APOLLO 15

LM CONTINGENCY CHECKLIST

PART NO.	S/N
SKB32100116-362	1001

CONTENTS

DATE 5/5/71

CONTENTS (CONT)

DATE 6/14/71

DOCKED DPS BURN
(PGNS)

1. 30-MINUTE ACTIVATION

(MANUAL)

30-MIN ACTIVATION

1. 30-MINUTE ACTIVATION

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 Record Docking Tunnel Index Angle _____

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

POWER TRANSFER/RCS HEATER ACTIVATION

1 CSM Transfer To LM PWR
(Flood Lts Blink, C/W PWR Caution Lt-On)

2 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
CB(16) S/C A&A CLOSE

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

DATE 4/5/71

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

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/SUBLIMATOR ACTIVATION

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 #1 - OPEN

DATE 4/5/71

CIRCUIT BREAKER ACTIVATION

1 Close CB's Per 30-MIN ACTIVATION Chart

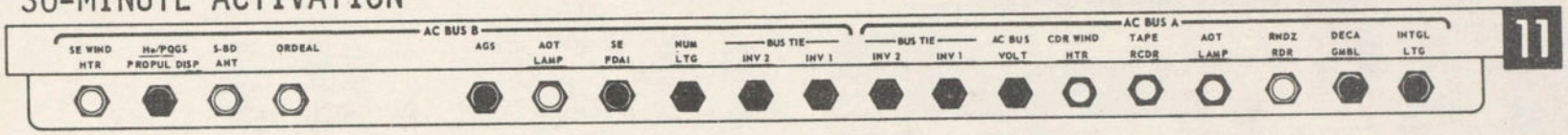
Monitor Bus Voltage, and select HI Voltage Taps When <27V:
CB(11&16) EPS: CROSS TIE BUS (2) - Close
CB(16) EPS: CROSS TIE BAL LOADS - Close
BAT 1 HI V - OFF/RESET, Then ON, tb - gray
BAT 4 HI V - OFF/RESET, Then ON, tb - gray
CB(16) EPS: CROSS TIE BUS - Open
: CROSS TIE BAL LOADS - Open
CB(11 & 16) ASC ECA - Close

When BAT 1 AMP MTR Indicates >30
BAT 5 ON, tb - gray
When BAT 4 AMP MTR Indicates >30
BAT 6 ON, tb - gray
Verify BAT Current
Leave BATS 2&3 Off

DATE 5/5/71

30-MINUTE ACTIVATION

8 OPEN



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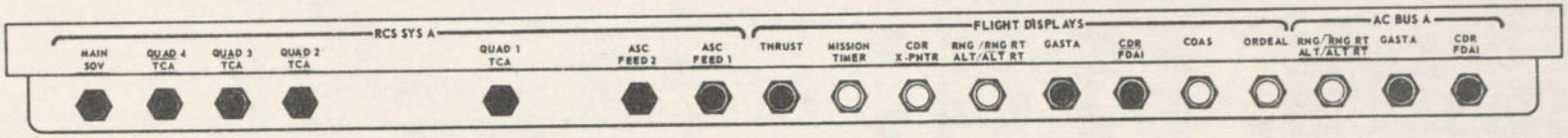

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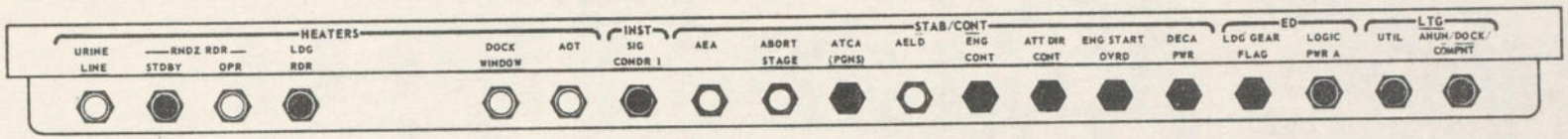

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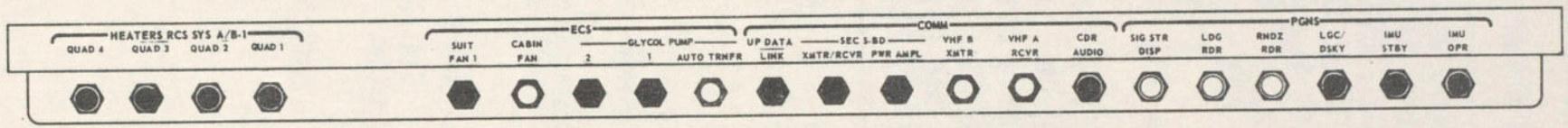

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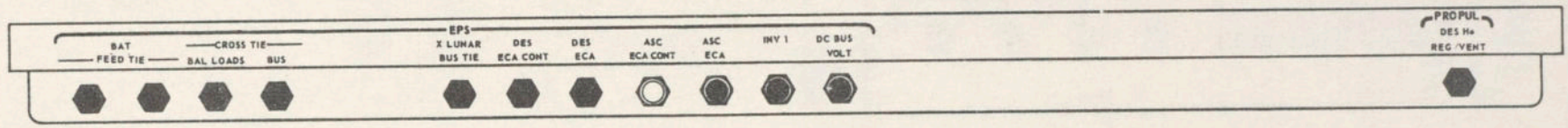
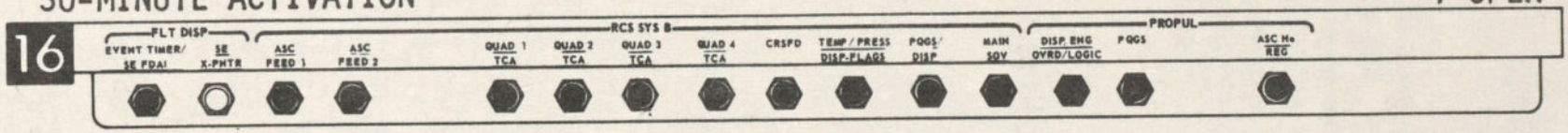


DATE 4/5/71

DATE 4/5/71

30-MINUTE ACTIVATION

1 OPEN



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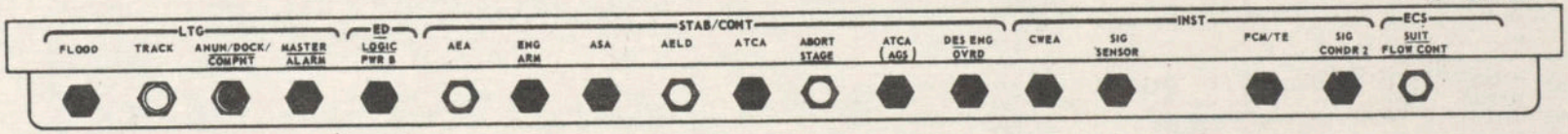

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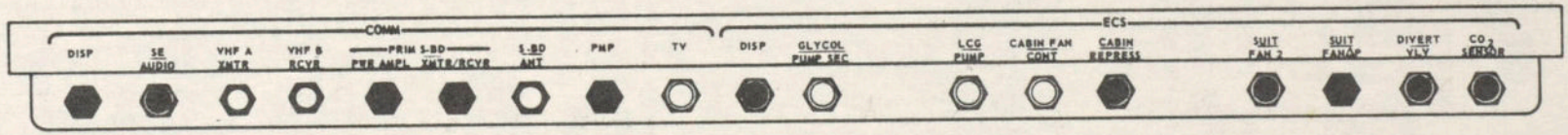
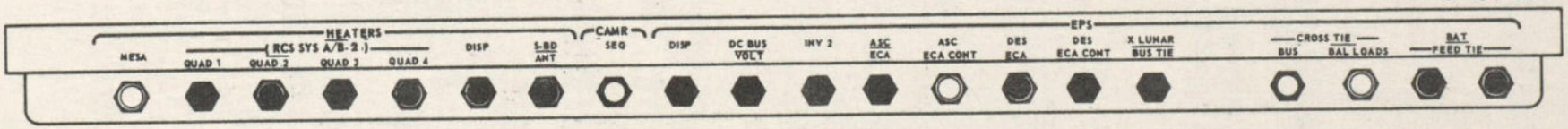


5 OPEN



1-5

DOCKED DPS BURN (PGNS) | DOCKED APS BURN (MANUAL) | AR | DOCKED DPS BURN (MANUAL) | PHASE I

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

WARN
RCS A REG
RCS B REG

S-BD ACTIVATION

1 Connect to LM Comm Umbilical
AUDIO (BOTH): S-BAND T/R - T/R
ICS T/R - T/R

2 COMM: S-BD-PM,SEC,PRIM,DN VOICE BU,
PCM,OFF/RESET,OFF,HI (Hot Mike to MSFN)
S-BD ANT-FWD or AFT

PGNS TURN - ON

1 NO ATT Lt - OFF
V96E

EVENT TIMER

1 Set DET Counting Down to TIG
on CSM Mark

DAP SET/GIMBAL DRIVE

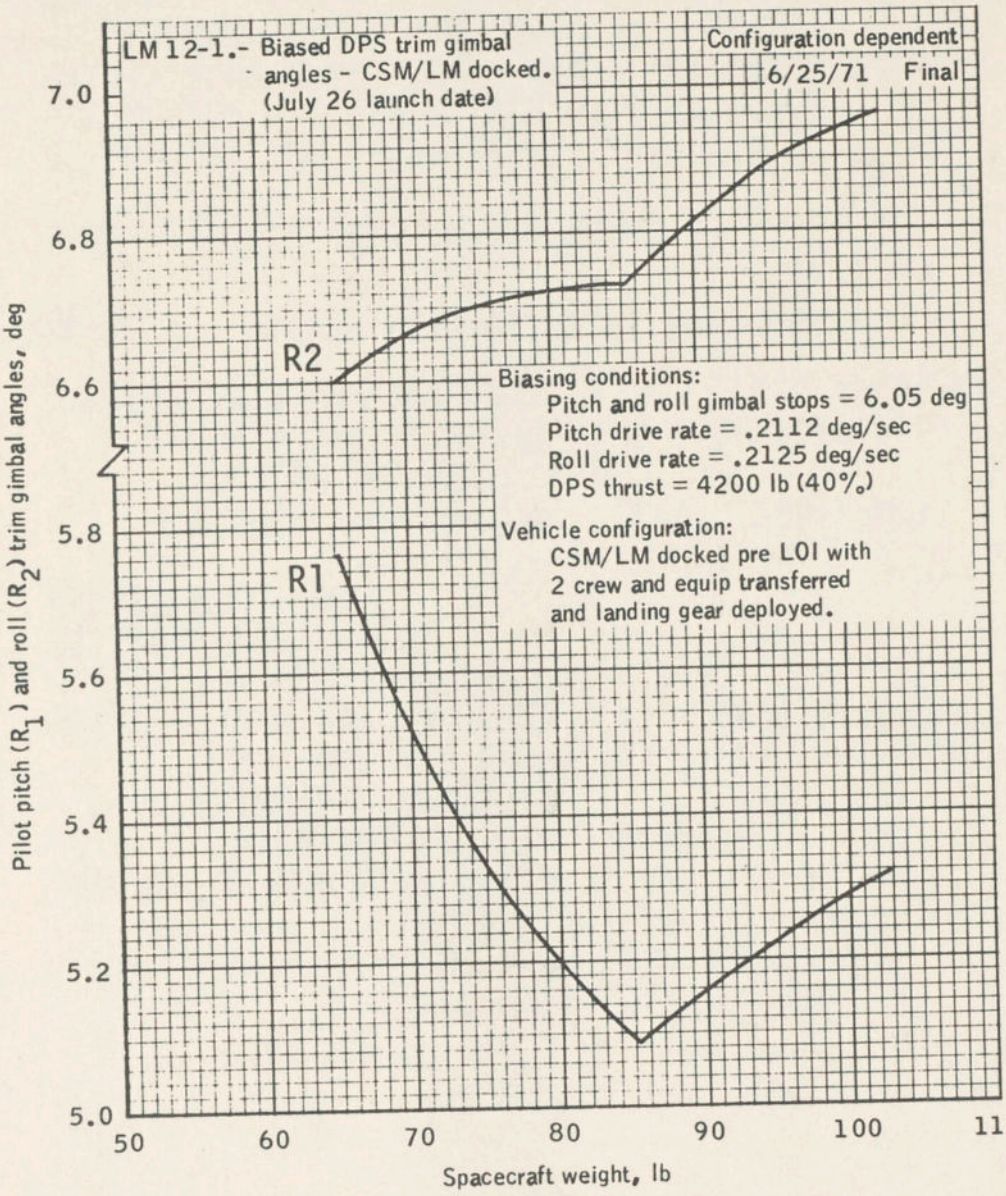
1 V76E
MODE CONT: PGNS - ATT HOLD
GUID CONT - PGNS
TTCA (CDR) - THROTTLE (MIN)

2 V48E
N46 32021, 00011
PRO
N47 + _____ (~~36702~~ 36698)
+ _____ (From MSFN or CSM)
PRO
N48 + _____ (From MSFN or GMBL TRIM CHART)
+ _____ (From MSFN or GMBL TRIM CHART)

DATE 5/5/71 7/9/71

GMBL TRIM CHART

LM WT	3	6	7	0	0
CSM WT					
SPACECRAFT					



DATE 7/12/71

PHASE I

DOCKED DPS BURN (MANUAL)

DOCKED APS BURN (MANUAL)

DOCKED DPS BURN (PGNS)

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DATE 5/5/71

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

3 F 50 48
MSFN Verify GDA Position if after AOS
PRO
ENG ARM - OFF (ENG GMBL Lt-OFF)
ENG STOP - Reset
MODE CONT (BOTH) - OFF

AGS ACTIVATION

VERIFY RSA CB HAS BEEN CLOSED FOR 10 MIN

1 AGS STATUS - STBY (AGS Warn Lt - On)
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 1

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
: CRSFD - CLOSE, tb-bp
: MAIN SOV SYS A&B - OPEN, tb(2)-gray

2 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
: CRSFD - CLOSE
: MAIN SOV SYS A&B - OPEN

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

DATE 5/5/71

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 (DES REG Lt - OFF)

PRPLNT TEMP/PRESS MON: DES 1, DES 2
(50°-90° FUEL, 50°-90° OXID
200-250 psi FUEL, 200-250 psi OXID)
HELIUM MON: AMB PRESS (200-1110 psi)
SUPRCRIT PRESS (870-1300 @ 75:00)

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

VHF ACTIVATION (OPTIONAL)

1 CSM Configure for VHF Simplex A

2 CB(11) COMM: VHF B XMTR - Close
VHF A RCVR - Close
CB(16) COMM: VHF A XMTR - Close
: VHF B RCVR - Close

3 VHF A: XMTR - VOICE
: RCVR - ON
AUDIO (BOTH): VHF A - T/R

4 Perform Comm Check with CSM

DATE 5/5/71

DOCKED DPS BURN (MANUAL)

V76E (Verify)
GUID CONT - AGS
MODE CONT (BOTH) - OFF (Verify)
ENG STOP (2) - RESET
ABORT/ABORT STAGE - RESET

CSM Mnvr to Burn Attitude

For LM Mnvr To Attitude:
ATT MON (BOTH) - AGS
400+5
400+0
MODE CONT: AGS - ATT HOLD
ATT CONT : ROLL - PULSE
: PITCH - PULSE
: YAW - MODE CONT
Mnvr to Burn Attitude
Pitch & Roll With TTCA
Yaw with ACA (Rate Cmd)

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

At burn attitude:
V40 N20E
V25 N07E, 77E, 10000E, 1E
V01 N01E, 77E (Verify A = 1,3,5,7)
V37E 51E, PRO, V96E
400 + 5
400 + 0
MODE CONT (AGS) - AUTO (If LM Is Holding Attitude)

DATE 5/5/71

DATE 5/5/71

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
470R

-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 - ON
ENG GMBL- ENABLE (OFF if docked to CM only)
DES ENG CMD OVRD - OFF
DEADBAND - MIN
ATT CONT: ROLL - PULSE
PITCH - PULSE
YAW - MODE CONT
MODE CONT (PGNS) - ATT HOLD
(AGS) - AUTO
PRPLNT QTY MON - DES 1

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

-1:00 MASTER ARM - ON

- :35 V32E (P47 Only)
F 16 83 ΔVX,Y,Z (All Zero) (.1fps)
ENG ARM - DES

- :10 MANUAL ULLAGE (LMP)

- :02 CMC MODE - FREE

:00 ENG START (CDR) - PUSH
Ignition

+ :01 DES He REG 1 - OPEN (If previously closed and PRPLNT QTY > 31%)

+ :05 TTCA (CDR) - Throttle Up As Req'd (40%)
ATT CONT: PITCH, ROLL - As Req'd

```
*        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  *
*RATE And ERROR Needles Are Moving   *
*In Same Direction And Are In Same   *
*Quadrant And Not Thrusting With     *
*TTCA's.  Throttle Initially At 10%, *
*Then Throttle Up When Stabilized,   *
*10% Before Cutoff.                  *
```

+:15 MASTER ARM - OFF

Monitor ΔVX Via N83, 470

DATE 4/5/71

DATE 5/5/71

PHASE I

DOCKED APS BURN (MANUAL)

DOCKED DPS BURN (PGNS)

When PRPLNT QTY = 31%:
DES He REG 1 - CLOSE

TTCA (CDR) - Reduce to 10% when Vgo = 10.0 fps, then close DES He REG 1 if PRPLNT QTY <86%

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

DATE 5/5/71

DOCKED APS BURN (MANUAL)

This procedure is for a docked APS burn immediately following a manual DPS burn (DPS failure or burn to depletion). Assumptions are that a "30-Minute Activation" has been performed.

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

ASC PRESS

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

ECS

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

EPS

Verify ASC BATS Have Been On For 20 Min
BAT 1,4 - OFF/RESET, tb-bp
DES BATS - DEADFACE, tb-bp

CB(11&16) DES ECA(2) - Open
DES ECA CONT (2) - Open
ASC ECA CONT (2) - Open

SET EVENT TIMER
CSM MNVR TO BURN ATTITUDE

DATE 5/5/71

DATE 5/5/71

If At New Attitude:
V41N20E,E,E,E,
V40 N20E
V25 N07E, 77E, 10000E, 1E
V01 N01E, 77E (Verify A = 1,3,5,7)
V37E 51E, PRO, V96E
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

400+5
400+0
404, 5, 6 + 0
470 R

GUID CONT - AGS
ATT MON (BOTH) - AGS
RATE SCALE - 5°/SEC
ATT/TRANSL - 4 JET
BAL CPL - ON
DEADBAND - MIN
MODE CONT (PGNS) - ATT HOLD
(AGS) - AUTO
ENG STOP (2) - RESET
ABORT/ABORT STAGE - RESET

DATE 5/5/71

-1:00 ATT CONT: ROLL - DIR
PITCH - DIR
YAW - MODE CONT
MASTER ARM - ON

-:35 V32E (P47 Only)
ENG ARM ASC

-:10 MANUAL ULLAGE

-:07 STAGE - FIRE

-:02 CMC MODE - FREE

:00 ENG START - PUSH
IGNITION

```
*          APS 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  *
*                                      *
*                                      *
*When APS Ignition Occurs, LMP         *
*Should Immediately Thrust Aft to      *
*Maintain Control.  ATT CONT:          *
*PITCH & ROLL - DIR.  Use ACA to       *
*  assist control.                     *
*If TTCA authority becomes             *
*  degraded, switch ATT CONT:          *
*  YAW to DIR.                         *
```

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

DATE 4/5/71

When ΔVX = Desired ΔV-200:
SYS A&B MAIN SOV (2) - OPEN
SYS A&B ASC FEED 2(2) - CLOSE

When ΔVX = Desired ΔV:
ENG STOP - PUSH

ATT CONT (3) - PULSE

Damp Excessive Rates Via LM Y, Z Translation

CSM Resume Attitude Control

PRO, V96E

ENG ARM - OFF

MASTER ARM - OFF
ENG STOP - RESET

DATE 6/14/71

DOCKED DPS BURN
(PGNS)

2. MODULAR ACTIVATION

PHASE I

2. MODULAR ACTIVATION

30-MIN ACTIVATION

PHASE I
(Life Support, Comm, Manual Att Cont)

DATE 4/5/71

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

POWER TRANSFER

If No CSM Power:
CB(16) INST: SIG CONDR 2 - Close
EPS: DISP - Close
: DC BUS VOLT - Close (verify)
: ASC ECA CONT - Close
BAT 5 NORM FEED - ON, tb - gray
CB(11&16) EPS: DES ECA CONT (2) - Close
: XLUNAR BUS TIE (2) - Close
BAT 1 LO VOLTAGE - ON, tb - LO
BAT 5 NORM FEED - OFF/RESET
BAT 4 LO VOLTAGE - ON, tb - LO
Verify DES BATS tb - gray
BATS 5,6 tb (4) - bp
CB(16) EPS: ASC ECA CONT - Open

1 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

2 FLOOD LIGHT - All
EXT LTG - OFF
CB(11) LTG: UTIL - Close
Activate Utility Lts

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 CONDR 2 - Close
EPS: DISP - Close
: DES ECA CONT -Close

3 Verify:
BAT 1 tb - LO
BAT 2&3 tb (2) - bp
BAT 4 tb - LO
LUNAR BAT tb - bp
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(11&16) EPS: CROSS TIE BUS (2) - Close
BAT 1 HI V - OFF/RESET, Then ON, tb - gray
BAT 4 HI V - OFF/RESET, Then ON, tb - gray
CB(16) EPS: CROSS TIE BUS - Open
: CROSS TIE BAL LOADS - Open

When BAT 1 AMP MTR Indicates >30,
BAT 2 OFF/RESET, Then ON, tb - gray

When BAT 4 AMP MTR Indicates >30,
BAT 3 OFF/RESET, Then ON, tb - gray

ECS ACTIVATION

1 CB(16) INST: SIG SENSOR - Close
ECS: DISP - Close
CB(11) ECS: SUIT FAN 1 - Close
: GLYCOL PUMP 2 - Close
PRESS REG A&B - CABIN
SUIT GAS DIVERTER - PUSH/CABIN

2 If LM to be active for more than 1 hour or GLYCOL TEMP >75°:
PRIM EVAP FLOW # 1 - OPEN

CONFIGURE AUDIO

1 Connect To LM Comm Umbilical

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

3 CB(11) COMM: SEC S-BD: XMTR/RCVR - Close
: CDR AUDIO - Close
CB(16) INST: SIG SENSOR - Close (verify)
: PCM/TE - Close
COMM: SE AUDIO - Close
: PMP - Close

4 COMM: S-BAND-PM,SEC,PRIM,DN VOICE BU,PCM,
OFF/RESET,OFF,LO (Hot Mike to MSFN)
S-BAND: ANT - FWD or AFT

CAUTION/WARNING TURN ON

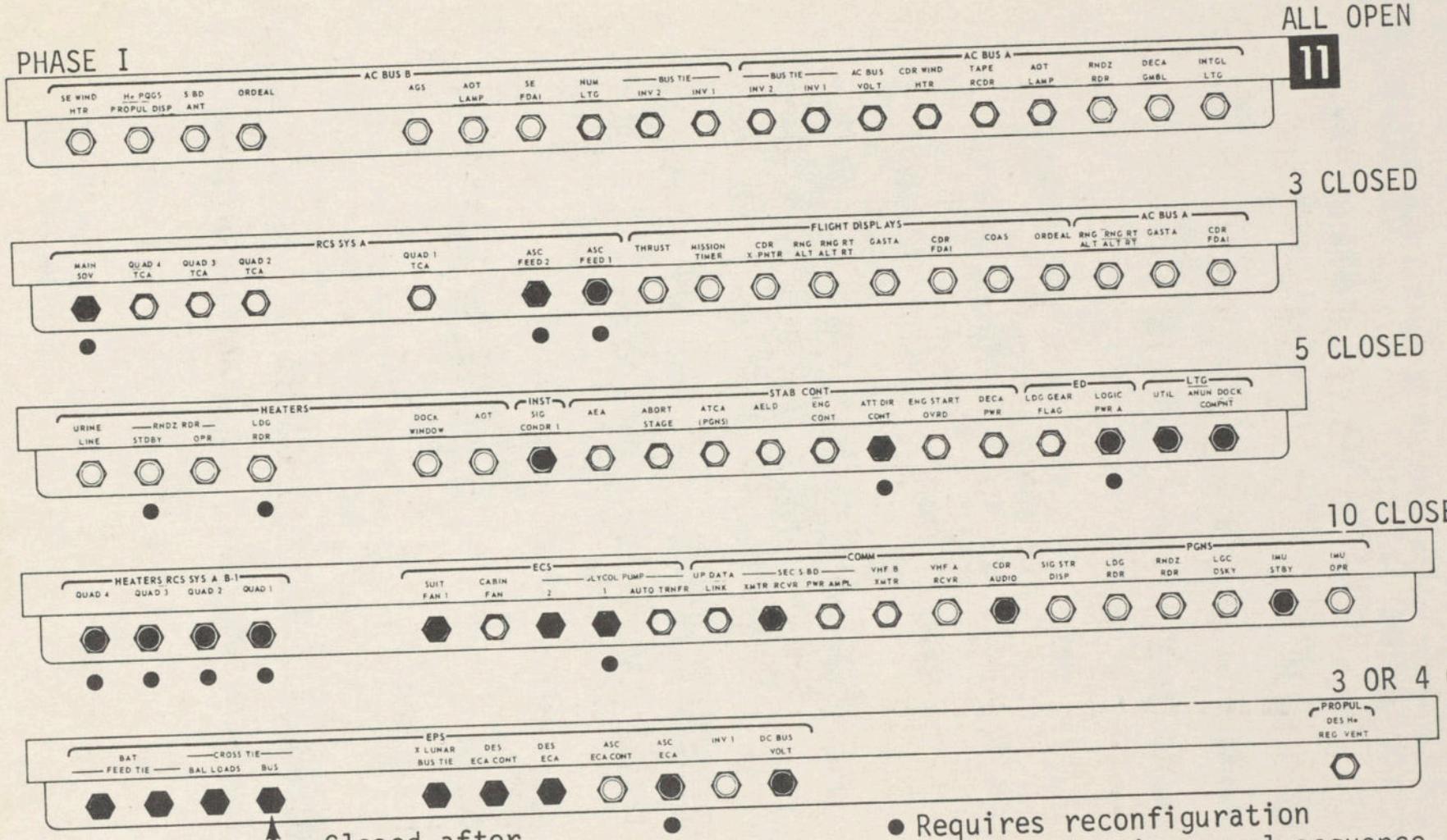
1 CB(16) LTG: MASTER ALARM - Close
INST: CWEA - Close

WARN	CAUT
CES AC	PREAMP
CES DC	GLYCOL (ON IF TEMP >50°)
LGC	
RCS A REG	
RCS B REG	

RCS HTR/CIRCUIT BREAKER ACTIVATION

1 Configure CB's Per Phase I Activation Chart

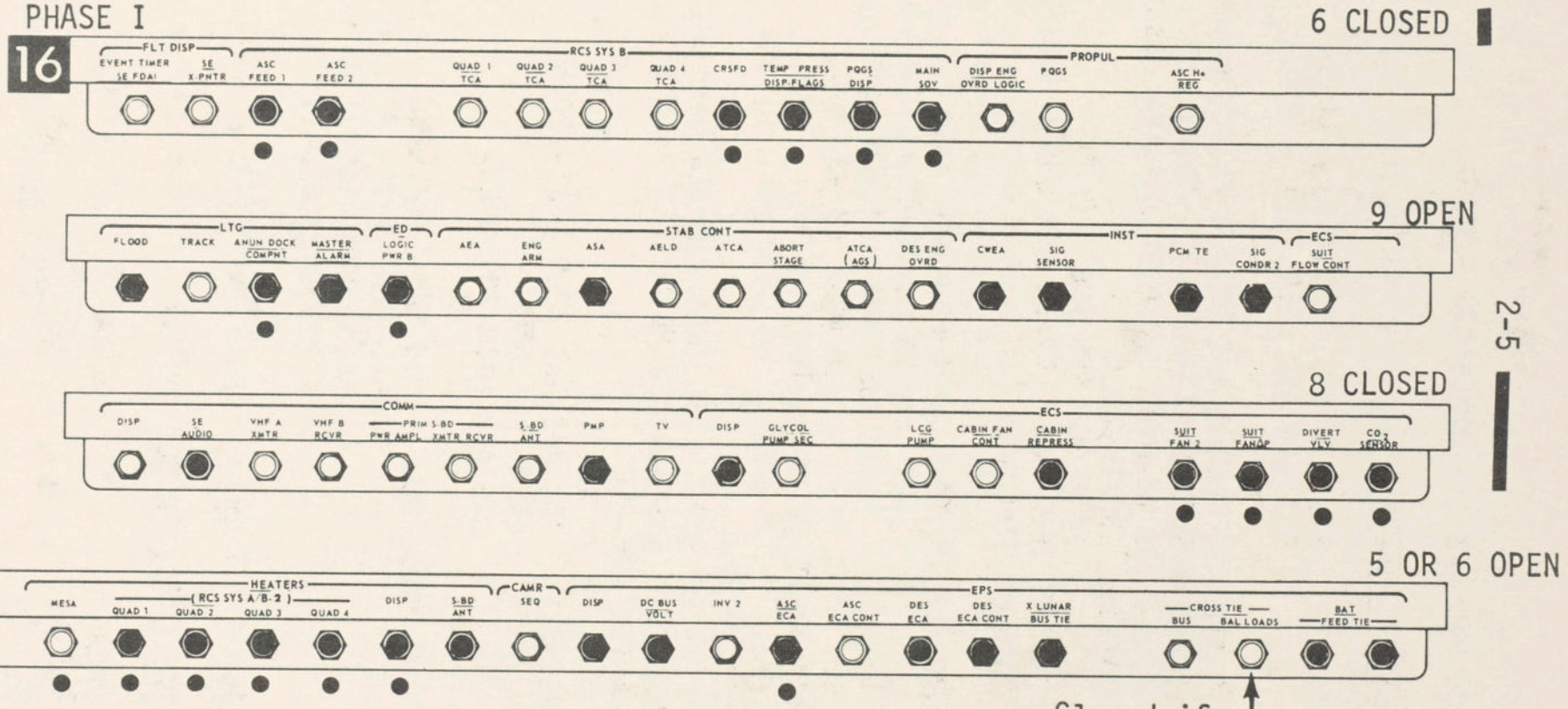
DATE 6/14/71


PHASE I
ALL OPEN
11
AC BUS B
SE WIND HTR
H2 PQGS PROPUL DISP
S BD ANT
ORDEAL
AGS
AOT LAMP
SE FDAI
NUM LTG
BUS TIE
INV 2
INV 1
BUS TIE
INV 2
INV 1
AC BUS VOLT
CDR WIND HTR
AC BUS A
TAPE RCDR
AOT LAMP
RNDZ RDR
DECA GMBL
INTGL LTG
3 CLOSED
RCS SYS A
MAIN SOV
QUAD 4 TCA
QUAD 3 TCA
QUAD 2 TCA
QUAD 1 TCA
ASC FEED 2
ASC FEED 1
FLIGHT DISPLAYS
THRUST
MISSION TIMER
CDR X PNTR
RNG ALT
RNG RT ALT RT
GASTA
CDR FDAI
COAS
ORDEAL
AC BUS A
RNG ALT
RNG RT ALT RT
GASTA
CDR FDAI
5 CLOSED
HEATERS
URINE LINE
RNDZ RDR STDBY
RNDZ RDR OPR
LDG RDR
DOCK WINDOW
AOT
INST
SIG CONDR 1
AEA
STAB CONT
ABORT STAGE
ATCA (PGNS)
AELD
ENG CONT
ATT DIR CONT
ENG START OVRD
DECA PWR
ED
LDG GEAR FLAG
LOGIC PWR A
LTG
UTIL
ANUN DOCK COMPNT
10 CLOSED
HEATERS RCS SYS A B-1
QUAD 4
QUAD 3
QUAD 2
QUAD 1
ECS
SUIT FAN 1
CABIN FAN
GLYCOL PUMP
2
1
AUTO TRNFR
COMM
UP DATA LINK
SEC S BD XMTR RCVR
PWR AMPL
VHF B XMTR
VHF A RCVR
CDR AUDIO
PGNS
SIG STR DISP
LDG RDR
RNDZ RDR
LGC DSKY
IMU STBY
IMU OPR
3 OR 4 OPEN
EPS
BAT FEED TIE
CROSS TIE BAL LOADS
BUS TIE
X LUNAR BUS TIE
DES ECA CONT
DES ECA
ASC ECA CONT
ASC ECA
INV 1
DC BUS VOLT
PROPUL
DES H2
REG VENT
Closed after transfer to HI V.
● Requires reconfiguration at this time in normal sequence

DATE 6/14/71

DATE 6/14/71

PHASE I



2-5

● Requires reconfiguration at this time in normal sequence

DOCKED DPS BURN (PGNS) | PHASE III | DEAC | PHASE II | DOCKED APS BURN (PGNS)

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

RCS PRESSURIZATION

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

2 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°
Before Firing)

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

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

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

7 ACA/4 JET (2) - ENABLE (verify)

C&W STATUS (AFTER RCS PRESS)

WARN	CAUT
CES AC	PRE AMP
CES DC	GLYCOL (ON IF TEMP > 50°)
LGC	

END OF PHASE I

DATE 4/5/71

PHASE II

(PGNS Activation, Docked Alignment, Comm Options, AC Activation, AGS Activation)

PGNS TURN-ON

1 CB(11) PGNS: LGC/DSKY - CLOSE
(Master Alarm, LGC Warn Lt-On, Then Off; Restart & NO DAP Lt - On)
V96E
V35E
F 88 88
(Master Alarm, LGC & ISS Warning, And All DSKY Lts - On, 8's In All Registers; All Lts except RESTART and NO DAP Reset In 5 sec, LGC Warning Resets Within 20 sec.)

2 CB(11) PGNS: IMU OPR - Close
NO ATT Lt - On (Off In 90 sec)

DATE 4/5/71

PGNS SELF TEST

1 Check Bus Voltages, Turn on HI Voltage If necessary (Pg 2-2)

2 V25 NO1E 1365E
E,E,E

3 V15 NO1E 1365E
R1,R2,R3 All Zero

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

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

```
      *PROG Lt-On, V05 N09E 01102 SELF-*
      *            TEST ERROR          *
      *NO8E    Record For MSFN         *
      *       R1 _____________         *
      *       R2 _____________         *
      *       R3 _____________         *
```

5 V21 N27E OE TERMINATE SELF TEST

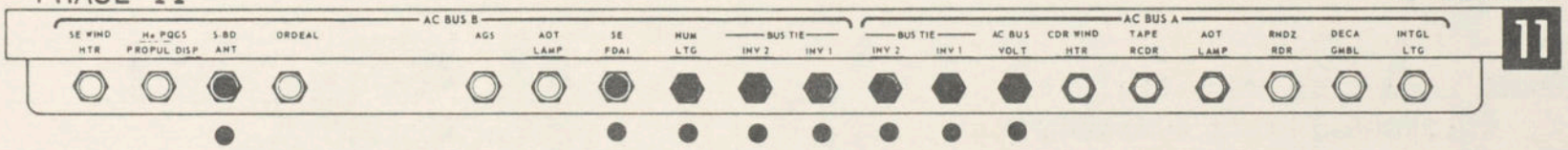
PHASE II CB ACTIVATION

1 Configure CB's Per Phase II Activation Chart

DATE 6/14/71

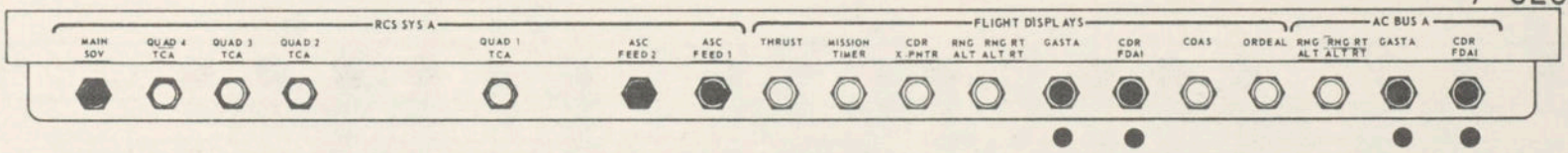
PHASE II

8 CLOSED



11

7 CLOSED



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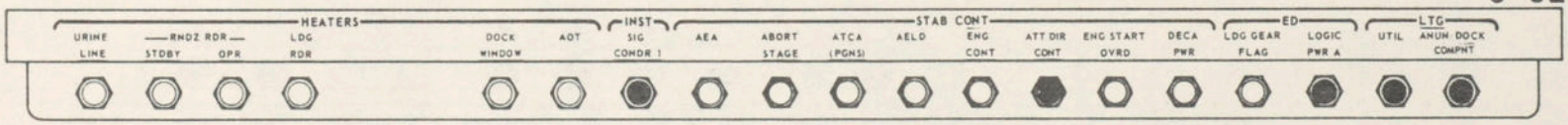
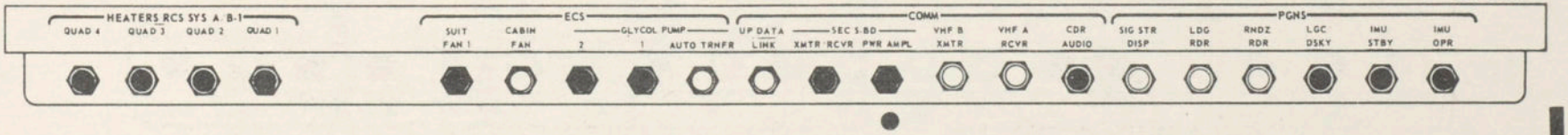
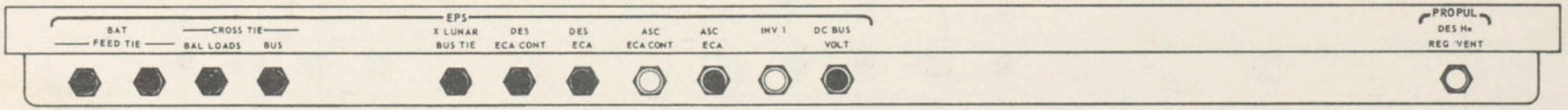


8 OPEN



3 OPEN



● Requires reconfiguration at this time in normal sequence

2-9

DOCKED DPS BURN (PGNS) | PHASE III DEACTIVATION | DOCKED APS BURN (PGNS)

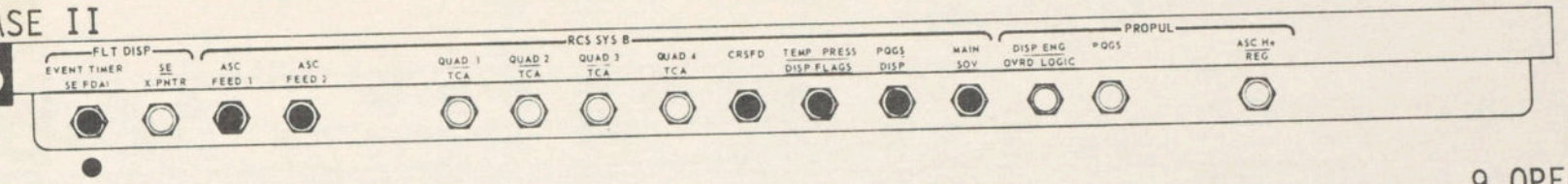
PHASE II

PHASE I

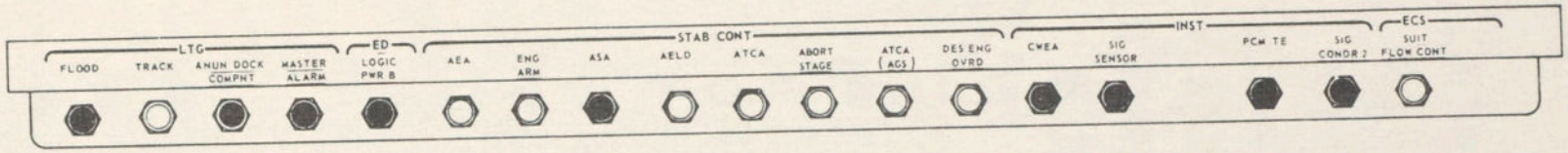
7 CLOSED

PHASE II

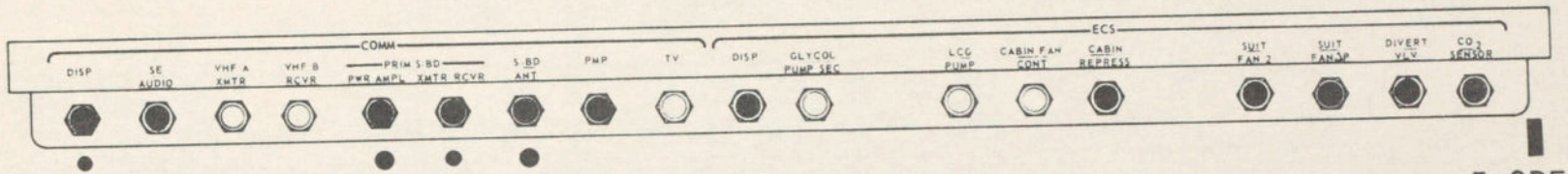
16



9 OPEN

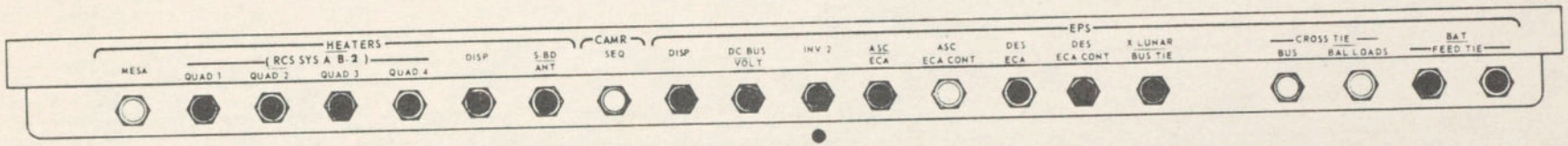


6 OPEN



2-10

5 OPEN



● Requires reconfiguration at this time in normal sequence

DATE 6/14/71

AC ACTIVATION

1 INV - 2

DOCKED IMU ALIGN

1 Verify CSM In MIN DEADBAND ATT HOLD

2 Calculate LM Gimbal Angles

	OG	IG	MG
	300.00	180.00	360.00
Rc(p.1-1)+	____.____		
CM	-____.____	+____.____	-____.____
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
V96E

DATE 4/5/71

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

	OG	IG	MG
CM	_____	_____	_____
LM	_____	_____	_____

8 Voice Gimbal Angles And Time To MSFN

VHF CHECKOUT (Optional)

1 CB(11) VHF B XMTR - Close
VHF A RCVR - Close
CB(16) VHF A XMTR - Close
VHF B RCVR - Close

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

3 Perform Voice Check On VHF Simplex B

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

DATE 4/5/71

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
S-BD CHECK WITH MSFN

AGS ACTIVATION AND SELF TEST

V ASA CB CLOSED FOR 10 MIN

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/H20 QTY MON-C/W RESET, Then DES 1

2 000+888888 (OPR ERR Lt-On)

3 123-45679

4 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)

DATE 6/14/71

IMU FINE ALIGN

1 Copy Ground Calculated Gyro Torquing Angles

X_____, Y_____, Y_____

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)

PGNS/AGS ALIGN

1 V40N20E
400 + 3
400R (+0)

END OF PHASE II

DATE 4/5/71

PHASE III
(Pre-Burn Prep)

MISSION TIMER ACTIVATION

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

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

5 CSM Read TEPHEM

R1 _____

R2 _____

R3 _____

6 V25 N01E, 1706E Load TEPHEM (Octal)

7 V05 N01E, 1706E Verify TEPHEM

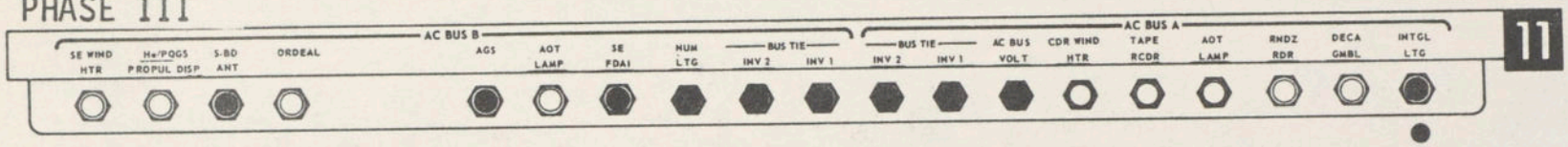
PHASE III CB ACTIVATION

1 Configure CB's Per Phase III Activation Chart

DATE 4/5/71

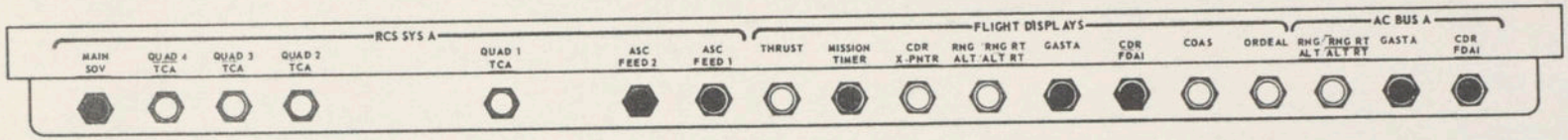
PHASE III

9 OPEN

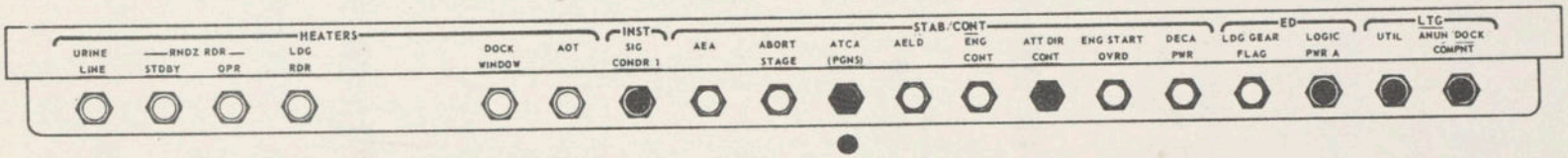


11

8 CLOSED

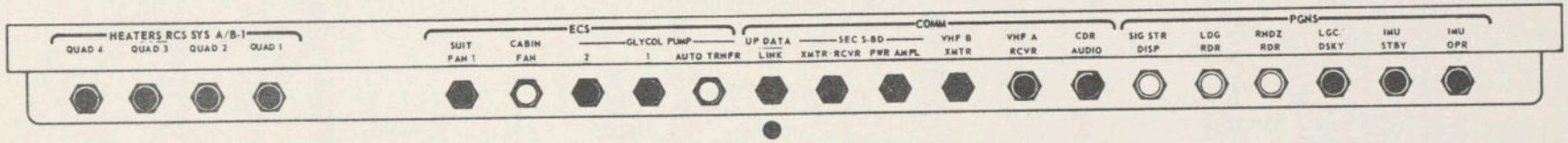


6 CLOSED

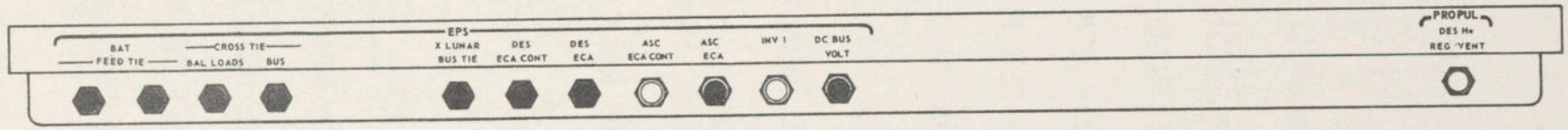


2-16

5 OPEN



3 OPEN

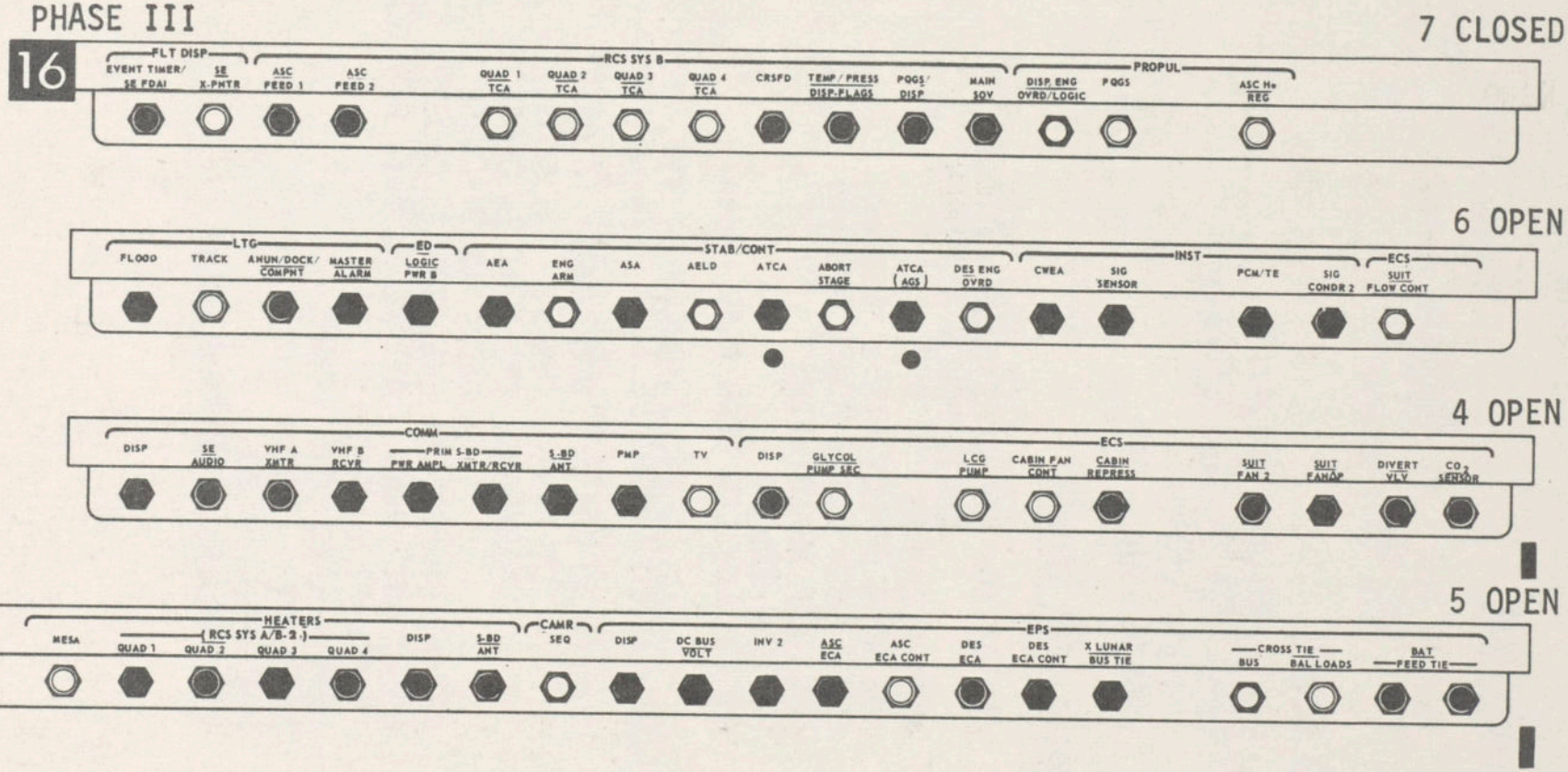


● Requires reconfiguration at this time in normal sequence

DATE 5/5/71

DATE 5/5/71

PHASE III



2-17

PHASE I

PHASE II

R ACT

PHASE III

E-MEMORY DUMP

1 Verify TLM - HI And MSFN Ready
V74E (42 Sec)

MSFN UPDATE

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

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

DAP SET, GIMBAL/THROTTLE TEST

1 CB(11) AC BUS A : DECA GMBL - CLOSE
FLT DISP : THRUST - CLOSE
STAB/CONT: ENG CONT - CLOSE
: DECA PWR - CLOSE
CB(16) STAB/CONT: ENG ARM - CLOSE
MODE CONT: PGNS - ATT HOLD (Poss RCS TCA Lt, And
QUAD Flags-Red)
Verify GUID CONT - PGNS
THR CONT - MAN
MAN THROT - CDR
TTCA (Both) -THROTTLE (MIN)

DATE 4/5/71

2 V48E
N46 32021, 00011
PRO
N47 +_____ (~~36702~~ 36698)
+_____ (From MSFN or CSM)

PRO
N48 +_____ (From MSFN or GMBL TRIM CHART)
+_____ (From MSFN or GMBL TRIM 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 (53%),
THEN MAX (>100%), 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

DATE ~~5/5/71~~ 7/9/71

PHASE I

PHASE II

AR AC7

PHASE III

DPS PRESSURIZATION AND CHECKOUT

1 CB(11) AC BUS B: He PQGS PROP DISP - CLOSE
PROP: DES He REG/VENT - CLOSE
CB(16) PROP: DISP/ENG OVRD/LOGIC - CLOSE
: PQGS - Close

2 PRPLNT TEMP/PRESS MON - DES 1, DES 2
(50°-75° FUEL, 50°-75° OXID/
50-130 psi FUEL, 30-80 psi OXID)

3 HELIUM MON: AMB PRESS (1495-1750 psi)
: SUPRCRIT PRESS (870-1300 PSI @ 75:00)

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

5 MASTER ARM - ON
DES PRPLNT ISOL VLV - FIRE
HE PRESS/DES START - FIRE (DES REG Lt - OFF)
MASTER ARM-OFF

6 PRPLNT TEMP/PRESS MON: DES 2, DES 1
(50°-90° FUEL, 50°-90° OXID
200-250 psi FUEL, 200-250 psi OXID)

7 HELIUM MON: AMB PRESS (200-1110 psi)
: SUPCRIT PRESS

DATE 5/5/71

RCS CHECKOUT (COLD FIRE)

1 GUID CONT - PGNS
ATT CONT (3) - PULSE
MODE CONTROL (Both) - ATT HOLD
ATT/TRANSL - 4 JET
ACA PROP (Both) - ENABLE (Verify)
ACA/4 JET (Both) - ENABLE (Verify)
TTCA/TRANSL (Both) - ENABLE (Verify)

2 Verify HBR With MSFN

3 V11N10E, 5E
TTCA (Both)
Up (+X) - R1 00252 (RCS TCA Lt & 4 Flags - Red)
Dn (-X) 00125 (4 Flags - Red)
E,6E
Rt (+Y) 00220
Lt (-Y) 00140
Fwd(+Z) 00011
Aft(-Z) 00006

4 Cycle CB(16) CWEA (RCS TCA Lt - Off, & 8 Flags-Gray)

RCS ACTIVATION

1 V76E
CB(11 & 16) QUAD TCA 1,2,3,4 (8) - Close

END OF PHASE III
Go to appropriate burn checklist
or refer to ATTITUDE CONTROL MATRIX

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

See Next Page

DATE 6/14/71

PHASE I
PHASE II
AR ACT
PHASE III

ROTATE DOCKING INTERFACE (Optional)

The Docking Interface may be rotated in preparation for a Docked APS Burn if desired to improve control moments. Pitch corrections (TTCA aft) will be reduced and roll corrections (TTCA left or right) will be ideally zero. The rotation may be accomplished either before or after the DPS Burn. Optimum rotation angle depends upon CSM wt.

1 Verify:
PHASE III Activation complete
VHF operational
Suits donned & Hoses connected (R/R,B/B), Helmets & Gloves stowed in LM
Drogue Lock Lever & 3 capture Latches Engaged

2 Close & Secure Hatch
CABIN DUMP (OVHD) - AUTO

3 Don Helmets & Gloves
SUIT GAS DIVERTER - PULL/EGRESS
CABIN GAS RETURN - EGRESS
SUIT CIRCUIT RELIEF - CLOSE
PRESS REG A - EGRESS
PRESS REG B - DIRECT 02 (Monitor Cuff Gage to 3.7 - 4.0 psig)
PRESS REG B - EGRESS (Monitor Cuff Gage, Decay <.3 psi in 1 Min.)
SUIT CIRCUIT RELIEF - AUTO
PRESS REG A&B - CABIN
Notify CSM to proceed with tunnel vent

4 Set DAP, V48E
N46 22001 (12001 if staged)
PRO
N47 +_____ LM Wt (36702, 10873 if staged)
+_____
PRO
N48 +_____ Do Not Use
+_____ GMBL TRIM CHART
V34E (unless gimbal drive required)

5 404, 405, 406+0, 470R

DATE 6/14/71

6 If LM to perform rotation:
ATT MON - AGS
400+5
400+0
DB - MIN
ATT CONT: ROLL - MODE CONT
: PITCH - MODE CONT
: YAW - PULSE
MODE CONT (AGS) - ATT HOLD

7 V77 (Do not ENTR)
Notify CSM to extend probe

8 At probe extension - ENTR

9 CSM Roll left to optimum position

CSM Wt	Rotation
<30K	125°
30K-40K	105°
>40K	85°

For LM Maneuver:
GUID CONT - AGS
Yaw right to optimum position (Pulse)
When rotation complete,
GUID CONT - PGNS
ATT CONT: YAW - MODE CONT

10 When rotation complete,
V76E
CSM retract probe

11 Set DAP, V48E
N46 32021

12 Doff Helmets & Gloves (O2 Hoses, R/B,B/R)

Note: If subsequent reconnection of CSM umbilicals is req'd, it may be possible to connect only one due to cable lengths. (Connectors are not interchangeable)

DATE 6/14/71

PHASE I

PHASE II

AR AC7

PHASE III

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DATE 4/5/71

DOCKED DPS BURN (PGNS)

Copy P30 Pad, Then CSM Mnvr to Attitude

If APS Follow-up Required:
Copy P30 Pad For APS Burn
BAT 5,6 - ON, tb(2) - gray
Verify BAT Current
BAT 1,4 - OFF/RESET, tb(2) -bp

CB(11) STAB/CONT: ENG START OVRD - Close
EPS: INV 1 - Close
CB(16) STAB/CONT: DES ENG OVRD - Close

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

GUID CONT - PGNS (Verify)

If time permits verify CB configuration per following charts

DATE 6/14/71

DOCKED DPS BURN (PGNS)

PHASE III

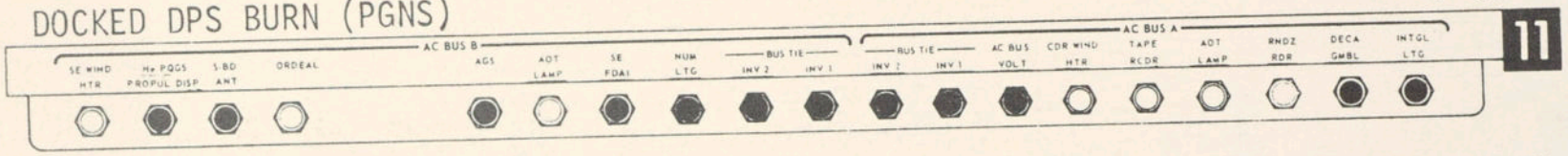
AR ACT

PHASE II

PHASE I

DOCKED DPS BURN (PGNS)

7 OPEN



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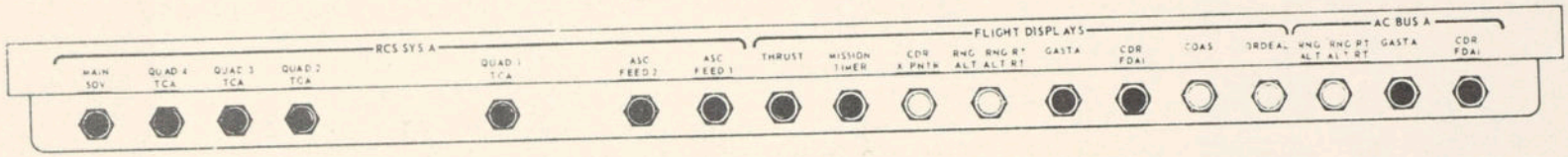
5 OPEN



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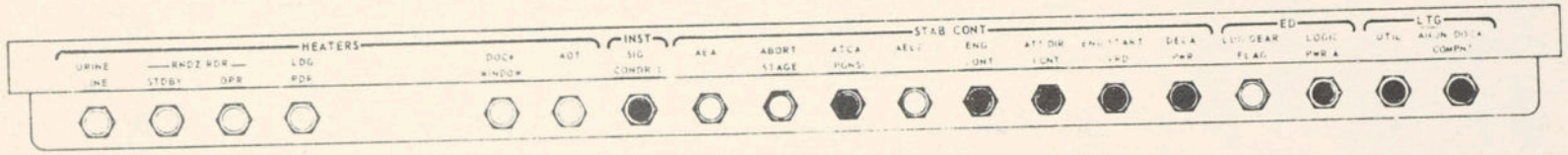

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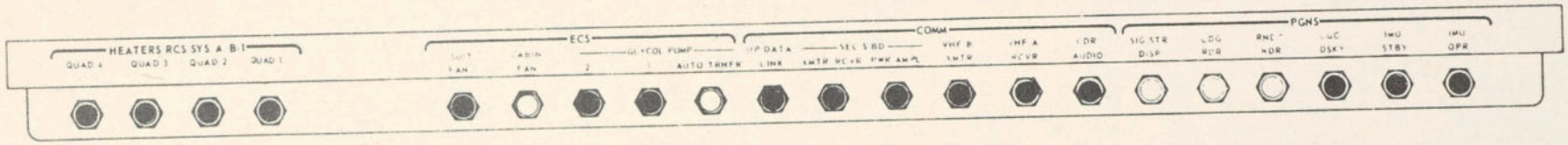
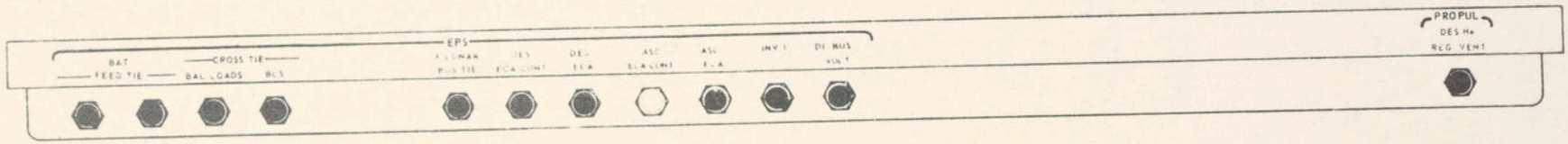


1 OPEN



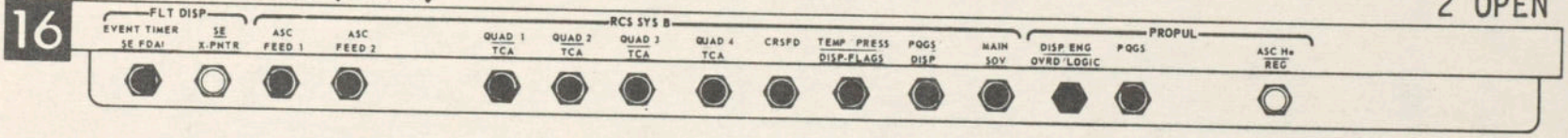
DATE 4/5/71

DATE 4/5/71

DOCKED DPS BURN (PGNS)

16

2 OPEN



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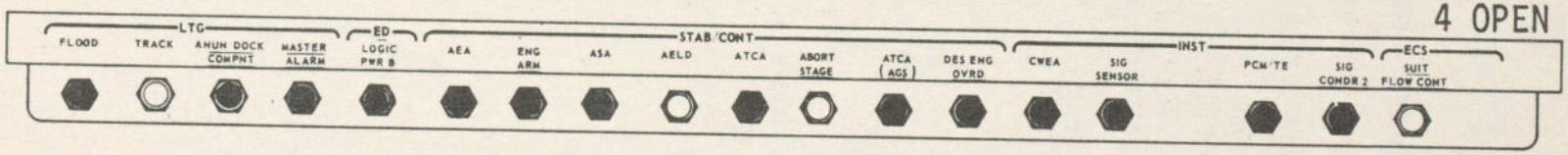
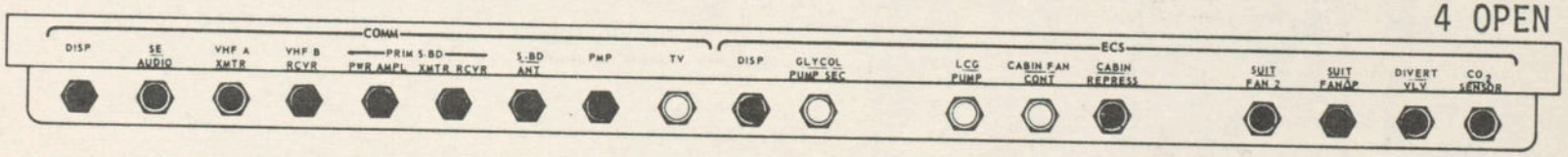
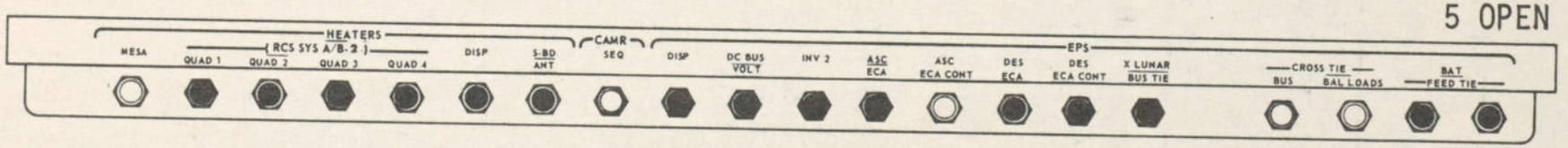


4 OPEN



5 OPEN



2-27

-6:00 P40E

F 50 18

CSM Verify Burn Attitude, Then CMC - FREE

For LM Mnvr (Manual): ATT CONT: YAW - MODE CONT Mnvr to Burn Attitude Roll, Pitch with TTCA Yaw with ACA (Min Impulse)

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
470R

DATE 6/14/71

-4:00 Select INV 1

CB(16) CWEA - Cycle

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

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

Check DPS, RCS, ECS, EPS

V65E

DATE 4/5/71

To Switch To AGS:
ATT CONT: ROLL - PULSE
: PITCH - PULSE
Check attitude. Next step resets error needles.
GUID CONT - AGS
ATT MON (CDR) - AGS
THR CONT - MAN
Go to page 1-11 (-1:00), DPS Manual Burn

-1:00 MASTER ARM - ON (FIRST BURN ONLY)

- :30 ENG ARM - DES

- :10 MANUAL ULLAGE (LMP)

- :07 AUTO ULLAGE

- :05 F 99 40, PRO

:00 IGNITION

+ :01 DES He REG 1 - OPEN (If previously closed and PRPLNT QTY >31%)

+ :05 TTCA (CDR) Throttle To 40%

+ :15 MASTER ARM - OFF

Null any excessive rates or errors with TTCA (Y,Z)

DATE 5/5/71

When PRPLNT QTY = 31%
DES He REG 1 - CLOSE

At TFC=10 sec (If PRPLNT QTY Between 31% & 86%):
DES He REG 1 - Close

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

V76E
Damp Excessive Rates Via LM Y, Z Translation

CSM RESUME ATTITUDE CONTROL

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

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

DATE 5/5/71

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DATE 4/5/71

DOCKED APS BURN (PGNS Guidance, AGS Control)

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

EPS

If Not Previously Performed:
Copy P30 Pad
BAT 5,6 - ON, tb (2) - gray
Verify BAT Current
BAT 1,4 - OFF/RESET, tb (2) - bp

CB(11&16) STAB/CONT:ABORT STAGE (2) - CLOSE
:AELD (2)-CLOSE
EPS:ASC ECA CONT (2) - CLOSE
CB(16) PROPUL: ASC He REG - Close

ASC PRESS

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

DATE 4/5/71

ECS

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

EPS

Verify ASC BATS Have Been On For 20 Min
BAT 2,3 - OFF/RESET, tb-bp
DES BATS - DEADFACE, tb-bp

CB(11&16) DES ECA (2) - Open
DES ECA CONT (2) - Open
ASC ECA CONT (2) - Open

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

SET EVNT TMR
PRO

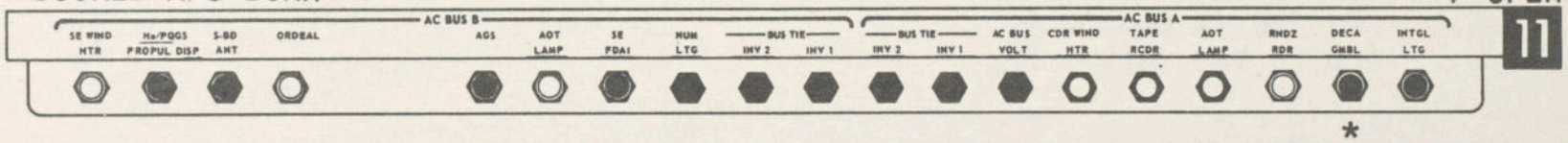
If time permits, verify CB configuration per following charts. Those indicated by "*" are no longer required and may be opened if desired.

DATE 5/5/71

DATE 5/5/71

DOCKED APS BURN

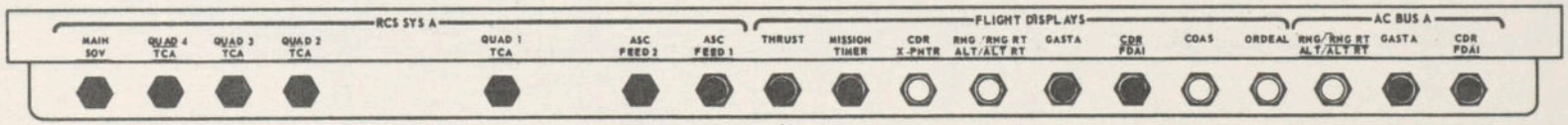
7 OPEN



11

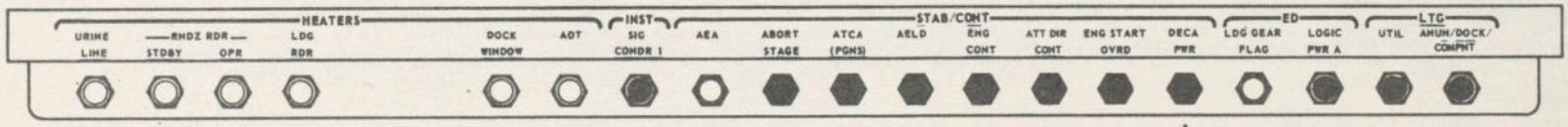
*

5 OPEN



*

8 OPEN



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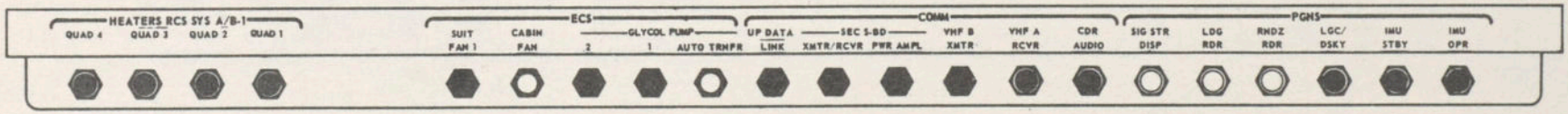
5 OPEN



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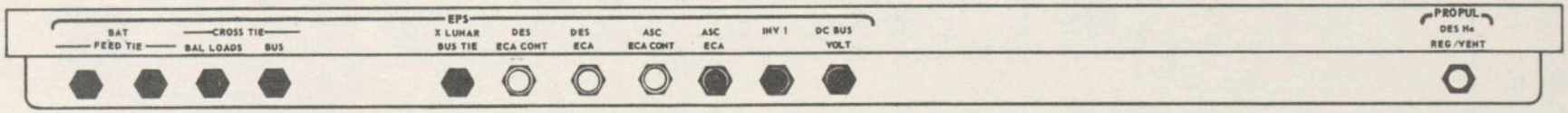


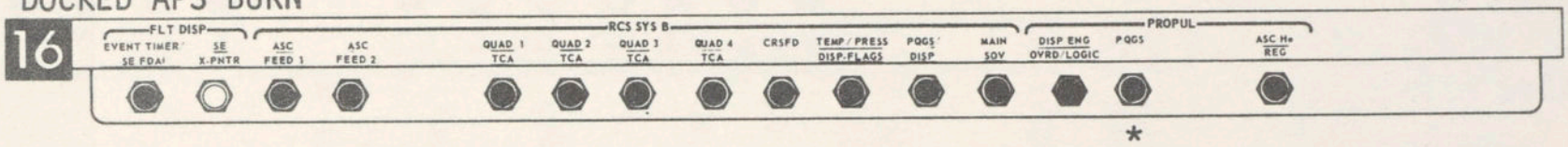
*No longer req'd. May be opened if desired

2-35

DOCKED APS BURN

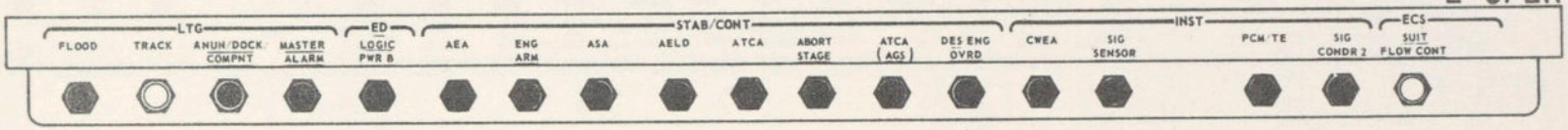
16

1 OPEN



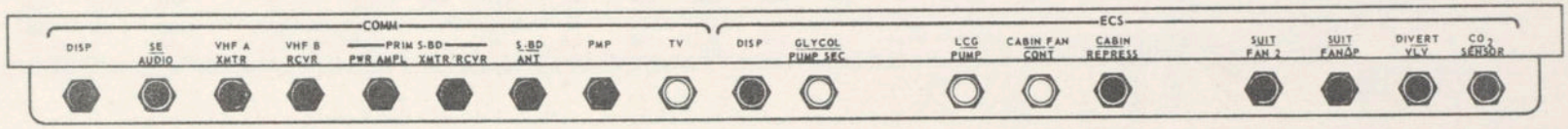
*

2 OPEN

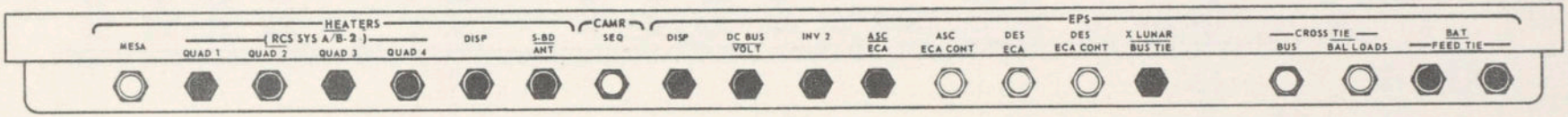


*

4 OPEN



7 OPEN



*No longer req'd. May be opened if desired

DATE 5/5/71

-6:00 P40E

F 50 18

CSM Mnvr To Burn Attitude

ENTR (Poss F 50 25, 00203, ENTR)
06 40 TFI, VG, ΔVM

400 + 5
400 + 0
404 + 0
405 + 0
406 + 0
470R

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

DATE 4/5/71

-1:00 MASTER ARM - ON

-:30 ENG ARM - ASC

-:10 MANUAL ULLAGE

-:07 STAGE - FIRE

-:05 F 99 40, PRO

-:02 CMC MODE - FREE

:00 ENG START - PUSH
Ignition

```
*          APS 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  *
*                                      *
*                                      *
*When APS Ignition Occurs, LMP         *
*Should Immediately Thrust Aft To      *
*Maintain Control.  ATT CONT:          *
*PITCH & ROLL - DIR.  Use ACA to       *
*  assist control.                     *
*If TTCA Authority becomes degraded,   *
*  switch ATT CONT:  YAW To DIR.       *
```

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

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

When VG = 0:
ENG STOP - PUSH

ATT CONT: (3) - PULSE

Damp Excessive Rates Via LM Y, Z Translation

CSM Resume Attitude Control

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

PRO

Copy Residuals: _____ VGX 470 _____
_____ VGY
_____ VGZ

PRO

DATE 4/5/71

DOCKED DPS BURN (PGNS)

PHASE III

AR ACT

PHASE II

DOCKED APS BURN (PGNS)

EQUIPMENT CYCLING PLAN (NO COOLING)

3. DOCKED DEACTIVATION

DOCKED DEACTIVATION (UNSTAGED)

DOCKED DPS BURN (PGNS)

3. DOCKED DEACTIVATION

DOCKED APS BURN (PGNS)

DOCKED DEACTIVATION (UNSTAGED)

1 V37E 06E
F 50 25, 00062
CB(11) IMU OPR - Open
PRO (Hold In Until 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 2

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

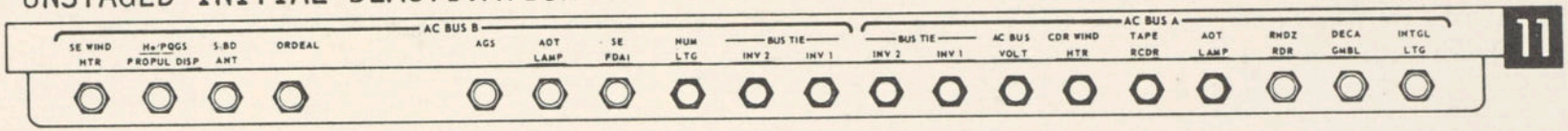
7 Window Shades - Close
CDR Transfer to CSM
INV - OFF

8 Configure CB's Per UNSTAGED INITIAL DEACTIVATION Charts

DATE 4/5/71

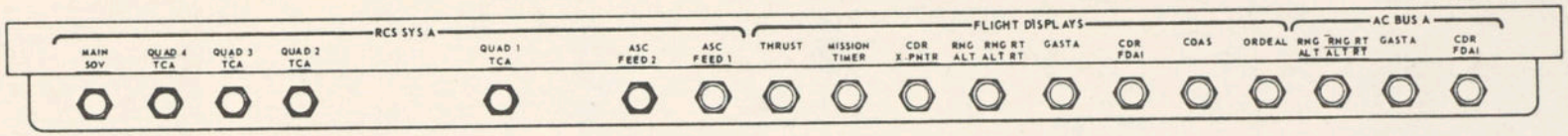
UNSTAGED INITIAL DEACTIVATION

ALL OPEN

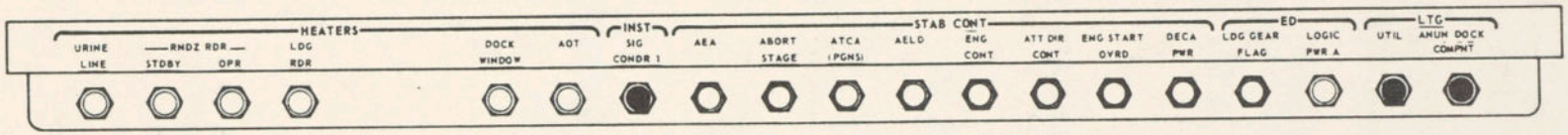


11

ALL OPEN

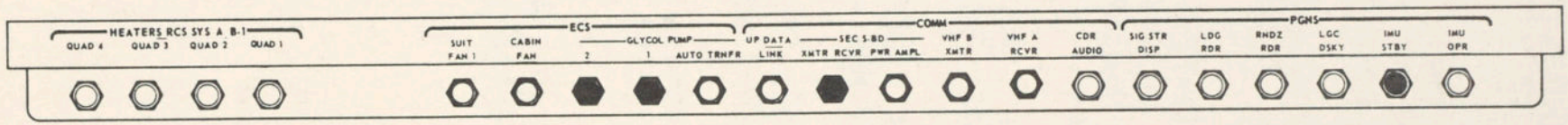


3 CLOSED

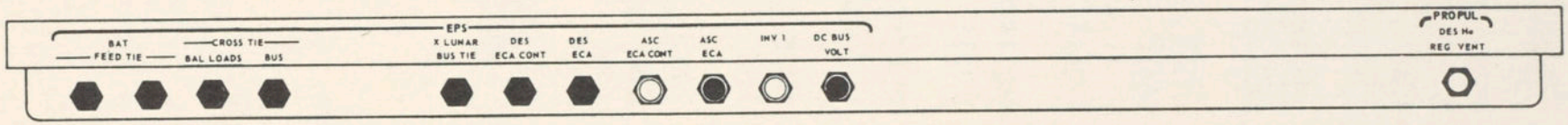


3-2

4 CLOSED



3 OPEN



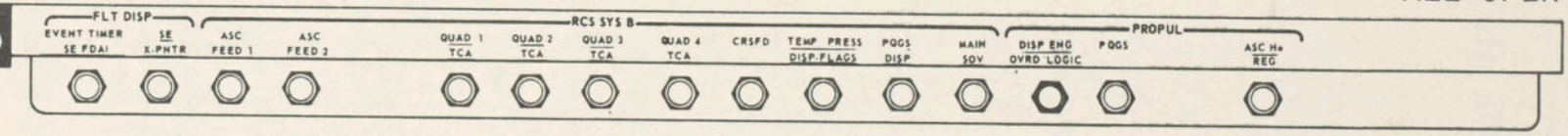
DATE 7/12/71

DATE 7/12/71

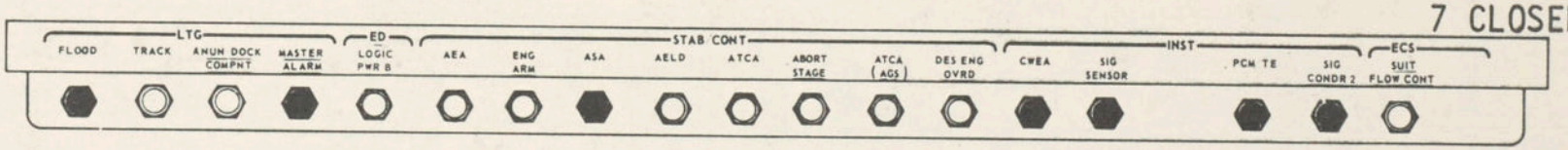
UNSTAGED INITIAL DEACTIVATION

ALL OPEN

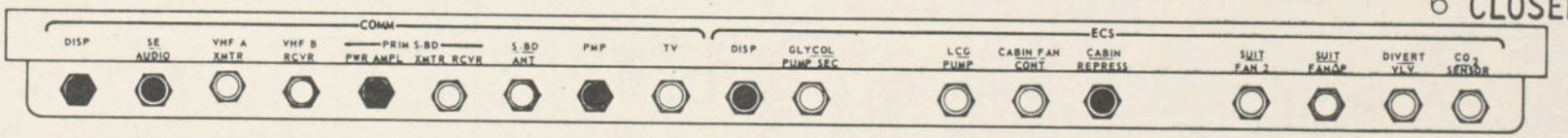
16



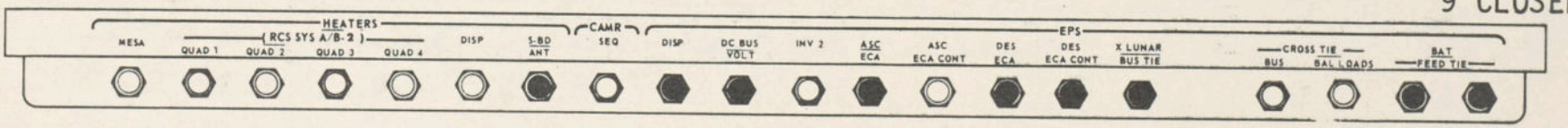
7 CLOSED



6 CLOSED



9 CLOSED



3-3

FINAL DEACTIVATION

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/RESET,OFF,HI

3 ANUN/NUM - DIM

4 CB(11) ECS: GLYCOL PUMP 2 - Open
: GLYCOL PUMP 1 - Open
COMM: SEC S-BD: XMTR/RCVR - Open
CB(16) LTG: MASTER ALARM - Open
INST: CWEA - Open
: PCM/TE - Open
COMM: PRIM S-BD: PWR AMP - Open
: PMP - Open

5 CHECK BAT & BUS Voltages
BAT 1 _____
BAT 2 _____
BAT 3 _____
BAT 4 _____
LUN _____
BAT 5 _____
BAT 6 _____

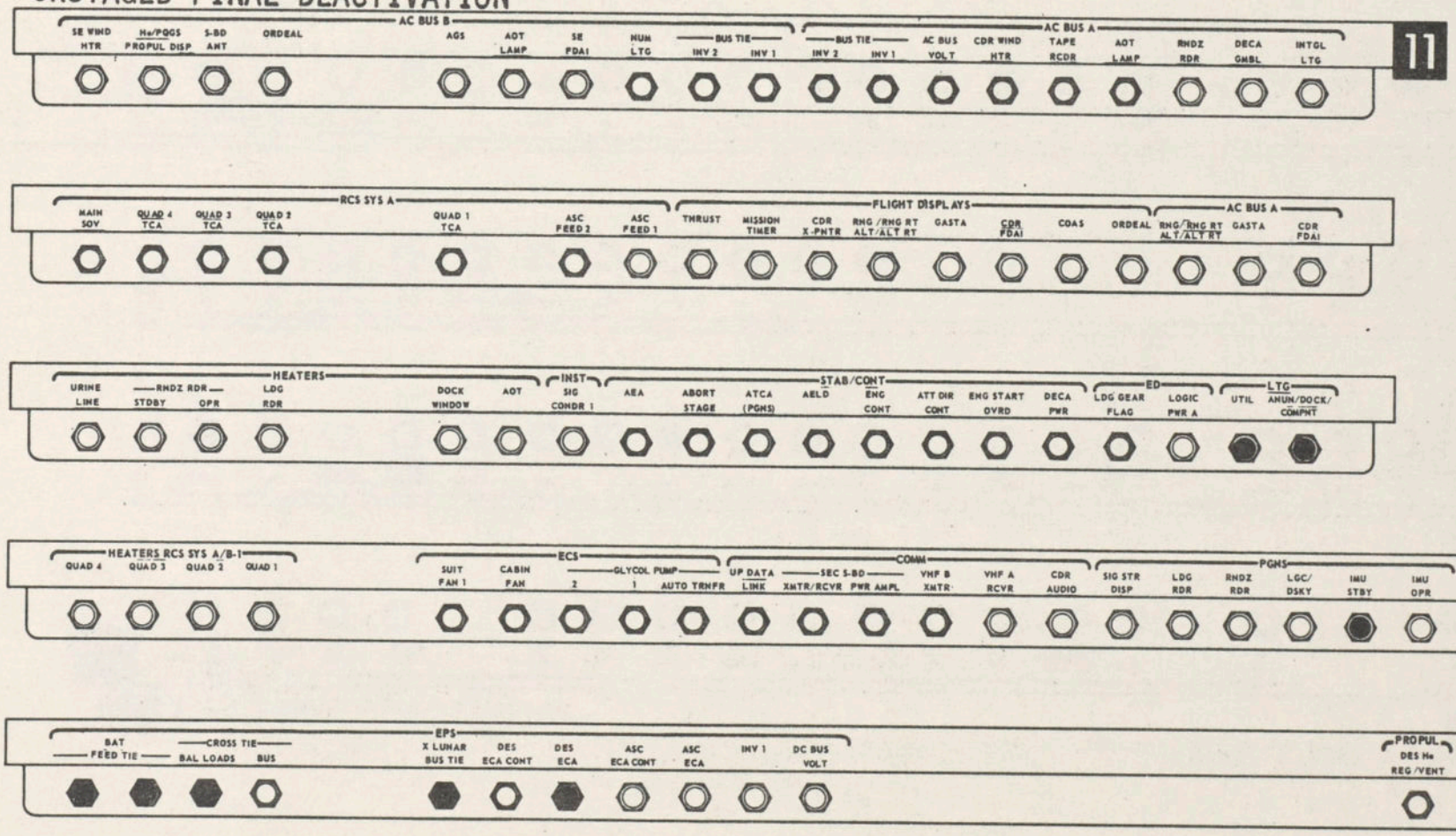
6 CB(16) EPS: CROSS TIE BUS - Close
: CROSS TIE BAL LOADS - Close
BAT 2,3 - OFF/RESET tb - bp
BAT 4 LO-V -
OFF/RESET, then ON, tb - LO
BAT 1 LO-V -
OFF/RESET, then ON, tb - LO
Check BAT & BUS Voltage & Amps Then
ED/OFF

7 Configure CB's per FINAL UNSTAGED
DEACTIVATION Charts

DATE 7/12/71

DATE 4/5/71

UNSTAGED FINAL DEACTIVATION



3-5

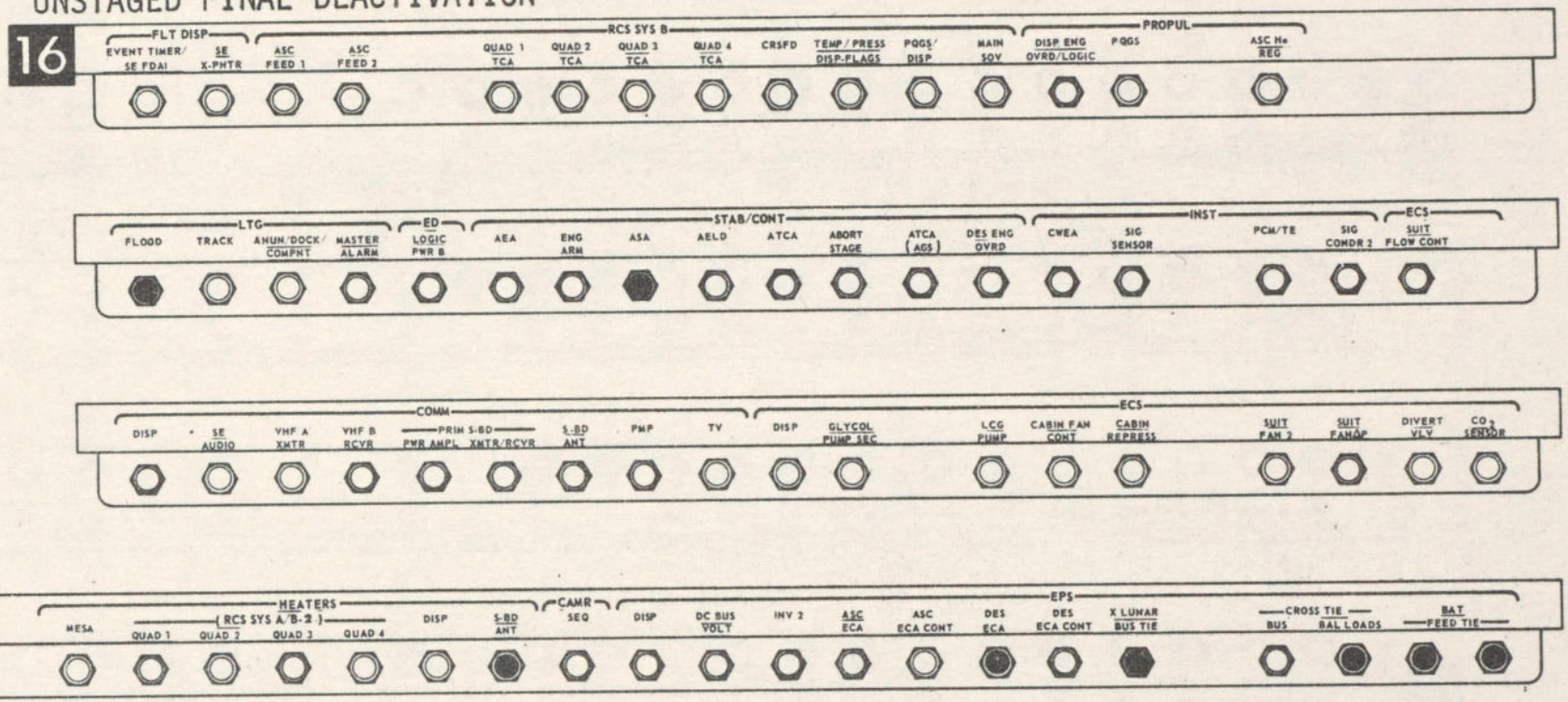
EQUIPMENT CYCLING PLAN (NO COOLING)

4. CH DOCKED DEACTIVATION (STAGED)

DISPLAY MATRIX

UNSTAGED FINAL DEACTIVATION

16



DATE 4/5/71

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

FLOOD - OFF

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

DATE 4/5/71

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DATE 4/5/71

DOCKED DEACTIVATION (STAGED)

1 V37E06E
F 50 25, 00062
CB(11) IMU OPR - Open
PRO (Hold In Until 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

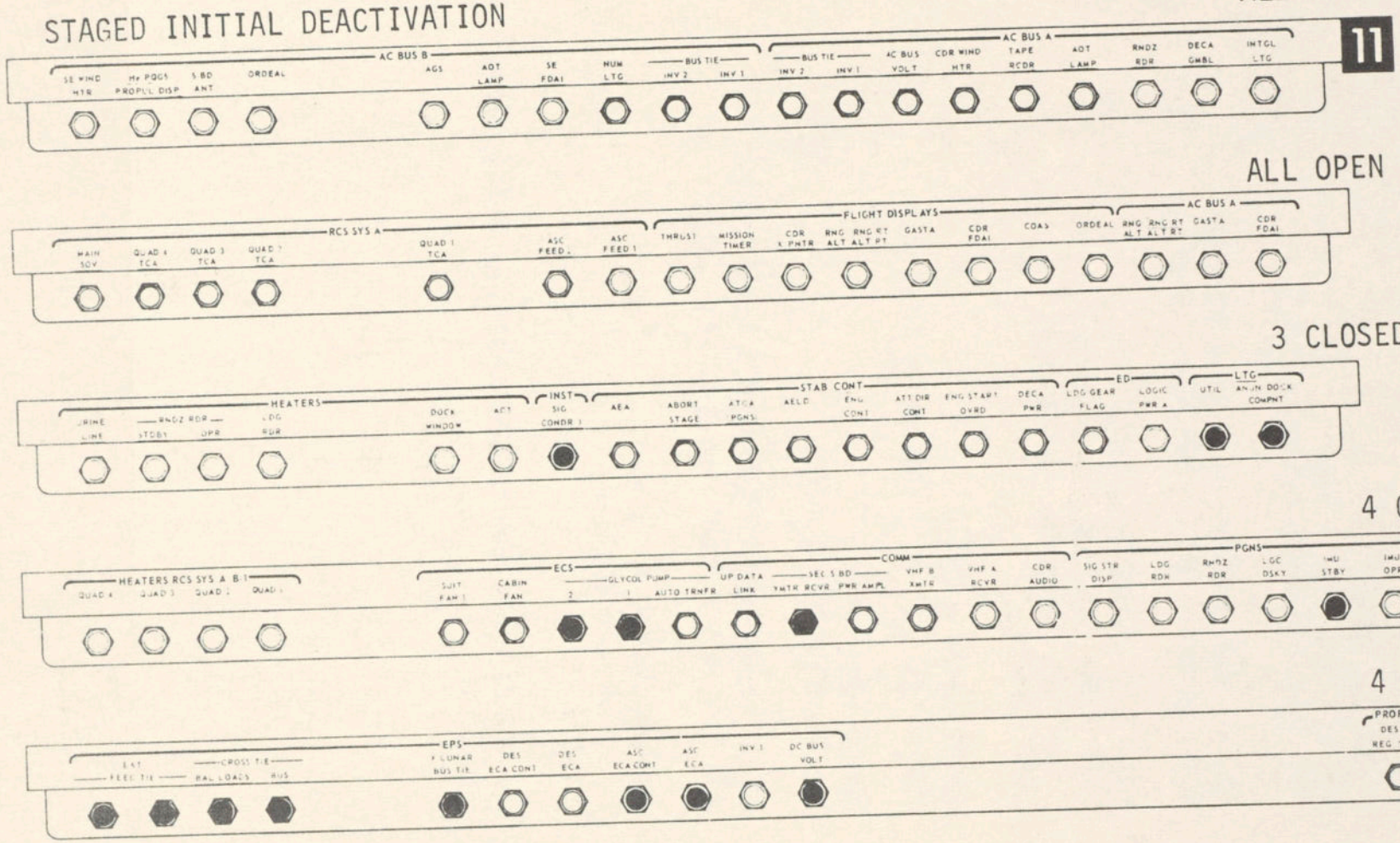
6 MOD CONT (Both) - OFF
RCS SYS A/B-2 QUAD 1,2,3,4,(4) - OFF

7 Window Shades - Close
CDR transfer to CSM
INV-OFF

8 Configure CB's Per STAGED INITIAL DEACTIVATION Charts

DATE 4/5/71

STAGED INITIAL DEACTIVATION



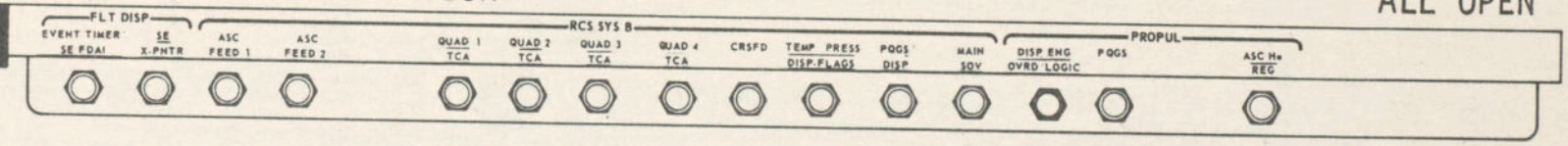
DATE 6/14/71

DATE 6/14/71

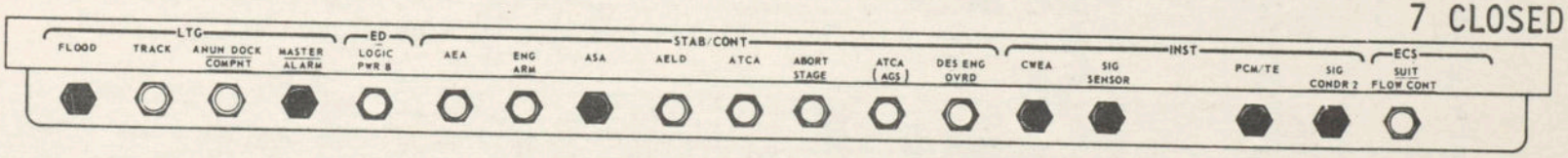
STAGED INITIAL DEACTIVATION

16

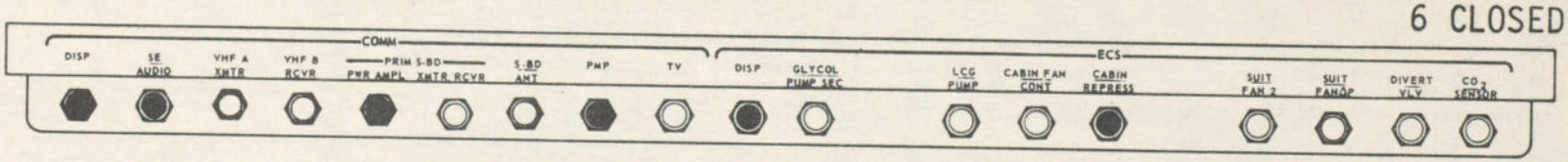
ALL OPEN



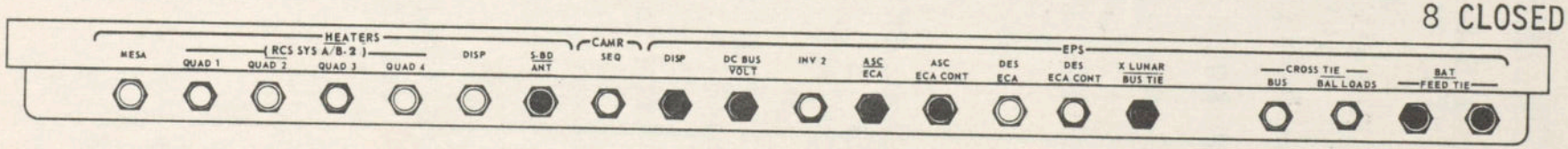
7 CLOSED



6 CLOSED



8 CLOSED



3-11

FINAL DEACTIVATION

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/RESET,OFF,HI

3 ANUN/NUM - DIM

4 CB(11) ECS: GLYCOL PUMP 1 & 2 (2) - Open
COMM: SEC S-BD: XMTR/RCVR - Open
CB(16) LTG: MASTER ALARM - Open
INST: CWEA - Open
COMM: PRIM S-BD: PWR AMP - Open
: PMP - Open

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

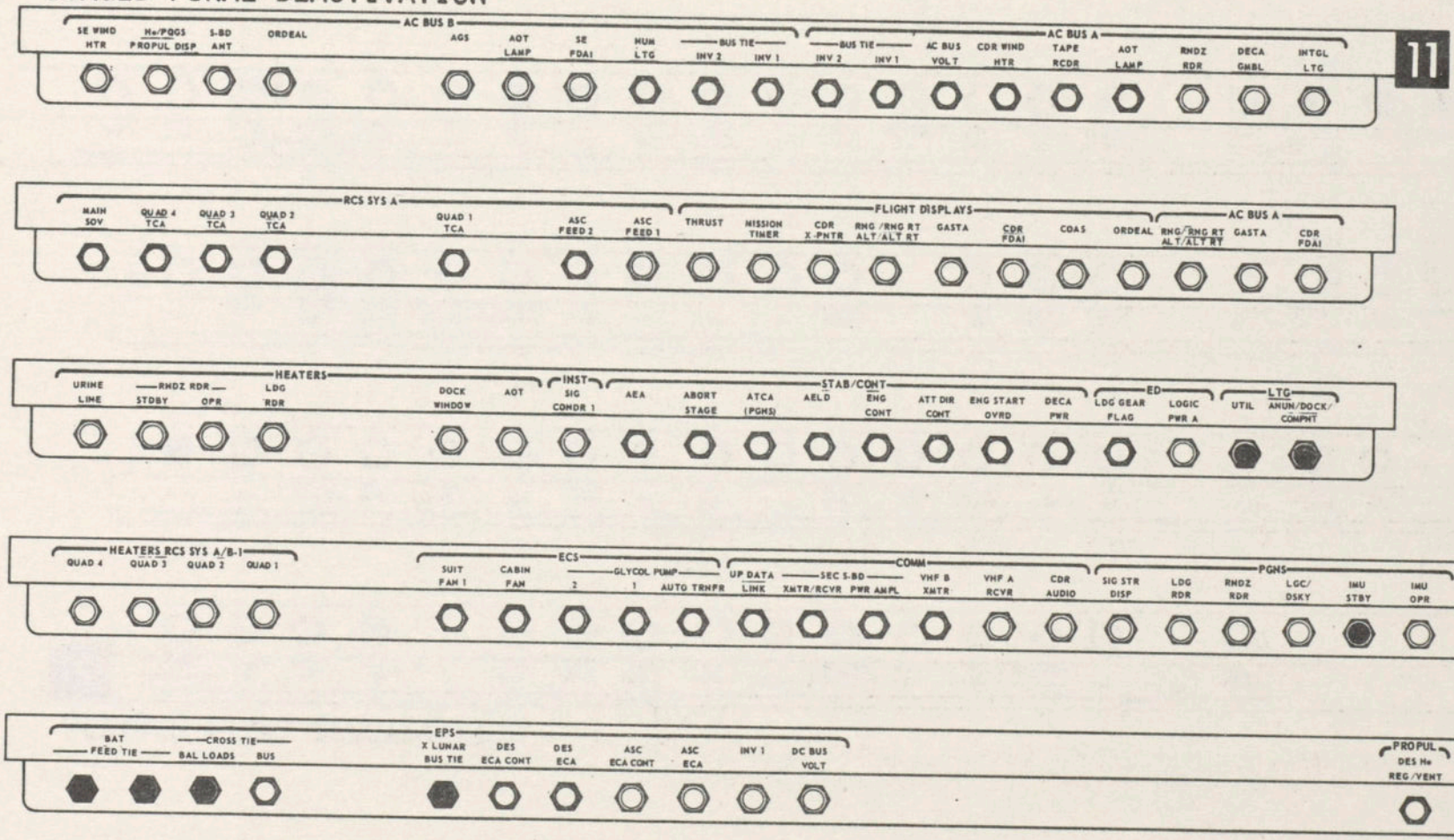
6 To use CSM Power:
CB(11) XLUNAR BUS TIE - Open
BAT 6 - OFF/RESET, tb - bp (Utility Lts - Off)
CSM Position LM PWR - CSM (Utility Lts - On)
BAT 5 - OFF/REST, tb - bp (Flood Lts - Off)
CB(16) EPS: CROSS TIE BAL LOADS - Close
(Flood Lts - ON)
: XLUNAR BUS TIE - Open

7 Configure CB's Per FINAL STAGED DEACTIVATION Charts

DATE 6/14/71

DATE 4/5/71

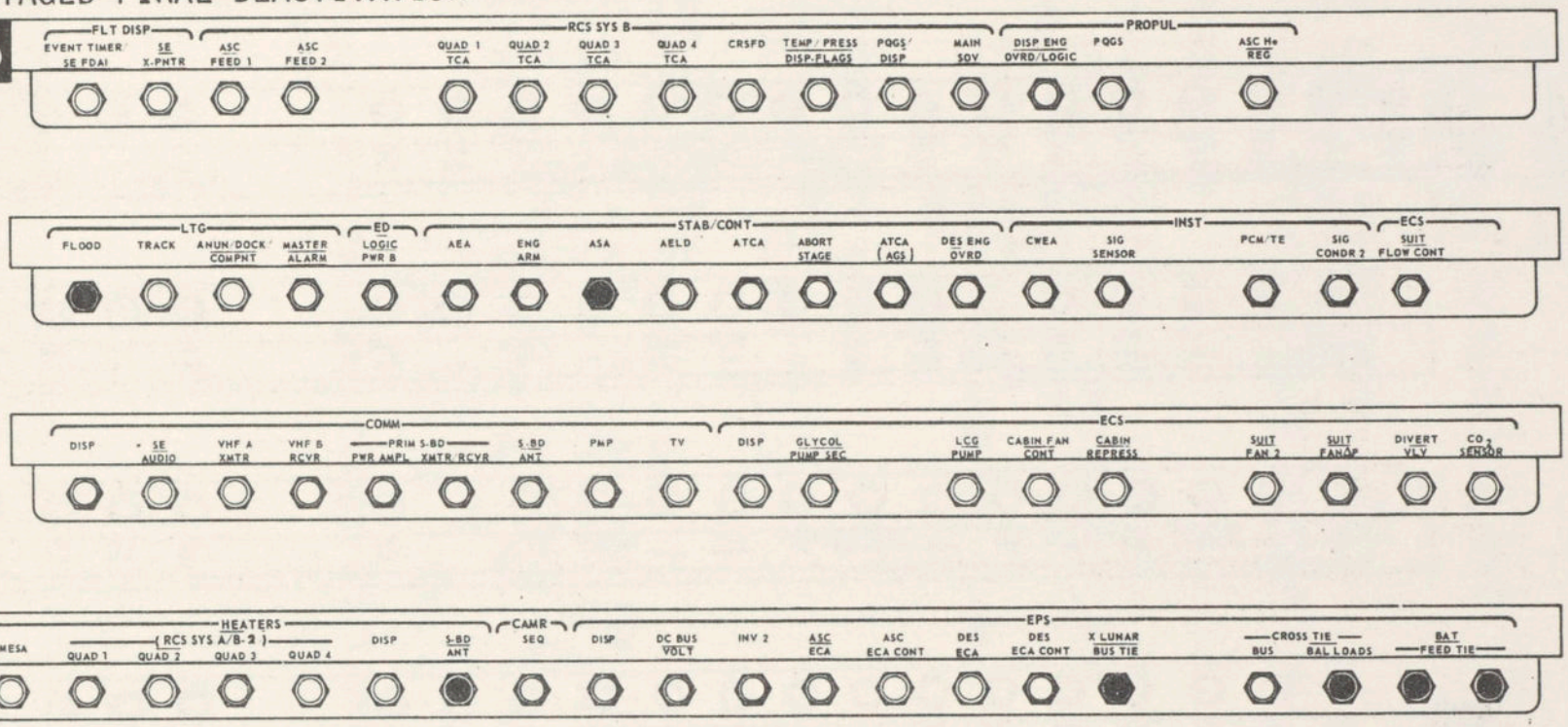
STAGED FINAL DEACTIVATION



3-13

STAGED FINAL DEACTIVATION

16



DATE 4/5/71

8 FLOOD - OFF
UTILITY LIGHTS (Both) - OFF
ASC 02 - CLOSE
ASC H20 - CLOSE

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

DATE 4/5/71

DOCKED DPS BURN (PGNS)

3. DOCKED DEAC

DOCKED DEACTIVATION (STAGED)

DOCKED DEACTIVATION (UNSTAGED)

EQUIPMENT CYCLING PLAN (NO COOLING)

4. CHARTS

DISPLAY MATRIX

DOCKED DPS BURN (PGNS)

4. CHARTS

DOCKED DEACTIVATION (UNSTAGED)

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DATE 5/5/71

DISPLAY MATRIX (1 of 2)

		PANEL 11																						
		He/POGS DISP	ORDEAL	SE FDAI	NUM LTG	BUS TIE (2)	BUS TIE (2)	AC BUS VOLT	RNG/RNG RT	GASTA	CDR FDAI	THRUST	CDR X-PNTR	RNG/RNG RT	GASTA	CDR FDAI	ORDEAL	INST: SIG CONDR 1	PGNS: SIG STR DISP	EPS: DC BUS BOLT
		AC BUS B					AC BUS A					FLT DISP								
ECS	PP CO2																			
	PRESS																	1		
	TEMP																	•		
	QUAN																	•		
	GLYCOL																	2		
EPS	PYRO																	•		
	AC						•	•										•		
	DC BUS V																	•		•
	DC BAT V																			
	DC AMPS																			
DPS	PRESS																			
	TEMP																	•		
	QUAN	•			•	•														
	HE MON	•			•	•														
RCS	QUAN																			
	PRESS																	3		
	TEMP																			
APS	PRESS																			
	TEMP																	•		
	HE MON	•			•	•												4		
G&N	CDR FDAI						•			•	•				•	•				
	LMP FDAI			•		•	•			•					•					
	CDR X-PNTR				•	•							•							
	LMP X-PNTR				•	•							•							
	RNG/RNG RT				•	•	•		•				•	•						
	SIG STR																		•	
	THRUST											•								
	ORDEAL		•			•	•			•	•				•	•	•			
HTRS: TEMP																		•		

1. REQ'D FOR SUIT PRESS
2. REQ'D FOR GLYCOL TEMP
3. REQ'D FOR HE/REG PRESS
4. REQ'D FOR APS He PRESS

DOCKED DPS BURN (PGNS)

DATE 4/5/71

DISPLAY MATRIX (2 of 2)

		PANEL 16																										11 or 16
		FLT DISP: SE FDAI	FLT DISP: SE X-PNTR	RCS B: TEMP/PRESS	RCS B: PQGS/DISP	DISP/ENG OVRD/LOG		PQGS		SIG SENSOR		PCM/TE		SIG CONDR 2		DISP		CO2 SENSOR		HTRS: DISP		DISP		DC BUS VOLT		INV 1 (2)		DES (ASC) ECA		INV SW - 1 or 2	
						PRP				INST						ECS						EPS									
ECS	PP CO2															•		•													
	PRESS									•						•															
	TEMP															•															
	QUAN									•				5		•															
	GLYCOL									6						•															
EPS	PYRO																					•									
	AC																					•				•				•	
	DC BUS V													•								•		•							
	DC BAT V													•								•									
	DC AMPS																					•						•			
DPS	PRESS					•				•																					
	TEMP					•																									
	QUAN							•																		•				•	
	HE MON									•																				•	
RCS	QUAN				•																										
	PRESS			•						•																					
	TEMP			•										•																	
APS	PRESS					•				•																					
	TEMP					•																									
	HE MON									•																					
G&N	CDR FDAI																														
	LMP FDAI	•																													
	CDR X-PNTR																														
	LMP X-PNTR		•																												
	RNG/RNG RT													•												•				•	
	SIG STR																														
	THRUST									•																					
	ORDEAL																									•				•	
HTRS: TEMP														7						•											

5. REQ'D FOR DES O2 QUAN
6. REQ'D FOR GLYCOL PRESS
7. REQ'D FOR S-BD TEMP

DATE 4/5/71

DISPLAY MATRIX

4. CHAR ATTITUDE CONTROL MATRIX (DOCKED)

	HEAVY CSM			LIGHT CSM			CM		
	ATT HOLD	ATT MNVR	BURN	ATT HOLD	ATT MNVR	BURN	ATT HOLD	ATT MNVR	BURN
DEADBAND	MAX		MIN	MAX		MIN	MAX		MIN
ATT CONT ROLL	PULSE			PULSE			MODE CONT		
PITCH	PULSE			PULSE			MODE CONT		
YAW	MODE CONT			MODE CONT			MODE CONT		
MODE CONT (PGNS)	ATT HOLD	ATT HOLD	AUTO	ATT HOLD	ATT HOLD	AUTO	ATT HOLD	AUTO	AUTO
MODE CONT (AGS)	ATT HOLD	ATT HOLD	AUTO	ATT HOLD	ATT HOLD	AUTO	ATT HOLD	ATT HOLD	AUTO
PGNS DB	5°		1.4°	5°		1.4°	5°	1.4°	1.4°
TTCA REQ	IF AGS	YES	IF AGS	IF AGS	YES	IF AGS	(USE ACA)		
OTHER		V76	V65		V76	V65			V65
	①						②	②	③

DAP: N46 - 31021 (32021 for burns)
N47 - LM WT: Actual
CSM WT: Actual unless CM Only, then 9050 (consult MSFN)

① Disable +X Jets if MSFN advises.

② BAL CPL may be OFF for RCS savings.

③ If AGS, ENG GMBL Must Be OFF During Burn

DATE 4/5/71

DOCKED DPS BURN (PGNS)

	HEAVY CSM			LIGHT CSM			CM		
	ATT HOLD	ATT MNVR	BURN	ATT HOLD	ATT MNVR	BURN	ATT HOLD	ATT MNVR	BURN
DEADBAND	MAX	MAX	MIN	MAX	MAX	MIN	MAX	MAX	MIN
ATT CONT ROLL	PULSE		DIR	PULSE		DIR	PULSE		DIR
PITCH	PULSE		DIR	PULSE		DIR	PULSE		DIR
YAW	MODE CONT			MODE CONT		(1)	MODE CONT		(1)
MODE CONT (PGNS)	ATT HOLD			ATT HOLD			ATT HOLD		
MODE CONT (AGS)	ATT HOLD		AUTO	ATT HOLD		AUTO	ATT HOLD		AUTO
PGNS DB	5°			5°			5°		
OTHER		V76			V76			V76	
			(2)			(2)		(3)	(2)

DAP: N46 - 31021
N47 - LM WT: 14,700 (Consult MSFN)
CSM WT: Consult MSFN

TTCA Control is required in all cases.
ACA Assistance (DIR) is required during burns, especially light configurations.

(1) If TTCA authority becomes degraded due to yaw errors, switch to DIR, otherwise MODE CONT.

(2) GUID CONT - AGS

(3) DAP Setting of of 21021 improves RCS usage.

DATE 6/14/71

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DATE 4/5/71

EQUIPMENT CYCLING PLAN FOR LOSS OF COOLING

	-30	LO 0	INS	LOS +30	CSI 1+00	AOS 1+30	CDH 2+00	LOS 2+30	TPI 3+00	AOS DOCK 3+30
CB(11)LGC/DSKY IMU OPR AC A:GASTA	OPEN	CLOSE				CONSULT MSFN				
CB(16)AEA ASA ATCA CB(11)AC B:AGS	OPEN	CLOSE		OPEN						
CB(11)RND RDR	OPEN			CLOSE						
CB(11) INV 1 CB(16) INV 2 INV	OPEN OPEN 2	OPEN CLOSE 2	CLOSE OPEN 1	OPEN CLOSE 2	CLOSE OPEN 1	OPEN CLOSE 2	CLOSE OPEN 1			
S-BD:XMTR/RCVR PWR AMPL	SEC,OFF	PRIM PRIM	PRIM OFF	OFF,OFF	SEC SEC	SEC OFF	PRIM PRIM	PRIM OFF	OFF,OFF	SEC SEC	SEC OFF
CB(16)PMP	CLOSE			OPEN	CLOSE				OPEN	CLOSE	
VHF A XMTR	OFF	VOICE/RNG			OFF					
A RCVR	OFF	OFF			ON					
B XMTR	OFF	OFF			VOICE					
B RCVR	OFF	ON			OFF					
CB(11)CDR AUDIO	CLOSE	OPEN			CLOSE					
AUDIO CONT (CDR)	NORM	BU			NORM					
CB(16)SE AUDIO	OPEN	CLOSE			OPEN					
AUDIO CONT (LMP)	BU	NORM			BU					
CLOSE NUM LTG & ANUN/DOCK/CMPT ONLY WHEN REQ'D	EMER L/O LUNAR SUR CKLST	← DIRECT RNDZ →								
		← CONCENTRIC RNDZ →								

4-7

DOCKED DPS BURN

ATTITUDE CONTROL
MATRIX (DOCKED)

CHAR

ATTITUDE CONTROL
MATRIX (DOCKED)

DOCKED DEACTIVATION

DISPLAY MATRIX

CSM TRANSFER
TO LM POWER

5. SPECIAL PROCEDURES

COMM

DISPLAY MATRIX

LOSS OF COMM

1 Verify Standard Comm Configuration
CB(11&16) COMM: ALL CLOSED
INST: PCM/TE - CLOSE
CB(11)AC BUS B: S-BD ANT - CLOSE

2 S-BD SIG STR Low (<3.0) - Reacquire

3 STILL NO COMM (SIG STR <3.0)
S-BD-FWD or AFT

4 STILL NO COMM:
DN VOICE BU
BIOMED - OFF (Hot Mike)

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

6 60 Sec, STILL NO COMM:
VOICE
FM

7 30-60 Sec, STILL NO COMM
PM
AUDIO (Both) S-BD-OFF
Notify CSM To Configure For
CSM Relay

DATE 6/14/71

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.

Perform the following from MODULAR ACTIVATION:

IVT TO LM

POWER TRANSFER

EPS ACTIVATION

ECS ACTIVATION

DATE 4/5/71

AC ACTIVATION (Not Req'd For Omni)

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

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

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

DATE 4/5/71

COMM ACTIVATION

1 TEMP MONITOR - S-BAND (-52° TO +135°)

2 COMM: S-BAND - PM,PRIM,PRIM,VOICE,PCM,OFF/RESET
VHF A:XMTR - VOICE
:RCVR - OFF
VHF B:XMTR - OFF
:RCVR - ON
TELEMETRY - OFF/HI

3 HI GAIN: PITCH - -75°
YAW - -12°
TRACK MODE - SLEW (30sec)

4 CSM: V64E
F 06 51 (.01°)
CSM MANEUVER
R1 = +03000, R2 = +09000 (+Z ORIEN, P-0, Y-0)
R1 = -03000, R2 = +27000 (-Z ORIEN, P-180, Y-0)

5 ANTENNA: S-BAND - SLEW (>3.0)
TRACK MODE - AUTO (>4.0)
PCM-HI, BIOMED-RIGHT

6 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

DATE 4/5/71

LOSS OF BOTH ASCENT H2O TANKS

1 Fill Drink Bags With DES H2O

2 At L.O.-1:00 (p. 12-9, LUNAR SUR CKLST), Begin Systems Cool-down:
- CB(16) ECS:GLYCOL PUMP SEC - Close*
- PRIM EVAP FLOW #2 - OPEN
- SEC EVAP FLOW - OPEN
- SUIT TEMP - COLD
- LIQUID GARMENT COOLING - COLD

3 Remain on DES H2O (p. 12-15, LUNAR SUR CKLST)
- DES H2O - OPEN
- ASC H2O - CLOSE
- WATER TANK SEL - DES

4 Before Liftoff:
- LIQUID GARMENT COOLING - HOT

5 After Insertion:
- PRIM EVAP FLOW #1 & #2 - CLOSE
- SEC EVAP FLOW - CLOSE
- Doff Helmets & Gloves
- PRESS REG A&B - CABIN
- CABIN GAS RETURN - AUTO
- SUIT GAS DIV - PUSH/CABIN
- SUIT FAN - 2

6 When Sublimators Are Dry:
- SUIT FAN - OFF (Cycle As Required for CO2 Control)
- SUIT ISOL VLV'S - SUIT DISC (If Desired)

7 Refer to EQUIPMENT CYCLING PLAN For Loss of Cooling

8 At Crew Convenience Doff Suits and Stow

*Affects p. 12-6 and 12-18, LUNAR SUR CKLST

DATE 5/5/71

LOSS OF BOTH SUIT FANS

Failure During Lunar Stay

1 Doff Helmets & Gloves
CB(11) ECS: CABIN FAN - Close

2 If PLSS's Available:
Connect PLSS Hoses to PGA's
(Red/Blue, Blue/Red)
Don PLSS with RCU (Refer to EVA PREP, p. 3-6
LUNAR SUR CKLST)
PLSS FAN - ON

If PLSS's Not Available:
PRESS REG A & B - CABIN
CABIN GAS RETURN - AUTO
SUIT GAS DIV - PUSH CABIN
Periodically Place PRESS REG A & B to
DIRECT O2 To Purge Cabin

Failure During Launch Prep

1 PRESS REG A&B CABIN (p. 12-15 LUNAR SUR CKLST)
Doff Helmets & Gloves

Failure During Ascent

1 Doff Helmets & Gloves (If Time Available)
or:
PRESS REG A - CABIN
PRESS REG B - DIRECT O2
SUIT GAS DIV - PUSH CABIN
PGA DIVERTER VLV - VERTICAL

2 After Insertion:
Doff Helmets & Gloves
PRESS REG A&B - CABIN
CB(11) ECS: CABIN FAN - Close
CABIN GAS RETURN - AUTO
SUIT GAS DIV - PUSH CABIN

3 Periodically Place PRESS REGS A & B To
DIRECT O2 To Purge Cabin

LOSS OF BOTH DEMAND REGS

EGRESS Mode (Cabin Dumped):

FWD DUMP VALVE - AUTO
OVHD DUMP VALVE - AUTO
CABIN REPRESS - AUTO
CB(16) ECS: CABIN REPRESS - CLOSE
(MSTR ALM & CABIN Warn Lt)
CABIN GAS RETURN - AUTO
PRESS REG A & B - CABIN
SUIT GAS DIV - PULL EGRESS

CABIN Mode (Pressurized):

CABIN GAS RETURN - AUTO
SUIT GAS DIVERTER - PULL EGRESS
CABIN REPRESS - AUTO
PRESS REG A & B - CABIN

DATE 4/5/71

PLSS H2O TRANSFER TO LM SUBLIMATOR

1 PLSS H2O SHUTOFF & RELIEF VLV - CLOSE (FWD)

2 Open Flap and Remove PLSS H2O Drain Dust Cap.

3 Vent PLSS H2O Drain to Cabin Ambient using Connector from Small Urine Collection Assembly. (Cut Hole In Bag)

4 When H2O QTY = 10%:
ASC H2O - CLOSE
DES H2O - CLOSE

5 Unstow LM H2O Recharge Hose.
Disconnect H2O Dispenser.
Remove Dust Cap From PLSS H2O Fill Fitting and Connect Recharge Hose.

6 ASC H2O - OPEN

7 Near Depletion (Signal from MSFN):
ASC H2O - CLOSE

8 Disconnect Vent Connector & Recharge Hose.
Install Dust Caps. Reconnect H2O Dispenser.

DATE 4/5/71

SURFACE SUBLIMATOR DRYOUT (Sublimator Breakthrough)

This procedure to be performed if breakthrough of primary sublimator occurs while on Lunar Surface

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

INITIAL POWER DOWN

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

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

3 SUIT TEMP - COLD
LIQUID COOLING GARMENT - MAX COLD

4 See SECONDARY GLYCOL CONFIGURATION, P. 5-11

DATE 4/5/71

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

DATE 4/5/71

SECONDARY GLYCOL CONFIGURATION (LUNAR SURFACE)

The following configuration is required after failure of the primary Glycol System and activation of the Secondary Glycol System. Lift-off next best opportunity.

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

2 CB(11) AC BUS B: NUM LTG - OPEN
AC BUS A: TAPE RCDR - OPEN
: INTGL LTG - OPEN
: GASTA - OPEN
FLT DISP: GASTA - 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 (1.8 Hrs Max)

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 Monitoring.

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

DATE 5/5/71

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PGNS PTC PROCEDURE FOR CSM/LM CONFIGURATION

1 V48E, Load 32022 and Weights.
GUID CONT - PGNS
ATTITUDE CONTROL (3) - MODE CONTROL
MODE CONTROL (PGNS) - ATT HOLD
V76E

2 Maneuver To PTC Attitude via TTCA

3 MODE CONTROL - AUTO
Wait 10 min

4 Disable + X Thrusters
V25 N07E
1257E
252E
1E

5 V77E (Zero Att Errors)
V48E, Load 22012, PRO
V34E

6 Wait 15 min

7 V76E
MODE CONTROL - ATT HOLD
30 Clicks Yaw Right (.3°/sec)

DATE 4/5/71

COMM

ECS

PTC, STAGING

AGS PTC PROCEDURE FOR CSM/LM CONFIGURATION

1 Mnvr to CRESCENT ALIGN Attitute
Per G&N DICT p. 3-5

2 400 + 5E Body Axis Align
400 + 0E

3 BAL CPL -ON
ATTITUDE CONT (3) - PULSE
GUID CONT - AGS
MODE CONTROL (AGS) - ATT HOLD
ATT/TRANSL - 2 JET
TTCA (CDR & LMP) - JETS
DEADBAND - MIN

4 Maneuver To PTC Attitude Using TTCA

5 When At Attitude Go Out-Of-Detent With ACA
ATTITUDE CONT (YAW) - MODE CONTROL

6 When Attitude Error Needles Appear Motionless And/Or
Star Appears Stationary In Either The AOT Or
COAS - Rates < 0.05°/sec then:
ATTITUDE CONT (YAW) - PULSE

7 Spin Up To 0.3°/sec In Yaw
Or
ACA (Yaw) Out-Of-Detent For 2 Seconds

8 MODE CONTROL (AGS) - OFF
PWR DOWN

DATE 4/5/71

AGS PTC PROCEDURE FOR CM/LM CONFIGURATION

1 Mnvr to CRESCENT ALIGN Attitude
Per G&N DICT p. 3-5

2 400 + 5E Body Axis Align
400 + 0E

3 MODE CONTROL (AGS) - ATT HOLD
ATTITUDE CONTROL (3) - MODE CONTROL
DEADBAND - MAX
BAL CPL - ON
ATT/TRANSL - 2 JET

4 Maneuver To Desired Attitude Using ACA

5 ATTITUDE CONTROL (3) - MODE CONTROL (Confirm)
Limit Cycle For Approx, 20 Min To Damp Rates

6 ATTITUDE CONT (3) - PULSE
Use ACA To Establish Yaw Rate Of 0.3°/sec Or
ACA (YAW) Out-Of-Detent For 2 Seconds

DATE 4/5/71

DOCKED STAGING (CM ONLY)

1 BAT 5,6 - ON (35 MIN PRECONDITION)
ATT/TRANSL - 4 JET
MODE CONT (BOTH) - ATT HOLD
BAT 1,2,3,4 - OFF/RESET
DES BATS - DEADFACE

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

IF Suited:
PRESS REG A&B - EGRESS
SUIT GAS DIV - PULL/EGRESS
CABIN GAS RETURN - EGRESS

3 GUID CONT - AGS
ACA - Out-of-detent
ATT CONT (3) - MODE CONT
BAL CPL - ON
DEADBAND - MIN

4 V37E 47E

5 404+0
405+0
406+0
470R

6 CB(11&16) ED: LOGIC PWR(2) - Close
STOP PB - PUSH
MASTER ARM - ON

7 TTCA - Thrust -X (.3fps - .5 fps)
STAGE - FIRE
TTCA - Thrust +X (.3fps - .5 fps)

8 CB(11&16) ED: LOGIC PWR(2) - Open
ATT/TRANSL - 2 JET

DATE 4/5/71

9 V48E
N46 32120
PRO
N47 +11150
+09050
PRO
V34E
STOP PB - RESET
GUID CONT - PGNS or AGS

DATE 4/5/71

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CSM TRANSFER TO LM POWER (UNSTAGED)

1 CB(11) INSTR: SIG CONDR 1 - Close
EPS: CROSS TIE BAL LOADS - Close
: CROSS TIE BUS - Close
: XLUNAR BUS TIE - Close
: DES ECA CONT - Close
: DES ECA - Close
: ASC ECA CONT - Close
: ASC ECA - Close
CB(16) INSTR: SIG CONDR 2 - Close
EPS: DISP - Close
: ASC ECA - Close
: ASC ECA CONT - Close
: DES ECA - Close
: DES ECA CONT - Close
: XLUNAR BUS TIE - Close
: CROSS TIE BUS - Close
: CROSS TIE BAL LOADS - Close

2 BAT 6 NORMAL FEED - ON, tb - gray

3 Connect LM/CSM Umbilicals

4 CSM configure for power transfer and place
LM PWR sw - CSM

5 After transfer verify BAT 1,2,3,4 tb's
remain gray
If not, BAT 1 HI V - ON, tb - gray
BAT 4 HI V - ON, tb - gray

6 CB(16) EPS: CROSS TIE BUS - Open
: CROSS TIE BAL LOADS - Open

7 When BAT 1 AMP MTR >30, BAT 2 - ON, tb - gray
When BAT 4 AMP MTR >30, BAT 3 - ON, tb - gray

CAUTION:
Do Not Use LUNAR BAT

8 BAT 6 NORMAL FEED - OFF/RESET, tb - bp

DATE 5/5/71

LM TO CSM POWER REMOVAL (UNSTAGED)

1 CSM configure for power removal

2 Verify BAT 6 NORMAL FEED (or BAT 5 BACK-UP FEED)
- ON (tb-gray)

3 CB(11) EPS: CROSS TIE BAL LOADS - Close
CB(16) INST: SIG CONDR 2 - Close
EPS: CROSS TIE BAL LOADS - Close
: DISP - Close

4 LUNAR BAT: LMP - OFF/RESET, Then ON, tb - LMP

DATE 4/5/71

CSM TRANSFER TO LM POWER (STAGED)

1 CB(11) EPS: XLUNAR BUS TIE - Close
CB(16) INST: SIG CONDR 2 - Close
EPS: DISP - Close
: ASC ECA - Close
: ASC ECA CONT - Close
: XLUNAR BUS TIE - Close

2 BAT 5 NORMAL FEED - ON, tb - gray
BAT 6 NORMAL FEED - ON, tb - gray

3 CB(11) INSTR: SIG CONDR 1 - Close
EPS: ASC ECA CONT - Close
: ASC ECA - Close

4 Connect LM/CSM Umbilicals

5 CSM transfer power

LM TO CSM POWER REMOVAL (STAGED)

1 CSM configure for LM power removal

2 CB(16) INSTR: SIG CONDR 2 - Close
EPS: DISP - Close
CB(11) INSTR: SIG CONDR 1 - Close
EPS: CROSS TIE BAL LOADS - Open
: CROSS TIE BUS - Open

3 CB(11) EPS: BAT FEED TIE (2) - Open, then Close
(CDR Bus temporarily lost)

4 CB(11) EPS: CROSS TIE BAL LOADS - Close
: CROSS TIE BUS - Close

DATE 4/5/71

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DPS PRPLNT VENTING (Zero g)

1 Verify:
DES He REG 1&2 tb - bp
FUEL VENT tb - gray
OXID VENT tb - gray

2 MASTER ARM - ON
DES VENT - FIRE
MASTER ARM - OFF

3 Verify FUEL & OXID PRESS decreasing
(DES REG Lt at 220)

4 If rate of decrease stops or slows (<6 psi/min):

:00 +X TRANSL - Push
+:02 OXID VENT - OPEN
FUEL VENT - OPEN
+:10 +X TRANSL - Release

5 Consult MSFN for vent termination pressures:
OXID _____
FUEL _____

6 At specified pressures:
OXID VENT - CLOSE
FUEL VENT - CLOSE

DATE 4/5/71

DPS SHe VENTING (Zero g, Docked)

1 GUID CONT - AGS
DB - MAX
ATT CONT (3) - PULSE
MODE CONT (AGS) - ATT HOLD

2 TTCA - Thrust forward to establish +1°/sec pitch rate

3 Wait 1 minute to allow propellant setting

4 Verify FUEL VENT tb - gray
OXID VENT - CLOSE, tb - bp
MASTER ARM - ON
DES VENT - FIRE (Pitch rate will increase during venting)
MASTER ARM - OFF

5 Verify SHe pressure decreasing

6 Consult MSFN for vent termination pressure:
SHe _____

7 At specified pressure:
FUEL VENT - CLOSE

8 TTCA - Null pitch rate

9 ATT CONT: PITCH - MODE CONT

DATE 4/5/71

DPS SHe VENTING (Zero g) (Alternate)

1 Verify:
  DES He REG 1 tb - gray
  DES He REG 2 tb - bp
  OXID VENT tb - gray

2 FUEL VENT - CLOSE, tb - bp
MASTER ARM - ON
DES VENT - FIRE
MASTER ARM - OFF

3 Verify SHe pressure decreasing

4 If rate of decrease stops or slows (<1 psi/sec):

:00	+X TRANSL - Push
+:02	OXID VENT - OPEN
	FUEL VENT - OPEN
+:10	+X TRANSL - Release

5 Consult MSFN for vent termination pressure:
  SHe _____

6 At specified pressure:
  OXID VENT - CLOSE
  FUEL VENT - CLOSE

DATE 4/5/71

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CONTINGENCY POWER DOWN LIST

*Required For LM Active Rendezvous

ACTION	DECREASE
********** PGNS **********	
*IMU: CB(11) PGNS: IMU OPR - Open (15 Min Warm-up)	7.15 Amps
*LGC: V37E 06E F 50 25 00062 PRO (Hold In 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 (25 Min Warm-up)	.40 Amps
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	.57 Amps
LR: CB(11) PGNS: LDG RDR - Open	4.21 Amps

DATE 4/5/71

********** 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	1.03	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	.15	Amps
CB(16) COMM: S-BD ANT -Open	.03	Amps
TAPE RCDR: CB(11) AC BUS A: TAPE RCDR - Open	.11	Amps

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

TRACK: EXTERIOR LTG - OFF	4.29	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	1.94	Amps
NUM LTG: CB(11) AC BUS B: NUM LTG - Open	.18	Amps
*AOT LAMP: CB(11) AC BUS B&A: AOT LAMP-Open	.38	Amps

DATE 4/5/71

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

*TAPEMETER: CB(11) FLT DISP: RNG/RNG RT-Open		.30	Amps
AC BUS A: RNG/RNG RT-Open		.43	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		.28	Amps
*GASTA: CB(11) FLT DISP: GASTA-Open		.22	Amps
AC BUS A: GASTA-Open		.52	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		.08	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

DATE 4/5/71

EVT (2 OPS)

ENCY EVT/IVT

EMERGENCY POWER DOWN

VACUUM IVT TO CM

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

*INV 1: CB(11) EPS: INV 1 - Open — 1.43 Amps (NO LOAD)

*INV 2: CB(16) EPS: INV 2 - Open — 1.43 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 — 2.56 Amps
(Up to 90 min to Clear Window)

LMP WIND: CB(11) AC BUS B: SE WIND HTR - Open — 2.56 Amps
(Up to 90 min to Clear Window)

DOCK WIND: CB(11) HTRS: DOCK WINDOW - Open — .86 Amps

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

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

*IMU: CB(11) PGNS: IMU STBY - Open — 1.00 Amps

*ASA: CB(16) STAB/CONT: ASA - Open — 2.14 Amps
(If Coolant Off, .30 Amps)

S-BD ANT: CB(11) HEATERS - S-BD ANT - Open — .02 Amps

DATE 4/5/71

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

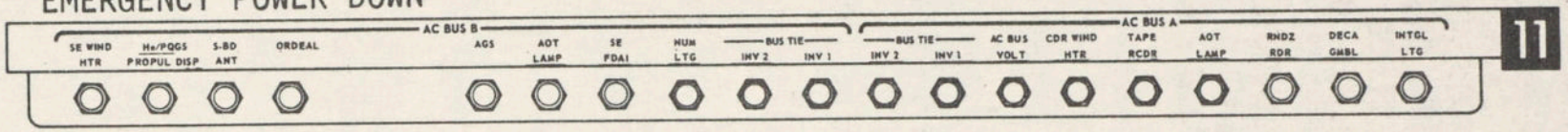
2 ATTITUDE CONTROL (3) - DIRECT

3 Configure C.B.'s per Chart

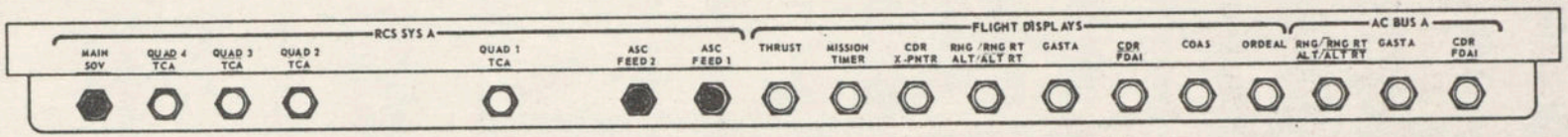
DATE 4/5/71

EMERGENCY POWER DOWN

ALL OPEN



3 CLOSED



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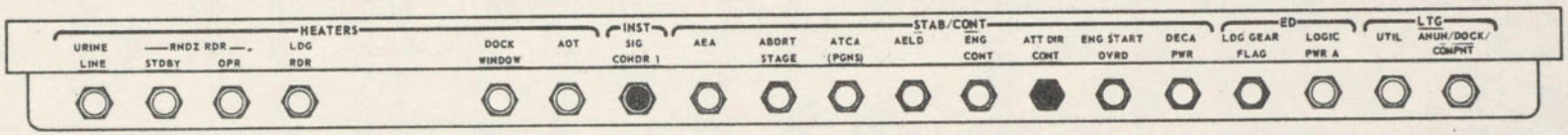

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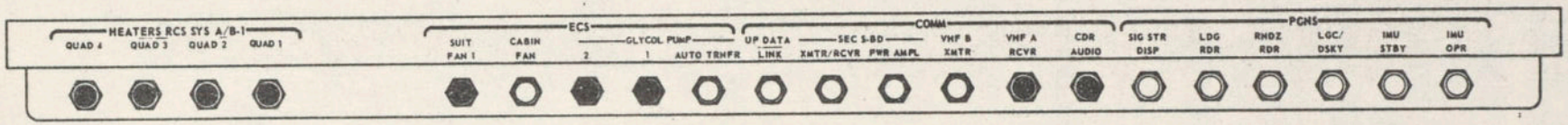

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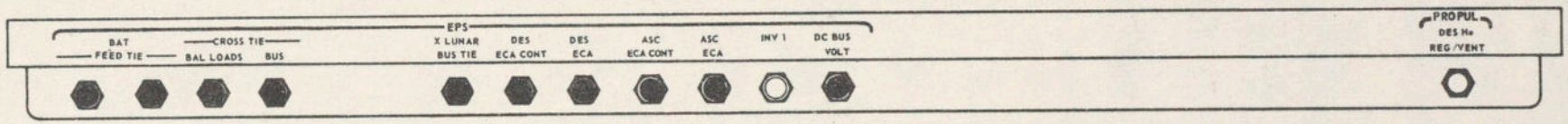


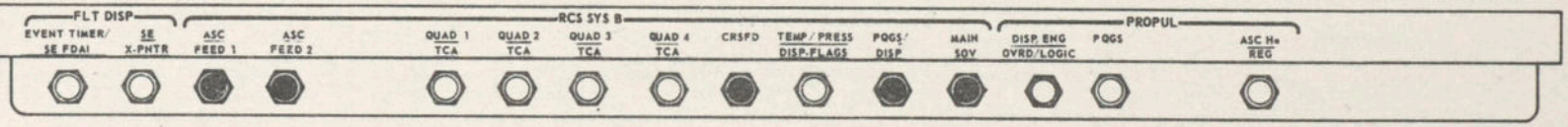
DATE 4/5/71

DATE 4/5/71

EMERGENCY POWER DOWN

16

5 CLOSED



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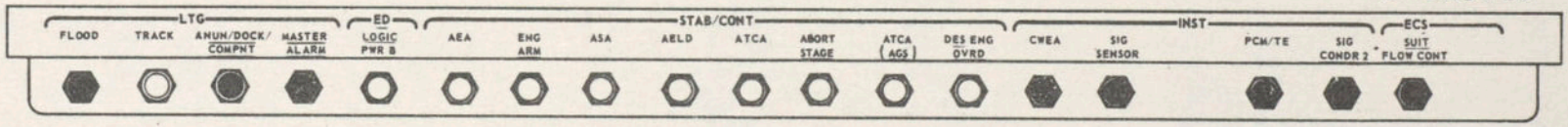

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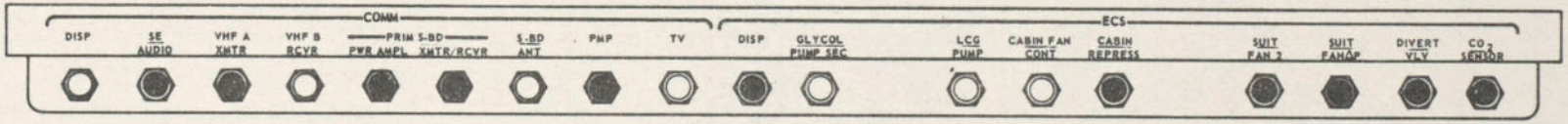
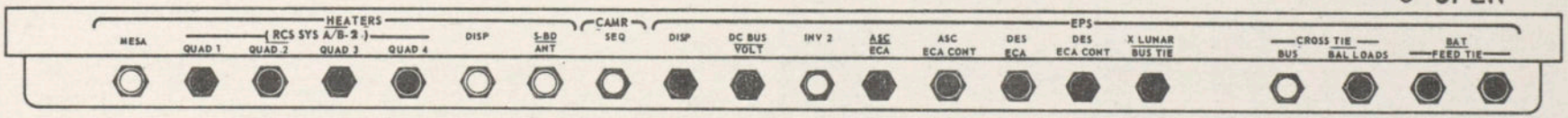


6 OPEN



5-33

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)

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

DATE 4/5/71

VACUUM IVT TO CM

6. CONTINGENCY EVT/IVT

EVT (2 OPS)

CSM TRANSFER
TO LM POWER

6. CONTINGENCY EVT/IVT

DPS VENTING
(ZERO G)

CONTINGENCY EVT (2 OPS)

PREP FOR EGRESS

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

Verify - PGA Zipper Locked
Stow COAS On Fwd Window Mount
Stow DEDA & DSKY Desk, Loose Items

EQUIPMENT PREP (OPTIONAL)

Install 2 spring bungees vertically
  in recharge station for temp stowage
  of ISA and SRC. Attach both to top
  horiz bar, secure one to BSLSS tie-
  down and other to lower snap on LH
  eng cover.

Place transfer items in ISA:
  SEQ Mags - 6 RHSSC, 2 bot boot
    box, 1 ISA, 1 camera
  70mm mags - 7 RHSSC, 6 bot boot box
  PPK's - Aft of SRC's
  Other rock bags optional

Remove ISA, extend straps, tie
  straps diagonally to minimize size
Stow ISA behind bungees in recharge sta

Unstow one SRC, stow behind bungees
Unstow 2nd SRC , stow on floor fwd CDR
  sta, T-handle fwd, bot face inboard
Route CDR's outboard restraint cable
  over top to secure

DATE 7/12/71

OPS DONNING

Stow PGA Gas Connector Plugs & LCG Plugs in PGA pocket
Unstow OPS Straps & Purge Valves (LHSSC)
Purge Vlvs - Hi
Don Purge Valves (Upper Red)
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 1st - Unstow OPS & Checkout * * * *
Verify OPS Reg Decays To 2.5 PSI(~3 Min)
Unstow OPS O2 Gas Hose
Remove O2 & Water Hoses
Secure OPS To OPS Straps (Do Not Twist Strap)
Connect OPS Hose To PGA (Inboard Blue)
Connect ECS Hoses (R/R, B/B) & Water Hose
Fix OPS Flaps To Expose Press Gage
CDR Repeat OPS DONNING * * * *

CB(11) ECS: CABIN FAN - Open (VERIFY)

Unstow Lifeline/Tethers - RHSSC
Verify Small Hooks Attached to Lifeline
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)
Secure Tool B (aft RHSSC) to CDR tether if required
Verify LM O2 Hoses - R/R, B/B

PGA Diverter Valves - Vertical
Don Helmets
Don LEVA's, Verify Helmet Aligned

CK Conn - Hel, O2, Comm,Purge Vlvs
Verify LM Restraints Removed
Don EV Gloves, Verify Locked

DATE 7/12/71

SUIT INTEGRITY CHECK

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

PRESS REG A - EGRESS
PRESS REG B - DIRECT 02
Monitor CUFF GAGE 3.7-4.0 PSIG Then
  PRESS REG B - EGRESS (Cuff Gage
  Decay <.3 Psig in 1 Min)
Verify Purge Valves Accessible

SUIT CIRCUIT RELIEF - AUTO (SUIT CKT
  PRESS DECAYS TO 4.8 PSIA)
Confirm CSM Side Hatch Open And
  CMP Go For LM Depress

LCG - COLD, As REQ'D
CB(16) ECS: LCG Pump - Open
Disconnect LM H2O Hoses
Inspect EMU

CABIN DEPRESS

CB(16) ECS: CABIN REPRESS-OPEN
CABIN REPRESS VLV - CLOSE (VERIFY)
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

Unstow SRC behind bungee, CDR attach
  small hook, lock
LMP unstow ISA, Attach small
  hook, lock

DATE 6/14/71

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

Turn Card Over And Review Transfer Method

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 (Vac transfer to ECS if necessary, CMP cue card)

CDR Secure Position In LEB & Tend Lifeline For LMP
LMP Egress Feet First and Transfer to CSM, Remove ISA, push inside - if T <15 min, return to LM, retrieve SRC on floor

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 move to CM hatch, remove ISA, push inside, if T <15 min, return to LM - attach small hook to SRC on floor, return to CM

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)

DATE 6/14/71

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 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

****

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)

****

DATE 6/14/71

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)

PREP FOR EGRESS

UCTA'S Empty
Stow IV Gloves Under Netting Behind LMP
Doff Helmets, Verify Feedport Cover
Installed
Apply anti fog to LMP helmet
Stow helmets On Ceiling
Inspect PGA Zipper, Verify Lock-locks

Check Status of CMP Prep for Egress

FWD Hatch Handle - Unlock
Verify With CMP That Tunnel is Depressed
Verify Wristwatch Donned
Stow COAS On FWD Window Brt
Stow DEDA, DSKY Desk, Loose Items

DATE 6/14/71

EQUIPMENT PREP (OPTIONAL)

Install 2 spring bungees vertically
in recharge station for temp stowage
of ISA and SRC. Attach both to top
horiz bar, secure one to BSLSS tie-
down and other to lower snap on LH
eng cover.

Place transfer items in ISA:
SEQ Mags - 6 RHSSC, 2 bot boot
box, 1 ISA, 1 camera
70mm Mags - 7 RHSSC, 6 bot boot box
PPK's - Aft of SRC's
Other rock bags optional

Remove ISA, extend straps, tie
straps diagonally to minimize size
Stow ISA behind bungees in recharge sta

Unstow one SRC, stow behind bungees
Unstow 2nd SRC, stow on floor fwd CDR
sta, T-handle fwd, bot face inboard
Route CDR's outboard restraint cable
over top to secure

CDR OPS DONNING

Stow PGA Gas Connector Plugs & LCG Plugs
in PGA Pockets, LMP & CDR
Unstow OPS Straps & Purge VLV (LHSSC)
Purge VLV-Hi
CDR Don Purge VLV (Upper Red)

CDR 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

DATE 7/12/71

Unstow OPS
Verify OPS O2 PRESS -5380 to 6380 psia
  and O2 Hose Locked
OPS O2 - ON
Verify REG Press -3.4 to 4.0 psig
OPS O2 - OFF
Verify REG PRESS Decays to 2.5 psig
  (~ 3 MIN)
Unstow OPS O2 Gas Hose
Remove O2 & Water Hoses
Secure OPS to PGA (Do Not Twist Strap)
Connect OPS O2 Hose to PGA (Inboard Blue)
Connect ECS Hoses (R/R, B/B) & Water Hose
Fix OPS Flaps to Expose Press Gage

LMP DON PLSS

Verify Sublimator Exhausts Clear
Unstow Upper and Lower PLSS Donning Straps
Unstow O2 and H2O Hoses, and Battery Cable
Remove ELEC Dust Cap, Stow
Connect Battery Cable to Battery, Verify Locked
Don PLSS by Securing PLSS Upper and
  Lower Straps to PGA
Lift PLSS Hoses Above LH Lower Strap
Connect PLSS O2 Hoses to PGA
Verify Diverter, O2, Prim/Aux
  Feedwater-Off
Unstow RCU
Attach RCU to upper PLSS Straps and PGA
Verify RCU Controls:
  Pump - OFF
  Fan - OFF (Left)
  Mode SEL - O
Connect RCU to PLSS

FINAL PREP FOR EVT

CB(11) ECS: CABIN FAN - Open (Verify)

Unstow Lifeline/Tethers (RHSSC)
Verify Small Hooks Connected to Lifeline

DATE 7/12/71

Attach Waist Tether Hooks To PGA
(Connect to LMP RH Side, Route in Front of LMP and behind CDR, Connect to CDR LH Side, Verify Hooks Locked)
Secure Tool B (aft RHSSC) to CDR tether if required
Verify LM O2 Hoses - R/R, B/B

PREP FOR CABIN DEPRESS

PGA Flow Diverters - Vertical
Don Helmets
Don LEVA'S
Verify Helmet/Neck Ring Align
Secure Transfer Items
Ck Conn-Hel, O2, COMM, Purge VLV (CDR)
Verify LM Restraints Removed

LMP PLSS Mode SEL sw - POS A (Min PWR)
PRESS FLAG - O
VENT FLAG - P
Verify PLSS O2 Bottle Press
Confirm CSM Side Hatch Open and CMP "GO" for LM Depress
PLSS Fan - ON (RT)
LMP Suit ISOL vlv - Suit Disc

Verify - vent FLAG - CLEAR
LCG-Cold, As Req'd
CB(16) ECS: LCG PUMP - Open
LMP Disconnect LM O2
Both Disconnect LM H2O Hoses
LMP Connect PLSS H2O Hose
Stow Hoses
Don EV Gloves, Lock

DATE 6/14/71

SUIT INTEGRITY CHECK

-CDR (OPS/Suit Circuit)-

SUIT GAS DIVERTER-PULL-EGRESS
CABIN GAS RETURN-EGRESS
SUIT CIRCUIT RELIEF - CLOSE
PRESS REG A - EGRESS
PRESS REG B - DIRECT 02
MONITOR CUFF GAGE TO 3.7-4.0 PSIG
  PRESS REG B - EGRESS (Cuff Gage Decay <.3 psig in 1 Min)
Verify Purge Vlv - Accessible

SUIT CIRCUIT RELIEF - AUTO (Suit Ckt Press Decays to 4.8 psia)

-LMP (PLSS)-

PLSS 02 - ON (02 Flag-0)
Press Flag-Clear (3.1-3.4 psid)
Cuff Gage Reads 3.7-4.0 PSIG
02 Flag Clear

PLSS 02-OFF (Monitor cuff gage for 1 min, Report Decay)
PLSS 02 - ON
Verify Cuff Gage Reads 3.7-4.0 psig, 02 Flag May Come On
Verify 02 Flag clear
PLSS Diverter Vlv - Min (UP)
PLSS Pump -ON

CABIN DEPRESS

CB(16) ECS: CABIN REPRESS-Open
CABIN REPRESS - CLOSE

DATE 6/14/71

Forward Dump Valve - Open
Then AUTO at 3.5 psia
CABIN AT - 3.5 psia
CDR SUIT PRESS - 3.6 to 4.3 psia
And Decaying
LMP PGA PRESS >4.8 psig, decaying

Forward Dump Valve - OPEN
H2O Flag-A (1.2-1.7 PSIA)
Monitor Cabin Press to 0 Psia
CDR SUIT PRESS - 3.6 to 4.3 psia and
decaying
LMP PGA Press >4.8 psig, decaying

HATCH OPENING

Partially Open Hatch
PLSS Prim Feedwater - OPEN
(H2O FLAG Clears in 4 MIN)
Unstow SRC behind bungee, CDR
attach small hook, lock
LMP Unstow ISA, attach small hook

VERIFY/PERFORM:

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

Review Transfer Method

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

DATE 6/14/71

CDR Configure Audio Panel As Desired
(Vac transfer to ECS if necessary,
CMP cue card)

CDR Secure Position In LEB And Tend
Lifeline for LMP
LMP Egress Feet First and Transfer to
CSM, Remove ISA, push inside - if
T <15 min, return to LM, Retrieve
SRC on floor

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 move to CM hatch, remove ISA, push
inside
If T <15 min, return to LM - attach
small hook to SRC on floor, return
to CM
LMP Ingress CSM Feet First, Face Toward
MDC and Assume Position In Center
Couch Area

DATE 6/14/71

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

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

****

LEVA'S - Lower As Required
OPS 02 - ON

DATE 6/14/71

CDR SUIT ISOL VALVE - SUIT DISC

CDR Purge Valve - OPEN (Give Mark To CMP For T+25 Min)
Verify O2 Flow
CDR LM O2 Hoses - Disconnect
Verify PGA Press - 3.4 to 4.0 psig
LM Comm - Disconnect
Stow LM Hoses

CDR Transfer to CSM LEB
LMP Manage Lifeline
LMP Transfer to CSM Center Couch Area
CDR Manage Lifeline

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 (2 PLSS/OPS)

Use Planned Lunar Surface EVA Procedures

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

DATE 6/14/71

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) Unstow Lifeline/Tethers - RHSSC
Verify Small Hooks attached to Lifeline
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)

(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

DATE 7/12/71

EVT (2 OPS)

EVT (CDR/OPS - LMP/PLSS)

EVT (2 PLSS/OPS) CHANGE

CSM TRANSFER TO LM POWER

VACUUM IVT TO CM

EQUIPMENT PREP

Perform In Conjunction With Post Docking Procedure P-13, LM Timeline Book

Stow DEDA And DSKY Desk

Install 2 spring bungees vertically in recharge station for temp stowage of ISA and SRC. Attach both to top horiz bar, secure one to BSLSS tie-down and other to lower snap on LH eng cover.

Place transfer items in ISA:
- SEQ Mags - 6 RHSSC, 2 bot boot box, 1 ISA, 1 camera
- 70mm Mags - 7 RHSSC, 6 bot boot box
- PPK's - Aft of SRC's
- Other rock bags optional

Remove ISA, extend straps, tie straps diagonally to minimize size
Stow ISA behind bungees in recharge sta

Unstow one SRC, stow behind bungees
Unstow 2nd SRC, stow on floor fwd CDR sta, T-handle fwd, bot face inboard
Route CDR's outboard restraint cable over top to secure

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

DATE 7/12/71

EVT (2 OPS)

EVT (2 PLSS/OPS) CHANGE (CDR/OPS - LMP/PLSS)

VACUUM IVT TO CM

PGA INTEGRITY CHECK

Inspect EMU & Lock - Locks

Suit Gas Diverter - Pull - EGRESS
Cabin Gas Return - EGRESS
Suit Circuit Relief - CLOSE

Press REG A - EGRESS
Press REG B - Direct 02
Monitor Cuff Gage to 3.7-4.0 psig then
  PRESS REG B - EGRESS (Cuff Gage
    Decay <.3 Psig In 1 Min)

Suit Circuit Relief - AUTO
Confirm CSM GO For LM Depress

CB(16) ECS: LCG PUMP - Open
Disconnect LM H2O Hoses

CABIN DEPRESS

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

FWD Dump VLV - Open
Monitor Cabin Press To 0 Psia

Verify LM Suit Press 3.6-4.3 Psia

HATCH OPENING

OVHD Dump VLV - Open
Open Hatch

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

DATE 6/14/71

Transfer SRC'S To CM

Receive B5, B6 & Jett Bag From CM And
Stow In LM

Transfer Other Items If Req'd

SWITCH OVER TO CM ECS

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

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

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

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

DATE 7/12/71

CDR transfer to CM
LMP tend umbilicals

CSM MANEUVER TO JETTISON ATTITUDE

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

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

Commence CM Cabin Repress

DATE 6/14/71

PROPULSION

7. EMERGENCY

FIRE/SMOKE IN CABIN

VACUUM IVT TO CM

7. EMERGENCY

EVT (2 OPS)

EMERGENCY PROCEDURES

FIRE/SMOKE IN CABIN (Not In Suit Loop, Crew Suited)

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 If time permits, O2 Hoses - R/R & B/B

5 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.

6 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

7 WHEN FIRE GOES OUT:
FWD CABIN DUMP - AUTO
SUIT CIRCUIT RELIEF - AUTO
CO2 Canister - MID Position
PRESS REG A - DIRECT O2 Until Suit Loop Clear
(Suit Press Will Increase To 4.3 psia)
CO2 Canister Sel - PRIM

DATE 6/14/71

SMOKE IN CABIN (Not In Suit Loop, Crew Unsuited)

1 If smoke is dense or toxic,
CABIN REPRESS - MANUAL
Purge cabin for 1 minute,
then CABIN REPRESS - CLOSE

Cabin relief valve will open at 5.4-5.85.
Purge time may be extended if O2 available.

2 CB(16) ECS: SUIT FAN ΔP - Open
SUIT FAN 2 - Open
(ECS Caut & H2O Sep Lt)

3 SUIT CIRCUIT RELIEF - AUTO (Verify)
Unstow Blue O2 Hoses
PRESS REGS A&B - DIRECT O2

4 Don PGA'S (LCG, UCTA, UCTA Hose,
LCG & Bio Belt Connections Not
Req'd)
Use Blue O2 Hoses to wash smoke from face.

5 Connect ECS Umbilicals (B/B, R/R)
Don Helmets & Gloves

6 PRESS REG B - EGRESS
SUIT GAS DIVERTER - PULL/EGRESS
CABIN GAS RETURN - EGRESS

WARNING
Next step terminates suit flow in order to purge suit loop. Do not leave suit ISOL valves in SUIT DISC more than one minute.

7 SUIT ISOL (2) - SUIT DISC

8 Begin suit loop purge,
CB(16) ECS: SUIT FAN 2 - Close
SUIT FAN ΔP - Close

DATE 6/14/71

9 Within one minute of step 7,
SUIT ISOL (2) - SUIT FLOW

10 CB(16) ECS: CABIN REPRESS - Open
CABIN DUMP vlv (FWD or OVHD) - OPEN
until CABIN PRESS = 3.5, then AUTO
PRESS REG A - EGRESS

11 Monitor SUIT PRESS for one minute,
Verify 4.3 psia and stable

12 CABIN DUMP vlv (FWD or OVHD) - OPEN
until CABIN PRESS = 0, then AUTO.

DATE 4/5/71

ABNORMAL VEHICLE DYNAMICS	Use ACA Hardover To Stabilize Vehicle If RCS TCA Lt-ON CB QUAD TCA - Open GUID CONT - AGS MODE CONT - ATT HOLD ATT CONT(3) - MODE CONT V77E (PGNS Only) 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	If DPS: ENG STOP - PUSH ENG ARM - OFF Verify ABORT - Reset CB(11): DECA PWR-OPEN CB(16): DES ENG OVRD - OPEN If APS: Verify ENG ARM - OFF ABORT STAGE - Reset CB(11&16): AELD (2) - OPEN

DATE 4/5/71

DC BUS

Either Bus < 26.5 V

BATTERY

(Poss)
Rev Current >10A
Overcurrent > 150A

DC
FEEDER
FAULT

Bus ΔV > 18

DATE 5/5/71

CDR BUS

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

DPS Goes to 100% And GDA Locked
To Start DPS: DES ENG CMD OVRD-ON
To Stop DPS: DES ENG CMD OVRD-OFF,
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
S-BD - SEC, SEC
INV - 1
After Insertion Go To EPS
Mal Proc; Unstaged, EPS-1
Staged, EPS-2

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

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: NORMAL FEED - OFF/RESET
Good BAT: BACK UP FEED - ON

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)

DATE ~~4/5/77~~ 7/9/77

DATE 4/5/77 7/9/71

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, Go To ED-3 If SHe Tank OK: MASTER ARM - OFF CLOSE LOGIC PWR CB ASC He PRESS-FIRE, IF APS PRESSURIZES - ABORT
	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 Off. Go To ED-3, ~~Poss Failed Armed~~

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
DES REG 220 > He Press > 260	DES He REG 1 - CLOSE REG 2 - OPEN Monitor TEMP/PRESS Maintain FUEL & OXID > 160 psi
ASC PRESS Either He Press < 2775 (Before Staging)	If APS Not Pressurized, Consult MSFN, Go To Mal Proc APS-1 If APS Pressurized, ASC He REG 1&2 - CLOSE Monitor ASC He PRESS If Both < 2775 and Decreasing, IMMEDIATE LIFTOFF Monitor FUEL/OXID PRESS If Either Decreasing, IMMEDIATE LIFTOFF
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

DATE 4/5/71

	Verify CB (16) ASC He REG - Closed ASC He REG's (2) - CLOSE If not pressurized, wait until TIG - :05 and Fire TANK 1 only.
APS He Leak (Between REG's and CK VLVS, MSFN detected)	At Ignition: ASC He REG (2) - OPEN for 40 Sec,* then CLOSE Monitor He PRESS If He Still decreasing, OPEN both REG's and leave open until insertion (Fire TANK 2 when FUEL or OXID PRESS = 110) If He not decreasing, leave REG's closed until FUEL or OXID PRESS = 110, then cycle between 110 and 170 until 5+40, then leave open until insertion (Fire TANK 2 when He PRESS = 500 psi) *During this 40 Sec, note He PRESS decay rate. If > 22 psi/sec (11 psi/sec if both tanks fired),close REG's individually to determine which gives lesser decay rate, then keep that REG closed thru insertion. If isolation of neither REG decreases decay rate, continue procedure.
RCS A REG RCS B REG 165 > Reg Press > 218	Monitor MANF PRESS When < 100 psi, MAIN SOV (Bad System) - CLOSE CRSFD - OPEN

DATE 4/5/71

RCS A or B He Press < 1700	Monitor He PRESS & RCS QUANTITY Affected Sys: LGC THR PAIR CMDS (4) - DISABLE MAIN SOV - CLOSE CB(11 or 16) QUAD TCA (4) - Open 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 (or unusual thruster activity, or PDI 10% throttle) Affected CB QUAD TCA - Open LGC THR PAIR CMDS - DISABLE During Ullage, Open CB for 1st Flag. If 2nd Flag Appears Open CB and DISABLE THR PAIR, Then Close 1st CB.
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

DATE 6/14/71

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
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
PRE AMPS Either - 4.7V Preamp Bias Out of Tolerance	No Crew Action Sproadic Jet Firings May Occur If Both Bias Supplies Fail
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 e) O2 Hoses - R/R & D/B (If time permits)

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) Select SUIT FAN 1 if operational b) Repress Cabin ASAP c) Doff Helmet & Gloves d) CB(16): SUIT FAN 2 - Open : SUIT FAN ΔP - Open e) 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
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) HI PLSS FILL - CLOSE b) LO PLSS FILL - CLOSE c) DES(ASC) O2-CLOSE d) CABIN REPRESS - CLOSE e) PRESS REG A&B-CLOSE f) Open Valves Individually To Isolate Problem Per Mal Proc ECS-3 CABIN PRESS Normal: Go To MAL Proc ECS 6 If DES O2 Lost, Go To ASC #1, Configure for Closed Suit Operation

DATE 6/14/71

ECS	Cross Check Comp Lts a) SUIT FAN Comp Lt On (ΔP<6"H2O) SUIT FAN-2 (or 1) b) H2O SEP Comp Lt On (RPM<800) Water Sep Sel - Alt SEP c) CO2 Comp Lt On (PPCO2 >7.6) 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
GLYCOL Glycol Temp >50° Glycol Accum <10% (Prim or Sec)	Cross Check GLYCOL TEMP And PRESS, SUIT TEMPS, And H2O 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 ECS-8 (Instr or Low Glycol Qty Problem)

PROPULSION

ELECTRICAL

ME

ABNORMAL DYNAMICS, NO AUTO SHUTDOWN

G&C, ECS

8. REAL TIME CHECKLIST

REAL TIME
CHECKLIST

PROPULSION

8. REAL TIME CHECKLIST

G&C, ECS

DATE 4/5/71

NO.	ITEM ⇩	ACTION	BACKOUT

PROPULSION

8. REAL TIME CHECKLIST

REAL TIME CHECKLIST

NO.	ITEM ⇩	ACTION	BACKOUT

DATE 4/5/71

NO.	ITEM ⇨	ACTION	BACKOUT

DATE 4/5/71

BLANK
CB CHARTS

PROPULSION

8. REAL TIME CHECKLIST

REAL TIME CHECKLIST

NO.	ITEM ⇩	ACTION	BACKOUT

DATE 4/5/71

DATE 4/5/71

NO.	ITEM	ACTION	BACKOUT

BLANK
CB CHARTS

NO.	ITEM ⇩	ACTION	BACKOUT

DATE 4/5/71

NO.	ITEM ⇨	ACTION	BACKOUT

DATE 4/5/71

BLANK
CB CHARTS

NO.	ITEM ⇩	ACTION	BACKOUT

DATE 4/5/71

NO.	ITEM ⇨	ACTION	BACKOUT

DATE 4/5/71

BLANK
CB CHARTS

NO.	ITEM ⇩	ACTION	BACKOUT

DATE 4/5/71

NO.	ITEM ⇨	ACTION	BACKOUT

DATE 4/5/71

BLANK
CB CHARTS

NO.	ITEM ⇨	ACTION	BACKOUT

DATE 4/5/71

NO.	ITEM ⇨	ACTION	BACKOUT

DATE 4/5/71

BLANK
CB CHARTS

NO.	ITEM ⇩	ACTION	BACKOUT

DATE 4/5/71

NO.	ITEM ⇨	ACTION	BACKOUT

DATE 4/5/71

BLANK
CB CHARTS

NO.	ITEM ⇩	ACTION	BACKOUT

DATE 4/5/71

DATE 4/5/71

NO.	ITEM ⇩	ACTION	BACKOUT

BLANK
CB CHARTS

PROPULSION

8. REAL TIME CHECKLIST

REAL TIME CHECKLIST

NO.	ITEM ⇩	ACTION	BACKOUT

DATE 4/5/71

NO.	ITEM ⇨	ACTION	BACKOUT

DATE 4/5/71

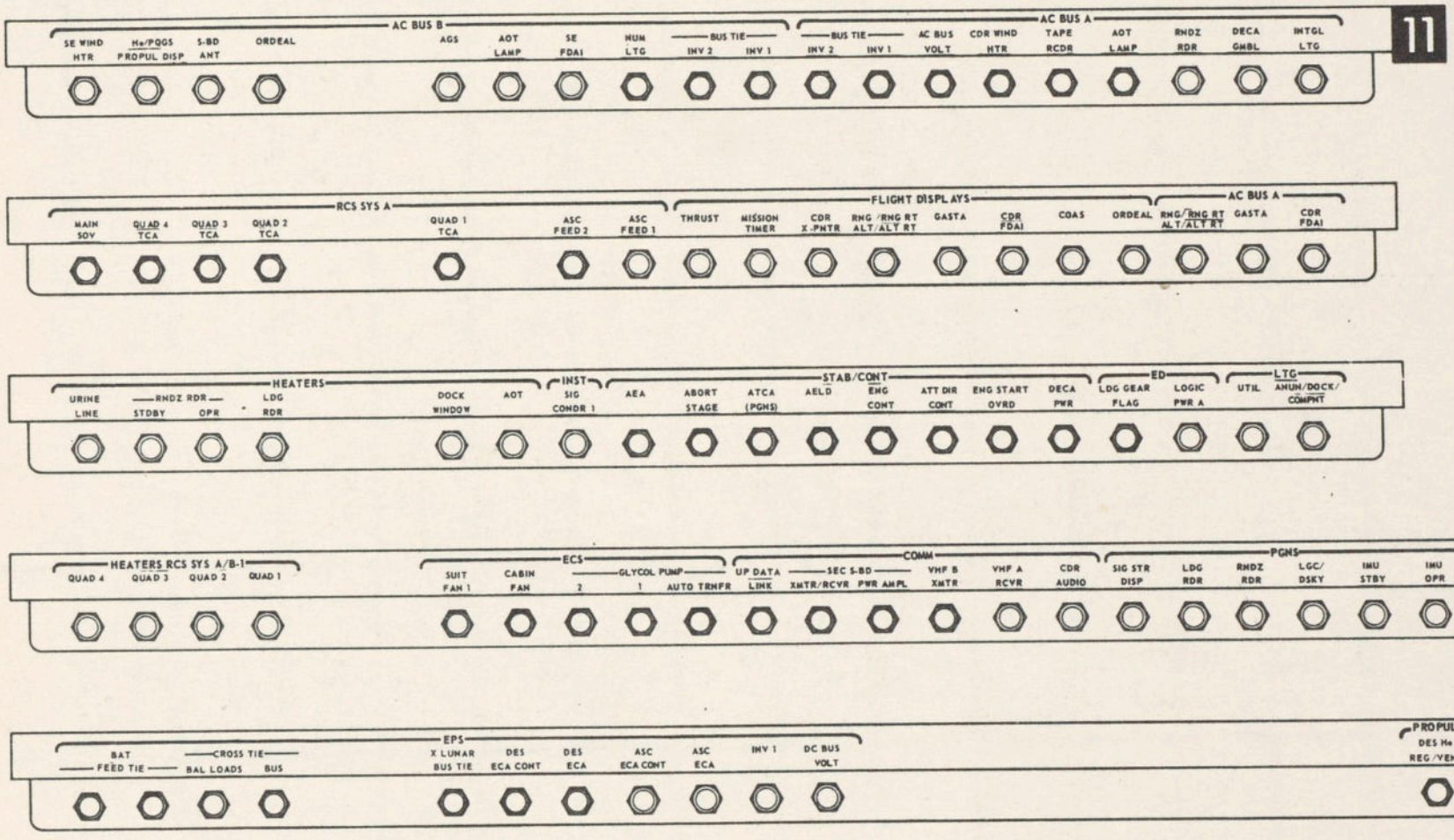
BLANK
CB CHARTS

NO.	ITEM ⇨	ACTION	BACKOUT

DATE 4/5/71

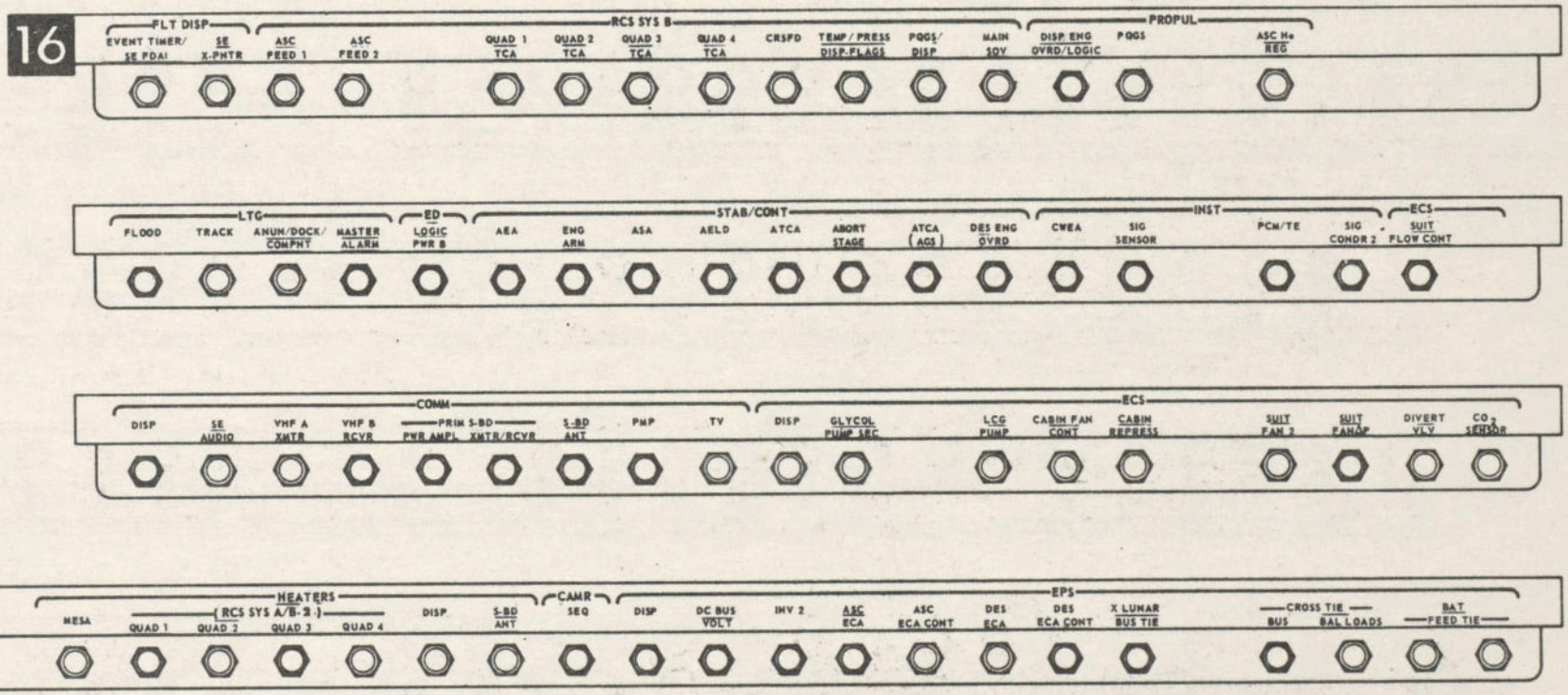
DATE 4/5/71

BLANK
CB CHARTS


11
AC BUS B
SE WIND HTR
He/PQGS PROPUL DISP
S-BD ANT
ORDEAL
AGS
AOT LAMP
SE FDAI
NUN LTG
BUS TIE
INV 2
INV 1
AC BUS A
BUS TIE
INV 2
INV 1
AC BUS VOLT
CDR WIND HTR
TAPE RCDR
AOT LAMP
RNDZ RDR
DECA GMBL
INTGL LTG
RCS SYS A
MAIN SOV
QUAD 4 TCA
QUAD 3 TCA
QUAD 2 TCA
QUAD 1 TCA
ASC FEED 2
ASC FEED 1
FLIGHT DISPLAYS
THRUST
MISSION TIMER
CDR X-PNTR
RNG /RNG RT ALT/ALT RT
GASTA
CDR FDAI
COAS
ORDEAL
AC BUS A
RNG/RNG RT ALT/ALT RT
GASTA
CDR FDAI
HEATERS
URINE LINE
RNDZ RDR
STDBY
OPR
LDG RDR
DOCK WINDOW
AOT
INST
SIG CONDR 1
AEA
ABORT STAGE
STAB/CONT
ATCA (PGNS)
AELD
ENG CONT
ATT DIR CONT
ENG START OVRD
DECA PWR
ED
LDG GEAR FLAG
LOGIC PWR A
LTG
UTIL
ANUN/DOCK/COMPNT
HEATERS RCS SYS A/B-1
QUAD 4
QUAD 3
QUAD 2
QUAD 1
ECS
SUIT FAN 1
CABIN FAN
GLYCOL PUMP
2
1
AUTO TRNFR
COMM
UP DATA LINK
SEC S-BD
XMTR/RCVR
PWR AMPL
VHF B XMTR
VHF A RCVR
CDR AUDIO
PGNS
SIG STR DISP
LDG RDR
RNDZ RDR
LGC/DSKY
IMU STBY
IMU OPR
EPS
BAT FEED TIE
CROSS TIE
BAL LOADS
BUS
X LUNAR BUS TIE
DES ECA CONT
DES ECA
ASC ECA CONT
ASC ECA
INV 1
DC BUS VOLT
PROPUL
DES He REG/VENT

DATE 4/5/71

DATE 4/5/71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FLT DISP
EVENT TIMER/ SE FDAI
SE X-PNTR
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ASC FEED 2
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QUAD 1 TCA
QUAD 2 TCA
QUAD 3 TCA
QUAD 4 TCA
CRSFD
TEMP/PRESS DISP-FLAGS
PQGS/ DISP
MAIN SOV
PROPUL
DISP ENG OVRD/LOGIC
PQGS
ASC He REG
LTG
FLOOD
TRACK
ANUN/DOCK/ COMPNT
MASTER ALARM
ED
LOGIC PWR B
STAB/CONT
AEA
ENG ARM
ASA
AELD
ATCA
ABORT STAGE
ATCA (AGS)
DES ENG OVRD
INST
CWEA
SIG SENSOR
PCM/TE
SIG CONDR 2
ECS
SUIT FLOW CONT
COMM
DISP
SE AUDIO
VHF A XMTR
VHF B RCVR
PRIM S-BD
PWR AMPL
XMTR/RCVR
S-BD ANT
PMP
TV
ECS
DISP
GLYCOL PUMP SEC
LCG PUMP
CABIN FAN CONT
CABIN REPRESS
SUIT FAN 2
SUIT FANΔP
DIVERT VLV
CO2 SENSOR
HEATERS
MESA
(RCS SYS A/B-2)
QUAD 1
QUAD 2
QUAD 3
QUAD 4
DISP
S-BD ANT
CAMR
SEQ
EPS
DISP
DC BUS VOLT
INV 2
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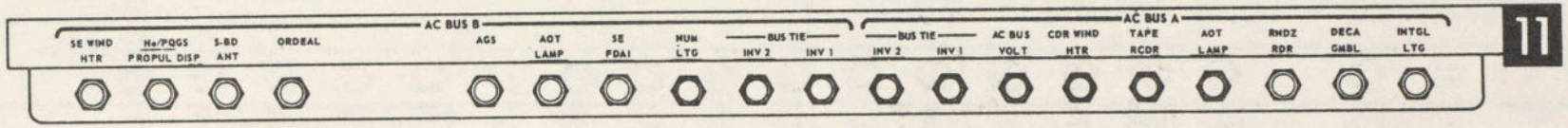
CROSS TIE
BUS
BAL LOADS
BAT
FEED TIE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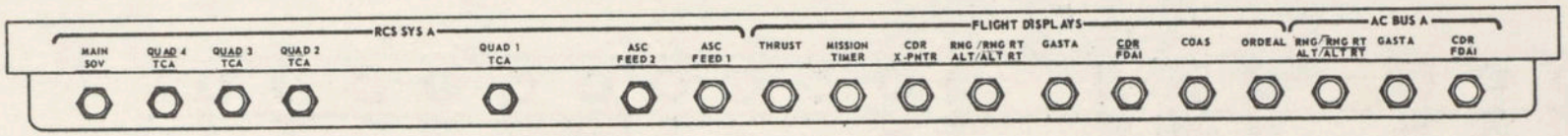
SE WIND HTR
He/PQGS PROPUL DISP
S-BD ANT
ORDEAL
AGS
AOT LAMP
SE FDAI
NUM LTG
BUS TIE
INV 2
INV 1
BUS TIE
INV 2
INV 1
AC BUS VOLT
CDR WIND HTR
AC BUS A
TAPE RCDR
AOT LAMP
RNDZ RDR
DECA GMBL
INTGL LTG
11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MAIN SOV
QUAD 4 TCA
QUAD 3 TCA
QUAD 2 TCA
QUAD 1 TCA
ASC FEED 2
ASC FEED 1
FLIGHT DISPLAYS
THRUST
MISSION TIMER
CDR X-PNTR
RNG/RNG RT ALT/ALT RT
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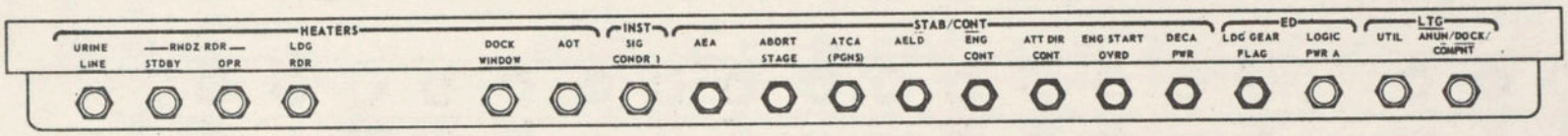
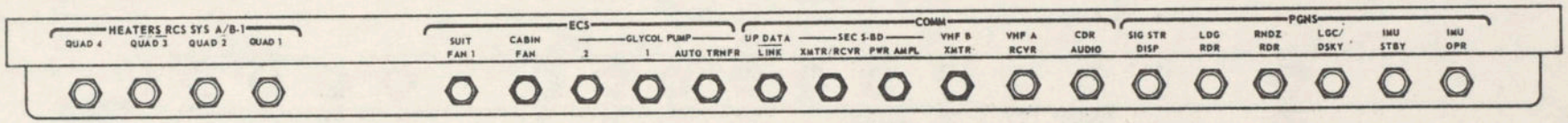
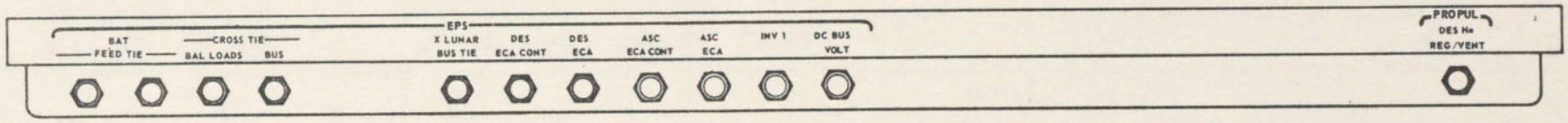
CDR FDAI
COAS
ORDEAL
AC BUS A
RNG/RNG RT ALT/ALT RT
GASTA
CDR FDAI


HEATERS
URINE LINE
RNDZ RDR
STDBY
OPR
LDG RDR
DOCK WINDOW
AOT
INST
SIG CONDR 1
AEA
STAB/CONT
ABORT STAGE
ATCA (PGNS)
AELD
ENG CONT
ATT DIR CONT
ENG START OVRD
DECA PWR
ED
LDG GEAR FLAG
LOGIC PWR A
LTG
UTIL
ANUN/DOCK/COMPNT

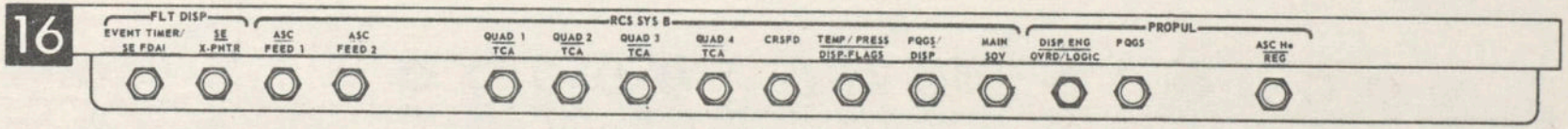

HEATERS RCS SYS A/B-1
QUAD 4
QUAD 3
QUAD 2
QUAD 1
ECS
SUIT FAN 1
CABIN FAN
GLYCOL PUMP
2
1
AUTO TRNFR
COMM
UP DATA LINK
SEC S-BD
XMTR/RCVR
PWR AMPL
VHF B XMTR
VHF A RCVR
CDR AUDIO
PGNS
SIG STR DISP
LDG RDR
RNDZ RDR
LGC/DSKY
IMU STBY
IMU OPR


EPS
BAT FEED TIE
CROSS TIE
BAL LOADS
BUS
X LUNAR BUS TIE
DES ECA CONT
DES ECA
ASC ECA CONT
ASC ECA
INV 1
DC BUS VOLT
PROPUL
DES He REG/VENT

DATE 4/5/71

DATE 4/5/71

16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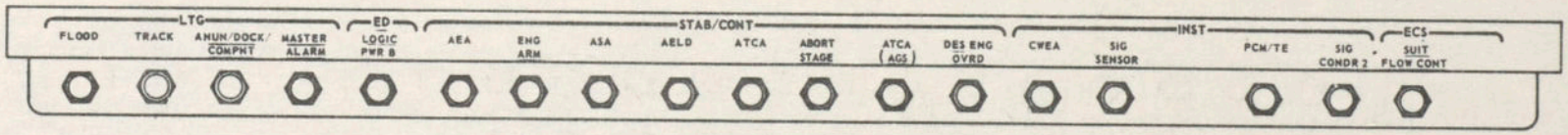
EVENT TIMER/ SE FDAI
SE X-PNTR
ASC FEED 1
ASC FEED 2
RCS SYS B
QUAD 1 TCA
QUAD 2 TCA
QUAD 3 TCA
QUAD 4 TCA
CRSFD
TEMP/PRESS DISP-FLAGS
PQGS/ DISP
MAIN SOV
PROPUL
DISP ENG OVRD/LOGIC
PQGS
ASC He REG


LTG
FLOOD
TRACK
ANUN/DOCK/ COMPNT
MASTER ALARM
ED
LOGIC PWR B
STAB/CONT
AEA
ENG ARM
ASA
AELD
ATCA
ABORT STAGE
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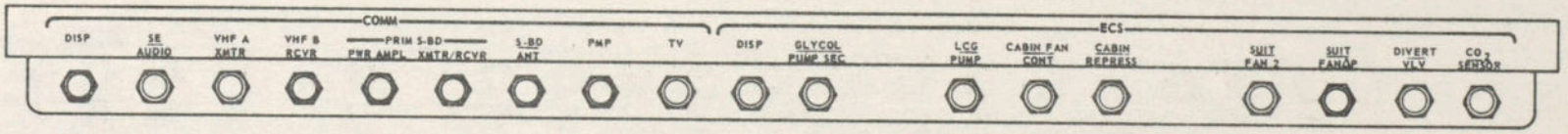
INST
CWEA
SIG SENSOR
PCM/TE
SIG CONDR 2
ECS
SUIT FLOW CONT


COMM
DISP
SE AUDIO
VHF A XMTR
VHF B RCVR
PRIM S-BD
PWR AMPL
XMTR/RCVR
S-BD ANT
PMP
TV
ECS
DISP
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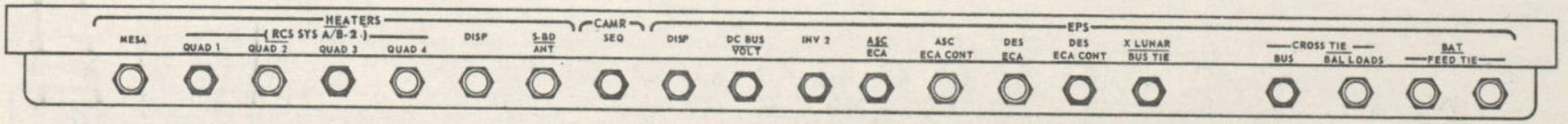
LCG PUMP
CABIN FAN CONT
CABIN REPRESS
SUIT FAN 2
SUIT FAN 1
DIVERT VLV
CO2 SENSOR


HEATERS
MESA
RCS SYS A/B-2
QUAD 1
QUAD 2
QUAD 3
QUAD 4
DISP
S-BD ANT
CAMR
SEQ
EPS
DISP
DC BUS VOLT
INV 2
ASC ECA
ASC ECA CONT
DES ECA
DES ECA CONT
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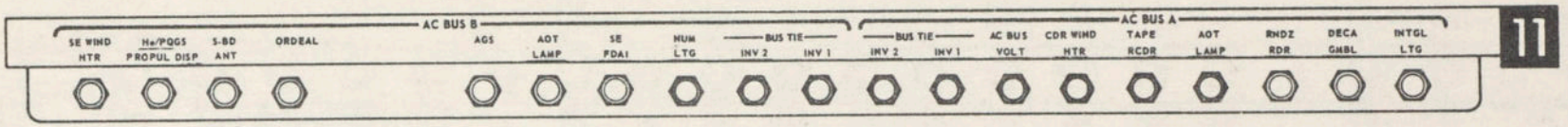
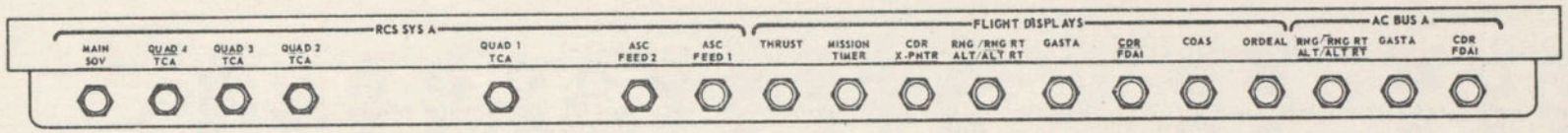
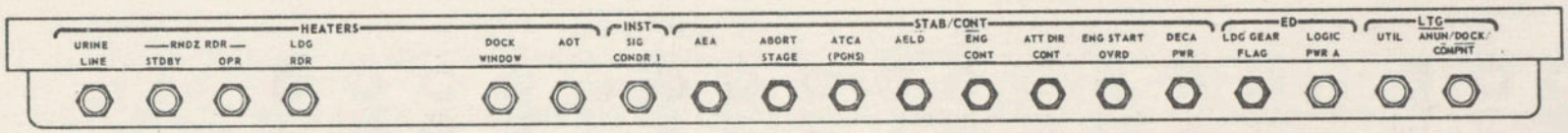
CROSS TIE
BUS
BAL LOADS
BAT
FEED TIE


AC BUS B
SE WIND HTR
He/PQGS PROPUL DISP
S-BD ANT
ORDEAL
AGS
AOT LAMP
SE FDAI
NUM LTG
BUS TIE
INV 2
INV 1
BUS TIE
INV 2
INV 1
AC BUS VOLT
CDR WIND HTR
AC BUS A
TAPE RCDR
AOT LAMP
RNDZ RDR
DECA GMBL
INTGL LTG
11


RCS SYS A
MAIN SOV
QUAD 4 TCA
QUAD 3 TCA
QUAD 2 TCA
QUAD 1 TCA
ASC FEED 2
ASC FEED 1
FLIGHT DISPLAYS
THRUST
MISSION TIMER
CDR X-PNTR
RNG/RNG RT ALT/ALT RT
GASTA
CDR FDAI
COAS
ORDEAL
AC BUS A
RNG/RNG RT ALT/ALT RT
GASTA
CDR FDAI


HEATERS
URINE LINE
RNDZ RDR STDBY
RNDZ RDR OPR
LDG RDR
DOCK WINDOW
AOT
INST
SIG CONDR 1
AEA
ABORT STAGE
STAB/CONT
ATCA (PGNS)
AELD
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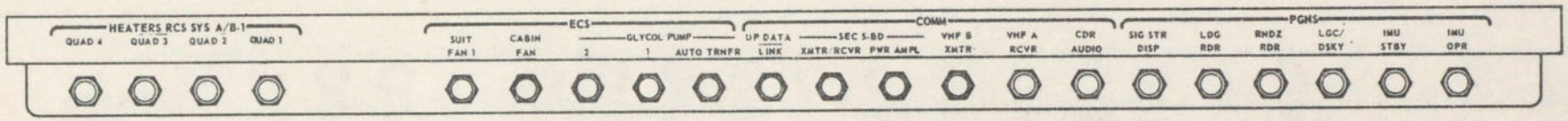
ENG START OVRD
DECA PWR
ED
LDG GEAR FLAG
LOGIC PWR A
LTG
UTIL
ANUN/DOCK/COMPNT


HEATERS RCS SYS A/B-1
QUAD 4
QUAD 3
QUAD 2
QUAD 1
ECS
SUIT FAN 1
CABIN FAN
GLYCOL PUMP
2
1
AUTO TRNFR
COMM
UP DATA LINK
SEC S-BD
XMTR/RCVR
PWR AMPL
VHF B XMTR
VHF A RCVR
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PGNS
SIG STR DISP
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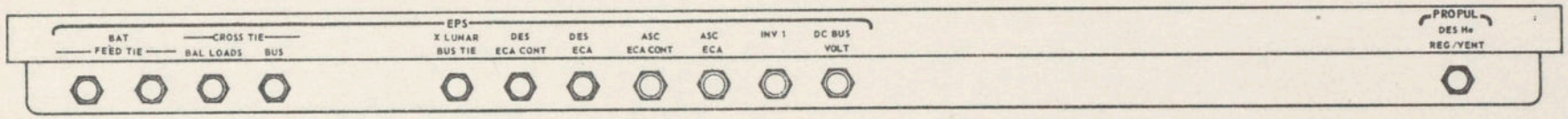
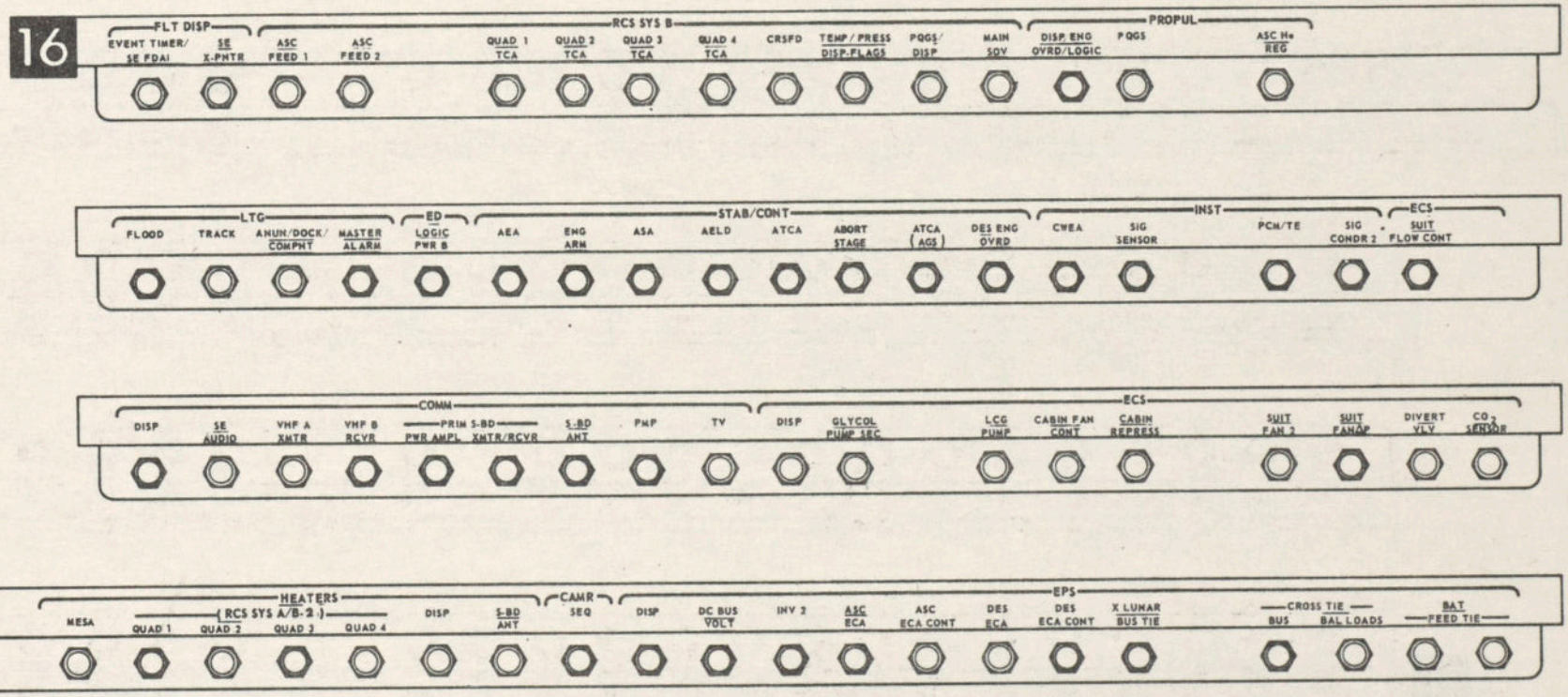
IMU STBY
IMU OPR


BAT
FEED TIE
CROSS TIE
BAL LOADS
BUS
EPS
X LUNAR BUS TIE
DES ECA CONT
DES ECA
ASC ECA CONT
ASC ECA
INV 1
DC BUS VOLT
PROPUL
DES He REG/VENT

DATE 4/5/71

DATE 4/5/71

16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QUAD 2 TCA
QUAD 3 TCA
QUAD 4 TCA
CRSFD
TEMP/PRESS DISP-FLAGS
PQGS/ DISP
MAIN SOV
PROPUL
DISP ENG OVRD/LOGIC
PQGS
ASC He REG
LTG
FLOOD
TRACK
ANUN/DOCK/ COMPNT
MASTER ALARM
ED
LOGIC PWR B
STAB/CONT
AEA
ENG ARM
ASA
AELD
ATCA
ABORT STAGE
ATCA (AGS)
DES ENG OVRD
INST
CWEA
SIG SENSOR
PCM/TE
SIG CONDR 2
ECS
SUIT FLOW CONT
COMM
DISP
SE AUDIO
VHF A XMTR
VHF B RCVR
PRIM S-BD PWR AMPL
S-BD XMTR/RCVR
S-BD ANT
PMP
TV
DISP
GLYCOL PUMP SEC
ECS
LCG PUMP
CABIN FAN CONT
CABIN REPRESS
SUIT FAN 2
SUIT FANΔP
DIVERT VLV
CO2 SENSOR
HEATERS
MESA
(RCS SYS A/B-2)
QUAD 1
QUAD 2
QUAD 3
QUAD 4
DISP
S-BD ANT
CAMR SEQ
DISP
EPS
DC BUS VOLT
INV 2
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DES ECA CONT
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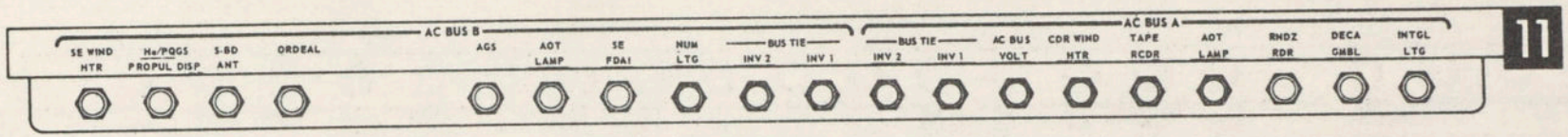
CROSS TIE
BUS
BAL LOADS
BAT
FEED TIE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He/PQGS PROPUL DISP
S-BD ANT
ORDEAL
AGS
AOT LAMP
SE FDAI
NUM LTG
BUS TIE
INV 2
INV 1
AC BUS A
BUS TIE
INV 2
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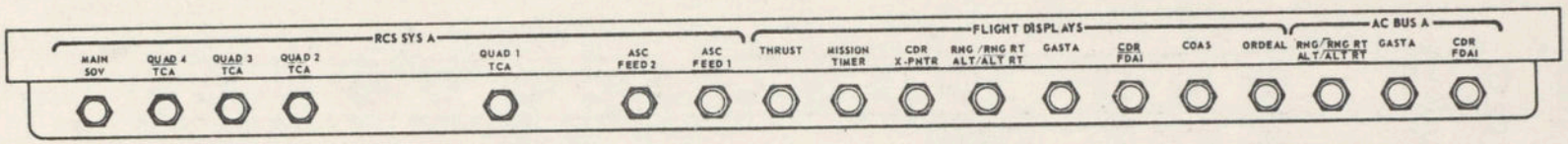
RCS SYS A
MAIN SOV
QUAD 4 TCA
QUAD 3 TCA
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ASC FEED 2
ASC FEED 1
FLIGHT DISPLAYS
THRUST
MISSION TIMER
CDR X-PNTR
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ORDEAL
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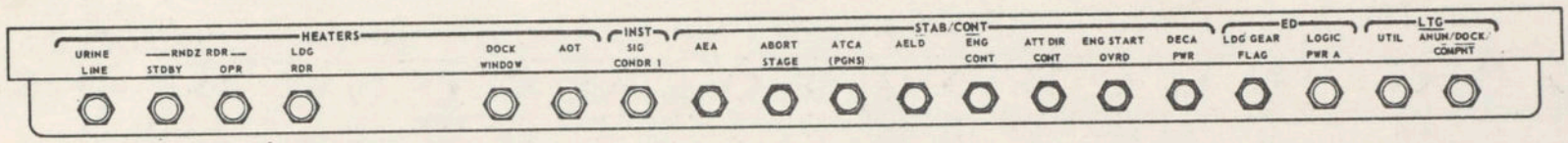
HEATERS
URINE LINE
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STDBY
OPR
LDG RDR
DOCK WINDOW
AOT
INST
SIG CONDR 1
AEA
ABORT STAGE
ATCA (PGNS)
STAB/CONT
AELD
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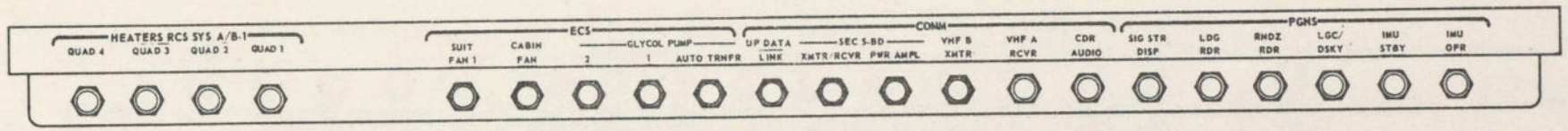
LDG GEAR FLAG
LOGIC PWR A
LTG
UTIL
ANUN/DOCK COMPNT


HEATERS RCS SYS A/B-1
QUAD 4
QUAD 3
QUAD 2
QUAD 1
ECS
SUIT FAN 1
CABIN FAN
GLYCOL PUMP
2
1
AUTO TRNFR
COMM
UP DATA LINK
SEC S-BD
XMTR/RCVR
PWR AMPL
VHF B XMTR
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LGC/ DSKY
IMU STBY
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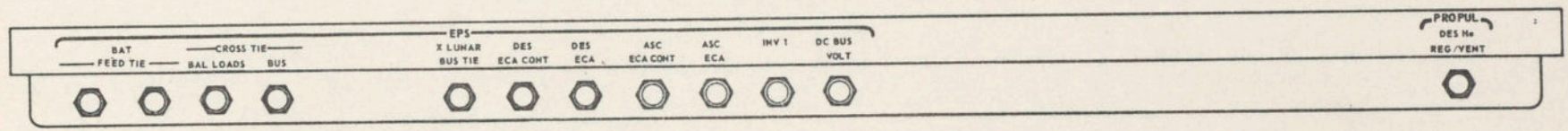
BAT
FEED TIE
CROSS TIE
BAL LOADS
BUS
EPS
X LUNAR BUS TIE
DES ECA CONT
DES ECA
ASC ECA CONT
ASC ECA
INV 1
DC BUS VOLT
PROPUL
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DATE 4/5/71