| APOLLO II | |
|---|---|
| **LM LUNAR SURFACE** **CHECKLIST** | |
| PART NO | S/N |
| SKB32100074-363 | 1002 |

102:55   TD + 8 1 REV "STAY" FROM MSFN
(PDI+20) ———————— OXID VENT-CLOSE (20-40 Psia ~ 6 min.)
                      FUEL VENT-OPEN
V37E00E               PRPLNT TEMP/PRESS MON - DES 1,2
MODE CONTROL (PGNS) — ATT HOLD
V76E
MODE CONTROL (AGS) — OFF
SYS A&B QUAD 1,2,3,4 (8)-OPEN, tb-gray
SYS A&B MAIN SOV(2)-OPEN, tb-gray


SEQ CAMERA-OFF


CB(16) EPS: ASC ECA CONT - Close
BAT 5,6 - OFF/RESET
INVERTER - 2
CB(11) EPS: INV 1 - Open


CB(11) STAB/CONT: DECA PWR - Open
CB(16) STAB/CONT: DES ENG OVRD - Open
    EPS: ASC ECA CONT - Open
    INST: CWEA - Open Then Close (DES REG-OFF)
    Cycle Temp Moniter


*047 R _____ Sin Az Comp To MSFN
*053 R _____ Cos Az Comp To MSFN
*623 R (+0 YAW Steering)


*544 R _____ X Gyro Coeff
*545 R _____ Y Gyro Coeff
*546 R _____ Z Gyro Coeff


*400 + 6E Calibrate Gyros




*232 R  +00600    Ins Alt
*465     +00320 E  Ins HDot
*400R (+ 0 Calibration Complete In 5 min 2 sec)
Verify Cabin Press
PRESS REG A&B - CABIN
SUIT GAS DIVERTER - Push/CABIN
CABIN REPRESS - AUTO


DOFF HELMET & GLOVES

TD + 8 MIN

~~OXID VENT - CLOSE~~
~~(Press 20-40 psia ~ 6 min)~~
~~FUEL VENT - OPEN~~
~~PRPLNT TEMP/PRESS MON - DES 1,2~~

103:08
PDI+32
TIG-1:20

P57E
04 06 <u>00001</u>
     <u>00003</u>  REFSMMAT
  PRO

05 06 <u>00010</u>
     <u>00001</u>  REFSMMAT & Gravity
     <u>00110</u>
  PRO

V16 N20E
  Monitor Gravity Measurement
  NO ATT Lt - On Then Off, Twice

     | +04200 |
     | +31800 |
     | +03500 |

  KEY REL

06 04 +_____ Gravity Err Angle
  V32E Remeasure Gravity
  PRO

06 22 ICDU Angles
  PRO
  NO ATT Lt - On Then Off

06 05 _____ Angle Diff
  PRO

06 93 _____ X Torque Angle
     _____ Y Torque Angle
     _____ Z Torque Angle
  V34E

FUEL VENT·CLOSE (20-40 Psia. ~ 6 Min.)
P00E

V40 N20E

*544 R _____ X Gyro Coeff
*545 R _____ Y Gyro Coeff
*546 R _____ Z Gyro Coeff
If Gyro Drift Changes >2.0°/hr, AGS Failed
*400 + 3E AGS/PGNS Align, Wait For MSFN
*400 + 4E Lunar Align

Notify MSFN of Approx Landing Site
Install Window Shades

103:18
PDI+42
TIG-1:10

If Star(s) In L, F, or R AOT
Detent, Position RR Antenna
Along (0°,283°) Via V41N72
(9 min Thermal Constraint)
If Star In Rear Detent, No Redesignation Req'd,
  Begin P57
CB(11) AC BUS A: RNDZ RDR - Close
Wait 30 Sec
PGNS: RNDZ RDR - Close
AC BUS B: AOT LAMP - Close

RR MODE - LGC

V41 N72E
 21  73  +00000   TRUN
         +28300   SHFT

 04  12   00006
          00002
    PRO
CB(11) PGNS: RNDZ RDR - Open
AC BUS A: RNDZ RDR - Open
V44E

P57E
04 06  00001
       00003  REFSMMAT
   PRO

```
05 06  00010
       00002  2 Stars
       00110
   PRO
06 22 ICDU Angles (If Torquing Angles > 5°)
   PRO
NO ATT Lt - On Then Off

01 70  00CDE  Detent, 1st Star
   Load Desired Star Code
   PRO

06 79  _____  Cursor
       _____  Spiral
       _____  Detent Position
   PRO

01 71  00CDE  Detent, 1st Star
   PRO

Read Cursor Angle  _____
54 71 MARK X OR Y
Read Spiral Angle  _____

06 79  _____ Cursor, _____ Spiral, _____ _____
   Load Cursor & Spiral Angles    _____ _____
   V32E Remark Star
   PRO After 2 Recycles

01 70  000CDE  Detent, 2nd star
   Load Desired Star Code
   PRO

06 79  _____  Cursor
       _____  Spiral
       _____  Detent Position
   PRO

01 71  000CDE  Detent, 2nd Star
   PRO

Read Cursor Angle  _____
54 71 MARK X OR Y
Read Spiral Angle  _____
```

Basic Date June 16, 1969
Changed June 25, 1969

LM-5

06 79 _____ Cursor, _____ Spiral, _____ _____
   Load Cursor & Spiral Angles     _____ _____
   V32E Remark Star
   PRO After 2 Recycles

If RR Antenna Along 0°, 283°,
Position RR Along +X Axis
CB(11) AC BUS A: RNDZ RDR - Close
Wait 30 sec
PGNS: RNDZ RDR - Close

V41 N72E
  21  73  +18000  TRUN
          +27000  SHFT

  04  12    00006
            00002
    PRO

CB(11) PGNS: RNDZ RDR - Open
AC BUS A: RNDZ RDR - Open
V44E

06 05 _____ Angle Diff
  PRO

06 93 _____ X Torque Angle
     _____ Y Torque Angle
     _____ Z Torque Angle
  PRO (Monitor Gyro Torquing)

50 25 00014
  ENTR

06 89 _____ Lat
     _____ Long/2
     _____ Alt
  Consult MSFN To Determine
  Acceptance Of Position
  (Accept) PRO
  (Reject) V34E

POOE
Stow Window Shades And Photograph Surface

NOMINAL                                    PAD (IF REQUIRED)

80MM/BW

FAR
FIELD-50'

1/250

W
↑
8
4   4
2.8
☀E
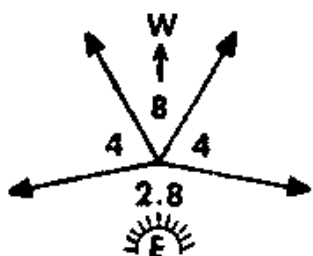
FULL SHADOW - 2.8/125
CREW IN SUN - 8/250

NEAR
FIELD-20'

1/250

W
↑
5.6
2.8   2.8
2.8
☀E
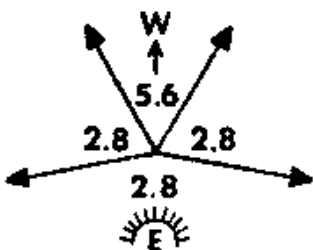
60MM/HCEX

FAR
FIELD-50'

1/250

W
↑
11
5.6   5.6
5.6
☀E
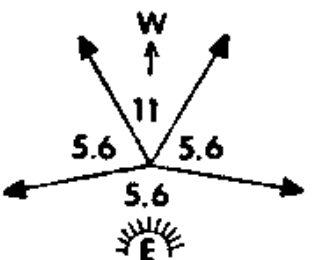
FULL SHADOW-5.6/125
CREW IN SUN-11/250

NEAR
FIELD-20'

1/125

W
↑
8
5.6   5.6
5.6
☀E

. 6 FRAMES FAR FIELD (FOCUS 50')AND

6 FRAMES NEAR FIELD (FOCUS 20')
   WITH EACH CAMERA

.REMOVE MAGS AND STOW

.INSTALL 60MM PROTECTIVE COVER
AND STOW BOTH CAMERAS

f STOP

9:00  _____
10:30 _____
12:00 _____ (2)
1:30  _____
3:00  _____

9:00  _____
10:30 _____
12:00 _____ (2)
1:30  _____
3:00  _____

9:00  _____
10:30 _____
12:00 _____ (2)
1:30  _____
3:00  _____
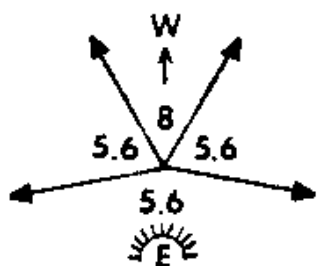
9:00  _____
10:30 _____
12:00 _____ (2)
1:30  _____
3:00  _____

Basic Date  JULY 2, 1969
Changed  JULY 12, 1969  J

*400 + 3E AGS/PGNS Align
*413 + 1E Store Azimuth

*047 R _____ Sin Az Comp
*053 R _____ Cos Az Comp
Transmit N04, N05, N93, Address 047,
And 053 To MSFN

103:38
PDI+1:02
TIG-50

UP DATA LINK - DATA
MSFN Updates RLS & CSM
    State Vectors (UPLINK ACTY
    Lt - On Then OFF)

Copy Ascent Pad For
    Simulated Countdown

D

Basic Date __June 16, 1969__
Changed __July 2, 1969__

LM-5

```
*047  _____   E Sin Az Comp
*053  _____   E Cos Az Comp
*225   +58598      E αLower Limit
*226   +58598      E αUpper Limit
*231  _____   E RLS
*465   +00320      E Ins H Dot
```
Install Window Shades

103:43
PDI+1:07
TIG-45

If Star In L,F, or R AOT Detent,
Position RR Antenna Along
(0°,283°) Via V41N72
(9 min Thermal Constraint)
If Star In Rear Detent,
No Redesignation Req'd
Begin P57
CB(11) AC BUS A: RNDZ RDR - Close
Wair 30 sec
PGNS: RNDZ RDR - Close
V41 N72E
```
  21   73   +00000  TRUN
             +28300  SHFT

  04   12    00006
             00002
      PRO
```
CB(11) PGNS: RNDZ RDR - Open
AC BUS A: RNDZ RDR - Open
V44E

P57E
```
04 06    00001
         00004   Landing Site
     PRO


06 34   T Align
        Load Simulated Countdown TIG
     PRO


05 06    00010
         00003   Gravity & Star
         00110
     PRO
```

LM-5

V16 N20E
  Monitor Gravity Measurement
  NO ATT Lt - On Then Off, Twice

> +04200
> +31800
> +03500

KEY REL
06  04 +_____ Gravity Err Angle
   PRO

If Gyro Torquing Angles > 5°:
  06 22 ICDU Angles
     PRO
     NO ATT Lt - On Then Off

01 70  00CDE  Detent, Star
   Load Desired Star
   PRO

06 79  _____  Cursor
       _____  Spiral
       _____  Detent Position
   PRO

01 71  00CDE  Detent, Star
   PRO

Read Cursor Angle _____
54 71 MARK X OR Y
Read Spiral Angle _____

06 79 _____ Cursor, _____ Spiral _____ _____
   Load Cursor & Spiral Angles    _____ _____
   V32E Remark Star
   PRO After 2 Recycles

If RR Antenna Along 0°, 283°,
Position RR Along +X Axis
CB(11) AC BUS A: RNDZ RDR - Close
Wait 30 sec
PGNS: RNDZ RDR - Close

V41 N72E
  21  73  +18000 TRUN
          +27000 SHFT

  04  12   00006
           00002
    PRO
CB(11) PGNS: RNDZ RDR – Open
AC BUS A: RNDZ RDR – Open
V44E

  06  05 _____ Angle Diff
      PRO

  06  93 _____ X Torque Angle
         _____ Y Torque Angle
         _____ Z Torque Angle
    PRO (Monitor Gyro Torquing)

  50  25  00014
      PRO For Alignment Check

  01  70  00CDE  Detent, Star
      Load Desired Star
      PRO

  06  79 _____ Cursor
         _____ Spiral
         _____ Detent Position
    Verify Detent & Star Position
    V34E

```
GET ____:____:____

PDI + _____

TIG - _____
```

CB(11) AC BUS B: AOT LAMP – Open
AOT – CL/0.0°

    POOE

104:07
PDI+1:12
TIG-35

    Don Helmets & Gloves

Basic Date June 16, 1969
Changed ~~June 25, 1969~~ "A"

LM-5

V48E
01 46 <u>12012</u> DAP Config
   PRO

06 47 _____ LM Wt
      _____ CSM Wt
  PRO

GUID CONT - PGNS
MODE CONTROL (PGNS) - AUTO
V77E

P12E
06 33 ___:___:_____ TIG ASC
    (104:42:05.5)
   PRO

06 76 _____ VH Final
    (        )
    _____ H Dot Final
    (        )
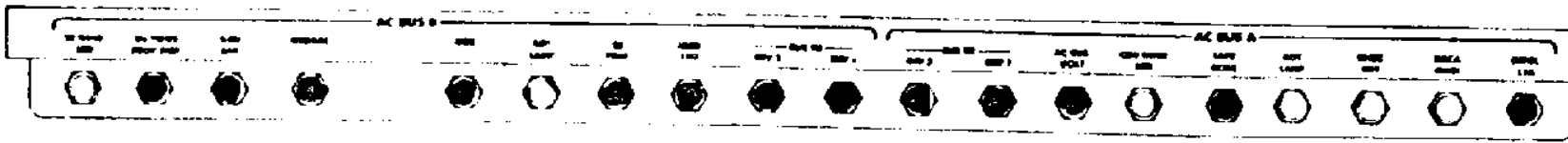    _____ Xrng
    (        )
   PRO

06 74 ___:_____ TFI
    _____ Yaw
    _____ Pitch
ET - Set/Up

*547 R + 0 Lunar Align Az
          Corrections
*623 + 0E  +Z Along CSM Plane

104:12
TIG-30

*400 + 4E Lunar Align

Configure CB's Per Chart
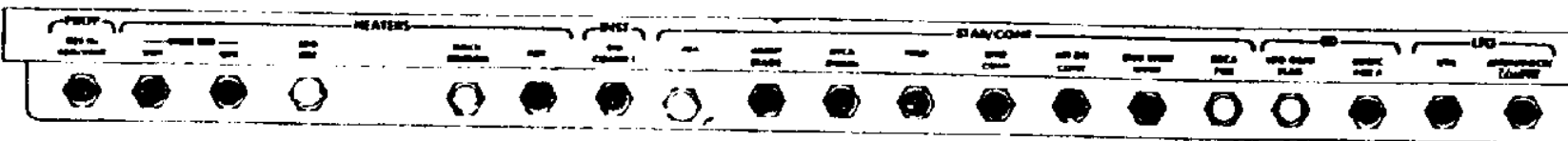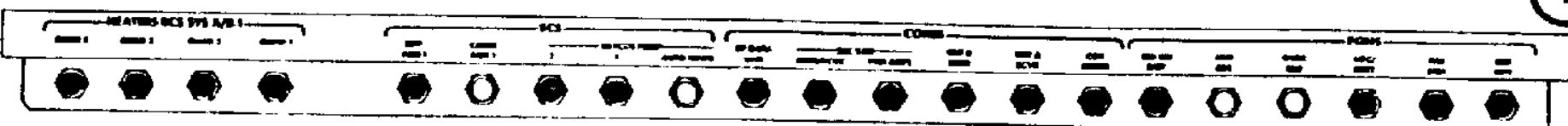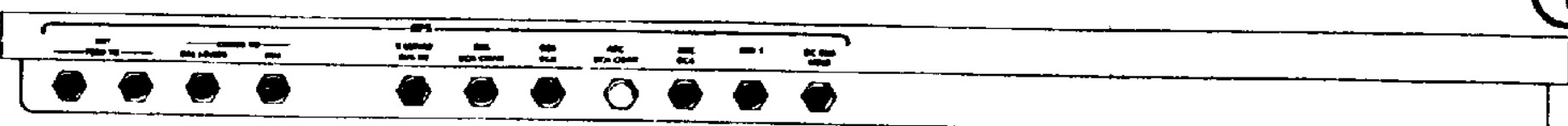
AC BUS B — AC BUS A

⑥

RCS SYS A — FLIGHT DISPLAYS — AC BUS A

⓪

PROP — HEATERS — INST — STAB/CONT — ED — LTG

⑤

④

HEATERS RCS SYS A/B — RCS — COMM — PGNS

①

EPS

Basic Date _____ June 16, 1969
Changed _____ July 2, 1969      D

LM-

**16**

SUR-13

X POINTER SCALE (2) - HI MULT
RATE/ERR MON (2) - LDG RDR/CMPTR
ATT MON (CDR) - PGNS
GUID CONT - PGNS
MODE SEL - AGS
RNG/ALT MON - ALT/ALT RT
RATE SCALE - 25°/SEC
ACA PROP (2) - ENABLE
ENG ARM - OFF
ATT/TRANSL - 4 JETS
BAL CPL - ON
ASC He REG 1&2 tb (2) - gray
ABORT - Reset
ABORT STAGE - Reset
ENGINE STOP (2) - Reset
PRPLNT TEMP/PRESS - ASC
HELIUM MON - ASC PRESS 1

SYS A&B QUAD 1,2,3,4 (8) tb - gray
SYS A&B ASC FEED tb (4) - bp
SYS A&B MAIN SOV tb (2) - gray
CRSFD - tb-bp
TEMP/PRESS MON - OXID MANF
GLYCOL - PUMP 1
SUIT FAN - 1
02/H20 QTY MON - ASC 1
ATTITUDE MON (LMP) - AGS

RADAR TEST — OFF
RR MODE — LGC
DEAD BAND — MIN
ATTITUDE CONTROL (3) — MODE CONT
MODE CONTROL (Both) — AUTO
TEMP MONITOR — RNDZ RDR
RCS SYS A/B-2 QUAD 1,2,3,4 — AUTO
ACA/4 JET (CDR) — ENABLE
ACA/4 JET ~~(2)~~ ~~ENABLE~~ (LMP) DISABLE
TTCA/TRANSL (2) — ~~ENABLE~~ DISABLE
TTCA (Both) — JETS

MASTER ARM — OFF
STAGE — SAFE/Guarded

DES H20 — CLOSE
WATER TANK SEL — ASC
ASC H20 — OPEN
DES 02 — CLOSE
ASC 02 No. 1 — OPEN
CABIN REPRESS — CLOSE
SUIT GAS DIVERTER — Pull/EGRESS
CABIN GAS RETURN — AUTO
SUIT CIRCUIT RELIEF — AUTO
PRESS REG A&B — EGRESS

Basic Date June 16, 1969
Changed ~~July 15~~, 1969 JULY 18 I

LM-

Launch Guidance System
  Recommendation From MSFN

Extended STAY From MSFN

```
ASC He REG 1&2 - tb(2)-gray
MASTER ARM - ON
ASC He SEL - BOTH
ASC He PRESS - FIRE
MASTER ARM - OFF
SYS A FEED 2-OPEN
   tb(2)-gray
Monitor Sys A Manf Press
SYS A MAIN SOV-CLOSE
   tb-bp
CRSFD-OPEN, tb-gray
SYS B ASC FEED 2-OPEN
   tb(2)-gray
Monitor Sys B Manf Press
SYS B MAIN SOV-CLOSE
   tb-bp
BAT 5,6 - ON
BAT 1,3 - OFF/RESET
   tb-bp
CB(11)EPS: ASC ECA CONT-CLOSE
CB(16)EPS: ASC ECA CONT-CLOSE
```

VHF A: XMTR - VOICE/RNG
     B  RCVR - ON
VHF A: XMTR - OFF
        RCVR - ON
AUDIO (Both) VHF A - T/R
                VHF B - RCV

  V47E
  06 16 _____PGNS/AGS Bias

          _____
          _____
 *414  +1E
  PRO
 *414R + 0 Complete
  50 16 Update Complete
  PRO

Basic Date — June 16, 1969
Changed — July 25, 1969 #1
  10
LM

104:25
TIG-17

    CB(11) AC BUS A: RNDZ RDR - Close
    Wait 30 sec
    PGNS: RNDZ RDR - Close

104:32
TIG-10

    Check APS, RCS, ECS, & EPS

104:37
TIG-5

```
BAT 2,4 - OFF/RESET, tb-bp
DES BATS - DEADFACE, tb-bp
   If bp
   CB(11) EPS: DES ECA-OPEN
               : DES ECA CONT-OPEN
   CB(16) EPS: DES ECA-OPEN
               : DES ECA CONT-OPEN
Check APS START Card
```

TIG-2    *400 + 1E Guid Steering

```
1st REV ABORT
TIG-1: MASTER ARM - ON
       *500R
       V77E

TIG-35:  DSKY BLANKS

TIG-30:  06 74 _____ TFI
                _____ YAW
                _____ PITCH

TIG-05:  ABORT STAGE-PUSH
         ENG ARM-ASC
         PRO
         ┌─────────────────────────┐
         │ NO IGN:                  │
         │ GUID CONT-AGS            │
         │ NO IGN: GUID CONT-PGNS   │
         │ ENGINE START-PUSH        │
         └─────────────────────────┘
         ENGINE START-PUSH
```

END SIMULATED COUNTDOWN

V37E
P00E
Doff Helmets & Gloves

POWERDOWN

    ASC O2 No. 1 - CLOSE
    DES O2 - OPEN
    CABIN REPRESS - AUTO
    WATER TANK SEL - DES
    ASC H2O - CLOSE
    DES H2O - OPEN
    O2/H2O QTY MON - DES

CB(11) PGNS: RNDZ RDR - Open
  AC BUS A: RNDZ RDR - Open
  HEATERS: RNDZ RDR OPR - Open

ET - STOP

CB(16) STAB/CONT: AEA - Open
AGS STATUS - STBY
CB(16) STAB CONT: AEA - Close
VHF A&B XMTR & RCVR - OFF
AUDIO (Both): VHF A&B - OFF
~~FUEL VENT - CLOSE~~

Configure CB's Per Chart
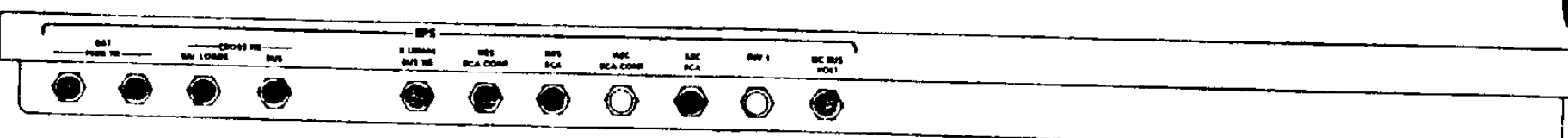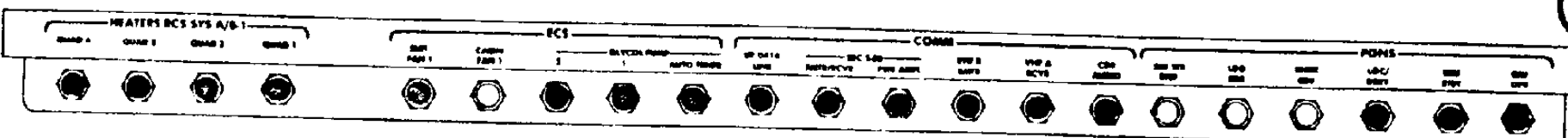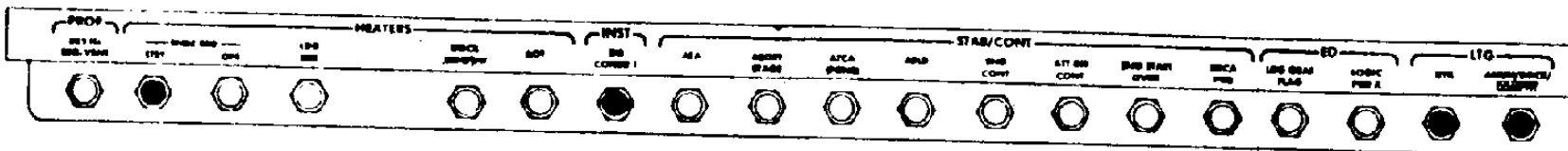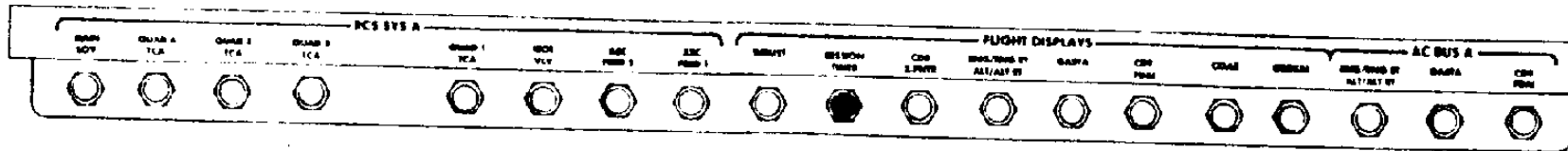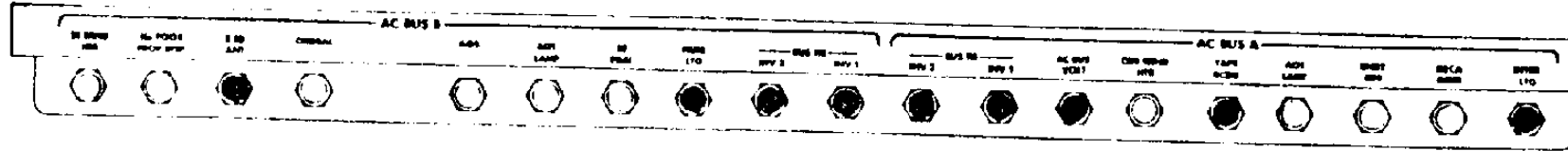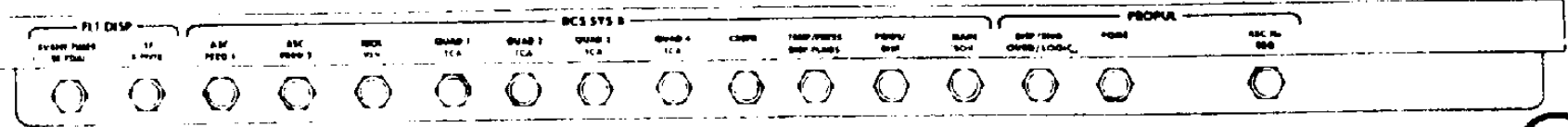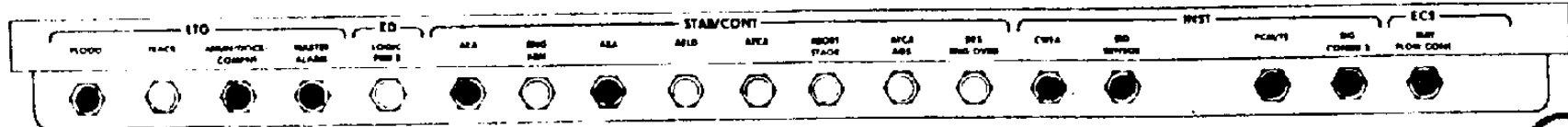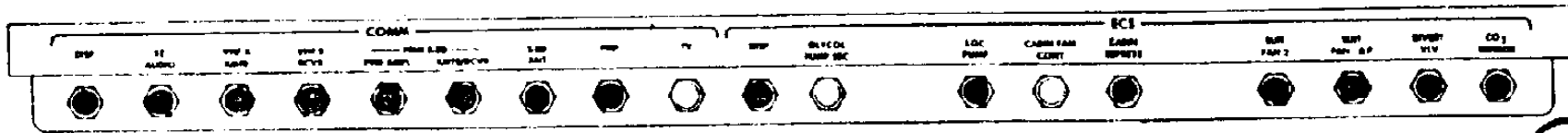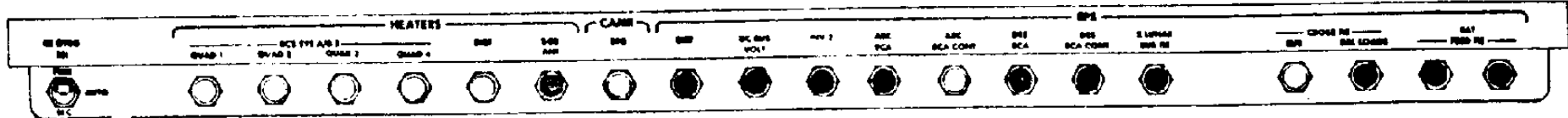
LM-

Basic Date ●—— June 16, 1969

Changed ——

FDAI 1&2 - INRTL
EARTH/LUNAR - PWR OFF
LTG - OFF
MODE - HOLD/FAST
ALT SET - 45

FUEL & OXID VENT tb-bp
MASTER ARM - OFF
DES VENT - SAFE
ASC He SEL - BOTH
STAGE - SAFE (guarded)

S BAND T/R - S BAND T/R
ICS T/R - ICS T/R
RELAY ON - RELAY OFF
MODE - ICS/PTT
AUDIO CONT - NORM
VHF A - OFF
VHF B - OFF
COAS - OFF

TTCA (CDR) - JETS (Dn)

Eng STOP - Reset (guarded)
Eng START - Reset

TMR CONT - START
OVERRIDE ANUN - OFF
OVERRIDE NUM - OFF
OVERRIDE INTEGRAL - OFF
SIDE PANELS - Crew Opt
FLOOD OVHD/FWD - Crew Opt
ANUN/NUM - Crew Opt
INTEGRAL - Crew Opt

X POINTER SCALE - HI MULT
RATE/ERR MON - LDG RDR/CMPTR
ATTITUDE MON (CDR) - PGNS
GUID CONT - PGNS
MODE SEL - PGNS
RNG/ALT MON - RNG/RNG RT
SHFT/TRUN - +50°
RATE SCALE - 25°/SEC
THR CONT - AUTO
MAN THROT - CDR

ENG ARM – OFF
ATT/TRANSL – 4 JETS
BAL CPL – ON
PRPLNT QTY MON – OFF
PRPLNT TEMP/PRESS MON – ASC
HELIUM MON – PRESS 1
ABORT – Reset
ABORT STAGE – Reset (Guarded)

TEMP/PRESS MON – OXID MANF
ACA PROP – DISABLE
RATE/ERR MON – LDG RDR/CMPTR
ATTITUDE MON (LMP) – AGS
GLYCOL – PUMP 1
SUIT FAN – 1
O2/H2O QTY MON – DES

DES ENG CMD OVRD – OFF
TEST – OFF
TEST MON – AGC
SLEW RATE – HI
RR MODE – LGC
DEAD BAND – MIN

ATTITUDE CONTROL (3) – MODE CONT
MODE CONTROL (PGNS) – ATT HOLD
MODE CONTROL (AGS) – AUTO
IMU CAGE – OFF
EVENT TIMER – UP And STOP
TEMP MON – RNDZ RDR
RCS SYS A/B-2 QUAD 1,2,3,4 – AUTO
SIDE PANELS – Crew Opt
FLOOD – Crew Opt
OVHD/FWD – Crew Opt
EXTERIOR LTG – OFF
X POINTER SCALE – HI MULT

ACA/4 JET (2) – DISABLE
TTCA/TRANSL (2) – DISABLE
AOT – CL
RR GYRO SEL – PRIM

TTCA (LMP) – JETS (Dn)

Eng STOP – Reset
AGS STATUS – STBY

POWER/TEMP MON - CDR BUS
INVERTER - 2
UP LINK SQUELCH - ~~ENABLE~~ OFF
UP DATA LINK - OFF

AUDIO CONT - NORM
S BAND T/R - S BAND T/R
ICS T/R - ICS T/R
RELAY ON - RELAY OFF
MODE - ICS/PTT
VHF A&B - OFF

S BAND MODULATE - PM
XMTR/RCVR - PRIM
PWR AMPL - PRIM
VOICE - VOICE

PCM - PCM
RANGE - CWEA ENABLE
VHF A XMTR & RCVR (2) - OFF
VHF B XMTR & RCVR (2) - OFF
TLM BIOMED - As Required
TLM PCM - HI
RECORDER - As Desired
VHF - AFT  TRACK MODE-SLEW
Peak SIG STR Meter
PITCH_____
YAW_____
S BAND - SLEW

PRESS REG A&B - CABIN
SUIT GAS DIVERTER - PUSH CABIN
CABIN REPRESS - AUTO
PLSS FILL - CLOSE
DES O2 - OPEN
#1,#2 ASC O2 - CLOSE
SUIT ISOL (Both) - SUIT FLOW
SUIT CIRCUIT RELIEF - AUTO
CABIN GAS RETURN - AUTO
CO2 CANISTER SEL - PRIM
PRIM & SEC CO2 CANISTER - CLOSE
WATER SEP SEL - PUSH SEP 1
ASC H2O - CLOSE
SEC EVAP FLOW - CLOSE
PRIM EVAP FLOW NO. 2 - CLOSE

DES H20 - OPEN
PRIM EVAP FLOW NO. 1 - OPEN
WATER TANK SELECT - DES
SUIT TEMP - As Required
LIQUID GARMENT COOLING - As Required

CABIN RELIEF & DUMP (Both) - AUTO
UTILITY LIGHTS (Both) - As Desired

OVHD FLOODS - As Desired

CWEA Status:

| <u>Caution</u> | <u>Warning</u> |
|------------|-------------|
| PREAMPS | CES AC (Reset via GYRO TEST Sw) |
| | CES DC (Reset via GYRO TEST Sw) |
| | ASC PRESS |

```
EAT & REST PERIOD
104:50 To 109:30
```

Crew Awake - Confirm No Change in CWEA Status

```
EAT PERIOD
109:30 To 110:30
```

Change Prim LiOH Cartridge

Stay/No Stay For EVA Prep
Crew Status Report To MSFN (Sleep, Dosimeter)

Basic Date June 16, 1969
Changed July 7 REV "F"

LM

## LM PREP FOR EVA   ~ 1064 18

### CREW STATUS

BTH        UCTA empty
           Helmets stowed
           Gloves stowed
           PGA flow diverter valves – horizontal
           LM $O_2$, COMM, AND H20 hose connected to PGA
           Inspect PGA Zipper-Verify lock-lock

### SYSTEMS PREPARATION FOR EGRESS

BTH        Adjust interior ltg to desired level
           Enable DSEA as required
           Unstow One Man Transition card and clip to
              AOT guard (page  SUR-36)
           Unstow and tape Final EVA configuration cards
              (Pages SUR-34 and 35)

### PREPARATION FOR EGRESS

BTH        Clear PGA pockets (Ball point & marker pens)
           Stow adjustable pockets
           Stow loose items not require for EVA
CDR        Stow RH armrest
BTH        Remove CDR's LH and LMP's RH and LH
              Armrest and stow on mid-section step
           LM restraints stowed for SSC access
CDR        Transfer coas to fwd window mount
LMP        Stow DEDA desk
           Verify bacteria filter installed on FWD
              hatch dump valve
           Remove 16mm data acquisition camera from
              bracket over window
           Verify cable to camera connection, fresh
              magazine installed, 10mm lens installed,
              and adjust settings: per 16mm mag decal
CDR        Remove Hang-down and EVA card no.1 from
              flite data file and temp stow

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III 1

LM-5

CDR Remove clamp and brackets from utility lights, stow on AOT guard, and secure utility lights and cords to AOT guard

Unstow Rt. angle bkt from LHSSC & attach to one clamp and bracket

Unstow RCU camera brkts (2) from lower overshoe comp and place on engine cover

LMP Install 16mm camera on univ brkt

Mount 16mm camera on mirror mount (Temp stow as desired)

Route cable around brkts to remove slack

Camera seq C/B - close

Verify camera operation

Mount Rt. angle/univ bkt on crash bar

Remove 2 16mm mags/stow in ISA botm pocket

Remove 60mm Hasselblad & Fresh HCEX mag fm RHSSC (Stow drk slide & prot cvr in LHSSC) & hnd to CDR

CDR Assemble camera-attach RCU camera brkt

LMP Remv EVA cam hndl fm RHSSC & hand to CDR

CDR Attach hndl to HBLAD-Adjust settings: per mag decal

Take phot - ver cam ops & place on engine cover (Cam fail - try manual

LMP Ass 80mm HBLAD with HCEX mag-attach RCU camera bkt

Adjust settings: per mag decal

Take phot-ver cam ops & rstw in RHSSC

Unstow LEC/TTHR pkg fm RHSSC - remv LEC, waist TTHR, & 2 hks - restw LEC/TTHR pkg

Att hooks to tiedown

Att LEC pulley to PLSS upr donng sta pin & hks to 60mm HBLAD

Stw HBLAD in ISA top pkt & LEC bag above flite data file

Att waist tether to 80mm HBLAD

Unstow YO YO from feedwater compt bag and stow in ISA mid pkt

Position mirror as desired

Secure util lt & cable for PLSS/OPS donning

## PLSS/OPS DONNING

*106 49*

| | |
|---|---|
| BTH | Remove PLSS fm floor, stow floor mounts and position PLSS against forward hatch |
| | Transfer helmet stowage bags to cabin floor |
| CDR | Transfer to AFT cabin area |
| | Remv top OPS & adap fm SRC rk & hand to LMP |
| | Remove 2nd OPS and adapter from SRC rack |
| BTH | Remv OPS fm brkts & temp stow brackets |
| | Verify OPS O2 press 5880+500 psia & O2 hose nozzle locked |
| | Open OPS O2 Shut off valve and verify O2 flow and regulation 3.70+0.30 psig |
| | Press heatr tst butt - Note lites on |
| | Close OPS O2 shut-off valve |
| | Unstw OPS antenna lead-snap thermal covers |
| | Stow OPS on cabin floor |
| CDR | Stow brackets with armrests in SRC rack |
| | Grasp EVA antenna "T" handle, pull down and rotate handle to detent, release handle |
| | Remove both RCU's from housing and pass to LMP for stowage on LHSSC |
| | Unstow top pair of lunar overshoes from L.H. mid-sect & hand to LMP (leave door open) |
| | Restow helmets in RCU stowage area |
| LMP | Remove purge valve & stow in ISA middle pocket |
| CDR | Don lunar overshoes with LMP's assistance |
| | Unstw 2nd pair overshoes fm LH mid-sect |
| | Remove purge valve-stow in ISA middle pocket |
| LMP | Don lunar overshoes with CDR's assistance |
| | Remv spent ECS cann & brkt-stow at crew station |
| BTH | Remove LEVA's and EV gloves from helmet bags and stow aft of engine |
| | Attach chronometers to RH EV glove |
| CDR | Remove anti-fog fm main kit and stow |
| | Stow helmet bags in top lunar overshoe comp |
| | Unstw CSRC fm LHSSC & stow in PGA leg pkt |
| BTH | Remove and stow PGA plugs in purse |

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Changed June 30, 1969

LM-

| | |
|---|---|
| LMP | Move PLSS fm floor to engine cover |
| | Route LM umbilicals behind PGA |
| BTH | Attach OPS to top of PLSS - lock |
| CDR | Hold PLSS/OPS for donning prep |
| LMP | Remove cover from EVCS antenna connector |
| | Connect OPS antenna lead to EVCS and lock |
| | Verify sublimator exhausts are clear |
| | Unstow upper and lower PLSS donning straps |
| | Unstow PLSS elec umb O2 & H2O hoses |
| | Unstow battery cable |
| | Xfer batt prot cover to cable stowage cnctr |
| | Connect battery cable to battery |
| | Remove PLSS RCU cnctr cover & stow in LHSSC |
| | Verify OPS reg checkout gage reads < 2.5 psi |
| | Unstow OPS O2 hose nozzle |
| BTH | Secure PLSS thermal cover |
| | Remv YO YO fm ISA Midl pkt & attch to lwr |
| |   RH PLSS strap |
| LMP | Turn right and back into PLSS |
| | Don PLSS/OPS by securing PLSS upper and |
| |   lower straps to PGA |
| CDR | Connect PLSS O2 hoses - lock |
| | Unstow RCU |

*107:31*

- - - - - - -

### WARNING
Before connecting RCU to
PLSS all elec PLSS cont
must be in off position

          Pump - off
          Fan - off
          Mode sel sw - 0 (off)

| | |
|---|---|
| | Connect RCU electrical to PLSS |
| BTH | Attach RCU to PLSS straps and PGA- lock |
| LMP | Verify these PLSS switch & valve positions |
| |   Diverter vlv - min (up) |
| |   O2 shutoff valve - off (up) |
| |   Feedwater valve - closed (up) |
| |   Pump - off |
| |   Fan - off |
| |   Mode sel sw - 0 (off) |

LM-5

| | | |
|---|---|---|
| | CDR | Remv PLSS fm rechrg sta & put on cab flr |
| | | Secure ISA |
| | | Transfer helmets to recharge station |
| | | Place PLSS on engine cover |
| | | Route LM umbilicals in front of PGA |
| | BTH | Attach OPS to top of PLSS - lock |
| | LMP | Hold PLSS/OPS for donning prep |
| | CDR | Remove cover from EVCS antenna connector |
| | | Connect OPS antenna lead to EVCS and lock |
| | | Verify sublimator exhausts are clear |
| | | Unstow upper and lower PLSS donning straps |
| | | Unstow PLSS elec umb O2 & H2O hoses |
| | | Unstow battery cable |
| | | Xfer batt prot cover to cable stowage cnctr |
| | | Connect battery cable to battery |
| | | Remov PLSS RCU cnctr cover and stow in LHSSC |
| | | Ver OPS reg checkout gage reads <2.5 psi |
| | | Unstow OPS O2 hose nozzle |
| | | Secure PLSS thermal cover |
| | | Turn left and back into PLSS |
| | | Don PLSS/OPS by securing PLSS upper and lower straps to PGA |
| | | Unstow RCU, hold, and turn right to face LMP |
| | LMP | Connect PLSS O2 hoses - lock |

WARNING
Before connecting RCU to PLSS,
all elec PLSS cont must be in
off position

       Pump - off
       Fan - off
       Mode sel sw - 0 (off)

| | | |
|---|---|---|
| | | Connect RCU electrical to PLSS |
| | BTH | Attach RCU to PLSS straps and PGA - lock |
| | CDR | Verify these PLSS sw and valve positions |
| | |   Diverter vlv - min (up) |
| | |   O2 shutoff vlv - off (up) |
| | |   Feedwater vlv - closed (up) |
| | |   Pump - off |
| | |   Fan - off |
| | |   Mode sel sw - 0 (off) |

## PLSS/EVCS ELECTRICAL CHECKOUT

LMP     Comm panel –                *108 01*
            S-band Modulate – FM
         TV C/B – Close
         Verify voice comm with MSFN
         LMP Audio panel –
            S-band – T/R
            ICS – T/R
            Relay – on
            Mode – VOX
            VOX sens – max increase

            VHF A – T/R
            VHF B – RCV

CDR     CDR audio panel –
            S-band – T/R
            ICS – T/R
            Relay – off
            Mode – VOX
            VOX sens – max increase
            VHF A – T/R
            VHF B – RCV

LMP     Verify LM EVA antenna deployed
         VHF ANT SEL sw – EVA
         Comm panel –
            VHF A XMTR – voice
            VHF A RCVR – on
            VHF B XMTR – off
            VHF B RCVR – on
            Range-off/Reset
            Squelch A-noise threshold + 1 1/2 div
            Squelch B-noise threshold + 1 1/2 div
            Recorder-on
         Biomed sw – off
         SE audio C/B – open
         Disconnect LM comm cable from PGA and secure
         Connect PLSS electrical umbilical to PGA
         SE audio C/B – close

LMP      RCU PTT - MAIN
PLSS mode sel sw - A
Verify -
   PLSS warning tone - on (10 sec)
   RCU press window - 0 (OPS act-abort)
   RCU vent window - P (purge-abort
Verify PLSS 02 bottle press >85%
Verify voice comm with CDR

## NOTE
Unstow antenna of PLSS
which transmits Garbled
and/or loses TM.

NO MSFN Reception when PLSS mode sel in POS B

CDR      Audio C/B - open
Disc LM comm cable fm PGA and secure
Connect PLSS electrical umbilical to PGA
CDR audio C/B - close
CDR audio panel -
   VHF A - off
   VHF B - off
RCU PTT-MAIN
PLSS mode sel sw - B
Verify -
   PLSS warning tone - on (10 sec)
   RCU press window - 0 (OPS act-abort)
   RCU vent window - P (purge-abort)
Verify PLSS 02 bottle press >85%
Verify voice comm with LMP

LMP      PLSS mode sel sw - B
PLSS warning tone - on (10 sec)

CDR      PLSS mode sel sw - A
PLSS warning tone - on (10 sec)
Verify voice with LMP

BTH      PLSS mode sel sw - AR
PLSS warning tone - on (10 sec)
Verify PLSS O2 bottle press>85%
Verify voice with each other
Verify voice and TM comm with MSFN

<u>NOTE</u>
If comm with MSFN is "NO GO" -
  S-band Modulate - PM
    Verify voice & TM comm with MSFN

LMP      TV C/B - open


## FINAL EVA EQUIPMENT PREP FOR EGRESS

BTH      Unstow OPS O2 hose and OPS O2 actuator
Attach O2 actuator to RCU
Snap OPS O2 hose to side of PLSS with
  RCU connector flap

## FINAL SYSTEMS PREP FOR EGRESS

BTH      Confirm "GO" for cabin depress with MSFN
LMP      Verify Cabin fan cont C/B - open
Verify cabin repress C/B - close
Suit fan Delta-P C/B - open
Des H2O vlv - close
CDR      Verify Cabin fan 1 C/B - open
Suit fan 1 C/B - open
Verify suit ckt relief vlv - auto
Suit gas div vlv - egress (pull)
Cabin gas return vlv - egress
Verify master alarm-master alarm pb-lt-Reset
Verify ECS caut lt & H2O sep comp caut lt on

## PREP FOR CABIN DEPRESS

CDR    Both suit isol vlv - suit disc
       Disconnect LM O2 hoses
BTH    Connect OPS O2 hose to RH PGA blue connector-lock
       Retrv purg vlvs fm mid ISA pkt-verif clos & lkd pin
       Anstl-instl in RH PGA red cnctr - lock
       PGA flow diverter valves - vertical
       Unstow helmet
       Verify feed port cover installed and locked
        apply anti-fog to helmet
       Position mikes
       Verify PLSS mode sel sw - AR
LMP    PLSS fan - on
CDR    Place LMP's helmet on LMP, and "LOCK"
LMP    Verify - RCU vent window - clears
CDR    Remove LEVA from engine cover, verify
       EV visor up, and attach to LMP's helmet
BTH    Verify helmet/neck ring align
CDR    PLSS fan - on
LMP    Place CDR's helmet on CDR, and "LOCK"
CDR    Verify - RCU vent window - clears
LMP    Remove LEVA from engine cover, verify
       EV visor up, and attach to CDR's helmet
BTH    Verify helmet/neck ring align
CDR    Unstow cue cards: Hang-down, Final EVA
       Configuration, & EVA Card No. 1
       Attach Hang-down to upper hatch
LMP    Attach EVA Card No.1 overhead
BTH    Position Final EVA Configuration Cards as desired
CDR    Stow Lunar Surface Checklist in purse

FINAL EVA CONFIGURATION

**11**

Basic Date _____

Changed _____

*CLOSED FOR 1 MAN EVA

# FINAL EVA CONFIGURATION

**16**
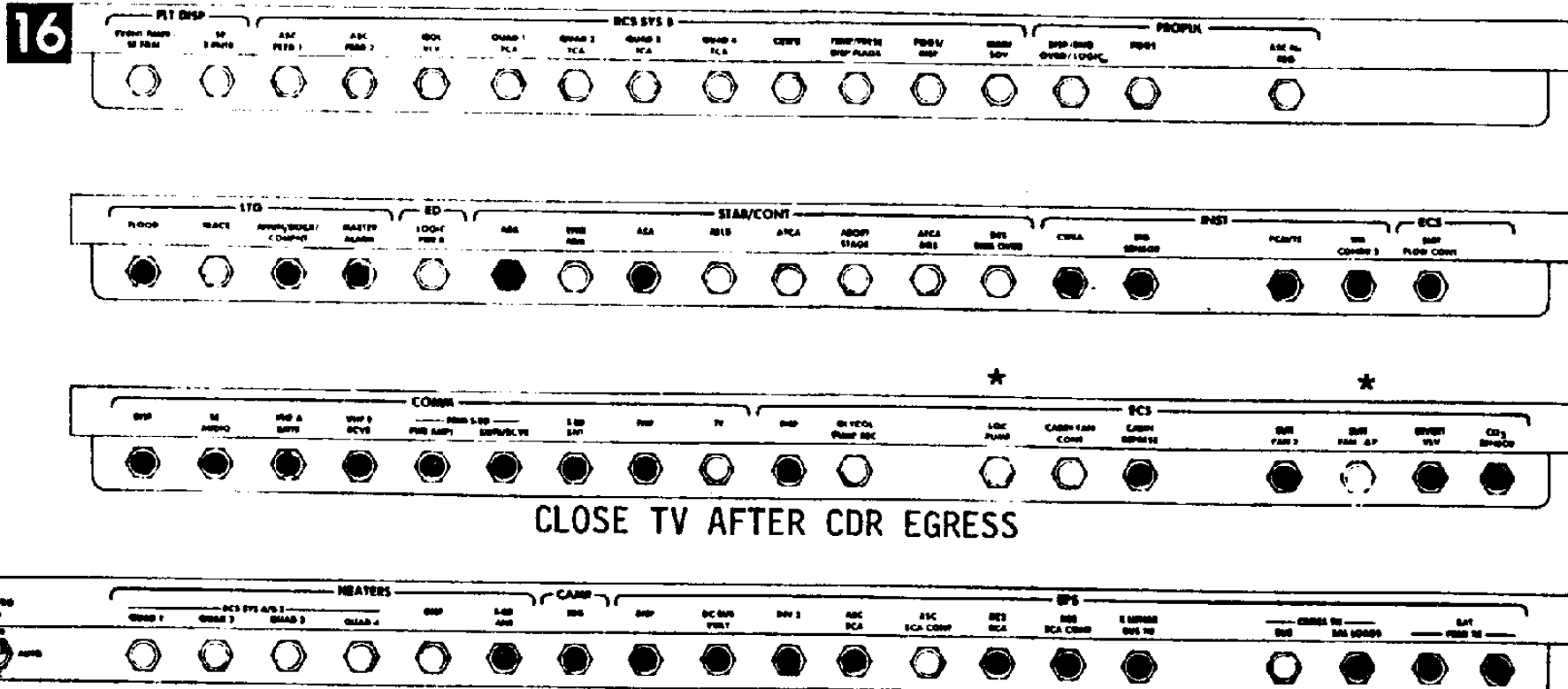
CLOSE TV AFTER CDR EGRESS

*CLOSED FOR 1 MAN EVA

Basic Date _____

Changed _____

## TRANSITION TO ONE MAN EVA

BTH    VERIFY/PERFORM-AS REQ'D AT TIME OF ·NO GO
        PLSS FEEDWATER VLV-CLOSE (UP)
        FWD HATCH CLOSED
        REPRESS CABIN (USE HANG-DOWN CUE CARD)
        PLSS $O_2$ SHUTOFF VLV-OFF
        SUIT FAN 1 C/B-CLOSE
        SUIT FAN DELTA-P C/B-CLOSE
        ECS CAUT LT & H20 SEP COMP CAUT LT-OFF
        PGA PRESS EQUAL TO CABIN (USE PURGE VLV, IF REQ'D)
        DOFF GLOVES AND HELMETS WITH EV VISORS
        PLSS PUMP-OFF
        PLSS FAN-OFF

NO GO CREWMAN
        PLSS MODE SEL SW-0 (OFF)
        DISCONNECT-OPS $O_2$ HOSE
                -PURGE VLV-STOW IN ISA MID PKT
                -OPS ACTUATOR FROM RCU
                -RCU FROM PGA AND PLSS
                -PLSS COMM, H20, AND $O_2$
        DOFF PLSS/OPS
        AUDIO C/B - OPEN
        BIOMED SW - OFF
        CONNECT LM COMM, $O_2$, AND H20
        AUDIO C/B - CLOSE
        COMM SWS - AS REQ'D

OTHER CREWMAN
        DISCONNECT PLSS H20
        CONNECT LM H20
        LCG PUMP C/B - CLOSE

BTH    REVIEW ONE MAN PROCEDURES TO TIME OF "TWO MAN
        NO GO" AND PROCEED

LM

ONE MAN EVA

CREW STATUS- Perform Planned
SYSTEMS PREP FOR EGRESS- Perform Planned
PREP FOR EGRESS- Perform Planned
PLSS/OPS DONNING- Perform following:

| | VERIFY/PERFORM- | EVA CREWMAN | NON EVA CREWMAN |
|---|---|---|---|
| 1 | Crew Stations | At CDR's | At LMP's |
| 2 | EVA Hook | Don | * LHSSC |
| 3 | OPS(Perform Checkout) | | |
| | OPS NO GO FOR EVT | N/A | Engine |
| | Other | Cabin Floor | SRC Rack |
| 4 | Armrests (3) | In OPS BRACKETS,SRC Rack | |
| 5 | OPS Brackets | SRC Rack | |
| 6 | LM EVA Antanna | Deploy | |
| 7 | RCU-RCU NO GO FOR EVT | N/A | ON LHSSC |
| | Other | ON LHSSC | RCU Comp |
| 8 | Helmets | Over RCU Stowage | |
| 9 | Purge Valves | ISA Mid Pkt | HSB |
| 10 | Lunar Boots | Don | * LHSSC |
| 11 | ECS Cannister and Bkt | | Cabin Flr |
| 12 | LEVA | Engine Cover | * HSB |
| 13 | EV Gloves | Engine Cover | Engine Cvr |
| 14 | Chronometer | RH EV Glove | RH EV Glove |
| 15 | Anti-Fog | Temp Stow | |
| 16 | HSB | Top Lunar Boot Compt | Engine Cvr |
| 17 | CSRC | PGA Leg Pkt | N/A |
| 18 | PGA Connec Plugs | Purse | LH PGA |
| 19 | PLSS Straps (lower) | | |
| | PLSS NO GO FOR EVT | N/A | ISA Mid |
| | Other | On PLSS-Exchange If Req'd | On PLSS |
| 20 | PLSS-PLSS NO GO FOR EVT | N/A | Rechg Sta |
| | Other | Cabin Floor | Rechg Sta |
| 21 | ISA | Secured | |

* If Donned, Leave On

Basic Date — June 16, 1969 #5
Changed — ~~July 16~~, 1969 *JULY 8*

C-5

ONE MAN EVA

22 PLSS/OPS PREP For DONNING – OPS ANT Lead – UNSTOWED
OPS Attached to PLSS – LOCKED
OPS ANT Lead to PLSS – LOCKED
Sub Exhaust – CLEAR
Donning Straps, ELEC, O2 and H20
   UMB – UNSTOWED
Battery – CONNECTED
RCU Connec Cover – In LHSSC
OPS Checkout Gage <2.5 psig
OPS O2 Hose Nozzle – UNSTOWED

23 PLSS/OPS DONNING – PLSS/OPS Donned – Straps Connected (4)
PLSS O2 to PGA LH connect – LOCKED
RCU (All Elec CNTLS-OFF) to PLSS,
   PGA and PLSS Straps-lock
Diverter VLV – MIN (up)
O2 Shutoff VLV – OFF (up)
Feedwater – Closed (up)
Pump – OFF
Fan  – OFF
MODE SEL sw – O (OFF)

PLSS/EVCS ELECTRICAL CHECKOUT

Set Comm panel –
  S-band Modulate – FM
TV C/B – Close
Verify voice comm with MSFN

Non EVA Crewman Audio Panel –
  S-band – T/R
  ICS – T/R
  Relay – off
  Mode – VOX
  VOX sens – max increase
  VHF A – RCV
  VHF B – T/R

EVA Crewman audio panel –
  S-band – T/R
  ICS – T/R
  Relay – on
  Mode – VOX
  VOX sens – max increase
  VHF A – RCV
  VHF B – T/R

Verify LM EVA antenna deployed
Set VHF ANT SEL sw - EVA

Set comm panel -
   VHF A XMTR - off
   VHF A RCVR - on
   VHF B XMTR - voice
   VHF B RCVR - on
   Squelch A - noise threshold +1 1/2 div
   Squelch B - noise threshold +1 1/2 div

Recorder - on
Biomed sw - Non EVA Crewman

EVA Crewman Audio C/B - open

Disconnect LM comm - connect PLSS comm to PGA

EVA Crewman Audio C/B - close
RCU PTT-MAIN
PLSS mode sel sw - B

Verify -
   PLSS warning tone - on (10 sec)
   RCU press window - 0 (OPS act - abort)
   RCU vent window - P (PURGE - ABORT)
Verify PLSS O2 bottle press>85%
   Voice comm with other crewman and MSFN
                    NOTE
        Unstow antenna if PLSS
        transmits Garbled and/or
        loses TM.
Non EVA Crewman Audio panel -
   VHF A - T/R
   VHF B - RCV

EVA Crewman Audio panel -
   VHF A - T/R
   VHF B - RCV

Set comm panel -
   VHF A XMTR - voice
   VHF B XMTR - off

PLSS mode sel sw - A

Verify -
  PLSS warning tone - on (10 sec)
  PLSS 02 bottle press>85%
  Voice with other crewman
  Voice and TM comm with MSFN
<div align="center">NOTE</div>

<div align="center">IF COMM with MSFN<br>is NO GO -<br>  S-band Modulate - PM<br>  Verify voice and TM<br>    with MSFN</div>

Non EVA Crewman
TV C/B - open

FINAL EVA EQUIPMENT PREP FOR EGRESS

Unstow OPS 02 Hose and Actuator

Attach 02 Actuator to RCU

Snap OPS 02 Hose to side of PLSS with
  RCU connector flap

FINAL SYSTEMS PREP FOR EGRESS

Confirm "GO" for cabin depress with MSFN

Verify Cabin fan 1 C/B - open

Verify Cabin fan cont C/B - open

Verify - cabin repress C/B - close

Des H20 vlv - close

Verify - suit ckt relief vlv - auto

Suit gas div vlv - egress (pull)

Cabin gas return vlv - egress

## PREP FOR CABIN DEPRESS

**EVA** CREWMAN (Other Crewmen Assist)-
Suit isol vlv - suit disc
Disconnect LM 02 hoses
Connect OPS 02 hose to RH PGA blue conn-lock
Get purge vlv from ISA mid pkt - verify closed & lkd
  pin instl
Install in RH PGA red conn - lock
PGA flow diverter vlvs - vertical
Verify helmet feed port cover installed and locked-
Apply anti-fog to helmet
Position mikes
Verify PLSS mode sel sw - A
PLSS fan - on
Don helmet and "lock"
Verify - RCU vent window - Clears
Attach LEVA to helmet
Verify helmet/neck ring align
Don EV gloves and "lock"

Non EVA CREWMEN-
Verify helmet feed port cover installed and locked-
Apply anti-fog
Position mikes
Don Helmet and "lock"
Verify helmet/neck ring align
Unstow Cue Cards:  Hang-down, Final EVA Configuration
                    & EVA Card No. 1
Attach Hang-down to upper hatch
Position Final EVA Configuration Card as desired
Stow Lunar surface checklist in purse

Basic Date  June, 1969 16 B
Changed  June 30, 1969

POST EVA Hardsuit Checklist Complete

Verify CB Status Per Chart

POST EVA

Basic Date _____ June 16, 1969
Changed _____ June 18, 1969

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Basic Dat● ———— June 16, 1969
Changed ————— June 18, 1969

**16**
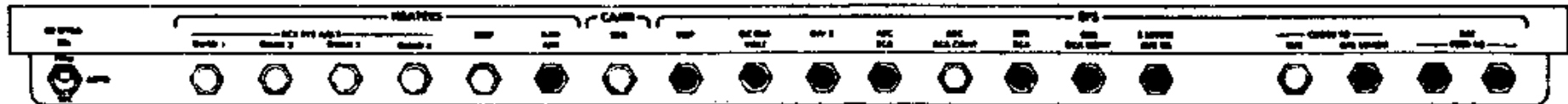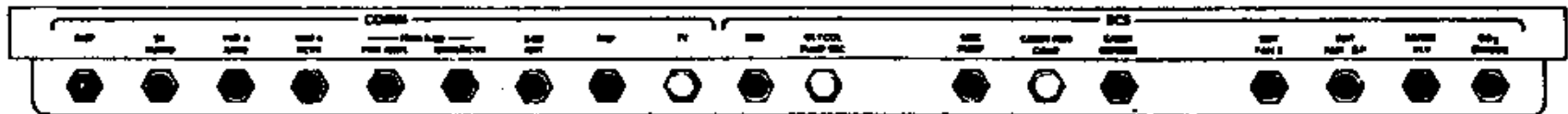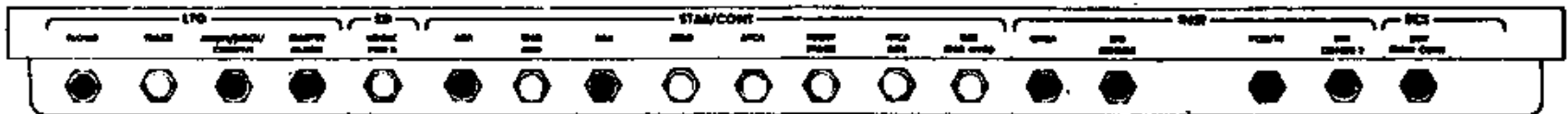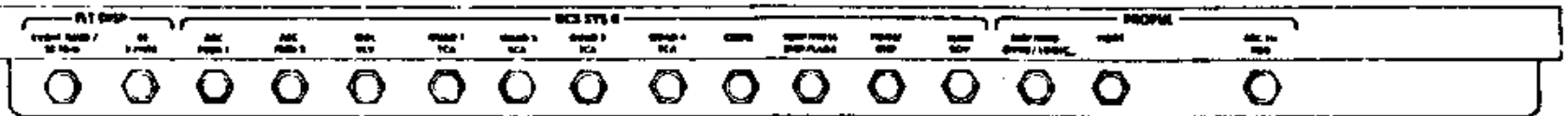
AUDIO (CDR):  S-BAND T/R - T/R
                  VHF A - OFF
                  VHF B - OFF

AUDIO (LMP):  S-BAND T/R - T/R
                  VHF A - OFF
                  VHF B - OFF

S-BAND: PM,PRIM,PRIM,VOICE,PCM,CWEA ENABLE,LEFT, HI

VHF A XMTR & RCVR (2) - OFF
VHF B XMTR & RCVR (2) - OFF

Verify:
    MASTER ARM - OFF
    ENG ARM - OFF
    ATTITUDE CONT (3) - MODE CONT
    MODE CONT:  PGNS - ATT HOLD
    MODE CONT:  AGS - AUTO

POWER TEMP MON - Check BAT, BUS Volts

| EAT PERIOD |
| --- |
| 116:40 To 117:20 |

CB(11) HEATERS:  RNDZ RDR OPR - Close
BIOMED - LEFT

| REST PERIOD |
| --- |
| 117:20 To 122:00 |

121:53
TIG-2:30

CB(11) AC BUS B:  AGS - Close
AGS STATUS - OPERATE

Configure CB's Per chart

Basic Date _____ June 16, 1969
Changed _____ July 7 REV "F"

6

5

7

4

2

2nd          1st

11

16

⑤

②

③

③

LM-5
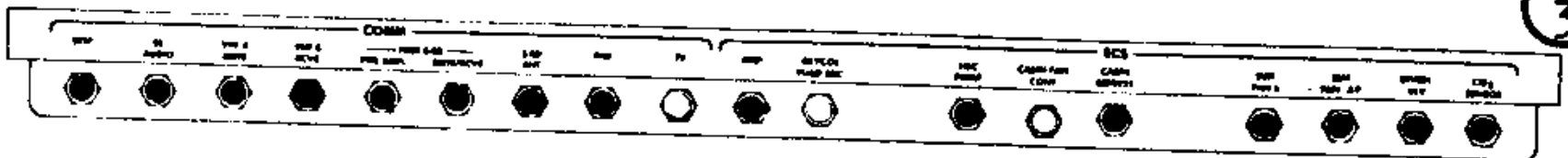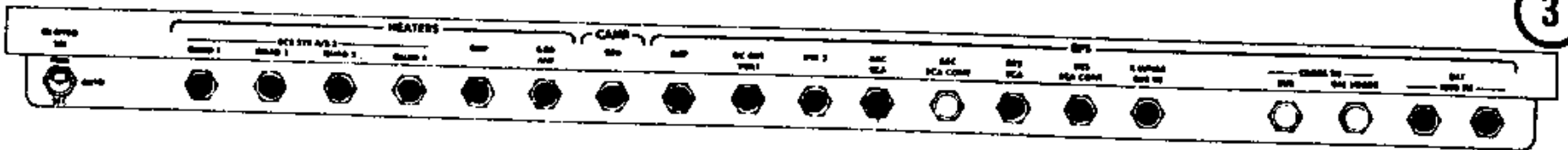
Basic Date _____ June 16, 1969
Changed _____ July 2, 1969

P00E

V35E
88 88   All Eights
        Master Alarm, LGC, ISS
        Warning & DSKY Lts – On (5 sec)
   RSET

V25 N01E, 1365E
   E,E,E

V15 N01E, 1365E

V21 N27E, 10E

15 01   Test Successful When
        R2 $\geq$ 3 (78 sec)

V21 N27E, 0E

*6666   OPR ERR Lt – On
*000 + 88888

*123 – 45679
*412+0E Reinitiate Self Test
*412 + 1 Satisfactory

*574R  + Not Staged
*604R  – On Surface
*612R  + 0 ATT HOLD At
           ABORT STAGE

UP DATA LINK – DATA
TELEMETRY PCM – HI

MSFN Uplinks CSM State Vector
   (UPLINK ACTY Lt – On Then Off)

UPDATA LINK – OFF

V16 N65E   LGC TIME
*377 + _____
*ENTR At Correct Time

```
      V47E
       06 16 ___:___:____  PGNS/AGS Bias
           Load Bias Time
     *414 + 1E
       PRO
     *414R  + 0 Complete
       50 16  Update Complete
       PRO
122:03
TIG-2:20
           If Star In L,F, or R AOT Detents,
           Position RR Antenna Along (0°, 283°)
           Via V41N72:
           If Star In Rear Detent, No Redesignation
             Req'd, Begin P57


           CB(11) AC BUS A: RNDZ RDR - CLOSE
             Wait 30 sec
             PNGS: RNDZ RDR - Close

           RR MODE - LGC


           V41 N72E
           21  73    +00000   TRUN
                     +28300   SHFT


           04  12    00006
                     00002
               PRO


           CB(11) PGNS: RNDZ RDR - Open
             AC BUS A: RNDZ RDR - Open
           V44E


           P57E
           04  06    00001
                     00003   REFSMMAT    (3 ref.)
               PRO


           05  06    00010
                     00003   Gravity & Star
                     00110
               PRO
```

V16 N20E  ICDU Angles
   Monitor Gravity Measurement
   NO ATT Lt - On Then Off, Twice

```
+ 04200
+ 31800
+ 03500
```

KEY REL

06  04  + _____    Gravity Err Angle   *drift or body slip for T3 exercise*
    PRO

06  22  ICDU Angles
    PRO
    NO ATT Lt - On Then Off
    CB(11) AC BUS B: AOT LAMP-CLOSE

01  70  00CDE Detent, Star
    Load Desired Star
       PRO

06 79  _____  Cursor
        _____  Spiral
        _____  Detent Position
    PRO

01  71  00CDE  Detent, Star
     PRO

Read Cursor Angle _____
54 71  MARK X OR Y
Read Spiral Angle _____

06 79 _____ Cursor, _____ Spiral _____ _____
   Load Cursor & Spiral Angles  _____ _____
   V32E Remark Star
   PRO After 2 Recycles

*122.15 Do* **P22** *AC PER PGNS-20 OF GEN DET 1 I X, 2 I O SHAFT*

   If RR Antenna Along (0°, 283°)
   Slew RR Along +X Axis Via V41N72:

CB(11) AC BUS A:  RNDZ RDR - Close
   Wait 30 sec
PGNS:  RNDZ RDR - Close

V41 N72 E
21  73  +18000   TRUN
        +27000   SHFT

04  12  00006
        00002
    PRO

RR MODE - SLEW
V44E

06  05  _____   Angle Diff
    PRO

06  93  _____   X Torque Angle
        _____   Y Torque Angle
        _____   Z Torque Angle
    PRO (Monitor Gyro Torquing)

50  25  00014   (star ck option)
    V34E

POOE

X-POINTER SCALE (Both) - HI MULT
RATE/ERR MON (Both) - RNDZ RDR
ATTITUDE MON (Both) - PGNS
MODE SEL - AGS
RNG/ALT MON - RNG/RNG RT
SHFT/TRUN - +50°

TEMP MONITOR - RNDZ (+10° To +145°)

RR MODE - AUTO TRACK

RADAR TEST - RNDZ (Rng Rt Tape Drives,
  X-Pointers & FDAI Needles Vary
  Between Limits.  After 12 sec
  Rng Tape Drives, NO TRACK - Out)

TEST/MONITOR - AGC          1.0 to 1.8 (1.8)
             - XMTR PWR     2.1 to 4.1 (2.6)
             - SHAFT ERR    2.1 to 2.6
             - TRUN ERR     2.2 to 2.6
             - AGC

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V25 NO7E
F21 07, 101E, 10E, 1E

RR MODE - LGC (NO TRACK Lt - On)


V63E
04 12   <u>00094</u>
        <u>00001</u>  RR
        PRO   (NO TRACK Lt - Out
         After 12 sec)


16 72  Varying @ 1/2 cps
    PRO


16 78  +19548 To +19588 Rng (TM Within ±1.2 of R1)
        -00467 To -00507 Rng Rt (TM=2<R2)

V34E
RADAR TEST - OFF (NO TRACK
   Lt - On, X-Pointers - Center)
V40N72E
*400 + 3E AGS/PGNS Align  *(1st of 2 with new imu align)*

V77E
V15N01E, 42E (Rate CMP Hot Fire Check ACA To Jets)


CB (11) RCS SYS A:  QUAD TCA (4) - Close ⎫ *enables pri fire*
CB (16) RCS SYS B:  QUAD TCA (4) - Close ⎬ *amps for jets)*

CDR ACA (OUT OF DETENT, PAUSE AT NULL)
    ROLL Rt   000XX
          Lt  777XX
    PITCH Up  000XX
          Dn  777XX
    YAW   Rt  777XX
          Lt  000XX


CB (11) RCS SYS A:  QUAD TCA (4) - Open
CB (16) RCS SYS B:  QUAD TCA (4) - Open

V76E (MIN IMP Check of CDR ACA to LGC, ACA Cold
   Fire CES Voltage, SEC RCS Coil Hot Fire 4-Jet
   In AGS)
V11N10E, 31E, R1 67777
GUID CONT - AGS
MODE CONT: AGS - ATT HOLD

ATTITUDE CONTROL (3) - MODE CONT
ACA/4 JET (CDR) - ENABLE
CDR ACA (Deflect slowly to Hardover, Pause at Null)
   ROLL Rt - Rl 27757
        Lt -    27737
  PITCH Up-    27776
       Dn-    27775
  YAW   Rt-    27767
       Lt-    27773

GUID CONT-PGNS
MODE CONT: AGS - AUTO

122:13
TIG-2:10

  V41N72E

  21 73  +18000 TRUN
         +27000 SHFT

  04 12  00006
        00002
   PRO

CB (11) PGNS: RNDZ RDR - Open
  AC BUS A:  RNDZ RDR - Open
V44E

*413 + 1E Store Azimuth (← *~*)

*544R_____X Gyro Coeff
*545R_____Y Gyro Coeff
*546R_____Z Gyro Coeff

*400 +6E Calibrate Gyros

*400R (+ 0 Calibrate Complete In 5 min 2 sec)

*544R_____X
*545R_____Y
*546R_____Z
If Gyro Coeff Changes More Than 2.0°/hr, AGS Failed

*400+3E AGS/PGNS Align
*413+1E Store Azimuth

*047R_____Sin Az Comp
*053R_____Sin Az Comp

Transmit The Following To MSFN:
N04,N05,N93,047,053

UP DATA LINK - DATA
TELEMETRY PCM - HI

MSFN Uplinks CSM State Vector
  & LGC Gyro Compensation

122:53
TIG-1:30

Copy Ascent And CSI Pads

*047_____E Sin Az Comp
*053R_____E Cos Az Comp
*225_____E αLower Limit
*226_____E αUpper Limit
*231_____E RLS

123:38
TIG-45

If Star In L,F, or R AOT Detent,
Position RR Antenna Along (0°,283°)
Via V41N72:

CB(11) AC BUS A: RNDZ RDR - Close
  Wait 30 sec
PGNS: RNDZ RDR - Close

V41N72E

21 73 +00000 TRUN
      +28300 SHFT

04 12 00006
      00002
   PRO

CB(11) PGNS: RNDZ RDR – Open
  AC BUS A: RNDZ RDR – Open
V44E

P57E
04  06  <u>00001</u>
        <u>00004</u>  Landing Site
    PRO

 06  34  T Align
        Load TIG
        PRO

05  06  <u>00010</u>
        <u>00003</u>  Gravity & Star
        <u>00110</u>
    PRO

V16 N20E
  Monitor Gravity Measurement
  NO ATT LT – On Then Off, Twice

```
+04200
+31800
+03500
```

KEY REL

06  04 + _____  Gravity Error Angle
    PRO

Basic Date _____ June 16, 1969
Changed _____ July 2, 1969    D

LM-5

If Gyro Torquing Angles >5°: – *this lcc question*

  06  22  ICDU Angles
      PRO
      NO ATT Lt – On Then Off

01  70  <u>00CDE</u>  Detent, Star
      Load Desired Star
      PRO

06  79  _____  Cursor
      _____  Spiral
      _____  Detent Position
    PRO

01  71  <u>00CDE</u> Detent, Star
      PRO

Read Cursor Angle _____
54  71 MARK X OR Y
Read Spiral Angle _____

06  79 _____ Cursor, _____ Spiral _____ _____
      Load Cursor & Spiral Angles _____ _____
      V32E Remark Star
      PRO  After 2 Recycles

06  05 _____ Angle Diff
    PRO

06  93 _____ X Torque Angle
      _____ Y Torque Angle
      _____ Z Torque Angle
    PRO  (Monitor Gyro Torquing)

50  25  <u>00014</u>
    PRO For Alignment Check

01  70  <u>00CDE</u>  Detent, Star
      Load Desired Star
      PRO

06  79  _____  Cursor
        _____  Spiral
        _____  Detent Position
    Verify Detent & Star Position
    V34E


POOE

If RR Antenna Along (0°,283°)
Slew RR Along +X Axis Via V41N72

CB(11) AC BUS A:  RNDZ RDR - Close
Wait 30 sec
   PGNS:  RNDZ RDR - Close

V41N72E
21  73  +18000  TRUN
        +27000  SHFT
          375
04  12  00006
        00002
    PRO

CB(11) PGNS:  RNDZ RDR - Open
   AC BUS A:   RNDZ RDR - Open
V44E

CB(11) AC BUS B:  AOT LAMP - Open
   AOT - CL/0.0°

SET CAMERA
FOR ASCENT
16mm/HCEX/OVERHEAD
(F4,500,INF)12 fps

```
LM CONSUMABLES UPDATE
GET  __ __ __:__ __
RCS A _____  B _____
DESC O_2 _____
DESC A-H _____
ASC A-H _____
```

123:47
TIG-35

Don Helmets & Gloves
Attach Restraints
V48E
01  46  <u>12012</u>  DAP Config
        PRO

06  47  _____  LM Wt
        _____  CSM Wt
        PRO

GUID CONT - PGNS
MODE CONTROL (PGNS) - AUTO
V77E

P12E
06  33  ___:___:___  TIG ASC *PAD*
        (124:23:21.3)
        PRO

06  76  _____  VH Final   *PAD*
        (       )
        _____  H Dot Final *PAD*
        (       )
        _____  Xrng   *compare w/ pad & Lmk*
        (       )            *no longer than 8 mi*
        PRO

06  74  ___:___  TFI
        _____  Yaw
        _____  Pitch
ET - Set/Up

*232 R  +00600    Ins Alt
*465 R  +00320    Ins H Dot
*410 R  +00000    Orb Ins  *guidance mode*

*547 R +0 Lunar Align Az  } *one & same vic 047*
                Correction }              *057*
*623 + 0E  +Z Along CSM Plane

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Changed _____ June 25, 1969  "A"

123:53
TIG-30

*400 + 4E Lunar Align

CB(11) RCS SYS A: QUAD 4,3,2,1 TCA (4)-Close
  STAB/CONT: AELD - Close *COMP*
  EPS:  INV 1 - Close *PROP: DES HE REG/VENT - CLOSE*
CB(16) RCS SYS B: QUAD 1,2,3,4 TCA (4)-Close
  STAB/CONT: AELD - Close
  *PROPUL: DISP/ENG OVRD/LOGIC - CLOSE*
X POINTER SCALE (2) - HI MULT
RATE/ERR MON (2) - LDG RDR/CMPTR
ATT MON - PGNS
GUID CONT - PGNS
MODE SEL - AGS
RNG/ALT MON - ALT/ALT RT
RATE SCALE - 25°/SEC
ACA PROP (2) - ENABLE
ENG ARM - OFF
ATT/TRANSL - 4 JETS
BAL CPL - ON
ASC He REG 1&2 tb(2)-gray
ABORT - Reset
ABORT STAGE - Reset
ENGINE STOP (2) - Reset
PRPLNT TEMP/PRESS - ASC
HELIUM MON - ASC PRESS 1

SYS A&B QUAD 1,2,3,4 (8) tb-gray
SYS A&B ASC FEED 1&2 tb(4)-bp
SYS A&B MAIN SOV tb(2)-gray
CRSFD tb-bp
TEMP/PRESS MON - OXID MANF
GLYCOL - PUMP 1
SUIT FAN - 1
02/H20 QTY MON - ASC 1
ATTITUDE MON - AGS
RADAR TEST - OFF
RR MODE - LGC -
DEAD BAND - MIN
ATTITUDE CONTROL (3) - MODE CONT
MODE CONTROL (Both) - AUTO
TEMP MONITOR - RNDZ RDR
RCS SYS A/B-2 QUAD 1,2,3,4 - AUTO

"A"

Basic Date ____ June 16, 1969
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ACA/4 JET (CDR)- ENABLE
ACA/4 JET ~~(2)~~ – ~~ENABLE~~ (LMP)DISABLE
TTCA/TRANSL (2) – ~~ENABLE~~ DISABLE
TTCA (Both) – JETS (Dn)

MASTER ARM – OFF
STAGE – SAFE/Guarded

DES H2O – CLOSE
WATER TANK SEL – ASC
ASC H2O – OPEN
DES O2 – CLOSE
ASC O2 No. 1 – OPEN
CABIN REPRESS – CLOSE
SUIT GAS DIVERTER – PULL/EGRESS
CABIN GAS RETURN – AUTO
SUIT CIRCUIT RELIEF–AUTO
PRESS REG A&B – EGRESS

Launch Guidance System
  Recommendation From MSFN
DES PROPULSION FUEL VENT, OPEN
DES PROPULSION OXID VENT, OPEN
ASC He REG 1&2 – tb(2)-gray —— Verify TB - Gray
MASTER ARM – ON
ASC He SEL – BOTH
ASC He PRESS – FIRE
MASTER ARM – OFF
SYS A ASC FEED 2-OPEN
        tb (2) – gray
Monitor Sys A Manf Press
SYS A MAIN SOV – CLOSE        J
                tb-bp
CRSFD-OPEN, tb-gray
SYS B ASC FEED 2-OPEN
                tb (2)-gray
Monitor Sys B Manf Press
SYS B MAIN SOV-CLOSE
                tb-bp
BAT 5,6 – ON
BAT 1,3 – OFF/RESET, tb-bp
CB(11 & 16) EPS:  ASC ECA CONT (2) – Close

```
         V47E
         06   16 _____    PGNS/AGS BIAS
                  _____
                  _____
         *414 + 1E
          PRO
         *414R + 0 Complete
          50   16 Update Complete
          PRO
```

124:06       FROM ~~~~·R
TIG-17

~~CB(11) AC BUS IN RNDR RDR - CLOSE~~

~~Wait 30 sec~~

~~PGNS - RNDR RDR - Above~~

**UPDATA LINK SW - Voice a/q**

VHF A:    XMTR - VOICE/RNG
          RCVR - ON
VHF B:    XMTR - OFF
          RCVR - ON
AUDIO (Both) VHF A - T/R
             VHF B - RCV

TRACK MODE - AUTO

124:13
TIG-10

Verify CB Status Chart

NOTE: Do NOT USE TAPEMETER IN PGNS; i.e. do NOT PLACE MODE SELECT SW TO PGNS

NOTE: IF ENG ARM CB DOES NOT CLOSE THEN DO NOT PLACE ENG ARM TO OFF AT 50 fps. STOP ENGINE VIA STOP PB AT OFPS.

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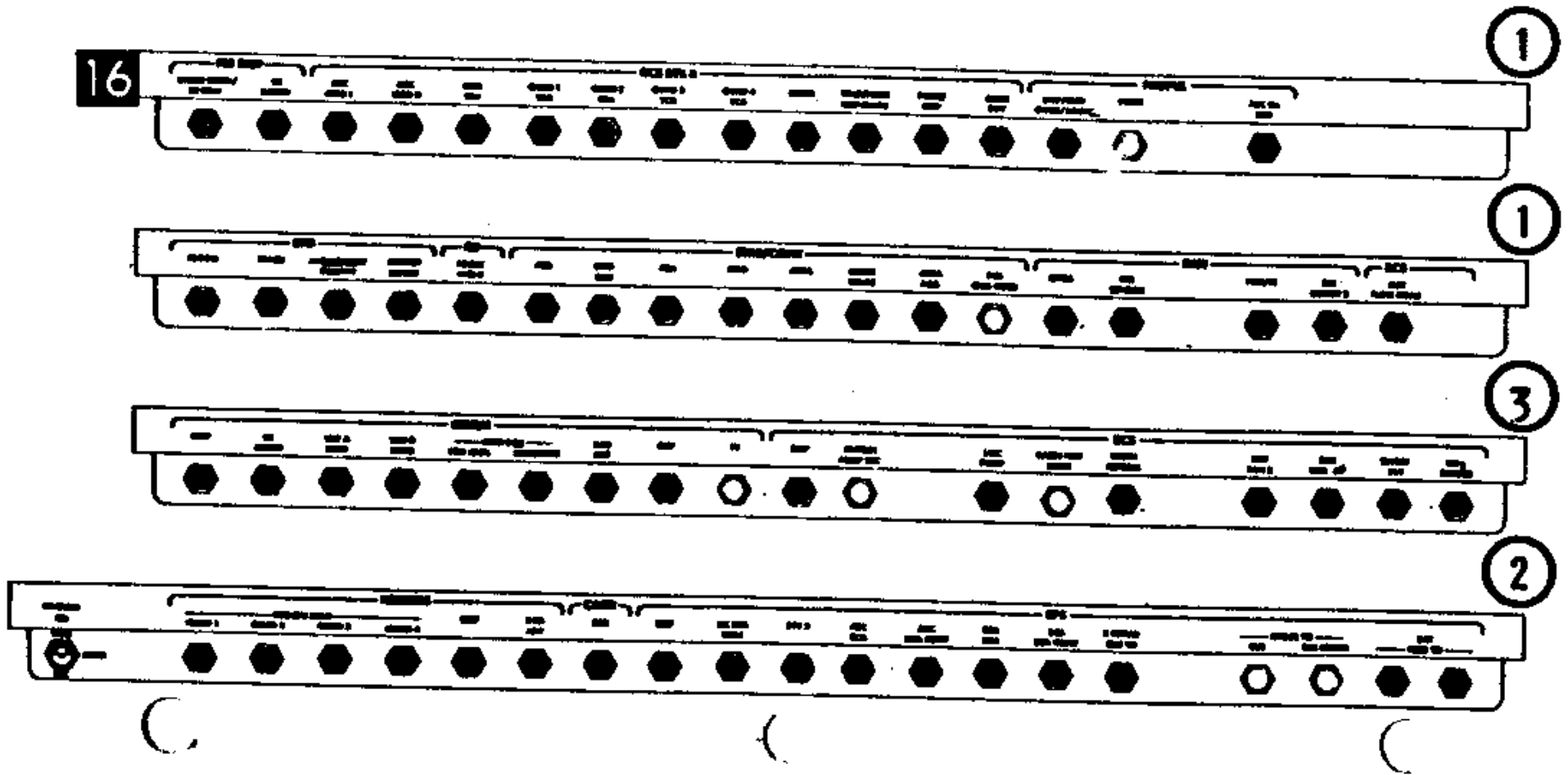
Check APS, RCS, ECS & EPS

TIG-5  BAT 2,4 - OFF/RESET, tb-bp
DES BATS - DEADFACE , tb-bp

   If tb-bp
   CB(11) EPS: DES ECA-OPEN
                : DES ECA CONT-OPEN
   CB(16) EPS: DES ECA-OPEN
                : DES ECA CONT- OPEN

Check APS START Card

TIG-2  CAMERA ON

Check APS Configuration Card
*400 + 1E Guid Steering

TIG-1

MASTER ARM - ON
*500 R

TIG-35

DSKY BLANKS

TIG-30

06  74 _____ TFI
       _____ YAW
       _____ PITCH

TIG-05

ABORT STAGE - PUSH
ENG ARM - ASC
PRO

┌─────────────────────────────┐
│ NO IGN:                      │
│ GUID CONT - AGS              │
│ NO IGN: GUID CONT-PGNS       │
│ ENGINE START - PUSH          │
└─────────────────────────────┘

ENGINE START - PUSH

## EMERGENCY LIFT-OFF

1    Bat 5&6:  NORM - ON tb-gray
     BAT 1&3 - OFF/RESET tb-bp

```
┌─────────────────────────────┐
│ IF TIME PERMITS:            │
│ Don Helmets And Gloves      │
│ SUIT GAS DIVERTER           │
│         -PULL/EGRESS        │
│ CABIN RELIEF-AUTO           │
│ PRESS REG A&B-EGRESS        │
└─────────────────────────────┘
```

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

3    CLOSE ALL CB's EXCEPT:
     **CB(11)** STAB/CONT:  DECA PWR - OPEN
                ECS:  CABIN FAN 1 - OPEN
             PGNS:  LDG RDR - OPEN
       STAB/CONT:  AEA - OPEN
     CB(16) PROPUL:  PQGS - OPEN
       STAB/CONT:  DES ENG OVRD - OPEN
            COMM:  TV - OPEN
             ECS:  GLYCOL PUMP SEC-OPEN
                   CABIN FAN CONT-OPEN
             EPS:  CROSS TIE BUS - OPEN
               :  CROSS TIE BAL LOADS-OPEN

1    Perform P-27 Update
     (REFSMMAT/STATE VECTOR)

## AGS ACTIVATION

1    AGS STATUS - OPERATE (Master Alarm,
                             AGS Warning Lt-ON)
     02/H20 QTY MON - C/W RESET Then ASC 1
      (AGS Warning Lt - OFF)

## ALIGN PGNS
P57E
04 06   <u>00001</u>
        <u>00004</u> LANDING SITE

   PRO
06 34   <u>00000</u>,<u>00000</u>,<u>00000</u> Present Time
   PRO
05 06   <u>00010</u>
        <u>00001</u> REFSMMAT & Gravity
        <u>00110</u>

   PRO

V16 N20E ICDU Angles
    Monitor Gravity Measurement
    No ATT Lt - ON, Then OFF, Twice


KEY REL

06  04 + _____ Gravity Err Angle
    PRO

06  22  ICDU Angles
    PRO
    NO ATT LT - ON, Then OFF

06  05  Angular Error/Difference
    PRO

06  93  Gyro Torquing Angles
    PRO (Monitor Gyro Torquing)

50  25  <u>00014</u>
    V34E

## AGS INITIALIZATION

1    V16 N65E
    16  65 LGC Time

2    Compute AGS Time (GET - 90:00:00)
        _____ (.1min)

    *377 + _____
    *ENTR At 90 + _____

3    V47E
    F 06 16

4    *414+1E
    PRO

5    *414R (+0)
6    F 50 16 Downlink Complete, PRO
7    *400+3
8     413+1E

| | | |
|---|---|---|
| *240 _____ | E X Position Comp | |
| *262 _____ | E Z Velocity Comp | |
| *254 _____ | E Epoch Time | |
| *414+2E Nav. Initial via DEDA | | |

EMERGENCY LIFT-OFF

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Basic Date ( ) _____ June 16, 1969
Changed _____ July 8, 1969 G

## TARGET PGNS

1    **V77E**
       **GUID CONT - PGNS**
       **MODE CONT (BOTH) - AUTO**

2    **P 12 E**
       **06  33** _____ : _____ : _____ **TIG ASC**
          **PRO**

       **06  76** _____ **VH FINAL**
                         _____ **HDOT FINAL**
                         _____ **XRNG**
          **PRO**

       **06  74** _____ : _____ **TFI**
                         _____ **YAW**
                         _____ **PITCH**

## TARGET AGS

1    ***232 +** _____
       ***465 +** _____
       ***225 +** _____
       ***226 +** _____
       ***410 + 0**
       ***411 + 1**
       **MASTER ARM-ON**
       **ASC He SEL-BOTH**
       **ASC He PRESS-FIRE**
       **MASTER ARM-OFF**
       **SYS A&B ASC FEED 2(2) - OPEN**
       **SYS A&B MAIN SOV (2) - CLOSE**
       **CRSFD - OPEN**

## ENABLE CONTROLS

1    **ACA PROP (BOTH) - ENABLE**
       **ACA/4 JET (BOTH) - ENABLE**
       **ATT CONT (3) - MODE CONT**
       **TTCA/TRANSL (BOTH) - ENABLE**
       **MODE SEL - AGS**
       **RNG/ALT MON - ALT/ALT RT**

### CONFIGURE COMM

1     P = _____ (+49)
      Y = _____ (-35)
      TRACK MODE – AUTO
      VHF A: XMTR – VOICE/RNG
             RCVR – ON
      VHF B: RCVR – ON
      AUDIO (BOTH):   VHF A – T/R
                      VHF B – RCV

### BEGIN FINAL COUNTDOWN

TIG-5:00
      BATS 2&4 – OFF/RESET tb-bp
      DES BATS – DEADFACE  tb-bp
      Check APS START Card

TIG-2:00
      *400 + 1

TIG-1:00
      MASTER ARM – ON
      *500 R

TIG-:35
      DSKY BLANKS

TIG-:30
      06   74   _____  TFI
                _____  YAW
                _____  PITCH

TIG-:05
      ABORT STAGE-PUSH
      ENG ARM-ASC

      PRO
      ┌────────────────────────┐
      │ NO  IGN:               │
      │ GUID CONT – AGS        │
      │ NO  IGN: ╶GUID CONT┼PGNS│
      │ ENG  START – PUSH      │
      └────────────────────────┘
      ENGINE START – PUSH

Basic Date June 16, 1969
Changed July 7, 1969

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(69)