDAI SELECT - 2 [1/2]
FDAI SOURCE - CMC [GDC]

4 CMC MIN IMPULSE
Configure for one MN BUS and active DAP
cb G/N COMPUTER (2) - CLOSE (Pnl 5)
PRO, push (~5 sec), if reqd
F37 00E
SC CONT - CMC/FREE
ROT CONTR PWR NORMAL 2 - AC/DC
AUTO RCS SELECT - single jet
When min impulse not req'd
AUTO RCS SELECT (16) - OFF
ROT CONTR PWR NORMAL 2 - OFF
V37E 06E
PRO, push (~ 5 sec) until DSKY blanks
cb G/N COMPUTER (2) - OPEN (Pnl 5)

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5 SCS MIN IMPULSE

Configure for AC1 & MNB BUS POWER
AC INV 2 - MNB (verify)
cb SCS LOGIC BUS MNB 1/4 - CLOSE
cb SCS LOGIC BUS MNB 2/3 - CLOSE
SCS ELECTRONICS PWR - ECA [OFF]
ROT CONTR PWR NORMAL 2 - AC/DC [OFF]
AUTO RCS SELECT - single jet

6 OPTICS POWER

Configure for MN BUS POWER
G&N POWER OPTICS - on (up)
If Reticle Required
  G/N PWR - AC1 or AC2 [OFF]

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MIN PWR G&N

CSM POWER CRITICAL ENTRY

MIN PWR SCS

COMM

CSM POWER CRITICAL ENTRY

EPS

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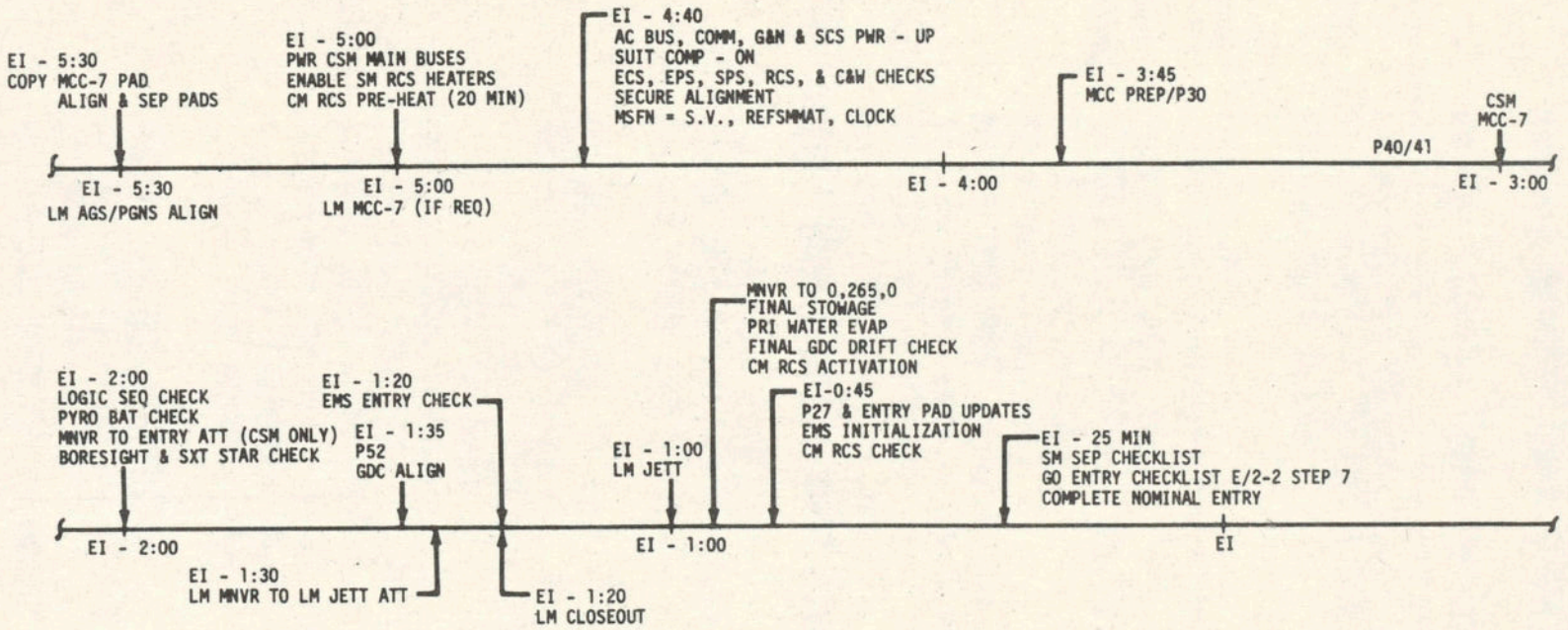

BASIC ENTRY (PWR CRITICAL)

C
3-1

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CSM POWER CRITICAL ENTRY-LM ATTACHED or CSM ONLY

Assumes DORMANT CONFIGURATION, pg C/2-1

1 Verify Stowage Transfer complete

2 LM MIDCOURSE MANEUVER, if req'd

EI-5:30hr	LM copy MCC-7, ALIGN & SEP PADS
	LM AGS/PGNS ALIGN
EI-5:00hr	LM MCC-7

3 POWER CSM MAIN BUSES

EI-4:55hr	
(250)	cb BAT A,B,&C PWR ENTRY/PL(3) - close
	FC 2 MNA - on (up)
	FC 2 MNB - on (up)
	MNA & MNB RSET - RSET, on
	Verify Main Buses > 26.5 vdc
(5)	cb C/W (2) - close
	cb IMU HTR MNB - close
(276)	cb INST PWR CONT (4) - close

4 ENABLE SM RCS HEATERS

(8)	cb SM RCS HTRS (4) - close
	SM RCS HTRS (4) - PRIM

5 CM RCS PREHEAT

Note: If sys test mtr 5c,d,6a,b,c,d all read 3.9 vdc (28°F) or more, omit preheat

	CM RCS LOGIC - on (up)
(8)	cb CM RCS HTRS (2) - close
(101)	CM RCS HTRS - ON (LMP Confirm) (20 min or til lowest rdg is 3.9 vdc) (Monitor Manf press for press drop)

6 TERM. CM RCS PREHEAT

	CM RCS HTRS - OFF (LMP Confirm)
	CM RCS LOGIC - OFF
	cb CM RCS HTR (2) - open

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7 EI-4:40hr AC BUS PWR UP
(275) cb INVERTER POWER (4) - close
INV 2 - MNB
INV 2 AC1 & AC2 - on (up)
AC1 & AC2 RSET - RSET, on

8 COMM PWR UP
(225) cb FLT BUS (2) - close
TELCOM GRP 1 - AC1
TELCOM GRP 2 - AC2
S-BD MODE PCM - PCM
SCE PWR - NORM
PMP PWR - NORM
Configure Pnl 6, 9, 10 for voice

9 G/N POWER UP
INTERIOR lts (NUMERICS) - INCR
cb G/N COMPUTER (2) - close
PRO, push (~ 5 sec), if req'd
F37 00E
Verify OMNI
UP TLM - CMD RSET, then NORM
UP TLM CM - ACCEPT (V74, State Vector
(V66), Clock Increment,
REFSMMAT(S), Entry TGT)

(229) cb TIMERS (2) - close
(225) cb CTE (2) · CLOSE
MISSION TIMER - RSET
Set MISSION TIMER

G/N PWR IMU - on (up) (wait 90 sec)
Perform DOCKED IMU ALIGN
CM(OGA)r = 300° - LM OGA + ΔØ
CM(IGA)p = LM IGA + 180°
CM(MGA)y = 360° - LM MGA

V41 N20E, OG____, IG____, MG____

V40E (free platform)
Set REFSMFLG:
V25 N7E, 77E, 10000E, 1E
Set DRIFTFLG:
V37E 51E, PRO, V37E 00E

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(8) cb SCS LOGIC BUS (4) - close
FDAI/GPI PWR - 1
FDAI SOURCE - CMC

G/N PWR - AC2
G/N PWR OPTICS - on (up)
OPT ZERO - OFF
OPT ZERO - ZERO (15 sec)
OPT ZERO - OFF
If CSM only, perform P51
Perform P52 (option 1)
MSFN supply optics angles for stars

G/N PWR OPTICS - OFF
G/N PWR (AC) - OFF

10 SCS POWER UP
SCS ELEC PWR - GDC/ECA
SIG CONDR/DRIVER BIAS PWR - AC1
FDAI/GPI PWR - OFF
BMAG PWR (both) - ON
(wait 90 sec)
FDAI/GPI PWR - BOTH
GDC ALIGN

11 SUIT COMPRESSOR 1 - AC1

12 ECS CKS
cb ECS TRANSDUCERS (8) - close
O2 SUPPLY REFILL pg S/1-7
PGA verification, (if suited)S/1-11

13 EPS CKS #1, 3, 4 (5 if req'd) pg S/1-2

14 SPS CK (If req'd) pg S/1-1

15 RCS CKS
SM RCS Monit Ck pg S/1-1
CM RCS Monit Ck pg S/1-1

16 C&W SYS CK pg S/1-17

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17	-03:45h	CSM MIDCOURSE MANEUVER, if req'd
		P30 - EXT ΔV
	-03:15h	P40/41 - SPS/RCS THRUSTING
		(If P40 req'd, go to pg C/1-17)
	-03:00h	CSM MCC-7

18 Select best OMNI

19 PRIMARY WATER EVAP ACTIVATION
H2O/GLY TK PRESS REG vlv - BOTH
PRI ECS GLY PUMP - AC1
SUIT CKRT H2O ACCUM - AUTO 1
GLY EVAP H2O FLOW - AUTO
GLY EVAP STM PRESS - AUTO

20 -02:00h LOGIC SEQUENCE CK
cb SECS ARM (2) - close
cb ELS/CM-SM SEP (2) - close
ELS LOGIC - on (up)
ELS - AUTO
Coordinate next 3 steps with MSFN
SECS LOGIC (2) - on (up)
MSFN confirm GO for PYRO ARM as req'd
SECS LOGIC (2) - OFF
cb SECS ARM (2) - open
ELS LOGIC - OFF
ELS - MAN
cb ELS/CM-SM SEP (2) - open

21 PYRO BATT CK
(250) cb PYRO A SEQ A - close (verify)
cb PYRO B SEQ B - close (verify)
DC IND - PYRO BAT A(B)
*If PYRO BAT A(B) < 35 vdc *
*cb PYRO A(B) seq A(B) - open *
cb PYRO A(B)BAT BUS A(B) TO PYRO
* BUS TIE - close *

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22 -01:35h P52 - IMU REALIGN pg G/6-2 (OPTION 3)
Record gyro torquing angles
R _____
P _____
Y _____
*IF > 1°, recycle P52 *
If confirmed, use SCS for EMS entry
Drive Optics to 90° shaft angle
OPTICS PWR - OFF
G/N PWR (AC) - OFF

23 (__:__:__) GDC ALIGN
If drift > 10°/hr, change rate source

24 -01:30h LM MNVR TO JETTISON ATTITUDE
MONITOR TO AVOID GIMBAL LOCK
LM ATT HOLD, MAX DB

25 LM CLOSE OUT
Close LM HATCH and DUMP vlv
Perform HATCH DECAL
Perform HATCH INTEGRITY CHECK
SURGE TK - ON
MAIN REG vlvs (2) - OPEN
EMER CABIN PRESS vlv - BOTH
LM PWR - OFF

26 -01:20h EMS ENTRY CHECK
EMS FUNC - OFF
(8) cb EMS (2) - close
EMS MODE - STBY
EMS FUNC - EMS TEST 1 (wait 5 sec)
EMS MODE - NORMAL (wait 10 sec)
Check ind lts - off
RANGE ind - 0.0
Slew hairline over notch
in self-test pattern
EMS FUNC - EMS TEST 2 (wait 10 sec)
.05G lt - on (all others out)
EMS FUNC - EMS TEST 3
.05G lt - on
RSI lower lt - on (10 sec later)
Set RANGE counter to 58 nm ±0.0

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EMS FUNC - EMS TEST 4
.05G lt - on (all others out)
G-V trace within pattern to lwr rt corner at 9G
RANGE ind counts down to 0±0.2
EMS FUNC - EMS TEST 5
.05G lt - on
RSI upper lt - on (10 sec later)
RANGE ind - 0.0
Scribe traces vertical line 9g to 0.28±0.1
ALIGN SCROLL TO ENTRY PATTERN (on 37K ft/sec line)
EMS FUNC - RNG SET
G-V scroll assy traces vert. line 0.28g to 0±0.1
EMS MODE - STBY

27 -01:00h LM JETTISON

AUTO RCS SELECT (12) - MNA or MNB
ROT CONTR PWR NORMAL 2 - AC/DC
ROT CONTR PWR DIRECT 2 - MNA/MNB
cb SECS ARM (2) - close
Cue MSFN
SECS LOGIC (2) - on (up)
V37E 47E
SC CONT - CMC/FREE
MSFN confirm GO for PYRO ARM
SECS PYRO ARM (2) - ARM
CSM/LM FINAL SEP (2) - on (up)
SECS PYRO ARM (2) - SAFE
SECS LOGIC (2) - OFF
Load DAP 11102
SC CONT - CMC/AUTO
PRO 00E

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28 MNVR TO 0°, 265°, 0°
V49E

Select best OMNI

29 BORESIGHT & SXT STAR CHECK
G/N PWR - AC2
G/N PWR OPTICS - on (up)
OPT ZERO - OFF
OPT ZERO - ZERO (15 sec)
OPT ZERO - OFF
OPT MODE - CMC
Check SXT STAR (V41 N91E)

30 FINAL STOWAGE
OPTICS
ORDEAL
(377) GLY TO RAD SEC vlv - BYPASS (verify)
Verify EVA COUCH STRUT disengaged
(382) Cool pnl installed
Y-Y struts (2) extended
Stow Data Box R-12
Attach Both strut unlock lanyards
Check for water in tunnel area
Stow gas separator (A8)
Stow Cl injector (R6)
WASTE MGMT DRAIN vlv - OFF (verify)
Remove & stow URA, urine transfer hose and urine filter

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31 (226) cb FC 1 BUS CONT - close
SYS TEST METER - 5B (BAT RLY BUS 3.4-4.1 vdc)

32 (__:__:__) FINAL GDC DRIFT CK (if req'd)
If drift > 10°/hr, Suspect GDC, Do not use RSI & FDAI #2

33 CM RCS ACTIVATION

(8) cb ELS/CM-SM SEP (2) - close
cb SECS ARM (2) - close (verify)
Cue MSFN
SECS LOGIC (2) - on (up)
MSFN confirm GO for PYRO ARM
SECS PYRO ARM (2) - ARM
CM RCS PRPLNT 1&2 tb(2) - gray(verify)
CM RCS PRESS - on (up)
RCS IND sw - CM1, then 2
  He PRESS stabilizes at 3300-3500
    psia after 15 minutes
  MANF PRESS 287-302 psia
SECS PYRO ARM (2) - SAFE

34 -00:45m P27 & ENTRY PAD UPDATE, pg E/1-7

35 Set DET (up, to EI)

36 EMS INITIALIZATION

Scroll not on 37K:
*EMS FUNC - TEST 5 *
Slew scroll to 37K

EMS FUNC - RNG SET (verify)
SET RNG TO PAD DATA RNG
EMS FUNC - Vo SET
Slew Scroll to Pad Data VIO
EMS MODE - STBY (verify)
EMS FUNC - ENTRY

37 RSI ALIGNMENT
FDAI SOURCE - ATT SET
ATT SET - GDC
EMS ROLL - on (up)
GDC ALIGN pb - push & hold
YAW THUMBWHEEL - Position RSI thru
  45° & back to LIFT UP
GDC ALIGN pb - release
EMS ROLL - OFF
Align GDC to IMU

DATE 3/22/71

38 CM RCS CHECK
AUTO RCS A/C ROLL (4) - OFF (verify)
cb RCS LOGIC (2) - close (verify)
SC CONT - SCS
MAN ATT (3) - MIN IMP
RCS TRNFR - CM
AUTO RCS SEL (RING 1) - OFF
AUTO RCS SEL (RING 2) - MNB
TEST RING 2 THRUSTERS
AUTO RCS SEL (RING 1) - MNA
AUTO RCS SEL (RING 2) - OFF
TEST RING 1 THRUSTERS
AUTO RCS SEL (RING 2) - MNB
RCS TRNFR - SM
MAN ATT (3) - RATE CMD
SC CONT - CMC/AUTO

39 30:00m (-30:00)
cb MNA BAT BUS A - close
cb MNA BAT C - close
cb MNB BAT C - close
cb MNB BAT BUS B - close
TAPE RCDR - REWIND

40 35:00m (-25:00)
SEPARATION CK LIST
cb SECS ARM (2) - close (verify)
cb ELS/CM-SM SEP (2) - close (verify)
PRIM GLY TO RAD - BYPASS (pull)
REPRESS PKG vlv - FILL to 865-935, then ON
O2 SM SUPPLY vlv - OFF
SURGE TK - ON (verify)
CAB PRESS REL vlv (2) - NORM
ABORT SYS PRPLNT - RCS CMD (verify)
SM RCS SEC PRPLNT FUEL PRESS (4) - OPEN
VHF AM A&B - off (ctr)
HI GAIN ANT PWR - OFF (verify)
Verify Loads Balanced
(5) cb ECS RAD CONT/HTR (2) - open

DATE 3/22/71

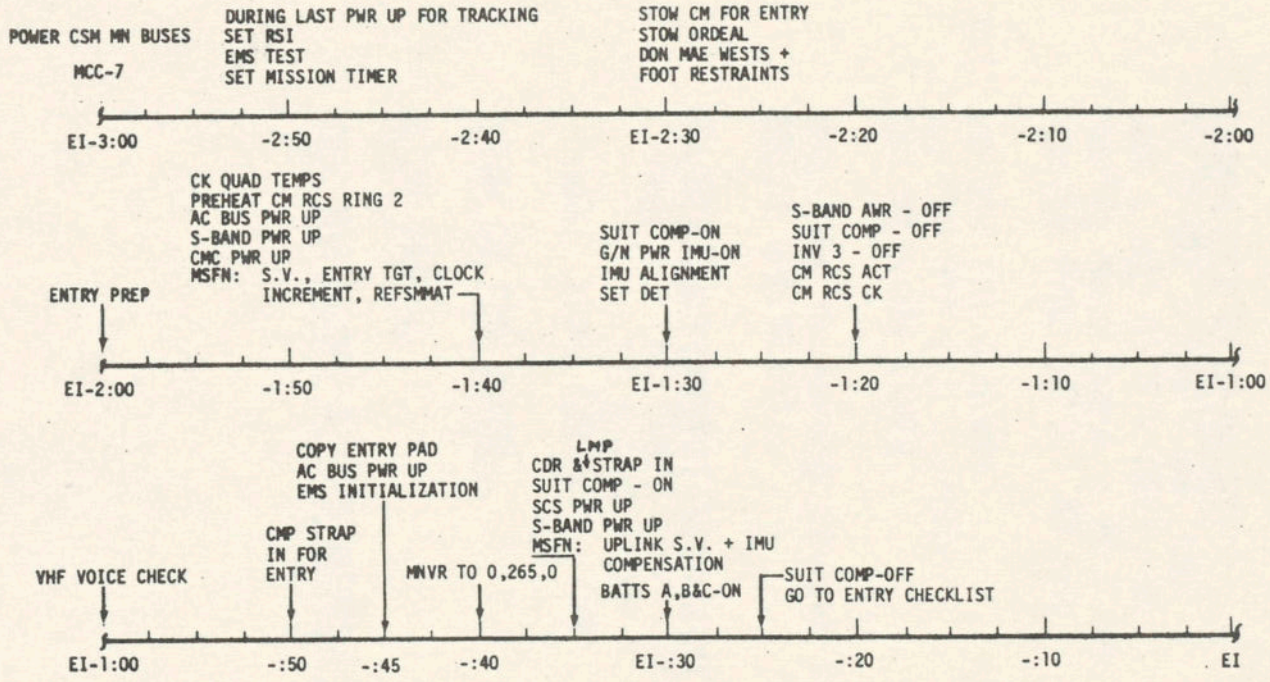
POWER UP 2nd INVERTER

INV 1 - MNA
INV 2 ACl - OFF
INV 1 ACl - on (up)
ACl RSET - RSET, on

Go to ENTRY CHECKLIST, Pg E/2-2, Step 7

DATE 3/22/71

DATE 3/22/71



POWER CRITICAL ENTRY (MIN POWER G&N)

C
3-13

MIN PWR G&N | GENERAL CONTINGENCY PROCEDURES | MIN PWR SCS

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POWER CRITICAL ENTRY-CSM ONLY-MIN PWR G&N

EI -3:00 hr MCC-7

Set RSI and do EMS test during pwr up
for last tracking and MCC

POWER CSM MAIN BUSES
FC 2 MNA & MNB - on (up)
MNA & MNB RSET - RSET, on
Verify Main Buses > 26.5 vdc
Verify PYRO BATS > 35 vdc

(5) cb C/W (2) - close
cb IMU HTR (2) - close
Set MISSION TIMER

Make the following changes in the
ENTRY CHECKLIST:

Pg E/2-2, step 6
delete: FC PUMPS (3) - OFF
FC 2 MNA - OFF
add: S-BD PWR AMP - OFF

STOW CM FOR ENTRY

STOW ORDEAL

DON MAE WESTS & FOOT RESTRAINTS

DATE 3/22/71

EI -2:00 hr ENTRY PREP
LIMIT CYCLE - OFF
RATE - HIGH
ROT CONTR PWR NORMAL (2) - AC/DC
SC CONT - CMC/FREE
BMAG MODE (3) - RATE 1
ATT SET dials - Set MSFN GDC angles
(EI-10 min ALIGNMENT, if req'd)
(8) cb SCS LOGIC BUS (4) - close
cb SM RCS HTRS (4) - close
AUTO RCS SEL (RING 1) - MNA
AUTO RCS SEL (RING 2) - MNB
MAN ATT (3) - ACCEL CMD
cb SCS B/D ROLL, P&Y MNB (3) - open
(5) cb ECS PRESS GRPS 1&2 MNA(2)-close
(276) cb INST PWR CONTR (4) - close
(275) cb FLIGHT/PL BAT BUS A&B(2)-close
(229) cb TIMERS MNA - close
(225) cb FLT BUS (2) - close
(225) cb CTE (2) - close
(250) cb BAT A,B&C PWR ENTRY/PL (3)-close
After Tunnel is closed:
(351) MAIN O2 REG vlvs (2) - OPEN
Configure Audio Pnls

EI -1:40 hr Check Quad Temps
If any Quad < 60°
RCS HTR - on until > 60°

PREHEAT CM RCS RING 2
(concurrent with IMU align)
Check CM RCS Temps > 3.9 vdc on sys test mtr
RING 2 - 5c, d, 6d
RING 1 - 6a, b, c
If heat req'd:
(8) cb CM RCS HTR MNB - close
CM RCS LOGIC - on (up)
CM RCS HTRS - on (up) (LMP Confirm)
When lowest temp is > 3.9 vdc or at 20 min, whichever comes first:
CM RCS HTRS - OFF (LMP Confirm)
CM RCS LOGIC - OFF
cb CM RCS HTR MNB - open

DATE 3/22/71

AC BUS PWR UP

(275) cb INV PWR (4) - close
INV 3 - MNA
INV 3 AC1 & AC2 - on (up)
AC1 & AC2 RSET - RSET, on
PWR PMP - NORM
TELCOM GRP 1&2 - AC1

G/N PWR UP

(5) cb G/N COMPUTER (2) - close
PRO, push (~ 5 sec), if req'd
F37 00E
Verify DAP set for B/D roll
UP TLM - CMD RSET, then NORM
UP TLM CM - ACCEPT
(V74, State Vector (V66), Clock Increment, REFSMMAT, Entry TGT)

EI -1:45 hr SUIT COMPRESSOR 1 - AC1 (10 min)
G/N PWR IMU - on (up)
NO ATT lt - on (90 sec)
NO ATT lt - out
G/N PWR OPTICS - on (up)

IMU ALIGNMENT

G/N PWR - AC2
OPT ZERO - OFF
OPT ZERO - ZERO (15 sec)
OPT ZERO - OFF

Perform P51
Perform P52 (option 1)

Set DET (counting up to EI)
Verify Mission Timer

G/N PWR OPTICS - OFF
G/N PWR (AC) - OFF
TELCOM GRP 1&2 - OFF
EI -1:20hr SUIT COMPRESSOR 1 - OFF
INV 3 AC1 & AC2 - OFF
INV 3 - OFF

V16 N20E (monitor R3 to avoid GMBL LOCK)

DATE 3/22/71

CM RCS ACTIVATION

(8) cb SECS ARM (2) - close
SECS LOGIC (2) - on(up)
SECS PYRO ARM (2) - ARM
CM RCS PRPLNT 1&2 tb (2) - gray (verify)
CM RCS PRESS - on (up)
RCS IND sw - CM1, then 2
He PRESS stabilizes at 3300-3500
psia after 15 minutes
MANF PRESS 287-302 psia
SECS PYRO ARM (2) - SAFE

CM RCS CHECK (within 5 min of press.)
(firing jets heats ring 1)
RCS TRNFR - CM
TEST RING 1 THRUSTERS (1 sec each)
cb SCS B/D ROLL, P&Y MNB (3) - close
cb SCS B/D ROLL, P&Y MNA (3) - open
TEST RING 2 THRUSTERS (1 sec each)
RCS TRNFR - SM
Damp S/C rates with SM RCS
MAN ATT (3) - MIN IMP

cb SCS B/D ROLL, P&Y MNA (3) - CLOSE

EI -1:00 hr VHF AM A - SIMPLEX
Contact MSFN

EI -50 min CMP strap in for Entry

EI -45 min COPY ENTRY PAD

AC BUS PWR UP
INV 3 - MNA
INV 3 AC1 & AC2 - on (up)
AC1 & AC2 RSET - RSET, on

EMS INITIALIZATION
EMS MODE - STBY
EMS FUNC - TEST 5
slew scroll to 37K
EMS FUNC - RNG SET
set PAD RNG
EMS FUNC - Vo SET
slew scroll to PAD VIO
EMS FUNC - ENTRY

DATE 3/22/71 7/13/71

EI -40 min MNVR TO 0°, 265°, 0°
SC CONT - CMC/AUTO
V49E
AUTO RCS SEL A/C ROLL (4) - OFF
(8) cb SPS P&Y (4) - open
cb ELS/CM-SM SEP (2) - close
At completion of V49 mnvr:
CMC MODE - FREE

EI -35 min CDR & LMP strap in for Entry
SUIT COMPRESSOR 1 - AC1 (10 min)

SCS PWR UP
SCS ELEC PWR - GDC/ECA
BMAG PWR 1 - ON
FDAI/GPI PWR - BOTH

TELCOM GRP 1&2 - AC1
S-BD OMNI ANT - C
VHF AM A - OFF
UP TLM CM - ACCEPT
(IMU compensation & State Vector)
GDC ALIGN to IMU
UP TLM CM - BLOCK

EI -30 min
(275) cb MNA BAT BUS A - close
cb MNA BAT C - close
cb MNB BAT C - close
cb MNB BAT BUS B - close

EI -25 min SUIT COMPRESSOR 1 - OFF
BMAG PWR 2 - ON

Go to ENTRY CHECKLIST, pg E/2-2, step 6

DATE 3/22/71

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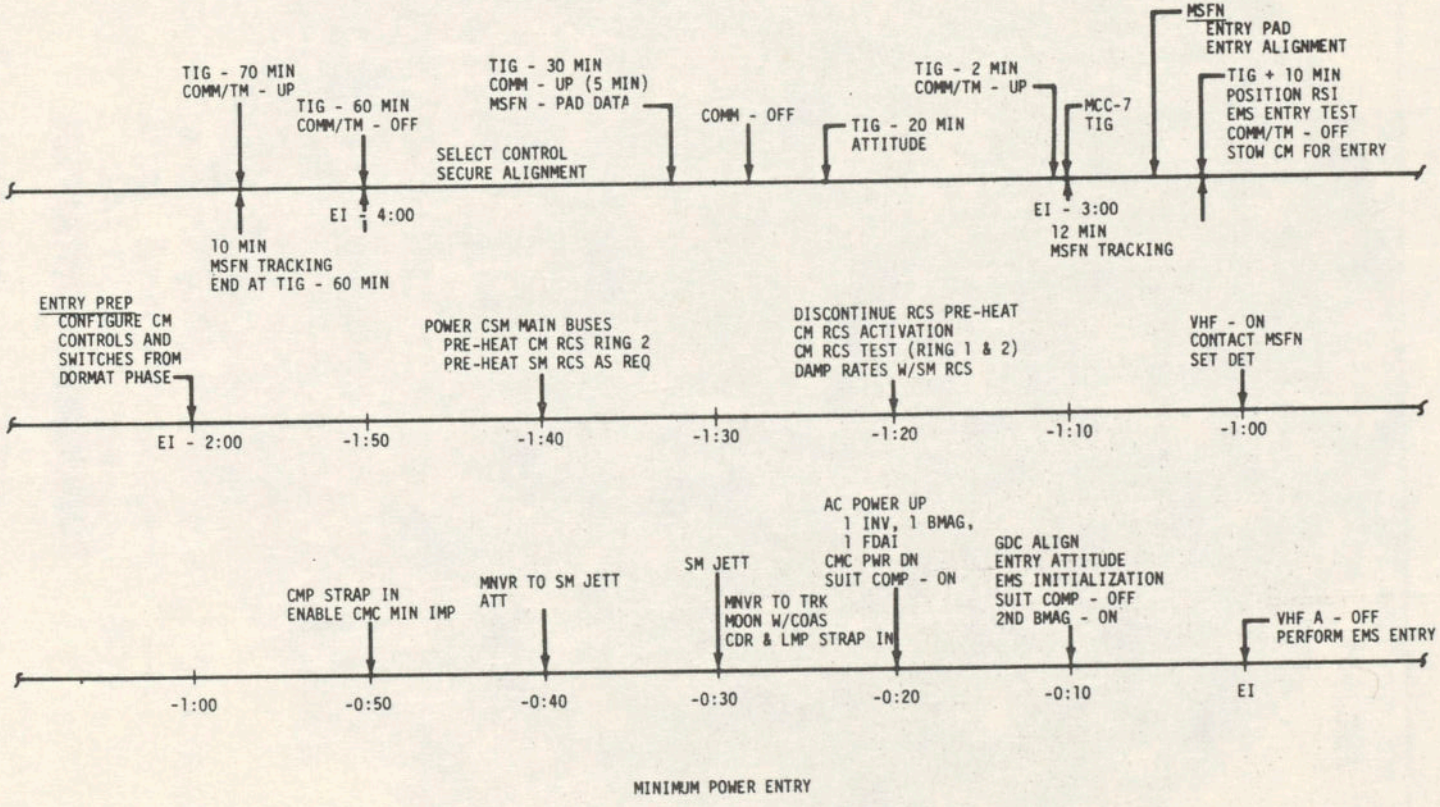
DATE 3/22/71



MINIMUM POWER ENTRY

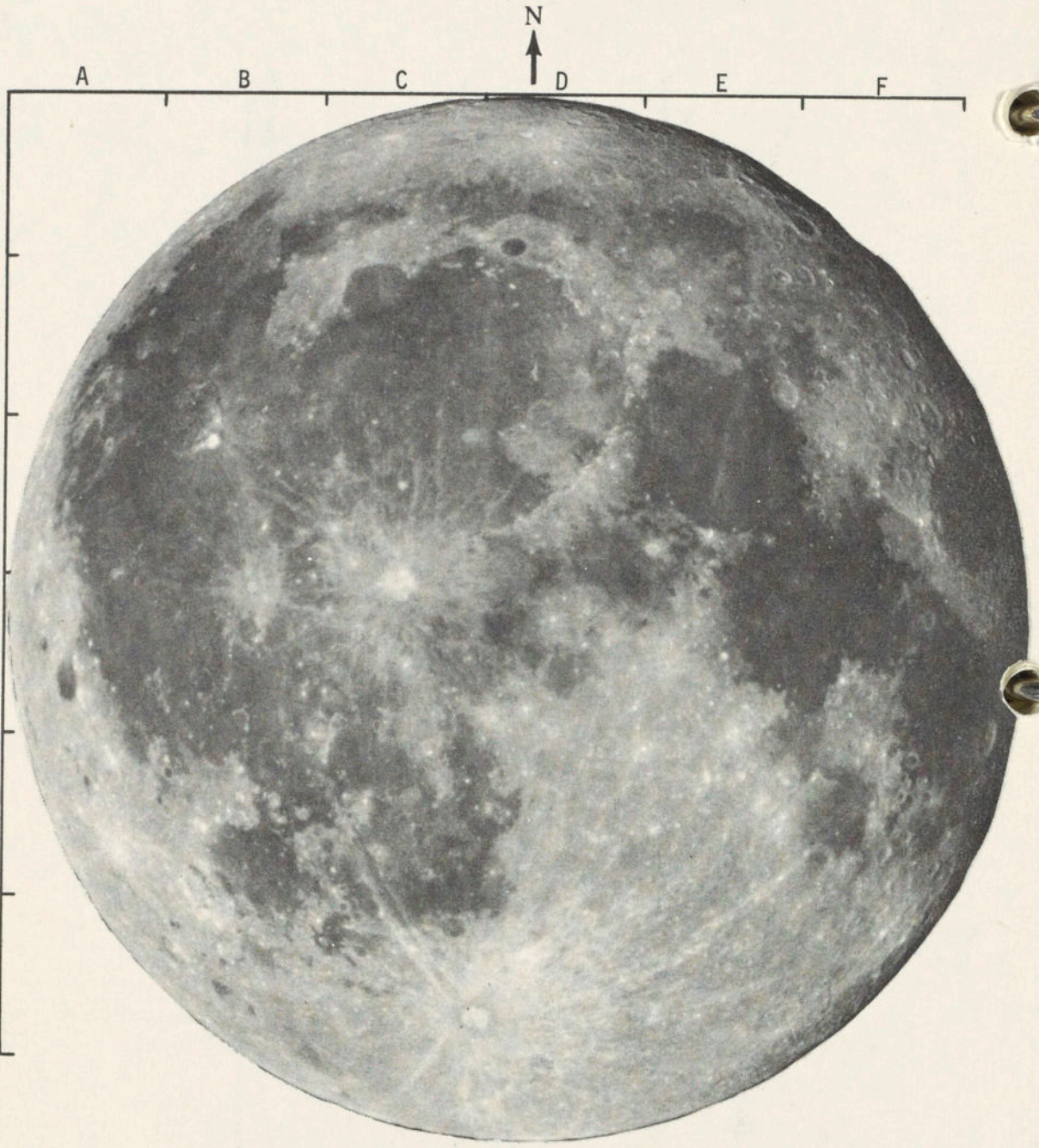
C
3-21

NO COMM LM JETTISON | GENERAL CONTINGENCY PROCEDURES | MIN PWR SCS

MIN PWR SCS

CSM/LM ATTACHED R CRITICAL ENTRY

MIN PWR G&N



MOON/COAS ILLUSTRATION

3/22/71

POWER CRITICAL ENTRY - CSM ONLY - MIN PWR SCS

EI -3:00 hr MCC-7

Set RSI and do EMS test during pwr up for last tracking and MCC and set Mission Timer, if pwr available.

STOW CM FOR ENTRY

STOW ORDEAL

DON MAE WESTS & FOOT RESTRAINTS

EI -2:00 hr ENTRY PREP

FDAI SELECT - 1
LIMIT CYCLE - OFF
RATE - HIGH
ROT CONTR PWR NORMAL (2) - AC/DC
SC CONT - CMC/FREE
BMAG MODE (3) - RATE 1
ATT SET dials - Set MSFN GDC angles
(EI-10 min ALIGNMENT)
(8) cb SCS LOGIC BUS (4) - close
cb SM RCS HTRS (4) - close
AUTO RCS SEL (RING 1) - MNA
AUTO RCS SEL (RING 2) - MNB
MAN ATT (3) - ACCEL CMD
cb SCS B/D ROLL, P&Y MNB (3) - open
(5) cb ECS PRESS GRPS 1&2 MNA(2)-close
(276) cb INST PWR CONTR (4) - close
(275) cb FLIGHT/PL BAT BUS A&B(2)-close
(229) cb TIMERS MNA - close
(225) cb CTE (2) - close
(250) cb BAT A,B&C PWR ENTRY/PL (3)-close
After Tunnel is closed:
(351) MAIN O2 REG vlvs (2) - OPEN
Configure Audio Pnls

EI -1:40 hr POWER CSM MAIN BUSES

FC 2 MNA & MNB - on (up)
MNA & MNB RSET - RSET, on
Verify Main Buses > 26.5 vdc
Verify PYRO BATS > 35 vdc
(5) cb C/W (2) - close

DATE 3/22/71

Check Quad Temps
If any Quad < 60°
  RCS HTR - on until > 60°

PREHEAT CM RCS RING 2
Check CM RCS Temps > 3.9 vdc on sys test mtr
  RING 2 - 5c, d, 6d
  RING 1 - 6a, b, c
If heat req'd:
(8) cb CM RCS HTR MNB (1) - close
  CM RCS LOGIC - on (up)
  CM RCS HTRS - on (up) (LMP Confirm)
When lowest temp is > 3.9 vdc or at 20 min, whichever comes first:
  CM RCS HTRS - OFF (LMP Confirm)
  CM RCS LOGIC - OFF
  cb CM RCS HTR MNB - open

EI -1:20 hr CM RCS ACTIVATION
(8) cb SECS ARM (2) - close
SECS LOGIC (2) - on(up)
SECS PYRO ARM (2) - ARM
CM RCS PRPLNT 1&2 tb (2) - gray (verify)
CM RCS PRESS - ON
RCS IND sw - CM1, then 2
  He PRESS stabilizes at 3300-3500 psia after 15 minutes
  MANF PRESS 287-302 psia
SECS PYRO ARM (2) - SAFE

CM RCS CHECK (within 5 min of press.)
  (firing jets heats ring 1)
RCS TRNFR - CM
TEST RING 1 THRUSTERS (1 sec each)
cb SCS B/D ROLL, P&Y MNB (3) - close
cb SCS B/D ROLL, P&Y MNA (3) - open
TEST RING 2 THRUSTERS (1 sec each)
RCS TRNFR - SM
Damp S/C rates with SM RCS
MAN ATT (3) - MIN IMP

cb SCS B/D ROLL, P&Y MNA (3) - CLOSE

DATE 3/22/77 7/13/77

EI -1:00 hr VHF AM A - SIMPLEX
Contact MSFN
Set DET (counting up to EI)

EI -50 min CMP strap in for Entry

ENABLE CMC MIN IMPULSE
cb G/N COMPUTER (2) - close
PRO, push (~5 sec), if req'd
F37 00E
Verify DAP loaded for B/D roll

EI -40 min MNVR TO SM JETT ATTITUDE
(+X at center of earth)
SURGE TK - ON
PRIM GLY TO RAD - BYPASS (pull)
SM O2 SUPPLY vlv - OFF
AUTO RCS SEL A/C ROLL (4) - OFF
(8) cb SPS P&Y (4) - open
cb ELS/CM-SM SEP (2) - close
SM RCS PRIM PRPLNT (4) - OPEN
SM RCS SEC PRPLNT FUEL PRESS (4) - OPEN
CM RCS LOGIC - on (up)
(275) cb MNA BAT BUS A - close
cb MNA BAT C - close
cb MNB BAT C - close
cb MNB BAT BUS B - close
Check BAT BUS current
RCS IND sw - CM2
SECS PYRO ARM (2) - ARM
Verify attitude & control
VHF AM A - OFF

EI -30 min SM JETT
CM/SM SEP (2) - on (up)
CSM/LM FNL SEP (2) - on (up)
RCS TRNFR - CM
Damp SC rates
C/W MODE - CM
SECS PYRO ARM (2) - SAFE
CM RCS LOGIC - OFF
CM RCS MANF PRESS - 287-302 psia
Verify attitude control (RING 2/MNB)

DATE 3/22/71

MNVR TO TRACK MOON WITH COAS, Pg C/3-22

CDR & LMP strap in for Entry

EI -20 min (275)

AC BUS PWR UP
cb INV PWR 3 MNA & MNB (2) - close
INV 3 - MNA
INV 3 AC1 & AC2 - on (up)
AC1 & AC2 RSET - RSET, on

SUIT COMPRESSOR 1 - AC1

SCS PWR UP
SCS ELEC PWR - GDC/ECA
BMAG PWR 1 - ON
FDAI/GPI PWR - 1
SC CONT - SCS

CMC PWR DOWN
V37E 06E
PRO, push (~5 sec) until STBY Lt - on
(5) cb G/N COMPUTER (2) - open

EMS INITIALIZATION
EMS MODE - STBY
EMS FUNC - TEST 5
  slew scroll to 37K
EMS FUNC - RNG SET
  set PAD RNG
EMS FUNC - Vo SET
  slew scroll to PAD VIO
EMS FUNC - ENTRY

EI -10 min GDC ALIGN (to MSFN angles set at -2:00 hr)

DATE 5/7/71

TRACK MOON, HORIZON OR ENTRY ATTITUDE
(moon set ~ EI -2 min)

SUIT COMPRESSOR - OFF
FDAI SCALE - 5/5
BMAG PWR 2 - ON
ROT CONTR PWR DIRECT (2) - MNA/MNB
Verify attitude
BMAG MODE (3) - RATE 2
MAN ATT (3) - RATE CMD
STOW COAS
EMS MODE - NORMAL

PERFORM EMS ENTRY

Go to EARTH/POST LANDING,
pg E/3-1

DATE 5/7/71

MIN PWR G&N

CSM/LM ATTACHED R CRITICAL ENTRY

MIN PWR SCS

NO COMM LM JETTISON

GENERAL CONTINGENCY PROCEDURES

SM JETTISON

MIN PWR G&N

GENERAL CONTINGENCY PROCEDURES

MIN PWR SCS

LOI 30 MIN DPS ABORT

ΔV THRUST A/B - OFF
SPS INJ vlvs (4) - CLOSED
SPS He tb (2) - bp
GMBL MOTS(4) - OFF (LMP Verify)
TVC SERVO PWR (2) - OFF
MN BUS TIE (2) - OFF
SC CONT - SCS
PCM BIT RATE - LOW
EMS MODE - STBY (verify)

RECORD DATA AND COMPUTE PAD

F 97 40
Record TFC _____
VG _____
ΔVM _____
EMS ΔVC _____
ENTR
F 99 40
ENTR
F 16 85
Record VGX _____ R _____
VGY _____ P _____
VGZ _____ Y _____
PRO
F 37 00E
When CMC ACTY lt out:
V66E

ALTERNATE
ΔVC LOI PAD _____
EMS ΔVC(Shutdown) _____
ΔVC(Burned) _____
ΔVC ABORT(Chart) ____

PRIMARY
G&N ΔVM _____
ΔVC ABORT(Chart) _____

GET LOI _____
+30:00
GET TEI ABORT : :

DATE 5/7/71

1 MNVR TO PAD BURN ATTITUDE
V62E

2 V49E
F 06 22 NEW ICDU ANGLES RPY (.01°)
Load desired angles
PRO

3 F 50 18 REQ MNVR TO FDAI RPY ANGLES (.01°)
(AUTO) BMAG MODE (3) - RATE 2
SC CONT - CMC
CMC MODE - AUTO
PRO
(MAN) MNVR - To 5

4 06 18 AUTO MNVR TO FDAI RPY ANGLES (.01°)

5 F 50 18 REQ TRIM MNVR TO FDAI RPY ANGLES
(TRIM) PRO To 4
(BYPASS) ENTR
EMS FUNC - OFF
Set ΔVC = +100.0
EMS FUNC - ΔV
TVC SERVO PWR 1 - AC1/MNA

28:00
(-02:00) V37E 47E
F 16 83 ΔV XYZ(CSM) (.1fps)

VI,HDOT,H available by N62E
*KEY RLSE to return to N83 *

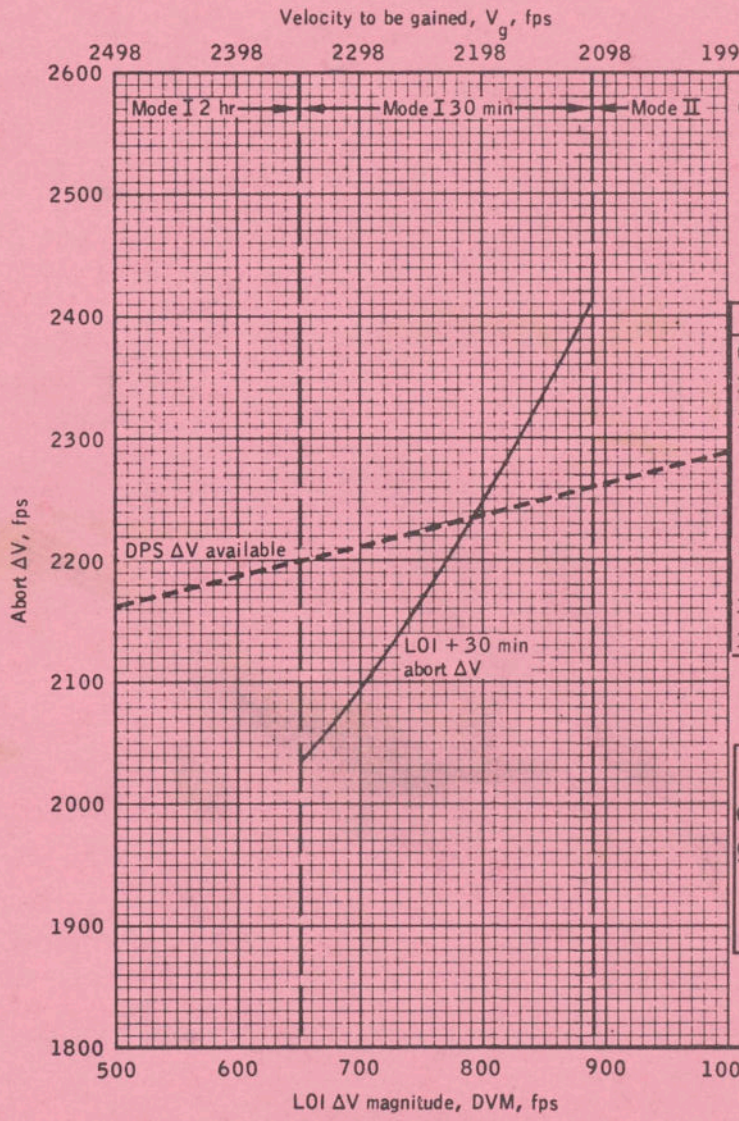
29:30
(-00:30) EMS MODE - NORMAL

29:58
(-00:02) CMC MODE - FREE
or SC CONT - SCS
MAN ATT (3) - ACCEL CMD

30:00 DPS IGNITION
(00:00) After engine cutoff (on LM callout)
CMC MODE - AUTO

3/22/71

DATE 7/8/71



CSM 4-1.- LOI + 30 min mode I DPS abort. (July 26 launch date)

Launch day dependent
Launch month dependent
Mission profile dependent

7/6/71 Final

Burntime	ΔVM	Mode	SPS	Type
0:00 - 1:38	0 - 652	I	TIGHT	DPS at 2 hr (RTCC)
1:38 - 1:58	652 - 791	I	LOOSE	DPS at 30 min (crewchart)
1:58 - 2:12	791 - 890	I	LOOSE	DPS at 30 min to depletion + APS at 2 1/2 hr (RTCC); Loss of comm, DPS followed immediately by APS (crewchart)
2:12 - 3:11	890 - 1313	II	LOOSE	DPS at 2 hr + DPS at perilune (RTCC)
3:11 - 3:56	1313 - 1649	III	LOOSE	DPS at perilune (RTCC)
3:56 - cutoff	1649 - cutoff	III	TIGHT	DPS at perilune (RTCC)

	Nominal	Update
GET LOI ignition	78:31:10.34	78 31 34.2
CSM IMU angles for LOI + 30 min DPS abort		
GET abort ignition	79:01:10.34	79 01 34.2
Roll	144	144
Pitch	2	352
Yaw	68	68

C
4-3

LOI 30 MIN DPS ABORT

NO COMM LM JETTISON | LOSS OF COMM NAV | CONTINGENCY EVA | SM JETTISON

RECORD ΔV COUNTER & RESIDUALS

ΔVC	_____	R	_____
VGX	_____	P	_____
VGY	_____	Y	_____
VGZ	_____		

PRO

F 37 00E

When CMC ACTY lt out, V66E
EMS FUNC - OFF
EMS MODE - STBY
TVC SERVO PWR 1 - OFF

DATE 3/22/71

2 LOI 2 HR DOCKED DPS/APS ABORT

ΔV THRUST A/B - OFF
SPS INJ vlvs (4) - CLOSED
SPS He tb (2) - bp
GMBL MTRS (4) - OFF (LMP verify)
TVC SERVO PWR (2) - OFF
MN BUS TIE(2) - OFF
SC CONT - SCS
PCM BIT RATE - LOW
EMS MODE - STBY

RECORD DATA AND COMPUTE PAD

F 97 40
Record TFC _____
VG _____
ΔVM _____
EMS ΔVC _____
ENTR
F 99 40
ENTR
F 16 85
Record VGX _____ R _____
VGY _____ P _____
VGZ _____ Y _____
PRO
F 37 00E
When CMC ACTY lt out, V66E
Perform P52 Star Check. If star not in SXT, perform P52, OPT 3
MODE I: MNVR TO CHART BURN ATT (P. C/4-7).
MODE II: + III: MNVR TO FLIGHT PLAN NOM AOS ATT.

ASSIST CDR & LMP IVT & LM ACT.

Couches: CDR - 0°, CMP - 0°, LMP - 180°
TUNL LTS - ON
TUNL VENT vlv - LM/CM ΔP
Verify LM/CM ΔP <0.2

*LM/CM ΔP >0.2 *
* Equalize CM/LM Pressure (Decal)*

Remove tunnel hatch (Decal)
Remove probe & stow (Decal)
Remove drogue & stow (Decal)

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Open LM hatch
LMP transfer to LM
At LM request,
LM PWR - RESET, then OFF
SYS TEST - 7D
SYS TEST ind - 0 volts
Transfer PGA's, Helmets, Gloves & Wristwatch
CDR transfer to LM

ALIGN LM IMU TO CSM IMU
ATT DB - MIN
RATE - LO
LIMIT CYCLE - ON
SC CONT - SCS (verify)
MAN ATT (3) - RATE CMD
BMAG MODE (3) - ATT1/RATE2
V06 N20E
Voice ICDU angles to LM
Terminate attitude hold on LM cmd
V06 N20 (On LM request)
On LM MARK, Key ENTR
Compare CSM & LM ICDU ANGLES

OG	IG	MG
_____CM	_____CM	_____CM
_____LM	_____LM	_____LM

LM (IGA)p = P20 + 180°
LM (OGA)y = 300° -R20 + ΔØ
LM (MGA)r = 360° -Y20

VHF CHECKOUT
Establish NORMAL LUNAR CONFIGURATION (S/1-23)
Configure for VHF Simplex B and respond
to LM comm check
Configure for VHF Simplex A

LM set MSN TMR to CSM MSN TMR on MARK

CMC/LGC CLOCK SYNC/TEPHEM UPDATE
V16 N65E (On LM request) _____:_____:_____
LM ENTR time on CSM MARK
V06 N65E on LM MARK and compare with
LM N65
CSM Time _____:_____:_____
LM Time _____:_____:_____
V05 N01E 1706E, Call TEPHEM to LM
R1 _____, R2 _____, R3 _____

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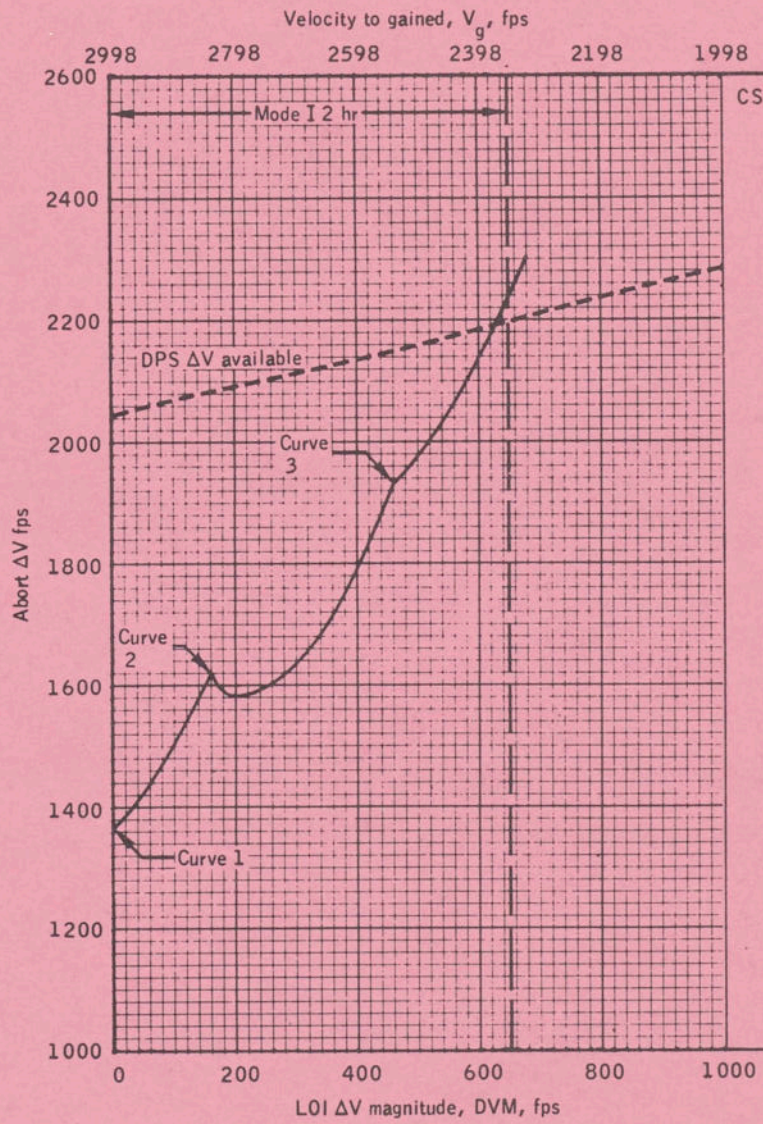
DATE 7/8/71



CSM 4-2.- LOI + 2 hr mode I DPS abort.
(July 26 launch date)

Launch day dependent
Launch month dependent
Mission profile dependent

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	Nominal
GET LOI ignition	78:31:10.34
GET abort ignition	80:31:10.34
Curve 1	
CSM IMU angles for LOI + 2 hr DPS abort	
Roll	298
Pitch	251
Yaw	80
LM FDAI angles for LOI + 2 hr DPS abort	
Roll	280
Pitch	69
Yaw	360
Curve 2	
CSM IMU angles for LOI + 2 hr DPS abort	
Roll	208
Pitch	335
Yaw	69
LM FDAI angles for LOI + 2 hr DPS abort	
Roll	269
Pitch	63
Yaw	340
Curve 3	
CSM IMU angles for LOI + 2 hr DPS abort	
Roll	189
Pitch	345
Yaw	57
LM FDAI angles for LOI + 2 hr DPS abort	
Roll	257
Pitch	50
Yaw	329

LOI MODE I DPS ABORT

C
4-7

NO COMM LM JETTISON | LOSS OF COMM NAV | CONTINGENCY EVA | SM JETTISON

Note: Rotation of docking interface may be performed at this point if desired.

DOCKING INTERFACE ROLL MNVR

COMPLETE IVT & CLOSEOUT
- Restow LM Umbilicals in LM tunnel
- Install drogue (Decal)
- Install probe (Decal)
- Preload probe (Decal)
- LM hatch closed
- Verify CSM roll cmds inhibited until LM/CM ΔP >3.5 psid (>4.0 psid, 4 jet)
- Don PGA, Helmet & Gloves
- Verify LM & CM Suit Check complete
- Release docking latches (Decal)
- Install tunnel hatch (Decal)
- Perform hatch integrity check (Decal)

Perform Soft Undocking Switch Configuration
- AUTO RCS - YAW, PITCH, B/D ROLL (12) - ON
  A/C ROLL (4) - OFF
- MAN ATT - ROLL - MIN IMP
  PITCH, YAW - RATE CMD
- LIMIT CYCLE - OFF
- ATT DB - MIN
- RATE - LOW
- THC PWR - ON
- RHC POWER NORM - AC/DC
- RHC PWR DIR (2) - OFF
- SC CONT - SCS
- CMC MODE - FREE
- BMAG MODE (3) - ATT1/RATE2
- cb DOCKING PROBE (2) - close

PROBE RETR (2) - OFF (verify)
PROBE EXTD/REL - RETR
PROBE EXTD/REL tb (2) - bp (verify, 1 reqd)
PROBE EXTD/REL - OFF
cb SECS LOGIC (2) - close (verify)
cb SECS ARM (2) - close
Cue MSFN for LOGIC ARM
- SECS LOGIC (2) - on (up)

MSFN go for PYRO ARM
- SECS PYRO ARM (2) - on (up)

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PROBE EXT/REL-EXT/REL (mom) (Cue LM)
Verify Probe Extended, LM Attached
Allow Motion to Damp (5 sec)
CSM Roll Left to Optimum Position

CSM WT	ΔROLL
<30K	125°
30K-40K	105°
>40K	85°

If LM to perform rotation:
* SC CONT - CMC/AUTO *

At Completion of Roll Mnvr
Allow Motion to Damp (5 sec)
SC CONT - CMC (Cue LM)
PROBE EXTD/REL - RETRACT
On LM Go - PROBE RETRACT - SEC 1 (PRIM 2)
At Dock Latch
PROBE EXTD/REL tb (2) - gray
After Hard Dock
SECS PYRO ARM (2) - SAFE
SECS LOGIC (2) - OFF
cb SECS ARM (2) - open
cb DOCK PROBE (2) - open
THC - LOCKED
RHC - LOCKED
PROBE EXT/REL - OFF
PROBE RETRACT (2) - OFF
THC PWR - OFF
RHC PWR DIR (2) - OFF (verify)
BMAG MODE (3) - RATE 2
CMC MODE - AUTO
Prepare Couch for Hatch
Remove Probe Straps (A1)
CDR - verify FWD DUMP vlv - AUTO
CABIN FANS - ON
Equalize CSM/LM Pressure (Decal A)
Remove Hatch and Stow (Decal)
Verify Docking Latches (Decal)
Connect LM Umbilicals (both, if poss)
Remove and Stow Probe and Drogue (Decal)

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DPS/APS BURN MONITOR CHECKLIST

Copy P-30 Pad
TIG (_____:_____:_____)
Cycle CRYO FANS

V48E - R1 21102, R2 01111, (DPS)
R1 61102, R2 01111, (APS)

MNVR TO PAD BURN ATT
V49E

50:00
(-10:00) START DET
V37E 00E

PERFORM BORESIGHT & SXT STAR CHECK, if poss
V41 N91E

54:00
(-06:00) CMC MODE - FREE
BMAG MODE - ATT1/RATE 2

If APS Burn
SC CONT - SCS
LIMIT CYCLE-ON
ATT DB - MIN (verify)
RATE-LOW (verify)

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EMS FUNC - ΔV SET/VHF RNG
Set ΔV = +100.0
EMS FUNC - ΔV
TVC SERVO PWR 1 - AC1/MNA

58:00
(-02:00) V37E 47E
F 16 83 ΔV XYZ(CSM) (.1fps)

VI,HDOT,H available by N62
*KEY RLSE to return to N83 *

59:30
(-00:30) EMS MODE - NORMAL

59:58
(-00:02) If APS Burn
SC CONT - CMC
BMAG MODE (3) - RATE 2

00:00 IGNITION
After engine cutoff (on LM callout)
CMC MODE - AUTO
RECORD ΔV COUNTER & RESIDUALS

ΔVC	_____	R	_____
VGX	_____	P	_____
VGY	_____	Y	_____
VGZ	_____		

PRO

F 37 00E
When CMC ACTY lt out, V66E
EMS FUNC - OFF
EMS MODE - STBY
TVC SERVO PWR 1 - OFF
BMAG MODE (3) - RATE 2

If DPS/APS Burn go to C/4-10 for APS Burn
If DPS Burn Incomplete go to C/4-8 for
Docking Interface Roll Mnvr (if reqd)
and C/4-10 for APS Burn.

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MIN PWR G&N

GENERAL CONTINGE

LOI ABORTS

MIN PWR SCS

NO COMM LM JETTISON

LOSS OF COMM NAV

CONTINGENCY EVA

SM JETTISON

MIN PWR SCS

LOI ABORTS

GENERAL CONTINGE

MIN PWR G&N

LOSS OF COMM PTC REFSMMAT

P27 UPDATE

PURP	PTC REF V	7	1	V			V		
GET	N/A : N/A	: N/A		:	:		:	:	
304 01	INDEX	2	4	INDEX			INDEX		
02	00306								
03	17021								
04	36620								
05	05012								
06	22002								
07	02132								
10	24730								
11	05361								
12	32416								
13	62151								
14	55770								
15	72011								
16	60343								
17	00000								
20	00000								
21	06273								
22	00746								
23	61244								
24	45532								
N34 HRS	X	X	X				X	X	X			
MIN	X	X	X	X			X	X	X	X		
NAV CHECK SEC	X	X					X					
N43 LAT		0						0				
LONG												
ALT	+	0					+	0				

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NOTE: AFTER LINE 24 ENTERED DO A V33E

LOSS OF COMM NAVIGATION

GENERAL RULES

1 A sighting or set is to consist of three marks.

2 Calibrate optics at the beginning of each batch and every half hour while navigation sightings in progress if the remaining sightings require more than 30 minutes to complete. The sextant calibration will be repeated until agreement of at least two checks (not necessarily sequential ones) are within 1 bit (.003°).

3 All attitude control should be done using coupled RCS thruster pairs.

4 See loss of comm midcourse proceed for mnvr times.

5 While in P23 V06N49 display:
If $\Delta R > 50$ nm, Or $\Delta V > 50$ fps;
Reject mark, reselect star and horizon, verify procedures, and repeat mark.

If large correction recurs, accept.

Large ΔR, ΔV values may be expected at the following times:

At initiation of tracking (first mark of each star of first batch).

At first switch of reference bodies.

After long periods between sightings.

Last hours before EI.

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6 Loss of W-Matrix after initiation of navigation sightings:

(a) Upon loss of W-Matrix, current onboard state vector is retained.

(b) W-Matrix Reinitialization and Navigation Procedures

(1) Sightings Not In Progress:

Before next batch, reinitialize W-Matrix, V67 V06N99 Load values shown in tables.

Continue Navigation

(2) Sightings In Progress:

Immediately reinitialize W-Matrix, V67 V06N99 Load values shown in tables.

Restart interrupted batch of navigation sightings.

Continue navigation

GENERAL PROCEDURES

1 If entry pad previously received, no tracking performed.

If not, proceed.

2 Execute abort - if required (unless comm loss during nominal TEC).

3 Reinitialize W-Matrix, V67 (diagonal values, V06N99, from tables)

4 Determine return-time

5 Select navigation schedule (see tables). If table I, II, or III are not applicable, refer to do-it-yourself rules.

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6 Select starting batch first navigation sightings to use stars corresponding to navigation schedule time first occurring after abort.

7 Alternate sightings are provided in the event the preferred sighting cannot be performed.

8 After each batch (or two batches if the batches are back to back), determine entry time from P37 by calling N38 after integration has been completed and before proceeding on the lat, long display.

9 Determine and record Hp using routine 30 V82 N44 by specifying the time load equal to entry time determined in above step.

10 The state vector from each previous batch of P23 sightings is retained in the LM state vector slot until the navigator has determined the current batch to be acceptable. When the state vector from the current batch has been determined to be acceptable, the state is transferred to the LM state vector slot (V66). If the batch is unacceptable, use V47 to transfer the good state vector from the LM slot to the CSM slot (do no reinitialize the W-matrix) and repeat current batch.

DO-IT-YOURSELF PECULIAR RULES

1 Reinitialize W-Matrix and schedule a tracking interval as soon as possible after the abort burn; or in the case of the lunar flyby, about 1 hour after perilune. If sightings are performed translunar for any reason, reinitialize the W-Matrix 1 hour after perilune for trans-earth sightings. W-Matrix values are given in tables IV-1 and 2 for each return type.

2 A batch is to consist of at least three star/horizon sightings, although as many as five can be advantageous, particularly following a sleep period.

3 All available stars should be used in the sighting schedule. No more than three marks should be taken on a star within a batch of data.

4 Sightings during the last 10 hours before entry interface are important. Five earth horizon sightings should be scheduled at EI-5 hours and three earth horizon sightings should be scheduled following the MCC at EI-3 hours. <u>If no earth horizon sightings are available, lunar horizon sightings should be used</u>.

5 Whenever possible, the navigation batches should be scheduled so that, immediately following a time period of length Δt (not to exceed 3 hours) in a non-PTC mode, five times Δt should be spent in a PTC mode (thermal constraints). This rule will be violated most frequently in the following situations: (1) aborts from a translunar trajectory with short return lengths, (2) time critical aborts, (3) the 10-hour period before entry interface.

6 If possible, both near and far horizons should be included in each batch of data.

7 Star availability is related to GMT <u>not</u> GET. Therefore, as a clue to determine star available, refer to either Table I, II or III which has a GMT for entry corresponding to your GMT for entry. In addition, the star charts should be used to select available stars.

8 Go to Table IV.

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MIDCOURSE PROCEDURES

Time Of Midcourse And Midcourse Execution Criteria

1 For midcourses following translunar coast aborts, execute the midcourse maneuvers whenever it is felt that a good estimate of the trajectory has been obtained by P23 and the ΔV shown by P37 is greater than 0 fps. The last midcourse maneuver should be executed no later than EI - 3 hours.

2 For midcourses following TEI, execute midcourse maneuvers at the times specified in the flight plan. These times are: MCC5: TEI + 17 hours
MCC6: EI - 22 hours
MCC7: EI - 3 hours
These midcourse maneuvers should be executed if the ΔV from P37 is greater than 0 fps.

Midcourse Maneuver Rules

Follow monitoring, shutdown and trim criteria as outlined in flight plan for MCC5, MCC6 and MCC7. Follow this criteria both for transearth midcourses and midcourses following TLC aborts.

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GENERAL INFORMATION

It can be determined if the entry corridor is being attained by determining Hp (vaccum perigee altitude) using the procedure outlined in the General Loss-of-Comm Navigation Procedure section, (steps 8, 9, 10) and comparing that value to the Hp limits listed in the following table.

Hp LIMITS FOR ENTRY CORRIDOR

	Minimum* Hp (n. mi.)	Nominal Hp (N. mi.)	Maximum** Hp (n. mi)
TLC aborts			
Lift-off + 8 hrs			
~ 18 hr trip time	7.7	21.6	36.0
~ 42 hr trip time	8.6	21.8	35.9
Lift-off + 15 hrs	8.9	22.2	35.9
Lift-off + 25 hrs	9.8	22.4	35.7
Lift-off + 35 hrs	10.4	22.8	35.6
Lift-off + 45 hrs	10.3	22.7	35.5
Lift-off + 60 hrs	10.5	22.8	36.3
Nominal transearth coast	9.9	22.2	35.7

*Corresponds to entry with bank 15° 12g undershoot
**Corresponds to entry with constant g - 2500 n. mi. overshoot

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C
5-7

NAVIGATION TIME DETERMINATION

1. To determine GET of navigation, GET (nav), from tables defining time in EI-XX.

GET(EI) = TIG (abort) + ΔT (P37)
Where: TIG (abort) = time (GETI) of abort
ΔT (P37) = Δt from TIG (abort) to EI from P37

Computation:

TIG (abort)							
+ΔT (P37)							
GET (EI)							

GET (nav) = GET (EI) - XX

GET (EI)														
-XX														
GET (nav)														
GET (EI)														
-XX														
GET (nav)														
GET (EI)														
-XX														
GET (nav)														

2. To determine GET of navigation, GET (nav), from tables defining time in TEI +YY

GET (nav) = GET (TEI) +YY

TIG														
+YY														
GET (nav)														
TIG														
+YY														
GET (nav)														

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TABLE I.- LIFT-OFF + 8 HR ABORT

W-MATRIX REINITIALIZATION

R1 + 80000
R2 + 00070
R3 + 00003

NAVIGATION SCHEDULE

ΔT to EI < 18 hrs, TABLE I(a)
ΔT to EI > 18 hrs, TABLE I(b)

TABLE I(a)

Sighting Schedule for Abort from Translunar Coast at 8:00 Hours GET
July 26, 1971 Launch Date
Short Return (Less than 18 hours)
(GMT of EI = 27 July 1971, 13 hours)

Time	Star	Horizon	R3
EI - 15.0	2 DIPHDA	EF	00120
	46	EN	00110
	131	EN	00110
	*132	EN	00110
	*103	EN	00110
EI - 13.0	2 DIPHDA	EF	00120
	46	EN	00110
	131	EN	00110
	*133	EN	00110
	*223	EF	00120
EI - 11:00	2 DIPHDA	EF	00120
	133	EN	00110
	46	EN	00110
	*131	EN	00110
	*223	EF	00120
EI - 9:00	1 ALPHERATZ	EF	00120
	11 ALDEBARAN	EN	00110
	46	EN	00110
	*10 MIRFAK	EN	00110
	*223	EF	00120

*Alternate stars - to be used if other sightings cannot be made.

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TABLE I(a)

Sighting Schedule for Abort from Translunar Coast
at 8:00 Hours GET, July 26, 1971 Launch Date
Short Return (Less than 18 hours)
(GMT of EI = 27 July 1971, 13 hours)
(Concluded)

Time	Star	Horizon	R3
EI - 7	1 ALPHERATZ	EF	00120
	11 ALDEBARAN	EN	00110
	135	EN	00110
	*2 DIPHDA	EF	00120
	*10 MIRFAK	EN	00110
EI - 5	1 ALPHERATZ	EF	00120
	13 CAPELLA	EN	00110
	60	EN	00110
	10 MIRFAK	EN	00110
	126	EF	00120
EI - 2.5	13 CAPELLA	EN	00110
	60	EN	00110
	64	EN	00110
	*55	EN	00110
	*106	EN	00110

TABLE I(b)

Sighting Schedule for an Abort from Translunar
Coast at 8:00 Hours GET
July 26, 1971 Launch Date
Long Return (Greater than 18 hours)
(GMT of EI = 27 July 1971, 16 hours)

Time	Star	Horizon	R3
EI - 17.0	131	EN	00110
	46	EN	00110
	131	EN	00110
	*103	EN	00110
	*224	EF	00120
EI - 15.0	2 DIPHDA	EF	00120
	46	EN	00110
	131	EN	00110
	*132	EN	00110
	*224	EF	00120
EI - 13.0	2 DIPHDA	EF	00120
	131	EN	00110
	46	EN	00110
	*3 NAVI	EN	00110
	*126	EF	00120
EI - 11.0	2 DIPHDA	EF	00120
	11 ALBEDARAN	EN	00110
	46	EN	00110
	*10 MIRFAK	EN	00110
	*126	EF	00120

*Alternate stars - to be used if other sightings cannot be made.

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TABLE I(b)
Sighting Schedule for an Abort from Translunar Coast
at 8:00 Hours GET, July 26, 1971 Launch Date
Long Return (Greater than 18 hours)
(GMT of EI = 27 July 1971, 16 hrs)
(Concluded)

Time	Star	Horizon	R3
EI - 9.0	1 ALPHERATZ	EF	00120
	11 ALDEBARAN	EN	00110
	135	EN	00110
	*10 MIRFAK	EN	00110
	*224	EF	00120
EI - 7.0	1 ALPHERATZ	EF	00120
	60	EN	00110
	126	EF	00120
	*133	EN	00110
	*135	EN	00110
EI - 5.0	10 MIRFAK	EN	00110
	60	EN	00110
	126	EF	00120
	1 ALPHERATZ	EF	00120
	13 CAPELLA	EN	00110
EI - 2.5	55	EN	00110
	64	EN	00110
	67	EN	00110
	*106	EN	00110
	*144	EN	00110

* Alternate stars - to be used if other sightings cannot be made.

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TABLE II.- ABORTS FROM LUNAR ORBIT

A. ABORTS BECAUSE OF LOSS OF COMM

W-MATRIX REINITIALIZATION
R1 +30000
R2 +00300
R3 +00003

NAVIGATION SCHEDULE
GMT RETURN ON AUGUST 3, TABLE II(a)
GMT RETURN ON AUGUST 4, TABLE II(b)
GMT RETURN ON AUGUST 5, TABLE II(c)
GMT RETURN ON AUGUST 6, TABLE II(d)
GMT RETURN ON AUGUST 7, TABLE II(e)

B. COMM LOSS AFTER ABORT FROM LUNAR ORBIT

W-MATRIX REINITIALIZATION

a. COMM LOSS PRIOR TO TIME FOR NAV STG BATCH 1
R1 + 30000
R2 + 00300
R3 + 00003

b. COMM LOSS AFTER TIME FOR BATCH 1 AND NO SV UPDATE AFTER TEI
R1 + 99000
R2 + 00020
R3 + 00003

c. COMM LOSS AFTER TIME FOR BATCH 1 AND AT LEAST ONE SV UPDATE AFTER TEI
R1 + 45000
R2 + 00006
R3 + 00003

NAVIGATION SCHEDULE
GMT EI AUGUST 3, TABLE II(a)
GMT EI AUGUST 4, TABLE II(b)
GMT EI AUGUST 5, TABLE II(c)
GMT EI AUGUST 6, TABLE II(d)
GMT EI AUGUST 7, TABLE II(e)
GMT NOT COVERED BY ABOVE, GO TO "DO-IT-YOURSELF", TABLE IV.

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TABLE II(a)

Sighting Schedule for Abort from Lunar Orbit
(GMT of EI = 3 August 1971, 17 hrs)
July 26, 1971 Launch Date

Time	Star	Horizon	R3
TEI + 2.0	76	MN	00210
	120	MN	00210
	127	MN	00210
	42 PEACOCK	MN	00210
	204	MN	00210
TEI + 13.5	46	EF	00120
	102	EF	00120
	13 CAPELLA	EN	00110
	*131	EF	00120
	*11 ALDEBARAN	EN	00110
TEI + 14.0	76	MN	00210
	41 DABIH	MF	00220
	42 PEACOCK	MN	00210
	*77	MN	00210
	*127	MN	00210
TEI + 16.0	46	EF	00120
	102	EF	00120
	13 CAPELLA	EN	00110
	*131	EF	00120
	*57	EN	00110
TEI + 20.5 (SAME AS TEI + 16.0)	46	EF	00120
	102	EF	00120
	13 CAPELLA	EN	00110
	*131	EF	00120
	*57	EN	00110
TEI + 27.0	46	EF	00120
	102	EF	00120
	13 CAPELLA	EN	00110
	*131	EF	00120
	*11 ALDEBARAN	EN	00110
EI - 32.0	12 RIGEL	EN	00110
	102	EF	00120
	13 CAPELLA	EN	00110
	*46	EF	00120
	*136	EN	00110

*Alternate stars - to be used if other sightings cannot be made.

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MIN PWR SCS
LOI ABORTS
LOSS OF COMM NAV
MIN PWR G&N

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TABLE II(a)
Sighting Schedule for Abort from Lunar Orbit
(GMT of EI = 3 August 1971, 17 hrs)
July 26, 1971 Launch Date
(Concluded)

Time	Star		Horizon	R3
EI - 27.0	12	RIGEL	EN	00110
	102		EF	00120
	13	CAPELLA	EN	00110
	*46		EF	00120
	*136		EN	00110
EI - 22.0	12	RIGEL	EN	00110
(SAME AS	102		EF	00120
EI - 27.0)	13	CAPELLA	EN	00110
	*46		EF	00120
	*136		EN	00110
EI - 19.0	12	RIGEL	EN	00110
(SAME AS	102		EF	00120
EI - 27.0)	13	CAPELLA	EN	00110
	*46		EF	00120
	*105		EN	00110
EI - 7.5	46		EF	00120
	13	CAPELLA	EN	00110
	105		EN	00110
	*131		EF	00120
	*57		EN	00110
EI - 5.0	105		EN	00110
	46		EF	00120
	60		EN	00110
	63		EN	00110
	7	MENKAR	EF	00120
EI - 2.5	106		EN	00110
	16	PROCYON	EN	00110
	64		EN	00110

*Alternate stars - to be used if other sightings cannot be made.

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TABLE II(b)

Sighting Schedule for Abort from Lunar Orbit
(GMT of EI 4 August 1971, 18 hrs)
July 26, 1971 Launch Date

Time	Star	Horizon	R3
TEI + 2.0	120	MN	00210
	40 ALTAIR	MN	00210
	121	MN	00210
	45 FOMALHAUT	MN	00210
	101	MN	00210
TEI + 13.5	57	EN	00110
	103	EF	00120
	13 CAPELLA	EN	00110
	*46	EF	00120
	*55	EN	00110
TEI + 14.0	76	MN	00210
	40 ALTAIR	MF	00220
	77	MN	00210
	*37 NUNKI	MN	00210
	*127	MN	00210
TEI + 16.0	57	EN	00110
	46	EF	00120
	13 CAPELLA	EN	00110
	*103	EF	00120
	*55	EN	00110
TEI + 20.5 (SAME AS TEI + 16.0)	57	EN	00110
	46	EF	00120
	13 CAPELLA	EN	00110
	*103	EF	00120
	*55	EN	00110
TEI + 27.0	57	EN	00110
	103	EF	00120
	13 CAPELLA	EN	00110
	*46	EF	00120
	*55	EN	00110
EI - 32.0	55	EN	00110
	46	EF	00120
	13 CAPELLA	EN	00110
	*103	EF	00120
	*57	EN	00110
EI - 27.0	55	EN	00110
	46	EF	00120
	106	EN	00110
	*103	EF	00120
	*57	EN	00110

*Alternate stars - to be used if other sightings cannot be made.

DATE 6/15/71

MIN PWR SCS
LOI ABORTS
LOSS OF COMM NAV
MIN PWR G&N

6/1/71 Final

TABLE II(b)
Sighting Schedule for Abort from Lunar Orbit
(GMT of EI 4 August 1971, 18 hrs)
July 26, 1971 Launch Date)
(Concluded)

Time	Star	Horizon	R3
EI - 22.0	55	EN	00110
	46	EF	00120
	106	EN	00110
	*103	EF	00120
	*64	EN	00110
EI - 19.0	55	EN	00110
(SAME AS	46	EF	00120
EI - 22.0)	106	EN	00110
	*103	EF	00120
	*64	EN	00110
EI - 7.5	16 PROCYON	EN	00110
	132	EF	00120
	67	EN	00110
	*227	EF	00120
	*64	EN	00110
EI - 5	11 ALDEBARAN	EF	00120
	67	EN	00110
	16 PROCYON	EN	00110
	132	EF	00120
	64	EN	00110
EI - 2.5	16 PROCYON	EN	00110
	12 RIGEL	EF	00120
	67	EN	00110
	*136	EF	00120
	*50	EN	00110

*Alternate stars - to be used if other sightings cannot be made.

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TABLE II(c)

Sighting Schedule for Abort from Lunar Orbit
(GMT of EI = 5 August 1971, 19 hrs)
July 26, 1971 Launch Date

Time	Star	Horizon	R3
TEI + 2.0	1 ALPHERATZ	MN	00210
	2 DIPHDA	MN	00210
	126	MN	00210
	223	MN	00210
	101	MN	00210
TEI + 13.5	64	EN	00110
	103	EF	00120
	106	EN	00110
	*55	EN	00110
	*10 MIRFAK	EF	00120
TEI + 14.0	37 NUNKI	MF	00220
	224	MN	00210
	40 ALTAIR	MF	00220
	*214	MF	00220
	*235	MF	00220
TEI + 16.0	55	EN	00110
	103	EF	00120
	106	EN	00110
	*64	EN	00110
	*46	EF	00120
TEI + 20.5	55	EN	00110
	46	EF	00120
	106	EN	00110
	*64	EN	00110
	*103	EF	00120
TEI + 27.0	55	EN	00110
	7 MENKAR	EF	00120
	64	EN	00110
	*10	EF	00120
	*133	EF	00120
EI - 32.0	16 PROCYON	EN	00110
	10 MIRFAK	EF	00120
	50	EN	00110
	*133	EF	00120
	*64	EN	00110

*Alternate stars - to be used if other sightings cannot be made.

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TABLE II(c)
Sighting Schedule for Abort from Lunar Orbit
(GMT of EI = 5 August 1971, 19 hrs)
July 26, 1971 Launch Date)
(Concluded)

Time	Star	Horizon	R3
EI - 27.0	16 PROCYON	EN	00110
	10 MIRFAK	EF	00120
	67	EN	00110
	*133	EF	00120
	*64	EN	00110
EI - 22.0	16 PROCYON	EN	00110
	10 MIRFAK	EF	00120
	11 ALBEDARAN	EF	00120
	*64	EN	00110
	*133	EF	00120
EI - 19	16 PROCYON	EN	00110
(SAME AS	10 MIRFAK	EF	00120
EI - 22.0)	11 ALDEBARAN	EF	00120
	*64	EN	00110
	*133	EF	00120
EI - 7.5	16 PROCYON	EN	00110
	11 ALDEBARAN	EF	00120
	67	EN	00110
	*133	EF	00120
	*50	EN	00110
EI - 5.0	37 NUNKI	MN	00210
	40 ALTAIR	MF	00220
	204	MN	00210
	45 FOMALHAUT	MF	00220
	213	MN	00210
EI - 2.5	37 NUNKI	MN	00210
(SAME AS	40 ALTAIR	MF	00220
EI - 5.0)	204	MN	00210
	*45 FOMALHAUT	MF	00220
	*213	MN	00210

*Alternate stars - to be used if other sightings cannot be made.

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TABLE II(d)

Sighting Schedule for Abort from Lunar Oribt
(GMT of EI = 6 August 1971, 20 hours)
July 26, 1971 Launch Date

Time	Star	Horizon	R3
TEI + 2.0	1 ALPHERATZ	MN	00210
	221	MF	00220
	2 DIPHDA	MN	00210
	223	MN	00210
	126	MN	00210
TEI + 13.5	16 PROCYON	EN	00110
	11 ALDEBARAN	EF	00120
	50	EN	00110
	*10 MIRFAK	EF	00120
	*67	EN	00110
TEI + 14.0	126	MN	00210
	40 ALTAIR	MF	00220
	224	MN	00210
	*120	MF	00220
	*223	MN	00210
TEI + 16.0 (SAME AS TEI + 13.5)	16 PROCYON	EN	00110
	11 ALDEBARAN	EF	00120
	50	EN	00110
	*10 MIRFAK	EF	00120
	*67	EN	00110
TEI + 20.5	16 PROCYON	EN	00110
	11 ALDEBARAN	EF	00120
	50	EN	00110
	*67	EN	00110
	*133	EF	00120
TEI + 27.0 (SAME AS TEI + 20.5)	16 PROCYON	EN	00110
	11 ALDEBARAN	EF	00120
	50	EN	00110
	*67	EN	00110
	*133	EF	00120
EI - 32.0	16 PROCYON	EN	00110
	11 ALDEBARAN	EF	00120
	50	EN	00110
	*60	EF	00120
	*67	EN	00110

*Alternate stars - to be used if other sightings cannot be made.

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MIN PWR SCS
LOI ABORTS
LOSS OF COMM NAV
MIN PWR G&N

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TABLE II(d)
Sighting Schedule for Abort from Lunar Orbit
(GMT of EI = 6 August 1971, 20 hrs)
July 26, 1971 Launch Date)
(Concluded)

Time	Star	Horizon	R3
EI - 27.0	16 PROCYON	EN	00110
(SAME AS	11 ALDEBARAN	EF	00120
EI - 32.0)	50	EN	00110
	*60	EF	00120
	*67	EN	00110
EI - 22.0	16 PROCYON	EN	00110
	11 ALDEBARAN	EF	00120
	50	EN	00110
	*13 CAPELLA	EF	00120
	*67	EN	00110
EI - 19.0	60	EF	00120
	50	EN	00110
	13 CAPELLA	EF	00120
	*11 ALDEBARAN	EF	00120
	*133	EF	00120
EI - 10.0	11 ALDEBARAN	EF	00120
	60	EF	00120
	57	EF	00120
	*142	EF	00120
	*135	EF	00120
EI - 5.0	37 NUNKI	MF	00220
	121	MN	00210
	77	MF	00220
	224	MN	00210
	214	MF	00220
EI - 2.5	45 FOMALHAUT	MN	00210
	235	MF	00220
	221	MN	00210
	*216	MF	00220
	*41 DABIH	MF	00220

*Alternate stars - to be used if other sightings cannot be made.

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TABLE II(e)
Sighting Schedule for Abort from Lunar Orbit
(GMT of EI = 7 August 1971, 21 hrs)
July 26, 1971 Launch Date

Time	Star	Horizon	R3
TEI + 2.0	103	MN	00210
	224	MF	00220
	7 MENKAR	MN	00210
	122	MN	00210
	3 NAVI	MN	00210
TEI + 13.5	221	MF	00220
	45 FOMALHAUT	MF	00220
	44 ENIF	MF	00220
	*1 ALPHERATZ	MN	00210
	*126	MN	00210
TEI + 14.0	50	EN	00110
	11 ALDEBARAN	EF	00120
	13 CAPELLA	EF	00120
	*57	EF	00120
	*60	EF	00120
TEI + 16.0 (SAME AS TEI + 14.0)	50	EN	00110
	11 ALDEBARAN	EF	00120
	13 CAPELLA	EF	00120
	*57	EF	00120
	*60	EF	00120
TEI + 20.5	11 ALDEBARAN	EF	00120
	13 CAPELLA	EF	00120
	57	EF	00120
	*60	EF	00120
	*142	EF	00120
TEI + 27.0 (SAME AS TEI + 20.5)	11 ALDEBARAN	EF	00120
	13 CAPELLA	EF	00120
	57	EF	00120
	*60	EF	00120
	*142	EF	00120
EI - 32.0	13 CAPELLA	EF	00120
	142	EF	00120
	60	EF	00120
	*144	EF	00120
	*106	EF	00120
EI - 27.0 (SAME AS EI - 32.0)	13 CAPELLA	EF	00120
	142	EF	00120
	60	EF	00120
	*144	EF	00120
	*106	EF	00120

*Alternate stars - to be used if other sightings cannot be made.

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TABLE II(e)
Sighting Schedule for Abort from Lunar Orbit
(GMT of EI = 7 August 1971, 21 hrs)
July 26, 1971 Launch Date)
(Concluded)

Time	Star		Horizon	R3
EI - 22.0	1	ALPHERATZ	MN	00210
	44	ENIF	MF	00220
	126		MN	00210
	*40	ALTAIR	MF	00220
	*224		MN	00210
EI - 19.0	1	ALPHERATZ	MN	00210
(SAME AS	44	ENIF	MF	00220
EI - 22.0)	126		MN	00210
	*40	ALTAIR	MF	00220
	*224		MN	00210
EI - 7.5	224		MN	00210
	45	FOMALHAUT	MF	00220
	126		MN	00210
	*223		MN	00210
	*40	ALTAIR	MF	00220
EI - 5.0	223		MN	00210
	40	ALTAIR	MF	00220
	126		MN	00210
	224		MN	00210
	221		MF	00220
EI - 2.5	126		MN	00210
	221		MF	00220
	40	ALTAIR	MF	00220
	*224		MN	00210
	*223		MN	00210

*Alternate stars - to be used if other sightings cannot be made.

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TABLE III.- COMM LOSS DURING NOMINAL TEC

W-MATRIX REINITIALIZATION

a. COMM LOSS PRIOR TO TIME FOR NAV STG BATCH 1
R1 + 30000
R2 + 00300
R3 + 00003

b. COMM LOSS AFTER TIME FOR NAV STG BATCH 1
AND NO SV UPDATE AFTER TEI
R1 + 99000
R2 + 00020
R3 + 00003

c. COMM LOSS AFTER TIME FOR NAV STG BATCH 1
AND AT LEAST ONE SV UPDATE AFTER TEI
R1 + 45000
R2 + 00006
R3 + 00003

Sighting Schedule for Nominal Transearth Coast
(GMT of EI = 7 August 1971, 20 hrs, 32 min, 20 sec)
July 26, 1971 Launch Date

Time	Star	Horizon	R3
TEI + 2.0	103	MN	00210
	44 ENIF	MF	00220
	43 DENEB	MN	00210
	3 NAVI	MN	00210
	122	MN	00210
TEI + 13.5	57	EF	00120
	50	EN	00110
	13 CAPELLA	EF	00120
	*11 ALDEBARAN	EF	00120
	*22 REGULUS	EN	00110
TEI + 14.0	102	MN	00210
	45 FOMALHAUT	MF	00220
	2 DIPHDA	MN	00210
	*1 ALPHERATZ	MN	00210
	*221	MF	00220
TEI + 16.0	57	EF	00120
	50	EN	00110
	13 CAPELLA	EF	00120
	*11 ALDEBARAN	EF	00120
	*22 REGULUS	EN	00110

*Alternate stars - to be used if other sightings cannot be made.

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TABLE III

Sighting Schedule for Nominal Transearth Coast
(GMT of EI = 7 August 1971, 20 hrs, 32 min, 20 sec)
July 26, 1971 Launch Date

Time	Star	Horizon	R3
TEI + 20.5	57	EF	00120
	50	EN	00110
	13 CAPELLA	EF	00120
	*22 REGULUS	EN	00110
	*11 ALDEBARAN	EF	00120
TEI + 27.0	11 ALDEBARAN	EF	00120
	50	EN	00110
	13 CAPELLA	EF	00120
	*22 REGULUS	EN	00110
	*60	EF	00120
EI - 32.0	11 ALDEBARAN	EF	00120
	13 CAPELLA	EF	00120
	142	EF	00120
	*60	EF	00120
	*135	EF	00120
EI - 27.0	60	EF	00120
	21 ALPHARD	EN	00110
	13 CEPELLA	EF	00120
	*142	EF	00120
	*135	EF	00120
EI - 22.0 (SAME AS EI - 27.0)	60	EF	00120
	21 ALPHARD	EN	00110
	13 CAPELLA	EF	00120
	*142	EF	00120
	*135	EF	00120
EI - 19.0	60	EF	00120
	21 ALPHARD	EN	00110
	13 CAPELLA	EF	00120
	*67	EF	00120
	*135	EF	00120
EI - 11.0	21 ALPHARD	EN	00110
	13 CAPELLA	EF	00120
	106	EF	00120
EI - 5.0	126	MN	00210
	221	MF	00220
	40 ALTAIR	MF	00220
	224	MN	00210
	223	MN	00210
EI - 2.5	126	MN	00210
	120	MF	00220
	40 ALTAIR	MF	00220
	*224	MN	00210
	*223	MN	00210

*Alternate stars - to be used if other sightings cannot be made.

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TABLE IV - DO-IT-YOURSELF

1. ABORTS FROM TLC

W-MATRIX INITIALIZATION

R1 + 80000
R2 + 00070
R3 + 00003

NAVIGATION SCHEDULE

ΔT TO EI <20 hrs
BATCHES OF 3 SETS EVERY 2.5 hrs
BATCH OF 5 SETS AT EI-5
(BEFORE LAST MCC AT EI-3)
BATCH OF 3 SETS AFTER LAST MCC

ΔT >20 hrs
SLEEP PERIODS OF 8 HOURS MAY BE SCHEDULED.
CREW SHOULD BE AWAKE LAST 10 HOURS PRIOR TO EI.
WHILE AWAKE:
BATCHES OF 3 SETS EVERY 3 HRS
BATCHES OF 5 SETS AFTER SLEEP PERIODS
BATCH OF 5 SETS PRIOR TO LAST MCC (AT EI-3)
BATCH OF 3 SETS AFTER LAST MCC

NOTE - ONLY STAR/EARTH HORIZON MARKS WILL BE MADE.

2. FLYBY, ABORT FROM LUNAR ORBIT, TEC.

W-MATRIX INITIALIZATION

a. COMM LOSS BEFORE BATCH 1
(at TEI + 1 or perilune +1 hr)

R1 + 30000
R2 + ~~00030~~ 00300
R3 + 00003

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TABLE IV - (Continued)

b. COMM LOSS AFTER ~~BARCH~~ BATCH 1
(at TEI + 1 or perilune + 1 hr)
and
No SV update after TEI
R1 + 99000
R2 + 00020
R3 + 00003

c. COMM LOSS AFTER BATCH 1
(at TEI + 1 or perilune +1 hr)
and
At least one SV update
after TEI
R1 + 45000
R2 + 00006
R3 + 00003

NAVIGATION SCHEDULE

A. RETURN LENGTH >70 hrs

1 Refer to Table III for placement of batches of star/horizon sightings and relate the times given at "TEI +" and "EI-" to the specific transearth situation. For each batch scheduled, take three marks on each available star (up to 5 stars).

2 Schedule three earth horizon sightings for every 5 hours between TEI + 32 and EI - 40 hours, or if an additional sleep period is needed for very slow returns, schedule five earth horizon sightings before the sleep period and five earth horizon sightings upon awakening.

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TABLE IV - (Concluded)

B. RETURN LENGTH <70 hrs

1 Sleep periods of 8 hours should be provided. Astronauts should be awake the last 10 hours before entry interface.

2 Three sets of star horizon observations should be scheduled every three hours while awake with five sets scheduled before and after each sleep period.

(a) A batch of lunar horizon sightings should be taken at TEI + 1 hour or perilune + 1 hr.

(b) The second batch of data should consist of earth horizon sightings.

(c) The third batch of data should consist of lunar horizon sightings.

(d) The remainder of the data should be earth horizon sightings. If no earth horizon sightings are available, lunar horizon sightings should be substituted.

3 Five earth/horizon sets should be scheduled at EI-5 hours before the MCC at EI = 3 hours. Three sets should be taken after the midcourse. If no earth horizon sightings are available, lunar horizon sightings should be substituted.

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CONTINGENCY JETTISON

1. NO COMM LM JETTISON

1 EARTH ORBIT - (LM/CSM CONTINGENCY DEORBIT)

MNVR TO POSIGRADE/HEADS DOWN ATTITUDE
POSITION 31.7° LINE ON HORIZON
USE P47 AND EMS TO MONITOR SEP MNVR

RETRO FIRE - 20 MIN

JETTISON LM
PERFORM -X 4 JET TRANSLATION (24 SEC)
MNVR TO RETRO FIRE ATTITUDE

2 TRANSLUNAR COAST - (DIRECT ABORT FROM TLC)

PITCH 180° FROM ABORT ATTITUDE
USE P47 AMD EMS TO MONITOR SEP MNVR

ABORT BURN - 30 MIN

JETTISON LM
PERFORM -X TRANSLATION (ΔV = 1 FPS)
MNVR TO ABORT BURN ATTITUDE

3 LUNAR ORBIT - (CONTINGENCY TEI)

(PERFORM ~ 1 HOUR (NO LATER THAN 30 MIN) PRIOR TO TEI)
MNVR TO LV/LH ATT R = 180° (HEADS DOWN)
P = 000°
Y = 000°
USE P47 AND EMS TO MONITOR SEP MNVR

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TEI - 1 HR

JETTISON LM
PERFORM -X TRANSLATION (NET ΔV = 1 FPS
RETROGRADE)
MNVR TO TEI ATTITUDE

4 TRANSEARTH COAST - LATE LM JETTISON)

(PERFORM ~ 1 HOUR TO 45 MIN PRIOR TO EI)
REALIGN IMU TO ENTRY REFSMMAT
MNVR TO INERTIAL ATT R = +0 (ARBITRARY)
P = +196
Y = +45
USE P47 AND EMS TO MONITOR SEP MNVR

EI - 1 HOUR

JETTISON LM
PERFORM -X TRANSLATION (NET ΔV = 3 FPS)
MNVR TO ENTRY ATTITUDE

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2. SERVICE MODULE JETTISON

PRIMARY GLYCOL TO RADIATORS - BYPASS (Pull)
SM O2 SUPPLY - OFF
Power SM MAIN BUS
cb INSTR PWR CONTROL (4) - CLOSE (Pnl 276)
  or cb INSTR ESS MN A & MN B (2) - CLOSE (Pnl 5)
cb C/W MNA & MNB (2) - CLOSE (Pnl 5)
cb RCS SM HEATERS (4) - CLOSE (Pnl 8)
Verify SM RCS Quad Temps - If <60°:
  SM RCS HEATERS - as required
cb PYRO A SEQ A - CLOSE (Pnl 250)
cb PYRO B SEQ B - CLOSE (Pnl 250)
cb BAT A PWR ENTRY/PL - CLOSE (Pnl 250)
cb BAT B PWR ENTRY/PL - CLOSE (Pnl 250)
cb SECS LOGIC A & B (2) - CLOSE (Pnl 8)
cb SECS ARM A & B (2) - CLOSE (Pnl 8)
cb ELS/CM-SM SEP BAT A & B (2) - CLOSE (Pnl 8)
AUTO RCS SELECT A/C ROLL (4) - OFF
cb SPS PITCH & YAW (4) - OPEN (Pnl 8)
SM RCS PRIM PRPLNT (4) - OPEN (mom)
SM RCS SEC PRPLNT FUEL PRESS (4) - OPEN (mom)
CM RCS LOGIC - on(up)
RCS TRNFR - SM (mom)
MAIN BUS TIE BAT A/C - BAT A/C
MAIN BUS TIE BAT B/C - BAT B/C
cb MAIN A BAT BUS A - CLOSE (Pnl 275)
cb MAIN B BAT BUS B - CLOSE (Pnl 275)
Verify Voltage on BAT BUSES and PYRO BATS
RCS Ind - CM 1
CM RCS PRPLNT (2) - OPEN (mom)
SECS LOGIC (2) - on(up)
Cue MSFN
SECS PYRO ARM (2) - ARM
Verify Attitude Control
CM/SM SEP (2) - on(up)

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C/W - CM
RCS TRNFR - CM (mom)
SECS PYRO ARM (2) - SAFE
SECS LOGIC (2) - OFF
cb SECS ARM A & B (2) - OPEN (Pnl 8)
cb ELS/CM-SM SEP BAT A & B (2) - OPEN (Pnl 8)
CM RCS LOGIC - OFF
Verify CM RCS Pressure
cb RCS SM HEATERS (4) - OPEN (Pnl 8)
cb MAIN A BAT BUS A - OPEN (Pnl 275)
cb MAIN B BAT BUS B - OPEN (Pnl 275)
cb INSTR PWR CONTROL (4) - OPEN (Pnl 276)
cb BAT A PWR ENTRY/PL - OPEN (Pnl 250)
cb BAT B PWR ENTRY/PL - OPEN (Pnl 250)

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CONTINGENCY EVA

1 CM PREP FOR CONTINGENCY EVA

1 C & R SUIT FLOW - OFF
2 C & R 02 hoses interconnected with A-8 interconnects
3 Center hoses stowed in tunnel, right hoses secured to tunnel MDC hand straps
4 Install EVA Stabilizer Strut
5 TSB's installed on R&L Girth Ring and LEB
6 Unstow Tool Kit (A-8) with jack screws fully opened inside, snap to LH Girth Ring
7 Unstow EMU MAINT KIT (A-8)
Stow CDR TSB, Top Pkt
8 Hatch Counterbalance (Engage or Disengaged)
(Pull Pip Pin, stow in CDR TSB, Top Pkt)
9 MDC Ingress Bar (Stowed or Unstowed)
10 Install MDC Bars (Side A-8)
11 Stow A-9 between Z-Z struts.

FINAL CABIN PREP

1 Depress tunnel, if docked
2 Stow Optics
3 Stow COAS
4 Stow cameras and bkt in TSB
5 Set up comm panels
6 Remove helmet shield from PGA bag
7 Disconnect PGA Bag from couch (4 places)
8 Remove center couch
9 Close and lock marmon clamps
10 Stow under RH couch using 2 straps (R-5)
11 Unzip fecal bag (PGA Bag)
12 Disconnect PGA bag and stow under RH couch
13 Stow RHC 1 in F1
14 L and R Couch - Stow foot, leg, and seat pans, 0°
15 LH X-X Strut - Connected or Disconnect and tie off

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16 Stow in jettison bag
A9 contents and partition
MISC waste
17 Unstow B5, B6
18 Prepare Jettison Bag, Secure Draw Strings

SYSTEM PREPARATION FOR DEPRESS

Pnl 325 - CAB PRESS REL vlv (2) - NORMAL
Pnl 2 - CABIN FANS - OFF
Pnl 351 Verify CAB REPRESS - OFF
Pnl 326 - REPRESS PKG vlv - FILL
Pnl 602 - Verify REPRESS 02 press 865-935 psi
Pnl 600 - EMERG 02 vlv - CLOSED
Pnl 601 - Verify REPRESS 02 vlv - CLOSED
Pnl 326 - Verify SURGE TANK vlv - ON
Pnl 2 - PRESS CRYO - IND QTY - SRG/3
Pnl 2 - 1/SRG IND - 865-935 psi
Select attitude control mode and maneuver spacecraft to EVT attitude
Check status of LM prep for egress

Stow loose items
NOTE: Perform PLSS Comm check if required
On request by LM,
VHF AM A - DUPLEX
VHF AM B - off (ctr)(Verify)
VHF RANGING - OFF (Verify)
Pnl 9 - VHF AM - T/R
Verify Comm with,
2 PLSS - CDR (EVCS #1) and then
LMP (EVCS #2)
or
1 PLSS - EVCS #1 or #2

FINAL SYSTEMS PREP FOR DEPRESS

EXT LTS - RUN/EVA - on (up) (IF REQ'D)
EXT LTS - RNDZ/SPOT - off (ctr)

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2 PREP FOR CABIN DEPRESS

Verify L O2 hoses connected Red/Red, Blue/Blue, Locked
PGA flow diverter valves (2) (horizontal or vertical)
Verify PGA Zipper - Lock-Lock
Unstow helmet
Verify feed port cover installed and locked,
Wipe helmet with anti-fog (EMU KIT, CDR TSB) (TOP PKT)
  Dry with Tissue
Verify PGA comm lead inside PGA and clear of suit
  neck ring
Place helmet attaching neck ring in the "ENGAGE"
  position
Position mike, don helmet (with shield) and lock
Secure helmet stowage bag
Place suit wrist disconnects to "ENGAGE" position
Don gloves and lock
Pnl 380 - SUIT CKT RET vlv - close (push)
Pnl 351 - EMERG CAB PRESS sel - OFF
Check all PGA connections and verify locked. (Helmet,
  Wrist, O2 Hoses, Comm, Feedport)
Ingress LH couch

PRESS INTEGRITY CHECK (DECAL) - EVT

1 Pnl 380 - SUIT CKT Return vlv - close (PUSH)
2 Unused hoses - SUIT FLOW
    VLVS - OFF, hoses interconnected
3 Pnl 7 - DIRECT O2 - CLOSE (CW)
4 SUIT PRESS ind - 4.7-5.3 psia
5 O2 FLOW ind - 0.2-0.4 LB/HR

CAUTION

SUIT TEST vlv should remain in the PRESS position until suit circuit pressure is stabilized to preclude seal scarring. If repositioning of SUIT TEST vlv from PRESS is required prior to suit pressure and O2 flow stabilization, perform the following:

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a. O2 DEMAND REG vlv - OFF
b. Allow 15 sec (min) stabilization time
c. Reposition SUIT TEST vlv - DEPRESS or OFF as applicable
d. When suit pressure stabilized, O2 DEMAND REG vlv - BOTH

6 SUIT TEST vlv - PRESS (DIR O2 - OPEN
At 4.0 psig, DIR O2 - OFF)
7 O2 FLOW ind - 1.0 LB/HR (pegged)
8 O2 FLOW HI LT - ON
9 MASTER ALARM PB/LT (3) - ON (PUSH)
10 When Suit Press IND 1.5-2.0 psi > CAB PRESS,
Suit Ckt Return vlv - OPEN
then CLOSE
11 SUIT PRESS ind -8.8-9.8 psia
12 CUFF GAGE ind - 4.1-4.5 psig
13 O2 FLOW HI LT - OFF
14 Allow O2 FLOW To Stabilize 15 sec
15 O2 FLOW Shall Remain Below .97 LB/HR
(Gage must not be pegged)
For 30 sec After Stabilization
16 SUIT TEST vlv - DEPRESS
17 O2 FLOW ind - 0.2-0.4 LB/HR
18 SUIT PRESS ind - Slight > CABIN PRESS ind
19 SUIT TEST vlv - OFF
20 Pnl 380 - DEMAND REG SEL - BOTH (Verify)

CABIN DEPRESS
Egress LH couch and transfer to hatch
Adjust RH strut mirror to read cabin pressure

CABIN DEPRESS (DECAL) - EVT
1 SIDE HATCH DUMP vlv - OPEN
O2 FLOW HI LT May Come On
Prior To CABIN PRESS REG LOCK UP
2 At 3.25 psia, SIDE HATCH DUMP vlv - CLOSE
3 O2 FLOW ind - LESS THAN 0.5 LB/HR
4 CABIN PRESS 3.25 psia
5 SUIT CKT PRESS STABLE 3.5 - 4.0 psia

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6 SIDE HATCH DUMP vlv - OPEN
7 CABIN PRESS ind - 0
8 Verify SUIT CKT PRESS STABLE 3.5-4.0 psia
9 Verify O2 FLOW HI Lt - OFF

3 HATCH OPENING (DECAL) - EVT
1 GN2 vlv HANDLE - PULL
2 GAGE READS - MIN
3 LOCK PIN RELEASE KNOB - UNLOCK
4 LOCK PIN INDICATOR RELEASED
5 GEAR BOX SEL - UNLATCH
6 ACTR HANDLE SEL-U
7 UNSTOW ACTR HANDLE
8 UNLOCK HATCH
9 ACTR HANDLE SEL-L
10 STOW ACTR HANDLE
11 GEAR BOX SEL-LATCH
12 OPEN HATCH
13 Start Elapse Time When OPS Activated

JETT: BAG, B5, B6
Station Keep At LM Fwd Hatch

AUTO RCS SELECT - undocked transfer
PITCH - A3, C4 - OFF
VERIFY 1/2° DEADBAND
AUTO RCS SELECT - Docked transfer
All - OFF

4 CM CONTINGENCY EVA
EVT (DOCKED)
Give GO for TRANSFER TO OPS & EVT
Start elapse time when OPS activated

EVT (UNDOCKED, STABLE)
Maneuver CSM apex to LM forward hatch
Give GO for transfer to OPS & EVT
Start elapse time when OPS activated

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EVT (UNDOCKED, UNSTABLE)
Maneuver CSM to LM
Give GO for transfer to OPS & EVT
Start elapse time when OPS activated
After CDR & LMP push away from LM, maneuver
apex to CDR and LMP

5 2 OPS EVT

INGRESS
CDR Ingress CM, head first, face toward MDC
and move to LEB
Retrieve C O2 hoses and elec umbilical
CMP Connect C electrical umbilical to CDR
CDR Audio panel sws - as desired
Secure position in LEB and manage
lifeline for LMP
LMP Ingress CM, feet first, face toward MDC
and assume position in center couch area
CM back off from LM
CDR Connect R electrical umbilical to LMP
CMP Close hatch

VAC TRANSFER TO CM ECS
(If 25 minutes elapsed from
OPS start time, perform the following)
C and R SUIT FLOW vlvs - OFF
Remove interconnects
Connect O2 hoses (Red/Red, Blue/Blue)
C to CDR, R to LMP
Close Purge vlv
SUIT FLOW vlv - adjust for comfort
OPS O2 - OFF

HATCH CLOSING (DECAL) - EVT (C/~~3-11~~ 7-12)
1 CLOSE HATCH
2 Verify Position of PIP PIN Bracket
3 LOCK HATCH
4 Verify LOCK PIN Dropped in
5 STOW ACTR HANDLE
6 ACTR HANDLE SELECT-N
7 GEAR BOX SEL-LATCH (verify)

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CABIN REPRESS (DECAL) - EVT

1 SIDE HATCH DUMP vlv - CLOSE
2 Pnl 326 - REPRESS PKG - FILL
3 Pnl 601 - REPRESS O2 vlv - OPEN, then CLOSE at cabin press - 1 psia
4 CABIN PRESS ind - monitor for gross leakage (30 sec)
5 Pnl 601 - REPRESS O2 vlv - OPEN
6 When surge tank decreases to 150 psia, Pnl 326 - REPRESS PKG vlv - OFF
7 CABIN PRESS ind - 3.0 psia
8 Pnl 601 - REPRESS O2 vlv - CLOSE
9 Pnl 351 - CABIN REPRESS vlv - OPEN (CW), adjust to maintain surge tank press >150 psia
10 Helmet/Glove Doffing
-O2 VLV - OFF
-Depress PGA
-Remove Helmet and Gloves
-Dump OPS into Cabin (if avail)
11 When Cab >4.7, CABIN REPRESS Vlv - OFF

TRANSFER TO ECS
(3.0 PSIA CABIN)
Remove LEVA'S From Helmets
Verify cabin pressure above 3.0 psia
Verify C and R SUIT FLOW vlv - OFF

-CDR-

Remove interconnect from C O2 hoses
CDR OPS O2 - OFF
As PGA press equalizes with cabin
Connect hoses to PGA (red to red, blue to blue)
No flow condition, remove helmet at safe cabin press
C SUIT FLOW vlv - adjust for comfort
L SUIT FLOW vlv - increase for comfort
Close Purge vlv

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-LMP-

Remove interconnect from R O2 hoses
LMP OPS O2 - OFF
As PGA press equalizes with cabin
Connect hoses to PGA
(red to red, blue to blue)
No flow condition, remove helmet at
safe cabin press
CDR SUIT FLOW vlv (3) - FULL FLOW
LMP Close Purge vlv

POST EVA SYSTEMS CONFIGURATION
CMP CAB PRESS ind - 4.7-5.3 psia
Pnl 351 - CDR CAB REPRESS vlv - OFF (CCW)
Doff gloves, helmets, and LEVA's, if req'd
If helmets and gloves doffed:
Pnl 351 - EMERG CAB PRESS sel - BOTH
Pnl 380 - SUIT CKT RET vlv - open (pull)

OPS DOFFING
Remove waist tethers, lifeline, and stow in TSB
Remove purge valves and stow in TSB
Verify PLSS antenna stowed
Verify OPS O2 - OFF
Verify OPS O2 actuator stowed
Disconnect OPS O2 hose and stow
Secure thermal cover
Doff OPS and PLSS straps
Secure OPS with PLSS straps
Stow interconnects in A-8
Secure transfer TSB

END OF 2 OPS EVT
(Go to FINAL SYSTEMS CONFIG) (C/7-16)

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6 PLSS - OPS EVT

INGRESS (CDR-OPS, LMP-PLSS)

CDR Ingress CM, head first, face toward MDC
and move to LEB
Retrieve C O2 hoses and electrical umbilical
CMP Connect C electrical umbilical to CDR
CDR Audio panel sws - as desired
Secure position in LEB and manage lifeline for LMP
LMP Ingress CM, feet first, face toward MDC
CMP Connect R electrical umbilical to LMP
LMP PLSS PRIM and AUX FEEDWATER - CLOSE
CMP Close hatch

VAC TRANSFER TO CM ECS

(If 25 minutes elapsed from OPS start time, perform the following)

-CDR (OPS)-

CDR Verify C SUIT FLOW vlv - OFF
Remove interconnect and hand C O2 hoses to CMP
CMP Connect C O2 hoses to CDR PGA (red to red, blue to blue)
CDR Close purge vlv
C SUIT FLOW vlv - adjust for comfort
OPS O2 - OFF

-LMP (PLSS)-

CDR Verify R SUIT FLOW vlv - OFF
Remove interconnect and hand R O2 hoses to CMP
CMP Connect R O2 hoses to LMP PGA (red to red, blue to blue)
CDR SUIT FLOW vlv (3) - FULL FLOW
LMP Verify flow
PLSS O2 - OFF
PLSS PUMP - OFF
PLSS FAN - OFF
PLSS MODE SEL - 0

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HATCH CLOSING (DECAL) - EVT (C/7-12)

1 CLOSE HATCH
2 Verify Position of PIP PIN Bracket
3 LOCK HATCH
4 Verify LOCK PIN Dropped in
5 STOW ACTR HANDLE
6 ACTR HANDLE SELECT-N
7 GEAR BOX SEL - LATCH (verify)

CABIN REPRESS - (DECAL) - EVT

1 SIDE HATCH DUMP vlv - CLOSE
2 Pnl 326 - REPRESS PKG - FILL
3 Pnl 601 - REPRESS O2 vlv - OPEN, then CLOSE at cabin press - 1 psia
4 CABIN PRESS ind - monitor for gross leakage (30 sec)
5 Pnl 601 - REPRESS O2 vlv - OPEN
6 ~~Control surge tank press >150 psia~~ WHEN SURGE TANK PRESS ~150 psia, THEN
7 Pnl 326 - REPRESS PKG vlv - OFF
8 CABIN PRESS ind - 3.0 psia
9 Pnl 601 - REPRESS O2 vlv - CLOSE
10 Pnl 351 - CABIN REPRESS vlv - OPEN (CW), Adjust To Maintain surge tank press >150 psia
11 Helmet/Glove Doffing
-O2 vlv - OFF
-DEPRESS PGA
-Remove Helmet and Gloves
-Dump OPS into cabin (if avail)
12 When Cab >4.7, CABIN REPRESS Vlv - OFF

TRANSFER TO ECS (3.0 PSIA CABIN)

Remove LEVA's from helmets
Verify cabin pressure above 3.0 psia
Verify C and R SUIT FLOW vlv - OFF

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-CDR (OPS)-

Remove interconnect from C O2 hoses
CDR OPS O2 - OFF
As PGA press equalizes with cabin
Connect hoses to PGA (red to red, blue to blue)
No flow condition, remove helmet at safe cabin press
C SUIT FLOW vlv - adjust for comfort
L SUIT FLOW vlv - increase for comfort
Close Purge vlv

-LMP (PLSS)-

Remove interconnect from R O2 hoses
LMP PLSS O2 - OFF
Connect Hoses to PGA (red/red, blue,blue)
For no flow condition, avoid negative pressure, remove helmet at safe cabin press
To depress suit remove PLSS blue hose
Depress blue O2 connector
CDR SUIT FLOW vlv (3) - FULL FLOW
PLSS PUMP - OFF
PLSS FAN - OFF
PLSS MODE SEL - POS O

POST EVA SYSTEMS CONFIGURATION

CMP CAB PRESS ind - 4.7-5.3 psia
Pnl 351 - CDR CAB REPRESS vlv - OFF (CCW)
Doff gloves, helmets, and LEVA's, if req'd
If helmets and gloves doffed - Pnl 351 - EMERG CAB PRESS sel - BOTH
Pnl 380 - SUIT CKT RET vlv - open (pull)

OPS DOFFING
Remove waist tethers, lifeline, and stow in TSB
Remove purge valves and stow in TSB
Verify PLSS antenna stowed
Verify OPS O2 - OFF
Verify OPS O2 actuator stowed

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Disconnect OPS O2 hose and stow
Secure thermal cover
Doff OPS and PLSS straps
Secure OPS with PLSS straps
Stow interconnects in A-8
Secure transfer TSB

PLSS/DOFFING

Remove waist tethers, lifeline, and stow in TSB
All RCU ELEC CNTLS - OFF (Verify)
Disconnect RCU stow in TSB
Disconnect PLSS O2 and H2O hoses
Disconnect lower then upper PLSS straps-Doff PLSS
Stow PLSS-O2, H2O, and COMM umbilicals
Temp stow PLSS

END OF PLSS - OPS EVT
(Go To FINAL SYSTEMS CONFIG) (C/7-16)

SIDE HATCH will not latch (frozen gearbox)

*The Following tools are required:
* Tool B, Tool F, (3) jackscrews
*Install (3) jackscrews to restrain hatch
* in closed position
*Use tool B to remove (2) clevis pins
* connecting linkage to gearbox and
* (1) clevis pin from linkage in corner
* above gearbox.
*Tighten jackscrews to close hatch as far
* as possible
*Use tool F on flats of latch bellcrank
* to drive latch to over-center closed position
* (Apply tool F to upper latch on hinge
* side to drive the lower and hinge side
* linkage closed). Apply tool F to center
* latch to drive upper linkage closed. Gearbox
* side linkage may not close if gearbox is
* in full open position.
*Install clevis pin in threaded hole
* in linkage bell crank at upper gearbox
* side (Clevis pin installed when approx half
* the threads are visible).

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7 2 PLSS/OPS EVT

INGRESS

CDR Ingress CM, head first, face toward MDC
and move to LEB
CDR Secure position in LEB and manage lifeline for LMP
LMP Ingress CM, feet first, face toward MDC and assume
position in center couch area
BOTH PLSS PRIM and AUX FEEDWATER - CLOSE
CMP Close hatch

VAC TRANSFER TO CM ECS

Verify C and R SUIT FLOW vlv - OFF
Remove interconnects
Remove OPS 02 hose and Purge vlv
Connect 02 hoses to PGA (red/red, blue/blue)
C-CDR, R-LMP
SUIT FLOW vlv - adjust for comfort
PLSS 02 - OFF
PLSS PUMP - OFF
PLSS FAN - OFF

CONNECT TO CM COMM, IF REQ'D

PLSS MODE SEL - POS 0
Disconnect PLSS COMM
Connect electrical umbilical (C-CDR, R-LMP)
Audio panel sws - as desired

HATCH CLOSING (DECAL) - EVT (C/7-12)

1 CLOSE HATCH
2 Verify Position of PIP PIN Bracket
3 LOCK HATCH
4 Verify LOCK PIN Dropped in
5 STOW ACTR HANDLE
6 ACTR HANDLE SELECT-N
7 GEAR BOX SEL - LATCH (verify)

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CABIN REPRESS - (DECAL) - EVT

1 SIDE HATCH DUMP vlv - CLOSE
2 Pnl 326 - REPRESS PKG - FILL
3 Pnl 601 - REPRESS O2 vlv - OPEN, then CLOSE at cabin press - 1 psia
4 CABIN PRESS ind - monitor for gross leakage (30 sec)
5 Pnl 601 - REPRESS O2 vlv - OPEN
6 ~~Control surge tank press >150 psia~~ WHEN SURGE TANK PRESS ~150 psia, THEN
7 Pnl 326 - REPRESS PKG vlv - OFF
8 CABIN PRESS ind - 3.0 psia
9 Pnl 601 - REPRESS O2 vlv - CLOSE
10 Pnl 351 - CABIN REPRESS vlv - OPEN (CW), Adjust To Maintain surge tank press >150 psia
11 Helmet/Glove Doffing
-O2 vlv - OFF
-Depress PGA
-Remove Helmet and Gloves
-Dump OPS into cabin (if avail)
12 When Cab >4.7, CABIN REPRESS Vlv - OFF

TRANSFER TO ECS (3.0 PSIA CABIN)

-CDR-

Remove LEVA's from helmets
Verify cabin pressure above 3.0 psia
Verify C and R SUIT FLOW vlv - OFF
Remove interconnect from C O2 hoses
CDR PLSS O2 vlv - OFF
Open Purge vlv to equalize press
No flow condition, avoid negative press, remove helmet at safe cabin press
Remove OPS hose and Purge vlv
Connect hoses to PGA (red/red, blue/blue)
C SUIT FLOW vlv - adjust for comfort
L SUIT FLOW vlv - increase for comfort
PLSS PUMP - OFF
PLSS FAN - OFF

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-LMP-

Remove interconnect from R O2 hoses
LMP PLSS O2 vlv - OFF
Open Purge vlv to equalize press
No flow condition, avoid negative press,
remove helmet at safe cabin press
Remove OPS hose and Purge vlv
Connect hoses to PGA connectors
(red/red, blue/blue)
CDR SUIT FLOW vlv (3) - FULL FLOW
LMP PLSS PUMP - OFF
PLSS FAN - OFF

CONNECT TO COMM

Verify SUIT PWR - OFF
Verify PWR - OFF
Verify AUDIO CONT - NORM
PLSS MODE SEL - POS O
Disconnect PLSS COMM
Connect electrical umbilical to PGA
Audio panel sws - as desired

POST EVA SYSTEMS CONFIGURATION

CMP CAB PRESS ind - 4.7-5.3 psia
Pnl 351 - CDR CAB REPRESS vlv - OFF (CCW)
Doff gloves, helmets, and LEVA's, if req'd
If helmets and gloves doffed - Pnl 351 - EMERG
CAB PRESS sel - BOTH
Pnl 380 - SUIT CKT RET vlv - open (pull)

PLSS/OPS DOFFING

Remove waist tethers, lifeline, and stow in TSB
All RCU ELEC CNTLS - OFF
Disconnect RCU stow in TSB
Disconnect PLSS O2 and H2O hoses
Disconnect lower then upper PLSS straps-Doff PLSS
Stow PLSS-O2, H2O, and COMM umbilicals
Stow OPS-O2 Actuator and O2 hose
Temp stow PLSS/OPS

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FINAL SYSTEMS CONFIGURATION

Pnl 2 - CRYO PRESS IND-SRG/3
Pnl 2 - CRYO O2 PRESS 1/SRG ind - > 500 psia
Pnl 351 - Verify CAB REPRESS vlv - OFF (CCW)
Pnl 601 - Verify REPRESS O2 - CLOSE
Pnl 326 - REPRESS PKG vlv - FILL
Pnl 602 - Verify Repress O2 press increasing
Pnl 2 - CRYO O2 PRESS 1/SRG ind - 865-935 psia
Pnl 2 - CRYO PRESS IND-1/2
Pnl 326 - REPRESS PKG vlv - OFF

CM EQUIPMENT JETTISON

Inspect PGA zipper-verify lock-lock

SYSTEMS PREPARATION FOR DEPRESS

SUIT FLOW vlv - SUIT FULL FLOW
Pnl 2 - CABIN FANS - OFF
Pnl 351 - CAB REPRESS - OFF
Pnl 326 - REPRESS PKG VLV - FILL
PNL 325 - CAB PRESS REL VLV (2) - NORMAL
Pnl 380 - SUIT CKT RET vlv - open (pull)
Pnl 351 - EMER CAB PRESS sel - BOTH
Pnl 602 - Verify Repress O2 pressure 865-935 psi
Pnl 600 - EMERGENCY O2 vlv - CLOSED
Pnl 601 - REPRESS O2 vlv - CLOSED
Pnl 326 - Verify SURGE TANK vlv - ON
Pnl 2 - CRYO PRESS IND-SRG/3
Verify surge tank pressure 865-935 psi

EQUIPMENT PREPARATION FOR DEPRESS

Stow loose items
Prepare all equipment to be
jettisoned and secure
- PLSS (1-2)
- RCU (1-2)
- OPS (1-2)
- PURGE VALVE (1-2)
- LIFELINE (1)
- LEVA's (2)
- WAIST TETHERS (2)

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PREP FOR CABIN DEPRESS

Verify O2 hoses connected (red/red, blue/blue)
PGA diverter valves- horizontal or vertical
Unstow helmet
Verify feed port cover installed and locked,
  wipe helmet with anti-fog
Position mikes, don helmet and "lock"
Secure helmet stowage bags
Don gloves and lock
Pnl 380 - SUIT CKT RET vlv - close (push)
Pnl 351 - EMER CAB PRESS sel - OFF
Check all PGA connections and verify
  lock-lock (Helmet, Wrist, O2 Hoses, Comm, Feedport)

PRESS INTEGRITY CHECK (DECAL) - EVT

1 Pnl 380 - SUIT CKT Return vlv - CLOSE (Push)
2 Unused hoses - SUIT FLOW
    VLVS - OFF, hoses interconnected
3 Pnl 7 - DIRECT O2 - CLOSE (CW)
4 SUIT PRESS ind - 4.7-5.3 psia
5 O2 FLOW ind - 0.2-0.4 LB/HR

CAUTION

SUIT TEST vlv should remain in the PRESS position until suit circuit pressure is stabilized to preclude seal scarring. If repositioning of SUIT TEST vlv from PRESS is required prior to suit pressure and O2 flow stabilization, perform the following:

a. O2 DEMAND REG vlv - OFF
b. Allow 15 sec (min) stabilization time
c. Reposition SUIT TEST vlv - DEPRESS or OFF as stabilized,
d. When suit pressure stabilized, O2 DEMAND REG vlv - BOTH

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6 SUIT TEST vlv - PRESS (DIR O2 - OPEN,
At 4.0 psig, DIR O2 - OFF)
7 O2 FLOW ind - 1.0 LB/HR (pegged)
8 O2 FLOW HI LT - ON
9 MASTER ALARM PB/LT (3) - ON (PUSH)
10 When SUIT PRESS IND 1.5-2.0 psi > CAB PRESS,
SUIT CKT return vlv OPEN then
CLOSE
11 SUIT PRESS ind - 8.8-9.8 psia
12 CUFF GAGE ind - 4.1-4.5 psig
13 O2 FLOW HI LT - OUT
14 Allow O2 FLOW To Stabilize 15 sec
15 O2 FLOW Shall Remain Below .97 LB/HR
(Gage must not be pegged)
For 30 sec After Stabilization
16 SUIT TEST vlv - DEPRESS
17 O2 FLOW ind - 0.2-0.4 LB/HR
18 SUIT PRESS ind - Slight > CABIN PRESS ind
19 SUIT TEST vlv - OFF
20 Pnl 380 - DEMAND REG SEL - BOTH (Verify)

CABIN DEPRESS (DECAL) - EVT

1 SIDE HATCH DUMP vlv - OPEN
O2 FLOW HI LT May Come On
Prior To CABIN PRESS REG LOCK UP)
2 At 3.25 psia, SIDE HATCH DUMP vlv - CLOSE
3 O2 FLOW ind - LESS THEN 0.5 LB/HR
4 CABIN PRESS 3.25 psia
5 SUIT CKT PRESS STABLE 3.5-4.0
6 SIDE HATCH DUMP vlv - OPEN
7 CABIN PRESS ind - 0
8 Verify SUIT CKT PRESS stable 3.5-4.0 psia
9 Verify O2 FLOW HI Lt - OFF

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HATCH OPENING (DECAL) - EVT

1 GN2 vlv HANDLE - PULL
2 GAGE READS - MIN
3 LOCK PIN RELEASE KNOB - UNLOCK
4 LOCK PIN INDICATOR RELEASED
5 GEAR BOX SEL - UNLATCH
6 ACTR HANDLE SEL-U
7 UNSTOW ACTR HANDLE
8 UNLOCK HATCH
9 ACTR HANDLE SEL-L
10 STOW ACTR HANDLE
11 GEAR BOX SEL-LATCH
12 OPEN HATCH
13 START ELAPSE TIME WHEN OPS ACTIVATED

EQUIPMENT JETTISON

JETTISON EQUIPMENT -
PLSS (1-2)
RCU (1-2)
OPS (1-2)
PURGE VALVE (1-2)
LIFELINE (1)
LEVA's (2)
WAIST TETHERS (2)

HATCH CLOSING (DECAL) - EVT (C/7-12)

1 CLOSE HATCH
2 LOCK HATCH
3 Verify LOCK PIN Dropped in
4 STOW ACTR HANDLE
5 ACTR HANDLE SELECT-N
6 GEAR BOX SEL - LATCH (verify)

CABIN REPRESS (DECAL) - EVT

1 SIDE HATCH DUMP vlv - CLOSE
2 Pnl 326 - REPRESS PKG - FILL
3 Pnl 601 - REPRESS 02 vlv - OPEN, then
CLOSE at cabin press - 1 psia

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4 CABIN PRESS ind - monitor for gross leakage (30 sec)
5 Pnl 601 - REPRESS O2 vlv - OPEN
6 ~~Control surge tank press >150 psia~~ WHEN SURGE TANK PRESS ~150 PSIA, THEN
7 Pnl 326 - REPRESS PKG vlv - OFF
8 CABIN PRESS ind - 3.0 psia
9 Pnl 601 - REPRESS O2 vlv - CLOSE
10 Pnl 351 - CABIN REPRESS vlv - OPEN (CW), Adjust To Maintain surge tank press >150 psia
11 Helmet/Glove Doffing
-O2 VLV - OFF
-DEPRESS PGA
-Remove Helmet and Gloves
-Dump OPS into cabin (if avail)
12 When Cab >4.7, CABIN REPRESS Vlv - OFF

SYSTEM CONFIGURATION

Pnl 2 - CAB PRESS ind - 4.7 - 5.3 psia
Pnl 351 - CAB REPRESS vlv - OFF (CCW)
Doff gloves and helmets, if req'd
If helmets and gloves doffed -
Pnl 351 - EMERG CAB PRESS sel - BOTH
Pnl 380 - SUIT CKT RET vlv - open (pull)

POST EVA CABIN CONFIGURATION

EXT LTS - RUN/EVA - OFF (down)
Perform as desired
(a) Recharge Repress Pkg
(b) Change crew stations
(c) Restow tool B & jack screws
(d) Unstow & install PGA bag
(e) Reinstall center couch
(f) Connect counterbalance (Pip Pin in TSB)

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EVT EQUIPMENT STOWAGE FOR ENTRY

I. CM reentry without suits:

ITEM	STOWAGE LOCATION FOR REENTRY
a. OPS (2)	In PGA Bag - over PGA
b. Purge Valve (2)	In PGA Bag
c. Life Line	In PGA Bag
d. EV Gloves	On PGA
e. LEVA (2)	2 on helmet attached to suits in RH & LH sleep restraints
f. Waist tether (2)	In PGA Bag
g. CSRC	Inside helmet in PGA Bag
h. Rock Bag w/Decom Bag	In Decom Bag on top of A7 or A1
i. Suits - with elec covers	2 Suits in sleep restraint under LH & RH couch w/tie down rope
Note: Stow RH & LH Suits first	1 Suit with OPS's in PGA Bag w/tie down rope
j. Helmets	2 On suits with LEVA 1 In PGA Bag
k. IV Gloves	On PGA
h. ISA w/Decom Bag	On A2

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II. CM reentry with suits:

ITEM	STOWAGE LOCATION FOR REENTRY
a. OPS (2)	LH & RH sleep restraint in PGA Bag w/tie down rope
b. Rock Bag/CSRC In Decom Bag	On A7 or A1
c. Purge Valve (2)	LH & RH sleep restraint in PGA Bag w/tie down rope
d. Life Line/Waist Tether (2)	In PGA Bag
e. EV Gloves	On PGA
f. LEVA (2)	PGA Bag

III. The following equipment may be transferred in PGA pockets during the EV transfer:

ITEM	STOWAGE LOCATION
a. Film Magazines	Vol R13, A8
b. Log Books	Vol R1, R2 and R3

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NO.	ITEM	ACTION	BACKOUT

C
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OPTIONAL P23

REAL TIME CHECKLIST

BURNS (OVER)

LV

SM RCS

NO COMM LM JETTISON | REAL TIME CHECKLIST | CONTINGENCY EVA | SM JETTISON

NO.	ITEM	ACTION	BACKOUT

C
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DATE 3/22/71

NO.	ITEM ⇩	ACTION	BACKOUT

C
8-__

OPTIONAL P23

ECS, CRITICAL BURNS (OVER)

LV

SM RCS

NO COMM LM JETTISON

REAL TIME CHECKLIST

CONTINGENCY EVA

SM JETTISON

NO.	ITEM	ACTION	BACKOUT

C
8-__

DATE 3/22/71

DATE 3/22/71

NO.	ITEM	ACTION	BACKOUT

C
8-__

OPTIONAL P23

ECS, CRITICAL BURNS (OVER)

LV

SM RCS

NO COMM LM JETTISON

REAL TIME CHECKLIST

CONTINGENCY EVA

SM JETTISON

NO.	ITEM	ACTION	BACKOUT

C
8-__

DATE 3/22/71

DATE 3/22/71

NO.	ITEM ⇩	ACTION	BACKOUT

C
8-__

OPTIONAL P23

ECS, CRITICAL BURNS (OVER)

LV

SM RCS

NO COMM LM JETTISON | REAL TIME CHECKLIST | CONTINGENCY EVA | SM JETTISON

NO.	ITEM	ACTION	BACKOUT

C
8-__

DATE 3/22/71 .

DATE 3/22/71

NO.	ITEM ⇩	ACTION	BACKOUT

C
8-__

OPTIONAL P23

ECS, CRITICAL BURNS (OVER)

LV

SM RCS

NO COMM LM JETTISON | REAL TIME CHECKLIST | CONTINGENCY EVA | SM JETTISON

NO.	ITEM	ACTION	BACKOUT

C
8-__

DATE 3/22/71

DATE 3/22/71

NO.	ITEM ⇩	ACTION	BACKOUT

C
8-__

OPTIONAL P23

ECS, CRITICAL BURNS (OVER)

LV

SM RCS

NO COMM LM JETTISON | REAL TIME CHECKLIST | CONTINGENCY EVA | SM JETTISON

NO.	ITEM ⇩	ACTION	BACKOUT

C
8-__

DATE 3/22/71 .

DATE 3/22/71

NO.	ITEM ⇩	ACTION	BACKOUT

C
8-__

OPTIONAL P23

ECS, CRITICAL BURNS (OVER)

LV

SM RCS

NO COMM LM JETTISON | REAL TIME CHECKLIST | CONTINGENCY EVA | SM JETTISON

NO.	ITEM ⇩	ACTION	BACKOUT

C
8-__

DATE 3/22/71 .

DATE 3/22/71

NO.	ITEM ⇩	ACTION	BACKOUT

C
8-__

OPTIONAL P23

ECS, CRITICAL BURNS (OVER)

LV

SM RCS

NO COMM LM JETTISON | REAL TIME CHECKLIST | GE | CONTINGENCY EVA | SM JETTISON

NO.	ITEM ⇩	ACTION	BACKOUT

C
8-__

DATE 3/22/71 .

DATE 3/22/71

NO.	ITEM	ACTION	BACKOUT

C
8-__

OPTIONAL P23

ECS, CRITICAL BURNS (OVER)

LV

SM RCS

NO COMM LM JETTISON | REAL TIME CHECKLIST | CONTINGENCY EVA | SM JETTISON

NO.	ITEM	ACTION	BACKOUT

C
8-__

DATE 3/22/71 .

DATE 3/22/71

NO.	ITEM ⇩	ACTION	BACKOUT

C
8-__

OPTIONAL P23

ECS, CRITICAL BURNS (OVER)

LV

SM RCS

NO COMM LM JETTISON

REAL TIME CHECKLIST

CONTINGENCY EVA

SM JETTISON

NO.	ITEM	ACTION	BACKOUT

C
8-__

DATE 3/22/71 .

OPTIONAL P23 TLC SIGHTINGS

1. V49 MNVR TO OPTICS CAL ATTITUDE (28:30)
   (210,339,330)

2. P23 CALIBRATION STAR N70 (00001)

3. V49 MNVR TO SIGHTING ATTITUDE (28:40)
   (197,312,330)

4. P23 CISLUNAR NAVIGATION
   (3 MARKS ON EACH STAR)

   A. N70 (00000)(00000)(00110)
      N88 (+77864)(+23864)(+58031)
      STAR 102 MIRACH (ENH)

   B. N70 (00002)(00000)(00120)
      STAR 2 DIPHDA (EFH)

   C. N70 (00000)(00000)(00120)
      N88 (+82401)(+44316)(+35301)
      STAR 131 BETA ARIETIS (ENH)

   D. N70 (00000)(00000)(00120)
      N88 (+96452)(+04966)(+25929)
      STAR 126 GAMMA PEGASI (EFH)

5. V49 MNVR TO OPTICS CAL ATTITUDE (29:30)
   (210,339,330)

6. P23 CALIBRATION STAR N70 (00001)

DATE 6/15/71

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EMERGENCY CSM/LV SEPARATION

IF POWERED FLT

TRANS CONTR - CCW (4 SEC)

MN BUS TIES - ON

TVC SERVO PWR 1 - AC1/MNA

TVC SERVO PWR 2 - AC2/MNB

BMAG MODE (3) - ATT 1/RATE 2

GMBL MTRS (4) - ON

ΔV THRUST A - NORMAL

DIR ULLAGE & THRUST ON PB - PUSH

SPS BURN (5 SEC) - THEN ΔV THRUST (2) - OFF

DATE 3/15/71

IF COASTING FLT

cb SECS ARM (2) (Pnl 8) - CLOSE

SECS LOGIC (2) - ON

SECS PYRO ARM (2) - ARM

ROT CONTR PWR DIR (2) - MNA/MNB

SC CONT - SCS

SEPARATE FROM LV AS APPLICABLE -

IF BEFORE DOCKING, THC CCW (4 SEC)

IF DOCKED, UMBIL NOT CONNECTED,
CSM/LM FINAL SEP (2) - ON

IF DOCKED, UMBIL CONNECTED, SIVB/LM SEP - ON

TRANSLATE AWAY FROM LV & MANEUVER TO BURN ATTITUDE

ΔVCG - CSM OR LM/CSM AS APPLICABLE

MN BUS TIE (2) - ON

TVC SERVO PWR 1 - AC1/MNA

TVC SERVO PWR 2 - AC2/MNB

BMAG MODE (3) - ATT1/RATE 2

GMBL MTRS (4) - ON

ΔV THRUST A - NORMAL

DIR ULLAGE & THRUST ON PB - PUSH

SPS BURN (5) SEC - THEN ΔV THRUST (2) - OFF

DATE 3/15/71

SUIT COMPRESSOR LITE - CLOSED SUIT LOOP

SWITCH TO OTHER COMPRESSOR ON OTHER BUS
SEE ECS 9

O2 FLOW HI + RAPID LOSS OF SURGE TK PRESS
+ CABIN PRESS <4.6 PSI

CABIN PRESS RELF vlvs (2) - CLOSE
✓TUNNEL EQUALIZATION vlv - CLOSED
REPRESS PKG vlv - ON (WHEN SURGE TK PRESS <150 PSI)
✓EMERG CABIN PRESS REGS - BOTH
DON SUITS

CONTAMINATION IN CM

DON O2 MASKS

CONTAMINATION IN CLOSED SUIT LOOP

CHANGE TO OTHER SUIT COMPR
DIRECT O2 vlv - FULL OPEN THEN ADJUST FOR SUIT
TO CABIN ΔP OF 2 IN OF H2O

IF CONDITION PERSISTS

SUIT COMPR (2) - OFF
DOFF HELMETS
DIRECT O2 vlv - CLOSE
DON O2 MASKS

FIRE/SMOKE IN CM

MONITOR DC FOR HI CURRENT - REMOVE POWER
FROM ASSOCIATED INVERTER
IF CURRENT REMAINS HI - REMOVE POWER FROM
ASSOCIATED DC BUS
IF CLOSED SUIT LOOP, SWITCH SUIT COMPR TO GOOD AC BUS
IF HELMET OFF, SUIT COMPR (2) - OFF
RECONFIGURE INVERTER 3 ON LOST AC BUS
VERIFY RCS CONTROL POWER CONFIGURATION

IF HELMETS OFF
- DON O2 MASKS
- USE FIRE EXTINGUISHER OR H2O GUN (OPTIONAL)

IF CLOSED SUIT LOOP
- USE FIRE EXTINGUISHER OR H2O GUN (OPTIONAL)
- ✓ EMERG CABIN PRESS REGS - OFF
- IF FIRE PERSISTS - DUMP CABIN

DATE 6/19/71

G&N CRITICAL BURNS

IF NO START OR ISS LITE + PROG LITE
IF CMC LITE, PROG ALARM 1407 OR EARLY CUTOFF

SCS TVC (2) - AUTO
SC CONT - SCS
✓ ATTITUDE
SPS THRUST - DIRECT (MOMENTARY), IF REQ'd

IF ABNORMAL DYNAMICS

THC CW, control rates by MTVC
After SHUTDOWN, AUTO RCS (16) - OFF

SCS CRITICAL BURN

IF NO START OR EARLY CUTOFF

SPS THRUST - DIRECT (MOMENTARY)

IF RATE NEEDLE HARDOVER & FDAIs DIVERGE OPPOSITE

BMAG MODE (3) - RATE 1
THC - CW, use MTVC

IF ABNORMAL DYNAMICS IN AUTO MODE

THC - CW, use MTVC
BMAG MODE (3) - RATE 2

IF ABNORMAL DYNAMICS IN MTVC MODE

THC - CW
IF PROBLEM PERSISTS, SHUTDOWN
AUTO RCS (16) - OFF

SPS

IF NO CUTOFF AFTER ΔV THRUST (BOTH - OFF)

cb SPS PILOT VLVS - open

IF EMS & N40 (R3) STILL COUNTING AFTER SHUTDOWN

SC CONT - SCS
TRANS CONT PWR - OFF
cb DIR ULLAGE (2) - open
IF CONDITION PERSISTS, AUTO RCS SEL (16) - OFF
SM RCS PRPLNT (AFFECTED QUAD) - OFF

SPS PRESS LITE

CONTINUE CRITICAL BURN

IF FUEL & OX PRESS (BOTH) > 200 PSI

SPS HE vlvs (2) - OFF, THEN CONTROL MANUALLY BETWEEN 170-200 PSI

IF FUEL/OX ΔP > 20 PSI

SPS HE vlvs (2) - ON
IF CONDITION PERSISTS,SPS HE vlvs(2)-OFF(Until Pc <70)

G&C (COASTING, ENTRY)

CMC LITE

SC CONT - SCS
SEE G&N 5

ISS LITE + PROG ALARM LITE

SC CONT - SCS
SEE G&N 6

DATE 6/19/71

EMERGENCY POWER DOWN

CAUTION: USE BATTS ONLY WHEN MAIN BUS VOLTS < 24.5

		DC AMPS
	CONFIGURE FOR USE OF AUX BATTERY FUEL CELL 2 MNA & MNB (2) - OFF cb CRYO O2 ISOL/AUX BAT - CLOSE (Pnl 226) SM PWR SOURCE - AUX BAT (mom) (Pnl 278) O2 TANK 3 ISOL - CLOSE (✓TB-bp) (Pnl 278) FUEL CELL 2 MN A(B) - as desired	
	INSURE DSE IS RECORDING	
	IF UNSUITED, SUIT COMP (2) - OFF	4.0
■	FC PUMPS (3) - OFF (Until Tskin > 475°F)	8.7 TOTAL
	cb G&N OPTICS MNA & MNB (2)- OPEN (Pnl 5)	3.1
	G&N PWR (AC) - OFF (Pnl 5)	0.9
	O2 HTRS (3) - OFF (CTR)	17.0
	H2 HTRS (2) - OFF (CTR)	1.4 EA
	H2 FANS (3) - OFF (CTR)	1.0
	C/W NORMAL - ACK	
	LM PWR - RESET - OFF	15.0 MAX
	ECS RAD HTRS (2) - OFF	17.2 EA
	POT H2O HTR - OFF	1.6 MAX
	SM RCS HTRS (4) - OFF	3.3 MAX EA
	HGA PWR - OFF	2.9
	LIGHTS - Min Reqd	5.3 MAX
	EXT LTS - OFF	4.6
■	NON ESS BUS - OFF (SPS Burn-Damage SIM CAM)	4 - 6
	VHF RANGING - OFF	1.4
	S BD AUX TV - OFF (CTR	5.3
	SPS LINE HTR - OFF (CTR)	6.2 (A/B)
	RNDZ XPNDR PWR - OFF or HEATER (Pnl 100)	3.0
	SIG CONDR/DRIVER BIAS PWR (2) - OFF	
	SECURE ONE BMAG	2.6
	SELECT SINGLE JET CONTROL	
	EMS FUNC - OFF	
	RHC PWR DIRECT (2) - OFF	
	THC PWR - OFF	
	CONFIGURE FOR SINGLE INVERTER OPERATION	
	TURN OTHER INVERTER OFF	4.0 MAX
	BAT CHGR - OFF	
	NOTE MISSION TIME	
	cb TIMERS (2) - OPEN (Pnl 229)	
	AC INVERTER (9) - OFF	
	CM RCS HTRS - OFF	
	ISOLATE FAILED FC's from MAIN BUSES	

DATE 6/19/71

ECS POWER DOWN	3.7 TOTAL
ECS GLY PUMP sel - OFF (ISS LIMIT 2.5 HRS)	2.6
ECS RAD FLOW CONT PWR - off (CTR)	0.7
GLY EVAP TEMP IN - MAN	
ECS RAD HTRS (2) - OFF	
GLYCOL EVAP H2O FLOW - OFF	≈0.1
GLYCOL EVAP STEAM PRESS - MAN	≈0.2

COMM POWER DOWN	13.0 TOTAL
IF VOICE DESIRED	
UP TLM CMD RESET - RESET then OFF	
S-BD AUX TAPE - DN VOICE BU	
S-BD MODE PCM - OFF	
PCM BIT RATE - HIGH	
S-BD PWR AMP - OFF (CTR)	4.0
TAPE RCDR - OFF (CTR)	1.6
SCE PWR - OFF (CTR)	0.7
cb INSTR ESS MNA & MNB (2) - OPEN (Pnl 5)	4.9
TELCOM GRP 1 & 2 (2) - OFF	1.6

CMC/IMU POWER DOWN	6.0 IMU
COMPLETE ALIGNMENT TRANSFER	
CMC MODE - FREE — PROVIDES CMC MIN IMP	
cb G&N IMU MNA & MNB (2) - OPEN (Pnl 5)	
V37E06E	3.0 CMC
F V50 N25, 00062, CMC PWR DN	
PRO, HOLD (≈5 SEC) UNTIL STBY LT - ON	

SCS POWER DOWN	6.0
ACCEPTABLE S/C ATTITUDE	
BMAG PWR (2) - OFF	
FDAI/GPI PWR - OFF — PROVIDES MIN IMP	
SCS ELECTRONICS PWR - ECA — (REQUIRES AC1 & MNB)	
ORDEAL PWR & LIGHTING - OFF	
cb SCS LOGIC BUS (4) - OPEN (Pnl 8)	2.0
SCS ELECTRONICS PWR - OFF	
RHC PWR NORM (2) - OFF	

DATE 3/15/71

LAUNCH BUS LOSS

MN BUS A LOST - LAUNCH

EDS AUTO/OFF - OFF
TVC GMBL DR (P,Y) - 2
SCS TVC (P,Y) - RATE CMD
BMAG MODE (3) - RATE 2
FDAI SEL - 2
cb SPS PITCH 2 & YAW 2 (Pnl 8) - OPEN
(AFTER GIMBAL MOTORS ON)

AC INV 3 - MNB
AC INV 3 AC 1 - ON
AC INV 1 AC 1 - OFF
All F/C MNA - OFF
ALL F/C MNB - MNB (BEFORE CM/SM SEP)
cb MNA BAT BUS A (Pnl 275) - OPEN
cb MNB BAT C (Pnl 275) - CLOSED

MN BUS B LOST - LAUNCH

EDS AUTO/OFF - OFF
TVC GMBL DR (P,Y) - 1
SPS TVC (P,Y) - RATE CMD
✓BMAG MODE (3) - RATE 1
FDAI SEL - 1
cb SPS PITCH 1 & YAW 1 (Pnl 8) - OPEN
(AFTER GIMBAL MOTORS ON)

AC INV 3 - MNA
AC INV 3 AC 2 - ON
AC INV 2 AC 2 - OFF
All F/C MNB - OFF
All F/C MNA - MNA (BEFORE CM/SM SEP)
cb MNB BAT BUS B (Pnl 275) - OPEN
cb MNA BAT C (Pnl 275) - CLOSED

AC BUS 1 LOST - LAUNCH

BMAG MODE (3) - RATE 2
FDAI SEL - 2
TVC SERVO PWR 1 - AC2/MNB
SCS TVC PITCH, YAW - RATE CMD

AC INV 1 MNA - OFF
SUIT COMPR - AC 2
ECS GLY PUMP - AC 2
S BD NORM XPNDR - SEC
S BD NORM PWR AMP - SEC

AC BUS 2 LOST - LAUNCH

✓BMAG MODE (3) - RATE 1
FDAI SEL - 1
TVC SERVO PWR 2 - AC1/MNA
MTVC WITH THUMBWHEELS (MODE III OR IV)

AC INV 2 MNB - OFF
✓SUIT COMPR - AC 1
✓ECS GLY PUMP - AC 1

BAT BUS A LOST - LAUNCH

EDS AUTO/OFF - OFF
AUTO RCS SEL (RING 1) - OFF
IF BUS LOST BEFORE GMBL MTRS ON
  TVC GMBL DR (P,Y) - 2
  cb SPS P2 & Y2 (Pnl 8) - OPEN
    (AFTER SEC GIMBAL MOTORS ON)

cb MNA BAT C (Pnl 275) - CLOSED

BAT BUS B LOST - LAUNCH

EDS AUTO/OFF - OFF
AUTO RCS SEL (RING 2) - OFF
IF BUS LOST BEFORE GMBL MTRS ON
  TVC GMBL DR (P,Y) - 1
  cb SPS P1 & Y1 (Pnl 8) - OPEN
    (AFTER PRI GIMBAL MOTORS ON)

cb MNB BAT C (Pnl 275) - CLOSED

DATE 6/19/71

SPS BURN BUS LOSS

MN BUS A LOST - SPS BURN

TVC GMBL DR (P,Y) - 2
✓SCS TVC (P,Y) - RATE CMD
cb SPS P2 & Y2 (Pnl 8) - OPEN
(CRIT BURNS - AFTER GMBL MTRS ON)
FDAI SEL - 2
✓FDAI SOURCE - CMC
RHC PWR DIRECT 2 - MNB
BMAG MODE (3) - RATE 2
✓ΔV THRUST B - NORM
AUTO RCS SEL - MNB

AC INV 3 - MNB
AC INV 3 AC 1 - ON
AC INV 1 AC 1 - OFF
All F/C MNA - OFF
ALL F/C MNB - MNB
cb MNA BAT BUS A (Pnl 275) - OPEN

MN BUS B LOST - SPS BURNS

SCS TVC (P,Y) - RATE CMD
TVC GMBL DR (P,Y) - 1
cb SPS P1 & Y1 (Pnl 8) - OPEN
(CRIT BURNS - AFTER GMBL MTRS ON)
FDAI SEL - 1
✓FDAI SOURCE - CMC
RHC PWR DIRECT 1 - MNA
BMAG MODE (3) - RATE 1
ΔV THRUST A - NORM
AUTO RCS SEL - MNA

AC INV 3 - MNA
AC INV 3 AC 2 - ON
AC INV 2 AC 2 - OFF
All F/C MNB - OFF
All F/C MNA - MNA
cb MNB BAT BUS B (Pnl 275) - OPEN

DATE 6/19/71

AC BUS 1 LOST - SPS BURNS

TVC SERVO PWR 1 - AC2/MNB
SCS TVC (P&Y) - RATE CMD
BMAG MODE (3) - RATE 2
FDAI SEL - 2
✓FDAI SOURCE - CMC

AC INV 1 MNA - OFF
SUIT COMPR - AC 2
ECS GLY PUMP - AC 2
S BD NORM XPNDR - SEC
S BD NORM PWR AMP - SEC
SPS GAUGING - AC 2

AC BUS 2 LOST - SPS BURNS

TVC SERVO PWR 2 - AC1/MNA
BMAG MODE (3) - RATE 1
SCS TVC (P&Y) - AUTO
ΔVCG - LM/CSM
MTVC WITH TRIM THUMBWHEELS (SCS BURN ONLY)
FDAI SEL - 1
✓FDAI SOURCE - CMC

AC INV 2 MNB - OFF
✓SUIT COMPR - AC 1
✓ECS GLY PUMP - AC 1

BAT BUS A LOST - SPS BURNS

TVC GMBL DR (P,Y) - 2
(IF BUS LOST BEFORE GMBL MTRS ON)
cb SPS P2 & Y2 (Pnl 8) - OPEN
(CRIT BURNS - AFTER GMBL MTRS ON)

cb MNA BAT C (Pnl 275) - CLOSED

BAT BUS B LOST - SPS BURNS

TVC GMBL DR (P,Y) - 1
(IF BUS LOST BEFORE GMBL MTRS ON)
cb SPS P1 & Y1 (Pnl 8) - OPEN
(CRIT BURNS - AFTER GMBL MTRS ON)

cb MNB BAT C (Pnl 275) - CLOSED

DATE 6/19/71

ENTRY BUS LOSS

MN BUS A LOST - ENTRY

- BMAG MODE (3) - RATE 2
  FDAI SEL - 2
  ✓FDAI SOURCE - CMC
- AUTO RCS SEL (12) - MNB *(ONLY IF BUS LOST AFTER SM SEP)*

  AC INV 3 - MNB
  AC INV 3 AC 1 - ON
  AC INV 1 AC 1 - OFF
  All F/C MNA - OFF
  ALL F/C MNB - MNB (BEFORE CM/SM SEP)
  cb MNA BAT BUS A (Pnl 275) - OPEN
  cb MNB BAT C (Pnl 275) - CLOSED

MN BUS B LOST - ENTRY

- BMAG MODE (3) - RATE 1
  FDAI SEL - 1
  ✓FDAI SOURCE - CMC
- AUTO RCS SEL (12) - MNA *(ONLY IF BUS LOST AFTER SM SEP)*

  AC INV 3 - MNA
  AC INV 3 AC 2 - ON
  AC INV 2 AC 2 - OFF
  All F/C MNB - OFF
  All F/C MNA - MNA (BEFORE CM/SM SEP)
  cb MNB BAT BUS B (Pnl 275) - OPEN
  cb MNA BAT C (Pnl 275) - CLOSED

DATE 7/9/71 ~~7/6/71~~

AC BUS 1 LOST - ENTRY

- BMAG MODE (3) - RATE 2
  FDAI SEL - 2
  ✓FDAI SOURCE - CMC

  AC INV 1 MNA - OFF
  SUIT COMPR - AC 2
  ECS GLY PUMP - AC 2
  S BD NORM XPNDR - SEC
  S BD NORM PWR AMP - SEC

AC BUS 2 LOST - ENTRY

BMAG MODE (3) - RATE 1
FDAI SEL - 1
✓FDAI SOURCE - CMC

AC INV 2 MNB - OFF
✓SUIT COMPR - AC 1
✓ECS GLY PUMP - AC 1

BAT BUS A LOST - ENTRY

cb SCS B/D ROLL, P&Y (MNA) (3) (Pnl 8)
Before CM/SM SEP - OPEN
After RCS transfer to CM - CLOSE
cb SCS CONTR/AUTO (2) (Pnl 8) - OPEN
(AFTER APEX COVER JET)

cb MNA BAT C (Pnl 275) - CLOSED

BAT BUS B LOST - ENTRY

cb SCS B/D ROLL, P&Y (MNB) (3) (Pnl 8)
Before CM/SM SEP - OPEN
After RCS transfer to CM - CLOSE
cb SCS CONTR/AUTO (2) (Pnl 8) - OPEN
(AFTER APEX COVER JET)

cb MNB BAT C (Pnl 275) - CLOSED

DATE 6/19/71

ALL FC'S DISCONNECTED - POWERED FLT

ATTEMPT FC RECONNECT (ONE BUS AT A TIME)

IF RECONNECT NOT SUCCESSFUL

FC 1 - MN B
FC 2 - MN B
FC 3 - MN A

IF STILL NO SUCCESS

SCE PWR - AUX
EDS AUTO/OFF - OFF
cb MNA BAT C (Pnl 275) - CLOSED
cb MNB BAT C (Pnl 275) - CLOSED

AC BUS OVERLD + AC BUS + MN BUS UNDER V LITES

AFFECTED AC BUS - OFF (REASON - AC BUS SHORT)

FC 1 (2,3) LITE

VERIFY FC 1 (2,3) REAC tb - gray

IF tb BP

FC 1 (2,3) REAC v1v - OPEN (up)

IF tb STILL BP & REAC FLOW ~0

OPEN CIRCUIT FC 1 (2,3)

DATE 6/19/71

SM RCS THRUSTER FAILED ON

BMAG MODE (3) - RATE 2
CHG TO OTHER SC CONT MODE
ROT CONT PWR DIR (2) - MNA/MNB
STOP SPACECRAFT RATES WITH DIRECT RCS
AUTO RCS SEL (16) - OFF

IF CONDITION PERSISTS

AUTO RCS SEL (16) - ON (AS REQ'D)
MAN ATT (3) - ACCEL CMD
STOP SPACECRAFT RATES
cb SCS DIR ULL (2)(Pnl 8) - open
ROT CONT PWR DIR (2) - OFF

IF CONDITION PERSISTS

NEUTRALIZE RHC
SM RCS PRPLNT (AFFECTED QUAD) - OFF

SM RCS LITE

SM RCS HE (2) - CLOSE
SEE RCS 1

SM RCS QUAD SECURE

SM RCS He 1 & 2 (AFFECTED QUAD) (2) - CLOSE
SM RCS PRIM PRPLNT (AFFECTED QUAD) - CLOSE
Fire one jet in affected quad - 2 sec continuously
AUTO RCS SELECT (AFFECTED QUAD) (4) - OFF (except BOOST)

DATE 4/15/71

CM RCS FAILS TO PRESSURIZE OR FEED PRPLNT

IF NO PRESSURIZATION

✓cb EPS BAT BUS (2) (Pnl 229) - CLOSE
✓cb PYRO A/B SEQ A/B (2) (Pnl 250) - CLOSE
✓cb SECS ARM (2) (Pnl 8) - CLOSE
✓SECS PYRO ARM (2) - ARM
✓SECS LOGIC (2) - ON
CM RCS - PRESS

IF NO RCS PRPLNT FEED

✓cb EPS GRP 1 & 3 (Pnl 229) - CLOSE
✓cb SM RCS HTR A&B (Pnl 8) - CLOSE
✓cb RCS PRPLNT ISOL (2) (Pnl 8) - CLOSE
CM RCS PRPLNT - ON

IF STILL NO FEED

cb EPS GRP 5 (Pnl 229) - CLOSE
cb RCS LOGIC (2) (Pnl 8) - CLOSE
CM RCS LOGIC - ON
CM PRPLNT - DUMP MOMENTARILY, THEN OFF

V05 N09 ALARM CODES

00110 Mark reject has been entered but ignored
Continue

00113 No inbits (chan 16)
Continue: if alarm recurs use MDC DSKY.

00114 More marks made than desired
Continue

00115 V41 N91 keyed with OPTICS MODE not in CMC
OPTICS MODE - CMC and OPTICS ZERO - OFF

00116 Optics switch altered before 15 sec zero time elapsed
OPTICS ZERO - ZERO (15 sec).

00117 V41 N91 keyed but CMC has reserved OCDU (from start of gimbal test in P40 until termination of TVC functional allocation of the "optics" CDU Driving Output)
V41 N91 not yet available

00120 Optics torque has been requested but optics have not been zeroed since last FRESH START or RESTART
OPTICS ZERO - OFF then ZERO (15 sec).

00121 In 0.05 sec following mark, an ICDU changed by more than 0.033°
Repeat MK.

(m)00205 PIPA saturated
Use SCS control (G&N 12).

00206 The IMU zero routine has been entered with both the GMBL LOCK lt and NO ATT lt on
Coarse align to 0,0,0 Reselect V40E.

(m)00207 ISS turn-on request not present for 90 sec
Redo IMU turn on (G&N 12).

(m)00210 The IMU is not operating
Redo IMU turn on. If alarm recurs perform fresh start (V36E).
Consult MSFN. (G&N 12).

DATE 5/12/71

(m)00211 Coarse align error
If P51(3)/52(4) in progress record gyro torquing angles and perform fine align check in P52(4)
Otherwise, see G/1-24. (G&N 12).

(m)00212 PIPA fail, but PIPA is not being used
PIPA BIAS check (G&N 6/8).

(m)00213 IMU not operating with turn-on request
See 00210

00214 Program using IMU when turned OFF
See 00210 or exit program.

(m)00217 IMU coarse align or pulse torque difficulty has occurred
If code 211 also, perform 211 cure only
Reinitiate current program.
If alarm recurs, terminate use of ISS (G&N 12).

00220 IMU orientation unknown
Align or if aligned set REFSMMAT flag

00401 Desired middle gimbal angle is excessive
Call N22 - maneuver if MGA < 85° or realign IMU.

00402 Second MINKEY pulse torque must be done.

00404 Target out of view (90 deg test)
(G/3-7,3-11,6-3,7-16)

00405 Acceptable star pair is not available
(G/6-3,6-6)

00406 Rend navigation not operating
Select P20 Opt. 0 or 4 or continue.

00421 W-matrix overflow
Notify MSFN but continue.
W-matrix automatically reinitialized at next mark.

00600 No solution on first iteration in P31 or P32/72
(G/4-6,4-8)

00601 Post CSI Perigee/lune alt <85nm/ 5.8nm
(G/4-6, 4-8)

00602 Post CDH Perigee/lune alt <85nm/ 5.8nm
(G/4-6, 4-8)

00603 Time from TIG (CSI) to TIG (CDH) <10 min
(G/4-6, 4-8)

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00604 Time from TIG (CDH) to TIG (TPI)
<10 min
(G/4-6,4-8)

00605 Number of iterations exceeds loop maximum
(G/4-6,4-8,4-15,4-16)

00606 ΔV (CSI) has been >1000 fps for last two iterations
(G/4-6,4-8)

00611 No TIG for given ELEV angle
(G/4-10,4-12)

00612 State vector in wrong sphere of influence at TIG
(G/4-15)

00613 Reentry angle out of limits
(G/4-16)

(m)00777 ISS warning caused by PIPA fail
(G&N 6).

01102 CMC self test error
(G/2-3)

(m)01105 Downlink too fast
Rset. If alarm recurs DOWNLINK FAILURE.
(G&N 12).

(m)01106 Uplink too fast
Rset. If alarm recurs UPLINK FAILURE.
(G&N 12).

(m)01107 Phase table failure-assume erasable memory is destroyed
If Comm:
1. V74 CMC DOWNLINK
2. P27 As Necessary.
3. V48 As Necessary (V46).
4. Reestablish REFSMMAT via P51 As Necessary.

If FRESH START recurs, CMC FAILURE (SSR-3).

If no Comm, pg G/9-1

01301 Arcsin or arccos input is greater than one
Notify MSFN, continue.

(m)01407 VG increasing
(G&N 12).

01426 IMU unsatisfactory
Realign or use SCS.

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01427 IMU reversed
Note FDAI operation is inverted.

01520 V37 request not permitted at this time
Wait till COMP ACTY lt.
not on continuously - reselect V37 or if P62-67, select P00 and then desired program.

01600 Overflow in drift test
This is gnd test alarm only.

01601 Bad IMU torque abort
See 01600

01703 Insufficient time for integration.
TIG slipped
(G/5-3,5-18)

(m)03777 ISS warning caused by ICDU fail
(G&N 6)

(m)04777 ISS warning caused by ICDU & PIPA fail
(G&N 6)

(m)07777 ISS warning caused by IMU fail
(G&N 6)

(m)10777 ISS warning caused by IMU & PIPA fail (G&N 6)

(m)13777 ISS warning caused by IMU & ICDU fail
(G&N 6)

(m)14777 ISS warning caused by IMU,ICDU & PIPA fail
(G&N 6)

**20430 Orbital integration has been terminated to avoid possible infinite loop.
Notify MSFN.
Probable S.V. uplink required

**20607 No solution to conic subroutine
Reselect program.

**20610 Alt at specified TIG in P37 < 400K ft
Reselect P37 and decrease TIG.

**21204 Negative or zero time waitlist call.
If ave-g or ext. vb. on, continue.
Otherwise reselect program.

**21206 Second job attempts to go to sleep via keyboard and display program
See 21204.

**21210 Second attempt is made to stall
Reselect program
Do not attempt use of IMU while CMC is using it.

**21302 SQRT called with negative argument
See 21204

**21501 Keyboard and display alarm during internal use
See 21204

**21502 Illegal flashing display
See 21204

**21521 P01 selected and P11 has already been performed
Select correct program

*31104 Delay routine busy
Reselect extended verb or continue with program.
Notify MSFN.

*31201 Executive overflow - no vac area
Reselect Extended Verb and/or Continue Program.

*31202 Executive overflow - no core sets
See 31201

*31203 Waitlist overflow - too many tasks
See 31201

*31211 Illegal interrupt of extended verb
Reselect extended verb after optics marking is completed.

(m) - Malf procedure indicated
**(2xxxx) - Generates restart (no lt), F37 (POODOO)
*(3xxxx) - Restart (no lt) and program continues (i.e. attempted recovery)(BAILOUT)

NOTE - All **alarms act as *type if they occur when Ave-g is on or display type extended verb is active.

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CRITICAL BURNS

ALARM CODES

CM RCS