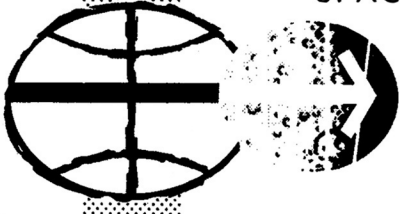
APOLLO 13	
LM CONTIGENCY CHECKLIST	
PART NO.	S / N
SKB32100076 – 362	

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APOLLO XIII
LM-7

CONTINGENCY CHECKLIST

PREPARED BY
FLIGHT CREW SUPPORT DIVISION
SPACECRAFT SYSTEMS BRANCH



MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

JANUARY 6, 1970
REVISED MARCH 31, 1970

APOLLO 13

LM CONTINGENCY CHECKLIST

March 16, 1970

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This document is under the configuration control of the Crew Procedures Control Board (CPCB). All proposed changes should be submitted to the Apollo Flight Data File Manager, Mr. T. W. Holloway, CF34, Room 230, telephone HU3-4271.

Distribution of this document is controlled by Mr. J. W. O'Neill, Chief, Flight Planning Branch, Flight Crew Support Division.

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Changed _____

EMERGENCY SECTION

CONTINGENCY EVT, IVT SECTION

Basic Date 4/1/70
Changed

APOLLO FLIGHT DATA FILE

LM CONTINGENCY CHECKLIST

LIST OF EFFECTIVE PAGES

Basic Date _____
Changed _____

PAGE NO.	BASIC DATE	CHANGED DATE
COVER PAGE	1/6/70	NONE
1	1/6/70	NONE
2	1/6/70	2/9/70
3	1/6/70	2/13/70
4	1/6/70	3/10/70
5	1/6/70	2/9/70
6	1/6/70	2/13/70
7	1/6/70	2/13/70
8	1/6/70	NONE
9	1/6/70	NONE
10	1/6/70	2/13/70
11	1/6/70	3/10/70
12	1/6/70	2/13/70
13	1/6/70	2/13/70
14	1/6/70	3/10/70
15	1/6/70	3/23/70
16	1/6/70	NONE
17	1/6/70	2/9/70
18	1/6/70	3/23/70
19	1/6/70	NONE
20	1/6/70	NONE
21	1/6/70	2/9/70
22	1/6/70	4/1/70
23	1/6/70	NONE
24	1/6/70	NONE
25	1/6/70	2/13/70
26	1/6/70	3/10/70
27	1/6/70	3/10/70
28	1/6/70	3/10/70
29	1/6/70	3/10/70

LIST OF EFFECTIVE PAGES
(CONT)

PAGE NO.	BASIC DATE	CHANGED DATE
30	1/6/70	3/10/70
31	1/6/70	NONE
32	1/6/70	NONE
33	1/6/70	3/23/70
34	1/6/70	3/23/70
35	1/6/70	2/13/70
36	1/6/70	NONE
37	1/6/70	3/10/70
38	1/6/70	NONE
39	1/6/70	NONE
40	1/6/70	3/10/70
41	1/6/70	NONE
42	1/6/70	2/13/70
43	1/6/70	NONE
44	1/6/70	3/10/70
45	1/6/70	NONE
46	1/6/70	NONE
47	1/6/70	3/10/70
48	1/6/70	NONE
49	3/10/70	3/31/70
SBD-1	1/6/70	3/23/70
SBD-2	1/6/70	NONE
SBD-3	1/6/70	NONE
SBD-4	1/6/70	NONE
SBD-5	1/6/70	3/10/70
PWR-1	1/6/70	3/10/70
PWR-2	1/6/70	3/10/70
PWR-3	1/6/70	3/10/70
PWR-4	1/6/70	3/10/70
PWR-5	1/6/70	3/10/70
PWR-6	1/6/70	NONE
PWR-7	1/6/70	3/10/70
PWR-8	1/6/70	3/16/70
PWR-9	1/6/70	3/10/70
PWR-10	1/6/70	NONE
PWR-11	2/9/70	NONE

Basic Date ——
Changed ——

LIST OF EFFECTIVE PAGES
(CONT)

PAGE NO.	BASIC DATE	CHANGED DATE
EMER-1	2/9/70	2/24/70
EMER-2	2/9/70	NONE
EMER-3	2/9/70	2/24/70
EMER-4	2/9/70	3/16/70
EMER-5	2/9/70	3/5/70
EMER-6	2/9/70	3/5/70
EMER-7	2/9/70	3/5/70
EMER-8	2/9/70	3/5/70
EMER-9	2/9/70	3/5/70
EMER-10	2/9/70	3/5/70
EMER-11	2/9/70	3/5/70
EMER-12	2/9/70	3/5/70
EMER-13	2/9/70	3/5/70
EVT-1	1/6/70	3/3/70
EVT-2	1/6/70	3/3/70
EVT-3	1/6/70	3/3/70
EVT-4	1/6/70	3/3/70
EVT-5	1/6/70	3/3/70
EVT-6	1/6/70	3/3/70
EVT-7	1/6/70	3/3/70
EVT-8	1/6/70	3/5/70
EVT-9	1/6/70	NONE
EVT-10	1/6/70	3/10/70
EVT-11	1/6/70	3/3/70
EVT-12	1/6/70	3/3/70
EVT-13	1/6/70	3/10/70
EVT-14	1/6/70	3/10/70
EVT-15	1/6/70	NONE
IVT-1	1/6/70	NONE
IVT-2	1/6/70	2/9/70
IVT-3	1/6/70	NONE

Basic Date ——
Changed ——

This is a complete reprint and incorporates basic date of 1/6/60, change dates 2/9/70, 2/13/70, 2/24/70, 3/5/70, 3/10/70 and 3/16/70.

2 HOUR ACTIVATION

IVT TO LM

1 Activate CABIN DUMP VALVE & Open Hatch
Carry Comm Carrier, CWG Connector And CSM 02 Hose

2 Record Docking Tunnel Index Angle _____
Window Shades - Down

3 Transfer To LM PWR
GET ___ : ___ : ___
(FLOOD Lts. Blink, C/W PWR Caution Lt-On)
CB(11) EPS: XLUNAR BUS TIE - Close
CB(16) EPS: XLUNAR BUS TIE - Close

4 FLOOD LIGHT - All
CB(11) LTG: UTIL - Close
Activate Utility Lts

5 DES H20 - OPEN
DES 02 - OPEN
CABIN REPRESS - AUTO
CB(16) ECS: CABIN REPRESS - Close

EPS ACTIVATION

1 LTG: ANUN/NUM - BRIGHT (1 Caution, 9 Power Failure, 1 COMP Lt - On)

2 CB(11) INST: SIG CONDR 1 - Close
EPS: DES ECA CONT - Close
CB(16) INST: SIG SENSOR - Close
: PCM/TE - Close
: SIG CONDR 2 - Close
EPS: DISP - Close
: DES ECA CONT - Close

3 Connect To LM Comm Umbilical

AUDIO (BOTH): S-BAND T/R - T/R
: ICS - T/R

Basic Date 1/6/70
Changed _____

4 Verify BAT 1,2,3,4 - tb-LO
DES BATS tb-gray
BATS 5&6 NORMAL & BACKUP (4)=tb-bp
Check BAT and BUS Voltages

When BUS Volts $\leq$ 27V, Select High Voltage Taps
CB(16) EPS: CROSS TIE BAL LOADS - Open
BAT 1 HI VOLTAGE-OFF/RESET
BAT 1 HI VOLTAGE-ON
Repeat for BATS 2,3,4

5 CB(11) AC BUS B&A: BUS TIE INV 2&1(4)-Close
: AC BUS VOLT(1) - Close
EPS: INV 1 - Close
CB(16) EPS: INV 2 - Close

6 POWER/TEMP MON - AC BUS
INV -1 Then 2
Verify Voltage in GREEN Band
CB(11) EPS: INV 1 - Open

MISSION TIMER ACTIVATION

1 CB(11) AC BUS B: NUM LTG - Close
FLIGHT DISPLAYS: MISSION TIMER-Close
Set MSN TMR On CSM Mark

PRIMARY GLYCOL LOOP ACTIVATION

1 CB(16) ECS: DISP - Close
GLYCOL - PUMP 1 _____psia
- INST (SEC) _____psia
- PUMP 2
CB(11) ECS: GLYCOL PUMP AUTO TRNFR - Close
: GLYCOL PUMP 1 - Close
: GLYCOL PUMP AUTO TRNFR - Open
GLYCOL - PUMP 1
Verify Press _____ psia
CB(11) ECS: GLYCOL PUMP 2 - Close

Basic Date 1/6/70
Changed 2/9/70

CAUTION/WARNING CHECKOUT

1 CB(16) LTG: MASTER ALARM - Close
INST: CWEA - Close

WARN	CAUT	COMP
ASC PRESS	PREAMP	H2O SEP
CES AC	HEATER	
CES DC	ECS	
LGC	GLYCOL (ON IF TEMP >50°)	
RCS A REG		
RCS B REG		

CB(16) LTG: ANUN/DOCK/COMPT - Close
STAB/CONT: ATCA - Close
HEATER: DISP - Close
INST: CWEA - Cycle
CB(11) STAB/CONT: ENG CONT - Close

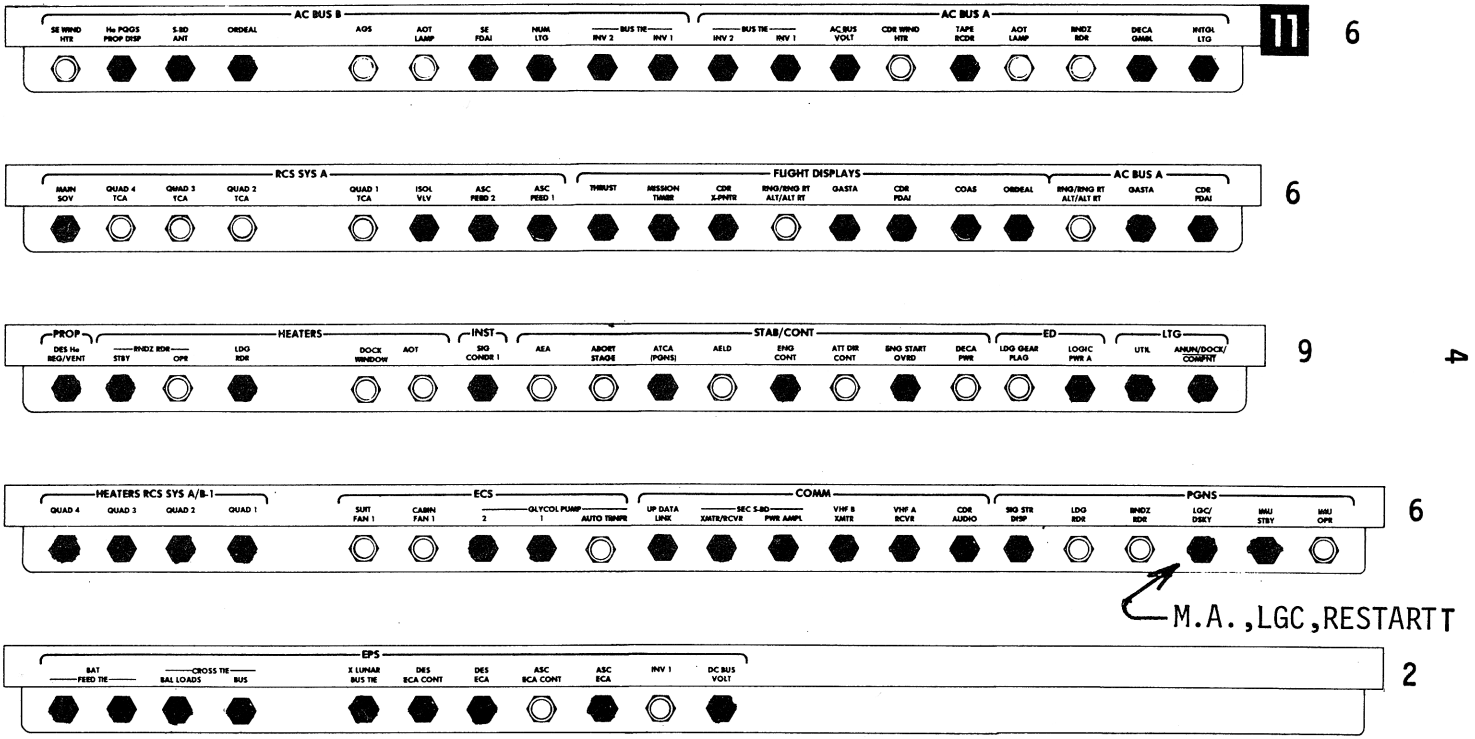
2 RCS SYS A/B-2: QUADS(4) - AUTO
HTR TEMP MONITOR - Cycle Then LDG
(HEATER Lt - Off)
LAMP/TONE TEST - Check All Positions

3 PRIM EVAP FLOW No 1 - OPEN GET ____:____:____

4 Close CB's Per ACTIVATION PWR UP Chart

Basic Date 1/6/70
Changed 2/13/70

ACTIVATION PWR UP (MODE I, IIA, II, III)



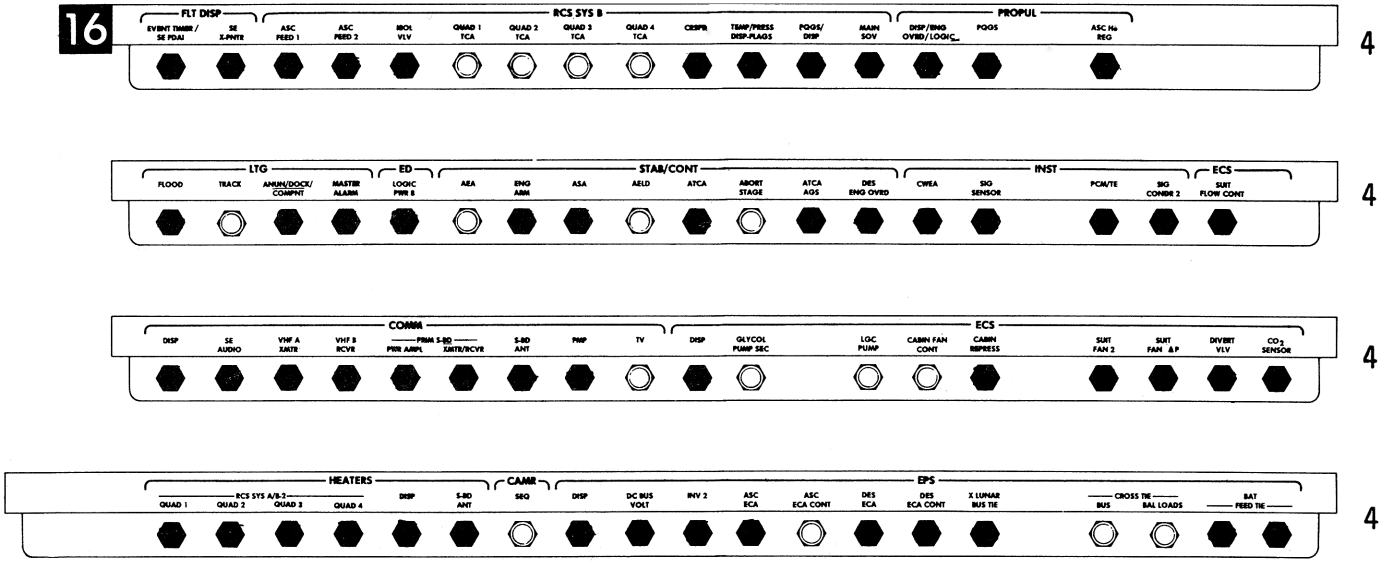
4

LM-7

Basic Date 1/6/70
Changed 3/10/70

Basic Date 1/6/70
Changed 2/9/70

ACTIVATION PWR UP



PGNS TURN-ON & SELF TEST

1 Check Bus Voltages

2 V35E
F 88 88
(Master Alarm, LGC & ISS Warning, And All DSKY Lts - On, 8's In All Registers; Lts Reset In 5 sec)

3 CB(11) PGNS: IMU OPR - Close
NO ATT Lt - On (Off In 90 sec)
Wait 20 Sec after NO ATT Lt-Off,
Then V37E00E

4 V25 N01E 1365E
E,E,E

5 V15 N01E 1365E
R1,R2,R3 All Zero

6 V21 N27E 10E (Test Fixed And Erasable Memory)

R1 Number Of Errors
R2 Number Of Tests Started
R3 Number Of Tests Successful
(Test Successful If R2 $\geq$ 3 Within 78 sec)

	*PROG Lt-On	*
*	V05 N09E 01102 SELF-	*
*	TEST ERROR	*
* N08E	Record For MSFN	*
*		*
*	R1 _____	*
*		*
*	R2 _____	*
*		*
*	R3 _____	*

7 V21 N27E 0E TERMINATE SELF TEST

Basic Date 1/6/70
Changed 2/13/70

S-BAND ACTIVATION

1 HTR CONT TEMP MONITOR - S-BAND
(-52° to +135°)
S-BD -PM, PRIM, PRIM, VOICE, PCM, OFF/RESET, OFF, LO
ANT: S-BD - FWD or AFT

ECS ACTIVATION & CHECKOUT

1 O2/H2O QTY MON - ASC 2, ASC 1, DES

2 SUIT GAS DIVERTER - PUSH/CABIN

3 SUIT FAN - 2 (Master Alarm (Twice),
SUIT/FAN Warning Lt-On &
SUIT/FAN Comp Lt-On
Momentarily, ECS Caution,
H2O SEP Comp Lts-On
Then Off In 2 Min)

Basic Date 1/6/70
Changed 2/13/70

DOCKED IMU COARSE ALIGN

1 Verify CSM In Min DEADBAND ATT HOLD

2 Calculate LM Gimbal Angles

OG	IG	MG
300.00	180.00	360.00
_____ +Rc (See Page 1)		
_____ -CM ( )	_____ +CM ( )	_____ -CM ( )
_____ LM	_____ LM	_____ LM

3 V41 N20E COARSE ALIGN IMU
F 21 22 LOAD ICDU ANGLES OG,IG,MG (.01°)
(NO ATT Lt - On, FDAI Torques)

```
*PROG Lt-On              *
*V05 N09E 00211 COARSE   *
*         ALIGN ERROR,Go*
*         To 3           *
```

4 V40 N20E ZERO CDU (NO ATT Lt-Off)
Notify CSM ATT HOLD No Longer Required

5 V25 N07E
F 21 07 SET REFSMFLG
77E,10000E,1E, V01 N01E,77E Confirm
Bit 13 Is Set (Set If 1st Digit Is
1,3,5, or 7)

6 V37E 51E
PRO
V37E 00E

7 V06 N20 On LM MARK - ENTR
Note Time; Copy CSM & LM OG, IG, MG
GET ___:___:___

OG	IG	MG
_____. CM	_____. CM	_____. CM
_____. LM	_____. LM	_____. LM

8 **Voice Gimbal Angles And Time To MSFN**

Basic Date 1/6/70
Changed _____

VHF B CHECKOUT

1 CSM Configure for VHF Simplex B
VHF B XMTR - VOICE
VHF B RCVR - ON
VHF ANT - FWD
AUDIO (Both): VHF B - T/R

2 Perform Voice Check On VHF Simplex B

VHF A CHECKOUT

1 CSM Configure For VHF Simplex A
VHF A XMTR - VOICE
VHF A RCVR - ON
VHF B XMTR - OFF
TLM - HI
AUDIO (Both): VHF B - RCV
: VHF A - T/R

LGC/CMC CLOCK SYNC/TEPHEM UPDATE

1 V25 N36E

2 Load CSM Time _____:_____:_____

3 On CSM Mark - ENTER

4 V06 N65E - Compare With CSM N65

CSM Time _____:_____:_____

LM Time _____:_____:_____

V55E - Load ΔT
Check Mission Timer

Basic Date 1/6/70
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5 CSM Read TEPHEM

R1 _____

R2 _____

R3 _____

6 V25 N01E, 1706E Load TEPHEM (Octal)

7 V05 N01E, 1706E Verify TEPHEM

S-BD STEERABLE ANTENNA ACTIVATION

1 TLM - HI
HI GAIN: PITCH- -75°
YAW - -12°

TRACK MODE - SLEW (Wait 30 Sec)

PITCH _____ (CCW)
YAW _____ (CCW)
ANTENNA: S-BD - SLEW

2 VERIFY SIGNAL STRENGTH >3.0
TRACK MODE - AUTO (>4.0)
S-BD CHECK WITH MSFN

E-MEMORY DUMP

1 Verify TLM - HI
V74E (42 Sec)

LANDING GEAR DEPLOY

1 CB 11) ED: LDG GEAR FLAG-Close
: LOGIC POWER A-Open
MASTER ARM-ON
LDG GEAR DEPLOY-FIRE, tb-gray
CB(11) ED: LOGIC POWER A-Close
LDG GEAR DEPLOY-FIRE
MASTER ARM-OFF
CB(11) ED: LDG GEAR FLAG-Open

Basic Date 1/6/70
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RCS PRESSURIZATION

1 RECYCLE: SYS A&B ASC FEED 2(2) - CLOSE
SYS A&B ASC FEED 1(2) - OPEN

2 RCS QUANTITY A&B - 100%
SYS A&B ASC FUEL & ASC OXID - tb(4) Remain-bp
SYS A&B THRUSTER PAIR QUADS - tb(8) gray
(Possible tb-Red, Cycle CWEA If Necessary)
RECYCLE: CRSFD-CLOSE
: MAIN SOV SYS A&B - OPEN
HTR CONT TEMP MON - Check RCS QUADS ($\geq$120°)

3 TEMP/PRESS MON - He (2820-3280 psia)
PRPLNT (40°-100°/10-50 psi)
FUEL MANF (25-90 psi)
OXID MANF (25-90 psi)

4 CB(16) LOGIC PWR B-Open
MASTER ARM - ON
HE PRESS RCS - FIRE
(RCS A&B REG Warning Lts-Off)
RECYCLE: SYS A&B ASC FEED 2(2) - CLOSE
CB(16) LOGIC PWR B-Close
MASTER ARM-OFF

5 RECYCLE: SYS A&B ASC FEED 1(2) - OPEN
: SYS A&B THR PAIR QUADS(8)-OPEN
: CRSFD - CLOSE
: SYS A&B MAIN SOV-OPEN

6 TEMP/PRESS MON - OXID MANF (175-188 psi)
- FUEL MANF (175-188 psi)
- PRPLNT (40°-100°/178-188 psi)
- He (2750-3200 psi)
Read He Pressure To MSFN

Basic Date 1/6/70
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MSFN - UPDATE

1 UPDATA LINK - DATA
MSFN P-27 Updates REFSMMAT/
STATE VECTOR
UPDATE LINK - OFF

AGS ACTIVATION AND SELF TEST

1 AGS STATUS - STBY (Master Alarm,
AGS Warning Lt-On)
CB(16) STAB/CONT: AEA-Close
(AGS Warning Lt-Off)
CB(11) AC BUS B: AGS - Close
AGS STATUS - OPERATE
(Master Alarm & AGS Warning Lt-On)
02/H2O QTY MON-C/W RESET, Then DES

2 000+888888 (OPR ERR Lt-On)

3 123-45679

4 412+0 REINITIATE TEST
412R +1 SELF TEST SATISFACTORY
+3 LOGIC TEST FAILURE
+4 MEMORY TEST FAILURE
+7 LOGIC AND MEMORY TEST FAILURE

5 574R DESCENT STAGE FLAG (+ Not Staged)

6 604R LUNAR SURFACE FLAG (+ Not On
Lunar Surface)

7 612R STAGING SEQ COUNTER (+0 Nom)

Basic Date 1/6/70
Changed 2/13/70

IMU FINE ALIGN

1 Copy Ground Calculated Gyro Torquing Angles

X_____, Y_____, Z_____

2 V76E (Verify)
V42E Fine Align IMU
F 21 93 Load Gyro Torquing
Angles X,Y,Z (.001°)

3 V16 N93E Monitor Torquing
(All Zero)

AGS ALIGN

1 400 + 5 Body Axis Align

DAP SET, GIMBAL/THROTTLE TEST

1 CB(11) STAB/CONT: DECA PWR - CLOSE
MODE CONT: PGNS - AUTO (Poss RCS TCA Lt, And QUAD
Verify GUID CONT - PGNS Flags-Red)
THR CONT - MAN
MAN THROT - CDR
TTCA(Both)-THROTTLE (MIN)

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2 V48E
N46 32021
PRO
N47 +_____ (33731)
+_____ (From MSFN or CSM)

PRO
N48 +_____ (From MSFN or Chart)
+_____ (From MSFN or Chart)

ENG STOP - PUSH
ENG ARM - DES (DES REG Lt-ON)
PRO (ENG GMBL Lt-ON in Approx 30 sec)

3 TTCA (CDR) - MIN, THEN SOFT STOP,
CHECK CMD THRUST METER (50%),
THEN MAX (98%), THEN MIN

4 MAN THROT - SE
TTCA (LMP)- Repeat Test

5 F 50 48
PRO
ENG ARM - OFF (ENG GMBL Lt-OFF)
ENG STOP - Reset
MSFN Verifies Final GDA Position

6 THR CONT - AUTO
MAN THROT - CDR
TTCA (Both) - JETS
MODE CONT: PGNS - OFF

DPS PRESSURIZATION AND CHECKOUT

1 PRPLNT TEMP/PRESS MON - DES 1&2
(50°-90° FUEL, 50°-90° OXID/
58-144 psi FUEL, 33-255 psi OXID)

2 HELIUM MON: AMB PRESS (1490-1780 psi)
: SUPCRIT PRESS 610-1070

3 DES HE REG 1 tb gray
DES HE REG 2 tb-bp

Basic Date 1/6/70
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4 MASTER ARM - ON
DES PRPLNT ISOL VLV - FIRE
HE PRESS/DES START - FIRE
MASTER ARM-OFF

5 PRPLNT TEMP/PRESS MON: DES 2&1
(50°-90° FUEL, 50°-90° OXID/242-253 psi)
HELIUM MON: AMB PRESS (200-1110 psi)
: SURCRIT PRESS (610-1070 psi)

RCS CHECKOUT

CB(11) ATT DIR CONT - Close
GUID CONT - PGNS
ATT CONT (3) - PULSE
MODE CONTROL (Both) - ATT HOLD
ATT/TRANSL - 4 JETS
ACA PROP (LMP) - ENABLE
ACA/4 JET (LMP) - ENABLE
TTCA/TRANSL (LMP) - ENABLE
V76E

CB(11 & 16) QUAD TCA 1,2,3,4, (8) - Close
Cycle CWEA (DES REG Lt - OFF)
Cycle TEMP MON

Verify HBR With MSFN
Verify CSM In Wide Deadband & Attitude Hold

V11N10E, 5E
TTCA (LMP)
Up (+X) - R1 00252
Dn (-X) - 00125
E,6E
Rt (+Y) 00220
Lt (-Y) 00140
Fwd(+Z) 00011
Aft(-Z) 00006

Notify CSM Check Complete

V48E, N46 31021
PRO, PRO, V34E

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Changed 3/23/70

DOCKED DPS BURN (PGNS)

Copy P30 Pad

If APS Follow-up Required: Copy P30 Pad For APS Burn BAT 5,6 - ON, tb(2) - gray Verify BAT Current BAT 1,3 - OFF/RESET, tb(2) -bp

V62E
V37E 30E
N33, TIG
PRO
N81 ΔV X, Y, Z
PRO
N42 Ha, Hp, ΔV
PRO
N45 M, TFI, MGA

SET EVNT TMR
PRO

-6:00 P40E

F 50 18

CSM Mnvr to Burn Attitude, Then CMC - FREE

MODE CONT: (BOTH) - AUTO
ATT CONT (3) - MODE CONT
PRO (TRIM ATT)

ENTR
06 40 TFI, VG, ΔVM

400 + 0
404 + 0
405 + 0
406 + 0
47OR

DOCKED DPS BURN (PGNS)

-4:00 CB(11) INV 1 - CLOSE
Select INV 1

CB(16) CWEA - Cycle
Cycle TEMP MON

TTCA (CDR) - THROT (Min)
TTCA (LMP) - JETS

RATE/ERR MON (Both) - LDG RDR/CMPTR
ATTITUDE MON (CDR) - PGNS
(LMP) - AGS
RATE SCALE - 5°/SEC
ENG GMBL - ENABLE
THR CONT - AUTO
MAN THROT - CDR
ATT/TRANSL - 4 JET
BAL CPL - ON
DES ENG CMD OVRD - OFF
DEADBAND - MIN
ENG STOP (2) - Reset
ABORT/ABORT STAGE - Reset
PRPLNT QTY MON - DES 1

V65E

Basic Date 1/6/70
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-1:00 MASTER ARM - ON (FIRST BURN ONLY)
CB(16) ABORT STAGE - CLOSE

- :30 ENG ARM - DES

- :10 MANUAL ULLAGE (LMP)

- :07 AUTO ULLAGE

- :05 F 99 40, PRO

:00 IGNITION

+ :05 TTCA (CDR) Throttle To 40%

+ :15 MASTER ARM - OFF

When PRPLNT QTY = 37%:
DES He REG 1 - CLOSE

At Engine Cutoff:
ENG STOP - PUSH
MODE CONT: PGNS - ATT HOLD

Damp Excessive Rates Via LM Y, Z Translation

CSM RESUME ATTITUDE CONTROL

PRO
N85 _____ VGX 470 _____
_____ VGY
_____ VGZ
PRO
POOE
V75E

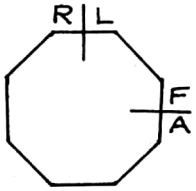
Basic Date 1/6/70
Changed 3/23/70

DOCKED APS BURN

If DPS Contains Insufficient ΔV To Complete A MODE II Abort, This Procedure May Be Entered Immediatly Upon Termination of DPS Burn.

APS BURN TECH

*If PITCH Error Needle Goes Down, LMP Thrust AFT (Pull Out On TTCA)
*If ROLL Needle Left, CDR Thrust Right (Push Right ON TTCA).
*See FDAI Picture Below.



*When APS Ignition Occurs, LMP Should Immediately Thrust Aft To Maintain Control. Use Of PITCH ATTITUDE CONTROL Switch To MODE CONT Will Provide An Assist.

If Required:
BAT 5,6 - ON, tb (2) - gray
Verify BAT Current
BAT 1,3 - OFF/RESET,
tb (2) - bp

CB(11&16) STAB/CONT:AELD (2)-CLOSE
EPS:ASC ECA CONT (2) - CLOSE

HELIUM MON - ASC PRESS 1&2
PRPLNT TEMP/PRESS MON - ASC
ASC He REG 1&2, tb(2) - gray

MASTER ARM - ON
ASC He SEL - BOTH
He PRESS:ASC - FIRE
MASTER ARM - OFF

DES H2O - CLOSE
WATER TANK SEL - ASC
ASC H2O - OPEN
DES O2 - CLOSE
CABIN REPRESS - CLOSE
#1 ASC O2 - OPEN

Verify ASC BATS Have Been On For 20 Min
BAT 2,4 - OFF/RESET, tb-bp
DES BATS - DEADFACE, tb-bp

400+5

V37E 30E
N33 TIG
PRO
N81 ΔV X, Y, Z
PRO
N42 Ha, Hp, ΔV
PRO
N45 M, TFI, MGA

SET EVNT TMR
PRO

ENG ARM - OFF
PRPLNT QTY MON - OFF
ENG STOP - RESET
TTCA (CDR) - JETS

MODE I, III: TO UNSTAGED POWER DOWN

MODE IA : To UNSTAGED POWER DOWN If Desired, then Reactivate LM For Docked APS Burn At Ground Calculated TIG.

MODE II : TO PAGE 16. Repeat DPS Burn At Ground Calculated TIG (up to 40 Hr), Then to UNSTAGED POWER DOWN.

Basic Date 1/6/70
Changed

-6:00 P42E
1706 ALARM, PRO

F 50 18

CSM Mnvr To Burn Attitude

ENTR
06 40 TFI, VG, ΔVM

400 + 0
404 + 0
405 + 0
406 + 0
47OR

-4:00 GUID CONT - AGS
ATTITUDE MON (BOTH) - PGNS
RATE SCALE - 5°/SEC
ATT/TRANSL - 4 JET
BAL CPL - ON
ATT CONT: ROLL - PULSE
: PITCH - PULSE
: YAW - MODE CONT
MODE CONT (BOTH) - ATT HOLD
ENG STOP (2) - RESET
ABORT/ABORT STAGE - RESET

-1:00 MASTER ARM - ON

Basic Date 1/6/70
Changed 4/1/70

30 ENG ARM - ASC

10 MANUAL ULLAGE

07 STAGE - FIRE

05 F 99 40, PRO

02 CMC MODE - FREE

ACA - Out of Detent (Yaw) (Zero Error Needles)

00 ENG START - PUSH
Ignition

SYS A&B ASC FEED 2(2) - OPEN, tb(4) - gray
SYS A&B MAIN SOV (2) - CLOSE

V16 N85E, VG X, Y, Z (.1fps)

When VGX = 200 fps:
SYS A&B MAIN SOV (2) - OPEN
SYS A&B ASC FEED 2(2) - CLOSE

When VGX = 0:
ENG STOP - PUSH

ATT CONT: YAW - PULSE

Damp Excessive Rates Via LM Y, Z Translation

CSM Resume Attitude Control

ENG ARM - OFF
MASTER ARM - OFF
ENG STOP - RESET

Copy Residuals: _____ VGX
_____ VGY
_____ VGZ

KEY REL, PRO, PRO

TO STAGED POWER DOWN

30-MIN ACTIVATION

IVT TO LM

1 CSM Mnvr To Burn Attitude
Activate CABIN DUMP VALVE & Open Hatch
Carry COMM Carrier & CWG Connector to LM

2 FLOOD LIGHT - All
DES O2 - OPEN
DES H2O - OPEN
CABIN REPRESS- AUTO
CB(16)ECS: CABIN REPRESS - CLOSE
SUIT GAS DIVERTER - CABIN

3 CSM Transfer To LM PWR
(Flood Lts Blink, C/W PWR Caution Lt-On)
CB(11) EPS: XLUNAR BUS TIE - CLOSE
HEATERS: RCS SYS A/B-1 QUAD 4,3,2,1 (4)-CLOSE
CB(16) EPS: XLUNAR BUS TIE - CLOSE
HEATERS: RCS SYS A/B-2 QUAD 1,2,3,4 (4)-CLOSE

4 RCS SYS A/B-2: QUADS (4) - AUTO

EPS ACTIVATION

1 LTG: ANUN/NUM - BRIGHT

2 CB(11) INST: SIG CONDR 1 - Close
EPS: DES ECA CONT - Close
CB(16) INST: SIG SENSOR - Close
: PCM/TE - Close
: SIG CONDR 2 - Close
EPS: DISP - Close
: DES ECA CONT - Close

3 Verify BAT 1,2,3,4 - tb-LO
DES BATS tb-gray
BATS 5&6 NORMAL & BACKUP (4)-tb-bp
Check BAT and BUS Voltages

When BUS Volts $\leq$ 27V, Select High Voltage Taps CB(16) EPS: CROSS TIE BAL LOADS - OPEN BAT 1 HI VOLTAGE-OFF/RESET Then ON Repeat for BATS 2,3,4

4 CB(11) AC BUS B&A: BUS TIE INV 2&1(4) - CLOSE
: AC BUS VOLT - CLOSE
EPS: INV 1 - CLOSE
CB(16) EPS: INV 2 - CLOSE

5 INV-1, Verify Voltage In Green Band

PRIMARY GLYCOL LOOP ACT

1 CB(16) ECS: DISP - CLOSE
CB(11) ECS: GLYCOL PUMP AUTO TRNFR - CLOSE
: GLYCOL PUMP 1 - CLOSE
: GLYCOL PUMP AUTO TRNFR - OPEN
GLYCOL - PUMP 1
CB(11) ECS: GLYCOL PUMP 2 - CLOSE

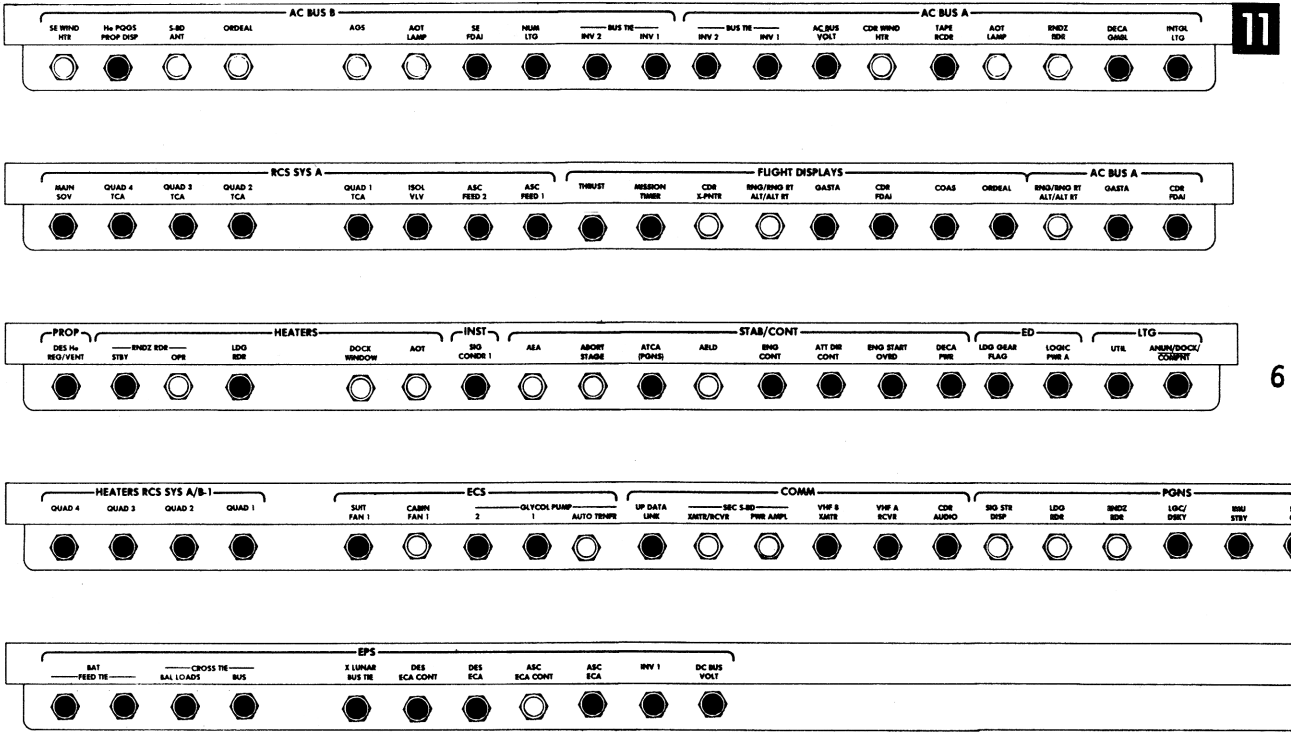
2 PRIM EVAP FLOW No. 1 - OPEN

3 Close CB's Per 30-MIN ACTIVATION Chart

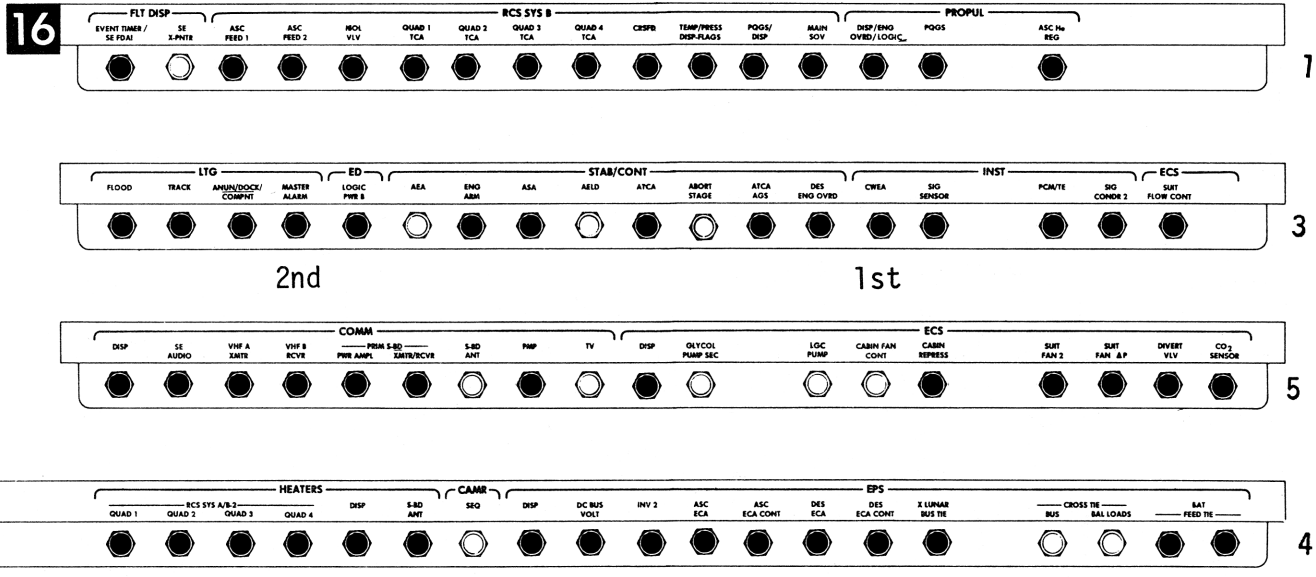
Basic Date 1/6/70
Changed 2/T3/70

Basic Date 1/6/70
Changed 3/10/70

30-MIN ACTIVATION



30-MIN ACTIVATION



27

Basic Date 1/6/70
Changed 3/10/70

4 CB(16) INST: CWEA - Open Then Close

WARN
ASC PRESS
RCS A REG
RCS B REG

VHF/S-BD ACTIVATION AND CHECKOUT

1 CSM Configure for VHF Simplex A
VHF - A: XMTR - VOICE
RCVR - ON
AUDIO (BOTH): S-BAND T/R - T/R
ICS T/R - T/R
VHF A - T/R

2 COMM: S-BD-PM,PRIM,PRIM,DN VOICE BU,
PCM,OFF/RESET,OFF,HI
S-BD ANT-As Required

3 LMP Perform Comm Check With CSM

PGNS TURN - ON

1 NO ATT Lt - Off
V96E

2 Set EVENT TIMER

DAP SET/GIMBAL DRIVE

1 MODE CONT: PGNS - AUTO
GUID CONT - PGNS
TTCA (CDR) - THROTTLE (MIN)

2 V48E
N46 31021
PRO
N47 +_____(33731)
+_____(From MSFN or CSM)

PRO
N48 +_____(From MSFN or Chart)
+_____(From MSFN or Chart)

Basic Date 1/6/70
Changed 3/10/70

ENG STOP - PUSH
ENG ARM - DES (DES REG Lt-ON)
PRO (ENG GMBL Lt-ON)
MSFN Verify GDA Position

3 F 50 48
PRO
ENG ARM - OFF (ENG GMBL Lt-OFF)
ENG STOP - Reset

AGS ACTIVATION

1 AGS STATUS - STBY (AGS Warn Lt - On)
CB(11) AC BUS B: AGS - CLOSE
CB(16) STAB/CONT: AEA - CLOSE (AGS Warn Lt-Off)
AGS STATUS - OPERATE (AGS Warn Lt - On)
02/H20 QTY MON - C/W RESET, Then DES

2 412R + 1 SELF TEST SATISFACTORY

RCS PRESS

1 Recycle: SYS A&B ASC FEED 2(2) - CLOSE,tb(4)-bp
: SYS A&B ASC FEED 1(2) - OPEN,tb(4)-bp
: SYS A&B THRUSTER PAIR QUADS-OPEN,
tb(8)-gray
: CRSFD - CLOSE
: MAIN SOV SYS A&B - OPEN

2 Cycle TEMP/PRESS MON

3 MASTER ARM - ON
HE PRESS RCS - FIRE
(RCS A&B REG. Warning Lts - Off)
RECYCLE: SYS A&B ASC FEED 2(2) - CLOSE,tb(4)-bp
: SYS A&B ASC FEED 1(2) - OPEN,tb(4)-bp
: SYS A&B THRUSTER PAIR QUADS-OPEN,
tb(8)-gray
: CRSFD - CLOSE
: MAIN SOV SYS A&B - OPEN

Basic Date 1/6/70
Changed 3/10/70

4 TEMP/PRESS MON - He (2750-3200 psi)
- PRPLNT (40°-100°/178-188 psi)
- FUEL MANF (175-188)
- OXID MANF (175-188)

DPS PRESS

1 PRPLNT QTY MON - DES 1
PROP TEMP/PRESS MON - DES 2
HELIUM MON - AMB PRESS
DES HE REG 1 - tb-gray
DES HE REG 2 - tb-bp

2 DES PRPLNT ISOL VLV - FIRE
HE PRESS/DES START - FIRE

3 PRPLNT TEMP/PRESS MON: DES 2&1
(50°-90° FUEL, 50°-90° OXID/242-253 psi)
HELIUM MON: AMB PRESS (200-1110 psi)
SUPRCRIT PRESS (610-1070 psi)

LANDING GEAR DEPLOY

1 CB(11) LOGIC PWR A - Open
LDG GEAR DEPLOY - FIRE, tb-gray

2 CB(11) LOGIC PWR A - Close
LDG GEAR DEPLOY - FIRE
MASTER ARM - OFF

Basic Date 1/6/70
Changed 3/10/70

DOCKED DPS BURN (MANUAL)

```
*         DPS BURN TECHNIQUE          *
*If PITCH Error Needle Goes Down,     *
*LMP Thrust AFT (Pull Out On TTCA).   *
*If ROLL Needle Left, CDR Thrust      *
*   Right (Push Right On TTCA).       *
*See FDAI Picture Below.              *
*                 R L                 *
*                                     *
*                                   F *
*                                   A *
*                                     *
*Only Set The PITCH or ROLL ATTITUDE  *
*CONTROL Switches To MODE CONT When    *
*The Rates & Errors Are Zero And       *
*Not Thrusting With TTCA's.  Throt-    *
*tle Initially At 10%, Then Throt-     *
*tle Up When Stabilized, 10% Before    *
*Cutoff.                               *
```

V76E (MIN IMPULSE)
GUID CONT - AGS
MODE CONT (Both) - OFF
ENG STOP (2)-Reset
ABORT/ABORT STAGE - Reset

-6:00 MODE CONT: PGNS - ATT HOLD
V41 N20E, E, E, E,

At burn attitude:
V40N 20E

V25 N07E, 77E, 10000E, 1E
V01 N01E, 77E (Verify A = 1,3,5,7)
V37E 51E, PRO, V37E00E

400 + 5

At burn attitude:
400 + 0

V37E 47E
When CMPTR ACTY Lt - ON
V06 N65 E __ __ __ __ __ hrs
__ __ __ __ __ min
__ __ __.__ __ sec

Load N65 Into N38:
V25 N38E (hrs) E
(min) E
(.01 sec) E

404 + 0
405 + 0
406 + 0
47OR

Basic Date 1/6/70
Changed

-4:00 RATE/ERR MON (BOTH) - LDG RDR/CMPTR
ATT MON (BOTH) - AGS
RATE SCALE - 5°/SEC
THR CONT - MAN
MAN THROT - CDR
ATT/TRANSL - 4 JET
BAL CPL - OFF
ENG GMBL- ENABLE
DES ENG CMD OVRD - OFF
DEADBAND - MIN
ATT CONT: ROLL - PULSE
PITCH - PULSE
YAW - MODE CONT
MODE CONT (BOTH) - ATT HOLD
PRPLNT QTY MON - DES 1

TTCA (CDR) - THROT (MIN)
TTCA (LMP) - JETS

-1:00 MASTER ARM - ON

- :35 V32E
F 16 83 ΔVX,Y,Z (All Zero) (.1fps)
ENG ARM - DES

- :10 MANUAL ULLAGE (LMP)

- :02 CMC MODE FREE

ACA - Out of Detent (Yaw) (Zero Error Needles)

:00 ENG START (CDR) - PUSH
Ignition

+ :05 TTCA (CDR) - Throttle Up As Req'd
ATT CONT: PITCH, ROLL - As Req'd

+:15 MASTER ARM - OFF

Basic Date 1/6/70
Changed 3/23/70

Monitor ΔVX Via N83, 470

When PRPLNT QTY = 37%:
DES He REG 1 - CLOSE

TTCA (CDR) - Reduce to 10% when Vgo = 10.0 fps

When ΔVX = Final ΔVX:
ENG STOP - PUSH
ATT CONT: YAW - PULSE

Damp Excessive Rates Via LM Y, Z Translation

CSM Resume Attitude Control

PRO, V96E
ENG ARM - OFF
PRPLNT QTY MON - OFF
ENG STOP - RESET
TTCA (CDR) - JETS

Basic Date 1/6/70
Changed 3/23/70

INITIAL POWER DOWN (UNSTAGED)

1 V37E 06E
F 50 25 00062
CB(11) IMU OPR - Open
PRO (STBY Lt-On)

2 CB(16) AEA - Open (AGS Warn Lt-ON)
AGS STATUS - OFF (AGS Warn Lt-OFF)

3 SUIT GAS DIVERTER - EGRESS
PRIM EVAP FLOW No. 1 - CLOSE
(Dryout Complete In 90 min)
Start Watch

4 MASTER ARM - OFF
AUDIO (CDR) - All Switches-OFF

5 HELIUM MON - OFF
O2/H2O QTY MON - DES

6 MODE CONTROL (Both) - OFF
RCS SYS A/B-2 QUAD 1,2,3,4(4) - OFF

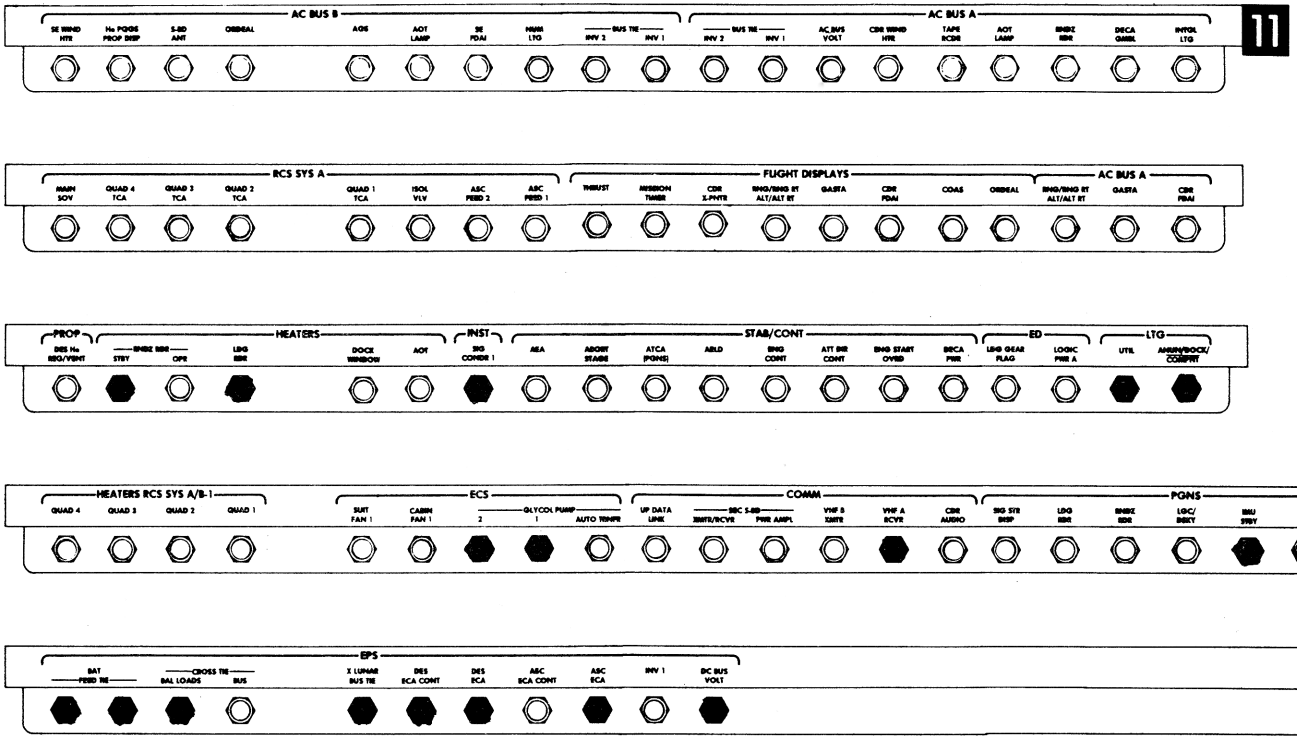
7 Window Shades - Up
CDR Transfer To CSM
INV - OFF

8 Configure CB's Per UNSTAGED INITIAL DEACTIVATION Charts

Basic Date 1/6/70
Changed 2/13/70

UNSTAGED
POWER DOWN

UNSTAGED
INITIAL DEACTIVATION

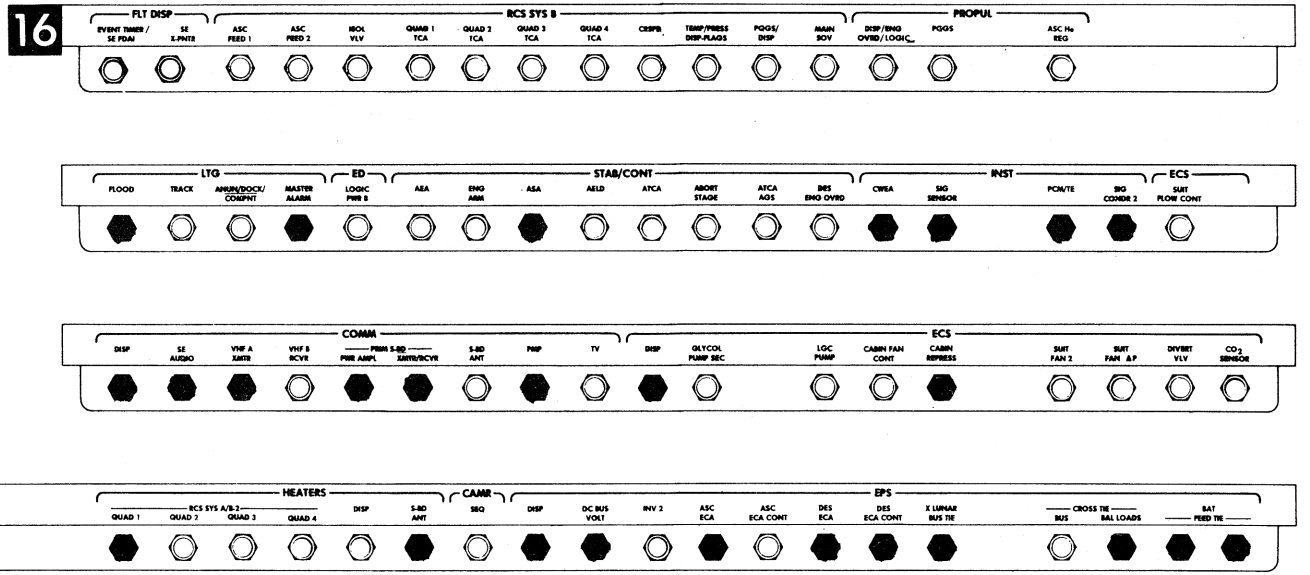


LM-7

Basic Date 1/6/70
Changed _____

Basic Date 1/6/70
Changed 3/10/70

UNSTAGED
INITIAL DEACTIVATION



*FINAL DEACTIVATION (UNSTAGED)

1 Wait Until Dryout Complete (90 min)
GLYCOL - PUMP 2

2 AUDIO (LMP)-All Switches -OFF
VHF A XMTR & RCVR - OFF
S-BAND - PM,OFF,OFF,OFF,OFF,OFF,HI

INV - OFF

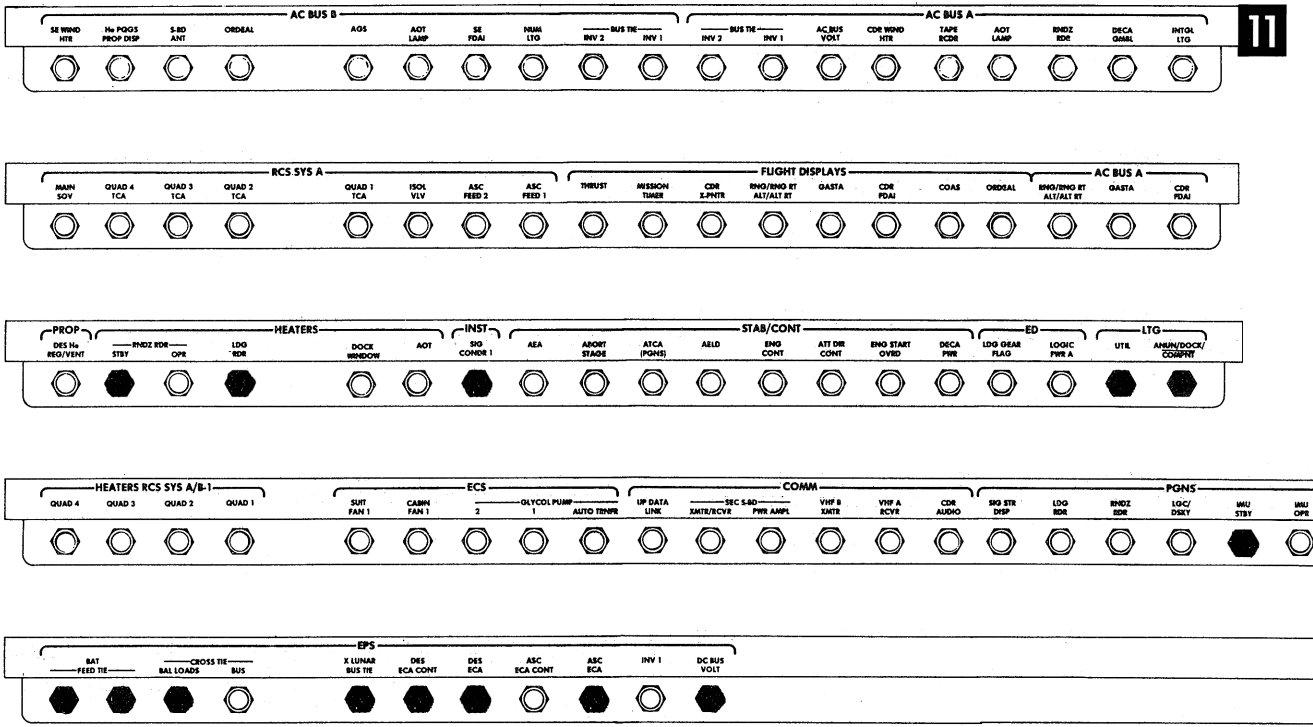
3 ANUN/NUM - DIM

4 Configure CB's Per UNSTAGED FINAL DEACT Charts

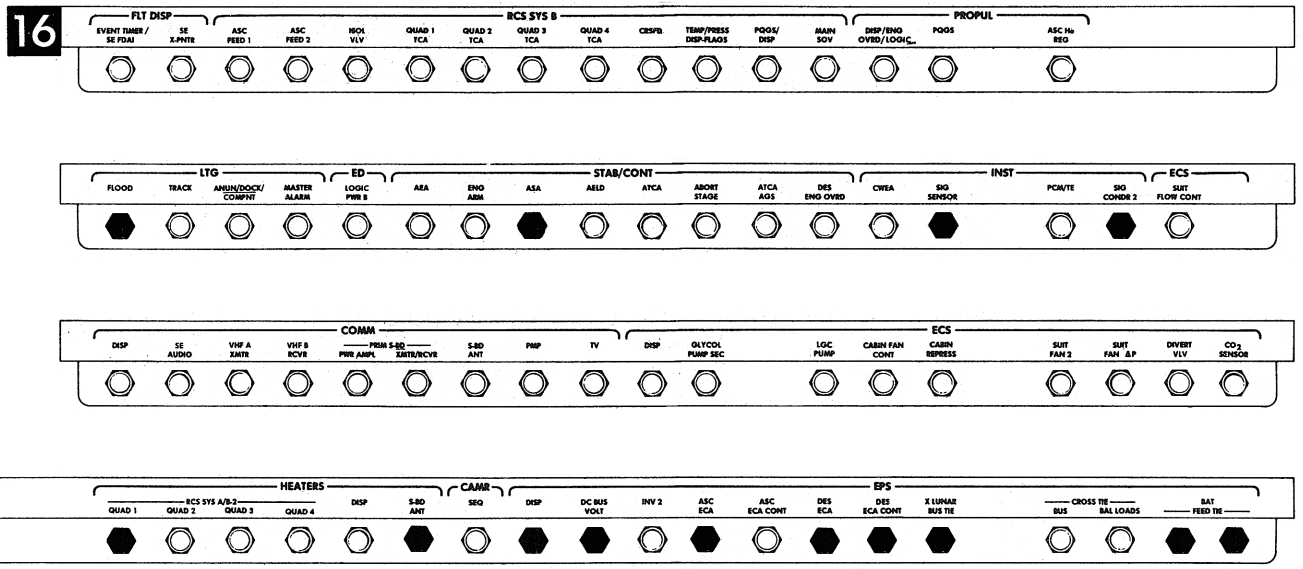
Basic Date 1/6/70
Changed

Basic Date ____ 1/6/70
Changed ____

UNSTAGED
FINAL DEACTIVATION



UNSTAGED
FINAL DEACTIVATION



LM-7

Basic Date 1/6/70
Changed 3/10/70

5 Check BAT & BUS Voltages
BAT 1 _____, BAT 2 _____, BAT 3 _____
BAT 4 _____, BAT 5 _____, BAT 6 _____
CDR BUS ____, SE BUS _____

6 BAT 1, LO VOLTAGE - OFF/RESET tb-bp
BAT 1, LO VOLTAGE - ON tb-LO
Repeat For BATS 2,3,4
Check BAT & BUS Voltage & Amps Then
ED/OFF

7 CB(11) INST: SIG COND 1 - Open
EPS: DES ECA CONT - Open
: DC BUS VOLT - Open
: ASC ECA - Open
CB(16) INST: SIG SENSOR - Open
: SIG CONDR 2 - Open
EPS: DISP - Open
: DC BUS VOLT - Open
: ASC ECA - Open
: DES ECA CONT - Open
: CROSS TIE BAL LOADS - Close

8 UTILITY LIGHTS (Both) - OFF
CB(11&16) EPS: XLUNAR BUS TIE (2)-Open
CSM Position LM PWR - CSM
DES H20 - Close
DES 02 - Close
CABIN REPRESS - Close

FLOOD - OFF

9 OVHD CABIN DUMP VALVE - AUTO
Ingress CSM and Secure Hatch

Basic Date ___ 1/6/70
Changed _____

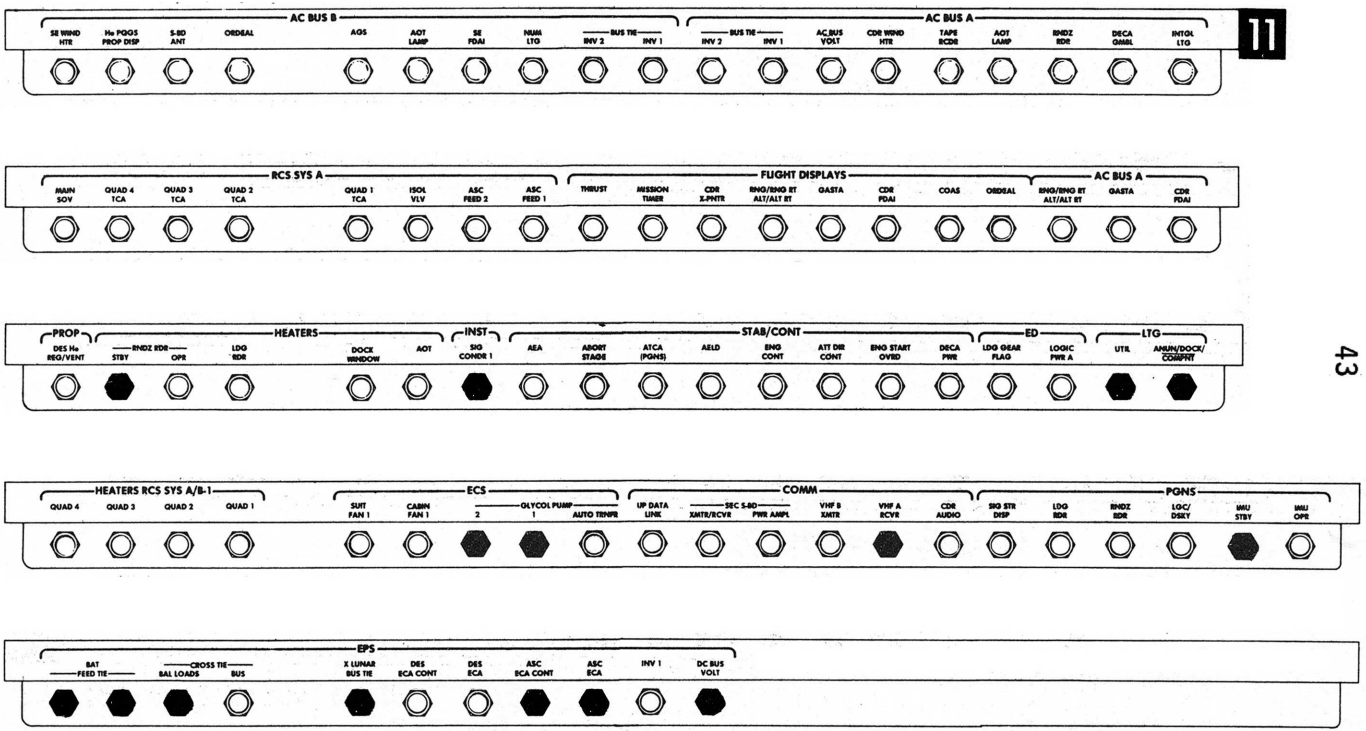
INITIAL PWR DN (STAGED)

1		V37E06E
	F 50 25	00062
		CB(11) IMU OPR - Open
		PRO (STBY Lt-On)
2		CB(16) AEA - Open (AGS Warn Lt-ON)
		AGS STATUS - OFF (AGS Warn Lt-OFF)
3		SUIT GAS DIVERTER - EGRESS
		PRIM EVAP FLOW No. 1 - CLOSE
		(Dryout Complete In 90 min)
		START Watch
4		MASTER ARM - OFF
		AUDIO (CDR): All Switches - OFF
5		HELIUM MON - OFF
		O2/H2O QTY MON - ASC 2
6		MODE CONT (Both) - OFF
		RCS SYS A/B-2 QUAD 1,2,3,4,(4) - OFF
7		Window Shades - Up
		CDR transfer to CSM
		INV - OFF
8		Configure CB's Per STAGED INITIAL DEACT Charts

Basic Date 1/6/70
Changed 2/13/70

STAGED
POWER DOWN

STAGED
INITIAL DEACTIVATION



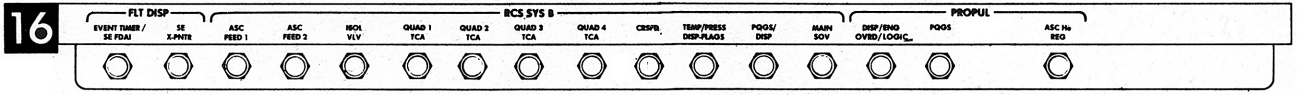
LM-7

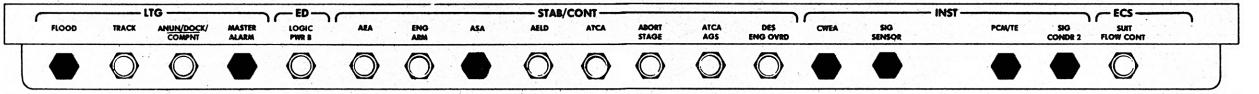
Basic Date 1/6/70
Changed _____

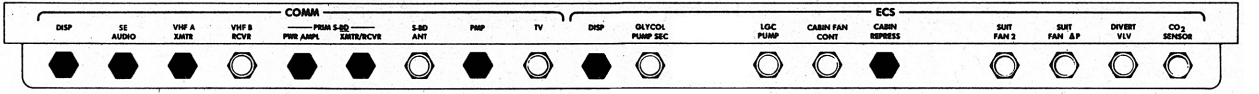
Basic Date 1/6/70
Changed 3/10/70

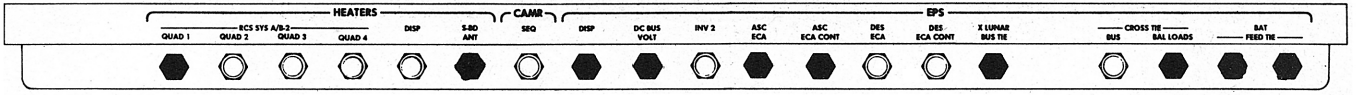
STAGED
INITIAL DEACTIVATION

16









*FINAL DEACTIVIATION (STAGED)

1 Wait Until Dryout Complete (90 min)
GLYCOL PUMP - 2

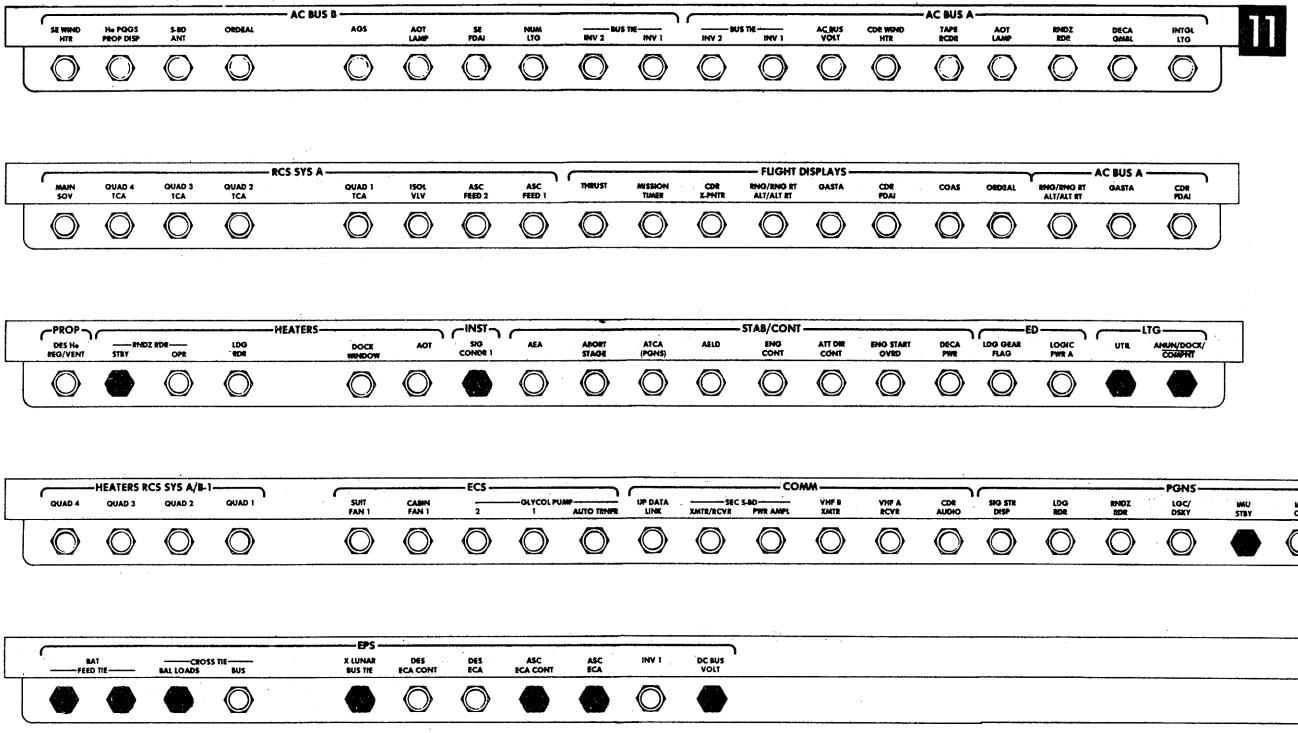
2 AUDIO (LMP): All Switches - OFF
VHF A XMTR & RCVR - OFF
S-BD-PM,OFF,OFF,OFF,OFF,OFF,HI

3 ANUN/NUM - DIM

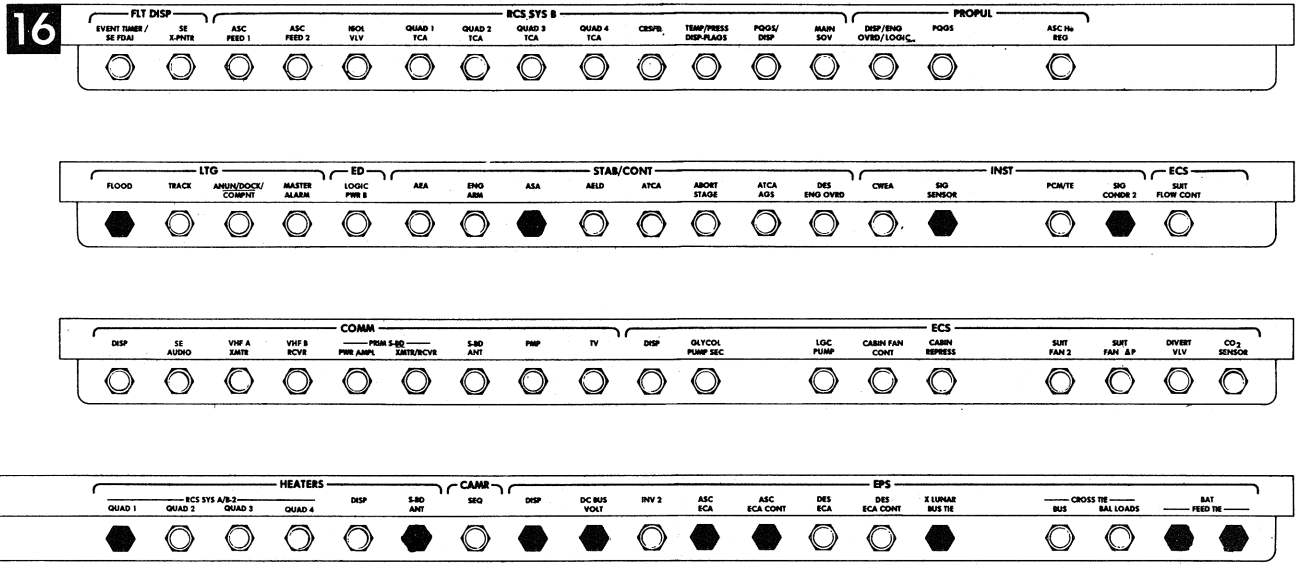
4 Configure CB's Per STAGED FINAL DEACT Charts

Basic Date 1/6/70
Changed _____

STAGED
FINAL DEACTIVATION



STAGED
FINAL DEACTIVATION



Basic Date 1/6/70
Changed 3/10/70

5 Check BAT & BUS Voltage
BAT 5 _____, BAT 6 _____
CDR BUS _____, SE BUS _____

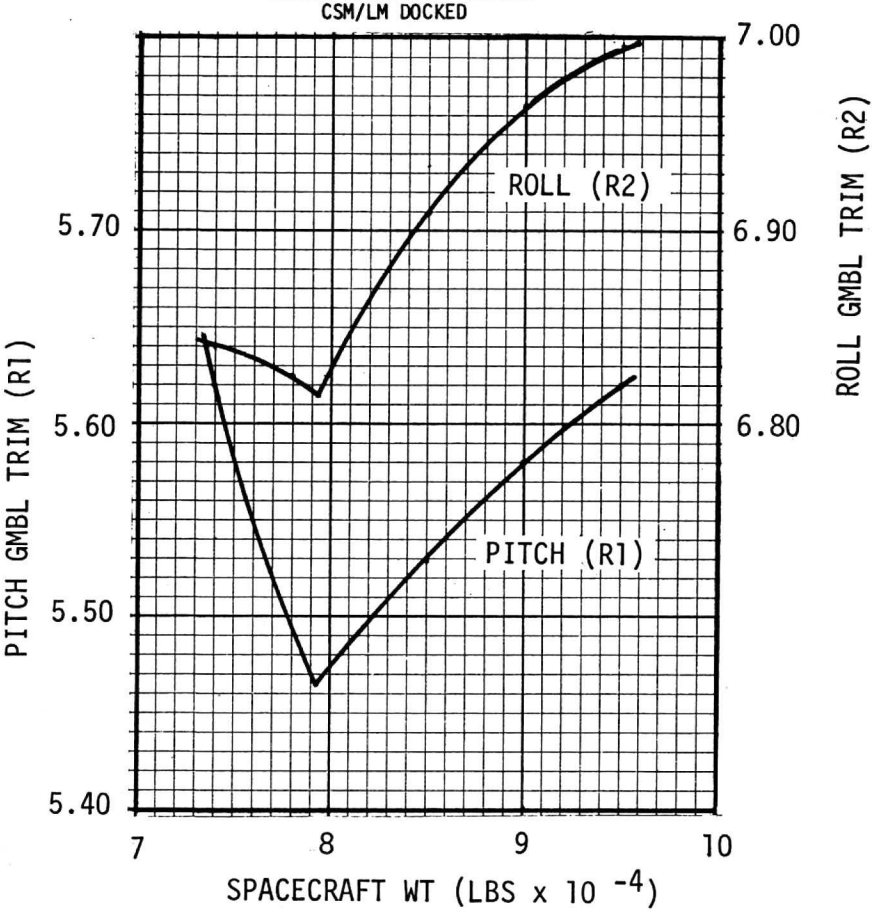
6 CB(11) INST: SIG CONDR 1 - Open
EPS: ASC ECA CONT - Open
: ASC ECA - Open
: DC BUS VOLT - Open
CB(16) INST: SIG SENSOR - Open
: SIG CONDR 2 - Open
EPS: DISP - Open
: DC BUS VOLT - Open
: ASC ECA - Open
: ASC ECA CONT - Open
: CROSS TIE BAL LOADS - CLOSE

7 FLOOD - OFF
UTILITY LIGHTS (Both) - OFF

8 OVHD CABIN DUMP VALVE - AUTO
Ingress CSM & Secure Hatch

Basic Date 3/10/70
Changed 3/31/70

BIASED DPS ENGINE TRIM GIMBAL ANGLES
VERSUS SPACECRAFT WEIGHT
CSM/LM DOCKED



LM Wt	3	3	9	5	0
CSM Wt					
Spacecraft Wt					

PITCH DRIVE RATE = .2104 DEG/SEC
ROLL DRIVE RATE = .2108 DEG/SEC
GIMBAL TRAVEL = +6.05 DEG
STARTUP THRUST = 1332 LBS

DATA SOURCE:
GRUMMAN

GMBL TRIM CHART

Basic Date _____
Changed _____

LOSS OF COMM

1 Verify Standard Comm Configuration

2 S-BD SIG STR Low - Reacquire

3 OMNI - FWD or AFT

4 STILL NO COMM - Verify
CB(11&16) COMM: ALL CLOSED
INST: PCM/TE - CLOSE
CB(11)AC BUS B: S-BD ANT - CLOSE

5 STILL NO COMM:
S-BD: XMTR/RCVR - SEC
: PWR/AMPL - SEC

6 20-60 Sec, STILL NO COMM
DN VOICE BU (Hot Mike)
BIOMED - OFF

7 STILL NO COMM:
VOICE
BIOMED - LEFT
FM

8 30-60 Sec, STILL NO COMM
PM
AUDIO (Both) S-BD-OFF
Notify CSM To Configure For
CSM Relay

Basic Date 1/6/70
Changed 3/23/70

LM RELAY MODE / CSM - MSFN

Summary:

LM Configures For VHF A Duplex,
While CSM Is In B Duplex.

LM Will Receive CSM Voice On
VHF B And Relay This to MSFN
On S-Band

LM Can Transmit And Receive
On S-Band To MSFN.

LM Will transmit MSFN Voice
To CSM On VHF A.

LMP IVT TO LM

1 Activate CABIN DUMP VALVE & Open Hatch

2 Record Docking Tunnel Index
Angle _____

3 FLOOD LIGHT - ALL
EXTERIOR LTG - OFF
DES H2O - OPEN
DES O2 - Open
CABIN REPRESS - AUTO
CB(16)ECS: CABIN REPRESS - CLOSE

4 Transfer To LM PWR
(Flood Lts Blink, C/W PWR Caution Lt-ON)
CB(11) EPS: XLUNAR BUS TIE - CLOSE
CB(16) EPS: XLUNAR BUS TIE - CLOSE
CB(11) LTG: UTIL - CLOSE
Activate Utility Lts

Basic Date 1/6/70
Changed

EPS ACTIVATION

1 LTG: ANUN/NUM - BRIGHT (1 Caution, 9 Power Failure, GLYCOL Comp Lt-ON)

2 CB(11) INST: SIG CONDR 1 - CLOSE
EPS: DES ECA CONT - CLOSE
CB(16) INST: SIG SENSOR - CLOSE
: PCM/TE - CLOSE
: SIG CONDR 2 - CLOSE
EPS: DISP - CLOSE
: DES ECA CONT - CLOSE

3 Verify BAT 1,2,3,4 - tb-LO
DES BATS - tb-gray
BATS 5&6 NORMAL & BACKUP(4)-tb-bp
Check BAT and BUS Voltages (When BUS Volts <27V, Select High Voltage Taps)
CB(16) EPS: CROSS TIE BAL LOADS-OPEN
BAT 1 HI VOLTAGE-OFF/RESET Then ON
Repeat for BATS 2,3,4
CB(11) EPS: CROSS TIE BUS - CLOSE

4 CB(11) AC BUS B&A: BUS TIE INV 2&1(4) - CLOSE
: AC BUS VOLT (1) - CLOSE
EPS: INV 1 - CLOSE
CB(16) EPS: INV 2- CLOSE
: CROSS TIE BAL LOADS - CLOSE

5 POWER/TEMP MON - AC BUS,
INV - 1 Then 2
Verify Voltage In Green Band
CB(11) EPS: INV 1 - OPEN

Basic Date 1/6/70
Changed

PRIMARY GLYCOL LOOP ACTIVATION

1 CB(16) ECS: DISP - CLOSE
GLYCOL - PUMP 1 _____ psia
- INST (SEC)_____ psia
- PUMP 2
CB(11) ECS: GLYCOL PUMP AUTO TRNER - CLOSE
: GLYCOL PUMP 1 - CLOSE
: GLYCOL PUMP AUTO TRNER - OPEN
GLYCOL - PUMP 1
CB(11) ECS: GLYCOL PUMP 2 - CLOSE

CB ACTIVATION

1	CB(11)	AC BUS B:	S-BD ANT - CLOSE
		COMM:	VHF B XMTR - CLOSE
			VHF A RCVR - CLOSE
			CDR AUDIO - CLOSE
2	CB(16)	COMM:	DISP - CLOSE
			SE AUDIO - CLOSE
			VHF A XMTR - CLOSE
			VHF B RCVR - CLOSE
			PRIM S-BD PWR AMPL - CLOSE
			PRIM S-BD XMTR/RCVR - CLOSE
			S-BD ANT - CLOSE
			PMP - CLOSE
		HEATERS:	DISP-CLOSE

Basic Date 1/6/70
Changed _____

COMM ACT

TEMP MONITOR - S-BAND (-52° TO +135°)

COMM: S-BAND - PM,PRIM,PRIM,VOICE,PCM,OFF/RESET
VHF A:XMTR - VOICE (VOICE/RNG If Ranging
:RCVR - OFF Is Req'd)
VHF B:XMTR - OFF
:RCVR - ON
TELEMETRY - OFF/HI

TRACK MODE - SLEW (30sec)
P- -75
Y- -12

CSM: V64E
F 06 51 (.01°)
CSM MANEUVER
R1 = +03000, R2 = +09000 (+Z ORIEN)
R1 = -03000, R2 = +27000 (-Z ORIEN)

ANT-FWD, Verify COMM
SLEW (>3.0), AUTO (>4.0)
PCM-HI, BIOMED-RIGHT

AUDIO (CDR): VHF A - T/R
VHF B - RCV
MODE - VOX
S-BAND - T/R
VOX SENS-MAX

AUDIO (LMP): S-BAND T/R - RCV
RELAY ON - RELAY ON
VHF A - T/R
VHF B - RCV
MODE - VOX
VOX SENS-MAX
Check VHF Squelch

To Use Omni:
S-BD-PM,PRIM,PRIM, VOICE,PCM,
OFF/RESET,OFF,LO

Basic Date 1/6/70
Changed

Basic Date 1/6/70
Changed _____

	POWER DOWN LIST	

CONTINGENCY POWER DOWN LIST

*Required For LM Active Rendezvous

Basic Date 1/6/70
Changed

********** PGNS **********

*IMU: CB(11) PGNS: IMU OPR - Open — 7.15 Amps
(15 Min Warm-up)

*LGC: V37E 06E
F 50 25 00062
PRO Until STBY Lt - On — 1.76 Amps
CB(11) PGNS: LGC/DSKY - Open — .85 Amps

********** AGS **********

AEA(STBY): CB(11&16) STAB/CONT: AEA - Open
AGS STATUS - STBY
CB(16) STAB/CONT: AEA- Close — 2.96 Amps

AEA(OFF): CB(11&16) STAB/CONT: AEA - Open
AGS STATUS - OFF — .40 Amps
(25 Min Warm-up)

AGS DISP: CB(11) AC BUS B: AGS - Open — .16 Amps

********** CES **********

*ATCA: CB(16) STAB/CONT: ATCA - Open — 1.93 Amps

GDA: CB(11) AC BUS A: DECA GMBL - Open — .25 Amps

********** RADAR **********

*RR: CB(11) PGNS: RNDZ RDR - Open — 5.35 Amps
CB(11) AC BUS A: RNDZ RDR - Open — .62 Amps

LR: CB(11) PGNS: LDG RDR - Open — 4.21 Amps

PWR DOWN LIST

********** COMM **********

SEC S-BD: CB(11) COMM: SEC S-BD XMTR/RCVR - open	1.29	Amps
CB(11) COMM: SEC S-BD PWR AMPL - open	2.57	Amps
VHF B XMTR: CB(11) COMM: VHF B XMTR - Open	.68	Amps
VHF B RCVR: CB(16) COMM: VHF B RCVR - Open	.04	Amps
*DUA: CB(11) COMM: UP DATA LINK - Open	.43	Amps
*S-BD ANT: CB(11) AC BUS B: S-BD ANT -Open	.16	Amps
TAPE RCDR: CB(11) AC BUS A: TAPE RCDR - Open	.11	Amps

********** LTG **********

TRACK: EXTERIOR LTG - OFF	6.79	Amps
DOCK: EXTERIOR LTG - OFF	1.07	Amps
FLOOD: LTG: FLOOD - OVHD/FWD (Sufficient For Rendezvous)	1.59	Amps
LTG: FLOOD - OFF	.856	Amps
CDR UTIL: UTILITY Lt (CDR) - OFF	.13	Amps
LMP UTIL: UTILITY Lt (LMP) - OFF	.09	Amps
INTGL LTG: CB(11) AC BUS A: INTGL LTG-Open	.40	Amps
NUM LTG: CB(11) AC BUS B: NUM LTG - Open	.05	Amps
*AOT LAMP: CB(11) AC BUS B&A: AOT LAMP-Open	.04	Amps

Basic Date 1/6/70
Changed 3/10/70

********** DISPLAYS **********

*TAPEMETER: CB(11) FLT DISP: RNG/RNG RT-Open .30 Amps
AC BUS A: RNG/RNG RT-Open .52 Amps

*CDR FDAI: CB(11) FLT DISP: CDR FDAI-Open .17 Amps
CB(11) AC BUS A: CDR FDAI-Open .16 Amps

*LMP FDAI/ EVNT TMR: CB(16) FLT DISP: EVNT TMR/ SE FDAI-Open .23 Amps
CB(11) AC BUS B: SE FDAI-Open .16 Amps

CDR X-PNTR: CB(11) FLT DISP: CDR X-PNTR-Open .07 Amps

LMP X-PNTR: CB(16) FLT DISP: SE X-PNTR-Open .07 Amps

He PQGS PROP: CB(11) AC BUS B: HE/PQGS PROPUL DISP-Open .13 Amps

*GASTA: CB(11) FLT DISP: GASTA-Open .22 Amps
AC BUS A: GASTA-Open .58 Amps

THRUST: CB(11) FLT DISP: THRUST-Open .04 Amps

*SIG STR: CB(11) PGNS: SIG STR DISP-Open .03 Amps

*TEMP: CB(16) HEATERS: DISP--Open .03 Amps

*MSN TMR: CB(11) FLT DISP: MISSION TIMER-Open .09 Amps

*RCS: CB(16) RCS SYS B: TEMP/PRESS DISP FLAGS - Open .18 Amps

ORDEAL: CB(11) AC BUS B: ORDEAL - Open .16 Amps
CB(11) FLT DISP: ORDEAL - Open .14 Amps

MASTER ALARM: CB(16) MASTER ALARM - Open (Closed For Sleep Periods) .26 Amps

Basic Date 1/6/70
Changed 3/10/70

LM7

********** EPS **********

*INV 1: CB(11) EPS: INV 1 - Open — 1.40 Amps (NO LOAD)

*INV 2: CB(16) EPS: INV 2 - Open — 1.40 Amps (NO LOAD)

********** ED **********

LOGIC: CB(11) ED: LOGIC PWR A - Open — .1 Amps
CB(16) ED: LOGIC PWR B - Open — .1 Amps

********** HEATERS **********

LR: CB(11) HEATERS: LDG RDR - Open — .41 Amps

*RR: CB(11) HEATERS: RNDZ RDR OPR - Open — .45 Amps
(2.5 Hr Warm-up)

*AOT: CB(16) HEATERS: AOT - Open — .20 Amps

CDR WIND: CB(11) AC BUS A: CDR WIND HTR-Open — 2.86 Amps
(Up to 90 min to Clear Window)

LMP WIND: CB(11) AC BUS B: SE WIND HTR - Open — 2.86 Amps
(Up to 90 min to Clear Window)

DOCK WIND: CB(11) HEATERS: DOCK WINDOW - OPEN — .86 Amps

Basic Date 1/6/70
Changed

* CAUTION: Damage Will Occur To The *
* Following Systems If Heater Power *
* Is Removed *

*RR ANT: CB(11) HEATERS: RNDZ RDR STBY - Open .17 Amps

*IMU: CB(11) PGNS: IMU STBY - Open .56 Amps

*ASA: CB(16) STAB/CONT: ASA - Open .30 Amps

S-BD ANT: CB(11) HEATERS - S-BD ANT - Open .17 Amps

EMERGENCY POWER DOWN

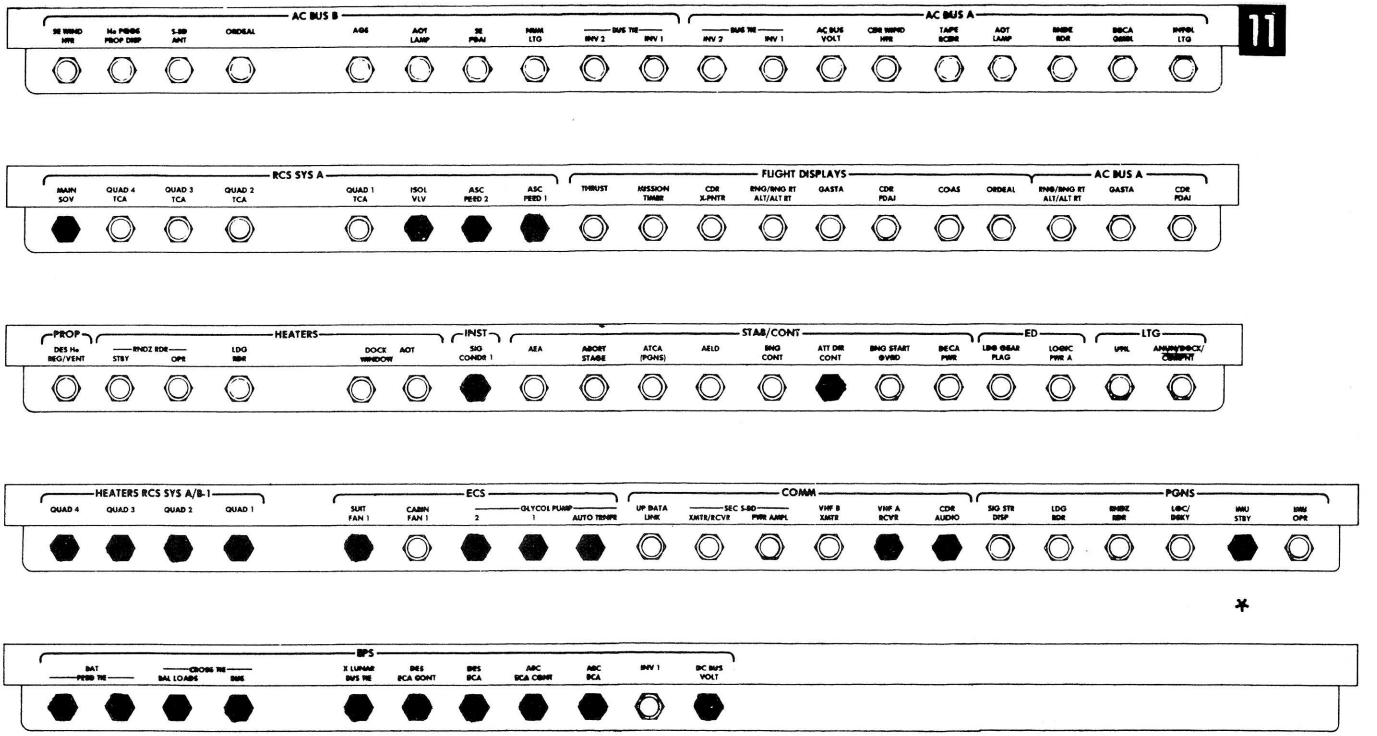
1 Configure COMM For Down Voice BU And VHF - A Simplex Operation
S-BD-PM,PRIM,PRIM,DN VOICE BU, OFF,
OFF/RESET, OFF, LO
VHF-VOICE, ON, OFF, OFF
LIGHTING: FLOOD - OFF
EXTERIOR LTG - OFF

2 ATTITUDE CONTROL (3) - DIRECT

3 Configure C.B.'s per Chart

Basic Date 1/6/70
Changed 3/10/70

EMER PWR DN

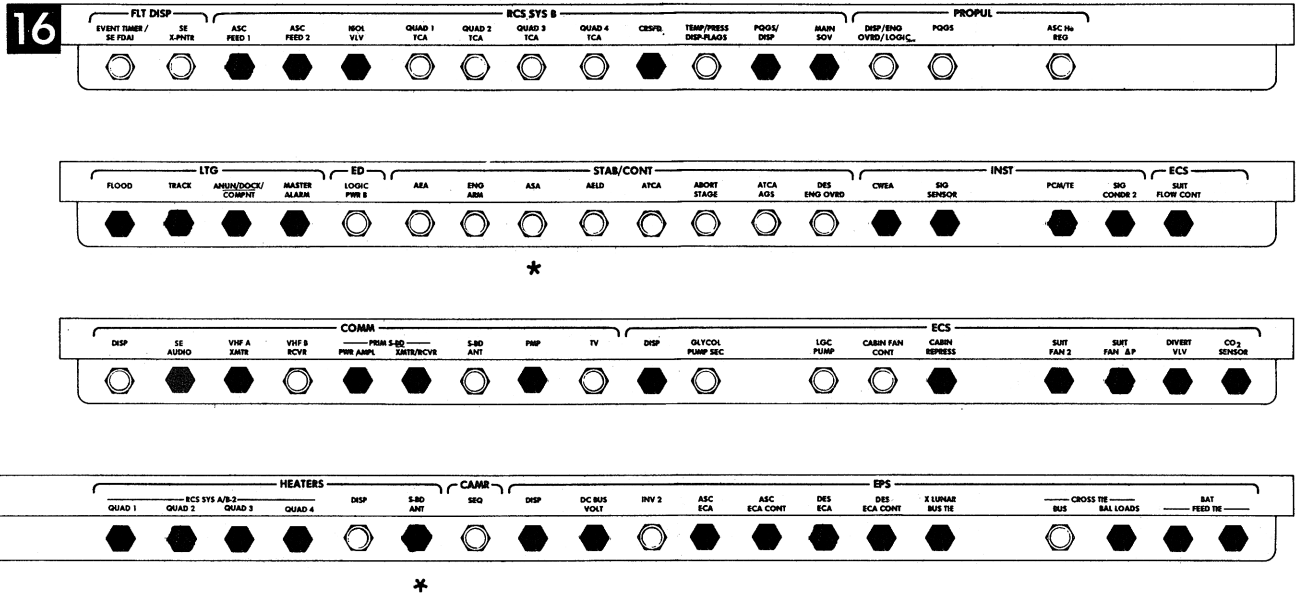


* Opening these CB's may cause system damage.

Basic Date 1/6/70
Changed

Basic Date 1/6/70
Changed 3/10/70

EMER PWR DN



* Opening these CB's may cause system damage.

4 Spacecraft Functions Remaining:
- LBR TM
- VHF And S-BAND VOICE
- CWEA
- GLYCOL PUMPS
- SUIT FANS (2)
- CABIN REPRESS
- RCS MANUAL ATTITUDE CONTROL
- ONBOARD RCS PQGS READOUT
- ONBOARD EPS And ECS READOUTS

5 CWEA STATUS:

WARNING Lts - ON
- CES AC
- CES DC
- AGS (Unless AGS STATUS - OFF)
- LGC (When GUID CONT - PGNS)
- RCS TCA (Possible)
- APS PRESS (Unless APS Pressurized)

CAUTION Lts - ON
- INVERTER (Unless INV - OFF)
- PREAMPS (UNLESS STAGED)

Basic Date 1/6/70
Changed 3/16/70

SURFACE SUBLIMATOR DRYOUT

ACTIVATE SEC LOOP

1 CB(11) ECS: GLYCOL PUMP AUTO TRNSFR - Close
: GLYCOL PUMP 1 - Open
GLYCOL-INST (SEC)
CB(16) ECS: GLYCOL PUMP SEC-Close
WATER TANK SEL-SEC
SEC EVAP FLOW-OPEN

DRYOUT INITIATION

1 PRIM EVAP FLOW - CLOSE
(Dryout Complete In Approx. 90 Min - GLYCOL TEMP Should Not Go Above 95°)

2 EVENT TIMER: RESET/CONT - RESET
: TIMER CONT - START

SURFACE INITIAL POWER DOWN

1 V37E 06E
F 50 25 R1 00062
PRO (Until STBY Lt-On)

2 O2/H2O QTY MON - ASC
EXTERIOR LTG - OFF

3 SUIT TEMP - COLD
LIQUID COOLING GARMENT - MAX COLD

4 CB(11) AC BUS A: TAPE RCDR - Open
PGNS: LGC/DSKY - Open
CB(16) ANUN/DOCK/COMPNT - Open

Basic Date 1/6/70
Changed 3/10/70

REACTIVATE PRIMARY LOOP

When Dryout Complete
GLYCOL - PUMP 2
CB(11) ECS: GLYCOL PUMP 1 - Close
: GLYCOL PUMP AUTO TRNSFR - Open
GLYCOL - PUMP 1
CB(11) ECS: GLYCOL PUMP AUTO TRNSFR - Close
SEC EVAP FLOW - CLOSE
WATER TANK SEL - DES
PRIM EVAP FLOW NO 1 - OPEN
Monitor GLYCOL TEMP for Decrease (Wait 1 hr)
CB(16) ECS: GLYCOL PUMP SEC - Open

SURFACE
SUBLIMATOR DRYOUT

Basic Date 1/6/70
Changed

SECONDARY GLYCOL CONFIGURATION (LUNAR SURFACE)

The following configuration is required for lunar stay after failure of the primary Glycol System and activation of the Secondary Glycol System. Lunar stay time may be based on Ascent Water redlines.

1 Verify SUIT FAN 1 or 2 on
TAPE RCDR - OFF

2 CB(11) AC BUS B: NUM LTG - OPEN
AC BUS A: INTGL LTG - OPEN
LTG: ANUN/DOCK/COMPNT - OPEN
PGNS: LGC/DSKY - OPEN
: IMU OPR - OPEN
CB(16) LTG: ANUN/DOCK/COMPNT - OPEN

> LIGHTING CB's may be closed briefly when necessary. Tape rcdr may be used when required (30 min on/60 min off)

3 LIGHTING: OVERRIDE (All) - ON

4 CB(11&16) EPS: DES ECA (2) - OPEN
CB(16) EPS: CROSS TIE - BAL LOADS - CLOSE

> One DES ECA CB Should Be Closed Periodically At MSFN Request For Consumables Monitering.

5 Do not close LGC/DSKY and IMU OPR CB's until L.O. - 1 hr.

Basic Date 2/9/70
Changed

SEC GLYCOL CONFIG
(LUNAR SURFACE)

Basic Date ___ 1/6/70
Changed _____

EMERGENCY PROCEDURES

FIRE/SMOKE In Cabin (Not In Suit Loop)

1 PRESS REGS A&B - EGRESS
SUIT GAS DIVERTER - PULL/EGRESS
CABIN GAS RETURN - EGRESS
(If Suit Flow Stops Switch To Redundant Fan)

2 Use Fire Extinguisher As Required

3 Check POWER/TEMP MON For Excessive Current, Remove Power From Affected Bus

4 Don Helmets And Gloves

WARNING
Combustion Products Should Be Considered Toxic. Smoke And Contaminants Must Be Removed From Cabin Before Removing Helmets and Gloves By Purging Or Dumping Cabin.

5 IF FIRE PERSISTS:
Prepare To Dump Cabin
CB(16) - CABIN REPRESS - OPEN
Visually Perform Suit Integrity Check
FWD CABIN DUMP - Open, Then Auto At 3.2 psia
Verify Suit Press - 3.6 to 4.3 psi
FWD CABIN DUMP - OPEN Until Cabin Press=0 psia
NOTE: If On ASC O2, Stay On Suit Loop. Insufficient O2 To Repress Cabin

6 WHEN FIRE GOES OUT:
FWD CABIN DUMP - CLOSE
SUIT CIRCUIT RELIEF - AUTO
CO2 Canister - MID Position
PRESS REG A - DIRECT O2 Until Suit Loop Clear (Suit Press Will Increase To 5.8 psia)
CO2 Canister Sel - PRIM

FIRE/SMOKE
ABN DYNAMICS

ABNORMAL VEHICLE DYNAMICS	Use ACA Hardover To Stabilize Vehicle If RCS TCA Lt-ON Affected QUAD - CLOSE GUID CONT - AGS MODE CONT - ATT HOLD ATT CONT(3) - MODE CONT V77E If Not Stabilized: CB(11) ATT DIR CONT - OPEN If Not Stabilized: TTCA/TRANSL (2) - DISABLE DEADBAND - MAX If Not Stabilized: ACA PROP (2) - DISABLE
NO AUTO ENGINE SHUTDOWN	ENG STOP - PUSH ENG ARM - OFF Verify ABORT (STAGE) - RESET If DPS: CB(11): DECA PWR-OPEN CB(16): DES ENG OVRD - OPEN If APS: CB(11&16) AELD (2) - OPEN

Basic Date 2/9/70
Changed

DC BUS

Either Bus < 26.5 V

BATTERY

(Poss)

Rev Current >10A

Overcurrent > 150A

DC
FEEDER
FAULT

Bus ΔV > 18

CDR BUS

GUID CONT - AGS
SUIT FAN - 2
CDR AUDIO CONT - BU
INV - 2
Activate Sec Glycol Loop
After Insertion Go to EPS
Mal Proc; Unstaged, EPS-1
Staged, EPS-2

DPS Goes to 100%
To Start DPS: DES ENG CMD OVRD-ON
To Stop DPS: DES ENG CMD OVRD-OFF,
or ENG STOP-PUSH, Or ENG ARM-OFF
To Start APS: AGS Auto On
To Stop APS: AGS Auto Off,
ABORT STAGE - Reset

LMP BUS

GUID CONT - PGNS
SUIT FAN - 1
LMP AUDIO CONT - BU
INV - 1
After Insertion Go To EPS
Mal Proc; Unstaged, EPS-1
Staged, EPS-2

DPS Goes To 100% And GDA Locked
To Start APS: ENG START - PUSH
To Stop APS: ENG STOP - PUSH

Basic Date 2/9/70
Changed 2/24/70

ELECTRICAL

BATTERY

Overtemp > 145°
Rev Current > 10A
Overcurrent > 150A

UNSTAGED

Check All BATS VOLTS, AMPS,
And tb's

If VOLTS, AMPS OK:
Faulty BAT-OFF/RESET, Then ON

If VOLTS, AMPS Abnormal:
Faulty BAT - OFF/RESET
CB(11&16) CROSS TIE BAL LOADS
-CLOSE

STAGED

Check BAT 5,6 VOLTS, AMPS,
And tb's

If VOLTS, AMPS Abnormal:
CB(11&16) CROSS TIE BUS-CLOSE
Faulty BAT - OFF/RESET
Good BAT: BACK UP FEED - ON
: NORMAL FEED - OFF/RESET

INVERTER

AC Volts < 112
398 > Freq > 402

For Other Than
Powered Descent,
Reference To
INV 1 And 2
Is Reversed

Check AC VOLTS & Freq With MSFN
Switch to INV 2
BUS A&B:BUS TIE INV 1 (2) - OPEN
(If Lt Off, INV 1 Feeder Short)

BUS B: BUS TIE INV 2 - OPEN
(If Lt Off, BUS B Short;
BUS A: BUS TIE INV 1 - CLOSE
Select INV 1)

BUS A&B: BUS TIE INV 1 (2) - CLOSE
Select INV - 1
BUS A: BUS TIE INV 2 - OPEN
(If Lt Off, INV 2 Feeder Short)

BUS A: BUS TIE INV 1 - OPEN
(BUS A Short, Lt Stays On;
Close BUS B: BUS TIE INV 2
Before Selecting INV 2)

Basic Date 2/9/70
Changed 3/5/70

LM7

ED RELAYS	**BEFORE PDI** Do Not Set MASTER ARM-ON STAGE RELAY - RESET Appropriate CB: LOGIC PWR-OPEN
	AFTER PDI Do Not Set MASTER ARM - ON STAGE RELAY - RESET If STAGE SEQ RELAYS Lt Still On: ASC He PRESS - FIRE Monitor ASC Fuel/Oxid Press. If APS Pressurizes, ABORT.
One STAGE SEQ RELAYS Lt-Off with MASTER ARM-ON	**AT PDI** MASTER ARM - OFF Open LOGIC PWR CB On System Which Had SEQ Lt-ON MASTER ARM - ON At Ignition Monitor DPS SHe And FUEL/OXID PRESS If SHe Tank Inoperative: STOP Pb - PUSH ENG ARM-OFF If SHe Tank OK: MASTER ARM - OFF CLOSE LOGIC PWR CB
	AT DPS PRESS MASTER ARM-OFF Open LOGIC PWR CB On System Which Had SEQ Lt-ON MASTER ARM - ON DES PRPLNT ISOL - FIRE DES START - FIRE Monitor FUEL/OXID PRESS If DPS Does Not Pressurize, ED System Failed.

Basic Date 2/9/70
Changed 3/5/70

LM7

DC BUS Either Bus < 26.5 V	Check VOLTS, AMPS On CDR And LMP BUS If Abnormal, Switch to Guid System On Good BUS For Thrusting Use PDI/Ascent Abort Procedures Power Down Low Bus And Go To Mal Procedures; Unstaged, EPS-1 Staged, EPS-2

Basic Date 2/9/70
Changed 3/5/70

DES REG 220 > He Press > 260	DES He REG 1 - CLOSE REG 2 - OPEN Monitor TEMP/PRESS Maintain FUEL & OXID > 160 psi
ASC PRESS FUEL or OXID < 120 psi Either He Press < 2775 (Before Staging)	POWERED ASCENT ASC He REG 1&2 - Cycle OPEN Monitor TEMP/PRESS Maintain FUEL & OXID > 125 psi
	APS PRESS TO LIFTOFF ASC He REG 1&2 - CLOSE Monitor ASC He PRESS If Both < 2775 And Decreasing, IMMEDIATE LIFTOFF Monitor TEMP/PRESS If FUEL or OXID Decreasing, IMMEDIATE LIFTOFF

Basic Date 2/9/70
Changed 3/5/70

LM7

PROPULSION

PROPULSION

ASC HI REG Manf Press > 220 psi	ASC He REG 1&2 - CLOSE Monitor TEMP/PRESS When < 220 psi, Open Each REG Separately
ASC QTY < 10 Sec Burn Time	MAIN SOV (2) - OPEN ASC FEED 2(2)- CLOSE
RCS A REG RCS B REG 165 > Reg Press > 218	Monitor MANF PRESS When < 100 psi, MAIN SOV (Bad System) - CLOSE CRSFD - OPEN
RCS A or B He Press < 1700	Monitor He PRESS & RCS QUANTITY Affected Sys: QUAD ISOL (4) - CLOSE MAIN SOV - CLOSE Monitor MANF PRESS Go to Mal Proc RCS 1
RCS TCA One or More Thrusters Fail Off Collinear Thrusters Firing Simultaneously	If Stable, Recycle CWEA If Unstable, Affected CB: QUAD TCA - OPEN QUAD ISOL- CLOSE Monitor MANF PRESS Between Ullage And Throttle-up, Wait 2 sec Affected QUAD ISOL - CLOSE
DES QTY < 113 Sec at 25%	Monitor PROP QTY (4% to 7%)

Basic Date 2/9/70
Changed 3/5/70

LM7

ENG GMBL GMBL Cmd/Response Discrepancy	ENG GMBL - OFF If Lt Still On, ENG GMBL - ENABLE (CWEA Fail)
LGC LGC Power, Scaler, or Counter Fail	GUID CONT - AGS Poss No Auto Eng Shutdown If RESTART Lt On, LGC Fail CB(11) AEA - CLOSE Go to Mal Proc - PGNS 1
ISS IMU, ICDU, or PIPA (Thrusting) Fail	GUID CONT - AGS Poss No Auto Eng Shutdown If PROG Lt Not On, CWEA Fail CB(11) AEA - CLOSE Go To Mal Proc - PGNS 2
CES AC ATCA AC (1Φ or 3Φ) Out of Tolerance Poss PREAMPS also	GUID CONT - PGNS GYRO TEST - POS RT If Lt Stays On, CWEA Fail Poss Loss of AGS Control, FDAI Rate Needles, And RR Usable In LGC Mode Only
CES DC ATCA DC Out of Tolerance	GUID CONT - PGNS GYRO TEST - POS RT If Lt Stays On, CWEA Fail, If Lt Off - Cycle CWEA CB, If Lt Stays Off, Cycle DECA GMBL AC CB to Unlock Throttle If Lt Reappears, Poss GDA Lock-up, DPS To 100% No AGS Attitude Control

Basic Date 2/9/70
Changed 3/5/70

LM7

G&N

AGS Power Supply Fail Over temp AEA Internal Failure	GUID CONT - PGNS If PGNS Unavailable MODE CONT (AGS) - ATT HOLD AGS RATE CMD OK, But NO ATT HOLD (FREE DRIFT) 412R, Self Test Go to Mal Proc - AGS 1
NO TRACK  RNDZ RDR (AUTO TRACK ONLY) Loss of RR Data Good	Check R and RDOT Displays If OK, Select SLEW, Then AUTO TRACK (AUTO TRACK Only) If Not OK, Check XMTR PWR Verify CSM Att & XPndr OK Attempt PGNS or AGS Reacquisition
PRE AMPS Either - 4.7V Preamp Bias Out of Tolerance	No Crew Action Sproadic Jet Firings May Occur If Both Bias Supplies Fail
WATER QTY DES Qty <16% (Unstaged) ASC QTY <95% (Unstaged) ΔASC QTY >15% (Staged)	Cross Check With H2O Gage Verify H2O TK Select In Proper Position Verify SEC EVAP Flow And PRIM EVAP FLOW #2 - CLOSED Monitor

Basic Date 2/9/70
Changed 3/5/70

LM7

G&N

CABIN Press <4.45-3.70	Cross Check CABIN Press, SUIT PRESS, & Cuff Gages Close Both Dump Vlvs Don Helmets & Gloves, Then a) PRESS REG A&B - EGRESS b) CABIN REPRESS - CLOSE c) SUIT GAS DIVERTER-PULL-EGRESS d) CABIN GAS RETURN-EGRESS
SUIT/FAN Suit Press <3.12 #2 Fan Fails When In Use	Check Suit Flow & Cuff Press (If Nominal, CWEA or Inst Failure) If SUIT ISOL - SUIT FLOW a) Repress Cabin ASAP b) Doff Helmet & Gloves c) Cabin Fan - On If SUIT ISOL Vlvs Closed: a) Repress Cabin ASAP If PGA Press <3.1 psi b) If Suit Integrity OK, CB(16) ECS: SUIT FLOW CONT - OPEN SUIT ISOL VLV-SUIT FLOW

Basic Date 2/9/70
Changed 3/5/70

ECS

O2 QTY Des Qty <5% Either ASC Qty <80% (Before Stage) ASC #1 <10% (After Stage)	Cross Check O2 QTY Gage & CABIN PRESS CABIN PRESS High: a) PLSS FILL-CLOSE b) DES(ASC) O2-CLOSE c) CABIN REPRESS - CLOSE d) PRESS REG A&B-CLOSE e) Open Valves Individually To Isolate Problem CABIN PRESS Normal: Go To MAL Proc ECS 6 If DES O2 Lost, Go To ASC #1, Configure for Closed Suit Operation
ECS	Cross Check Comp Lts a) SUIT FAN Comp Lt On (ΔP<6"H2O) SUIT FAN-2 b) H2O SEP Comp Lt On (RPM<800) Water Sep Sel - Alt SEP c) CO2 Comp Lt On (PPCO2 >6.75) CO2 CANISTER SEL-SEC If ECS Lt Not Off In <1 min CO2 Sensor Failed d) GLYCOL Comp Lt (Pump ΔP <3) Check GLYCOL Press; If both pumps failed, activate Sec Glycol Loop

Basic Date 2/9/70
Changed 3/5/70

LM7

GLYCOL Glycol Temp >50° Glycol Accum <10% (Prim or Sec)	Cross Check GLYCOL TEMP And PRESS, SUIT TEMPS, And H20 QTY If GLYCOL TEMP >50° And Increasing a) PRIM EVAP FLOW #1-CLOSE b) PRIM EVAP FLOW #2-OPEN If GLYCOL TEMP Continues To Increase Activate SEC LOOP a) WATER TANK - SEC b) GLYCOL - INST /(SEC) c) CB(16) ECS: GLYCOL PUMP SEC - CLOSE d) SEC EVAP FLOW - OPEN e) Shutdown Primary Loop f) CB(16) LCG PUMP-Open If GLYCOL TEMP <50°, Go To MAL Proc (Instr or Low Glycol Qty Problem)
HEATER -54°> RR ANT > 148° -67°>S-BD ANT > 153°	Check RR, S-BAND TEMP RR Too Hot-Open Both RR HTR CB's RR Too Cold - Power Up RR S-BD Too Hot (>185°)-CB(16) HTR: S-BD ANT-OPEN S-BD Too Cold-Power Up S-Bd Antenna
LDG RDR Temp Abnormal	LDG RDR Too Hot (>145°)CB(11) HTR: LDG RDR - OPEN LDG RDR Too Cold (<50°) Power Up LDG RDR
RCS Temp Abnormal	RCS Too Cold (<120°) RCS SYS A/B-2 - MAN (Affected Quad)

Basic Date 2/9/70
Changed 3/5/70

HTRS, TEMP

Basic Date ___ 1/6/70
Changed _____

CONTINGENCY EVT (2 OPS)

PREP FOR EGRESS

onfigure CB's As Required
Doff IV Gloves, Stow Under Netting
Behind LMP
Doff Helmets, Verify Feedport Cover
Installed, & Stow Helmets On Ceiling
Verify Wristwatch Donned
FWD Hatch Handle - UNLOCK
Verify With CMP That Tunnel Is Depressed

Stow Loose Items
Stow COAS On Fwd Window Brkt
Stow DEDA & DSKY Desk
CDR Unstow CSRC From Upper Lunar
Boot Comp & Place In PGA Pocket
Stow Other Items As Desired For XFER
SEQ MAGS (5-RHSSC, 1-CAM
2-ISA)
70mm MAGS (4-RHSSC 2nd Shelf,
1-CAM-RHSSC)
CSC CASSETTE MAG-UPPER LUNAR
BOOT COMP
PPK-RHSSC

Basic Date 1/6/70
Changed 3/3/70

Stow PGA Gas Connector Plugs In RHSSC
(Fecal Emesis)
Unstow OPS Straps & Purge Valves
From RHSSC (Fecal Emesis)
Don Purge Valves (R/R) (LH Side)
Don OPS Straps (Break Stitches 2 Places, Remove
Keeper, Extend To Max Length, Route Thru PGA
LH D-RING With Adjustable Strap On RH Side)
LMP Fix OPS Flaps To Expose Press Gage

LM7

1P Unstow OPS & Checkout
Wait Until PRESS Drops To 2.5 PSI (Approx 3 MIN)
Unstow OPS O2 Gas Connector
Secure OPS To LMP's OPS Straps (Route
Under LM Hoses, Do Not Twist Strap)
Connect O2 Hose To LMP's PGA (B/B)

EVT(2OPS)

CDR Unstow OPS & Checkout
Wait Until PRESS Drops To 2.5 PSI (Approx 3 MIN)
Unstow OPS O2 Gas Connector
Secure OPS To CDR's OPS Straps (Route
  Under LM Hoses, Do Not Twist Strap)
Connect O2 Hose To CDR's PGA (B/B)

CDR Unstow Lifeline/Tethers (LH MID)
Attach Waist Tether Hooks To PGA
  (Connect To LMP RH Side, Route In Front of LMP &
  Behind CDR & Connect To CDR LH Side,
  Verify Hooks Locked)

PGA Diverter Valves - Vertical
Don Helmets
Don LEVA's
Don EV Gloves

Secure Transfer Items
Give CMP Go For CSM Depress
Inspect EMU & Lock - Locks
Verify LM Restraints Removed
Verify Purge Valves Accessible

SUIT INTEGRITY CHECK

SUIT CIRCUIT RELIEF - CLOSE
SUIT GAS DIVERTER - PULL-EGRESS
CABIN GAS RETURN - EGRESS

PRESS REG A - CLOSE
PRESS REG B - DIRECT O2
Monitor Suit Press To 8.85 Psia Then
  PRESS REG B - CLOSE (Cuff Gage
  Decay <.3 Psig in 1 Min)

Basic Date 1/6/70
Changed 3/3/70

LM7

SUIT CIRCUIT RELIEF - AUTO
PRESS REG A & B - CABIN
Confirm CSM Side Hatch Open And
  CMP Go For LM Depress

PRESS REG A & B - EGRESS
CB(16) ECS: LCG Pump - Open
Disconnect LM H2O Hoses
Inspect EMU

CABIN DEPRESS

Verify CSM Go For EVT
CABIN REPRESS VLV - CLOSE
CB(16) ECS: CABIN REPRESS-OPEN
Fwd Dump Valve - OPEN Then AUTO
  At 3.5 Psia
Verify LM Suit Press 3.6-4.3 Psia
  And Decaying Slowly
Fwd Dump Valve - OPEN
Monitor Cabin Press To 0 Psia
Verify LM Suit Press 3.6-4.3 Psia

HATCH OPENING

Open Hatch
LMP Verify XFER Items Ready

VERIFY/PERFORM:

CB(11) STAB/CONT:	ATCA (PGNS)	- OPEN
	AELD	- OPEN
	ATT DIR CONT	- OPEN
CB(16) STAB/CONT:	ATCA (AGS)	- OPEN
	AELD	- OPEN

Basic Date 1/6/70
Changed 3/3/70

LEVA - Lower As Required
OPS O2 - On
SUIT ISOL VALVES (Both) - SUIT DISC
Purge Valves - OPEN (Give Mark To CMP
For T+25 Min On OPS)
Verify O2 Flow & PGA Press 3.4-4.0 Psig

Disconnect LM O2 Hoses

Disconnect LM Comm Umbilical
Stow LM Hoses

CDR Transfer To CSM LEB (LMP Manage
Lifeline)
LMP Transfer To CSM Center Couch Area
(CDR Manage Lifeline)

EVT (DOCKED)

CDR Egress Feet First and Transfer To CSM
LMP Tend Lifeline

CDR Ingress CSM Head First, Face Toward MDC,
and Move To LEB
Retrieve C O2 Hoses and Comm Umbilical

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired

CDR Secure Position In LEB & Tend Lifeline For LMP
LMP Egress Feet First and Transfer to CSM

LMP Ingress CSM Feet First, Face Toward MDC,
and Assume Position In Center Couch Area
CDR Connect R Electrical Umbilical
To LMP
CMP Close Hatch

Basic Date 1/6/70
Changed 3/3/70

LM7

EVT (UNDOCKED, STABLE)

CSM Maneuver Apex to LM Forward Hatch

CDR, Then LMP, Egress Feet First, Move
Along Handrails to CSM
LMP Tend Lifeline

CDR Ingress CSM, Head First, Face Toward MDC,
And Move To LEB
Retrieve C 02 Hoses And Comm Umbilical

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired
Secure Position In LEB And Tend Lifeline
For LMP
LMP Ingress CSM Feet First, Face Toward MDC,
and Assume Position In Center Couch Area
CDR Connect R Electrical Umbilical to LMP
CMP Close Hatch

EVT (UNDOCKED, UNSTABLE)

CSM Maneuver to LM

CDR Egress Feet First, Move to EVA
Handrail Clear of Hatch
LMP Tend Lifeline

LMP Egress, Move Up EVA Handrail

CDR and LMP Push Away from LM at
Same Time (Give Signal, Pull In, Push Off)

CSM Maneuver Apex to CDR and LMP

Basic Date 1/6/70
Changed 3/3/70

LM7

CDR and LMP Use CSM Handholds to Move
To Side Hatch

CDR Ingress CSM, Head First, Face Toward MDC, And
Move To LEB
Retrieve C O2 Hoses And Comm Umbilical

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired
Secure Position in LEB And Tend Lifeline
For LMP
LMP Ingress CSM Feet First, Face Toward MDC,
and Assume Position In Center Couch Area
CDR Connect R Electrical Umbilical to LMP
CMP Close Hatch

EV HATCH OPENING (CDR)

Attach Restraints As Required

Unstow Tool B
Insert Tool B Into Dump Valve
Depress, Rotate CW to Stop
Vent for 30 Sec

Insert Tool B Into Actuation Socket
Rotate CCW (368°) Until Hatch Can Be
Opened

Partially Open Hatch

Remove Tool B and Stow On PGA

Open Hatch

CONTINGENCY EVT (CDR/OPS-LMP/PLSS)

CREW STATUS

UCTA'S Empty
Helmets And Gloves Stowed, If Req'd
Inspect PGA Zipper, Verify Lock-locks
Check Status of CMP Prep for Egress

PREPARATION FOR EGRESS

Verify With CMP That Tunnel is Depressed
Verify Wristwatch Donned
Stow Loose Items
COAS To FWD Window Brt
Stow DEDA and DSKY Desk
Remove PGA Connector Plugs & Stow In
  RHSSC (Fecal EMESIS)
Remove LEVA From CDR'S Helmet Bag
Attach LEVA to CDR's Helmet
Unstow Purge VLV From RHSSC (Fecal EMESIS)
Install Purge Valve in CDR's LH PGA
  Red Connector
Stow Anti-Fog For Later Use

(LMP) Unstow OPS Straps From RHSSC
Break Stitch 2 Places, Remove Keeper,
  Extend to Max Length

(CDR) Don OPS Straps, Route Thru PGA LH D-RING
  With Adjustable Strap On RH Side

(LMP) Secure OPS Flap To Expose Press Gage

Stow Transfer Items,
  SEQ MAGS (5-RHSSC, 1-CAM, 2-ISA)
70mm MAGS (4-RHSSC, 2nd Shelf, 1-CAM-RHSSC)
CSC CASSETTE MAG - UPPER
  LUNAR BOOT COMP
PPK-RHSSC

(CDR) Remove CSRC From Upper Lunar Boot
  Compartment and Stow in PGA Pocket

Basic Date 1/6/70
Changed 3/3/70

LM7

DON PLSS

(LMP) Unstow Upper and Lower PLSS Donning Straps
Unstow O2 and H2O Hoses, and Battery Cable
Connect Battery Cable to Battery
Don PLSS by Securing PLSS Upper and Lower Straps to PGA
Connect PLSS O2 Hoses and Verify Lock
RCU (All Elec Cnts-OFF)-Connect Elec to PLSS and Lock
Attach RCU to PLSS Straps and PGA
Verify these Switch and Valve Positions
Diverter Valve - MIN (up)
O2 Shutoff Valve - OFF (up)
Feedwater Valve - CLOSED (up)
Pump - OFF
Fan - OFF
Mode SEL sw - POS 0

DON OPS

(CDR) UNSTOW OPS
Verify OPS O2 PRESS -5380 to 6380 psia and O2 Hose Locked
OPS O2 SOV - ON
Verify REG Press -3.4 to 4.0 psig
Heater Test - PRESS (Note Lts - On)
OPS O2 SOV - OFF
Verify REG PRESS <2.5 psig (Approx 3 MIN)
Unstow O2 Hose (Nozzle End)
Secure OPS to PGA (Route RH Strap Under LM O2 Hoses. Do Not Twist Strap)
Connect OPS O2 Hose to LH PGA Blue Connector

FINAL PREP FOR EVT

CB(11) ECS: CABIN FAN 1 - Open

Unstow Waist Tethers and Lifeline (LH MID)

Attach Waist Tether Hooks To PGA
(Conn to LMP RH Side, Route Behind CDR & Connect to LH Side, Verify Locked)

(CDR) FWD HATCH HANDLE - UNLOCK

PREP FOR CABIN DEPRESS

PGA Flow Diverters - Vertical
If Helmet And Gloves Donned, Proceed With Prep For Depress As Required

(CDR) Unstow LMP Helmet
Verify Feed Port Cover Installed and Locked
Apply Anti-Fog

(LMP) Position Mikes

(CDR) Place Helmet on LMP, Lock

(CDR) Unstow Helmet
Verify Feed Port Cover Installed and Locked
Position Mikes

(LMP) Place Helmet on CDR, Lock

(CDR) Unstow LEVA From Helmet Bags

(CDR) Attach LMP's LEVA - UP

Verify Helmet/Neck Ring Align

(LMP) PLSS Mode SEL sw - POS A (Min PWR)
RCU PRESS Window - O (OPS ACT-ABORT)
RCU Vent Window -P (Purge & Abort)
Verify PLSS O2 Bottle Press
Confirm CSM Side Hatch Open and CMP "GO" for LM Depress
PLSS Fan - ON
Suit ISOL vlv - Suit Disc
Verify -RCU vent window - CLEAR
CB(16) ECS: LCG PUMP - Open
Disconnect LM O2 and H2O Hoses, Secure
Connect PLSS H2O Hose

Basic Date 1/6/70
Changed

LM7

(CDR) Disconnect LM H20 Hose, Secure

Don EV Gloves, Lock (Watch Attached)

Inspect EMU
Check Connectors and Lock-locks
Disconnect and Stow LM Restraints
Secure Transfer Items

SUIT INTEGRITY CHECK

(CDR) SUIT CIRCUIT RELIEF - CLOSE
SUIT GAS DIVERTER-PULL-EGRESS
CABIN GAS RETURN-EGRESS
PRESS REG A - CLOSE
PRESS REG B - DIRECT 02
When ECS: SUIT PRESS - 8.85 psia
PRESS REG B - CLOSE

Monitor Cuff Gage Pressure
Decay for One Minute
Verify Decay <.3 psig

SUIT CIRCUIT RELIEF - AUTO
PRESS REG A and B - CABIN

(LMP) PLSS 02 Shutoff vlv - ON (Down)
Verify
-PLSS Warning Tone - ON (10 sec)
-RCU 02 Window - 0(OPS ACT-ABORT)
-RCU PRESS Window - CLEARS
-RCU 02 Window - CLEARS
-PGA GAGE READS 3.7 to 4.0 psig

PLSS 02 Shutoff vlv-OFF (up)
Read PGA Gage and Monitor Press Decay
1 min.

EMU CKT Decay Not to Exceed 0.3 psid
PLSS 02 Shutoff Valve - ON(Down)(PLSS Hi
02 Flow Warn May Come ON)
Verify
-PGA Gage Reads 3.7 - 4.0 psig
-PLSS Diverter Vlv - Min (UP)

Basic Date 1/6/70
Changed 3/10/70

LM7

PLSS Pump -ON
Verify Audible Notice of Pump Operation
Confirm CSM Side Hatch Open and CMP go for Depress

(CDR) PRESS REG A AND B -EGRESS

CABIN DEPRESS

Verify CSM Is Go For EVT
CABIN REPRESS - CLOSE
CB(16) ECS: CABIN REPRESS-OPEN
Monitor Suit Circuit Press During Depress
Verify Press 3.6 to 4.3 psia

(LMP) Monitor PGA Gage During Depress-
Verify PGA PRESS >4.8 psig

(LMP) Forward Dump Valve - Open
Then AUTO at 3.5 psia

(CDR) Verify ECS: CABIN PRESS - 3.5 psia
: SUIT PRESS - 3.6 to 4.3 psia
And Decaying Slowly

(LMP) Verify: PGA PRESS >4.8 psig, decaying slowly

(LMP) Forward Dump Valve - OPEN
Verify: RCU H2O Window -A (ABORT)

(CDR) Monitor ECS: CABIN PRESS - Observe decrease to 0 psia
: SUIT PRESS - 3.6 to 4.3 psia

(LMP) Verify: PGA Press >4.8 psig, decaying slowly

HATCH OPENING

(LMP) Open Hatch
Verify CSM in Position & Go For EVT
Verify/Perform:
CB(11) STAB/CONT: ATCA(PGNS) -OPEN
AELD -OPEN
ATT DIR CONT-OPEN
CB(16) STAB/CONT: ATCA (AGS) -OPEN
AELD -OPEN
PLSS Feedwater Shutoff Vlv-OPEN (Down)
After RCU H2O Window Clears (Approx 4 min),
PLSS Diverter Vlv - Max Cooling (Down)
LEVA'S - Lower As Required

Verify: CSM In Position
CMP "GO" For Transfer To
OPS And EVT

(CDR) OPS O2 SOV - ON
SUIT ISOL VALVE - SUIT DISC

PURGE VALVE - OPEN (Give Mark To CMP
For T+25 Min)
Verify O2 Flow
Verify Reg Press - 3.4 to 4.0 psig
LM O2 Hoses - Disconnect
Verify PGA Press - 3.4 to 4.0 psig

LM Comm Umbilical - Disconnect

EVT (DOCKED)

CDR Egress Feet First and Transfer To CSM
LMP Tend Lifeline

CDR Ingress CSM Head First, Face Toward MDC,
and Move To LEB
Retrieve C O2 Hoses and Comm Umbilical

CMP Connect C Comm Umbilical to CDR

CDR Configure Audio Panel As Desired

Basic Date 1/6/70
Changed 3/3/70

LM7

CDR Secure Position In LEB And Tend
Lifeline for LMP
LMP Egress Feet First and Transfer to CSM

LMP Ingress CSM Feet First, Face Toward MDC,
and Assume Position In Center Couch Area
CDR Connect R Electrical Umbilical To LMP
CMP Close Hatch

EVT (UNDOCKED, STABLE)

CSM Maneuver Apex to LM Forward Hatch

CDR, Then LMP, Egress Feet First, Move
Along Handrails to CSM
LMP Tend Lifeline

CDR Ingress CSM, Head First, Face Toward MDC,
And Move to LEB
Retrieve C O2 Hoses And Comm Umbilical

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired
Secure Position In LEB And Tend Lifeline
For LMP
LMP Ingress CSM Feet First, Face Toward MDC
and Assume Position In Center Couch Area
CDR Connect R Electrical Umbilical To LMP
CMP Close Hatch

EVT (UNDOCKED, UNSTABLE)

CSM Maneuver to LM

CDR Egress Feet First, Move to EVA
Handrail Clear of Hatch
LMP Tend Lifeline

LMP Egress, Move Up EVA Handrail

Basic Date 1/6/70
Changed 3/10/70

LM7

CDR and LMP Push Away from LM at
Same Time (Give Signal, Pull In, Push Off)

CSM Maneuver Apex to CDR and LMP

CDR and LMP Use CSM Handholds to Move
To Side Hatch

CDR Ingress CSM, Head First, Face Toward MDC,
And Move to LEB
Retrieve C 02 Hoses And Comm Umbilical

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired
Secure Position in LEB And Tend Lifeline
For LMP
LMP Ingress CSM Feet First, Face Toward MDC,
and Assume Position In Center Couch Area
CDR Connect R Electrical Umbilical To LMP
CMP Close Hatch

EV HATCH OPENING (CDR)

Attach Restraints As Required

Unstow Tool B
Insert Tool B Into Dump Valve
Depress, Rotate CW to Stop
Vent for 30 Sec

Insert Tool B Into Actuation Socket
Rotate CCW (368°) Until Hatch Can Be
Opened

Partially Open Hatch

Remove Tool B and Stow On PGA

Open Hatch

Basic Date 1/6/70
Changed 3/10/70

LM7

CONTINGENCY EVT (2 PLSS/OPS)

Use Planned EVA Procedures

Perform the following sections as applicable and with changes as noted.

CABIN PREP EVA 1

EQUIPMENT PREP EVA 1

PLSS DONNING

PLSS COMM CHECK-OMIT

(1) Both Connect PLSS COMM to PGA (LMP First)

(2) Both - PLSS Mode SEL - AR

(3) Both - Verify COMM With CMP and each other

FINAL SYSTEMS PREP

OPS CONNECT

(1) Connect Waist Tethers and Lifeline

(2) Before Leaving LM Cooling - LCG PUMP C/B - Open - Verify CMP "GO" For LM Depress

HELMET/GLOVE DONNING

PRESSURE INTEGRITY CHECK

CABIN DEPRESS

FINAL PREP FOR EGRESS

(1) Do Not Deploy PLSS Antenna

EVT(2 PLSS/OPS)

VACUUM IVT TO CM

EQUIPMENT PREP

1 Perform In Conjunction With Post Docking Procedure
P- , LM Timeline Book

2 Stow DEDA And DSKY Desk
CDR Unstow CSRC From Upper Lunar Boot Comp And Place In PGA Pocket
Stow Other Items As Desired For XFER (SEQ, 70mm, & CSC Cassette MAGS;PPK's; RNDZ Charts, Flt Data, DSEA)

3 Unstow SRC'S And Place In Bag And Temp Stow
Move HSB'S Aft From ASC Eng Cover

4 Remove PGA Gas Connector Plugs And Stow In RHSSC
Verify LM Restraints Removed

PGA INTEGRITY CHECK

1 Inspect EMU & Lock - Locks

2 Suit Circuit Relief - Close
Suit Gas Diverter - Pull - Egress
Cabin Gas Return - Egress

3 Press REG A - Close
Press REG B - Direct O2
Monitor Suit Press To 8.85 Psia Then
Press Reg B - Close (Cuff Gage Decay <.3 Psig In 1 Min)

4 Suit Circuit Relief - Auto
Press REG A & B - Cabin
Confirm CSM GO For LM Depress

5 Press REG A & B - Egress
CB(16) ECS: LCG PUMP - Open
Disconnect LM H2O Hoses

CABIN DEPRESS

1 Cabin Repress VLV - Close
CB(16)ECS: CABIN REPRESS - OPEN
FWD Dump VLV - Open Then Auto At 3.5 Psia
Verify LM Suit Press 3.6-4.3 Psia And
Decaying Slowly

2 FWD Dump VLV - Open
Monitor Cabin Press To 0 Psia

Verify LM Suit Press 3.6-4.3 Psia

HATCH OPENING

1 OVHD Dump VLV - Open
Open Hatch

2 Stow: Probe On Left Hand Side Using
Outboard (Double) Restraint Cable
: Drogue Over Probe Using Inboard
(Single) Restraint Cables Through
Drogue Handles.

3 Transfer SRC'S To CM

4 Receive B5 And B6 From CM And Stow In LM

5 Transfer Other Items If Req'd

SWITCH OVER TO CM ECS

1 CMP - Verify Right And Left Suit Flow Vlvs - OFF
Remove interconnects

2 Connect LMP to Transfer umbilical (R/R, B/B)
CMP - set Right Suit Flow (PNL 300) - FULL FLOW
When CM Flow Confirmed, LMP SUIT ISOL VLV -
SUIT DISC
Disconnect LMP LM hoses
Connect To CM Electrical umbilical
(Audio, Biomed), And Stow LM hoses
CMP Set Right Couch AUDIO PWR - AUDIO TONE,
SUIT PWR - ON
Verify Comm with LMP

Basic Date 1/6/70
Changed 2/9/70

VACUUM IVT

LM7

3 CMP route CM Left 02 Hoses into Tunnel
CDR move into position in tunnel for connect to CM umbilicals.

4 Connect CDR to CM (L) 02 umbilicals (R/R, B/B)
CMP Set LEFT SUIT FLOW VLV - (PNL 301) - FULL FLOW
When CDR Flow Confirmed, CDR SUIT ISOL VLV - SUIT DISC
Disconnect CDR LM hoses
Connect To CM Electrical umbilical (Audio, Biomed) and stow LM hoses
CMP set Left couch AUDIO PWR - AUDIO TONE, SUIT PWR - ON
Verify comm with CDR

5 CDR transfer to CM
LMP tend umbilicals

CSM MANEUVER TO JETTISON ATTITUDE

1 LMP Perform The Following In The LM Timeline Book, Post Docking C/L
Configure S-BAND
Configure LM For Jettison

2 LMP Transfer To CSM
Close And Lock LM Hatch
Install CM Hatch And Lock

3 Commence CM Cabin Repress

Basic Date 1/6/70
Changed

LM7