APOLLO 14	
LM CONTINGENCY CHECKLIST	
PART NO.	S/N
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APOLLO 14

LM CONTINGENCY CHECKLIST

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

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
: 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 2,3,4 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

Changed

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DISPLAY

1 Use display matrix for desired display(s)

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

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

ECS ACTIVATION

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

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

Basic Date 10/16/70 Change

DISPLAY

1 Use display matrix for desired display(s).

CONFIGURE AUDIO

1 Connect To LM Comm Umbilical

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

3 CB(11) COMM: CDR AUDIO - Close
CB(16) INST: SIG SENSOR - Close
: FCM/TE - Close
COMM: SE AUDIO - Close
: PRIM S-BD XMTR/RCVR - Close
: PMP - Close
COMM: S-BAND-PM,PRIM,PRIM,DN VOICE BU,PCM,OFF/RESET, OFF,LO
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	

DISPLAY

1 Use display matrix for desired display(s)

RCS HTR/CIRCUIT BREAKER ACTIVATION

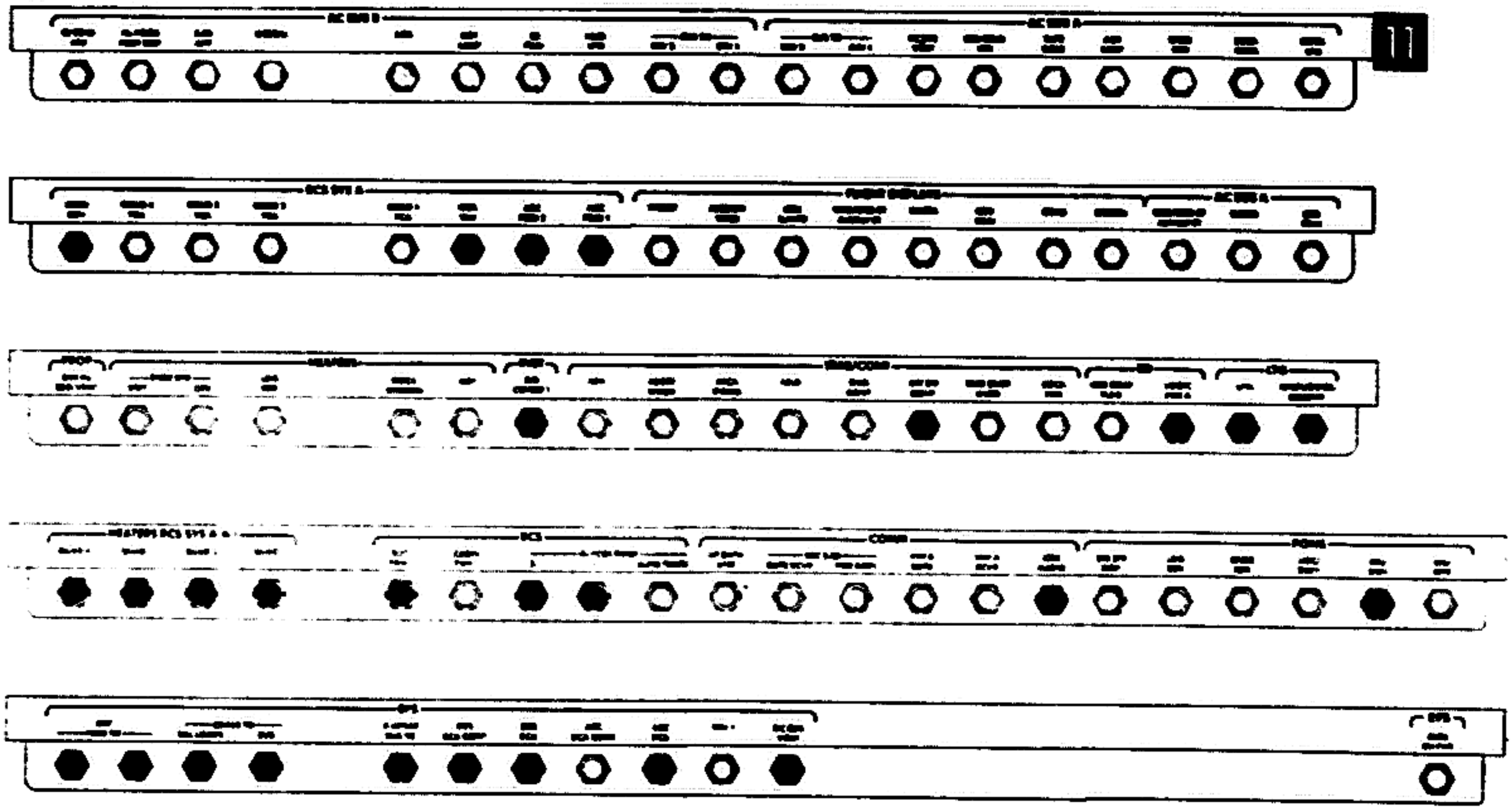
1 RCS SYS A/B-2: QUADS (4) - AUTO

2 Close CB's Per Phase I Activation Chart

Changed

Basic Date 10/16/70

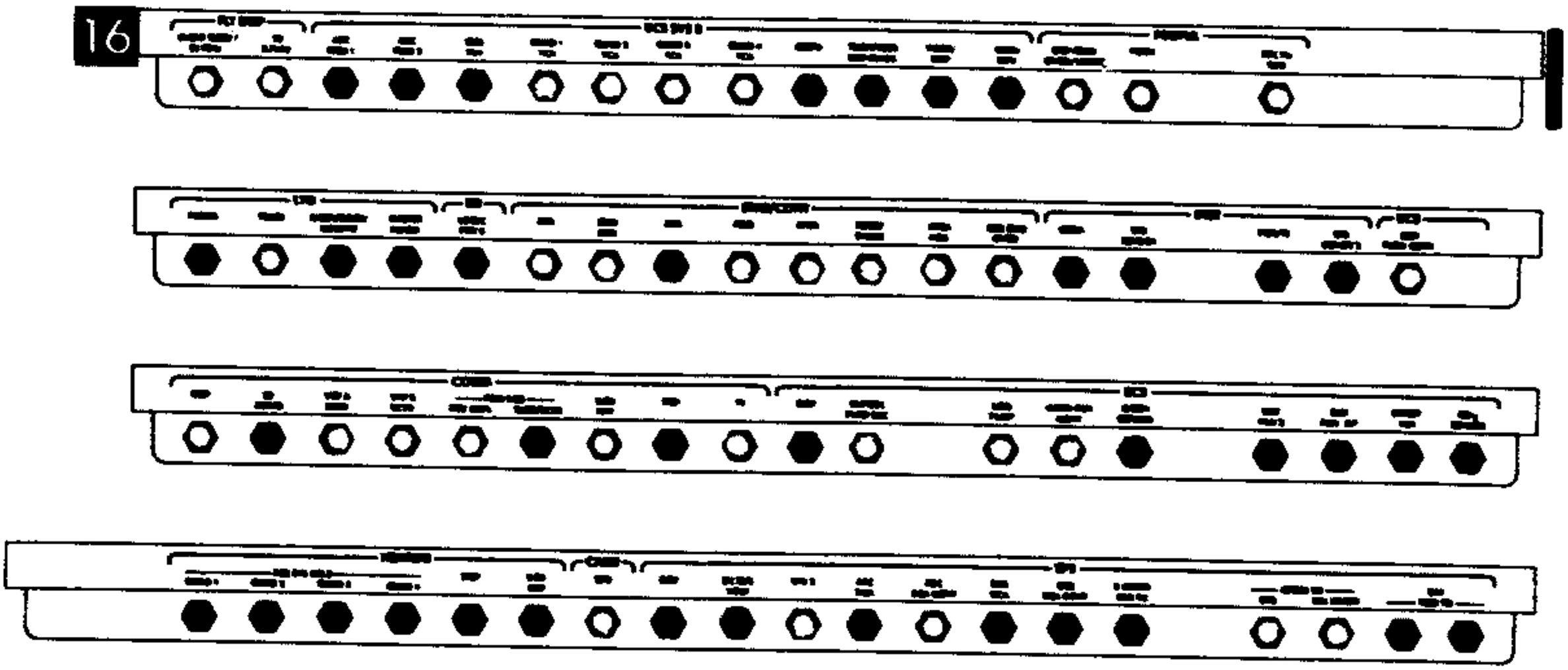
PHASE I CB CONFIGURATION



Basic Date 10/16/70 Changed _____

Basic Date 10/16/70 Changed 12/17/70

PHASE I CB CONFIGURATION



3 CB(16) CWEA - Open then - Close

RCS PRESSURIZATION

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

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

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

4 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
: SYS A&B THR PAIR QUADS(8)-OPEN
: CRSFD - CLOSE
: SYS A&B MAIN SOV-OPEN

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

7 ACA/4 JET - ENABLE

C&W STATUS (AFTER RCS PRESS)

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

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PHASE II

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

PGNS TURN-ON

1 CB(11) PGNS: LGC/DSKY - CLOSE
V35E
F 88 88
(Master Alarm, LGC & ISS Warning, And All DSKY Lts - On, 8's In All Registers; Lts Reset In 5 sec, LGC Warn Within 20 sec)

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

PGNS SELF TEST

1 Check Bus Voltages

2 V25 N01E 1365E
E,E,E

3 V15 N01E 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 > 3 Within 78 sec)

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

5 V21 N27E 0E TERMINATE SELF TEST

DISPLAY

1 Use display matrix for desired display

DOCKED IMU COARSE ALIGN

1 Verify CSM In MIN DEADBAND ATT HOLD

2 Calculate LM Gimbal Angles

OG	IG	MG
300.00	180.00	360.00

_____.____ Rc (See Page 1-1)

(_____.____) -CM (_____.____) +CM (_____.____) -CM

_____.____ LM _____.____ LM _____.____ LM

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

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

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

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

6 V37E 51E
PRO
V37E 00E

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

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

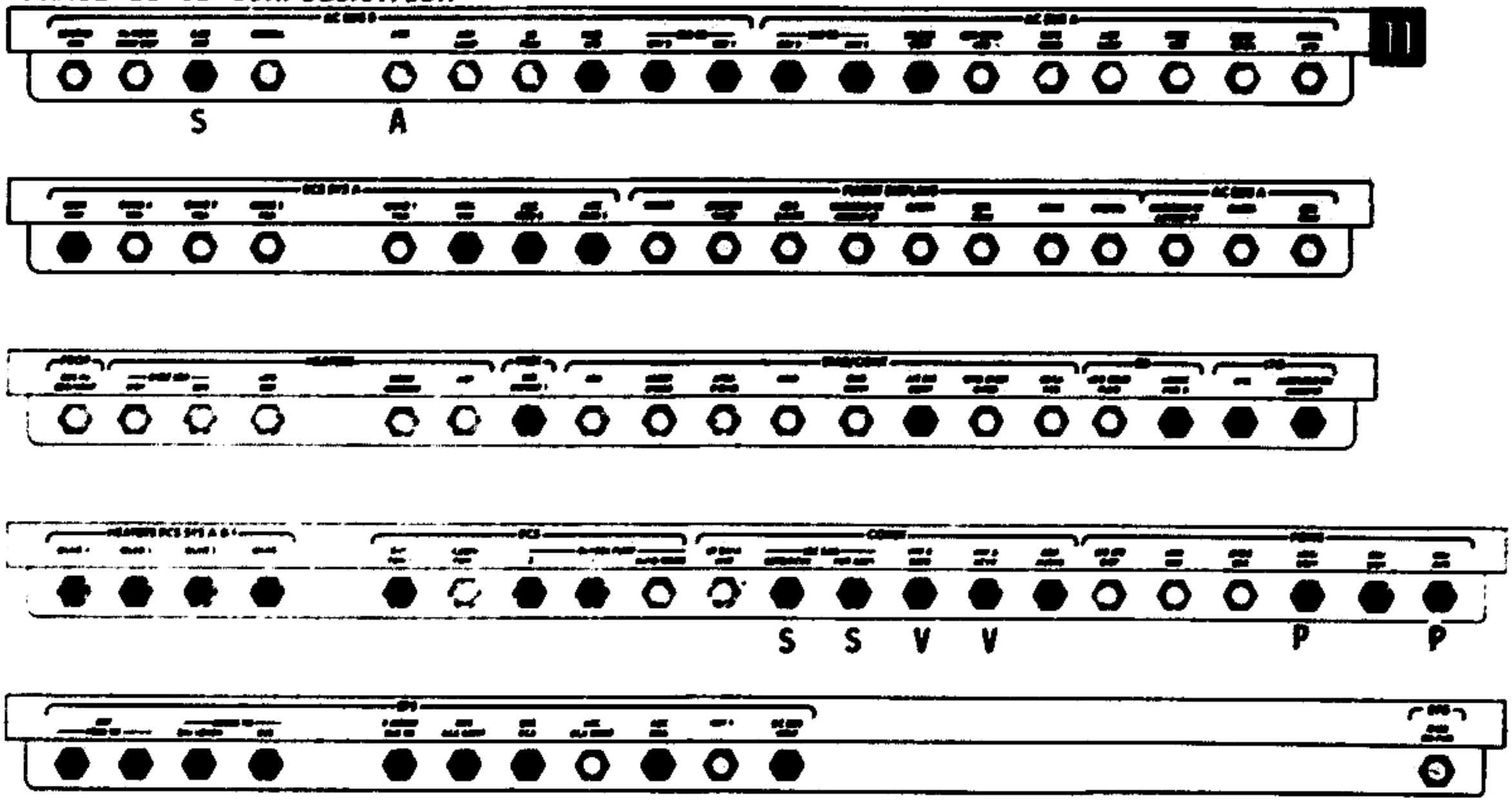
8 Voice Gimbal Angles And Time To MSFN

PHASE II CB ACTIVATION

1 Close CB's Per Phase II Activation Chart

Basic Date 10/16/70 Changed

PHASE II CB CONFIGURATION



P-Closed if PGNS is required
A-Closed if AGS has been powered

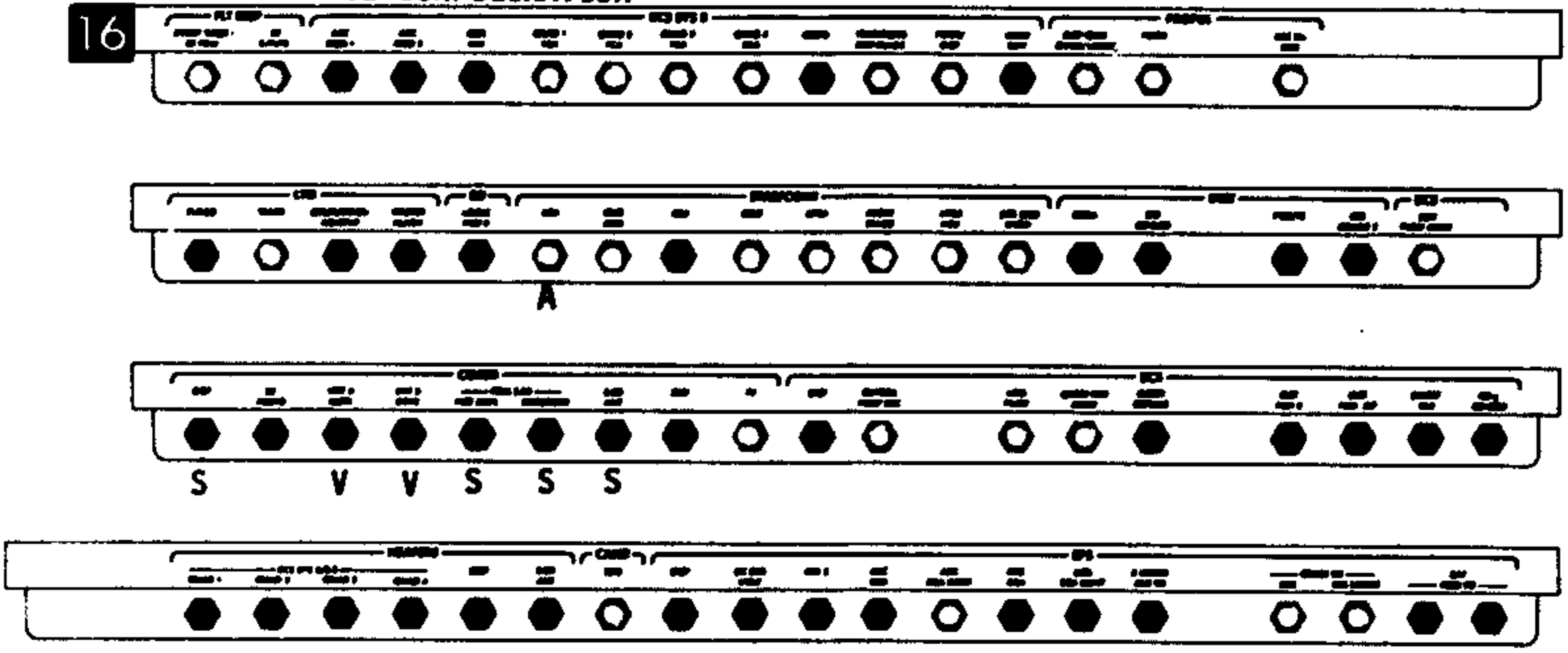
S-Close if S-BD to be powered
V-Close if VHF to be powered

Basic Date 10/16/70

Changed _____

Basic Date 10/16/70 Changed _____

PHASE II CB CONFIGURATION



P-Closed if PGNS is required
A-Closed if AGS has been powered

S-Close if S-BD to be powered
V-Close if VHF to be powered

VHF CHECKOUT

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

2 Perform Voice Check On VHF Simplex B

3 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

AC ACTIVATION

1 INV - 2

S-BD STEERABLE ANTENNA ACTIVATION

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

TRACK MODE - SLEW (Wait 30 Sec)

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

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

Basic Date 10/16/70 Changed ____

DISPLAY

1 Use Display Matrix for desired display

AGS ACTIVATION AND SELF TEST

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

2 000+888888 (OPR ERR Lt-On)

3 123-45679

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

5 574R DESCENT STAGE FLAG (+ Not Staged)

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

7 612R STAGING SEQ COUNTER (+0 Nom)

Changed 10/16/70

Basic Date

IMU FINE ALIGN

1 Copy Ground Calculated Gyro Torquing Angles

X _____, Y _____, Z _____

2 V76E (Verify)
V42E Fine Align IMU
F 21 93 Load Gryo 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

Changed 12/17/70

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PHASE III
(Pre-Burn Prep)

MISSION TIMER ACTIVATION

1 CB(11) AC BUS B: NUM LTG - Close
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 _____

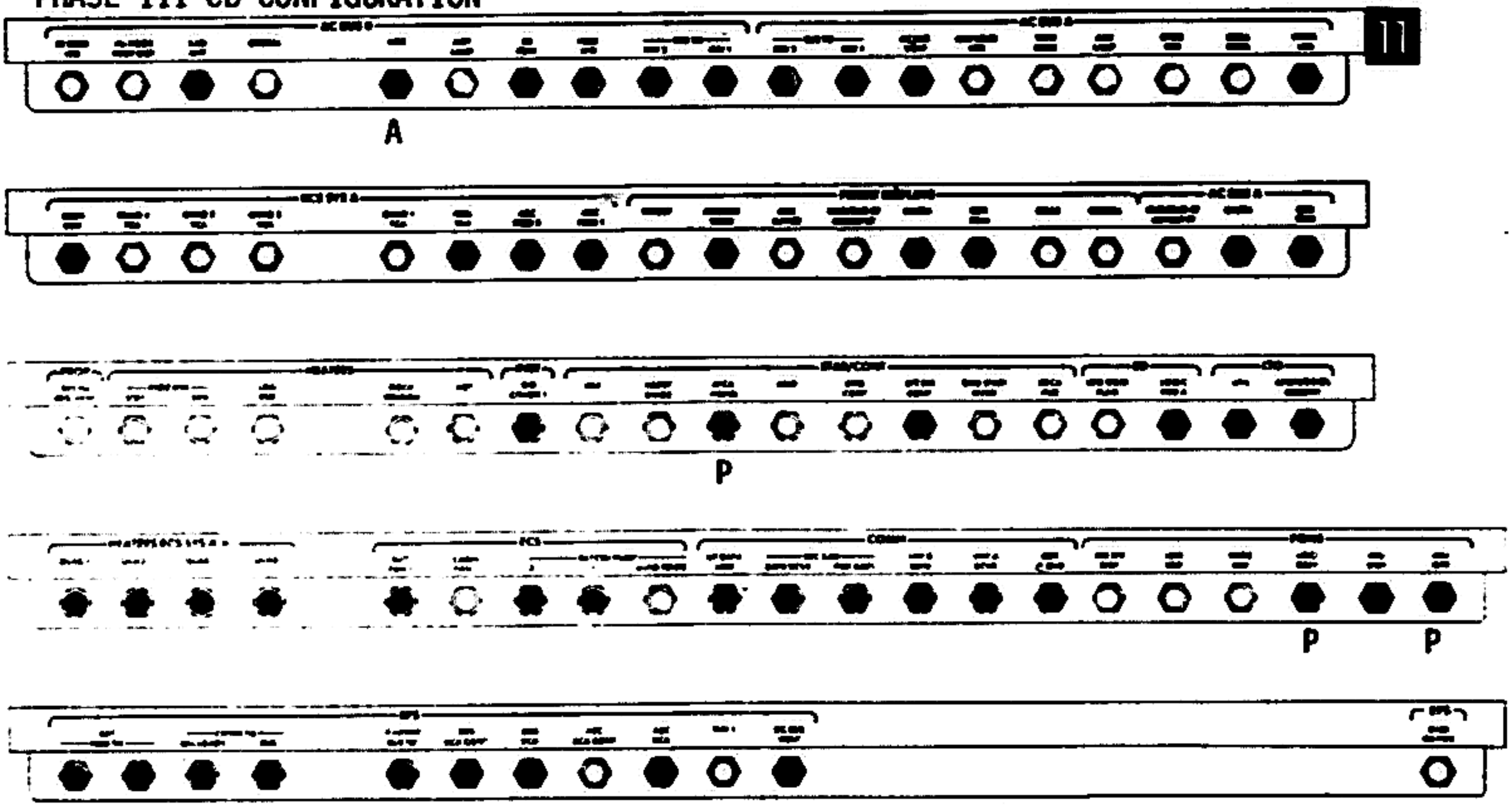
6 V25 N01E, 1706E Load TEPHEM (Octal)

7 V05 N01E, 1706E Verify TEPHEM

PHASE III CB ACTIVATION

1 Close CB's Per Phase III Activation Chart

PHASE III CB CONFIGURATION



A-Required for AGS

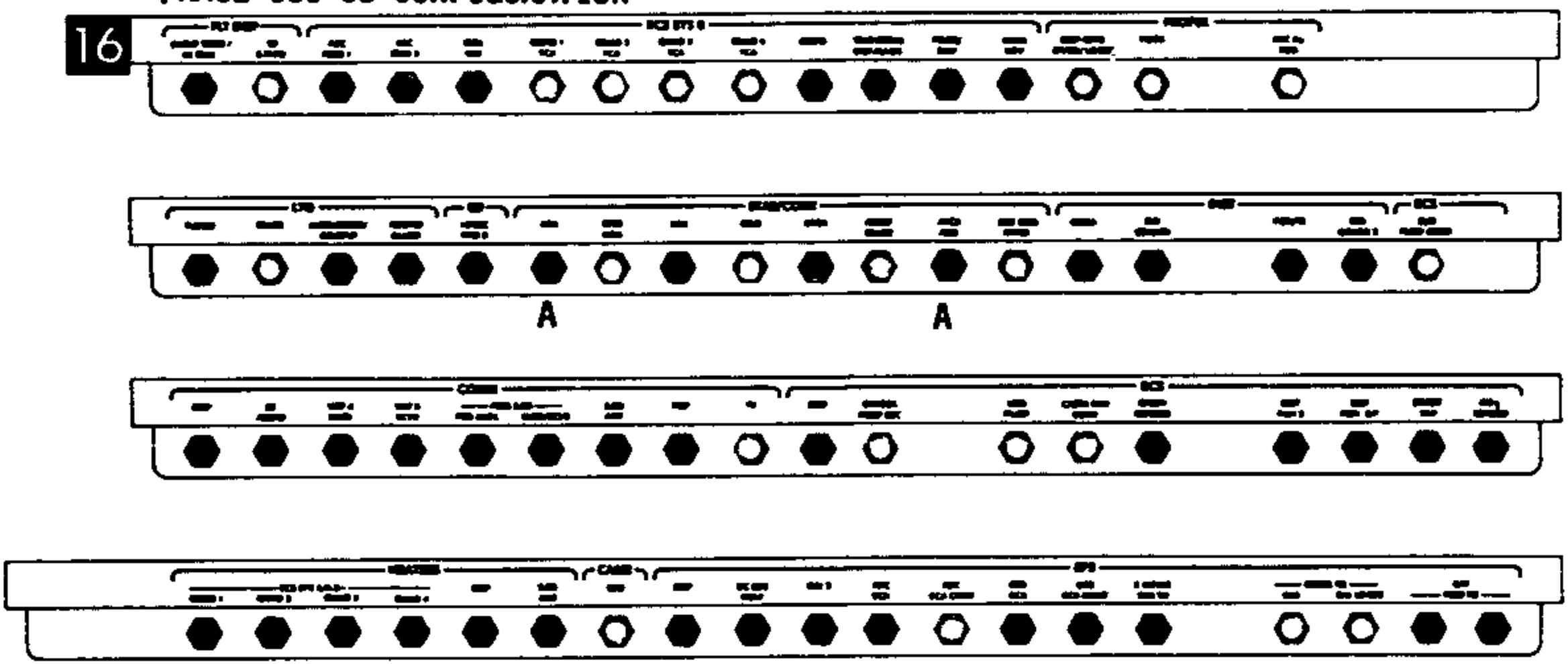
P-Required for PGNS

Basic Date 10/16/70

Changed _____

Basic Date 10/16/70 Changed _____

PHASE III CB CONFIGURATION



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) STAB/CONT: DECA PWR - CLOSE
MODE CONT: PGNS - AUTO (Poss RCS TCA Lt, And QUAD Flags-Red)
V40N20E (To Sync DAP/Error Needles)
Verify GUID CONT - PGNS
THR CONT - MAN
MAN THROT - CDR
TTCA (Both) -THROTTLE (MIN)

CB(11) STAB/CONT: ENG CONT - CLOSE
FLT DISP : THRUST - CLOSE
AC BUS A : DECA GMBL- CLOSE
CB(16) STAB/CONT: ENG ARM - CLOSE

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2 V48E
N46 32021 (31021 if RCS C/O to be omitted)
PRO
N47 + _____ (34150)
+ _____ (From MSFN or CSM)

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

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

3 TTCA (CDR - MIN, THEN SOFT STOP,
CHECK CMD THRUST METER (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

Changed 12/17/70

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DPS PRESSURIZATION AND CHECKOUT

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

2 PRPLNT TEMP/PRESS MON - DES 1&2
(50°-~~90°~~ 75 FUEL, 50°-~~90°~~ 75 OXID/
70-~~[illegible]~~ 122 psi FUEL, ~~39-254~~ 41-78 psi OXID)

3 HELIUM MON: AMB PRESS (1495-1750 psi)
: SUPCRIT PRESS (~~620-1130~~ 776-1000 psi) (@84:30)

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
MASTER ARM-OFF

6 PRPLNT TEMP/PRESS MON: DES 2&1
(50°-90° FUEL, 50°-90° OXID/~~242-253~~ 200-250 psi)
HELIUM MON: AMB PRESS (200-1110 psi)
: SUPCRIT PRESS

7 Cycle CWEA (DES REG Lt - OFF)

Basic Date 10/16/70 Changed 1/20/71

Changed 10/16/70

RCS ACTIVATION

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

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

RCS CHECKOUT

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

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

3 Notify CSM Check Complete

4 V48E, N46 31021
PRO, V34E

END OF PHASE III
Go to appropriate burn checklist

Basic Date

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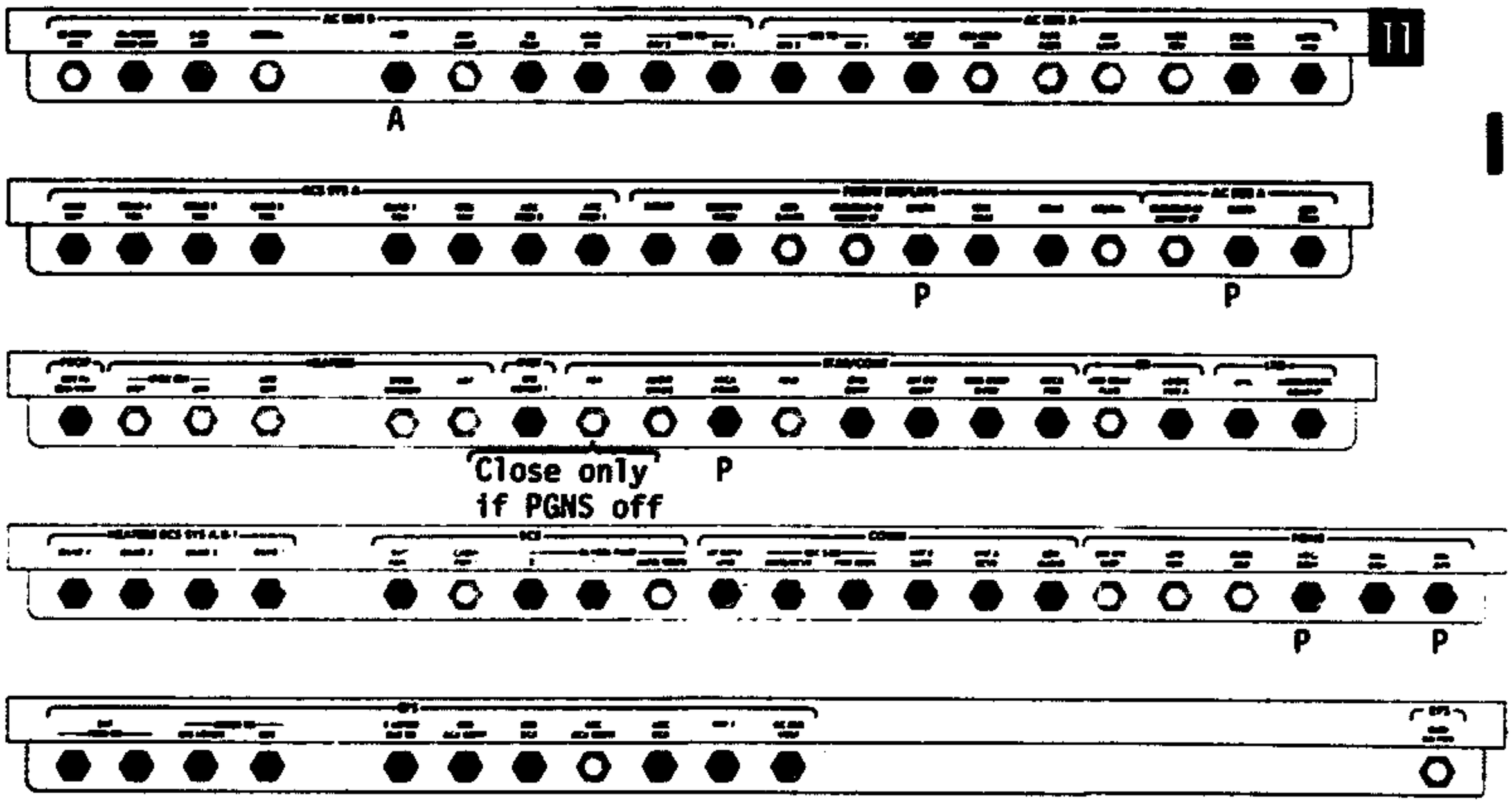
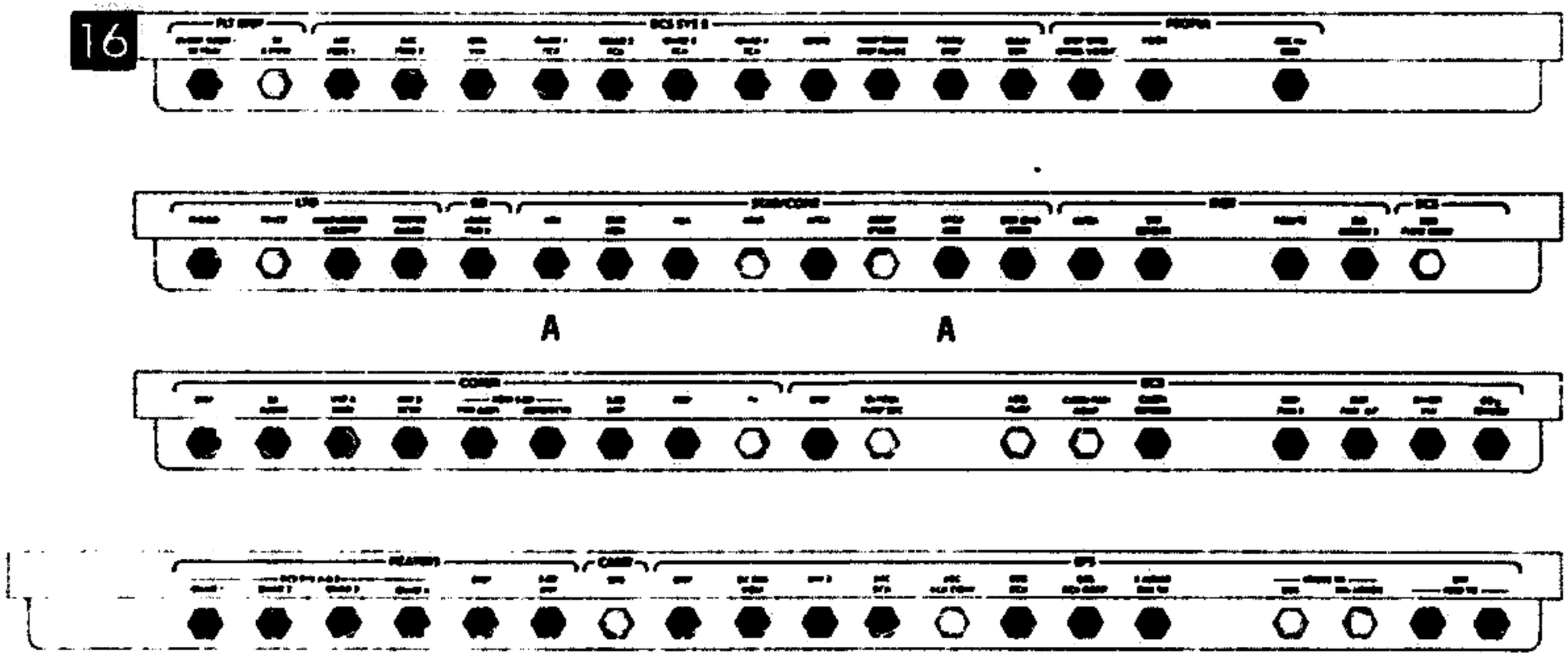
DOCKED DPS BURN



DOCKED DPS BURN



Basic Date 10/16/70 Changed _____

DOCKED DPS BURN (PGNS)

Copy P30 Pad

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

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

SET EVNT TMR
PRO

GUID CONT - PGNS (Verify)

-6:00 P40E

F 50 18

```
CSM Mnvr to Burn Attitude, Then CMC - FREE
```

```
For LM Mnvr:
  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

Changed 11/23/70
Basic Date 1/18/70

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

-4:00 CB(11) INV 1 - CLOSE
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
ENG GMBL - ENABLE (If trimming req'd)
THR CONT - AUTO
MAN THROT - CDR
ATT/TRANSL - 4 JET
BAL CPL - ON
DES ENG CMD OVRD - OFF
DEADBAND - MIN
ENG STOP (2) - Reset
ABORT/ABORT STAGE - Reset
PRPLNT QTY MON - DES 1

V65E

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 1-49 (-1:00), DPS Manual Burn

Basic Date 7/8/70 Changed 11/23/70

-1:00 MASTER ARM - ON (FIRST BURN ONLY)
CB(16) ABORT STAGE - CLOSE

- :30 ENG ARM - DES

- :10 MANUAL ULLAGE (LMP)

- :07 AUTO ULLAGE

- :05 F 99 40, PRO

:00 IGNITION

+ :01 DES He REG 1 - OPEN (If previously closed and PRPLNT QTY >29%)

+ :05 TTCA (CDR) Throttle To 40%

+ :15 MASTER ARM - OFF

When PRPLNT QTY = 29%
DES He REG 1 - CLOSE

At TFC=10 sec (If PRPLNT QTY Between 29% & 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

Changed 12/17/70

Basic Date 7/8/70

PRO
N85 _____ VGX 470 _____
_____ VGY
_____ VGZ

PRO
POOE
V75E

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

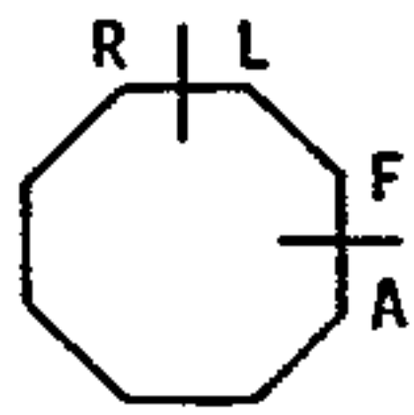
Basic Date 7/8/70 Changed

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.

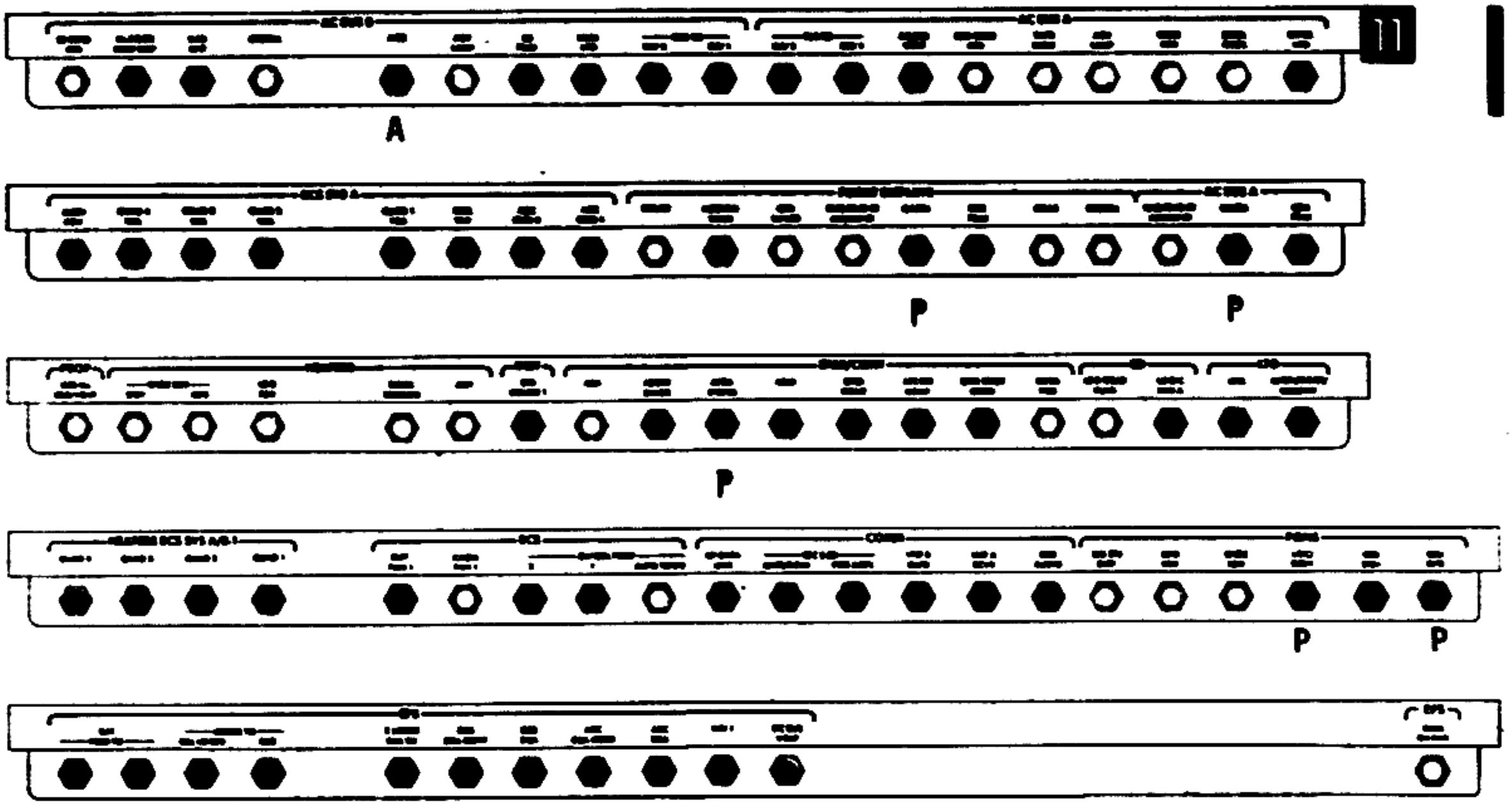
APS BURN TECHNIQUE

*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.



*When APS Ignition Occurs, LMP
*Should Immediately Thrust Aft To
*Maintain Control. ATT CONT:
*PITCH & ROLL - DIR. Use ACA to
* assist control.

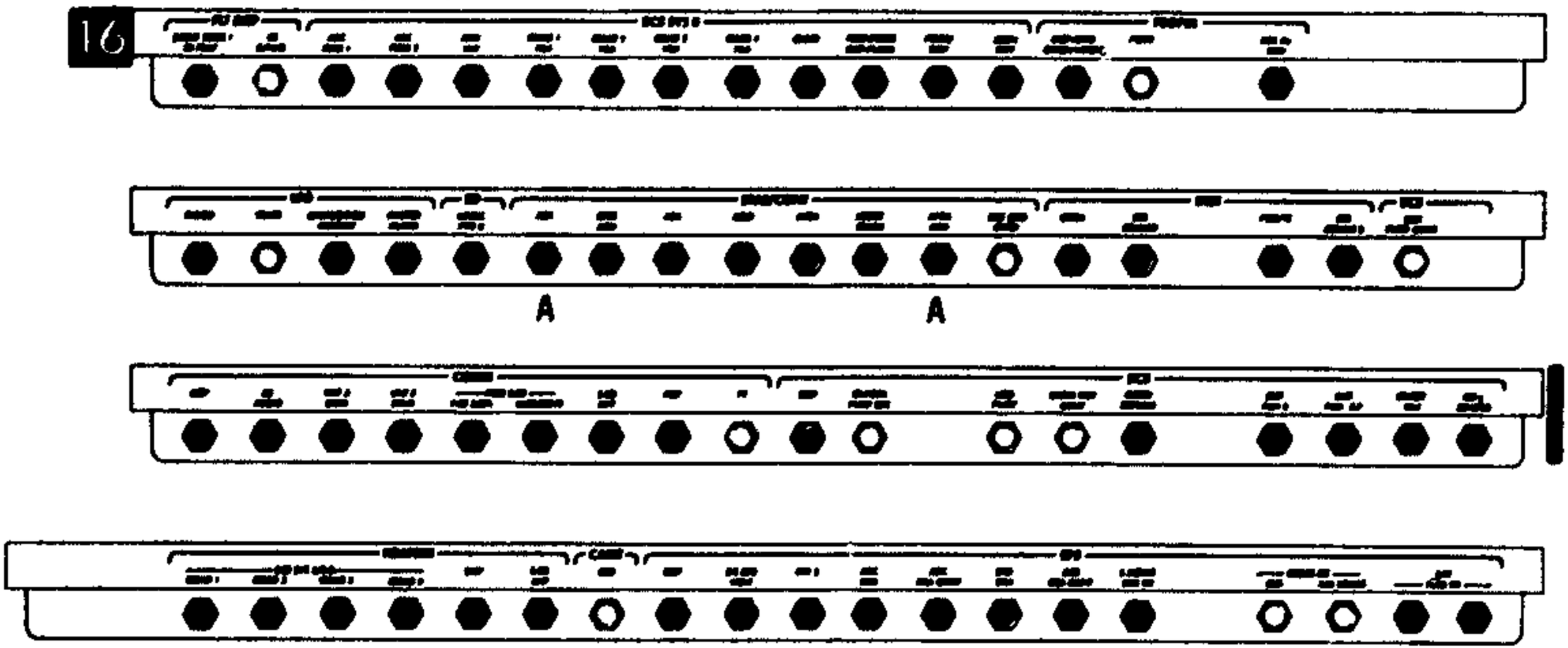
DOCKED APS BURN (PGNS)



Basic Date 10/16/70 Changed 11/23/70

Basic Date 10/16/70 Changed 12/17/70

DOCKED APS BURN (PGNS)



EPS

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

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

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

ASC PRESS

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

ECS

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

EPS

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

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

SET EVNT TMR
PRO

Changed 11/23/70

Basic Date 7/8/70

-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

-1:00 MASTER ARM - ON

Changed 12/17/70
Basic Date 7/8/70

-:30 ENG ARM - ASC

-:10 MANUAL ULLAGE

-:07 STAGE - FIRE

-:05 F 99 40, PRO

-:02 CMC MODE - FREE

:00 ENG START - PUSH
Ignition

Use ACA if req'd to assist Pitch & Roll Control with TTCA. 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

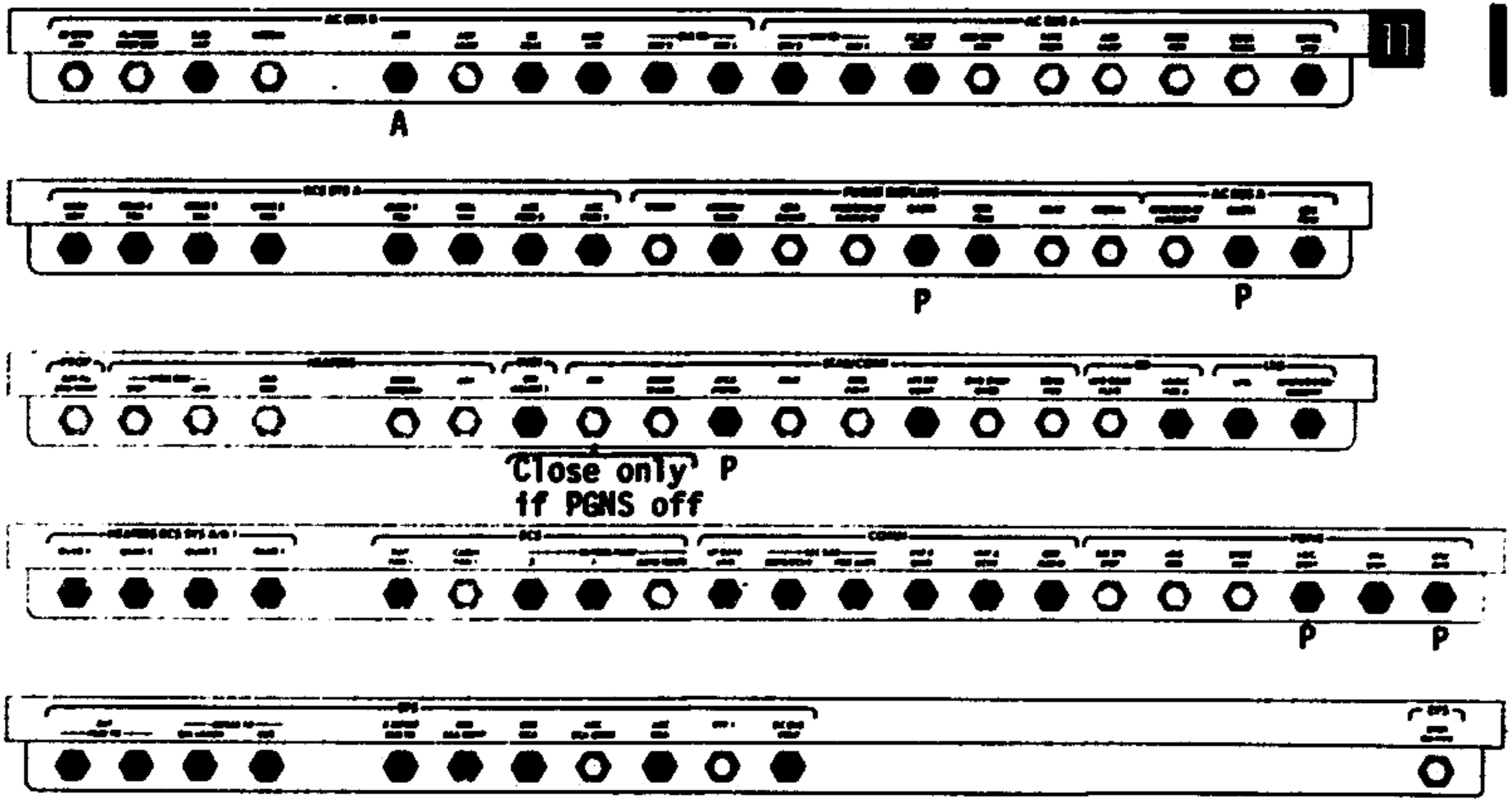
Basic Date 7/8/70 Changed 1/8/71

DOCKED RCS BURN

If a docked RCS Burn is required, configure CB's per following pages, then perform burn via modified DOCKED DPS BURN (MANUAL) procedures, pages 1-48 to 1-49

Basic Date 10/16/70 Changed

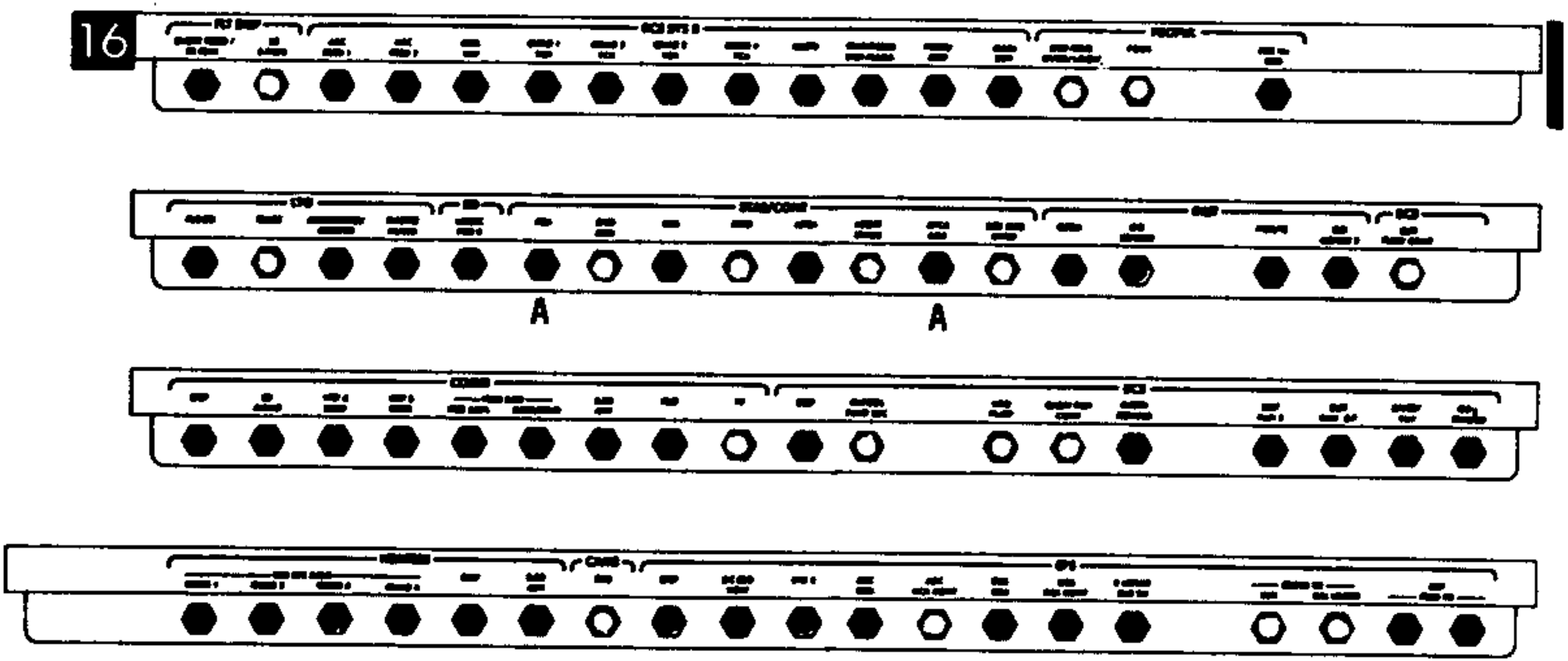
DOCKED RCS BURN



Basic Date 10/16/70 Changed 12/17/70

Basic Date 10/16/70 Changed 12/17/70

DOCKED RCS BURN



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Basic Date 7/8/70

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 (GET ___:___:___)
(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

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

EPS ACTIVATION

1 LTG: ANUN/NUM - BRIGHT

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

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

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

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

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

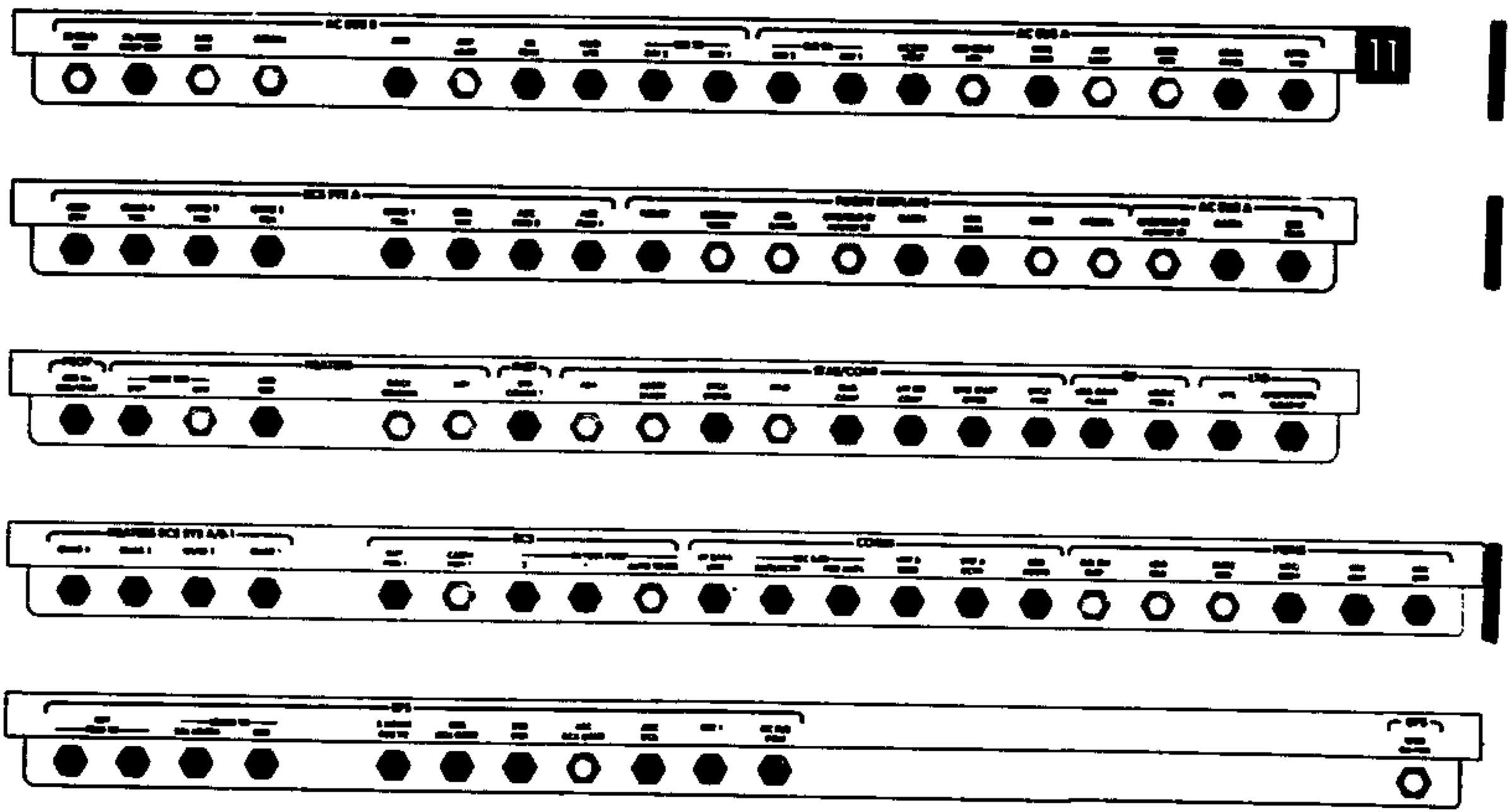
CIRCUIT BREAKER ACTIVATION

1 Close CB's Per 30-MIN ACTIVATION Chart

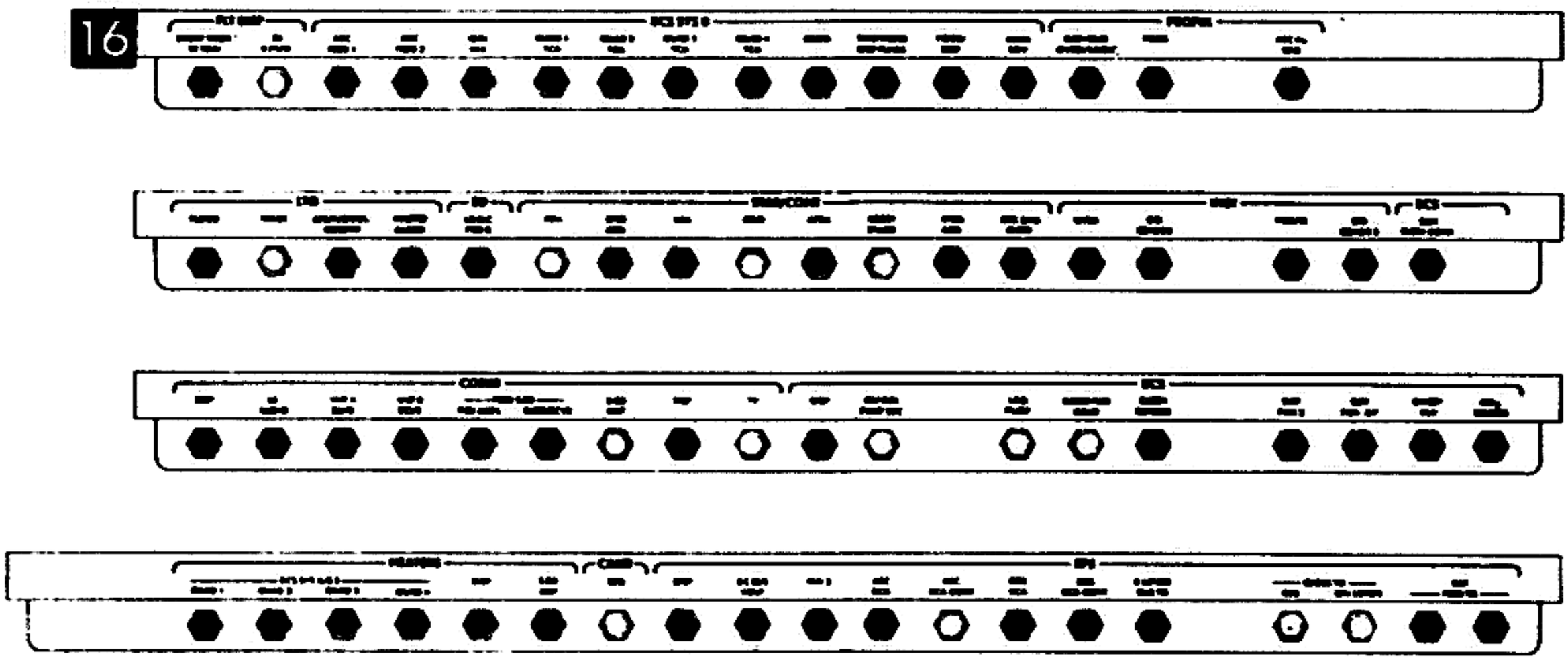
Basic Date 7/8/70 Changed 12/17/70

Basic Date 7/8/70 Changed 12/17/50

30-MIN ACTIVATION



30-MIN ACTIVATION



Basic Date 7/8/70 Changed 12/17/70

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

WARN
RCS A REG
RCS B REG

VHF/S-BD ACTIVATION AND CHECKOUT

1 Connect to LM Comm Umbilical
CSM Configure For VHF Simplex A
VHF - A: XMTR - VOICE
RCVR - ON
AUDIO (BOTH): S-BAND T/R - T/R
ICS T/R - T/R
VHF A - T/R

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

3 LMP Perform Comm Check With CSM

PGNS TURN - ON

1 NO ATT Lt - OFF
V96E

2 Set EVENT TIMER Counting Down to TIG

DAP SET/GIMBAL DRIVE

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

2 V48E
N46 31021
PRO
N47 + _____ (34150)
+ _____ (From MSFN or CSM)

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

Basic Date 7/8/70 Changed 12/17/70

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

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

AGS ACTIVATION

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)
O2/H2O QTY MON - C/W RESET, Then DES

2 412R + 1 SELF TEST SATISFACTORY

RCS PRESS

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

2 Cycle TEMP/PRESS MON

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

Basic Date 7/8/70 Changed 12/17/70

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

DPS PRESS

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

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

3 PRPLNT TEMP/PRESS MON: DES 2&1 200-250
(50°-90° FUEL, 50°-90° OXID/[redacted] psi)
HELIUM MON: AMB PRESS (200-1110 psi)
SUPRCRIT PRESS ([redacted] psi) (@83:00)
768-990

4 CB(16) CWEA - Open Then Close (DES REG Lt-Off)

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

ENABLE LMP CONTROLS

1 ACA PROP - ENABLE
ACA/4 JET - ENABLE
TTCA/TRANSL - ENABLE

Changed ~~10/16/70~~ 11/20/71

Basic Date 7/8/70

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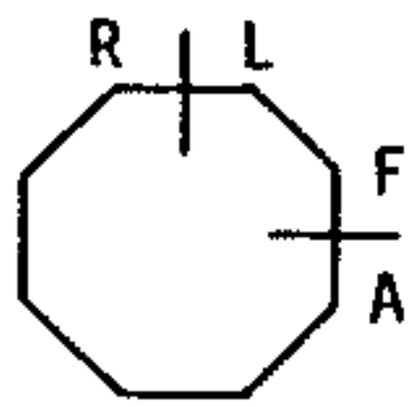
Changed
7/8/70
Basic Date

DOCKED DPS BURN (MANUAL)

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



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

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

At burn attitude:
V40 N20E
V25 N07E, 77E, 10000E, 1E
V01 N01E, 77E (Verify A = 1,3,5,7)
V37E 51E, PRO, V37E00E
400 + 5
400 + 0
MODE CONT (AGS) - AUTO (If LM Mnvr to Att)

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
470P

-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 > 29%)

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

+:15 MASTER ARM - OFF

Monitor ΔVX Via N83, 470

Changed 1/8/71

Basic Date 7/8/70

When PRPLNT QTY = 29%:
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

Basic Date 7/8/70 Changed 11/23/70

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. Burn technique is the same as p. 1-29.

Basic Date 12/17/70 Changed

EPS

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

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

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

ASC PRESS

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

ECS

DES H20 - CLOSE
WATER TANK SEL - ASC
ASC H20 - OPEN
DES 02 - CLOSE
CABIN REPRESS - CLOSE
#1 ASC 02 - OPEN

EPS

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

SET EVENT TIMER
CSM MNVR TO BURN ATTITUDE

```
If Required:
   V41N20E,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, V37E00E
        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
ATT CONT: ROLL - DIR
PITCH - DIR
YAW - MODE CONT
MODE CONT (PGNS) - ATT HOLD
(AGS) - AUTO
ENG STOP (2) - RESET
ABORT/ABORT STAGE - RESET

Changed - 12/17/70
Basic Date

-1:00 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

Use ACA if req'd to assist Pitch & Roll Control with TTCA. 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 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

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

Basic Date 12/17/70 Changed 1/8/71

INITIAL POWER DOWN (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

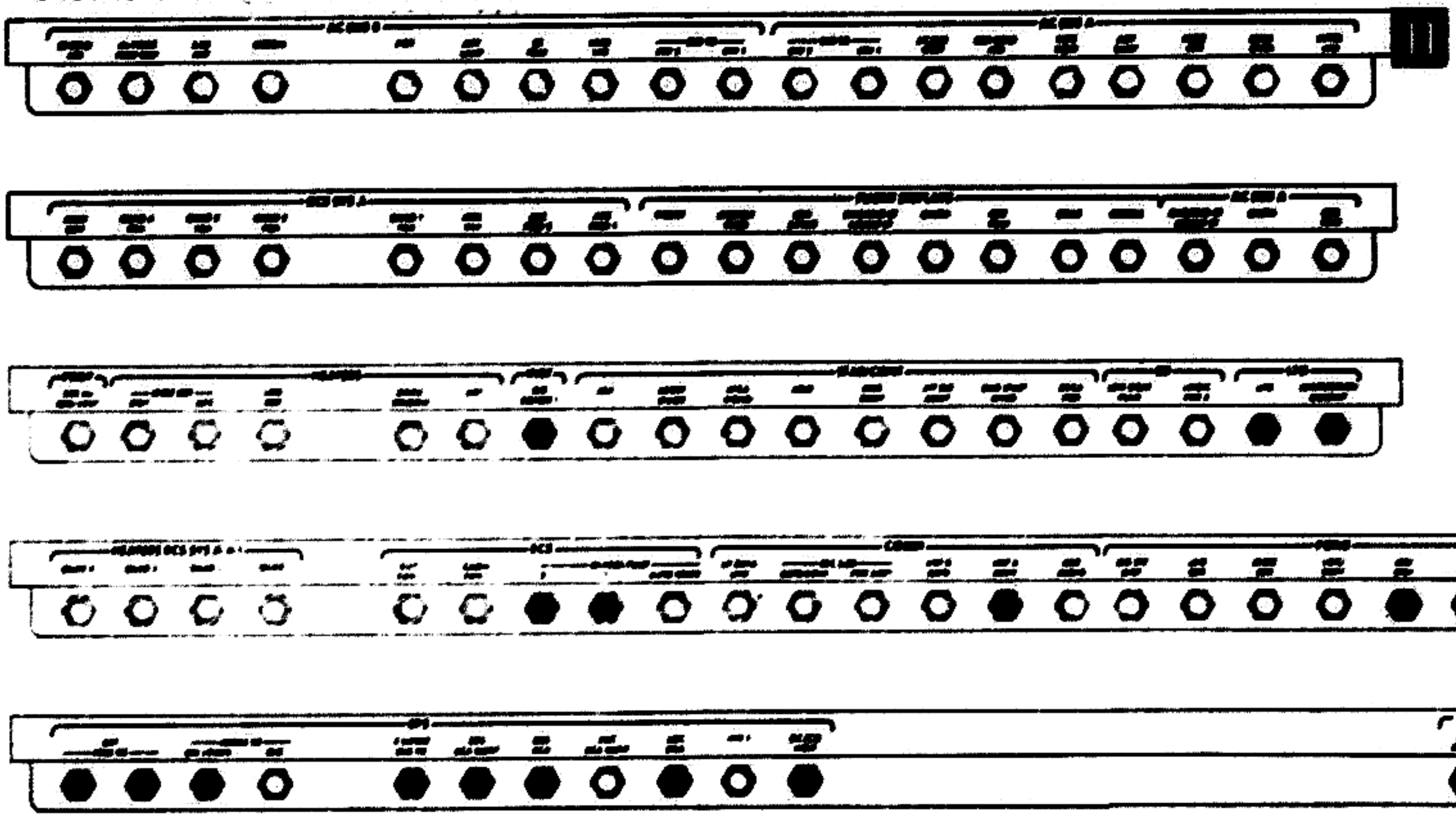
6 MODE CONTROL (Both) - OFF
RCS SYS A/B-2 QUAD 1,2,3,4(4) - OFF

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

8 Configure CB's Per UNSTAGED INITIAL DEACTIVATION Charts

Changed -
Basic Date - 7/8/70

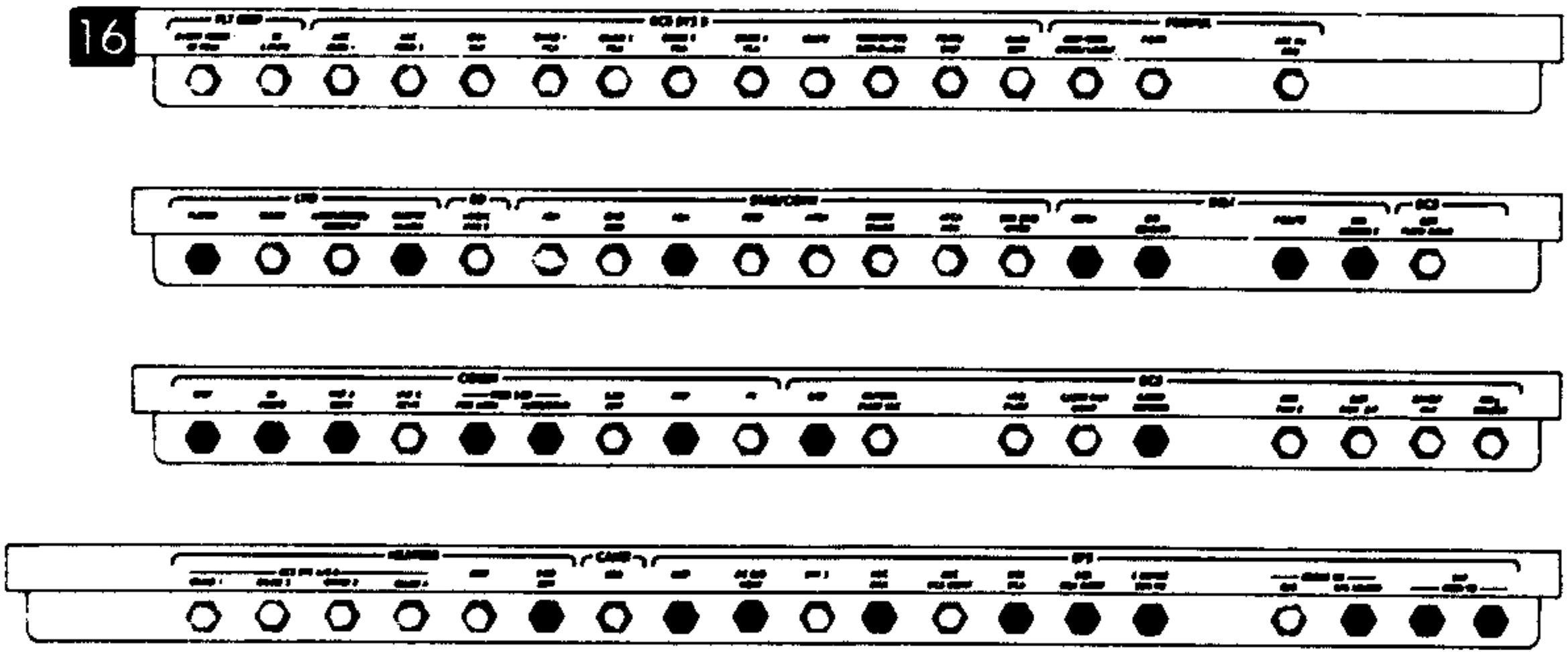
UNSTAGED INITIAL DEACTIVATION



Basic Date 7/8/70 Changed 10/16/70

Basic Date 7/8/70 Changed _____

UNSTAGED INITIAL DEACTIVATION



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,HI

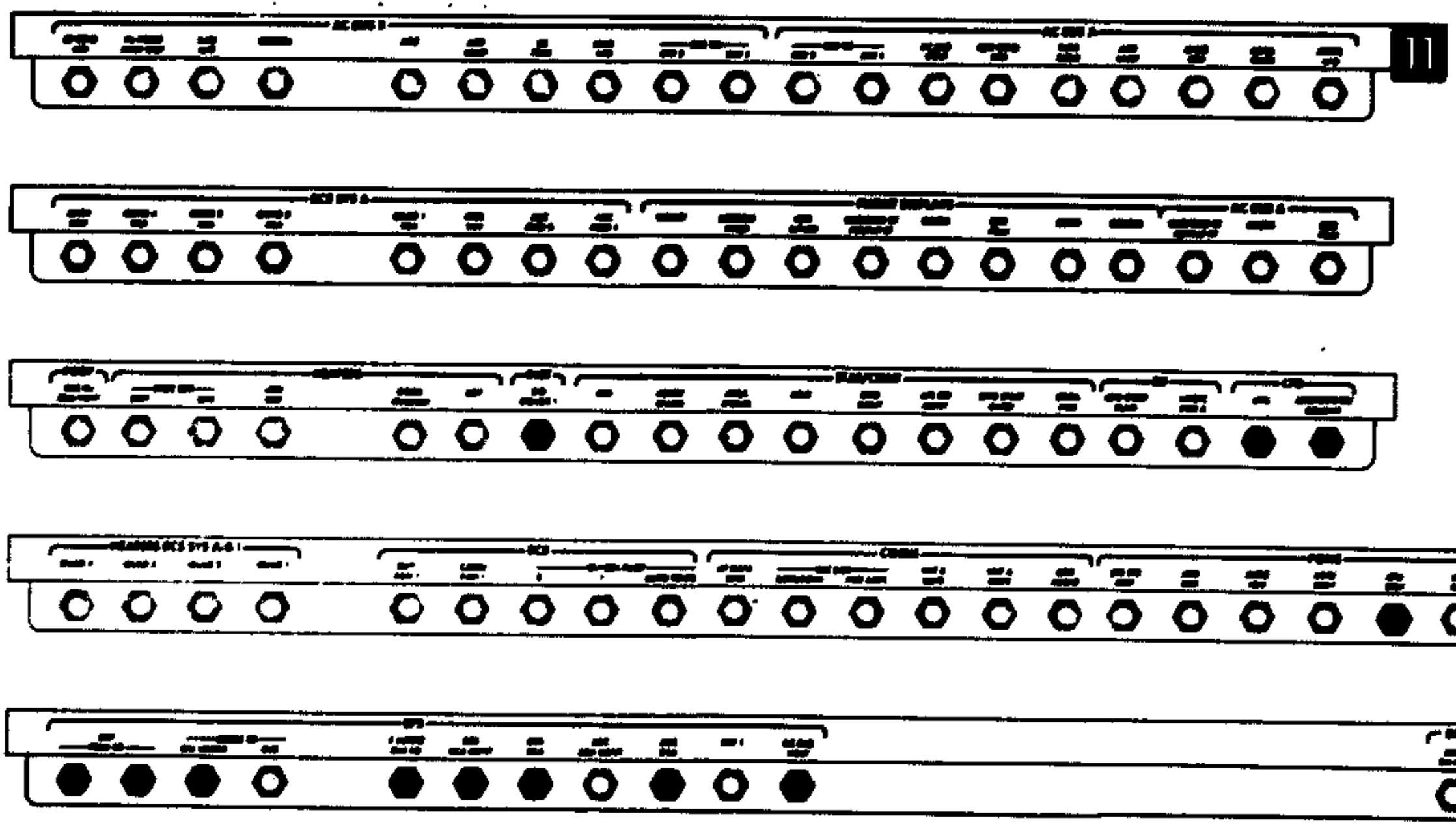
3 ANUN/NUM - DIM

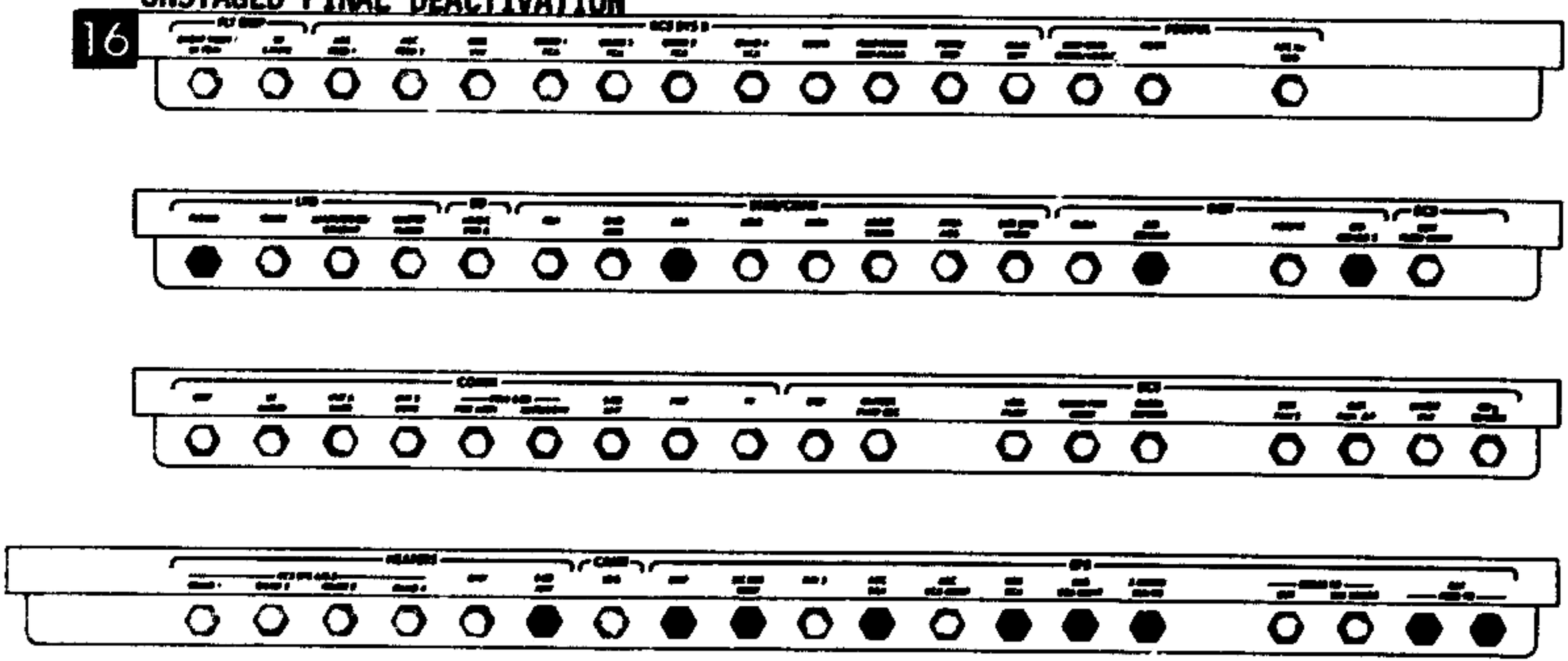
4 Configure CB's Per UNSTAGED FINAL DEACT Charts

Changed

Basic Date 7/8/70 Changed 10/16/70

UNSTAGED FINAL DEACTIVATION





Basic Date 7/8/70

Changed _____

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

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

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

8 UTILITY LIGHTS (Both) - OFF
CB(11&16) EPS: XLUNAR BUS TIE (2) - Open
CSM Position LM PWR - CSM
GET ____:____:____
DES H2O - Close
DES O2 - Close
CABIN REPRESS - Close

FLOOD - OFF

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

Basic Date 7/8/70 Changed -

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Basic Date 7/8/70 Changed

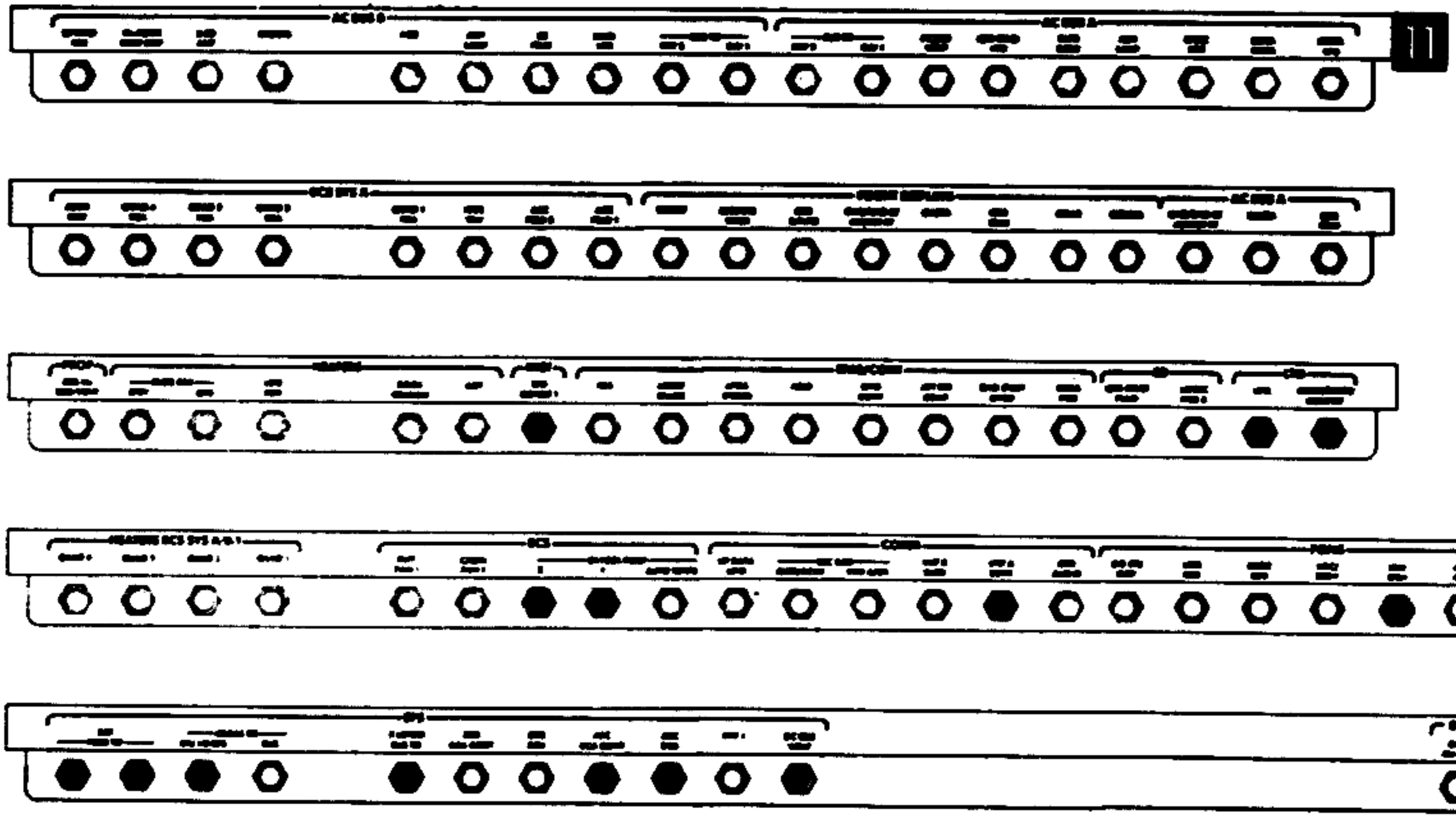
INITIAL PWR DN (STAGED)

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		MODE CONT (Both) - OFF
		RCS SYS A/B-2 QUAD 1,2,3,4,(4) - OFF
7		Window Shades - Up
		CDR transfer to CSM
		INV-OFF
8		Configure CB's Per STAGED INITIAL DEACT Charts

Changed - Basic Date 7/8/70

STAGED POWER DOWN

STAGED INITIAL DEACTIVATION

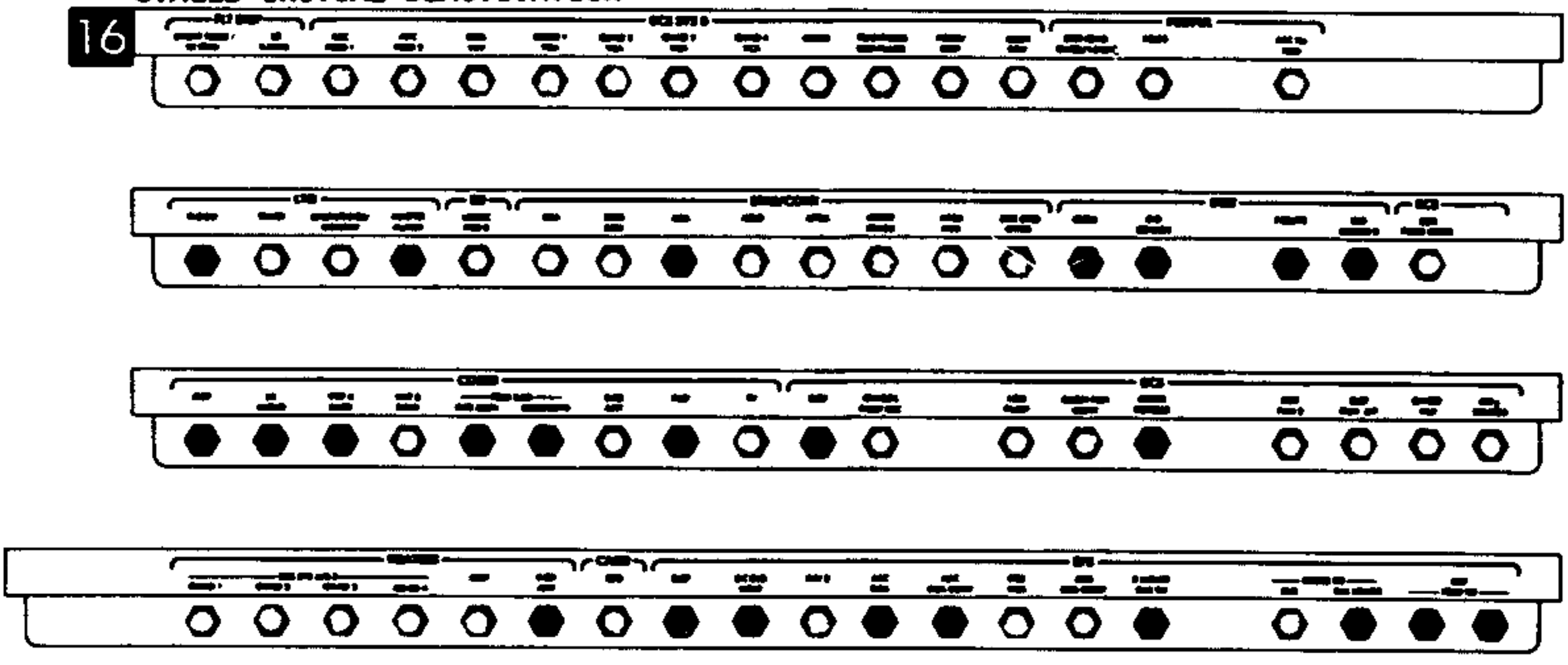


Basic Date 7/8/70 Changed 10/16/70

Basic Date 7/8/70 Changed _____

STAGED INITIAL DEACTIVATION

16



FINAL DEACTIVIATION

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

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

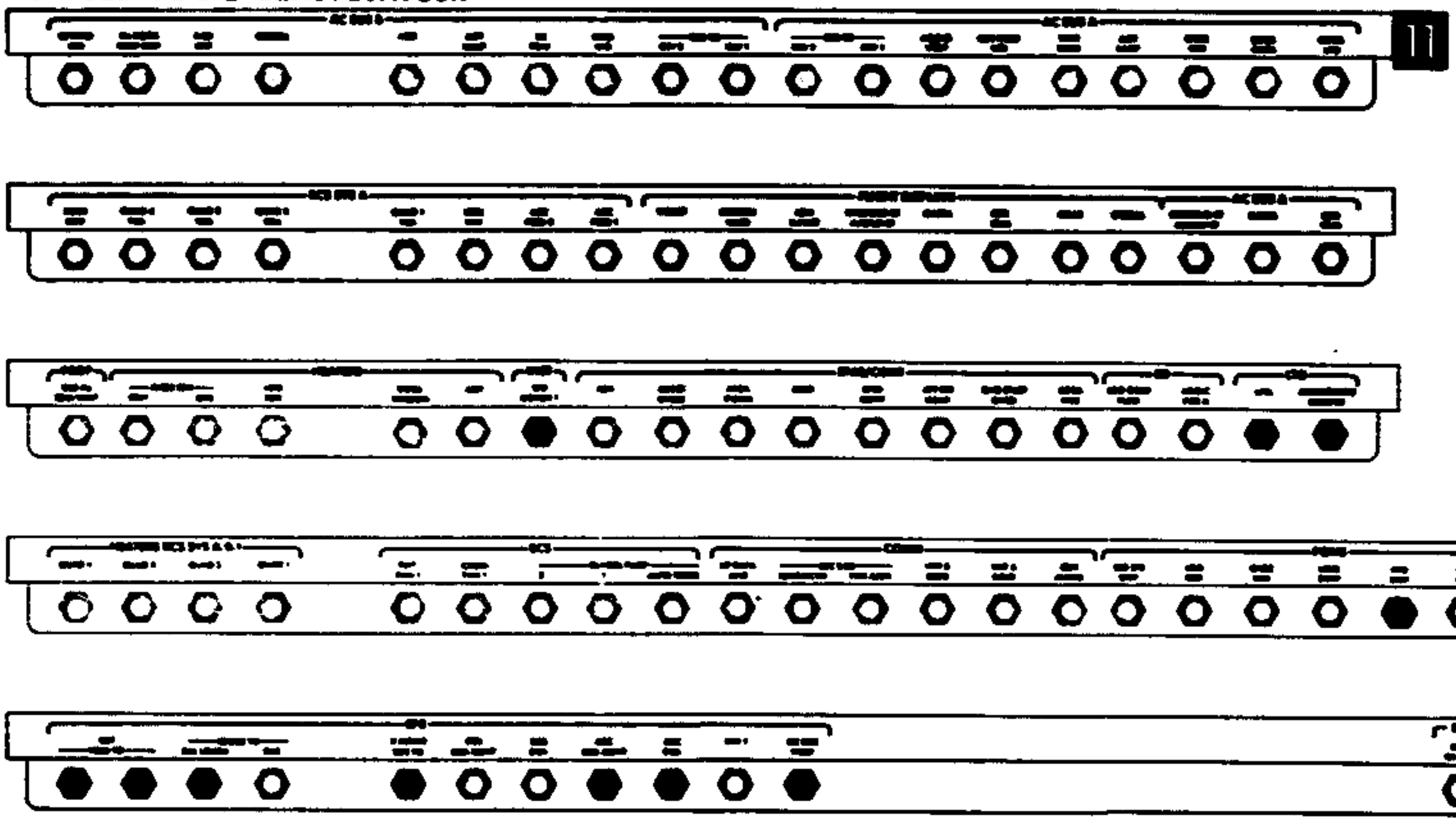
3 ANUN/NUM - DIM

4 Configure CB's Per STAGED FINAL DEACT Charts

Basic Date 7/8/70 Changed 10/16/70

Basic Date 7/8/70 Changed 10/16/70

STAGED FINAL DEACTIVATION



STAGED FINAL DEACTIVATION

16

Basic Date 7/8/70 Changed _____

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

6 To use CSM Power:
CB(16) EPS: CROSS TIE BAL LOADS - Close
Coordinate power transfer with CSM
CB(11) EPS: EMER CM PWR - Close
BAT 5, 6 - OFF/RESET, tb - bp

Changed 12/17/70

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

8 FLOOD - OFF
UTILITY LIGHTS (Both) - OFF
ASC O2 - CLOSE
ASC H2O - CLOSE

Basic Date 7/8/70

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

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

6 To use CSM Power:
CB(16) EPS: CROSS TIE BAL LOADS - Close
Coordinate power transfer with CSM
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: SIG CONDR 2 - Open
EPS: DISP - Open
: DC BUS VOLT - Open
: ASC ECA - Open
: ASC ECA CONT - Open
: CROSS TIE BAL LOADS - Close

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ASC O2 - CLOSE
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9 OVHD CABIN DUMP VALVE - AUTO
Ingress CSM & Secure Hatch

Changed 12/17/70

Basic Date 7/8/70

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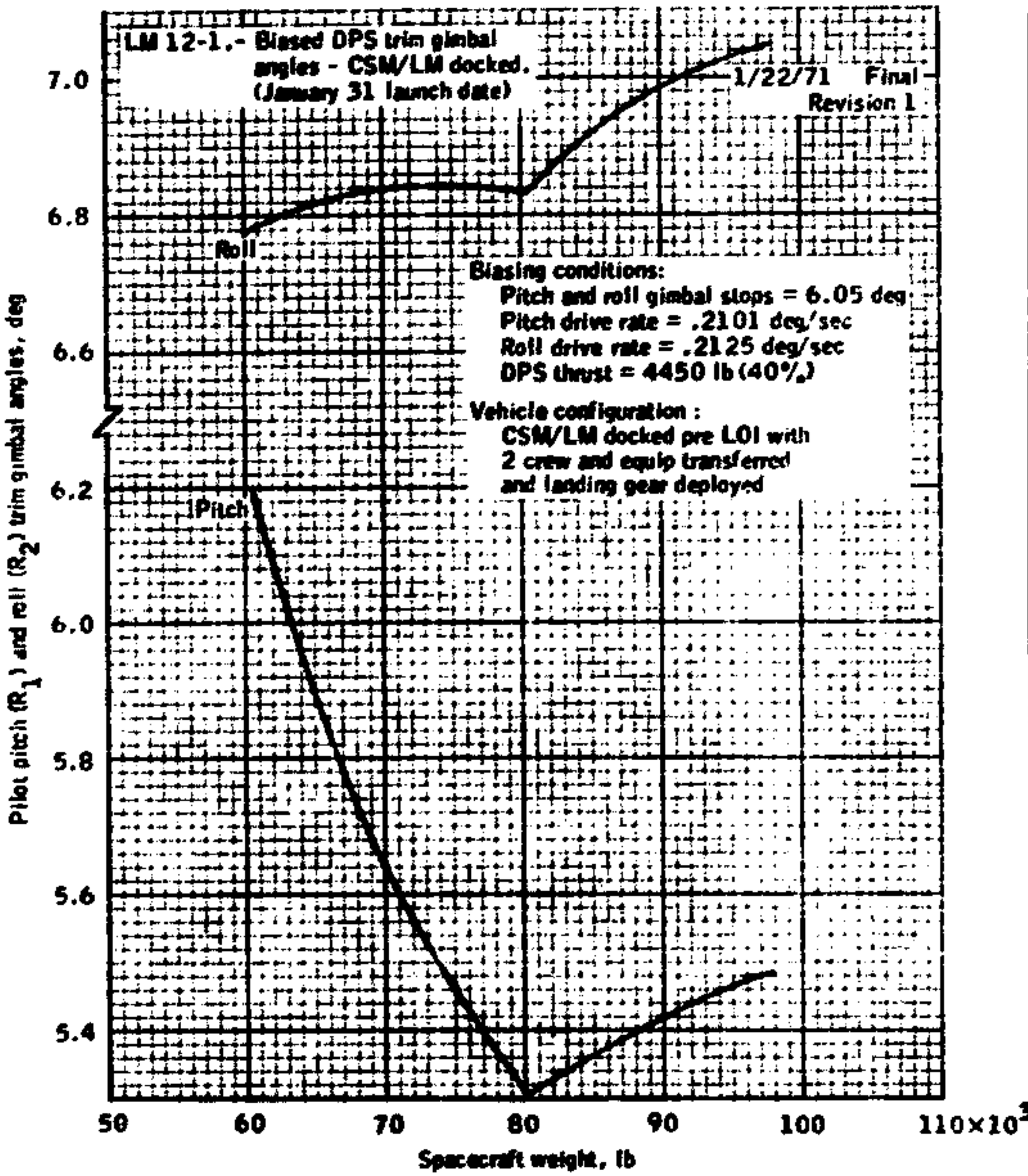
Basic Date 7/8/70 Changed

LM Wt	3	4	1	3	0
CSM Wt					
Spacecraft Wt					



Biased DPS trim gimbal angles - CSM/LM docked.

Basic Date 7/8/70 Changed 12/17/70 1/26/71

GMBL TRIM CHART

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	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		V76	V65
	①						②	②	③

DAP: N46 -31021
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 ENG GMBL - OFF (After pre-trim)

ATTITUDE CONTROL MATRIX (DOCKED)

Basic Date 10/16/70 Changed 1/8/71

	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			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.

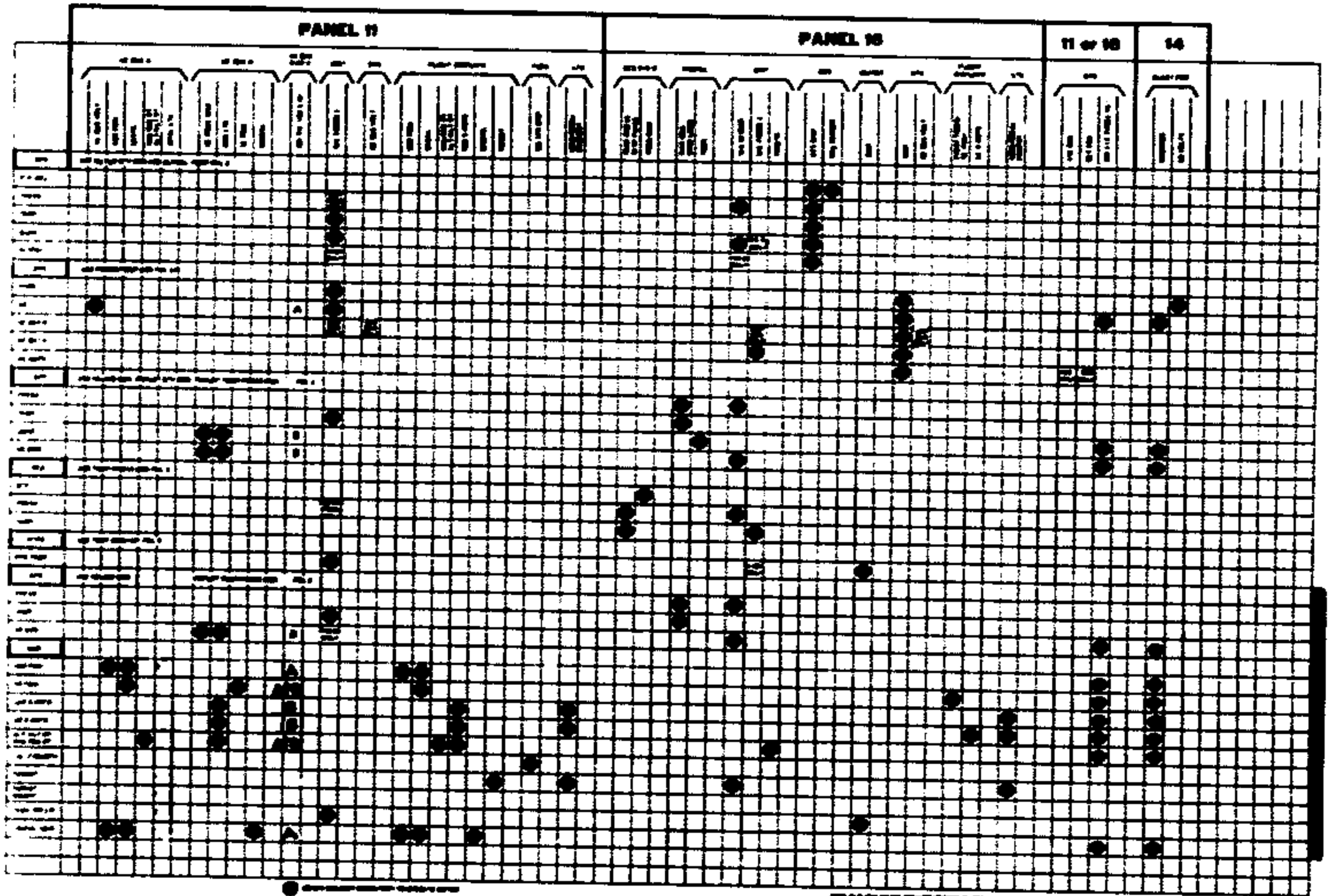
① If TTCA authority becomes degraded due to yaw errors, switch to DIR, otherwise MODE CONT.

② GUID CONT - AGS

ATTITUDE CONTROL MATRIX (DOCKED)

Basic Date 10/16/70 Changed 1/8/71

Basic Date 11/23/70 Changed 12/17/70



1-71

DISPLAY MATRIX

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Basic Date 12/17/70 Changed 1/12/71

EQUIPMENT CYCLING PLAN FOR LOSS OF COOLING	-30	0 (LO)	INS	+30 (LOS)	1+00 (CSI)	1+30 (AOS)	2+00 (CDH)	2+30 (LOS)	3+00 (TPI)	3+30 (AOS DOCK)
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	CONSULT MSFN				
CB(11)RNG 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 →							

EQUIPMENT CYCLING PLAN (NO COOLING)

SPECIAL PROCEDURES SECTION

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:
S-BD: XMTR/RCVR - SEC
: PWR/AMPL - SEC

5 20-60 Sec, STILL NO COMM
DN VOICE BU (Hot Mike)
BIOMED - OFF

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

Changed 10/16/70

Basic Date 7/8/70

LM RELAY MODE / CSM - MSFN

Summary:

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

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

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

LM Will transmit MSFN Voice To CSM On VHF A.

Changed 10/16/70

Perform the following from MODULAR ACTIVATION:

IVT TO LM

POWER TRANSFER

EPS ACTIVATION

ECS ACTIVATION

Basic Date - 7/8/70

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

Changed

Basic Date 7/8/70

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

Changed Basic Date 7/8/70

LOSS OF BOTH ASCENT H20 TANKS

1 Fill Drink Bags With DES H20

2 At L.O.-1:00 (p. 8-1, 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 H20 (p. 8-13, LUNAR SUR CKLST)
- DES H20 - OPEN
- ASC H20 - 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. 8-3 and 8-17, LUNAR SUR CKLST

Basic Date 7/8/70 Changed 12/17/70

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. 2-6
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 02 To Purge Cabin

Changed 12/17/70

Failure During Launch Prep

1 PRESS REG A&B CABIN (p. 8-13 LUNAR SUR CKLST)
Doff Helmets & Gloves

Failure During Ascent

1 Doff Helmets & Gloves
or
PRESS REG A - CABIN
PRESS REG B - DIRECT 02
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 02 To Purge Cabin

Basic Date 7/8/70

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
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

Changed - 11/23/70

Basic Date 7/8/70

PLSS H20 TRANSFER TO LM SUBLIMATOR

1 PLSS H20 SHUTOFF & RELIEF VLV - CLOSE (FWD)

2 Open Flap and Remove PLSS H20 Drain Dust Cap.

3 Vent PLSS H20 Drain to Cabin Ambient using Connector from Small Urine Collection Assembly. (Cut Hole In Bag)

4 When H20 QTY = 10%:
ASC H20 - CLOSE
DES H20 - CLOSE

5 Unstow LM H20 Recharge Hose.
Disconnect H20 Dispenser.
Remove Dust Cap From PLSS H20 Fill Fitting and Connect Recharge Hose.

6 ASC H20 - OPEN

7 Near Depletion (Signal from MSFN):
ASC H20 - CLOSE

8 Disconnect Vent Connector & Recharge Hose.
Install Dust Caps. Reconnect H20 Dispenser.

Changed 11/23/70

Basic Date 7/8/70

SURFACE SUBLIMATOR DRYOUT

ACTIVATE SEC LOOP

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

DRYOUT INITIATION

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

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

SURFACE INITIAL POWER DOWN

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

2 02/H20 QTY MON - ASC
EXTERIOR LTG - OFF

3 SUIT TEMP - COLD
LIQUID COOLING GARMENT - MAX COLD

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

Basic Date 7/8/70 Change 10/16/70

REACTIVATE PRIMARY LOOP

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

Basic Date 7/8/70 Changed

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.

Changed 10/16/70

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
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 (1.3 Hrs Max)

3 LIGHTING: OVERRIDE (A11) - ON

Basic Date 7/8/70

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.

PGNS PTC PROCEDURE FOR CSM/LM CONFIGURATION

1 V48E, Load 3XXXX 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 2XX1X, PRO
V34E

6 Wait 15 min.

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

Basic Date 10/16/70 Changed 11/23/70

AGS PTC PROCEDURE FOR CSM/LM CONFIGURATION

1 400 + 5E Body Axis Align
400 + 0E

2 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

3 Maneuver To PTC Attitude Using TTCA

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

5 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

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

7 MODE CONTROL (AGS) - OFF
PWR DOWN

Basic Date 10/16/70 Change 1

AGS PTC PROCEDURE FOR CM/LM CONFIGURATION

1 400 + 5E Body Axis Align
400 + 0E

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

3 Maneuver To Desired Attitude Using ACA

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

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

Changed

Basic Date 10/16/70

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

Basic Date 10/16/70 Change d

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

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

Basic Date 10/16/70 Changed

LM TO CSM POWER TRANSFER

1 Verify/Perform

```
CB(11)  EPS: CROSS TIE BAL LOADS - Close
           : CROSS TIE BUS - Close
           : X LUNAR BUS TIE - Close
           : DES ECA CONT - Close
           : DES ECA - Close
           : ASC ECA - Close
           : ASC ECA CONT - Close
CB(16) INST: SIG CONDR 2 - Close
        EPS: DISP - Close
           : ASC ECA - Close
           : DES ECA - Close
           : DES ECA CONT - Close
           : X LUNAR BUS TIE - Close
           : CROSS TIE BAL LOADS - Close
```

2 BAT 5 NORMAL FEED - ON

3 If DES Bats On:
  BAT 1,2,3,4 HI VOLT - OFF/RESET (tb-bp)

4 Connect LM/CSM umbilicals

5 Verify CSM configured for power transfer

6 CB(11) EPS: EMER CM PWR - Close

7 If Unstaged:
  BAT 1,2,3,4 HI VOLT - ON (tb - gray)
  BAT 5 NORMAL FEED - OFF/RESET (tb-bp)
  CB(11) EPS: ASC ECA CONT - Open
            : EMER CM PWR - Open

Changed 10/16/70

Basic Date 7/8/70

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
: BAT FEED TIE (2) - Open

4 If DES BATS Still Required:
BAT 1 HI VOLTAGE - OFF/RESET, tb-bp
BAT 2 LOW VOLTAGE - OFF/RESET, then ON, tb-LO
BAT 2 HI VOLTAGE - OFF/RESET, then ON, tb-gray
BAT 1 HI VOLTAGE - ON, tb-gray

If DES BATS Not Required:
BAT 1,2,3,4 HI VOLTAGE - OFF/RESET, tb's-bp
BAT 2 LOW VOLTAGE - ON, tb-LO
BAT 2 LOW VOLTAGE - OFF/RESET, tb-bp

5 CB(16) EPS: BAT FEED TIE (2) - Close

Basic Date 7/8/70 Changed —

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	.40 Amps
(25 Min Warm-up)	
AGS DISP: CB(11) AC BUS B: AGS - Open	.16 Amps
********** CES **********	
*ATCA: CB(16) STAB/CONT: ATCA - Open	1.93 Amps
GDA: CB(11) AC BUS A: DECA GMBL - Open	.25 Amps
********** RADAR **********	
*RR: CB(11) PGNS: RNDZ RDR - Open	5.35 Amps
CB(11) AC BUS A: RNDZ RDR - Open	.57 Amps
LR: CB(11) PGNS: LDG RDR - Open	4.21 Amps

Changed 10/16/70

Basic Date 7/8/70

********** 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

Changed — 10/16/70

********** 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

Basic Date — 7/8/70

********** 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

Basic Date 7/8/70 Changed 10/16/70

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

*INV 1: CB(11) EPS: INV 1 - Open	1.43 (NO LOAD)	Amps
*INV 2: CB(16) EPS: INV 2 - Open	1.43 (NO LOAD)	Amps

********** 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 (2.5 Hr Warm-up)	.45	Amps
*AOT: CB(16) HEATERS: AOT - Open	.20	Amps
CDR WIND: CB(11) AC BUS A: CDR WIND HTR- Open (Up to 90 min to Clear Window)	2.56	Amps
LMP WIND: CB(11) AC BUS B: SE WIND HTR - Open (Up to 90 min to Clear Window)	2.56	Amps
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 (If Coolant Off, .30 Amps)	2.14	Amps
S-BD ANT: CB(11) HEATERS - S-BD ANT - Open	.02	Amps

Basic Date 7/8/70 Changed 10/16/70

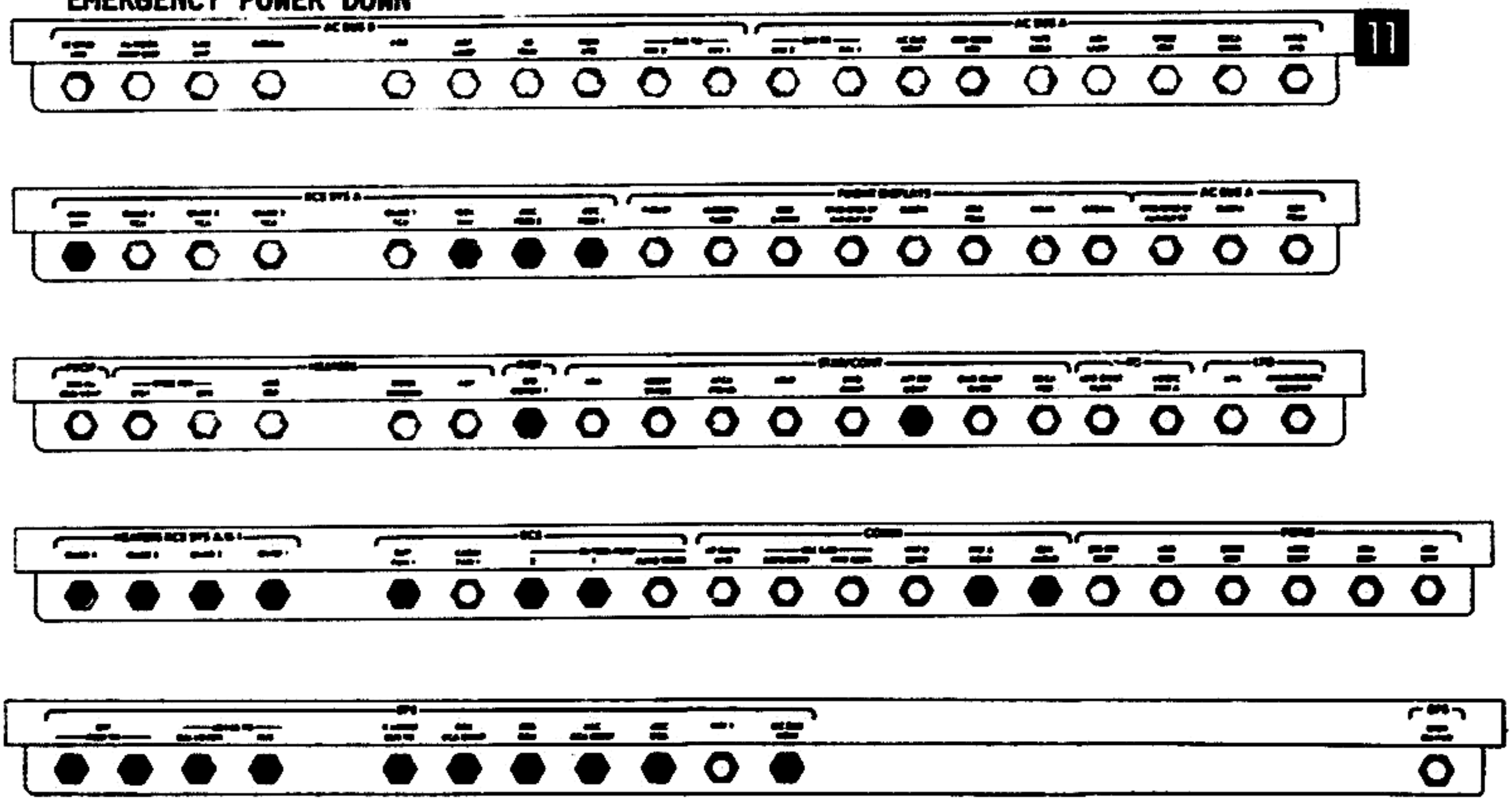
EMERGENCY POWER DOWN

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

EMERGENCY POWER DOWN

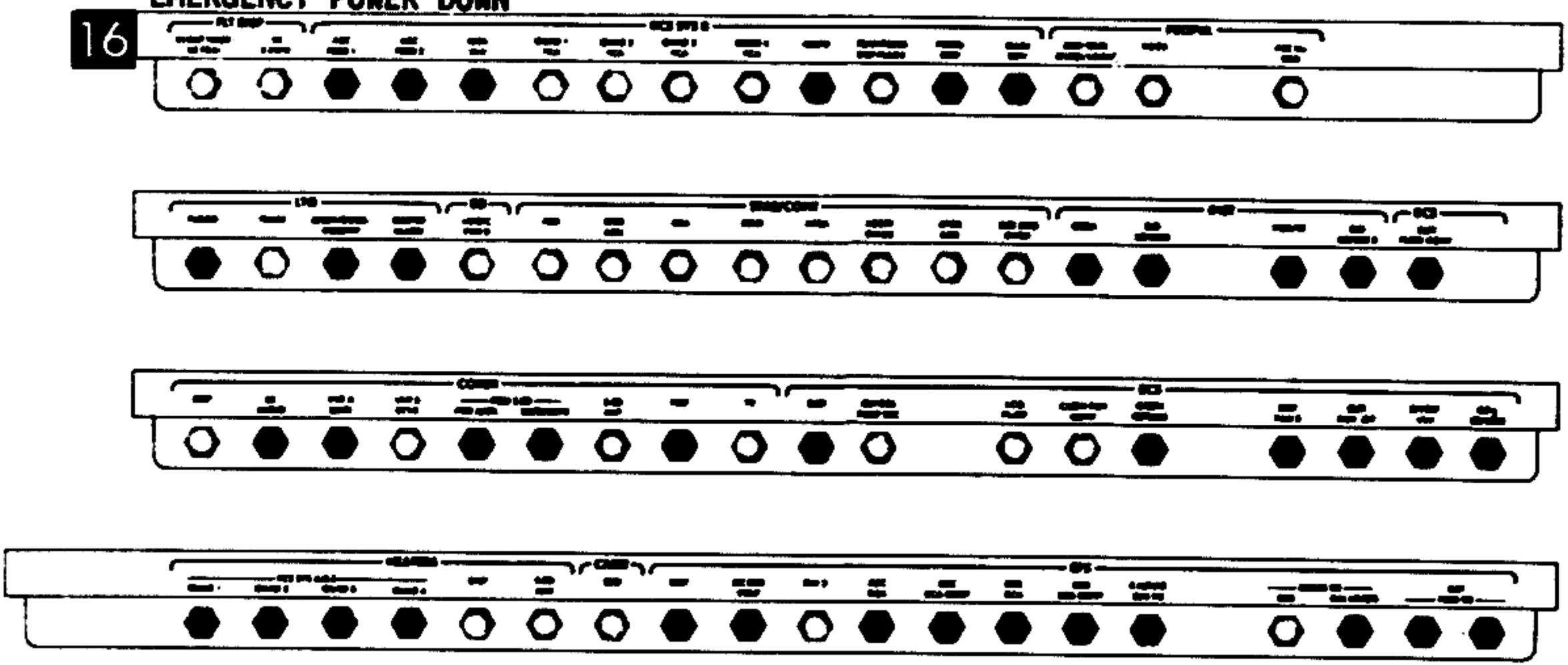


Basic Date 7/8/70 Changed _____

Basic Date 7/8/70 Changed _____

EMERGENCY POWER DOWN

16



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)

Basic Date 7/8/70

Changed 10/16/70

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

Basic Date 11/23/70 Changed -

DPS SHe VENTING (Zero g)

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

2 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

Basic Date 11/23/70 Changed ____

CONTINGENCY EVT/IVT SECTION

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, & 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
Unstow CSRC (ISA, Top Pkt) Put in
  PGA Pkt
Stow Other Items As Desired For XFER
  SEQ MAGS (6-RHSSC, 1-CAM, 1-ISA)
  70mm MAGS (3-RHSSC 2nd Shelf,
    1-CAM-RHSSC, 1-ISA)
  CSC CASSETTE MAG-ISA
  PPK-RHSSC, LHSSC, Tool B if required

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

Basic Date 7/8/70 Changed ~~12/17/70~~ 1/20/71

EVT (2 OPS)

OPS DONNING (LMP 1st)
Unstow OPS & Checkout
Verify OPS Reg Decays To 2.5 PSI(~3 Min)
Unstow OPS O2 Gas Hose
Secure OPS To OPS Straps (Route
  Under LM Hoses, Do Not Twist Strap)
Connect O2 Hose To PGA (B/B)
Fix OPS Flaps To Expose Press Gage
CDR Repeat OPS DONNING

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

CDR Unstow Lifeline/Tethers - LHSSC
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)
Verify LM O2 Hoses - R/R, B/B

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

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

SUIT INTEGRITY CHECK

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

PRESS REG A - EGRESS
PRESS REG B - DIRECT O2
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

Basic Date 7/8/70
Changed 12/17/70

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 H20 Hoses
Inspect EMU

Changed 12/17/70

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

Open Hatch
LMP Verify XFER Items Ready

Basic Date 7/8/70

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 02 Hoses and Comm Umbilical

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired

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

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

EVT (UNDOCKED, STABLE)

CSM Maneuver Apex to LM Forward Hatch

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

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

CMP Connect C Comm Umbilical To CDR

Basic Date 7/8/70 Change D

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

EVT (UNDOCKED, UNSTABLE)

CSM Maneuver to LM

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

LMP Egress, Move Up EVA Handrail

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

CSM Maneuver Apex to CDR and LMP

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

Changed 7/8/70

Basic Date

****

LEVA - Lower As Required
OPS 02 - On
SUIT ISOL VALVES (Both) - SUIT DISC
Purge Valves - OPEN (Give Mark To CMP
  For T+25 Min On OPS)
Verify 02 Flow & PGA Press 3.4-4.0 Psig

Disconnect LM 02 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)

****

EV HATCH OPENING (CDR)

Attach Restraints As Required

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

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

Partially Open Hatch

Remove Tool B and Stow On PGA

Open Hatch

Basic Date 7/8/70 Changed 12/17/70

CONTINGENCY EVT (CDR/OPS-LMP/PLSS)

CREW STATUS

UCTA'S Empty
Stow IV Gloves Under Netting Behind LMP
Doff Helmets, Verify Feedport Cover Installed,
& Stow On Ceiling
Inspect PGA Zipper, Verify Lock-locks

Check Status of CMP Prep for Egress

PREPARATION 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

Stow Transfer Items,
SEQ MAGS (6-RHSSC, 1-CAM, 1-ISA)
70mm MAGS (3-RHSSC 2nd Shelf, 1-CAM-RHSSC,
1-ISA)
CSC CASSETTE MAG - ISA
PPK-RHSSC, LHSCC
TOOL B IF REQUIRED

Remove CSRC From ISA, Top Pocket
and Stow in PGA Pocket

Stow PGA Gas Connector Plugs in RHSCC Fecal Emesis
Unstow OPS Straps & Purge VLV From RHSSC (Fecal Emesis)

Purge VLV-Hi
CDR Don Purge VLV (R/R, LH Side)

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

Basic Date 7/8/70 Changed ~~12/17/70~~ 1/20/71

CDR DON OPS

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 O2 Gas Hose
Secure OPS to PGA (Route RH Strap Under
  LM O2 Hoses. Do Not Twist Strap)
Connect OPS O2 Hose to PGA (B/B LH Side)
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, Feedwater-Off
Unstow RCU
Attach RCU to upper PLSS Straps and PGA
Verify RCU Controls:
  Pump - OFF
  Fan - OFF (Left)
  Mode SEL - 0
Connect RCU to PLSS

FINAL PREP FOR EVT

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

CDR Unstow Lifeline/Tethers (LHSSC)

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)

Verify LM O2 Hoses - R/R, B/B

PREP FOR CABIN DEPRESS

PGA Flow Diverters - Vertical
Unstow LMP Helmet and Apply Anti-fog
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

Basic Date 7/8/70 Change 12/17/70

SUIT INTEGRITY CHECK

-CDR (OPS/ARS)-

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)
VERY 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 (Cuff Gage Decay <.3 psig in 1 min)
PLSS 02 - ON
Verify Cuff Gage Reads 3.7-4.0 psig, 02 Flag May Come On
PLSS Diverter Vlv - Min (UP)
PLSS Pump -ON

CABIN DEPRESS

CB(16) ECS: CABIN REPRESS-OPEN
CABIN REPPESS - CLOSE

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

Changed 12/17/70

Basic Date 7/8/70

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

Open Hatch
PLSS Feedwater - OPEN
(H2O FLAG Clears in 4 MIN)
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

CDR Configure Audio Panel As Desired

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

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

Basic Date 7/8/70 Changed 12/17/70

EVT (UNDOCKED, STABLE)

CSM Maneuver Apex to LM Forward Hatch

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

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

CMP Connect C Comm Umbilical To CDR

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

EVT (UNDOCKED, UNSTABLE)

CSM Maneuver to LM

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

LMP Egress, Move Up EVA Handrail

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

CSM Maneuver Apex to CDR and LMP

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

Basic Date 7/8/70 Changed

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

CDR SUIT ISOL VALVE - SUIT DISC

CDR PURGE VALVE - OPEN (Give Mark To CMP For T+25 Min)

Verify 02 Flow
CDR LM 02 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

<u>EV HATCH OPENING (CDR)</u>

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 EVA Procedures

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

CABIN PREP EVA 1

EQUIPMENT PREP EVA 1

PLSS DONNING

PLSS COMM CHECK-OMIT

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

(2) Both - PLSS Mode SEL - AR

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

FINAL SYSTEMS PREP

OPS CONNECT

(1) CDR Unstow Lifeline/Tethers - LHSSC 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

Basic Date 7/8/70 Changed 12/17/70

VACUUM IVT TO CM

EQUIPMENT PREP

1 Perform In Conjunction With Post Docking Procedure P-15 , LM Timeline Book

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

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

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

PGA INTEGRITY CHECK

1 Inspect EMU & Lock - Locks

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

3 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)

4 Suit Circuit Relief - Auto
Confirm CSM GO For LM Depress

5 CB(16) ECS: LCG PUMP - Open
Disconnect LM H20 Hoses

Basic Date 7/8/70 Changed 12/17/70

CABIN DEPRESS

1 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

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

Verify LM Suit Press 3.6-4.3 Psia

HATCH OPENING

1 OVHD Dump VLV - Open
Open Hatch

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

3 Transfer SRC'S To CM

4 Receive B5 And B6 From CM And Stow In LM

5 Transfer Other Items If Req'd

SWITCH OVER TO CM ECS

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

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

3 CMP route CM Left O2 Hoses into Tunnel
CDR move into position in tunnel for connect to CM umbilicals.

4 Connect CDR to CM (L) O2 umbilicals (R/R, B/B)
CMP Set LEFT SUIT FLOW VLV - (PNL 301) - FULL FLOW
When CDR Flow Confirmed, CDR SUIT ISOL VLV - SUIT DISC
Disconnect CDR LM hoses
Connect To CM Electrical umbilical (Audio, Biomed) and stow LM hoses
CMP set Left couch AUDIO PWR - AUDIO TONE, SUIT PWR - ON
Verify comm with CDR

5 CDR transfer to CM
LMP tend umbilicals

Basic Date 7/8/70 Change

CSM MANEUVER TO JETTISON ATTITUDE

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

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

3 Commence CM Cabin Repress

Changed

Before Date 7/8/70

EMERGENCY SECTION

EMERGENCY PROCEDURES

FIRE/SMOKE In Cabin (Not In Suit Loop)

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

2 Use Fire Extinguisher As Required

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

4 Don Helmets And Gloves

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

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

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

Changed

Basic Date 7/8/70

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

Changed

Basic Date 7/8/70

Basic Date 7/8/70 Changed 12/17/70

DC BUS

Either Bus < 26.5 V

BATTERY

(POSS)

Rev Current >10A
Overcurrent > 150A

DC FEEDER FAULT

Bus ΔV > 18

CDR BUS

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

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

LMP BUS

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

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

ELECTRICAL

BATTERY Overtemp > 145° Rev Current > 10A Overcurrent > 150A	**UNSTAGED** Check All BATS VOLTS, AMPS, And tb's If VOLTS, AMPS OK: Faulty BAT-OFF/RESET, Then ON If VOLTS, AMPS Abnormal: Faulty BAT - OFF/RESET CB(11&16) CROSS TIE BAL LOADS -CLOSE **STAGED** Check BAT 5,6 VOLTS, AMPS, And tb's If VOLTS. AMPS Abnormal: CB(11&16)CROSS TIE BUS - CLOSE Faulty BAT: 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)

Changed 10/16/70

Basic Date 7/8/70

Basic Date 7/8/70 Changed 11/23/70

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
	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

Basic Date — 7/8/70 Changed — 12/17/70

	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

Changed 12/17/70

Basic Date 7/8/70

PROPULSION

RCS A or B He Press < 1700	Monitor He PRESS & RCS QUANTITY Affected Sys: QUAD ISOL (4) - CLOSE MAIN SOV - CLOSE Monitor MANF PRESS Go to Mal Proc RCS 1
RCS TCA One or More Thrusters Fail Off Collinear Thrusters Firing Simultaneously	If Stable, Recycle CWEA If Unstable, Affected QUAD ISOL - CLOSE Monitor MANF PRESS Between Ullage And Throttle-up, Wait 2 Sec Affected QUAD ISOL - CLOSE
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 <u>Not</u> On, CWEA Fail CB(11) AEA - CLOSE Go To Mal Proc - PGNS 2

Basic Date 7/8/70 Changed

NASA — MSC

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

Changed

Basic Date 7/8/70

SUIT/FAN Suit Press <3.12 #2 Fan Fails When In Use	Check Suit Flow & Cuff Press (If Nominal, CWEA or Inst Failure) If SUIT ISOL - SUIT FLOW a) Repress Cabin ASAP b) Doff Helmet & Gloves c) CB(16): SUIT FAN 2 - Open : SUIT FAN ΔP - Open d) 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) PLSS FILL-CLOSE b) DES(ASC) O2-CLOSE c) CABIN REPRESS - CLOSE d) PRESS REG A&B-CLOSE e) Open Valves Individually To Isolate Problem 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

Basic Date 7/8/70 Changed 10/16/70

ECS	Cross Check Comp Lts a) SUIT FAN Comp Lt On (ΔP<6"H20) SUIT FAN-2 b) H20 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 H20 QTY If GLYCOL TEMP >50° And Increasing a) PRIM EVAP FLOW #1-CLOSE b) PRIM EVAP FLOW #2-OPEN If GLYCOL TEMP Continues To Increase Activate SEC LOOP a) WATER TANK - SEC b) GLYCOL - INST /(SEC) c) CB(16) ECS: GLYCOL PUMP SEC - CLOSE d) SEC EVAP FLOW - OPEN e) Shutdown Primary Loop f) CB(16) LCG PUMP-Open If GLYCOL TEMP <50°, Go To MAL Proc ECS-8 (Instr or Low Glycol Qty Problem)

Changed 10/16/70

Basic Date 7/8/70

REAL TIME CHECKLIST SECTION

REAL TIME CHECKLIST

NO.	ITEM ⇨	ACTION	BACKOUT

Basic Date 10/16/70 Changed

REAL TIME CHECKLIST

NO.	ITEM ⇨	ACTION	BACKOUT

Basic Date 10/16/70

Changed _____

NO.	ITEM ⇨	ACTION	BACKOUT

Basic Date 10/16/70 Changed _____

NO.	ITEM ⇨	ACTION	BACKOUT

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Basic Date 10/16/70

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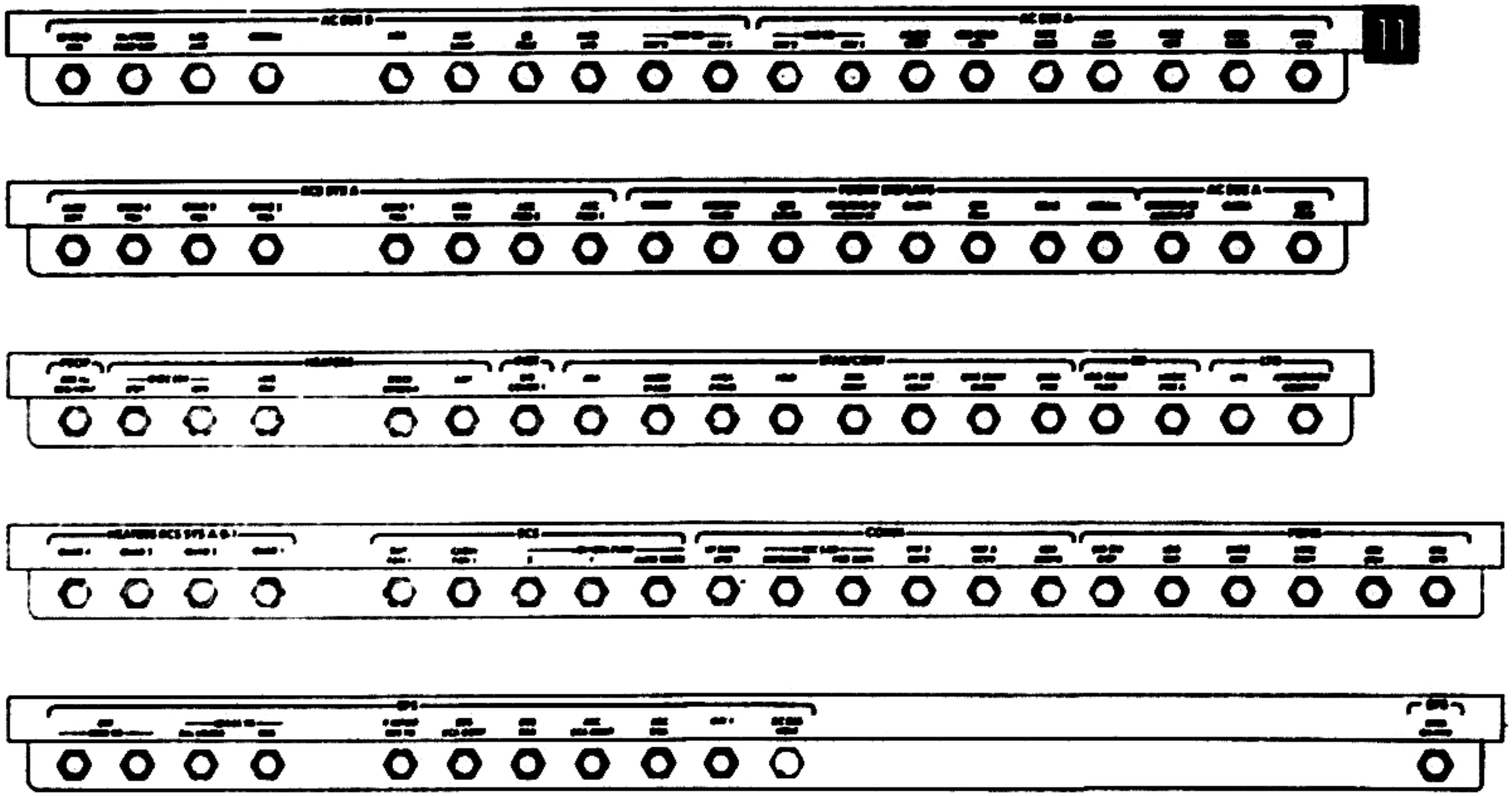

Basic Date 10//6/70

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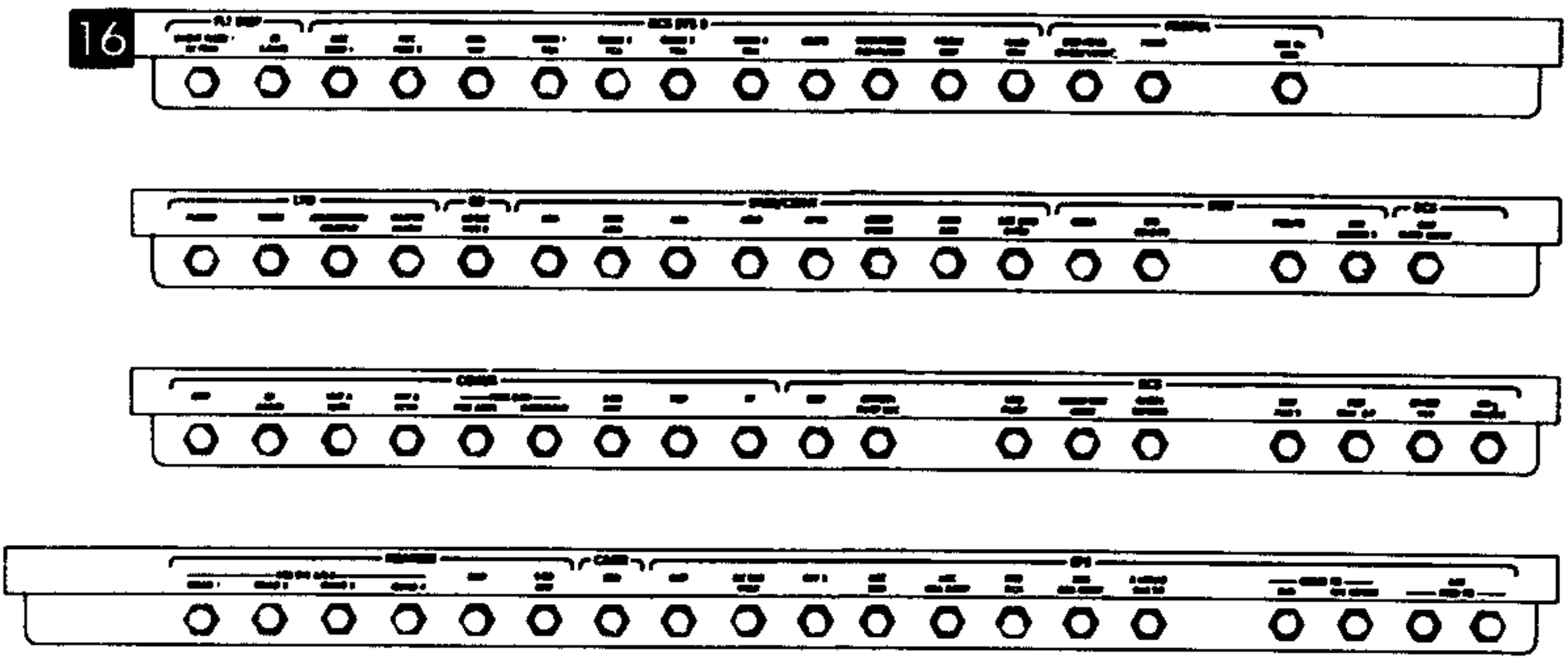

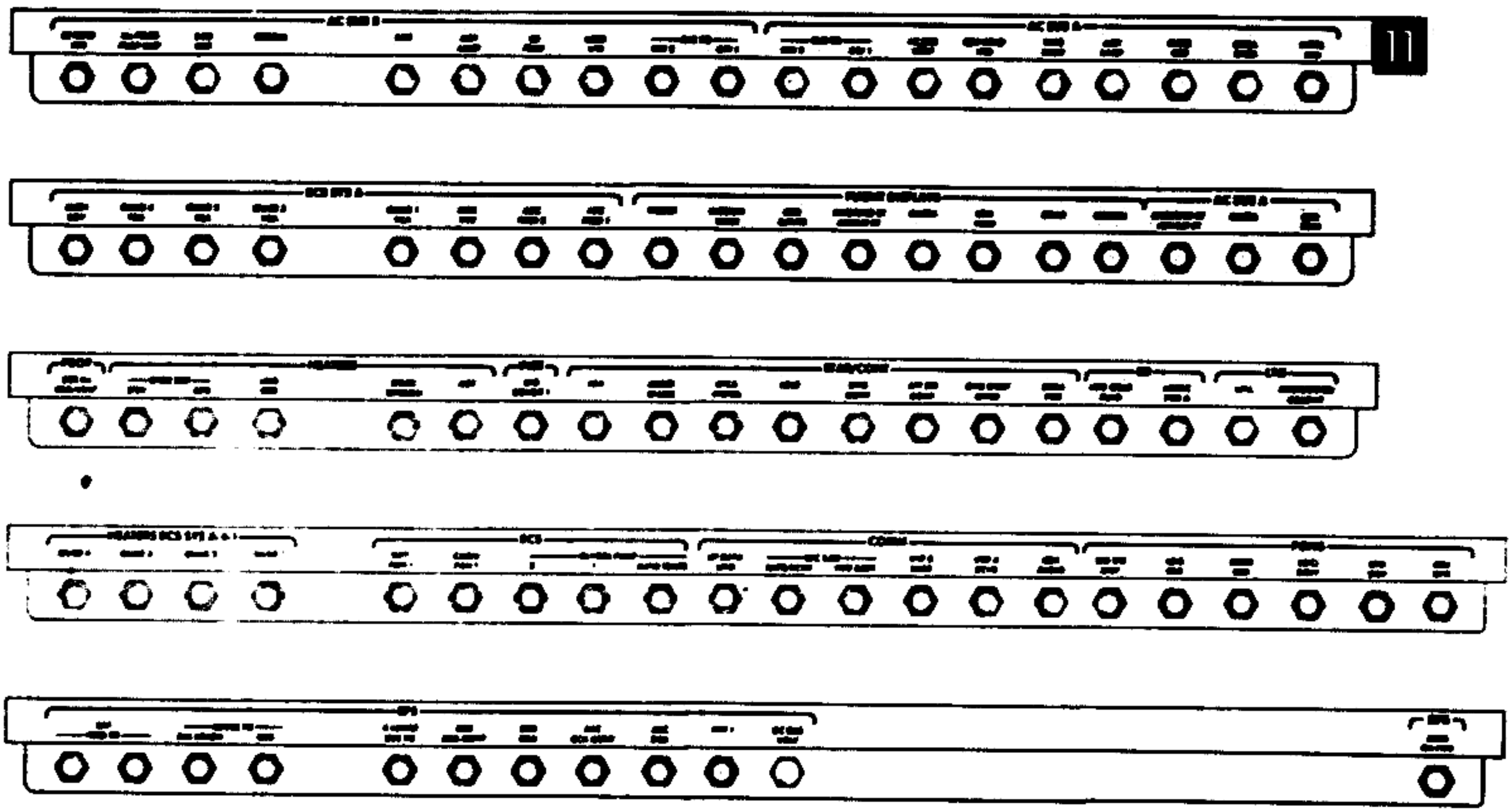

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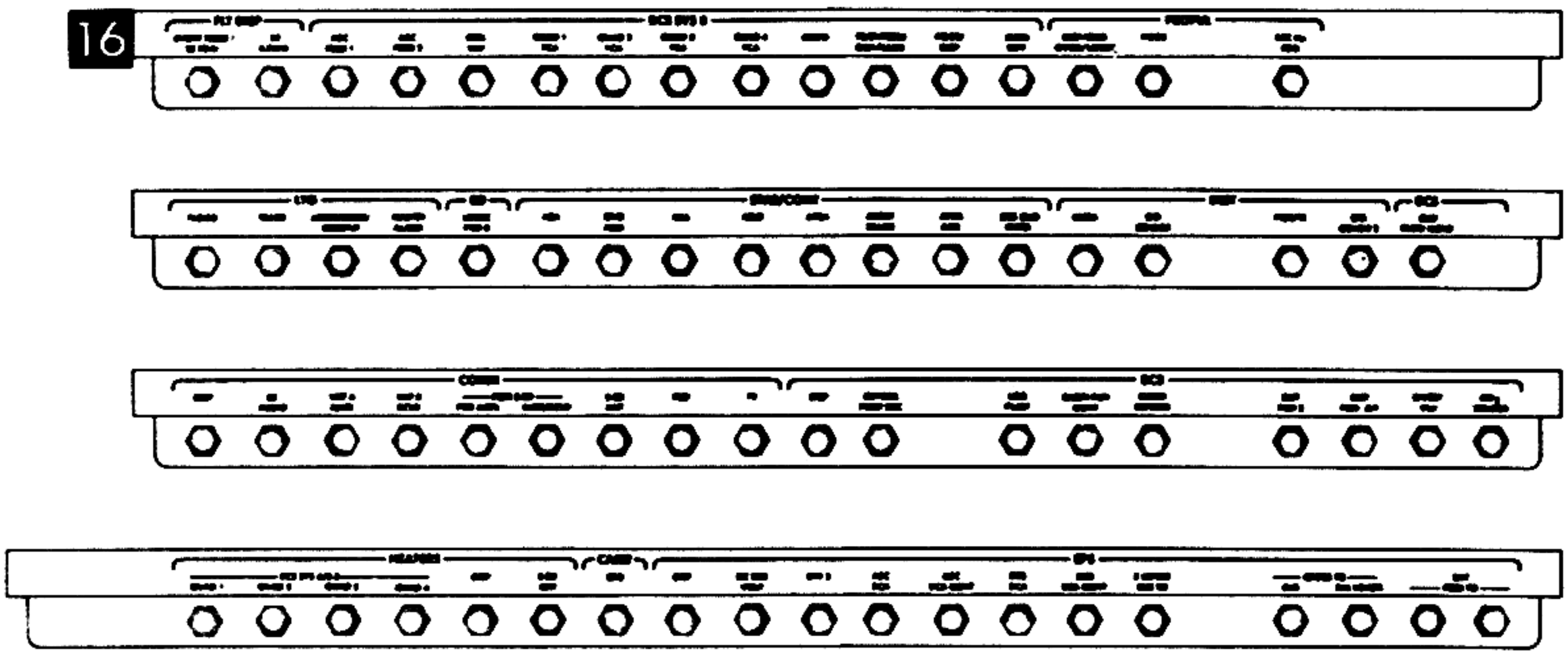

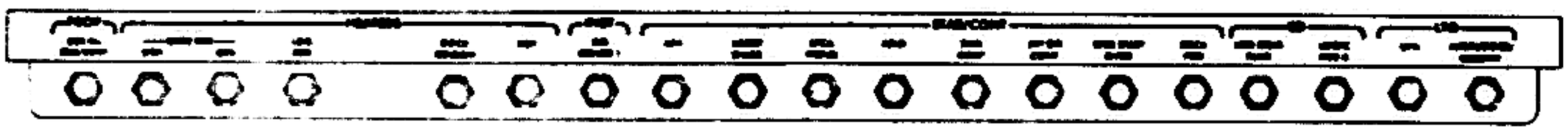

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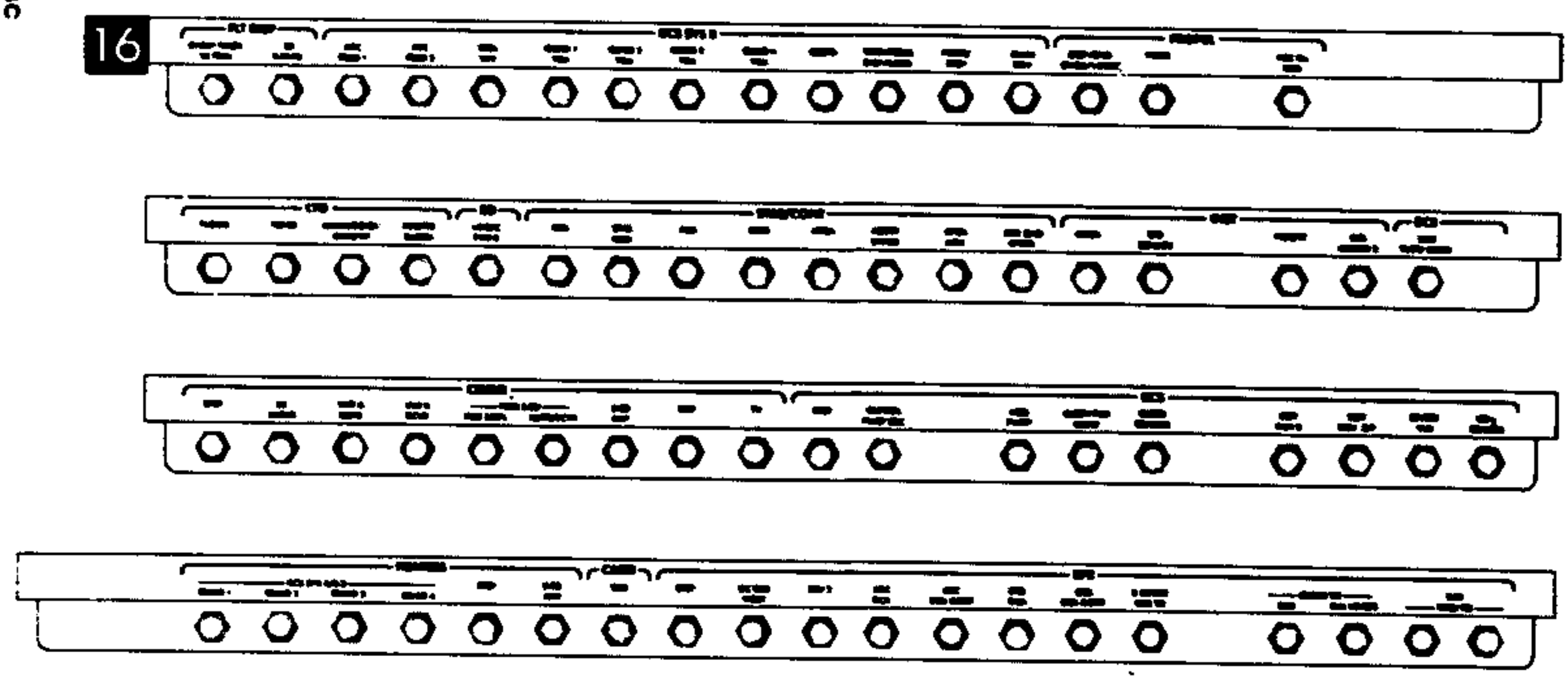
NASA — MSC

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