It is requested that any organization having comments, questions, or suggestions concerning this document contact C. E. Wilkins, TRW Task 81, Building 4, room 265, telephone 483-3952.

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Distribution of this document is controlled by J. W. O'Neil, Chief, Flight Planning Branch, Flight Crew Support Division.
## LIST OF EFFECTIVE PAGES

**BASIC**

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9/15/70

12/21/70
DEDAA ADDRESSES

R DOT - 440
R - 317
Ha - 315
Hp - 403
VI - 433
H DOT - 367
H - 337

$\Delta V$ 404, 5, 6 = 0 470, 71, 72R

Y DOT - (Present)(-)270
- (Next Man)(-)263
STORE $\frac{1}{2}$ -415 & 1E
STORE R DOT -503E
STORE R -316E
V16N78 RR RNG/RNG RT
V16N92 %THROT/HDOT/H
V21N69 $\Delta$RLS

11/9/70

HOCK VELCRO

12/21/70
## RR RANGE VS AGC VOLTS

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11/9/70

12/21/70
### COAS Boresight Log

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<td>C 0=FINE</td>
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<td>&gt;78 PSI OX</td>
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<td>3=DOCKED</td>
<td>&gt;114 PSI FU</td>
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<td>δT&lt;60°F FOR</td>
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<td>TEMP &gt;119°F</td>
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### DPS APS RCS

**TEMP/PRESS MON**

- >30 PSI @ PDI
- >100 PSI
- >1000<1150 PSI

**TEMP PRESS MON**

- >78 PSI OX
- >114 PSI FU
- >1000<1150 PSI

**HELium Nom**

- 50 - 90°F
- ΔT<60°F FOR
- BT<100 SEC
- PRESS 3125 PSI

**QuAD TEMP >119°F**

- (25 MIN TO FIRING)
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- SHDN: 0:30
- NA: 2:00
- UA: 2:40

**PDI**

- To PD 1 and PD 2 are measured with respect to
- 3 T1 and T2 are measured with respect to
- 2 Begin pitch at specified time to
- 1 All pitch rates are 5° per second.

**PDI**

- 12/21/70

**DPS/APS (CONT)**

- 12/21/70

**DPS/APS (CONT)**

- 12/21/70

---

1. Adjust angles on the APS after 10 min use.
2. Adjust pitch at specified time to
3. T1 and T2 are measured with respect to
4. The manual ascent angles.
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<td>CDR AUDIO CONT-BU</td>
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<td>SQUELCH SW AS DESIRED</td>
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<td>Panel 13 - Updata Link</td>
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<td>SW - OFF</td>
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<tr>
<td>Panel 12 - Audio (AMP)</td>
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<tr>
<td>5-BAND T/R SW - 1/8</td>
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<tr>
<td>1CS T/R SW - 1/8</td>
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<tr>
<td>RELAY ON SW - RELAY OFF</td>
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<td>AUDIO CONT SW - NORM</td>
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<tr>
<td>VHF A SW - OFF</td>
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<td>VHF B SW - OFF</td>
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<tr>
<td>VOX SENS - MAX INCR</td>
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<td>Panel 17 - Comm</td>
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<td>5-BAND MODULAT</td>
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<td>SW-PM</td>
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<td>5-BANK XMT/RCV SW-PRI</td>
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<td>5-BAND VOICE SW-VOICE</td>
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<td>5-BAND PCM SW - PCM</td>
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<td>5-BAND RANGE SW-OFF/ EST</td>
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<td>VHF A XMTR SW-VOICE</td>
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<td>VHF A RCVR SW - 1/8</td>
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<td>VHF B XMT/R SW-OFF</td>
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<td>SQUELCH VHF A - NORM</td>
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<td>SQUELCH VHF B - NORM</td>
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<tr>
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<tr>
<td>TEM PCM SW - HI</td>
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<td>RECORDER SW AS DES</td>
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<tr>
<td>Panel 17 - Comm Anti</td>
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<tr>
<td>TRACK MODE SW - AUTO</td>
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<td>PITCH CONT - COMPUTED ANGLE</td>
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<tr>
<td>YAW CONT - COMPUTED ANGLE</td>
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<tr>
<td>5-BAND SEL-SLEW</td>
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<td>SQUELCH VHF A - NORM</td>
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<td>SQUELCH VHF B - NORM</td>
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<tr>
<td>TEM BIOMED SW - AS REQ</td>
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<td>RECORDER SW AS DES</td>
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<tr>
<td>Panel 15 - Comm Anti</td>
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<td>TRACK MODE SW - AUTO</td>
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<td>PITCH CONT - COMPUTED ANGLE</td>
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<tr>
<td>YAW CONT - COMPUTED ANGLE</td>
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<td>5-BAND SEL-SLEW</td>
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<tr>
<td>SQUELCH VHF A - NORM</td>
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</tr>
<tr>
<td>SQUELCH VHF B - NORM</td>
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<tr>
<td>TEM BIOMED SW - AS REQ</td>
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<tr>
<td>TEM PCM SW - HI</td>
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<tr>
<td>RECORDER SW AS DES</td>
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<td></td>
</tr>
</tbody>
</table>

*During EVA - ENABLE
LOSS OF COMM (PDI)

1. VERIFY STANDARD COMM CONFIG
2. S-BD SIG STR LOW (<3.0)-REACQ WITH STEerable
3. STILL NO COMM(SIG STR LOW<3.0) OMNI - SELECT BEST OMNI
4. STILL NO COMM
   S-BD: XMTR/RCVR - SEC
   : PWR/AMP - SEC
5. 60 SEC, STILL NO COMM
   DN VOICE BU (HOT MIKE)
   BIOMED - OFF
6. 60 SEC, STILL NO COMM
   VOICE
7. 60 SEC, STILL NO COMM
   CSM RELAY
   PM
   S-BD AUDIO (BOTH) - OFF
   NOTIFY CSM TO CONFIG FOR RELAY

<table>
<thead>
<tr>
<th>LM CORD</th>
<th>STER ANT</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>PITCH YAW</td>
</tr>
<tr>
<td>+X</td>
<td>90</td>
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<tr>
<td>-X</td>
<td>-45</td>
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<tr>
<td>+Y</td>
<td>90</td>
</tr>
<tr>
<td>-Y</td>
<td>45</td>
</tr>
<tr>
<td>+X</td>
<td>0</td>
</tr>
<tr>
<td>-Z</td>
<td>180</td>
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</table>

LOSS OF COMM (EVA)

1. CK ERECT ANT ALIGNMENT
2. CK COMM CBs
3. SEL ALT S-BD XMTR/RCVR
4. IF SIG STR METER < 3.9, SEL STEerable ANT
5. CONFIG FOR CDR RELAY:
   AUDIO (LMP) AUDIO (CDR)
   RELAY-OFF RELAY-ON
   VHF A-OFF VHF A-T/R
   VHF B-OFF VHF B-RCV
6. CONFIG LM TO B/U EVA MODE
   XMTR A-OFF
   XMTR B-VOICE
   AUDIO (CDR)
   VHF A-RCV
   VHF B-T/R
   PLSS MODE-A(CDR), B(LMP)
   7S-BD-ON VOICE BU
   8UPDATA LINK - VOICE BU
   9VHF ANT-AFT

1/19/71
<table>
<thead>
<tr>
<th>CODES</th>
<th>DEFINITION</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>00214</td>
<td>PROG USING IMU WHEN TURNED OFF</td>
<td>GUID CONT - AGS</td>
</tr>
<tr>
<td>00402</td>
<td>FIND CDUW ROUTINE NOT CONTROLLING ATTITUDE</td>
<td>GUID CONT - AGS</td>
</tr>
<tr>
<td>00511</td>
<td>NEITHER OR BOTH LR ANT POSITION DISCRETES PRESENT</td>
<td>LR ANT - HOVER, CONSULT MSFN</td>
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<tr>
<td>01107</td>
<td>PHASE TABLE FAILURE</td>
<td>GUID CONT-AGS (LAND MANUALLY IF DESIRED)</td>
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<tr>
<td>RECURRING 01406</td>
<td>BAD RETURN FROM ROOTPSRS</td>
<td>NO GUIDANCE, SWITCH TO P66 OR SWITCH TO AGS</td>
</tr>
<tr>
<td>RECURRING 01410</td>
<td>UNINTENTIONAL OVERFLOW IN GUIDANCE</td>
<td>NO GUIDANCE, SWITCH TO P66 OR SWITCH TO AGS</td>
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<tr>
<td>01412</td>
<td>DESCENT IGN ALGORITHM NOT CONVERGING</td>
<td>PRIOR TO BURN-SUSPECT BAD UPLINK SV OR RLS, HAVE MSFN SEND NEW UPLINK</td>
</tr>
<tr>
<td>01466</td>
<td>INSUFFICIENT THROTTLE SERVICING</td>
<td>GUID CONT - AGS, FLY PGNS ATTITUDE ERROR NEEDLES</td>
</tr>
<tr>
<td>01703</td>
<td>INTEGRATION CANNOT BE COMPLETED IN TIME FOR BURN</td>
<td>IF LARGE IGNITION DELAY-DO NOT BURN POI</td>
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<tr>
<td>2XXXX</td>
<td>ALL POODO'S (EXCEPT 21406)</td>
<td>GUID CONT - AGS</td>
</tr>
<tr>
<td>21406</td>
<td>BAD RETURN FROM ROOTPSRS</td>
<td>SUSPECT BAD UPLINK SV OR RLS, HAVE MSFN SEND NEW UPLINK</td>
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<tr>
<td>RECURRING 3XXXX</td>
<td>ALL SOFTWARE RESTARTS (BAILOUT)</td>
<td>CONTINUE-INSURE NO UNSAFE CONDITION DEVELOPS. IF IT DOES SWITCH TO AGS TO REDUCE LGC DUTY CYCLE AND FLY PGNS ATTITUDE ERROR NEEDLES</td>
</tr>
</tbody>
</table>
| N49 | RMAX VMAX >.3nm, 2.0fps | 1. IF STEADY STATE-RESET  
2. REJECT FIRST MARK THEN ACCEPT NEXT COUPLE OF MARKS AND MONITOR FOR NEXT CONVERGENCE  
>2.0nm OR 12.0fps PRIOR TO CSI OR  
>.8nm OR 5.0fps AFTER CSI CONSIDERED EXCESSIVE |
| F97N63 | LGC THINKS ENG FAILED | PRO TO SET ΔV MON. DO NOT ENTER BECAUSE IT WILL SLIP TIG IF RECURRING, NO GUIDANCE |
### Mission Rules No-Go's

<table>
<thead>
<tr>
<th>Pre PDI</th>
<th>PDI to PDI +5</th>
<th>PDI +5 to HI Gate</th>
<th>HI Gate to LO Gate</th>
<th>LO Gate to TD</th>
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<tr>
<td><strong>EPS</strong></td>
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<tr>
<td>One DC Bus</td>
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<td>ABORT</td>
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<tr>
<td>One Descent Feeder Shorted</td>
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<td>ABORT</td>
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<tr>
<td>One Ascent Feeder Shorted</td>
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<td>ABORT</td>
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<tr>
<td>3 Descent Bats</td>
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<tr>
<td>One Ascent Bat</td>
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<td>GO</td>
<td>GO</td>
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<tr>
<td>Both Inverters</td>
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<td>AC Bus A and B</td>
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<td><strong>ED</strong></td>
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<tr>
<td>One Pyro System Armed</td>
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<td>ABORT</td>
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<td>Cabin Press &lt;4.4</td>
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<tr>
<td>Both Demand Regs</td>
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<td>GO</td>
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<tr>
<td>Both H2O SEPS</td>
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<td>GO</td>
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<tr>
<td>Descent 02 Tank</td>
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<tr>
<td>Two 02 Tanks</td>
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<tr>
<td>PRI or SEC Coolant Loop</td>
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<td>PRI and SEC Coolant Loop</td>
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<tr>
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<td>PGNS Guid Steer</td>
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<td>3 Axis Att Cont ACA</td>
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<td>OPTION</td>
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<tr>
<td>PGNS Rate CMC &amp; PGNS Auto</td>
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<td>AUTO +X &amp; AUTO DPS IGNITION</td>
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<td>RED APS ON</td>
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<tr>
<td>P &amp; R GDA Trim (Imping Const Viol)</td>
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<td>Manual Throttle (2 TTCA) &amp; AUTO THROT</td>
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<td>Prop Leak (ΔQ Fu/Ox&gt;13%)</td>
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<td>Fu/Ox Inlet Press&lt;62,&gt;220</td>
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<td><strong>RCS</strong></td>
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<tr>
<td>HE/Prop Leak</td>
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<td>GO</td>
<td>GO</td>
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<tr>
<td>HE/Prop Leak (Between Main &amp; ISO VLV)</td>
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<td>Fu/Ox Mnfld A or B Press&lt;100</td>
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<td>Pair Isolated</td>
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<tr>
<td>3 Axis Att Cont RED</td>
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</tbody>
</table>
### ABNORMAL VEHICLE DYNAMICS

*Use ACA Hardover to Stabilize Vehicle*
- If RCS TCA LT ON-Affected QUAD-CLOSE
- GUID CONT-AGS, MODE CONT-ATT HOLD, ATT CONT(3)-MODE CONT, V77E
  - If Not Stabilized-CB(11) STAB/CONT: ATT DIR CONT-OPEN
  - If Not Stabilized-TTCA/TRANSL(2)-DISABLE, DEADBAND-MAX

### RAPID IMU REALIGN

1. AGS INERTIAL FDAI TO 0°, 0°, 0°
2. V41 N20E, E, E, E
3. V40 N20 0°, 0°, 0° ON AGS FDAI, ENTR WAIT 15 SEC.
4. P51E, PRO, POOE
5. V25N07E, 77E, 10000E, 1E
6. PERFORM P52, OPTION 3 (AUTO OPTICS ARE GOOD)

**NOTE:** FOR TEMPORARY LOSS OF CDR'S BUS, UPDATE LGC CLOCK WITH V55 TO COMPLETE RECOVERY.

### LIGHT MEANING IMMEDIATE ACTION (POSSIBLE OPERATIONAL IMPLICATIONS)

<table>
<thead>
<tr>
<th>LIGHT</th>
<th>MEANING</th>
<th>IMMEDIATE ACTION</th>
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<tbody>
<tr>
<td>DC BUS BATTERY</td>
<td>CDR BUS FAILURE</td>
<td><em>(DPS GOES TO 100%)</em> GUIDE CONT - AGS, SUIT FAN - 2, CDR AUDIO CONT - BU, INV 2,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activate Sec Glycol Loop TO START DPS: DES ENG CMD OVRD - ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TO STOP DPS: DES ENG CMD OVRD - OFF, ENG STOP - PUSH, ENG ARM - OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TO START APS: AGS Auto ON UNSTAGED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TO STOP APS: AGS Auto OFF, ABORT STAGE - Reset STAGED</td>
</tr>
<tr>
<td>FEEDER FAULT COMPONENT</td>
<td>~7 W&amp;C LTS</td>
<td><em>(DPS GOES TO 100% And GDA LOCKED)</em> GUIDE CONT - PGNS, SUIT FAN - 1, LMP AUDIO CONT - BU, INV - 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TO START APS/DPS: ENG START - PUSH UNSTAGED</td>
</tr>
<tr>
<td></td>
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<td>TO STOP APS/DPS: ENG STOP - PUSH STAGED</td>
</tr>
<tr>
<td>BATTERY</td>
<td>BATT OVERTEMP REV CURRENT &gt;10A</td>
<td>UNSTAGED: Check All BATS VOLTS, AMPS &amp; TB'S</td>
</tr>
<tr>
<td></td>
<td>OVERCURRENT</td>
<td>IF VOLTS, AMPS OK: Faulty BAT - OFF Then ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IF VOLTS, AMPS NOT OK: Faulty BAT - OFF, CB (11&amp;16) CROSS TIE BAL LOADS - CLOSE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STAGED: Check BAT 5, 6 VOLTS, AMPS &amp; TB'S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IF VOLTS, AMPS NOT OK: CB (11&amp;16) CROSS TIE BUS - CLOSE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Faulty BAT: NORMAL FEED - OFF, Good BAT: BACKUP FEED - ON</td>
</tr>
<tr>
<td>ED RELAY</td>
<td>ED Relays K1 To K6 CLOSE With MASTER ARM - OFF</td>
<td>BEFORE PDI: Do NOT Set MASTER ARM-ON, STAGE RELAY - RESET, Appropriate LOGIC POWER CB - OPEN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AFTER PDI: Do NOT Set MASTER ARM - ON, STAGE RELAY - RESET</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IF STAGE SEQ RELAYS LT Still ON: ASC He PRESS - FIRE, Monitor ASC Fuel/Oxid Press. If APS Pressurizes. ANORT</td>
</tr>
</tbody>
</table>

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**Light Meanings for Immediate Action (Possible Operational Implications):**

- **DC BUS BATTERY:** CDR BUS FAILURE *(DPS GOES TO 100%)*
  - GUIDE CONT - AGS, SUIT FAN - 2, CDR AUDIO CONT - BU, INV 2, Activate Sec Glycol Loop
  - TO START DPS: DES ENG CMD OVRD - ON
  - TO STOP DPS: DES ENG CMD OVRD - OFF, ENG STOP - PUSH, ENG ARM - OFF
  - TO START APS: AGS Auto ON UNSTAGED
  - TO STOP APS: AGS Auto OFF, ABORT STAGE - Reset STAGED

- **FEEDER FAULT COMPONENT ~7 W&C LTS:** *(DPS GOES TO 100% And GDA LOCKED)*
  - GUIDE CONT - PGNS, SUIT FAN - 1, LMP AUDIO CONT - BU, INV - 1
  - TO START APS/DPS: ENG START - PUSH UNSTAGED
  - TO STOP APS/DPS: ENG STOP - PUSH STAGED

- **BATTERY:** BATT OVERTEMP REV CURRENT >10A OVERCURRENT
  - UNSTAGED: Check All BATS VOLTS, AMPS & TB'S
  - IF VOLTS, AMPS OK: Faulty BAT - OFF Then ON
  - IF VOLTS, AMPS NOT OK: Faulty BAT - OFF, CB (11&16) CROSS TIE BAL LOADS - CLOSE
  - STAGED: Check BAT 5, 6 VOLTS, AMPS & TB'S
  - IF VOLTS, AMPS NOT OK: CB (11&16) CROSS TIE BUS - CLOSE
  - Faulty BAT: NORMAL FEED - OFF, Good BAT: BACKUP FEED - ON

- **INVERTER:** AC VOLTS <112 398>FREQ>402

- **ED RELAY:** ED Relays K1 To K6 CLOSE With MASTER ARM - OFF
  - BEFORE PDI: Do NOT Set MASTER ARM-ON, STAGE RELAY - RESET, Appropriate LOGIC POWER CB - 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. ANORT
**LIGHT MEANING IMMEDIATED ACCTO. (POSSIBLE OPERATIONAL IMPLICATIONS)**

**STAGE SEQ RELAY LT. OFF AT PDI**
- Possible Relay Fail
  - 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. She Tank Inoperative: STOP PB - PUSH,
  - ENG ARM - OFF. She Tank OK: MASTER ARM - OFF, LOGIC PWR CB - CLOSE
  - (M71)

**DES REG**
- 220 psi>He Press>260psi
  - DES HE REG 1 - CLOSE, DES HE REG 2 - OPEN
  - Monitor TEMP/PRESS, Maintain FUEL & OXID>160psi
  - (M31)

**ASC PRESS**
- Either He Press<2775psi (Before Staging)
  - IF APS NOT PRESSURIZED - CONSULT MSFN, GO TO MAL PROC APS-1
  - IF APS PRESSURIZED - CLOSE ASC He REG 1 & 2: MONITOR ASC He
  - PRESS; IF BOTH <2775 AND DECREASING - IMMEDIATE LIFTOFF
  - MONITOR FUEL/OXID PRESS; IF EITHER DECREASING - IMMEDIATE LIFTOFF
  - (M37)

**ASC HI REG**
- Manf Press>220psi
  - ASC He REG 1 & 2 CLOSE, When <220psi, Open Each REG Separately.
  - (M38)

**ASC QTY**
- <10 Sec Burn Time
  - MAIN SOV (2) - OPEN, ASC FEED 2 (2) - CLOSE
  - (M38)

**RCS A REG RCS B REG**
- 165psi>Reg Press>218psi
  - Monitor MANF PRESS, When <100psi: Bad System MAIN SOV - CLOSE,
  - CRSFD - OPEN
  - (M42)

**RCS**
- A OR B He Press<1770
  - Monitor He PRESS & RCS QUANTITY. Affected Sys: QUAD ISOL (4) - CLOSE,
  - MAIN SOV - CLOSE. Monitor MANF PRESS. (Translation May Be Lost
  - In One Or More Axis With A Single System Out.)
  - (M41)

**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
  - (M42)

**ENG GMBL**
- GMBL Cmd/Response Discrepancy
  - ENGN GMBL - OFF. IF Lt Still ON: ENG GMBL - ENABLE (CWEA FAIL)
  - (M25)

**LGC**
- LGC Power, Scaler, or Counter Fail
  - GUID CONT - AGS. Poss No Auto Eng Shutdown.
  - IF RESTRT LT ON, LGC Fail. CB(11) AEA - CLOSE
  - (M10)

**ISS**
- IMU, ICDU or PIPA (Trusting) FAIL
  - GUID CONT - AGS. Pos No Auto Eng Shutdown.
  - IF PROG LT NOT ON, CWEA Fail. CB(11) AEA - CLOSE
  - (M9)

**CES AC**
- ATCA AC Out of Tolerance
  - GUID CONT - PGNS, GYRO TEST - POS RT. IF Light Stays ON, CWEA Fail.
  - Poss Loss of AGS Control, FDAI Rate Needles Unreliable, RR Usable
  - In LGD Mode Only.
  - (M27)

**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
  - (M27)

**AGS**
- AGS Power Supply Out of Tolerance, AGS Heater Failed ON, AGS Self Test Failed
  - GUID CONT - PGNS. If PGNS Unavailable: MODE CONT (AGS) - ATT HOLD,
  - AGS RATE CMD OK, But NO ATT HOLD (Free Drift). 412R, Self Test.
  - (M17)
DPS BURN

CB(11) DECA GMBL AC - CLOSED
CB(16) DISP/ENG OVRO/LOGIC - CLOSED
CB(11)&(16) STAB/CONT CB'S(ALL) - CLOSED
EXCEPT CB(11) AEA - OPEN

RATE SCALE PDI - 25°/SEC
THR CONT - MAN/CDR
- PDI AUTO/CDR

ATT/TRANSL - 4 JETS
BAL CPL - ON
ENG GMBL - ENABLE
DES ENG CMD OVRO - OFF
ABORT/ABORT STAGE - RESET
DEADBAND - MIN
ATT CONT(3) - MODE CONT

MODE CONT PDI PGNS - AUTO
AGS - AUTO
STOP PB (2) - RESET
TTCA (2) - THROT/line PDI LMP TTCA-SOFT STOP

FOR PDI GO TO TIMELINE BOOK

-2:00 400+1

-1:00 MASTER ARM - ON (1st BURN)
- :30 ENG ARM - DES

FOR AGS BURN ABORT PB - PUSH (T=0 FOR AGS)
- :07.5 ULLAGE (MANUAL FOR AGS)
- :05 PRO

+ :01 DES REG (2)-OPEN (>29%)
TFC-10 DES REG (2) - CLOSE (<86%)
ΔV=0 STOP PB - PUSH
ENG ARM - OFF
ABORT PB - RESET
NO PDI+12 APS ABORT

ASSUMPTIONS:

PDI CHECKLIST COMPLETE TO TIG.
DPS INOPERATIVE.

V37E 30E, LOAD NO PDI+12 PAD
V37E 42E
01706 ALARM, PRO
N86
410+5, LOAD ΔV
267 R
411+1
407+0

N18 R, P, Y (0, 270, 0)

SET DET

He MON - ASC PRESS
MASTER ARM - ON
ASC He SEL - BOTH
CB(11)&(16)
√ED LOGIC PWR(2)-CLOSED
He PRESS ASC - FIRE

DES 02 - CLOSE
#1 ASC 02 - OPEN
H2O SEL - ASC
DES H2O - ASC
ASC H2O - OPEN

V48, 11002

CHECK APS BURN

APS BURN

CB(16)
DISP/ENG OVRD/LOGIC - CLOSED
CB(11)&(16)
STAB/CONT (ALL) - CLOSED
EXCEPT
CB(11) AEA AND DECA PWR AND
CB(16) DES ENG OVRD - OPEN
CB(16) EPS:
CROSS TIE BAL LOADS - OPEN
RATE SCALE - 25°/SEC
ATT/TRANSL - 4 JETS
BAL CPL - ON
DEAD BAND - MIN
ABORT/ABORT STAGE - RESET
ATT CONT(3) - MODE CONT
MODE CONT - \[ASCENT\] - PGNS - AUTO
AGS - AUTO

STOP PB (2) - RESET
TTCA (2) - JETS
411+1

-2:00 400+1

\[AGS/PGNS\]

-1:00 MASTER ARM - ON

RCS STAGE
-:14 MANUAL ULLAGE
-:10 STAGE-FIRE

-:10 ABORT STAGE PB - PUSH(T=0 FOR AGS)
ENG ARM - ASC

-:05 PRO

:00 ENG ON
+:01 ENG START - PUSH
200 fps ENG ARM - OFF
0 fps ABORT STAGE - RESET
STOP PB - PUSH

11/9/70
### DPS ABORT/INSERTION

- **GUID SW**
- THROTTLE-UP
- ABORT PB-PUSH
- MODE CONT(both)-AUTO
- YAW RT 30°
- **623+1**
  - √INVERTER
  - V16N85 (500R)
- **29% DES REG-CLOSE**

#### 200fps
- DES ENG CMD OVRD-OFF
  - (UNLESS CDR BUS OUT)
- TFC-10 DES REG-Close (<86%)
- STANDBY TO COPY GET
- **0fps**
  - STOP PB-PUSH
  - DET-STOP
  - GET
  - MODE CONT-ATT HOLD
  - ENG ARM-OFF
  - ABORT (STAGE)-RESET
  - STOP PB - RESET
- **404, 5, 6=0 470R**

### APS ABORT/INSERTION

- **GUID SW**
- ABORT STAGE PB-PUSH
- MODE CONT(both)-AUTO
- ENG ARM-ASC
- START PB-PUSH
- ASC FEED(2)-OPEN+ (UNLESS MAIN SOV-CLOSE+ BUS LOSS)
- YAW RT 30°
- **623+1**
  - CABIN REPRESS - CLOSE
  - DES 02-CLOSE, #1 ASC 02-OPEN
- PRESS REGS A&B - EGRESS
- SUIT GAS DIV - EGRESS
- CABIN GAS RETURN - EGRESS
- H2O SEL-ASC
- DES H2O-CLOSE, ASC H2O - OPEN
- PROP TEMP/PRESS-ASC
- He MON-ASC
  - √XFEED
  - √INVERTERS
  - THROTTLE/JETS-JETS
  - V16N85 (500R)

### ABORT RULES

<table>
<thead>
<tr>
<th>Rule</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ATT &amp; RATE LIMITS</td>
<td>DPS &gt;5° SEC</td>
</tr>
<tr>
<td>2. DPS SHUTDOWN</td>
<td>APS &gt;10° SEC</td>
</tr>
<tr>
<td>3. APS UNDER BURN</td>
<td>□ &lt;30 fps - STAGE &amp; RCS</td>
</tr>
<tr>
<td></td>
<td>□ &gt;30 fps - ABORT STAGE</td>
</tr>
<tr>
<td>4. INSERTION</td>
<td>□ 404, 5, 6=0 470R</td>
</tr>
<tr>
<td>5. NO VOICE</td>
<td>AGS &amp; PGNS &lt;10fps</td>
</tr>
<tr>
<td></td>
<td>AGS &amp; PGNS &gt;10fps</td>
</tr>
</tbody>
</table>

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**NOTES:**

- All pgns shall be set to AGS, autov, or auto.
- All inverts shall be set to V16N85 (500R).
- **HOT**
  - H20 SEL-ASC
  - DES H2O-CLOSE, ASC H2O - OPEN
- PROP TEMP/PRESS-ASC
- He MON-ASC
- PGS SHUTDOWN (UNLESS BUS LOSS)
  - STANDBY TO COPY GET
  - ABORT STAGE-RESET
  - STOP PB-PUSH
  - DET-STOP
  - GET
  - MODE CONT-ATT HOLD

---

**12/21/70**
<table>
<thead>
<tr>
<th>STAGING</th>
<th>DPS ABORT/APS INSERTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASC BATT (2)-ON(PRECONDITION)</td>
<td>√GUID SW</td>
</tr>
<tr>
<td>DES BATT-OFF</td>
<td>THROTTLE-UP</td>
</tr>
<tr>
<td>MODE CONTROL (BOTH)-ATT HOLD</td>
<td>ABORT PB-PUSH</td>
</tr>
<tr>
<td>DEADFACE</td>
<td>MODE CONT (BOTH)-AUTO</td>
</tr>
<tr>
<td>√GUID SW (IF PGNS: DAP 11002, V77)</td>
<td>YAW RT 30°</td>
</tr>
<tr>
<td>ATT CONT (3)-MODE CONT</td>
<td>623+1</td>
</tr>
<tr>
<td>BAL CPL-ON</td>
<td>29%</td>
</tr>
<tr>
<td>DEAD BAND - MIN</td>
<td>DES REG-CLOSE</td>
</tr>
<tr>
<td>P47, 404,5,6=0</td>
<td>BURN DPS TO DEPLETION</td>
</tr>
<tr>
<td>470R</td>
<td>ABORT STAGE PB-PUSH</td>
</tr>
<tr>
<td>HELIUM MON-/ASC PRESS</td>
<td>ENG ARM-ASC</td>
</tr>
<tr>
<td>MASTER ARM-ON</td>
<td>START PB-PUSH</td>
</tr>
<tr>
<td>ASC He Sel-BOTH</td>
<td>ASC FEED(2)-OPEN+ (UNLESS</td>
</tr>
<tr>
<td>√CB ED LOGIC PWR (2)-CLOSED</td>
<td>MAIN SOV-CLOSE+ BUS LOSS)</td>
</tr>
<tr>
<td>He PRESS ASC-FIRE</td>
<td>CABIN REPRESS - CLOSE</td>
</tr>
<tr>
<td>STOP PB-PUSH</td>
<td>DES 02-CLOSE, #1 ASC 02-OPEN</td>
</tr>
<tr>
<td>-X TRANS 2fps</td>
<td>H2O SEL-ASC</td>
</tr>
<tr>
<td>STAGE-FIRE</td>
<td>DES H2O-CLOSE ASC H20-OPEN</td>
</tr>
<tr>
<td>+X TRANS 2fps</td>
<td>PRESS REGS A&amp;B-EGRESS</td>
</tr>
<tr>
<td>CB ED LOGIC PWR (2)-OPEN</td>
<td>SUIT GAS DIVERTER - EGRESS</td>
</tr>
<tr>
<td>CABIN REPRESS-CLOSE</td>
<td>CABIN GAS RETURN - EGRESS</td>
</tr>
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<td>DES 02-CLOSE, #1 ASC 02-OPEN</td>
<td>PROP TEMP/PRESS-ASC</td>
</tr>
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<td>H2O SEL-ASC</td>
<td>He MON-ASC</td>
</tr>
<tr>
<td>DES H2O-CLOSE, ASC-H20-OPEN</td>
<td>✓XFEED</td>
</tr>
<tr>
<td>PRESS REG A&amp;B-EGRESS</td>
<td>✓INVERTER</td>
</tr>
<tr>
<td>SUIT GAS DIV-EGRESS</td>
<td>THROTTLE/JET-JETS</td>
</tr>
<tr>
<td>CABIN GAS RETURN - EGRESS</td>
<td>CB(11) RR(2) - CLOSED</td>
</tr>
<tr>
<td>ATT/TRANSL-2 JET</td>
<td>V16N85 (500R)</td>
</tr>
<tr>
<td>POO</td>
<td>500fps</td>
</tr>
<tr>
<td>STOP PB-RESET</td>
<td>MAIN SOV-OPEN+</td>
</tr>
<tr>
<td>✓GUID SW</td>
<td>ASC FEED(2)-CLOSE+</td>
</tr>
<tr>
<td></td>
<td>200fps</td>
</tr>
<tr>
<td></td>
<td>ENG ARM-OFF (UNLESS BUS LOSS)</td>
</tr>
<tr>
<td></td>
<td>STANDBY TO COPY GET</td>
</tr>
<tr>
<td></td>
<td>0fps</td>
</tr>
<tr>
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<td>ABORT STAGE-RESET</td>
</tr>
<tr>
<td></td>
<td>STOP PB-PUSH</td>
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<tr>
<td></td>
<td>DET-STOP</td>
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<tr>
<td></td>
<td>GET</td>
</tr>
<tr>
<td></td>
<td>MODE CONT-ATT HOLD</td>
</tr>
<tr>
<td></td>
<td>404,5,6=0 470R</td>
</tr>
</tbody>
</table>
### 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

### CONTINGENCY EVT (2 OPS)

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

### 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

### 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

CB(16) ECS: LCG PUMP - OPEN
LCG - COLD, As REQ'D

### 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

### OPS DONNING (LMP 1st)

Unstow OPS & Checkout
Verify OPS Reg Decays To 2.5 PSI (< 3 Min)
Unstow OPS 02 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
CB(16) ECS: LCG PUMP - OPEN
LCG - COLD, As REQ'D

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

### LCG - COLD, As REQ'D
CDR Egress Feet First and Transfer To CSM, LMP Tend Lifeline

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

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired

CDR Secure Position In LEB & Tend Lifeline For LMP

LMP Egress Feet First and Transfer to CSM

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

CMP Close Hatch

---------

CSM Maneuver Apex to LM Forward Hatch

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

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

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired

Secure Position In LEB And Tend Lifeline For LMP
LMP Ingress CSM Feet First, Face Toward MDC, and Assume Position In Center Couch Area
CDR Connect R Electrical Umbilical To LMP

CMP Close Hatch

-------------------------------------

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

Disconnect LM O2 Hoses

Disconnect LM Comm Umbilical
Stow LM Hoses

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

-------------------------------------

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 O2 Hoses And Comm Umbilical

CMP Connect C Comm Umbilical To CDR

CDR Configure Audio Panel As Desired

Secure Position In LEB And Tend Lifeline For LMP
LMP Ingress CSM Feet First, Face Toward MDC, and Assume Position In Center Couch Area
CDR Connect R Electrical Umbilical To LMP

CMP Close Hatch
CABIN PREP-Perform EVA 1 Or 2 As Reqd

EQPT PREP-Perform EVA 1 Or 2 As Reqd

PLSS DONNING-Perform EVA 1 or 2 As Reqd

Position Post EVA 1 or 2 Cue Card
   For Post EVA

NON EVA CREWMAN-Connected To LM 02,
   Comm, & H2O
   Gas Connector Plugs In PGA
   PGA Diverter Vlv - Horizontal

EVA CREWMAN: PGA Diverter Vlv - Vertical
   For EVA 1 (MIN TIME) - CSRC
   In PGA Pocket

PLSS COMM CHECK

Verify Powerdown CB Configuration
Verify LM EVA Antenna Deployed
COMM: MODULATE-FM
CB(16) COMM: TV-Close
Verify Voice Comm With Hou

Audio (Non EVA Crewman)
S-BAND - T/R
ICS - T/R
RELAY - OFF
MODE - VOX (VOX SENS MAX)
VHF A - RCV
VHF B - T/R

Audio (EVA Crewman)
S-BAND - T/R
ICS - T/R
RELAY - ON
MODE - VOX (VOX SENS MAX)
VHF A - RCV
VHF B - T/R

NOTE: Unstow PLSS Antenna If It Transmits Garbled And/Or Loses TM.

Audio (CDR & LMP)
VHF A - T/R
VHF B - RCV

COMM:
VHF A XMTR - VOICE
VHF B XMTR - OFF

PLSS Mode - A, Wheel-CCW (Tone-On)
Perform Comm Check With Each Other &
Comm & TM Check With Hou

Read PLSS 02 Qty To Hou

NOTE: IF Comm Is NO GO With Hou
   S-BD MOD - PM
   Verify Comm & TM

CB(16) COMM: TV - Open (EVA 1)

FINAL SYSTEMS PREP
CB(16) ECS: CABIN REPRESS - Close (Ver)
   SUIT FLOW CONT- Open

SUIT GAS DIVERTER - PULL-EGRESS
   CABIN GAS RETURN - EGRESS

SUIT CIRCUIT RELIEF - AUTO (Verify)

OPS CONNECT

Unstow OPS 02 Actuator
Connect Actuator To RCU
SUIT ISOL - SUIT DISC
Discon LM 02 Hoses, Secure About PGA

Connect OPS 02 Hose To PGA B/B
Retrieve Purge Valve (Purse) -
   Verify Closed, Locked & LO
Install Purge Valve In PGA R/R

FOR EVA 2:
   Verify Items Prepared For Jettison -
      ECS LiOH Cartridge & Brkt
      Hammocks
      PLSS Batteries & LiOH Carts
      Food Waste, Urine Bags
      Feedwater Bags & Scale

Drink
DES H20 VLV - CLOSE

HELMET/GLOVE DONNING

Position Mikes (Both)
PLSS FAN - ON, Rt (Vent Flag - Clear)
Don Helmets, Check Drink Bag Position
Don LEVA

EVA Crewman:
   LCG - COLD, As Reqd
   Disconnect LM H2O Hose
   Connect PLSS H2O Hose
   Stow LM Hoses
Verify EVA Crewman in CDR's Station

Verify The Following:
- Helmet & Visor (2) - Aligned & Adjusted
- Torso Tiedown (2) - Adjusted
- O2 Connectors (7) - Locked
- Purge Valve (1) - Locked
- H2O Connectors (2) - Locked
- Comm Connectors (2) - Locked

Verify No Fog RH Window
If BSLSS Not Req'd, Stow In Jett Bag
Tie Jett Bag & Transfer To Eng Cover

Don EV Gloves & Verify:
- Wrist Locks (4) - Locked
- Glove Straps (4) - Adjusted

NOTE: If PGA Biting, PLSS 02 - ON/OFF

PLSS DIVERTER - MIN (Verify)
PLSS PUMP - ON

PRESSURE INTEGRITY CHECK
(Non EVA Crewman)

NOTE: LM Suit Circuit Shall Not Be Maintained At Elevated Press >5 min

SUIT GAS DIVERTER - PULL-EGRESS (Verify)
CABIN GAS RETURN - EGRESS (Verify)
CABIN CIRCUIT RELIEF - CLOSE

PRESS REG A - EGRESS
PRESS REG B - DIRECT O2
- Monitor Cuff Gage To 3.7 - 4.0 Psig
  Then PRESS REG B - EGRESS (Cuff Gage Decay <.3 Psig In 1 min)

SUIT CIRCUIT RELIEF - AUTO (Suit Ckt Press Decays To 4.8 Psig)

PLSS/OPS/PGA (EVA Crewman)
- PLSS 02 - ON (Tone-On, 02 Flag-0)
- Press Flag Clear (3.1-3.4 Psid)
- Cuff Gage 3.7-4.0 Psig
- O2 Flag Clear

- PLSS 02 - OFF (Cuff Gage Decay <.3 Psig In 1 Min)
- PLSS 02 - ON (Cuff Gage 3.7-4.0 Psig, Tone & O2 Flag May Come On)

CABIN DEPRESS
- Confirm Go For Depress From Hou
- CABIN REPRESS - Open
- CABIN REPRESS VLV - Close

- Ovhd Or Fwd Dump Valve - OPEN Then AUTO
  At 3.5 Psia (Verify EVA Crewman Cuff Gage Does Not Drop Below 4.8 Psig)

Verify:
- Cabin At 3.5 Psia
- LM Suit Circuit 3.6 to 4.3 Psia & Decaying
- PLSS/OPS/PGA > 4.8 Psig & Decaying

Start Wrist Watch :00

- Ovhd Or Fwd Dump Valve - OPEN

Verify:
- Tone-On & H2O Flag - A (1.3-1.6 Psia)
- LM Suit Circuit 3.6 To 4.3 Psia & Decaying
- PLSS/OPS/PGA > 4.8 Psig & Decaying

Partially Open Fwd hatch

Fwd Hatch - Open

Rest Until Cooling Sufficient
Verify:

PLSS/OPS/PGA 3.7 To 4.8 Psig
CWEA Status:
Caution PREAF/PREP

CB(16) COMM: TV - Close

Release PLSS Antenna
Lower EV Visor :10

POST ONE-MAN EVA

Perform POST EVA 1 or 2 As Applicable
EQUIPMENT PREP EVA 1

DET-Set/Up :15
Unstow BSLSS, Remove From Bag
Stow BSLSS RH Fwd Cabin
Stow BSLSS Bag In Jett Bag (LHSSC)
Stow RCU Brkt Bag (Purse) In Jett Bag
Stow Jett Bag On LH Fwd Floor

Unstow PLSS On Floor, Set Against Hatch
Stow COAS In FWD Window Mount
Secure Util Lts Back Of AOT
Verify O2 EVA Stowage Straps Accessible

Empty UCTA's
Check PGA Zippers, Verify Lock-Lock
Fill Drink Bags (Back ISA)-Evac, Install

Stow PGA Gas Conn Plugs In Purse
Empty PGA Pockets Into Purse
Verify Watch On PGA

Unstow CSRC (LHSSC), Remove Bag, Stow In LMP Pkt
Unstow Sur Seq Cam (LHSSC) Install Lens
Stow Sur Seq Cam Bag In Jett Bag
Install Mag CC (Purse)
Connect Power Cable, Ver Ops

Settings 2.8/60, TIME FR (2 Places)
Stow Sur Seq Cam In LHSSC,
Handle Aft, Lens Outboard
Unsnap LEC Compt (Aft LHSSC)

Stow LEVA Bags On Floor, 1 Left, 1 Rt
Position Helmets On Armrests

CDR Move To Aft Cabin Area
Deploy LM EVA Antenna
Unstow B&W TV, Stow On Mid-Step
Unstow RCU's, Resnap Flaps
Stow RCU's On Data File

EVA 1 PREP & POST

Unstow CDR Boots, Purge Valve In Purse
CDR Don Boots
LMP Move To Aft Cabin Area
Unstow LMP Boots, Purge Valve In Purse

Stow IV Gloves In Bot Boot Comp
LMP Don Boots
Unstow LMP OPS
Remove Pallet, Stow In Jett Bag

Hand LMP OPS To CDR For Checkout
Unstow CDR OPS
Remove Pallet, Stow In Jett Bag
Perform OPS Check (Both)

Stow LMP OPS On RH Floor Under Dump Vlv
LMP Move To LMP Station
Stow CDR OPS On LH Eng Cover

Apply Antifog (ISA Back Pkt) 3-4x
Stow EMU Maint Kit In Purse
Unstow LEVA's
Stow LEVA's, Then Helmets On RH Eng Cov

Stow EV Gloves On Comm Panels
Stow LEVA Bags In SRC Area
Disconnect 3 Armrests, CDR LH,
LMP RH & LH, Stow In Jett Bag

POGE
CB(11) PGNS: IMU OPR - Open
PRO (Hold In Until STBY Lt - On)
UPDATA LINK - OFF
Fwd Hatch Handle - UNLOCK

PLSS DONNING :58

LMP 1st:
Set PLSS On Mid-Step
Retrieve OPS, Unstow Antenna Lead
Verify OPS Reg Decay, Unstow Nozzle
Secure Flap

Attach OPS To PLSS
Connect OPS Antenna Lead To PLSS
Verify Sublimator Exhausts Clear

Unstow PLSS Straps & Hoses
Remove Elect Dust Cap, Stow In Purse
Verify DIVERTER, O2, FEEDWATER - OFF
Connect Battery Cable

Verify The Following Locked:
OPS To PLSS
OPS Antenna To PLSS
PLSS Battery Connection

Don PLSS/OPS, Lift PLSS Hoses Above LH Lower Strap
Connect PLSS 02 Hoses To PGA
Verify DIVERTER, O2, FEEDWATER - OFF
Unstow OPS 02 Hose

CDR Repeat PLSS DONNING

Unstow RCU's
Connect RCU To PGA Upper Straps
Verify RCU Controls:
PUMP, FAN - OFF (Left) MODE SEL-0

Connect RCU To PLSS, Snap OPS 02 Hose To Side of PLSS
PLSS COMM CHECK :18

Verify Powerdown CB Configuration
COMM: MODULATE - FM
CB(16) COMM: TV - Close
Verify Voice Comm With Hou

Audio (CDR)
S-BAND - T/R
ICS - T/R
RELAY - OFF
MODE - VOX (VOX SENS MAX)
VHF A - T/R
VHF B - RCV

Audio (LMP)
S-BAND - T/R
ICS - T/R
RELAY - ON
MODE - VOX (VOX SENS MAX)
VHF A - T/R
VHF B - RCV

COMM:
S-BD XMTR/RCVR-SEC
VHF - VOICE, ON, OFF, ON, OFF, HI
RANGE - RANGE
SQUELCH A & B - Noise Thres + 1-1/2
RECORDER - ON
VHF Antenna - EVA
UPLINK SQUELCH - ENABLE

LMP Connect To PLSS Comm (Audio CB Open/Close)

PLSS PTT (LMP) - MAIN (Rt)
PLSS Mode(LMP) - A, Wheel-CCW (Tone-On, Vent Flag- P, Press Flag- 0, 02 Mom)
PLSS 02 Press Gage > 85%
Perform Comm Check With CDR

NOTE: Unstow PLSS Antenna If It Transmits Garbled And/Or Loses TM

CDR Connect To PLSS Comm (Audio CB Open/Close)

Audio (CDR)
VHF A - OFF
VHF B - OFF
PLSS PTT (CDR) - MAIN (Rt)

NOTE: No MSFN Reception In PLSS Mode B

PLSS Mode(CDR) - B, Blade-CCW (Tone-On, Vent Flag- P, Press Flag- 0, 02 Mom)
PLSS 02 Press Gage > 85%
Perform Comm Check With LMP

PLSS Mode (LMP)- B, Blade-CCW (Tone-On)
PLSS Mode (CDR)- A, Wheel-CCW (Tone-On)
Verify Voice Comm With Each Other

PLSS Mode (Both) - AR (Tone-On)

NOTE: (AR) Wheel-Hou, Blade-EVA

Perform Comm & TM Check With Hou & Comm Check With Each Other
Read PLSS 02 Qty to Hou

NOTE: If Comm Is NO GO With Hou
S-BD MOD - PM
Verify Comm & TM

CB(16) COMM: TV - Open

FINAL SYSTEMS PREP :28

CB(16) ECS: CABIN REPRESS - Close (Ver)
SUIT FAN ΔP - Open
SUIT FAN 2 - Open
SUIT FAN Sel - 2
Verify ECS Caution & H20 SEP COMP Lts - On (~ 1 Min)

Verify The Following:
Helmet & Visor (2) - Aligned & Adjusted
Torso Tiedown (2) - Adjusted
02 Connectors (6) - Locked
Purge Valves (2) - Locked
H20 Connectors (2) - Locked
Comm Connectors(2) - Locked

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Verify EVA CB Configuration
Verify No Fog RH Window
Tie Jett Bag, Transfer to Eng Cover
Don EV Gloves & Verify:
  Wrist Locks (4) - Locked
  Glove Straps (4) - Adjusted

NOTE: If PGA Biting, PLSS 02 - ON/OFF

PLSS DIVERTER - MIN (Verify)
PLSS PUMP - ON, Rt
PRESS REG A & B - EGRESS

PRESSURE INTEGRITY CHECK :52
PLSS 02 - ON (Tone-On, 02 Flag-0)
Press Flag Clear (3.1-3.4 Psid)
Cuff Gage 3.7-4.0 Psig
02 Flag Clear
PLSS 02 - OFF (Cuff Gage Decay <.3
Psig In 1 Min)
PLSS 02 - ON (Cuff Gage 3.7-4.0
Psig, Tone & 02 Flag May Come On)

CABIN DEPRESS :57
Confirm Go For Depress From Hou
CB(16)ECS: CABIN REPRESS - Open
CABIN REPRESS Vlv - CLOSE
Ovhd Or Fwd Dump Vlv - OPEN Then AUTO @ 3.5 Psia (Verify Cuff Gage Does Not Drop Below 4.8 Psig)
Verify:
  Cabin At 3.5 Psia
  LM Suit Circuit 3.6 To 4.3 Psia
  PGA > 4.8 Psig & Decaying
Start Wrist Watch :00

Ovhd Or Fwd Dump Valve - OPEN
Verify:
  Tone-On & H20 Flag - A (1.2-1.7 Psia)
  PGA > 4.8 Psig & Decaying
Partially Open Fwd Hatch

FINAL PREP FOR EGRESS :03
PLSS FEEDWATER - OPEN (H20 Flag - Clear In About 4 Min)
Fwd Hatch - Open
Rest Until Cooling Sufficient
Verify:
  PGA 3.7 To 4.8 Psig
  CWEA Status:
  Caution
  PREAMPS
  ECS
  H20 SEP COMP Lt - ON
Lighting: ANUN/NUM - DIM
DET - STOP
Release PLSS Antennas
Lower EV Visor :10

POST EVA SYSTEMS CONFIGURATION :00
CABIN GAS RETURN - AUTO
SUIT CIRCUIT RELIEF - AUTO (Verify)
SUIT GAS DIVERTER - PUSH-CABIN

Verify EVA CB Configuration
CB(16) ECS: SUIT FAN 2 - Close
SUIT FAN ΔP - Close
ECS Caution & H20 SEP Comp Lts - Out
Doff Gloves, Stow On Comm Panels
Doff Helmets With Visors, Stow On RH Eng Cover, Top ETB

Verify Safety On Dump Valve
DES H20 Vlv - OPEN
Remove Purge Valve, Stow In Purse
Discon OPS 02 Hose
Connect LM 02 Hoses

SUIT ISOL (Both) - SUIT FLOW
PLSS PUMP - OFF (Left)
PLSS FAN - OFF (Left)
Disconnect PLSS ...0 From PGA
Connect LM H2O
CB(16) ECS: LCG PUMP - Close
Adjust LCG Cooling Gradually
PLSS Mode (Both) - 0
Connect To LM Comm(Audio CB, Biomed Sw)

Connect LM H2O
CB(16) ECS: LCG PUMP - Close
Adjust LCG Cooling Gradually
PLSS Mode (Both) - 0
Connect To LM Comm(Audio CB, Biomed Sw)

POST EVA CABIN CONFIGURATION :43
Stow CSRC (Mid-Step) In ISA Top Pkt
Unstow Scale (Bot LHSSC)
Empty ETB As Follows:
Weigh Sample Bag, Report To Hou,
Stow Bag In LHSSC
Replace 70mm Camr Mag With B&W LL, MM
Stow 3-16mm Mags In RHSSC
Stow Map As Req'd
Stow Return Items In ISA Back Pkt
Stow Lens/Scribe/Brush In ISA Back Pkt

Weigh SRC, Report To Hou
CDR Move To Aft Cabin
Stow SRC In Lower Comp
Stow CDR OPS In Top Comp
Stow Scale In Purse
Verify Powerdown CB Configuration
MODULATE - PM

Unstow Lunar Surface Checklist, 4-4
Stow EVA 1 Prep & Post Card

PLSS/OPS DOFFING :16
Disconnect OPS, Actuator From RCU's
Disconnect RCU's From PGA
Verify Pump, Fan, Mode Sel-Off
Discon RCU's From PLSS,Stow On Mid-Step

Unstow Disp Cont (LHSSC), Set On LH
Fwd Floor
Install Gas Conn Plugs (Purse) In PGA

Unstow Jett Bag (LHSSC)
Place ETB Inside Jett Bag, Stow On RH
Cabin Floor, Fwd

PLSS Mode - AR (02 QTY ~85%)
PLSS Mode - 0
Repeat 02 Recharge For CDR PLSS
Stow 02 Supply Hose

CDR 1st:
Change PLSS Batt, Stow In Disp Cont
Connect Cable To Battery
Stow PLSS Hoses & Straps
Change LiOH Cart, Temp<130°-Read Decals

Verify OPS 02 Press 5380 - 6380
Stow CDR OPS On LH Eng Cover, End Up
Stow CDR PLSS In Recharge Station

Stow LMP PLSS On Mid-Step, Repeat Above

Stow LMP OPS On Floor Under Dump Vlv
Stow PLSS On Floor Against Hatch
Stow RCU's On Data File
Stow Disp Cont On Mid-Step Under PLSS

Stow U1P OPS On Floor Under Dump Vlv
Stow PLSS On Floor Against Hatch
Stow RCU's On Data File
Stow Disp Cont On Mid-Step Under PLSS

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EVA 1
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EVA 2 PREP & POST

Attach OPS To PLSS
Connect Antenna Lead To PLSS
Verify Sublimator Exhausts Clear

Unstow PLSS Straps & Hoses
Verify DIVERTER, O2, FEEDWATER - OFF
Verify The Following Locked:
  OPS To PLSS
  OPS Antenna To PLSS
  PLSS Battery Connection

Don PLSS/OPS, Lift PLSS Hoses Above LH Lower Strap
Connect PLSS O2 Hoses To PGA
Verify DIVERTER, O2, FEEDWATER - OFF
Unstow OPS O2 Hose

CDR Repeat PLSS DONNING

Unstow RCU's
Connect RCU To PGA Upper Straps
Verify RCU Controls:
  PUMP, FAN - OFF (Left) MODE SEL - 0
Connect RCU To PLSS, Snap OPS O2 Hose To Side Of PLSS

PLSS COMM CHECK :17
Verify Powerdown CB Configuration
COMM: MODULATE - FM
CB(16) COMM: TV - Close (Verify)
Verify Voice Comm With Hou

Audio (CDR)
S-BAND - T/R
ICS - T/R
RELAY - OFF
MODE - VOX (VOX SENS MAX)
VHF A - T/R
VHF B - RCV

Audio (LMP)
S-BAND - T/R
ICS - T/R
RELAY - ON
MODE - VOX (VOX SENS MAX)
VHF A - T/R
VHF B - RCV

COMM:
S-BD XMTR/RCVR - SEC
VHF - VOICE, ON, OFF, ON, OFF, HI
RANGE - RANGE
SQUELCH A & B - Noise Thres + 1-1/2
RECORDER - ON
VHF Antenna - EVA
UPLINK SQUELCH - ENABLE

LMP Connect To PLSS Comm (Audio CB Open/Close)
PLSS PTT (LMP) - MAIN (Rt)
PLSS Mode(LMP) - A, Wheel-CCW (Tone-On, Vent Flag- P, Press Flag- 0, 02 Mom)
PLSS O2 Press Gage >85%
Perform Comm Check With CDR

NOTE:
Unstow PLSS Antenna If It Transmits Garbled And/Or Loses TM

CDR Connect To PLSS Comm (Audio CB Open/Close)

Audio (CDR)
VHF A - OFF
VHF B - OFF
PLSS PTT(CDR) - MAIN (Rt)
NOTE: No MSFN reception in PLSS Mode B

PLSS Mode (CDR) - B, Blade-CCW (Tone-On, Vent Flag - P, Press Flag - 0, 02 Mom)
PPLSS 02 Press Gage > 85% Perform Comm Check With LMP

PLSS Mode (LMP) - B, Blade-CCW (Tone-On)
PLSS Mode (CDR) - A, Wheel-CCW (Tone-On)
Verify Voice Comm With Each Other

PLSS Mode (Both) - AR (Tone-On)

NOTE: (AR) Wheel-Hou, Blade-EVA

Perform Comm & TM Check With Hou & Comm Check With Each Other
Read PLSS 02 Qty To Hou
NOTE: If Comm Is NO GO With Hou S-BD MOD - PM Verify COMM & TM

FINAL SYSTEMS PREP : 27

CB(16) ECS: CABIN REPRESS - Close (Ver)
SUIT FAN ΔP - Open
SUIT FAN 2 - Open
Verify ECS Caution & H2O SEP COMP Lts - On (~1 Min)

SUIT GAS DIVERTER - PULL-EGRESS
CABIN GAS RETURN - EGRESS
SUIT CIRCUIT RELIEF - AUTO (Verify)

OPS CONNECT : 28

LMP 1st - Unstow OPS 02 Actuator
Connect Actuator To RCU
SUIT ISOL - SUIT DISC
Disconnect LM O2 Hoses, Secure About PGA

Connect OPS 02 Hose To P6, B/B
Retrieve Purge Valve (Purse) - Verify Closed, Locked & LO
Install Purge Valve In PGA R/R
PGA Diverter Valves - Vertical

CDR Repeat OPS CONNECT

Verify Items Prepared For Jettison:
ECS LiOH Cartridge & Brkt
Hammocks
PLSS Batteries & LiOH Carts
Food Waste, Urine Bags
Feedwater Bags & Scale

Drink
DES H2O VLV - CLOSE

HELMET/GLOVE DONNING : 37

Position Mikes (Both)
PLSS FAN - ON, Rt (Vent Flag - Clear)
Don Helmets With LEVA’s, Check Drink Bag Position

LCG - COLD, As Req’d
CB(16) ECS: LCG PUMP - Open
Disconnect LM H2O Hose
Connect PLSS H2O Hose
Stow LM Hoses (CDR’s To ECS Handhold)

Verify The Following:
Helmet & Visor (2) - Aligned & Adjusted
Torso Tiedown (2) - Adjusted
O2 Connectors (6) - Locked
Purge Valves (2) - Locked
H2O Connectors (2) - Locked
Comm Connectors (2) - Locked

Verify EVA CB Configuration

Don EV Gloves & Verify:
Wrist Locks (4) - Locked
Glove Straps (4) - Adjusted

NOTE: If PGA Biting, PLSS 02 - ON/OFF

PLSS DIVERTER - MIN (Verify)
PLSS PUMP - ON, Rt

PRESS REG A & B - EGRESS

PRESSURE INTEGRITY CHECK : 52

PLSS 02 - ON (Tone-On, O2 Flag - 0)
Press Flag Clear (3.1-3.4 Psid)
Cuff Gage 3.7-4.0 Psig
O2 Flag Clear

PLSS 02 - OFF (Cuff Gage Decay < .3 Psig In 1 Min)
PLSS 02 - ON (Cuff Gage 3.7-4.0 Psig, Tone & O2 Flag May Come On)

CABIN DEPRESS : 57

Confirm Go For Depress From Hou
CM(16) ECS: CABIN REPRESS - Open
CABIN REPRESS VLV - CLOSE

Ovhd Or Fwd Dump VLV - OPEN, Then AUTO @ 3.5 Psia (Verify Cuff Gage Does Not Drop Below 4.8 Psig)
Verify:
Cabin At 3.5 Psia
LM Suit Circuit 3.6 To 4.3 Psia
PGA > 4.8 Psig & Decaying

Start Wrist Watch : 00

Ovhd Or Fwd Dump Valve - OPEN Verify:
O2 Connectors & H2O Flag - A (1.2-1.7 Psia)
PGA > 4.8 Psig & Decaying

Partially Open Fwd Hatch
**FINAL PREP FOR EGRESS :03**

**PLSS FEEDWATER - OPEN (H2O Flag - Clear In 2-4 Min)**

Fwd Hatch - Open

Rest Until Cooling Sufficient

Verify:
- PGA 3.7 To 4.8 Psig
- CHEA Status: Caution
- PREAMPS
- ECS

H2O SEP COMP Lt - ON

Lighting: ANUN/NUM - DIM

DET - STOP

Release PLSS Antennas

Lower EV Visor :10

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**POST EVA 2**

**PLSS FEEDWATER - CLOSE**

Fwd Hatch - Close & Lock

Dump Valves (Both) - AUTO

NOTE: PLSS 02 & PRESS Flags May Come On During Repress. If PLSS 02 <10% Manually Control Cabin Repress To Maintain Positive PGA Pressure.

(Leave Cabin Repress CB Open For Manual Repress)

Lighting: ANUN/NUM - BRIGHT

CABIN REPRESS - AUTO

CB(16)ECS: CABIN REPRESS - Close

MASTER ALARM & CABIN Warning Lt - On

Verify Cabin Press Increasing

**PLSS 02 - OFF @ Cabin > 2.5 Psia**

CABIN Warning Lt - Off

Verify Cabin Press Stable At 4.6-5 Psia

Use Purge Valve To Depress PGA As Reqd

DET - Set/Up :00

**POST EVA SYSTEMS CONFIGURATION :00**

Verify EVA CB Configuration

CB(16) ECS: SUIT FAN 2 - Close

SUIT FAN ΔP - Close

ECS Caution & H2O SEP Comp Lts - Out

Doff Gloves, Stow On Comm Panels

Verify Safety On Dump Valve

DES H2O VLV - OPEN

Remove Purge Valves, Stow In Purse

Discon OPS 02 Hose

Connect LM 02 Hoses, R/R & B/B

SUIT ISOL (Both) - SUIT FLOW

PLSS PUMP - OFF (Left)

PLSS FAN - OFF (Left)

Disconnect PLSS H2O From PGA

Connect LM H2O To PGA

CB(16) ECS: LCG PUMP - Close

PLSS Mode (Both) - 0

Connect To LM Comm(Audio CB, Biomed Sw)

**AUDIO (CDR & LMP)**

- VHF A - OFF
- VHF B - OFF
- MODE - ICS/PTT
- RELAY - OFF

**COMM:**

- S-BD XMT/RCVR - PRIM
- VHF - OFF, OFF, OFF, OFF, LEFT, HI
- RECORDER - OFF

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**PLSS/OPS DOFFING :10**

Disconnect OPS Actuator From RCU's

Disconnect RCU's From PGA

Verify Pump, Fan, Mode Sel - Off

Discon RCU's From PLSS, Stow On Mid-Step

Disconnect PLSS 02 Hoses

Doff PLSS/OPS (LMP First)

Stow OPS 02 Hose, Actuator & Antenna

Blade - Leave Flaps Open For Checkout

Stow LMP PLSS On Floor

Stow CDR PLSS On Mid-Step

Unstow Disp Cont(LHSSC), Set On LH Fwd Floor

Install Gas Conn Plugs (Purse) In PGA

CDR 1st:

Disconnect OPS Antenna Connector

Remove OPS, Stow Antenna Connector

Perform OPS Checkout

Stow OPS On Engine Cover, Top ETB

Stow PLSS Hoses & Upper Straps

Remove Lower PLSS Straps, Clip Straps Together, D-Ring (Name-To-Name)

Remove Yo-Yo, Stow In Disp Cont

Stow Straps In RHSSC (FECAL EMESIS)

Stow PLSS On Floor

LMP Stow PLSS On Mid-Step, Repeat Above

Verify Powerdown CB Configuration

CB(11) HEATERS: RR OPR - Close

RR STBY - Open
PREP FOR EQUIP! JETTISON: 26

Verify DES 02 QTY > 20%
Fwd Hatch Handle - UNLOCK
Doff Lunar Boots, Stow In Disp Cont
Stow RCU's In Disp Cont
Unstow PLSS Condensate Container, Stow In Disp Cont

Remove Armrest, Stow In Disp Cont
Tie Disp Cont
Position PLSS's For Jettison, Eng Cover & Mid-Step
Clean & Lub Wristrings As Req'd
PGA Diverter Valves - Horizontal
Don EV Gloves
Check PGA Connectors

PRESS INTEGRITY CHECK: 38

NOTE: LM Suit Circuit Shall Not Be Maintained At Elevated Press >5 Min

SUIT GAS DIVERTER - PULL-EGRESS (Ver)
CABIN GAS RETURN - EGRESS (Verify)
SUIT CIRCUIT RELIEF - CLOSE

PRESS REG A - EGRESS
PRESS REG B - DIRECT 02
Monitor Cuff Gage To 3.7 - 4.0 Psig
Then PRESS REG B - EGRESS (Cuff Gage Decay <.3 Psig In 1 Min)

SUIT CIRCUIT RELIEF - AUTO (Suit Ckt Press Decays To 4.8 Psia)

CABIN DEPRESS FOR JETTISON: 41

CB(16)ECS: CABIN REPRESS - Open
Ovhd Or Fwd Dump Valve - OPEN Then AUTO At 3.5 Psia
(Verify Cabin Press 3.5 Psia & LM Suit Circuit 3.6 To 4.3 Psia & Decaying)
Ovhd Or Fwd Dump Valve - OPEN (Verify LM Suit Circuit 3.6 To 4.3 Psia)

HATCH OPENING: 44

Partially Open Fwd Hatch
Ovhd Or Fwd Dump Valve - AUTO
Fwd Hatch - Full Open

Jettison The Following:
Disp Cont
PLSS On Mid-Step
PLSS On Eng Cover

Verify Items Clear Of Ascent Stage
Fwd Hatch - Close & Lock

CABIN REPRESS: 48

Dump Valves (Both) - AUTO (Verify)
CABIN REPRESS - AUTO (Verify)
CB(16)ECS: CABIN REPRESS - Close
MASTER ALARM & CABIN Warning Lt - On
Verify Cabin Press Increasing
PRESS REG A & B - CABIN

CABIN Warning Lt - Off
Verify Cabin Press Stable At 4.6-5 Psia

CABIN GAS RETURN - AUTO
SUIT GAS DIVERTER - PUSH-CABIN

Doff Gloves, Stow On Comm Panels
Doff Helmets W/Visors, Stow On Eng Cov
VHF ANT SEL - AFT
Verify Safety On Dump Valve

Unstow Lunar Surface Checklist, 7-4
Stow EVA 2 Prep & Post Card

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