Malfunction Procedures

Mission Operations Directorate
Operations Division
Generic, Rev J
October 20, 2008

NOTE
For STS-126 and subsequent flights

Verify this is the correct version for the pending operation (training, simulation or flight). Electronic copies of FDF books are available. URL: http://mod.jsc.nasa.gov/do3/FDF/index.html
List of Implemented Change Requests (482s):

MAL-1720

Incorporate the following:

1. Replace iii thru vi
2. Replace 6-109 & 6-110

NOTE
For STS-125 and subsequent flights

Prepared by: 

Publication Manager

Approved by: 

Manager/Flight Procedures

Accepted by: 

FDF Manager

Encl: 6 pages

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List of Implemented Change Requests (482s):

MULTI-1833    MAL-1704
MULTI-1834    MAL-1705

Incorporate the following:
1. Replace iii thru x
2. Replace 5-65 thru 5-68, 5-97 thru 5-100
3. Replace 6-111 & 6-112
4. Replace 7-75 & 7-76
5. Replace 10-27 thru 10-34

NOTE
For STS-119 and subsequent flights

Prepared by: [Signature]
Publication Manager

Approved by: [Signature]
Manager, Shuttle Procedures Management

Accepted by: [Signature]
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Encl: 28 pages

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**AREAS OF TECHNICAL RESPONSIBILITY**

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## MALFUNCTION PROCEDURES

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<tr>
<td>SSR-2</td>
<td>RESERVED</td>
<td>.....................................................</td>
<td></td>
</tr>
<tr>
<td>SSR-3</td>
<td>BACKDRIVE TECHNIQUE – JOINT FREE .............</td>
<td>12-103</td>
<td></td>
</tr>
<tr>
<td>SSR-4</td>
<td>RMS IFM D&amp;C KIT ..................................</td>
<td>12-111</td>
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</tr>
</tbody>
</table>

not used
APU/HYD

1. APU
   1.1a APU FUEL QTY ↓, APU FUEL TK P ↑↓ .................................................. 1-6
   1.1b APU FUEL T: TK SURF ↓, TK HTR ↑↓, TEST LN 1(2) ↑↓,
       FEED LN ↑↓, PUMP IN ↑↓, PUMP DRN LN 1(2) ↑↓,
       PUMP OUT ↑↓, PUMP BYP LN ↑↓, GG SUPPLY LN ↑↓;
       H2O LN INJ ↑↓.............................................................................. 1-7
   1.1c APU FUEL TK VLV T ↑↓................................................................. 1-9

2. HYD
   2.1a RSVR P ↓, ACCUM P ↓............................................................... 1-10
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       WORKAROUND ............................................................................. 1-16
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   SSR-5 LEAK (NONISOLATABLE) (CIL)................................................. 1-20
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1.1a APU FUEL QTY ↓
APU FUEL TK P ↑↓

<table>
<thead>
<tr>
<th>APU FUEL TK P psia</th>
<th>APU FUEL OUT P psia</th>
<th>APU FUEL QTY %</th>
<th>FAILURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑ or 500(H)</td>
<td>&lt; 300</td>
<td>100</td>
<td>XDCR SHIFT OR FAILURE 1</td>
</tr>
<tr>
<td>decr</td>
<td>decr</td>
<td>decr</td>
<td>HYDRAZINE OR N2 LEAKING</td>
</tr>
<tr>
<td>0(L)</td>
<td>0</td>
<td>0</td>
<td>N2 LEAKED OUT</td>
</tr>
<tr>
<td>80 ↓</td>
<td>0</td>
<td>~0</td>
<td>HYDRAZINE LEAKED OUT</td>
</tr>
<tr>
<td>0(L)</td>
<td>&lt; 300</td>
<td>0</td>
<td>XDCR SHIFT OR FAILURE 1</td>
</tr>
</tbody>
</table>

SM 86 APU/HYD
• Match indications in chart to determine failure

1. Puts qty computation in error. FUEL OUT P XDCR may be substituted in fuel qty calculation.

SM ALERT

S86 APU FUEL 1(2,3)

If:
APU 1(2,3) FUEL QTY < 50% or
APU 1(2,3) FUEL TK P < 100 psia
> 350 psia

BFS

SM2 APU 1(2,3)

If:
APU 1(2,3) FUEL QTY < 20%

Nominal Config:
(R2)
APU OPER 1(2,3) – OFF
APU FU TK VLV 1(2,3) – CL

Appliances:
APU/HYD 1
APU/HYD 5
SSR-4
SSR-5

If:
APU 1(2,3) FUEL QTY < 20%

Nominal Config:
(R2)
APU OPER 1(2,3) – OFF
APU FU TK VLV 1(2,3) – CL

09/23/08 1-6 MAL/ALL/GEN J
1 Deactivate all APU fuel htrs

(A12) APU HTR TK/FU LN/H2O SYS
• 1A,2A,3A – OFF
• 1B,2B,3B – OFF
APU HTR GAS GEN/FU PUMP
• 1,2,3 – OFF

2 Reactivate unaffected htrs per previous config
(Refer to SM FDA THERMAL LIMITS TABLE)

3 SM 88 APU/ENVIRON THERM
Param(s) off-scale high (H) or low (L)
(Refer to SM FDA THERMAL LIMITS TABLE)?

4 Param(s) high (↑)
Param(s) low (↓)

5 THERMOSTAT FAILED ON OR HTR SHORT

6 XDCR FAILURE

7 Switch to alternate htr for affected sys
(Refer to SM FDA THERMAL LIMITS TABLE)
Affected temp(s) returns within limits?

8 TK SURF low (L)?

9 △MCC for affected htr config

10 HTR/THERMOSTAT CKT FAILED OFF

11 Continue normal ops

12 EXTREMELY COLD ENVIRONMENT OR XDCR SHIFT
If subsequent failure occurs in remaining htr ckt, consult MCC

SYS 2 upper limit is 195 degF; lower limit is 48 degF

Because of xdcr location, FU PUMP DRN LN T1 and T2 may not be equal. Generally, T2 will be higher than T1, which is more evident on SYS 2

SYS 2 upper limit is 190 degF

<table>
<thead>
<tr>
<th>PARAM</th>
<th>XDCR RANGE degF</th>
<th>LOW LIMIT degF</th>
<th>HIGH LIMIT degF</th>
<th>SWITCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUEL T</td>
<td></td>
<td>45</td>
<td>140</td>
<td>(A12) APU HTR TK/FU</td>
</tr>
<tr>
<td>TK SURF</td>
<td>0-160</td>
<td>45</td>
<td>140</td>
<td>LN/H2O/SYS</td>
</tr>
<tr>
<td>TK HTR</td>
<td>0-160</td>
<td>45</td>
<td>110</td>
<td>1B(2B,3B) – AUTO(OFF)</td>
</tr>
<tr>
<td>TEST LN 1</td>
<td>0-250</td>
<td>45</td>
<td>120</td>
<td>1A(2A,3A) – OFF(AUTO)</td>
</tr>
<tr>
<td>LN 2</td>
<td>0-250</td>
<td>45</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>FEED LN</td>
<td>0-250</td>
<td>43</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>PUMP IN</td>
<td>0-250</td>
<td>43</td>
<td>140</td>
<td></td>
</tr>
<tr>
<td>DRN LN 1</td>
<td>0-250</td>
<td>43</td>
<td>140</td>
<td></td>
</tr>
<tr>
<td>H2O LN INJ</td>
<td>-75-300</td>
<td>40</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>FUEL T PUMP OUT</td>
<td>0-250</td>
<td>50</td>
<td>210</td>
<td>(A12) APU HTR GAS GEN/</td>
</tr>
<tr>
<td>BYP LN</td>
<td>0-400</td>
<td>60</td>
<td>200</td>
<td>FU PUMP 1(2,3) – B AUTO(AUTO)</td>
</tr>
<tr>
<td>GG SPLY LN</td>
<td>0-450</td>
<td>60</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>
1. MCC has access to alternate Xdcrs

2. Normal operation of APU available through other fuel tk vlv
1. ACCUM P is maintained automatically when Circ Pump sw is in GPC. At ACCUM P < 1960 psia or RSVR P < 32 psia, Circ Pump is commanded ON. If after 2 min ACCUM P > 1960 psia or RSVR P > 32 psia, Circ Pump is commanded OFF.

2. ACCUM P MGMT software is designed to turn on Circ Pump before pressure decay causes FDA alarm to ring, if Circ Pump sw is in GPC.
1. Normal operating qty approx 60%, but compare qty with previous reading
2. Circ pumps or APUs must be operating in order to operate LG EXTD, BK, and MPS/TVC ISOL VLVS if reqd
3. If BFS SYS SUMM 2, use HYD PRESS 1(2,3)
4. May be possible to pump fluid from high to low system by pressurizing high qty system relative to low qty system

Nominal Config:
(L4:O)
- cb AC1 φB HYD QTY 1 – cl
- cb AC2 φB HYD QTY 2 – cl
- cb AC3 φB HYD QTY 3 – cl

APU OFF Config:
(R2)
- HYD MN PUMP PRESS (three) – NORM
- HYD CIRC PUMP (three) – GPC (ON)
- BKR CNTLR/HTR (three) – A/B
- BLR PWR (three) – OFF
- BLR N2 SPLY (three) – OFF
(R4)
- HYD BK ISOL VLV (three) – GPC (tb-CL)
- LG EXTD ISO VLV – GPC (tb-CL)
- HYD MPS/TVC ISOL SYS (three) – GPC (tb-CL)

APU/HYD

1.2b HYD RSVR QTY ↑↓

1. Normal operating qty approx 60%, but compare qty with previous reading
2. Circ pumps or APUs must be operating in order to operate LG EXTD, BK, and MPS/TVC ISOL VLVS if reqd
3. If BFS SYS SUMM 2, use HYD PRESS 1(2,3)
4. May be possible to pump fluid from high to low system by pressurizing high qty system relative to low qty system
5. Hyd system may be lost for entry depending on the size of leak. Sys should remain OFF unless another system lost.

6. Valve must be closed manually after automatic opening during entry.

7. If leak isolated by aff MPS/TVC ISOL vlv, do not open aff vlv for SSME HYD REPRESS during entry.

8. Turn on circ pump and close hydraulic isolation valve(s) on aff system.

(R2)
- HYD CIRC PUMP 1(2,3) – ON
- Wait 10 sec

(R4)
- HYD BK ISOL VLV 1(2,3) – CL
- Hold 5 sec, √tb – CL
- LG EXTD ISO VLV – CL
- Hold 5 sec, √tb – CL
- HYD MPS/TVC ISOL SYS 1(2,3) – CL
- Hold 5 sec, √tb – CL

(CRT)
(Aff) HYD RSVR QTY decreasing?

8

18. NON-ISOLATABLE HYD SYSTEM LEAK

CAUTION
Possible leak downstream of elevon or RSB switching valve that eventually will affect all HYD systems

(R2)
- Return circ pump to original configuration

19. ISOLATABLE HYD SYSTEM LEAK, DOWNSTREAM OF ISOLATION VALVE

20. Return circ pump to original configuration

(R2)
- HYD CIRC PUMP 1(2,3) – OFF

MCC

21. Turn off aff circ pump

(R2)
- HYD CIRC PUMP 1(2,3) – OFF

MCC
### SM ALERT

1. SM ALERT occurs every time affected Circ Pump cycles ON. This can be prevented by changing FDA S/W press threshold for affected system via table maintenance to -1 psia. Refer to APU/HYD SSR-1

## Nominal Config:

- **(R2)** HYD CIRC PUMP 1,2,3 (three) – GPC(ON)
- **(A12)** HYD CIRC PUMP PWR 1 – MNA
- 2 – MNB
- 3 – MNC

### Inoperative Circ Pump may be damaged and may generate excessive Hyd Temps if ON for > 60 sec

#### Turn off Circ Pump

- **(R2)** HYD CIRC PUMP 1(2,3) – OFF
- **(R2)** HYD CIRC PUMP 1(2,3) – ON
- **(A12)** HYD CIRC PUMP 1(2,3) – MNB (MNC, MNA)

### Select alternate pwr

- **(A12)** HYD CIRC PUMP PWR 1(2,3) – ON
- **(R2)** HYD CIRC PUMP 1(2,3) – OFF

### Resume normal ops in original config

- **(A12)** HYD CIRC PUMP 1(2,3) – MNB, MNC, MNA
APU/HYD SSR-1
CIRC PUMP PRESS XDCR FAILURE WORKAROUND

To inhibit FDA alarm for affected Circ Pump

1. For Hyd Circ Pump 1 Press Xdcr failure:

   SM 60 SM TABLE MAINT
   ITEM 1 +0 5 8 0 1 3 7 EXEC
   If Xdcr failed ‘↓’ (low), or DSC LOSS (L), or OI MDM failed (M), ITEM 2 -1 EXEC
   If Xdcr failed ‘↑’ (high), ITEM 5 +8 0 1 EXEC

2. For Hyd Circ Pump 2 Press Xdcr failure:

   SM 60 SM TABLE MAINT
   ITEM 1 +0 5 8 0 2 3 7 EXEC
   If Xdcr failed ‘↓’ (low), or DSC LOSS (L), or OI MDM failed (M), ITEM 2 -1 EXEC
   If Xdcr failed ‘↑’ (high), ITEM 5 +8 0 1 EXEC

3. For Hyd Circ Pump 3 Press Xdcr failure:

   SM 60 SM TABLE MAINT
   ITEM 1 +0 5 8 0 3 3 7 EXEC
   If Xdcr failed ‘↓’ (low), or DSC LOSS (L), or OI MDM failed (M), ITEM 2 -1 EXEC
   If Xdcr failed ‘↑’ (high), ITEM 5 +8 0 1 EXEC

APU/HYD SSR-2
SIMULTANEOUS CIRC PUMP ON/GPC OPS

To allow normal GPC ops of other two Circ Pumps after failure of X Circ Pump Press Xdcr or manual ON ops of X Circ Pump

1. For Circ Pump 1, Press Xdcr failure or manual ON ops:

   SM 60 SM TABLE MAINT
   ITEM 16 +0 9 2 1 7 4 2 EXEC
   ITEM 17 +8 0 0 EXEC

2. For Circ Pump 2, Press Xdcr failure or manual ON ops:

   SM 60 SM TABLE MAINT
   ITEM 16 +0 9 2 1 8 4 2 EXEC
   ITEM 17 +8 0 0 EXEC

3. For Circ Pump 3, Press Xdcr failure or manual ON ops:

   SM 60 SM TABLE MAINT
   ITEM 16 +0 9 2 1 9 4 2 EXEC
   ITEM 17 +8 0 0 EXEC
APU/HYD SSR-3
CIRC PUMP XDCR FAILURE WORKAROUND

To allow normal GPC ops of Circ Pumps for the following failures: accumulator press/temp xdcr, reservoir press/temp xdcr, MDM, or DSC. Procedure changes corresponding upper and lower S/W limits to off-scale low, effectively removing xdcr from Circ Pump control

The accumulator pressure sensors have only lower limit of 1960 psia as shown in tables. Low limit for accumulator pressure should be changed to -110. Low limit for reservoir pressure should be changed to -2. Only one item entry is reqd for accumulator or reservoir pressure sensor failure

SM 60 SM TABLE MAINT

ITEM 16 + _ (A) _ EXEC
ITEM 17 -8 0 EXEC
ITEM 16 + _ (B) _ EXEC
ITEM 17 -8 0 EXEC

(A) Choose the appropriate lower limit parameter ID number from table
(B) Choose the appropriate upper limit parameter ID number from table
### HYDRAULIC SYSTEM 1 PARAMS

<table>
<thead>
<tr>
<th>Param Name</th>
<th>Pump SW Control Constants</th>
<th>FDA</th>
<th>MDM</th>
<th>DSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINE TEMPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEVON LOB1</td>
<td>0921728 -30 degF</td>
<td>0921729 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>ROB1</td>
<td>0921722 -30 degF</td>
<td>0921723 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>RD/SB PDU1</td>
<td>0921738 -35 degF</td>
<td>0921739 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>FUS1</td>
<td>0921736 -30 degF</td>
<td>0921737 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>BDYFLP FUS1</td>
<td>0921718 -30 degF</td>
<td>0921719 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>HYD ACCUM P1</td>
<td>0921740 1960 psi</td>
<td>NONE</td>
<td>1930 psi</td>
<td>OA1</td>
</tr>
<tr>
<td>RSVR P1</td>
<td>0920142 32 psi</td>
<td>NONE</td>
<td>28 psi</td>
<td>OA1</td>
</tr>
</tbody>
</table>

### HYDRAULIC SYSTEM 2 PARAMS

<table>
<thead>
<tr>
<th>Param Name</th>
<th>Pump SW Control Constants</th>
<th>FDA</th>
<th>MDM</th>
<th>DSC</th>
</tr>
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<tbody>
<tr>
<td>LINE TEMPS</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ELEVON LIB2</td>
<td>0921822 -30 degF</td>
<td>0921823 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>ROB2</td>
<td>0921816 -30 degF</td>
<td>0921817 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>RD/SB PDU2</td>
<td>0921832 -35 degF</td>
<td>0921833 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>FUS2</td>
<td>0921830 -30 degF</td>
<td>0921831 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>BDYFLP PDU2</td>
<td>0921814 -35 degF</td>
<td>0921815 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>HYD ACCUM P2</td>
<td>0921834 1960 psi</td>
<td>NONE</td>
<td>1930 psi</td>
<td>OA2</td>
</tr>
<tr>
<td>RSVR P2</td>
<td>0920143 32 psi</td>
<td>NONE</td>
<td>28 psi</td>
<td>OA2</td>
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</table>

### HYDRAULIC SYSTEM 3 PARAMS

<table>
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<tr>
<th>Param Name</th>
<th>Pump SW Control Constants</th>
<th>FDA</th>
<th>MDM</th>
<th>DSC</th>
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<tbody>
<tr>
<td>LINE TEMPS</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>ELEVON LOB3</td>
<td>0921920 -30 degF</td>
<td>0921921 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>RIB3</td>
<td>0921918 -30 degF</td>
<td>0921919 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>RD/SB PDU3</td>
<td>0921930 -35 degF</td>
<td>0921931 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>BDYFLP PDU3</td>
<td>0921914 -35 degF</td>
<td>0921915 -10 degF</td>
<td>-40</td>
<td>250</td>
</tr>
<tr>
<td>HYD ACCUM P3</td>
<td>0921932 1960 psi</td>
<td>NONE</td>
<td>1930 psi</td>
<td>OA3</td>
</tr>
<tr>
<td>RSVR P3</td>
<td>0920144 32 psi</td>
<td>NONE</td>
<td>28 psi</td>
<td>OA3</td>
</tr>
</tbody>
</table>
Selection of alternate xcr for APU fuel comp

1. For APU 1 FUEL QTY:
   SM 60 SM TABLE MAINT
   ITEM 16 +0 9 2 2 1 5 0 EXEC
   ITEM 17 +0 EXEC
   ITEM 16 +0 9 2 2 1 5 2 EXEC
   ITEM 17 +1 EXEC

2. For APU 2 FUEL QTY:
   SM 60 SM TABLE MAINT
   ITEM 16 +0 9 2 2 2 5 0 EXEC
   ITEM 17 +0 EXEC
   ITEM 16 +0 9 2 2 2 5 2 EXEC
   ITEM 17 +1 EXEC

3. For APU 3 FUEL QTY:
   SM 60 SM TABLE MAINT
   ITEM 16 +0 9 2 2 3 5 0 EXEC
   ITEM 17 +0 EXEC
   ITEM 16 +0 9 2 2 3 5 2 EXEC
   ITEM 17 +1 EXEC
APU/HYD SSR-5
APU FUEL LEAK (NONISOLATABLE)

Before proceeding, √MCC

1. STEAM VENT HTR ACTIVATE
   R2
   BLR PWR X – ON
   √CNTLR/HTR (three) – B(A)

2. GNC CONFIG
   O14:F, O15:F, O16:F
   O17:A
   C3
   √FCS CH (four) – AUTO
   O6
   √MDM All FF and FA – ON
   GNC I/O RESET
   C3(A6U)
   √DAP: A/AUTO/VERN

3. DPS CONFIG
   O14:F, O15:F
   Perform G2 TO G8 TRANSITION (ORB OPS, DPS)
   √MMU 1,2 – ON
   Use the “If FCS Checkout” steps (TFL change required)
   1: GNC, FCS/DED DIS C/O

4. APU PRESTART
   R2
   √SM 86 APU/HYD
   O14:F
   √HYD BK ISOL VLV X tb – CL
   √LG EXTD ISO VLV tb – CL
   O15:F
   R2
   BLR N2 SPLY X – ON
   HYD CIRC PUMP X – OFF
   cb
   APU FU TK VLV ENA (six) – cl
   √APU FU TK VLV (three) – CL
   √AUTO SHTDN (three) – ENA
   √SPEED SEL (three) – NORM
   √OPER (three) – OFF
   HYD MN PUMP PRESS X – LO
   APU CNTLR PWR X – ON
   Inform MCC: READY FOR APU START
   Wait for MCC GO

5. APU START
   R2
   APU FU TK VLV X – OP
   √APU/HYD RDY X tb – gray
   * If tb – bp, √MCC *
   00:00
   Start Event Timer
   APU OPER X – START/RUN
   HYD/APU
   √HYD PRESS X ind – LO green
   R2
   √APU/HYD RDY X tb – bp
   * If APU did not start normally: *
   * APU OPER X – OFF *
   * FU TK VLV X – CL *
   * Shutdn (HYD PRESS < 200) *
   * Report APU F7 lts *
   * APU CNTLR PWR X – OFF *
   * √MCC *
   HYD/APU
   HYD MN PUMP PRESS X – NORM
   √HYD PRESS X ind – HI green

6. MPS/TVC ISOL VLV CONFIG
   R4
   HYD MPS/TVC ISOL VLV SYS X – OP (hold 5 sec, tb–OP)
7. **AEROSURFACE DRIVE**

   CRT1
   SURF DR START – ITEM 10 EXEC (*)

   **NOTE**
   Pos ‘↓’ may be indicated until HYD SYS is warm

   * If FCS CH failure (↓) port status, reset aff FCS CH:
   * FCS CH – ORIDE
   * – AUTO

8. **SECONDARY ACTUATOR CHECK**

   On MCC GO:
   After ≥ 30 sec of aerosurface drive:
   SURF DR STOP – ITEM 11 EXEC (*)
   √Surfaces not moving

   **NOTE**
   If port does not bypass during check, bypass aff port after APU shutdn:
   SEC ACT BYPASS – ITEM 21 +X X EXEC
   If aff port still does not bypass:
   SEC ACT RESET – ITEM 22 +X X EXEC
   (See DPS DICT, GNC, OPS G8 FOR ITEM ENTRY values)

   CRT1
   a. √POS STIM ENA, ITEM 20 – (*)
   C3
   b. FCS CH 1,2,3,4 – AUTO
   CRT1
   c. SEC ACT CK, CH 1 – ITEM 15 EXEC (*)
   d. √All CH 1 ports bypass ‘↓’
      STOP – ITEM 19 EXEC (*)
   C3
   e. FCS CH 1 – ORIDE
   CRT1
   f. √All CH 1 ports reset (no ‘↓’)
   C3
   f. FCS CH 1 – AUTO
   h. Repeat steps c thru f for CH 2, 3, 4
   CRT1
   g. NEG STIM – ITEM 20 EXEC (no *)
   h. Repeat steps b thru f

   SURF DR START – ITEM 10 EXEC (*)

9. **APU FUEL DEPLETION AND AERO DRIVE TERMINATION**

   After APU shuts down due to fuel depletion:
   SURF DR STOP – ITEM 11 EXEC (*)

   **NOTE**
   ‘AERO DRIVE’ Fault Msg may occur after APU shutdown.

   * If continuous ‘AERO DRIVE’ Fault Msg:
   * ITEM 15 EXEC (*)

10. **APU SHUTDOWN**

    R2
    BLR PWR X – OFF
    APU OPER X – OFF
    FU TK VLV X – CL
    ‘Shutdn (HYD PRESS < 200)
    APU CNTLR PWR X – OFF
    BLR N2 SPLY X – OFF

11. **HYD RECONFIG**

    Wait 10 sec
    HYD MPS/TVC ISOL VLV SYS X – CL (hold 5 sec, tb–CL)
    HYD CIRC PUMP X – ON

    R4
    CIRC PUMP X – GPC

12. **GNC/DPS RECONFIG**

    Perform G8 TO G2 TRANSITION (ORB OPS, DPS)
    O14:F, ASA (four) – OFF
    O15:F,
    O16:F
    O17:A ATVC (four) – OFF
APU/HYD SSR-6
APU FU TK SURF T XDCR FAILURE WORKAROUND

Inputting a temperature constant for the APU Fuel Comp

1. For APU 1 QTY:

   SM 88 APU/ENVIRON THERM
   Note: APU FUEL T 1 TK HTR
   SM 60 SM TABLE MAINT
   ITEM 16 +0 0 2 2 1 6 0 EXEC
   ITEM 17 +0 EXEC
   ITEM 16 +0 0 2 2 1 4 0 EXEC
   ITEM 17 +APU FUEL T 1 TK HTR (from SPEC 88) EXEC

2. For APU 2 QTY:

   SM 88 APU/ENVIRON THERM
   Note: APU FUEL T 2 TK HTR
   SM 60 SM TABLE MAINT
   ITEM 16 +0 0 2 2 2 6 0 EXEC
   ITEM 17 +0 EXEC
   ITEM 16 +0 0 2 2 2 4 0 EXEC
   ITEM 17 +APU FUEL T 2 TK HTR (from SPEC 88) EXEC

3. For APU 3 QTY:

   SM 88 APU/ENVIRON THERM
   Note: APU FUEL T 3 TK HTR
   SM 60 SM TABLE MAINT
   ITEM 16 +0 0 2 2 3 6 0 EXEC
   ITEM 17 +0 EXEC
   ITEM 16 +0 0 2 2 3 4 0 EXEC
   ITEM 17 +APU FUEL T 3 TK HTR (from SPEC 88) EXEC
2.1 AUDIO
2.1a NO AUDIO (MULTIPLE PNL OR OTHER SUBSYSTEM) ........................................ 2-4

2.2 GCIL/KU COMM
2.2a ‘S76 GCIL FAIL’ – GCIL CONFIG: PNL,
‘S76 KU-GMBL A TEMP’ – KU GMBL TEMP A ↑,
‘S76 KU-GMBL B TEMP’ – KU GMBL TEMP B ↑,
‘S76 KU-GYRO TEMP’ – KU GYRO TEMP ↑,
‘S76 KU-XMTR TEMP’ – KU PA TEMP ↑ ................................................................. 2-6

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2.4 S62 BCE BYP
PL COMM MALFUNCTION POINTS SCHEMATIC .................................................. 2-18
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2.6a OI DSC LOSS ............................................................................................. 2-34

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SSR-20 OF4 ...................................................................................................... 2-50
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SSR-22 OL2 ...................................................................................................... 2-52
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SSR-24 OR2 ...................................................................................................... 2-54
SSR-25 OM1 ...................................................................................................... 2-55
SSR-26 OM2 ...................................................................................................... 2-56
SSR-27 OA1 ...................................................................................................... 2-57
SSR-28 OA2 ...................................................................................................... 2-58
SSR-29 OA3 ...................................................................................................... 2-59
SSR-30 OM3 ...................................................................................................... 2-60
The following Fault Msgs have no corresponding MAL procedures in this book:
- TFL FAIL
- S76 COMM CAMR OVERTEMP
- PA2(1) OVERTEMP
- PA2(1) OUTPUT LO
- NSP 2(1) BITE
- COMSEC 2(1) BITE
- BCE BYP KU
2.1a  NO AUDIO
(MULTIPLE PNL OR OTHER SUBSYSTEM)

Loss of Audio Affecting More Than One Audio Pnl or One or More of the Following:
1) UHF Transceiver
2) NSP Audio
3) Payload Bay Outlets
4) Audio Between Orbiter and Spacelab
5) Audio Between Orbiter and Vehicle at Orbiter Docking System

Nominal Config:
(R14:A)
• cb MNA AUD MS
• cb MNB AUD
• MIDDECK SPKR – cl
• cb MNC AUD AUD CTR 2 – cl
• cb MNC AUD
• PS/AIRLK – cl
(R14:F)
• cb ESS 1BC
• AUD L – cl
• cb ESS 2CA
• AUD R – cl
• cb ESS 2CA AUD
• AUD CTR 1 – cl
(C3)
• AUD CTR – 1
(R10)
• MS AUD PWR – AUD/TONE
(R14:A)
• cb MNA AUD MS/OS – cl
• cb MNB AUD
• MIDDECK SPKR/CCU – cl

1. (O9,R10)
   • R AUD PWR, MS AUD PWR
   sw positions:
   Both powered
   One powered
   Neither powered

2. (O9,R10)
   • Turn other pwr sw to AUD

3. DATA WORD FROM ORIGINALLY PWRD PNL FAILED

4. (R10)
   • MS AUD PWR – OFF
   (O9)
   • R AUD PWR – OFF

5. (C3)
   • AUD CTR – 2(1)

6. FAILURE OF PRI(SEC) ACCU CIRCUITS FOR AFF SYSTEMS/LOOPS

7. Normal sys ops

8. (R10)
   • MS AUD PWR – OFF
   (O9)
   • R AUD PWR – OFF

9. (C3)
   • Cycle AUD CTR sw

10. YES
    • Inform MCC of audio config

11. DOUBLE DATA WORD FAILURE OR ACCU PWR SWITCH FAILURE

12. (R10)
    • MS AUD PWR – AUD
    (O9)
    • R AUD PWR – AUD

13. YES
    • Go to LOSS OF ALL VOICE COMM, step 2, COMM SSR-1

1. MS or R AUDIO pnl must be pwrd (AUD or AUD TONE) to enable audio control signals to the ACCU

2. Cycle (C3) AUD CTR sw several times to establish random audio loop config, \COMM with MCC after each cycle

3. Further cycling could cause loss of comm

4. DATA WORD FROM ORIGINALLY PWRD PNL FAILED

5. Failure of PRI(SEC) ACCU CIRCUITS FOR AFF SYSTEMS/LOOPS

6. FAILURE OF PRI(SEC) ACCU CIRCUITS FOR AFF SYSTEMS/LOOPS

7. Normal sys ops

8. (R10)
   • MS AUD PWR – OFF
   (O9)
   • R AUD PWR – OFF

9. (C3)
   • Cycle AUD CTR sw

10. YES
    • Inform MCC of audio config

11. DOUBLE DATA WORD FAILURE OR ACCU PWR SWITCH FAILURE

12. (R10)
    • MS AUD PWR – AUD
    (O9)
    • R AUD PWR – AUD

13. YES
    • Go to LOSS OF ALL VOICE COMM, step 2, COMM SSR-1

1. MS or R AUDIO pnl must be pwrd (AUD or AUD TONE) to enable audio control signals to the ACCU

2. Cycle (C3) AUD CTR sw several times to establish random audio loop config, \COMM with MCC after each cycle

3. Further cycling could cause loss of comm
Upon pwr loss, GCIL will revert to High Frequency for S-Band PM. There is no switch on panel A1L for frequency; therefore, no action should be taken. MCC will reconfig network to match orbiter frequency if previously configured for Low Frequency. Reconfiguration could take up to 10 min.
SB-SYS 2 PWR: CNTLBC2 AND MNCFLC3
**UPLINK/DOWNLINK COMMUNICATIONS TABLE**

<table>
<thead>
<tr>
<th>SITE ID</th>
<th>S-Band</th>
<th>UHF</th>
<th>TV</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDA</td>
<td>N/A</td>
<td></td>
<td></td>
<td>Decommissioned</td>
</tr>
<tr>
<td>CAN</td>
<td>N/A</td>
<td></td>
<td></td>
<td>Decommissioned</td>
</tr>
<tr>
<td>CTS</td>
<td>SGLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFR</td>
<td>STDN</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>DGS</td>
<td>SGLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDX</td>
<td>N/A</td>
<td></td>
<td></td>
<td>Decommissioned</td>
</tr>
<tr>
<td>GTS</td>
<td>SGLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTS</td>
<td>SGLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JSC</td>
<td>STDN</td>
<td>●</td>
<td>●</td>
<td>Emergency Only</td>
</tr>
<tr>
<td>MAD</td>
<td>N/A</td>
<td></td>
<td></td>
<td>Decommissioned</td>
</tr>
<tr>
<td>MIL</td>
<td>STDN</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>NHS</td>
<td>SGLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTS</td>
<td>SGLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAL</td>
<td>N/A</td>
<td>●</td>
<td></td>
<td>Salinas Peak for WSSH</td>
</tr>
<tr>
<td>(Northrup)</td>
<td></td>
<td></td>
<td></td>
<td>landing at Northrup</td>
</tr>
<tr>
<td>VTS</td>
<td>SGLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WLP</td>
<td>STDN</td>
<td>●</td>
<td>●</td>
<td>TV record/playback</td>
</tr>
</tbody>
</table>

All S-band sites can handle Hi/Lo Data rates, encryption/clear uplink or downlink. Three-letter site designators may be inhibited on SM 2011 by MCC if site use was not planned. Check World Map for sites that may be inhibited. Decommissioned sites are included here because they may appear on SM 2011 even though they no longer have orbiter support equipment. OTS(LION) no longer has UHF equipment. SAL (Salinas Peak) can now support UHF comm for overhead passes or entry.
From ORB PKT, COMM LOST, step 12

Nominal Config:
Switches selected to SYS 1 (pnl mode backup)
(R14:A)
- cb MNA AUD MS – cl
- cb MBN AUD MIDDECK
- SPKR – cl
- cb MNC AUD AUD CTR 2 – cl
- cb MNC AUD PS/AIRLK – cl
(R14:B)
- cb MNA UHF – cl
- cb MNC UHF – cl
(R14:F)
- cb ESS 1BC AUD L – cl
- cb ESS 2CA AUD R – cl
- cb ESS 2CA AUD CTR 1 – cl
(R10)
- MS AUD PWR – AUD/TONE
(O9)
- R AUD PWR – AUD/TONE

1. Verify comm system config

SM 76 COMMUNICATIONS
- Display
  S-BAND PM TDRS
  ANT ELEC 1 ON
  XPNDR 1 ON
  PREAMP 1 ON
  PWR AMPL 1 ON
  OPER 1 ON
  STBY 1 STBY
  NSP 1 BITE GOOD
  UL DATA SOURCE S
  DATA RATE XMIT HI
  RCV HI
  CODING XMIT ON
  RCV ON
  GCIL CONFIG CMD

Displayed config matches A1L switches?

2. Check for Ku-Band coverage

(A1U)
- \SIGNAL STR sw – Ku
- Meter > 1?

3. Reconfigure to Ku receive

(A1L)
- NSP UPLK DATA – Ku
- NSP CODING XMIT – ON
- NSP CODING RCV – OFF

(C3)
- \S-BD PM CNTL – PNL

Two-way voice?

4. POSSIBLE ANT ELEC SW, S-BD FREQ OR DUAL S-BD FAILURE

5. DUAL NSP OR UNEXPLAINED FAILURE

6. Advise MCC of panel A1L and ACCU config
1. Command System 1 TDRS mode

(C3) • S-BD PM CNTL - CMD
• Issue RTCs
System 1 TDRS mode from MAL
CMD TABLE 23, then continue

8. Verify comm system config

SM 76 COMMUNICATIONS

- Display
  S-BAND PM TDRS
  ANT ELEC 1 ON
  XPNDR 1 ON
  PREAMP 1 ON
  PWR AMPL 1 ON
  OPER 1 ON
  STBY 1 STBY
  NSP 1
  BIT SYNC YES
  FRM SYNC YES
  BITE GOOD
  COMSEC BITE 1 GOOD
  UL DATA SOURCE S
  DATA RATE XMIT HI
  CODING XMIT ON
  GCIL CONFIG CMD

Displayed config matches commanded config?

9. POSSIBLE TOTAL GCIL FAILURE OR DUAL S-BD FAILURE

10. POSSIBLE SW OR GCIL PNL DRIVER FAILURE (DO NOT USE S-BD PM CNTL - PNL)

11. Two-way voice?

12. Advise MCC of panel A1L and ACCU config

13. NO

21


2.3a (Cont)

13 Switch to alt freq

(C3)
- √ S-BD PM CNTL – CMD

SM 76 COMMUNICATIONS
- If FREQ HI, issue FREQ LOW RTC [25] from MAL CMD TABLE
- If FREQ LO, issue FREQ HI [24] from MAL CMD TABLE

SM 76 COMMUNICATIONS
- √ S-BAND PM FREQ – HI(LO)
- Wait up to 10 min for TDRS acquisition

Two-way voice?

YES

14 ANT ELEC
- ANT SWITCH OR FREQ PROBLEM

NO

15 Maneuver to select another antenna

SM ANTENNA
- MNR for new S-BAND PM ANT
- If Upper ANT indicated, maneuver to adjacent Lower ANT
- If Lower ANT indicated, maneuver to adjacent Upper ANT

Two-way voice?

YES

16 ORIGINAL ANTENNA FAILED

NO

17 Try Comm through Ground Site per site coverage

(ATU)
- √ A/A – T/R

(O6)
- √ UHF SPLX/EVA PWR AMP – ON
- √ UHF MODE sel – SPLX

(A1L)
- CODING (two) – OFF
- DATA RATE (two) – HI
- PM MODE – STDN LO or SGLS

(C3)
- S-BD PM CNTL – PNL

Two-way voice?

YES

18 TDRS NETWORK OR DUAL HIGH POWER FAILURE

NO

19 Advise MCC of panel A1L and ACCU config

20 MULTIPLE UNEXPLAINED COMM FAILURES

21 When Ku-Band available

- Perform COMM SSR-1, starting with step 3 for OCA uplink via Ku-Band

22 UHF voice may be uplink only (sites MIL, WLP, WSSH, DFR)

5

5

4

2 Payloads may have conflict with alt freq

3 Ground sites are generally not active during Orb phase. Minimum 2 hr to call up

4 UHF sites may not be active. Minimum 2 hr to call up

5 MIL - MILA MERRITT ISLAND, FL
- WLP - WALLOPS ISLAND, MARYLAND
- WSSH - WHITE SANDS SPACE HARBOR, NEW MEXICO
- DFR - DRYDEN FLIGHT RESEARCH CENTER PALM DALE, CA
### MAL CMD TABLE

<table>
<thead>
<tr>
<th>Block</th>
<th>Description</th>
<th>Command 1</th>
<th>Command 2</th>
<th>Command 3</th>
<th>Command 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>SYSTEM 1 TDRS MODE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Issue RTC (PWR AMP 1 OPR ON)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Issue RTC (XPNDR/PREAMP FREQ – HI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Issue RTC (XPNDR/PREAMP FREQ – LOW)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>FREQ HI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Issue RTC (RESET PL1 or PL2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Issue RTC (RESET PL1 or PL2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>FREQ LOW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Issue RTC (RESET PL1 or PL2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>STDN LO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Issue RTC (RESET PL1 or PL2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Issue RTC (NSP 1 ON)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>SGLS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Issue RTC (RESET PL1 or PL2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- The RTC (RESET PL1 or PL2) must be sent prior to any command.
- Those RTCs which do not match the expected comm config in block 1.
Switch failures may prevent certain antennas from being selected.

Pause 2 sec between antenna selections.

Nominal Config:
(C3) S-BD PM ANT – GPC CNTL – CMD
(A1L) S-BD PM ANT SW ELEC – 1 PRE AMP – 1
PWR AMPL STBY – 1 PWR AMPL OPER – 1
XPNDR – 1 NSP PWR – 1

1. SM ANTENNA
   S BAND ANT QUAD ‘↓’?
   
   YES
   
   2. TLM PARAM ON PREVIOUSLY SELECTED ANTENNA FAILED OR TRANSIENT FAIL
      
      NO
      
      3. Verify Comm with MCC
         Two-way Comm?
         
         YES
         
         4. MCC will isolate failure, select alternate sys via ground cmd
            •√MCC for further action
         
         NO
         
         5. Select alternate S-BD PM system
            (C3) S-BD PM CNTL – PNL/CMD
            
            (CRT) S BAND ANT QUAD ‘↓’ still present?
            
            YES
            
            6. ANT SW ELEC, GCIL CMD DRIVER OR PL MDM FAILURE
               
               NO
               
               7. Select best quad antenna
                  (C3) S-BD PM ANT – as reqd
                  Two-way comm with MCC?
                  
                  YES
                  
                  8. GPC/MDM AUTO ANT SELECT MODE FAILURE. CREW WILL BE PRIME FOR SWITCHING ANTENNAS
                     
                     NO
                     
                     9. •√MCC for further action
                     
                     10. Return S-BD PM ANT to GPC position
                          (C3) S-BD PM ANT – GPC
                           
                           2.3a
                           
                           13
**2.3c NO UHF VOICE (MULTI PNLS)**

**Nominal Config:**
- CB MNA, MNC
- UHF – cl (O6)
- UHF MODE – SPLX
- UHF XMIT FREQ – 259.7
- UHF SPLX PWR AMP – ON
- UHF SQUELCH – ON (A1R)
- AUD CTR UHF A/A – T/R

1. **What is the symptom:**
   - Loss of RCV only
   - Loss of XMIT only
   - Loss of XMIT and RCV

2. **(O6) UHF SQUELCH – OFF**
   - MCC Comm?

3. **SQUELCH FAILURE**
   - YES

4. **Switch ACCU**
   - (C3) AUD CTR – 2(1)
   - MCC Comm?

5. **PRI(SEC) ACCU CIRCUITS FAILURE, AFFECTING UHF**

6. **259.7 FREQ FAILURE. XMTR AND/OR RCVR FAILURE, DEPENDING ON PATH TAKEN**

7. **Switch to alt UHF freq**
   - Notify MCC/site prior to changing freq
   - UHF XMIT FREQ – 296.8
   - MCC Comm?

8. **Only headsets, MHAs, WCCS, and other voice comm devices connected at ATUs**
   - MCC Comm?

9. **UHF XMIT FREQ SWITCH FAILURE**

10. **Switch to GUARD freq**
    - Notify MCC/site prior to changing freq
    - UHF MODE – G T/R
    - MCC Comm?

11. **NON-VOICE COMM DEVICE INTERFERING WITH COMMUNICATIONS**

12. **UHF SPLX PWR AMP FAILURE**

13. **Bypass PA**
    - UHF SPLX PWR AMP – OFF
    - Roll vehicle heads up to maximize antenna gain to ground site
    - MCC Comm?

14. **Operate without pwr amp**

15. **UHF INOP. POSSIBLE INPUT, KEYING, OR DOUBLE SYS FAILURE**

**XMTR range is 350 miles with PWR AMP**
- Up to 30 sec may be reqd for MCC/site response
- Example: PADM provides constant UHF key if ATU configured to T/R. Loss of UHF comm would result
- This step will limit UHF XMIT range
2.4a ‘S62 BCE BYP OFA’

Nominal Config:
(C3)
OI PCMMU PWR – 1
(O14:B,O15:B)
cb MNA,MNB OI
MDM 1/2 A,B
(two) – cl

If:
OF1 or OF2 MDM failure, or Card failure in OF1 or OF2, or OF1/OF2 MDM data path PCMMU failure

I/O RESET
PCM may cause additional SM alerts if continuing problems with OI MDMs or PDI

Must obtain GO from MCC for cb cycle before proceeding to step 10

Additional SM alerts when power is removed

Do not close any cb found (reported) OPEN (tripped) without MCC consent

Both cbs must be open for 3 to 5 seconds to remove power from the MDM
COMM 2.4a (Cont)

1. I/O RESET
PCM may cause additional SM alerts if continuing problems with OI MDMs or PDI

6. Advise MCC of PCMMU switch

7. Full data recovered by PCMMU switch. Redundant path to OF1(2) MDM lost

8. Change WINDECOM connections (O5,Mo30F) as reqd

---

10. Switch to alternate PCMMU
(C3)
- OI PCMMU PWR – 2(1)

12. SM 62 PCMMU/ PL COMM
- PCMMU I/O RESET PCM – ITEM 5 EXEC (*)
  Fault msgs recur?

13. TRANSENT PCMMU MIA FAILURE

14. Switch to alternate PCMMU
(C3)
- OI PCMMU PWR – 2(1)

15. SM 62 PCMMU/ PL COMM
- PCMMU I/O RESET PCM – ITEM 5 EXEC (*)
  Fault msgs recur?

16. DATA recovered by PCMMU switch.
Redundant path to OF1(2) MDM lost

17. HARD FAILURE ON OI MDM DETERMINED IN BLOCK [2] OR [3]

18. FAILED PCMMU MIA

19. OI MDM MIA PORT FAILURE

20. Switch to original PCMMU
(C3)
- OI PCMMU PWR – 1(2)

21. Return to original PCMMU and LOAD TFLs
(C3)
- OI PCMMU PWR – 1(2)
  - Perform 64 and 128 TFL, LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

22. Load TFLs
  - Perform 64 and 128 TFL, LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

23. TRANSIENT MIA FAIL ON PCMMU 1(2) RESET BY PWR CYCLE

24. DOUBLE FAILURE: ALL OI DATA IS SUSPECT

25. MCC

26. Load TFLs
  - Go to 64 and 128 TFL, LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

27. Go to COMM SSRs for specific loss actions
Which failed MDM:
- OF1
- OF2

28. Go to OI MDM LOST: OF1, COMM SSR-10

29. Go to OI MDM LOST: OF2, COMM SSR-11

---
I/O RESET
PCMs may cause additional SM alerts if continuing problems with OI MDMs or PDI

Must obtain GO from MCC for cb cycle before proceeding to step 10

Additional SM alerts when power is removed

Do NOT close any cb found (reported) OPEN (tripped) without MCC consent

Both cbs must be open for 3 to 5 seconds to remove power from the MDM
COMM 2.4b (Cont)

1. I/O RESET
   PCM may cause additional SM alerts if continuing problems with OI MDMs or PDI

6. Advise MCC of PCMMU switch

7. Full data recovered by PCMMU switch. Redundant path to OF3(4) MDM lost

8. Change WINDECOM connections (O5,M030F) as reqd

10. Switch to alternate PCMMU

13. SM 62 PCMMU/PL COMM
    • PCMMU I/O RESET PCM – ITEM 5 EXEC (*)
    Fault msgs recur?
    YES
    NO

14. Switch to alternate PCMMU

15. SM 62 PCMMU/PL COMM
    • PCMMU I/O RESET PCM – ITEM 5 EXEC (*)
    Fault msgs recur?
    YES
    NO

16. TRANSIENT PCMMU MIA FAILURE

17. HARD FAILURE ON OI MDM DETERMINED IN BLOCK 2 or 3

18. FAILED PCMMU MIA

20. Switch to original PCMMU

21. Return to original PCMMU and LOAD TFLs

22. Load TFLs

23. TRANSIENT MIA FAIL ON PCMMU 1(2) RESET BY PWR CYCLE

24. DOUBLE FAILURE. ALL OI DATA IS SUSPECT

25. •√MCC

26. Load TFLs

27. Go to COMM SSRs for specific loss actions

28. Go to OI MDM LOST: OF3, COMM SSR-12

29. Go to OI MDM LOST: OF4, COMM SSR-13

19. OI MDM MIA PORT FAILURE

Data recovered?
YES
NO

12. Advise MCC of PCMMU switch

24. Load TFLs

30. Go to 64 and 128 TFL, LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

31. •√MCC

32. Go to OI MDM LOST: OF3, COMM SSR-12

33. Go to OI MDM LOST: OF4, COMM SSR-13
If OA1 or OA2 or OA3 MDM failure or Card failure in OA1/OA2/OA3 or OA1/OA2/OA3 data path to PCMMU failure.

Nominal Config:
(C3)
OI PCMMU PWR – 1
(O17:D)
MDM OA 1/2/3 – ON

1. Accompanied by ‘S62 BCE BYP OFA’ and ‘S62 BCE BYP OFB’?
   - Yes → 20
   - No → 2

2. Determine which OA1, OA2, OA3 MDM affected:
   - APU 1 SPEED % and HYD 2 PRESS both status missing (M)
   - APU 2 SPEED % and HYD 1 PRESS both status missing (M)
   - APU 3 SPEED % and HYD 3 PRESS both status missing (M)
   - None of the above

3. OA1 MDM DETECTED PROBLEM
4. OA2 MDM DETECTED PROBLEM
5. OA3 MDM DETECTED PROBLEM

6. On a 2nd CRT
   - SM 62 PCMMU/PL COMM
   - PCMMU I/O RESET PCM – ITEM 5 EXEC (*)
   - Status missing clear of previous lost params?
     - No → 9
     - Yes → 11

9. SINGLE CARD LOSS IN OA1, OA2, OR OA3 MDM

10. Cycle pwr on subject MDMs
    - (O17:D)
    - MDM OA 1/2/3 – OFF, then ON

11. TRANSIENT OA1, OA2, OR OA3 MDM FAILURE
    - Switch to alternate PCMMU
    - (C3)
    - OI PCMMU PWR – 2(1)
    - (CRT)
    - I/O RESET PCM – ITEM 5 EXEC (*)
    - Data recovered?
      - Yes → 12
      - No → 14

12. Switch to alternate PCMMU
    - Data recovered?
      - Yes → 15
      - No → 13

13. TRANSIENT OA1, OA2, OR OA3 MDM FAILURE

14. HARD FAILURE ON OI MDM DETERMINED IN BLOCK 2

15. OI MDM MIA PORT FAILURE

16. Data recovered?
Change WINDECOM connections (O5, MO30F) as reqd

1. Return to original PCMMU and load TFLs (C3)
   - OI PCMMU PWR – 1(2)
   - Perform 64 and 128 TFL, LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

16. Go to COMM SSRs for specific loss actions Which failed MDM:
   - OA1
   - OA2
   - OA3

17. Return to original PCMMU and load TFLs (C3)
   - OI PCMMU PWR – 1(2)
   - Perform 64 and 128 TFL, LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

18. Go to OI MDM LOST: OA1, COMM SSR-14
19. Go to OI MDM LOST: OA2, COMM SSR-15

20. SM 62 PCMMU/PL COMM
    - PCMMU I/O RESET PCM – ITEM 5 EXEC (*)

21. Switch to alternate PCMMU
    - OI PCMMU PWR – 2(1)

22. SM 62 PCMMU/PL COMM
    - PCMMU I/O RESET PCM – ITEM 5 EXEC (*) Fault msgs recur?

23. TRANSIENT PCMMU MIA FAILURE

24. Switch to original PCMMU
    - OI PCMMU PWR – 1(2)

25. FAILED PCMMU MIA

26. Load TFLs
    - Perform 64 and 128 TFL, LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

27. TRANSIENT MIA FAIL ON PCMMU 1(2) RESET BY PWR CYCLE

28. DOUBLE FAILURE. ALL OI DATA IS SUSPECT

29. Load TFLs
    - Go to 64 and 128 TFL, LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

30. MCC
If PDI port failure or PCMMU port failure or PDI to PCMMU data path failure

Nominal Config:
(C3) OI PCMMU PWR – 1(2)
A1L PL DATA INTLVR PWR – ON

1 I/O RESET PCM may cause additional SM alerts if previous OI failure, PDI not pwrd ON, PDI not receiving payload data which is FDAd

2 MCC can uplink PDI loads when SM SPEC 62 is resumed

3 IFM available whenever spare PDI is manifested

4 Change PCDECOM connections (O5, MO30F) as reqd

---

SM ALERT

S62 BCE BYP PL

1 FAULT

Msg accompanied by ‘S62 BCE BYP PDI’?

NO

2 SM 62 PCMMU/ PL COMM

PCMMU I/O

RESET PCM – ITEM 5 EXEC (*)

PDI I/O RESET – ITEM 8 EXEC (*)

Fault msgs repeat?

NO

3 Reestablish PDI/PCM I/F

SM 62 PCMMU/ PL COMM

PCMMU I/O

RESET PCM – ITEM 5 EXEC (*)

‘S62 BCE BYP PL’ msg repeats?

NO

7 Port Mode PDI by switching to alternate PCMMU

(C3)

• OI PCMMU PWR – 2(1)

SM 62 PCMMU/ PL COMM

PCMMU I/O

RESET PCM – ITEM 5 EXEC (*)

If ‘S62 BCE BYP PL’ msg repeats?

NO

3 PDI OUTPUT

LOGIC FAILURE

10 Reselect original PCMMU

(C3)

• OI PCMMU PWR – 1(2)

SM 62 PCMMU/ PL COMM

PCMMU I/O

RESET PCM – ITEM 5 EXEC (*)

11 Reload TFLs and config, if reqd

• Perform 64 and 128 TFL, LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

12 ORIGINALLY SELECTED PCMMU MIA OR PDI PORT FAILURE

8 Load PDI formats

• Go to LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)

4 TRANSIENT PDI/PCM BUS FAILURE

5 TRANSIENT PDI LOGIC/PWR FAILURE

6 Transient PDI/PCM Bus Failure

4 Change PCDECOM connections (O5, MO30F) as reqd
1 I/O RESET
PCM may cause additional SM alerts if previous OI failure, PDI not pwrd ON, PDI not receiving payload data which is FDAd

2 MCC can uplink PDI loads when SM SPEC 62 is resumed

3 IFM available whenever spare PDI is manifested

5 MCC has insight on power going to the PDI. MCC may desire not to cycle
2.4e ‘S62 BCE BYP PDI’

1. If PDI PL Bus port failure or GPC port failure or PDI to GPC data path failure

2. Nominal Config:
   (A1L)
   PL DATA INTLVR
   PWR – ON

3. ‘S62 BCE BYP PDI’ msg recur?
   YES
   NO

4. GPC S/W or PL BUS OR PDI/GPC MIA PORT OR PDI LOGIC FAILURE

5. NOTE
   No additional Decom input or FPM format loading possible
   √MCC for further action

1. May occur prior to ‘I/O ERROR PL1’ msg, which requires Mal procedure for that error condition be performed

2. Msg will occur if SM I/O RESET accomplished and PDI pwr off

3. Internal PDI logic lockup may be cleared by PDI pwr cycle. However, this will cause loss of currently loaded formats. Do not cycle pwr without MCC direction

4. May be possible to clear if GPC MIA or GPC S/W with an SM GPC switch.
   √MCC for further action
2.4f ‘S62 BCE BYP PSP 1(2)’

1. **FAULT**
   - Msg accompanied by ‘S62 PDI DECOM FAIL’ on input 6 associated decom?

2. **SM 62 PCMMU/PL COMM**
   - I/O RESET PSP 1(2) – ITEM 6(7) EXEC (*)
   - Fault msg repeats?

3. **PAYLOAD SPEC XXX**
   - If available, config PSP by item entry; otherwise, MCC will uplink config CMD

4. **SM 62 PCMMU/PL COMM**
   - PSP SYNC BIT = YES and PSP SYNC FRAME = YES?

5. **PSP 1(2) PWR FAILURE**

6. **TRANSIENT PSP FAILURE**

7. **Cycle PSP 1(2) pwr**

8. **TRANSIENT PSP LOGIC LOCKUP ON PSP/PL MDM INTERFACE**

9. **PAYLOAD SPEC XXX**
   - If available, config PSP by Item Entry; otherwise, MCC will uplink config CMD

Nominal Config:
- (A1L)
- S-BD PL
- CNTL – CMD
- PWR SYS – 1
- PWR SEL – BOTH
- PSP CMD
- OUTPUT – PL UMB (INTRG)

If:
- PSP/PL MDM Interface fails or PSP pwrd off or PSP pwrd supply failure

- FDA must be enabled to receive ‘S62 PDI DECOM FAIL’ and ↑
- Msg occurs if PSP pwrd off
- ‘S62 PDI DECOM FAIL’ fault msg may occur during PSP pwrd cycle
- PSP config will be lost in next block steps
- S-BD PL PWR SEL sw position should reflect current operational requirements
6 Selection of alternate S-BD PL sys will cause temporary loss of RF to PL

7 Indications of PL RCVR lock vary with flight
Data on display driven by failed DECOM may be static.

Nominal Config:
- (A1L) PL DATA INTLVR PWR – ON
- SM 62 PCMMU/PL COMM
- DECOM FDA ENA – ITEM 14 (15,16,17) = ENA (*)
- (A1L) S-BD PL PWR SYS – 1
- PWR SEL – BOTH
- PSP CMD OUTPUT – INTRG(PL UMB)

If:
- PDI Decom fails, or
- PL to orbiter PI RF link fails, or PL TLM output to PDI fails, or PSP/PDI hardline failure

1. On SM CRT:
   - FAULT
   - Msg accompanied by ‘S62 BCE BYP PSP 1(2)’ ?
   - Msg accompanied by ‘S62 BCE BYP PDI’ ?
   - Neither of the above

2. Determine which DECOM(s) indicate(s) fail
   - [SM 62 PCMMU/PL COMM]
   - PDI DECOM 1,2,3, or 4 indicates fail (*) ?
     - NO
     - YES

3. TRANSIENT PDI DECOM FAIL OR MOMENTARY LOSS OF PL TLM DATA INPUT TO PDI
   - [SM 62 PCMMU/PL COMM]
   - Item 11 = CPLT ?
     - NO
     - YES

4. Does associated DECOM have active PL ?
   - [SM 62 PCMMU/PL COMM]
   - Item 11 = CPLT ?
     - NO
     - YES

5. Does associated DECOM have flt-specific procedures ?
   - [SM 62 PCMMU/PL COMM]
   - Item 11 = CPLT ?
     - NO
     - YES

6. Determine if DECOM indicating fail (*) operating on RF P/L TLM input
   - Failed PDI DECOM INPUT = 6 ?
     - NO
     - YES

7. Go to S62 PDI DECOM FAIL (PL OPS, PL SYS, or SODF: ASSY OPS)

8. Determine if DECOM still indicating fail (*) ?
   - [SM 62 PCMMU/PL COMM]
   - Item 11 = CPLT ?
     - NO
     - YES

9. Reload DECOM indicated as failed (*)
   - Perform LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)

10. Determine if PL INTRG to PSP interface operating properly
    - [SM 62 PCMMU/PL COMM]
    - Item 11 = CPLT ?
      - NO
      - YES

11. PDI DECOM FAILURE
    - YES
    - NO

12. TRANSIENT PDI DECOM MEMORY FAILURE
    - YES
    - NO

13. TRANSIENT PDI DECOM MEM. FAILURE
    - YES
    - NO

14. TRANSIENT PDI DECOM MEM. FAILURE
    - YES
    - NO
Selection of alternate S-BD PL sys will cause temporary loss of RF to PL

Some payloads, on a flight-specific basis, may not be supported by PL comm string 2

MCC TFL/DFL loads cannot be performed with SPEC 62 active

Original orbiter S-BD PL TLM sys lost

B/U DECOM config requires a TFL change

PL RCVR lock indications vary with flight

Determine if B/U PDI DECOM will reestablish PL data

- Perform LOAD PDI DECOM FORMAT for B/U DECOM (ORB OPS FS, COMM/INST)

'S62 PDI DECOM FAIL' error msg and ↑ recur on original PL input when selected to new DECOM?

Select alternate S-BD PL Comm sys

- Is DECOM associated with RF PL TLM and failed PDI DECOM INPUT = 6?

P/L TLM SYS TO PDI INTERFACE FAILURE OR PL TLM SYS PROBLEM

- SM 62 PCMMU/PL COMM

DECOM FDA still indicating fail (↑) ?

- SM 62 PCMMU/PL COMM

If MCC available:

- Drop SPEC 62 and MCC will perform block 25; otherwise, continue

Reconfig PDI/PCMMU completely to B/U config

Inh failed DECOM FDA:

- ITEM 14(15,16,17) EXEC

Zero input to failed DECOM:

- ITEM 9 +1(2,3,4) EXEC

- ITEM 12 +0 EXEC

- ITEM 13 EXEC Enable FDA for new DECOM:

- ITEM 14(15,16,17) EXEC

Go to LOAD PDI DECOM FORMAT for remaining B/U config (ORB OPS FS, COMM/INST)

PL TLM SYSTEM FAILURE OR PDI_CNTL LOGIC FAILURE

PSP 1(2) PDI INTERFACE FAILURE

PL RCVR lock Locked?

- S-BD PL FREQ SWEEP – ON (for up to 90 sec until lock), then OFF

- If no lock, \MCC

Reconfig PDI/PCMMU completely to B/U config

Inh failed DECOM FDA:

- ITEM 14(15,16,17) EXEC

Zero input to failed DECOM:

- ITEM 9 +1(2,3,4) EXEC

- ITEM 12 +0 EXEC

- ITEM 13 EXEC Enable FDA for new DECOM:

- ITEM 14(15,16,17) EXEC

Go to LOAD PDI DECOM FORMAT for remaining B/U config (ORB OPS FS, COMM/INST)

PL RCVR lock Locked?

- S-BD PL FREQ SWEEP – ON (for up to 90 sec until lock), then OFF

- If no lock, \MCC

Reconfig PDI/PCMMU completely to B/U config

Inh failed DECOM FDA:

- ITEM 14(15,16,17) EXEC

Zero input to failed DECOM:

- ITEM 9 +1(2,3,4) EXEC

- ITEM 12 +0 EXEC

- ITEM 13 EXEC Enable FDA for new DECOM:

- ITEM 14(15,16,17) EXEC

Go to LOAD PDI DECOM FORMAT for remaining B/U config (ORB OPS FS, COMM/INST)
Unable to Obtain PSP Bit and/or Frame Sync Lock

If:
PL INTRG/PSP Interface failure or PSP Bit Frame Sync failure

Nominal Config:
(A1L)
S-BD PL
CNTL – CMD
PWR SYS – 1
PWR SEL – BOTH

2.5a PSP BIT AND/OR FRAME SYNC LOCK FAIL

1. Determine if PL INTRG operating properly

SM 62 PCMMU/PL COMM
PL INTRG: PHASE LOCK = YES and PL SIG STR > 1.43?

2. If available, config PSP by Item Entry; otherwise, MCC will uplink config CMD on crew call

SM 62 PCMMU/PL COMM
PSP Sync BIT and FRAME = YES?

3. TRANSIENT PSP LOGIC FAILURE

4. Select alt orbiter S-BD PL comm sys

(A1L) S-BD PL
\( \backslash \text{CNTL} – \text{CMD} \)
\( \backslash \text{PWR SYS} – 2(1) \)
\( \text{MOD} – \text{OFF} \)
\( \backslash \text{CNTL} – \text{PNL} \)
\( \text{Error msg: ‘S62 BCE BYP PSP 1(2)’} \)

SM 62 PCMMU/PL COMM
PSP I/O RESET PSP 2(1) – ITEM 7(6) EXEC (*)

PAYLOAD SPEC XXX
If available, config PSP by Item Entry; otherwise, MCC will uplink config CMD on crew call

(A1L) S-BD PL
PSP CMD OUTPUT – INTRG?

5. PL RCVR locked?

6. YES

7. NO
6 (A1L)
- S-BD PL FREQ SWEEP – ON (for up to 90 sec until lock), then OFF
- If no lock, \(\sqrt{\text{MCC}}\)

7 (A1L)
- S-BD PL
- MOD – ON
- CNTL – CMD

8
- Determine if PSP operating properly

SM 62 PCMMU/PL COMM

PSP SYNC BIT = YES and PSP SYNC FRAME = YES?

9 PL TLM SYS PROBLEM

YES

10 ORIGINALLY SELECTED PSP OR PI FAILURE

NO

11 \(\sqrt{\text{MCC}}\)
2.6a OI DSC LOSS

1. Loss of signal conditioning will usually (but not always) cause display of off-scale low value for that param. 'L' will be displayed adjacent to this value.

2. Match param indicators on displays to determine failed DSC.

3. icb(s) for particular DSC.

Nominal Config:
- cb MNA OI SIG CONDR OF 1/4
- cb MNB OI SIG CONDR OF 1/4
- cb MNC OI SIG CONDR OF 2/3

Simultaneous occurrence of these fault msgs indicates DSC OM3 problem.

Match param indicators on displays to determine failed DSC.

√ cb(s) for particular DSC.

DSC FAILURE

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COMM SSR-1
LOSS OF ALL VOICE COMM

1. Perform NO AUDIO_COMM, 2.1a
2. Install AUDIO CTR BYP CONNECTORS
   Perform ACCU BYPASS CONNECTOR INSTALLATION (IFM, PROCEDURES A THRU F) for CDR and PLT ATUs

If still no COMM but CMD capability confirmed (ORB PKT, COMM, COMM LOST multi panels), MCC will attempt
telecon via OCA
   If Ku-Band not deployed/activated:
   3. Perform KU-BD ANT DEPLOY and KU-BD ACTIVATION (ORB OPS, COMM/INST):
   4. Configure for OCA telecon (ORB OPS, PGSC, VIDEO CONFERENCING) in low rate
      PDIP KU BD RATE – LOW
      KU SIG PROC LDR – PL DIGITAL
      KU SIG PROC HDR – TV
      KU PWR – ON
      KU MODE – COMM
      KU – GPC
      KU CNTL – PNL

If no OCA capability (CMD OK) and voice still cannot be established:
5. Perform next day PLS
6. Use Scratch Pad line(s) to inform MCC of no voice and for other msgs
   (MCC monitors all Scratch Pad lines)

    NOTE
   For letters above F, use ROW/COLUMN combinations below; i.e., 2B = N.
   Use ‘.’ when msg requires > 1 Scratch Pad line (expect ERR)

    COLUMN
    A B C D E F
    1 G H I J K L
    2 M N O P Q R
    3 S T U V W X
    4 Y Z

   Standard Responses
   11 YES
   22 NO
   33 MSG RCVD – STBY
   44 MSG RCVD – WILCO
   55 DON’T KNOW
   66 RESEND MSG
   77 REFERENCE MSG
   88 ? (DON’T UNDERSTAND – PLEASE CLARIFY)
   99 MISSION STATUS – OK
   00 MISSION STATUS – PROBLEM IDENTIFIED, PLEASE ADVISE

   AA PAGE NUMBER

EX:
   ITEM 01 +77 (02) +924 (03) +88
   ‘Reference Msg 924; Don’t Understand – Please Clarify’

7. MCC will acknowledge by lighting Abort light:
   ON for at least 1 min, then OFF = MSG RCVD – STBY
   ON for 10 sec, then OFF = YES
   ON for 10 sec, then OFF for 10 sec, ON for 10 sec, then OFF = NO

If still no Comm, and no CMD:
8. Minimize perturbations and deorbit
   Cease payload ops, which cause vehicle movement
   Do not perform any unnecessary attitude maneuvers, vents, dumps, or purges
   Perform reqd attitude maneuvers, vents, dumps, and purges as close to Deorbit Burn as possible
   MNVR/TRK - ZLV, +XVV attitude until Deorbit Prep
   TG = 2, BV = 3, OM = 180
   OPS 202 PRO
   GNC XXXX MNVR YYYY
   If PEG 7 ≤ Vs = 0 and TIG in future, then Deorbit to PLS at TIG in target set >>
COMM SSR-1 (Cont)

Otherwise:
Perform GPS INCORPORATION (ORB OPS, GNC), then:
If GPS is functioning properly, Deorbit to next lighted CONUS opportunity or next
CONUS if lighted doesn’t exist (either current or next day PLS)

NOTE
Do not inhibit GPS for crew sleep

D/O, NOMINAL DEORBIT PREP PROCEDURES
Pen & Ink: Add “GPS INCORPORATION (EPCL, GNC)” at TIG-2:00 hr

If GPS is NOT functioning properly, Deorbit according to following priorities for altitude and
available targets:
Current Altitude:
1. Deorbit within next 13 hr if Hp ≥120 nmi
2. Deorbit within next 9 hr if 105 ≤ Hp < 120 or less
Available Targets:
1. Next lighted CONUS opportunity
2. Next CONUS opportunity
3. Next lighted ELS opportunity
EXPLANATORY NOTES FOR OI MDM/DSC LOSS SSRs

NOTE
OI MDM/DSC Loss action items are based on loss of specific OI MDM or DSC. Each procedure defines crew actions reqd because of the lost measurements on failed OI MDM or DSC.

For each procedure, the following assumptions/guidelines are used:

1. Only on-orbit and sleep configs are addressed. Entry changes will be uplinked with entry sw list changes.

2. Only a few lost measurements have possible recoveries. Many Mal procedures will remain unusable. Actions reqd maximize capability.

3. Pwr consumption is not a consideration. Loads will be balanced after the fact by MCC.

4. Procedures include primary C/W inhibits (DSC only). MCC will do TMBUs to assure safe monitoring/control only, with no general TMBU of all affected measurements.

5. Procedures do not represent a complete list of measurements affected. Procedures include only those measurement losses that are significant to crew and those with possible actions.

6. Params affected by OI MDM loss will have 'M' displayed adjacent to them. Those params affected by DSC loss will have 'L' displayed adjacent to them (params displayed on meter will be pegged low). Do not use these data.
<table>
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<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
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</table>
| If on PCS SYS 1:  
  - Perform RECONFIG TO ALT PCS SYS, ECLS SSR-3  
  (L1)  
  - AV BAY 3 FAN B – OFF  
  - AV BAY 3 FAN A – ON | Most PCS 1 measurements | 1 If condensation in cabin, √MCC |
| If on IMU FAN A:  
  - IMU FAN B(C) – ON  
  - IMU FAN A – OFF  
  - Monitor Cabin Fan flow by feel  
  During sleep periods:  
  - CAB FAN A,B (two) – ON | Av Bay 3 Fan Temp  
  (MCC has limited insight)  
  Hum Sep A,B (two)  
  Speed Snsr  
  Waste Qty 1  
  IMU Fan A Speed  
  Cab Fan ΔP | 2 Buses will be untied for entry. MCC will TMBU FC ΔAMPS 2 limits and notify crew. If loss of comm, reset limits to present value ± 40 |
| If on IMU Fan A:  
  - IMU FAN B(C) – ON  
  - IMU FAN A – OFF  
  - Monitor Cabin Fan flow by feel  
  During sleep periods:  
  - CAB FAN A,B (two) – ON | PPO2 (MCC cannot assess) | 3 WST TK will be dumped by time (∼2%/min) to provide ullage to make EOM, MCC will provide the time |
| (R1)  
  - MN BUS TIE B,C (two) – ON (tb-ON) | | 4 This action activates redundant htrs on Supply H2O Dump Line, Waste H2O Dump Line, Vacuum Vent Line |
| (L1)  
  If FLASH EVAP CNTLR PRI B enabled:  
  - Perform FES RESTART ECLS SSR-5, using PRI A | Ku Gyro temp monitoring  
  Waste Qty 1  
  Waste H2O Dump Line T | 5 Smoke Det H/W Alarm still available |
| (R14:C)  
  - cb MNB KU ANT HTR – op  
  - MCC about performing WASTE H2O DUMP | Most FES Feedline A Htr measurements | 6 Xdcrs on disp SM 87 HYD THERMAL will show ‘M’ for some parameters |
| (ML86B.A)  
  - cb MNA,MNB H2O LINE HTR A, HTR B (two) – cl | | 7 Visibility into Truss Flange temps lost |
| (ML86B:C)  
  - cb MNA,MNB EXT ARLK HTR STRUC (two) – cl  
  - cb MNA, MNB EXT ARLK HTR LINE ZN 1,2 (four) – cl | | 8 One of two temps in each zone lost |
| 2  
  - MN BUS TIE B,C (two) – ON (tb-ON) | | 9 Vlv position is normally closed. Position can be verified during EMU recharge |
| 3  
  - MCC about performing WASTE H2O DUMP | | 10 Freon Loop 2 Automatic Radiator Isolation capability is lost |
| (ML86B.A)  
  - cb MNA,MNB H2O LINE HTR A, HTR B (two) – cl | | 11 Call MCC for MMU 1 action. If MMU 1 off, ITEM 4 EXEC |
| 4  
  - MCC about performing WASTE H2O DUMP | | |
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<th>ACTIONS</th>
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<td>If on PCS SYS 2:</td>
<td>Most PCS Sys 2 measurements</td>
<td>1 Use interchanger flow to monitor H2O Loop 1 performance if reqd</td>
</tr>
<tr>
<td>• Perform RECONFIG TO ALT PCS SYS, ECLS SSR-3</td>
<td>Av Bay 1 Fan ΔP Temp (MCC has limited insight) Most H2O Loop 1 measurements</td>
<td>2 Crossover vlv needs to be checked and TKC unisolated to equalize tks to provide leak protection</td>
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<tr>
<td>(L1)</td>
<td>Sply H2O Qty B Qty D</td>
<td>3 Buses will be untied for entry. MCC will TMBU FC ΔAMPS 3 limits and notify crew. If loss of comm, reset limits to present value ± 40</td>
</tr>
<tr>
<td>• AV BAY 1 FAN B – OFF</td>
<td>FC3 SS1 ΔV SS2 ΔV SS3 ΔV</td>
<td>4 This action activates dual htrs on Supply H2O Dump Line, Waste H2O Dump Line, Vacuum Vent Line</td>
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<tr>
<td>• A – ON</td>
<td>Cabin Press Snsr</td>
<td>5 Smoke det H/W Alarm still available</td>
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<tr>
<td>• H2O PUMP LOOP 2 – ON</td>
<td>N2 Qty 2</td>
<td>6 Zone 1 temps verify proper switch config</td>
</tr>
<tr>
<td>• H2O PUMP LOOP 1 – OFF</td>
<td>FC2 pH Snsr</td>
<td>7 Vestibule Temp 2 available</td>
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<tr>
<td>• Do not don Biomed Electrodes</td>
<td>Sply H2O Dump Line T</td>
<td>8 Structural temps verify proper switch config</td>
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<td>(R11L)</td>
<td>Smoke Det A Concn Av Bay 1 Smoke Det B Concn Av Bay 3 Smoke Det Concn Right Flt Deck</td>
<td>9 Vlvs still operational. Alternate vlvs available</td>
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<tr>
<td>• PLY H2O TKC INLET, OUTLET (two) – OP (tb-OP)</td>
<td>External Airlock LCG EV 2 Supply Line press</td>
<td>10 Freon Loop 1 Automatic Radiator Isolation capability is lost</td>
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<tr>
<td>(R1)</td>
<td>External Airlock H2O Line Zone 1 MNA,B,C Htr ON status</td>
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<tr>
<td>• MN BUS TIE C,A (two) – ON (tb-ON)</td>
<td>Vestibule Temp 1</td>
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<td>SM 66 ENVIRONMENT</td>
<td>EXT A/L Struc Htr MNA,B Htr ON status</td>
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<td>• Monitor AIRLK P and dP/dT for cabin integrity on-orbit</td>
<td>Vestibule Isolation Vlv 1 and Depress Vlv 1 op/cl positions</td>
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<td>(ML86B:A)</td>
<td>Freon Loop 1 Accum Qty</td>
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<td>• cb MNA,MNB H2O LINE HTR A, HTR B (two) – cl</td>
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<td>ACTIONS</td>
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<td><strong>SM 66 ENVIRONMENT</strong>&lt;br&gt;- Monitor Cabin Press for cabin leaks (L1)</td>
<td>Cabin dP/dT</td>
<td><strong>1</strong> Use Interchanger flow to monitor H2O Loop 2 performance if reqd</td>
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<tr>
<td>- H2O PUMP LOOP 1 – ON&lt;br&gt;- H2O LOOP 1 BYP MODE – AUTO&lt;br&gt;- H2O PUMP LOOP 2 – OFF&lt;br&gt;- H2O LOOP 2 BYP MODE – MAN (R13U)</td>
<td>Av Bay 2 Fan ΔP Temp (MCC has limited insight)</td>
<td><strong>2</strong> Raises H2O Loop 1 Pump Out P Limit</td>
</tr>
<tr>
<td>2&lt;br&gt;- C/W PARAM SEL tw (three) – 105&lt;br&gt;- C/W LIMIT SET VALUE tw (three) – 1.50&lt;br&gt;- C/W LIMIT SET LIMIT – LOWER&lt;br&gt;- C/W LIMIT SET FUNC – SET&lt;br&gt;- C/W PARAM SEL tw (three) – 115&lt;br&gt;- C/W LIMIT SET VALUE tw (three) – 0.65&lt;br&gt;- C/W LIMIT SET LIMIT – LOWER&lt;br&gt;- C/W LIMIT SET FUNC – SET&lt;br&gt;- C/W PARAM SEL tw – &gt; 119</td>
<td>Most H2O Loop 2 measurements</td>
<td><strong>3</strong> Lowers H2O Loop 2 Pump Out P Limit</td>
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<tr>
<td>When reqd:&lt;br&gt;- Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS) (Cue Card) (Assume SM 2 not available when using Cue Card)</td>
<td>FC Purge Line temps FC3 pH Snsr</td>
<td><strong>4</strong> Causes loss of FC Auto purge capability</td>
</tr>
<tr>
<td><strong>SM 60 SM TABLE MAINT</strong>&lt;br&gt;Inhibit S-BD ANT QUAD Alert:&lt;br&gt;- Param ID – ITEM 1&lt;br&gt;+0 9 2 1 0 4 9 EXEC&lt;br&gt;- INH – ITEM 10(15) EXEC (L1)</td>
<td>Antenna Select feedbacks</td>
<td><strong>5</strong> Avoids nuisance alarms</td>
</tr>
<tr>
<td>If FLASH EVAP CNTLR PRI A enabled:&lt;br&gt;- Perform FES RESTART, ECLS SSR-5, using PRI B</td>
<td>Most FES Feedline B Htr measurements</td>
<td><strong>6</strong> SM 76 COMM display S-BD PM mode static, SM GPC will continue selecting ANT for the mode shown</td>
</tr>
<tr>
<td><strong>SM ANTENNA</strong>&lt;br&gt;If TDRS:&lt;br&gt;- GPC OVRD – ITEM 13 EXEC (*)</td>
<td>S-BD mode</td>
<td><strong>7</strong> Force TDRS antenna pointing</td>
</tr>
<tr>
<td>7&lt;br&gt;- GPC OVRD – ITEM 13 EXEC (*)</td>
<td>N2 Qty (two) 1.2</td>
<td><strong>8</strong> Xdcrs on disp SM 87 HYD THERMAL will show 'M' for some parameters</td>
</tr>
<tr>
<td>8</td>
<td>HYD sys temps</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1. Use Interchanger flow to monitor H2O Loop 2 performance if reqd
2. Raises H2O Loop 1 Pump Out P Limit
3. Lowers H2O Loop 2 Pump Out P Limit
4. Causes loss of FC Auto purge capability
5. Avoids nuisance alarms
6. SM 76 COMM display S-BD PM mode static, SM GPC will continue selecting ANT for the mode shown
7. Force TDRS antenna pointing
8. Xdcrs on disp SM 87 HYD THERMAL will show 'M' for some parameters

**Continued**
### ACTIONS
- Terminate all SUPPLY H2O Dump operations through dump nozzle
- If Supply H2O Dump reqd, perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS)
- Terminate all WASTE H2O Dump operations through dump nozzle

### MEASUREMENT LOSS
- Supply H2O Noz T A,B (two)
- Waste H2O Noz T A,B (two)
- Supply H2O Qty C

### NOTES
- For leak detection
- Smoke Det H/W Alarm still available
- F9 meter still available
- Zone 2 temps verify proper switch config
- Both htrs activated since only one Vestibule temp available
- Vestibule Temp 1 available
- Both htrs activated since visibility into temps lost
- Vlv still operational. Alternate vlv's available

### (R11L)
- SPLY H2O TKC INLET, OUTLET (two) – OP (lb-OP)

### (ML86B-C)
- cb MNA,MNB EXT ARLK HTR VEST (two) – cl
- cb MNA,MNB EXT ARLK HTR STRUC (two) – cl
- cb MNA,MNB EXT ARLK HTR LINE ZN 1,2 (four) – cl

### (ML86B-C)
- Smoke Det B Concn Av Bay 1
- Smoke Det Concn Left F1
- Smoke Det B Concn Av Bay 2
- Deck
- Smoke Det B Concn Av Bay 2
- Smoke Det Concn Left F1

### (ML86B-C)
- Supply H2O Qty C
- FC 1,2,3 Amps

### (ML86B-C)
- External Airlock H2O Line Zone 2 MNA,B,C Htr ON status
- External Airlock Vestibule MNA,B Htr ON status
- Vestibule Temp 2
- External Airlock Lower Bulkhead temp
- External Airlock H2O Line Zone 1 and 2 LCG 2 temp
- Temp A O2 Sply
- Vestibule Isolation Vlv 2 op/cl positions
### COMM SSR-13

**OI MDM LOST: OF4**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| When reqd:  
- Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS) (Cue Card) (Assume SM 2 not available when using Cue Card)  
- During CCTV Camr ops, monitor CCTV Camr temps on Monitor | FC Auto Purge Start discretes | 1 No SM alerts for CCTV overtemp |
|  | 1 CCTV Camr overtemp discrete | 2 Xdcrs on disp SM 87 HYD THERM will show 'M' for some parameters |
|  | 2 HYD sys temps | 3 Inhibits FES High Load duct alerts. Pre-condition steering could cause nuisance alarms unless params are inhibited |
|  |  | 4 May get Antenna alerts when manually operating (C3) S-BD PM ANT sw (loss of position discrete to SM) |
|  |  | 5 Buses will be untied for entry. MCC will TMBU FC ΔAMPS 1 limits and notify crew. If loss of comm, reset limits to present value ± 40 |
|  | Fwd,Aft Topping Duct Htr measurements | 6 Vlv still operational. Alternate vlv's available |
|  | Hi Load Outbd Duct Htr measurements | 7 Freon Loop 1,2 Automatic Radiator Isolation capability is lost |
| If Topping Evap enabled:  
L1  
- TOP EVAP HTR DUCT – A/B |  |  |
| If High Load Evap enabled:  
L1  
- HI LOAD DUCT HTR – A/B |  |  |
| If High Load Evap not enabled:  
SM 60 SM TABLE MAINT  
- ITEM 1 +0 6 3 1 8 2 0  
- ITEM 10 EXEC  
- ITEM 1 +0 6 3 1 8 2 1  
- ITEM 10 EXEC  
- ITEM 1 +0 6 3 1 8 0 0  
- ITEM 10 EXEC |  |  |
| (A12)  
- APU HTR TK/FU LINE/H2O/SYS 1A,1B, 3A,3B (four) – AUTO |  |  |
| (R1)  
- MN BUS TIE A,B (two) – ON (t-b-ON) |  |  |
| (L2)  
- FREON LOOP ISOL MODE – OFF |  |  |
|  |  |  |
|  | 4 S-BD Quad Sel 1/2 – GPC |  |
|  | APU H2O sys temps (Htr mon) |  |
|  | FC1 SS1 ΔV  
SS2 ΔV  
SS3 ΔV |  |
|  | Vestibule Vlv 2 op/cl position |  |
|  | Radiator Isolation Auto Mode indication |  |
### ACTIONS
- Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR-1 for Circ Pump 1
- Perform SIMULTANEOUS CIRC PUMP ON/GPC OPS, APU/HYD SSR-2 for Circ Pump 1
- Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3, for ‘M’ xdcrs on display SM 87 HYD THERMAL

### MEASUREMENT LOSS
- HYD sys 1 Circ Pump pressure
- HYD sys temps
- HYD sys 1 Accumulator and Reservoir pressure
- APU 1 Fuel Qty (MDU and CRT)
- Hi Load Inbd Duct Htr measurement
- Partial insight into OMS CRSFD Line Htr ops
- L OMS Fu Inj T

### NOTES
1. GPC capability to monitor HYD Accumulator and Reservoir pressure lost for sys 1
2. Loss of fuel injector temperature is no-go for non-critical on-orbit burns. The engine will be used for deorbit

2 L OMS no-go for on-orbit burns

If High Load Evap Enabled:
- (L1) Hi LOAD DUCT HTR – A/B
- (A14) RCS/OMS HTR OMS CRSFD LINES (two) – AUTO

L OMS no-go for on-orbit burns
### COMM SSR-15
### OI MDM LOST: OA2

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>When reqd:</td>
<td>1</td>
<td>1. Causes loss of FC Auto purge capability</td>
</tr>
<tr>
<td>• Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS) (Cue Card) (Assume SM 2 not available when using Cue Card)</td>
<td>FC Purge Line temps</td>
<td></td>
</tr>
<tr>
<td>• Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR-1 for Circ Pump 2</td>
<td>HYD sys 2 Circ Pump pressure</td>
<td>2. GPC capability to monitor HYD Accumulator and Reservoir pressure lost for sys 2</td>
</tr>
<tr>
<td>• Perform SIMULTANEOUS CIRC PUMP ON/GPC OPS, APU/HYD SSR-2 for Circ Pump 2</td>
<td>HYD sys temps</td>
<td>3. Loss of fuel injector temperature is no-go for non-critical on-orbit burns. The engine will be used for deorbit</td>
</tr>
<tr>
<td>• Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3, for ‘M’ xdcrs on display SM 87 HYD THERMAL</td>
<td>HYD sys 2 Accumulator and Reservoir pressure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>APU 2 Fuel Qty (MDU and CRT)</td>
<td></td>
</tr>
<tr>
<td>(A14)</td>
<td>Partial insight into OMS CRSFD Line Htr ops</td>
<td></td>
</tr>
<tr>
<td>• RCS/OMS HTR OMS CRSFD LINES (two) – AUTO</td>
<td>R OMS Fu Inj T</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>N2 Qty 1 (OV105)</td>
<td></td>
</tr>
<tr>
<td>R OMS no-go for on-orbit burns</td>
<td>If no internal airlock, External Airlock H2O Transfer Line press</td>
<td></td>
</tr>
</tbody>
</table>
**COMM SSR-16**  
**OI MDM LOST: OA3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• RCS/OMS HTR OMS CRSFD LINES – A AUTO.B AUTO</td>
<td>OMS/RCS Htr monitoring temps</td>
<td>1 GPC capability to monitor HYD Accumulator and Reservoir pressure lost for sys 3</td>
</tr>
<tr>
<td>• Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR-1 for Circ Pump 3</td>
<td>HYD sys 3 Circ Pump pressure</td>
<td></td>
</tr>
<tr>
<td>• Perform SIMULTANEOUS CIRC PUMP ON/GPC OPS, APU/HYD SSR-2 for Circ Pump 3</td>
<td>HYD sys temps HYD sys 3 Accumulator and Reservoir pressure</td>
<td></td>
</tr>
<tr>
<td>• Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3, for ‘M’ xdcrs on display SM 87 HYD THERMAL</td>
<td>APU 3 Fuel Qty (MDU and CRT)</td>
<td></td>
</tr>
</tbody>
</table>

- N2 Qty 1 (OV105)
**COM**M SSR-17
**OI DSC LOST: OF1**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| If on PCS Sys 1:  
  • Perform **RECONFIG TO ALT PCS SYS, ECLS SSR-3** | Most PCS 1 measurements | 1 Turn on both Cabin Fans for sleep |
| 1 | | 2 C/W channels 14,34,54,104,114 also lost but high limit-sensed only |
| **(L1)**  
  • Monitor Cabin Fan by feel  
  • During sleep periods: CAB FAN A,B (two) – ON | Cab Fan ΔP | 3 WST TK will be dumped by time (>2%/min) to provide ullage to make EOM. MCC will provide the time |
| 2 | | 4 This action activates redundant htrs on Supply H2O Dump Line, Waste H2O Dump Line, and Vacuum Vent Line |
| (R13U)  
  • C/W PARAM SEL tw (three) – 034  
  • C/W PARAM – INH  
  • C/W PARAM SEL tw (three) – 074  
  • C/W PARAM – INH  
  • C/W PARAM SEL tw (three) – > 119 | PPO2 A  
  Cab Fan ΔP | 5 Smoke Det H/W Alarm still available |
| 3 | | 6 Both htrs activated since visibility into temps lost |
| **(R14:C)**  
  • cb MNB KU ANT HTR – op | Ku Gyro temp monitoring | 7 Alternate temps available in each zone |
| 4 | | 8 Use pnl F9 Meter for insight to AC volts |
| (ML86B:A)  
  • cb MNA,MNB H2O LINE HTR A,HTR B (two) – cl | Waste Qty 1 | |
| 5 | | |
| (ML86B:C)  
  • cb MNA,MNB EXT ARLK HTR STRUC (two) – cl | Waste H2O Dump Line T  
  Sply H2O Qty A  
  Smoke Det A Concn Av Bay 2  
  Smoke Det A Concn Av Bay 3  
  Concn Cabin  
  If no internal airlock  
  External Airlock Fwd and Aft Truss Flange temps  
  External Airlock H2O Line Zone 1 Htr A temp  
  External Airlock H2O Line Zone 2 Htr B temp  
  AC1 volts | | |
| 6 | | |
| 7 | | |
| 8 | | |
### ACTIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
</table>
| GNC 23 RCS | RCS FWD  
Reprioritize jets: DES INH on F3,4 jets:  
F3L ITEM 10 EXEC (*)  
F4R ITEM 14 EXEC (*)  
F3U ITEM 18 EXEC (*)  
F3D ITEM 24 EXEC (*)  
F4D ITEM 28 EXEC (*)  
F3F ITEM 32 EXEC (*)  
Reset auto deselected jets (2)  
Increase PRI Jet Fail Limit: ITEM 4+4 EXEC  
Override Manf vlv status to CL for F3,4 Manifolds: OVRD MANF VLVS  
F3 ITEM 42 EXEC (CL)  
F4 ITEM 43 EXEC (CL)  |
| GNC SYS SUMM 2 | FWD RCS MANF ISOL 5 – CL (tb-CL), then GPC  
Perform LOSS OF VERNIER (ORB OPS, RCS)  |
| (R13U) | C/W PARAM SEL tw (three) – 004  
C/W PARAM – INH  
C/W PARAM SEL tw (three) – 016  
C/W PARAM – INH  
C/W PARAM SEL tw (three) – 044  
C/W PARAM – INH  
C/W PARAM SEL tw (three) – 105  
C/W PARAM – INH  
C/W PARAM SEL tw (three) – 106  
C/W PARAM – INH  
C/W PARAM SEL tw (three) – > 119  |

### MEASUREMENT LOSS

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet Pc, Pc discrete, Injector temps (Jet fail-off, leak RM detection)</td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

1. Auto overpressure protection lost for Fwd RCS Oxidizer Dual Reg failure  
2. (O3) FWD RCS OXID  
H2 TK PRESS and FWD RCS FUEL PRPLT TK P and FWD RCS FUEL PRPLT TK P ind on meter is lost. FWD RCS OXID and FUEL PRPLT QTY ind on meter is invalid  
3. C/W param 24,64,84 also lost, but high limit-sensed only  
4. Use pnl F9 Meter for insight to AC volts  

(Continued)
### COMM SSR-18 (Cont)
#### OI DSC LOST: OF2

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R11L) 5</td>
<td>• √ SPLY H2O TKC INLET, OUTLET (two) – OP (tb-OP)</td>
<td>5 Crossover vlv needs to be checked and TKC unisolated to equalize tks to provide leak protection</td>
</tr>
<tr>
<td>SM 66 ENVIRONMENT</td>
<td>• Monitor AIRLK P and dP/dT for cabin integrity on-orbit</td>
<td>6 This action activates redundant htrs on Supply H2O Dump Line, Waste H2O Dump Line, Vacuum Vent Line</td>
</tr>
<tr>
<td>(ML86B:A) 6</td>
<td>• cb MNA,MNB H2O LINE HTR A, HTR B (two) – cl</td>
<td>7 Smoke Det H/W Alarm still available</td>
</tr>
<tr>
<td></td>
<td>7 Smoke Det A Concnc Av Bay 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 Smoke Det B Concnc Av Bay 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 Smoke Det Concnc Right Fit Deck</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If no internal airlock, External Airlock LCG EV 2 Supply Line press</td>
<td></td>
</tr>
</tbody>
</table>

### COMM SSR-19
#### OI DSC LOST: OF3

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 66 ENVIRONMENT</td>
<td>• Monitor CABIN PRESS for cabin leaks on-orbit</td>
<td>1 C/W params 51,71,94 are also lost, but high limit-sensed only</td>
</tr>
<tr>
<td>(R13U) 1</td>
<td>• C/W PARAM SEL tw (three) – 115</td>
<td>2 Smoke Det H/W Alarm still available</td>
</tr>
<tr>
<td></td>
<td>• C/W PARAM – INH</td>
<td>3 Fwd RCS PASS Fu qty degraded, BFS Fu qty lost</td>
</tr>
<tr>
<td></td>
<td>• C/W PARAM SEL tw (three) – 116</td>
<td>4 Both htrs activated since visibility into temps lost</td>
</tr>
<tr>
<td></td>
<td>• C/W PARAM – INH</td>
<td>5 Crossover vlv needs to be checked and TKC unisolated to equalize tks to provide leak protection</td>
</tr>
<tr>
<td></td>
<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
<td>6 Use pnl F9 Meter for insight to AC volts</td>
</tr>
<tr>
<td>(ML86B:C) 2</td>
<td>• cb MNA,MNB EXT ARLK HTR STRUC (two) – cl</td>
<td>7 Use pnl A1U for S-Band PM Signal Strength</td>
</tr>
<tr>
<td></td>
<td>2 Smoke Det B Concnc Av Bay 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Smoke Det Concnc Left Fit Deck</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Fwd RCS Fu Tk T</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If no internal airlock:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>External Airlock Lower Bulkhead temp</td>
<td></td>
</tr>
<tr>
<td></td>
<td>External Airlock H2O Line Zone 1.2 LCG 2 temp</td>
<td></td>
</tr>
<tr>
<td></td>
<td>External Airlock H2O Line Zone 2 QD Pnl temp</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 Sply H2O Qty C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 AC3 volts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 Pnl F9 S-Band Signal Strength</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACTIONS</td>
<td>MEASUREMENT LOSS</td>
<td>NOTES</td>
</tr>
<tr>
<td>---------</td>
<td>------------------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| GNC 23 RCS RCS FWD  
• ITEM 1 EXEC  
Reprioritize jets: DES INH on F1,2 JETS  
• F1L ITEM 8 EXEC (*)  
• F2R ITEM 12 EXEC (*)  
• F1U ITEM 16 EXEC (*)  
• F2U ITEM 20 EXEC (*)  
• F1D ITEM 22 EXEC (*)  
• F2D ITEM 26 EXEC (*)  
• F1F ITEM 30 EXEC (*)  
• F2F ITEM 34 EXEC (*)  
• Reselect auto deselected jets (2)  
Increase PRI Jet Fail Limit:  
• ITEM 4+4 EXEC  
Override Manf vlv status to CL for F1,2 Manifolds:  
OVRD MANF VLVS  
• F1 ITEM 40 EXEC (CL)  
• F2 ITEM 41 EXEC (CL) | Jet Pc, Pc discrete, Injector temps (Jet fail-off, leak RM detection) | 1 Without F1F, F2F no low Z translation capability; -X only one jet (usually 2)  
2 Auto overpressure protection lost for Fwd RCS Fuel Dual Reg failure  
3 (O3) FWD RCS Fuel H6 TK P and FWD RCS OXID PRPLT TK P ind on meter is lost |

<table>
<thead>
<tr>
<th>GNC SYS SUMM 2</th>
<th>Fwd RCS TK and Manf Press and Qty</th>
</tr>
</thead>
</table>
| (R13U)  
• C/W PARAM SEL tw (three) – 006  
• C/W PARAM – INH  
• C/W PARAM SEL tw (three) – > 119 | Fwd RCS OX Tk ULL P |

| | External Airlock LCG EV 1  
Supply Line press | |
## ACTIONS

<table>
<thead>
<tr>
<th>[GNC 23 RCS]</th>
<th>RCS L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 2 Exec</td>
<td></td>
</tr>
<tr>
<td>Reprioritize jets: DES INH on L1.2 JETS</td>
<td></td>
</tr>
<tr>
<td>L2L Item 10 Exec (*)</td>
<td></td>
</tr>
<tr>
<td>L1L Item 14 Exec (*)</td>
<td></td>
</tr>
<tr>
<td>L2U Item 18 Exec (*)</td>
<td></td>
</tr>
<tr>
<td>L1U Item 20 Exec (*)</td>
<td></td>
</tr>
<tr>
<td>L2D Item 26 Exec (*)</td>
<td></td>
</tr>
<tr>
<td>L1A Item 32 Exec (*)</td>
<td></td>
</tr>
</tbody>
</table>

Reselect auto deselected jets (2)

Increase PRI Jet Fail Limit:

Item 4+3 Exec

Override Manf vlv status to CL for L1.2 Manifolds:

OVRD MANF VLVS

L1 Item 40 Exec (CL)

L2 Item 41 Exec (CL)

If I’CNCT config:

Item 48 Exec (INH)

(07)

AFT L RCS MANF ISOL 5 – CL (tb-CL); then GPC

Perform LOSS OF VERNIER RCS (ORB OPS, RCS)

[GCN SYS SUMM 2]

Monitor L RCS He ΔP for leaks. If L RCS leak suspected, secure sys and call MCC

MCC for sleep config

(R13U)

C/W PARAM SEL tw (three) – 017

C/W PARAM – INH

C/W PARAM SEL tw (three) – 036

C/W PARAM – INH

C/W PARAM SEL tw (three) – 056

C/W PARAM – INH

C/W PARAM SEL tw (three) – > 119

L OMS no-go for on-orbit burns

## MEASUREMENT LOSS

Jet Pc, Pd discrete, Injector temps (Jet fail-off, leak RM detection)

## NOTES

1. Prior to deorbit, override L1 Manf vlv status to op

2. Auto overpressure protection lost for L RCS Oxidizer Dual Reg failure

3. (O3) L RCS OXID He TK P, L RCS OXID PRPLT TK P, L OMS He P, and L OMS Fu TK P ind on meter is lost. L RCS OXID PRPLT QTY ind on meter is invalid

4. Loss of fuel injector temp is no-go for noncritical on-orbit burns. Engine will be used for deorbit

L OMS Fu Tk ULL pressure

L RCS OX Tk ULL pressure

L RCS leak

L OMS Fu Inj T
## Actions

<table>
<thead>
<tr>
<th>GNC 23 RCS</th>
<th>RCS L</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITEM 2 EXEC</td>
<td>Re prioritize jets</td>
</tr>
<tr>
<td>DES INH on L3,4 jets:</td>
<td></td>
</tr>
<tr>
<td>L4L ITEM 8 EXEC (*)</td>
<td></td>
</tr>
<tr>
<td>L3L ITEM 12 EXEC (*)</td>
<td></td>
</tr>
<tr>
<td>L4U ITEM 16 EXEC (*)</td>
<td></td>
</tr>
<tr>
<td>L4D ITEM 24 EXEC (*)</td>
<td></td>
</tr>
<tr>
<td>L3D ITEM 28 EXEC (*)</td>
<td></td>
</tr>
<tr>
<td>L3A ITEM 30 EXEC (*)</td>
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<tr>
<td>Reselect auto deselected jets (2)</td>
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<td>Increase PRI Jet Fail Limit:</td>
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<td>ITEM 4+3 EXEC</td>
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<td>Override Manf vlv status to CL for L3,4 Manifolds:</td>
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<tr>
<td>L3 ITEM 42 EXEC (CL)</td>
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<td>L4 ITEM 43 EXEC (CL)</td>
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<tr>
<td>ITEM 48 EXEC (INH)</td>
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</table>

## Measurement Loss

- Jet PC, PC discrete, injector temps (Jet fail-off, leak RM detection)

## Notes

1. Prior to deorbit, override L3 Manf vlv status to OP
2. Auto overpressure protection lost for L RCS Fuel Dual Reg failure
3. (O3) L RCS FUEL He TK P, L OMS OXID TK P, and (OMS/MPS) L OMS N2 TK P, L OMS Pc are lost. (O3) L RCS FUEL PRPLT QTY ind on meter is invalid
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
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<tbody>
<tr>
<td>[GNC 23 RCS] RCS R</td>
<td>Jet PC, PC discrete, Injector temps (Jet fail-off, leak RM detection)</td>
<td>① Prior to deorbit, override R1 Manf. vlv status to OP</td>
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<tr>
<td>• ITEM 3 EXEC</td>
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<tr>
<td>Reprioritize jets:</td>
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<tr>
<td>DES INH on R1,2 jets</td>
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<tr>
<td>• R2R ITEM 10 EXEC (*)</td>
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<td>• R1R ITEM 14 EXEC (*)</td>
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<td>• R2U ITEM 18 EXEC (*)</td>
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<td>• R1U ITEM 20 EXEC (*)</td>
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<td>• R2D ITEM 26 EXEC (*)</td>
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<td>• R1A ITEM 30 EXEC (*)</td>
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<tr>
<td>Reselect auto deseleced jets (2)</td>
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<td>• ITEM 4+3 EXEC</td>
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<td>Override Manf vlv status to CL for R1,2 Manifolds:</td>
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<td>• R1 ITEM 40 EXEC (CL)</td>
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<td>• R2 ITEM 41 EXEC (CL)</td>
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<tr>
<td>• ITEM 48 EXEC (INH)</td>
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<tr>
<td>② (O3) R RCS OXID He TK P, R RCS OXID PRPLT TK P, R OMS FUEL TK P and (OMSMS) R OMS He P are lost. (O3) R RCS OXID PRPLT QTY ind on meter is invalid</td>
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<td></td>
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<tr>
<td>③ Auto overpressure protection lost for R RCS Oxidizer Dual Reg failure</td>
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<tr>
<td>④ Loss of fuel injector temp is no-go for noncritical on-orbit burns. Engine will be used for deorbit</td>
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<tr>
<td>[GNC SYS SUMM 2]</td>
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<tr>
<td>① Monitor R RCS He AP for leaks. If R RCS leak suspected, secure sys and call MCC</td>
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<td>• MCC for sleep config</td>
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<td>(R13U)</td>
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<tr>
<td>• C/W PARAM SEL tw (three) – 066</td>
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<tr>
<td>• C/W PARAM SEL tw (three) – 086</td>
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<tr>
<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
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<tr>
<td>R OMS no-go for on-orbit burns</td>
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<tr>
<td>② R RCS OX ULL pressure</td>
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<td></td>
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<tr>
<td>③ Right RCS Tk and Manf Press and Qty (leak detection lost)</td>
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<td></td>
<td></td>
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<tr>
<td>④ R OMS Fu Inj T</td>
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</table>

1 Prior to deorbit, override R1 Manf. vlv status to OP
2 (O3) R RCS OXID He TK P, R RCS OXID PRPLT TK P, R OMS FUEL TK P and (OMSMS) R OMS He P are lost. (O3) R RCS OXID PRPLT QTY ind on meter is invalid
3 Auto overpressure protection lost for R RCS Oxidizer Dual Reg failure
4 Loss of fuel injector temp is no-go for noncritical on-orbit burns. Engine will be used for deorbit
# COMM SSR-24
# OI DSC LOST: OR2

## Actions

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<thead>
<tr>
<th>[GNC 23 RCS]</th>
<th>RCS R</th>
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<tr>
<td>• ITEM 3 EXEC</td>
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<tr>
<td>Reprioritize jets:</td>
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<tr>
<td>DES INH on R3,R4 JETS</td>
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<tr>
<td>• R4R ITEM 8 EXEC (*)</td>
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<tr>
<td>• R3R ITEM 12 EXEC (*)</td>
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<td>• R4U ITEM 16 EXEC (*)</td>
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<td>• R4D ITEM 24 EXEC (*)</td>
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<td>• R3D ITEM 28 EXEC (*)</td>
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<td>Increase PRI Jet Fail Limit:</td>
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<tr>
<td>• ITEM 4+3 EXEC</td>
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<tr>
<td>Override Manf vlv status to CL for R3,4 Manifolds</td>
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<tr>
<td>OVRD MANF VLVS</td>
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<tr>
<td>• R3 ITEM 42 EXEC (CL)</td>
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<td>• R4 ITEM 43 EXEC (CL)</td>
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<td>If I’CNCT config:</td>
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<tr>
<td>• ITEM 48 EXEC (INH)</td>
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<table>
<thead>
<tr>
<th>[GNC SYS SUMM 2]</th>
<th>MONITOR R RCS He ΔP for leaks. If R RCS leak suspected, secure sys and call MCC</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Override Manf vlv status to CL for R3,4 Manifolds</td>
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<tr>
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<td>OVRD MANF VLVS</td>
</tr>
<tr>
<td></td>
<td>• R3 ITEM 42 EXEC (CL)</td>
</tr>
<tr>
<td></td>
<td>• R4 ITEM 43 EXEC (CL)</td>
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<tr>
<td></td>
<td>If I’CNCT config:</td>
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<td>• ITEM 48 EXEC (INH)</td>
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## Measurement Loss

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<th>[R13U]</th>
<th>C/W PARAM SEL tw (three) – 037</th>
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<td>• C/W PARAM SEL tw (three) – 076</td>
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<td>• C/W PARAM – INH</td>
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<td>• C/W PARAM SEL tw (three) – 086</td>
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<td>• C/W PARAM – INH</td>
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<tr>
<td></td>
<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
</tr>
</tbody>
</table>

## Notes

1. Prior to deorbit, override R3 Manf vlv status to OP
2. Auto overpressure protection lost for R RCS Fuel Dual Reg failure
3. (O3) R RCS FUEL He TR P, R RCS FUEL PRPLT TK P, R OMS OXID TK P and (OMS/OMS) R OMS N2 TK P, R OMS PC are lost. (O3) R RCS FUEL PRPLT QTY ind on meter is invalid
## ACTIONS

When reqd:
- Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS) (Cue Card) (Assume SM 2 not available when using Cue Card)

<table>
<thead>
<tr>
<th>R13U</th>
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<tbody>
<tr>
<td>1. FC Purge O2 Vent Line temp</td>
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<tr>
<td>2. FC Purge H2 Vent Line temp 2</td>
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</table>

### [R13U]

- C/W PARAM SEL tw (three) – 062
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 023
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – > 119

- Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3 for ‘L’ xdcrs on display SM 87 HYD THERMAL

**If FLASH EVAP CNTLR PRI B enabled:**
- Perform FES RESTART, ECLS SSR-5, using PRI A

- Perform ECLS COMPUTATION INHIBIT, ECLS SSR-14, TABLE D for faulty parameters:
  - 925522 SYS 1 N2 TK2 T
  - 925524 SYS 2 N2 TK2 T
  - 925529 SYS 1 N2 PRESS

### MEASUREMENT LOSS

- FC1 Stack temp
- MNC volts
- HYD sys temps
- Most FES Feedline A Htr measurements
- N2 Qty (two) 1,2
- ESS 3AB volts
- FC1 volts
- FC 1,2,3 AMPS

### NOTES

1. Causes loss of FC Auto purge capability
2. C/W params 1,21,41 are lost also, but high limit-sensed only
3. Recoverable by TMBU
4. Use pnl F9 Meter for insight to FC AMPS, ESS 3AB, and FC1 volts

1. Causes loss of FC Auto purge capability
2. C/W params 1,21,41 are lost also, but high limit-sensed only
3. Recoverable by TMBU
4. Use pnl F9 Meter for insight to FC AMPS, ESS 3AB, and FC1 volts
# COMM SSR-26
## OI DSC LOST: OM2

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
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<tr>
<td>• C/W PARAM SEL tw (three) – 072</td>
<td>FC 2,3 Stack Temp</td>
<td>1 C/W params 11,31,61,72,82 are lost also, but high limit-sensed only</td>
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<tr>
<td>• C/W PARAM – INH</td>
<td>MNA,MNB volts</td>
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<tr>
<td>• C/W PARAM SEL tw (three) – 082</td>
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<tr>
<td>• C/W PARAM – INH</td>
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<td>2 GPC capability to monitor HYD Accumulator pressure lost for 2,3 systems. HYD Reservoir pressure monitoring remains</td>
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<td>• C/W PARAM SEL tw (three) – 003</td>
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<td>• C/W PARAM – INH</td>
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<td>3 Recoverable by TMBU</td>
</tr>
<tr>
<td>• C/W PARAM – INH</td>
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<tr>
<td>• C/W PARAM SEL tw (three) – 013</td>
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<tr>
<td>• C/W PARAM SEL tw (three) – &gt;119</td>
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<tr>
<td>• Perform CIRC PUMP XDCR FAILURE</td>
<td>HYD sys temps</td>
<td>4 Use pnl F9 Meter for insight to ESS and FC volts</td>
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<tr>
<td>WORKAROUND, APU/HYD SSR-3 for ‘L’</td>
<td>HYD sys 2,3 Accumulator pressures</td>
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<td>xdcrs on display SM 87 HYD THERMAL</td>
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<td>If FLASH EVAP CNTLR PRI A enabled:</td>
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<tr>
<td>• Perform FES RESTART, ECLS SSR-5, using PRI B</td>
<td>Most FES Feedline B Htr measurements</td>
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<td>If Topping Evap enabled: (L1)</td>
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<td>• TOP EVAP HTR DUCT – A/B</td>
<td>Fwd,Aft Topping Duct Htr measurements</td>
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<td>If High Load Evap enabled: (L1)</td>
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<tr>
<td>• HI LOAD DUCT HTR – A/B</td>
<td>HI Load Outbd Duct Htr measurements</td>
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<tr>
<td>• Perform ECLS COMputation INHIBIT, ECLS SSR-14, TABLE D for faulty parameters:</td>
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<tr>
<td>925521 SYS 1 N2 TK1 T</td>
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<td>925523 SYS 2 N2 TK1 T</td>
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<td>925525 SYS 1 N2 TK3 T</td>
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<td>925530 SYS 2 N2 PRESS</td>
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<td>• APU HTR TK/FU LN/H2O SYS 1A,1B,3A,3B (four) – AUTO</td>
<td>APU H2O sys htr monitoring temps</td>
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<td>• If Rendezvous or Docked</td>
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<td>• cb MNA,MNB EXT ARLK HTR VEST Z1/2/3 (two) – cl</td>
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### COMM SSR-27
**OI DSC LOST: OA1**

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<td><strong>GNC 23 RCS</strong></td>
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<td>1. C/W param 109 is also lost, but is inhibited during post insertion</td>
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<td>If I’CNCT config:</td>
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<td>• RCS/OMS HTR OMS</td>
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<td>CRSFD LINES (two) –</td>
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<td>• C/W PARAM SEL tw</td>
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<td>• RCS/OMS HTR OMS CRSFD LINES – A AUTO, B AUTO</td>
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When reqd:

• Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS) (Cue Card) (Assume SM 2 not available when using Cue Card)

• Perform CIRC PUMP XDCR FAILURE WORKAROUND, APU/HYD SSR-3, for ‘L’ xdcrs on display SM 87 HYD THERMAL

• Perform CIRC PUMP PRESS XDCR FAILURE WORKAROUND, APU/HYD SSR-1 for Circ Pump 2

• Perform APU FUEL TANK P XDUCER FAILURE WORKAROUND, APU/HYD SSR-4 for APU 2

• Perform APU FUEL TANK T XDUCER FAILURE WORKAROUND, APU/HYD SSR-6 for APU 2

<table>
<thead>
<tr>
<th>MEASUREMENT LOSS</th>
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</thead>
<tbody>
<tr>
<td>OMS/RCS Htr monitoring temps</td>
</tr>
<tr>
<td>FC Purge H2 Vent Line temp 1</td>
</tr>
<tr>
<td>HYD sys temps</td>
</tr>
<tr>
<td>HYD Circ Pump 2 pressure</td>
</tr>
<tr>
<td>APU 2 FUEL TK P</td>
</tr>
<tr>
<td>APU 2 FUEL T TK SURF</td>
</tr>
<tr>
<td>EVAP OUT T 1</td>
</tr>
<tr>
<td>MPS He Tk P L</td>
</tr>
<tr>
<td>MPS He REG P L</td>
</tr>
</tbody>
</table>

2 C/W params 18, 48, 69 are lost also, but high limit-sensed only; C/W param 99 is also lost, but is inhibited during post insertion

## NOTES

1 Causes loss of FC Auto Purge capability

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2. C/W params 18, 48, 69 are lost also, but high limit-sensed only; C/W param 99 is also lost, but is inhibited during post insertion

1. Causes loss of FC Auto Purge capability

2. C/W params 18, 48, 69 are lost also, but high limit-sensed only; C/W param 99 is also lost, but is inhibited during post insertion
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A14)</td>
<td>OMS/RCS Htr monitoring temps</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HYD Circ Pump 3 pressure</td>
<td></td>
</tr>
<tr>
<td>(R13U)</td>
<td>MPS He Tk P R</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MPS He REG P R</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EVAP OUT T 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HYD sys temps</td>
<td></td>
</tr>
<tr>
<td></td>
<td>APU 3 FUEL Tk P</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>APU 3 FUEL T Tk SURF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N2 Qty 1 (OV105)</td>
<td></td>
</tr>
</tbody>
</table>

1. C/W params 28,58,59,117 lost also, but high limit-sensed only; C/W param 119 is also lost, but is inhibited during post insertion
2. Recoverable by TMBU
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>MEASUREMENT LOSS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Perform CIRC PUMP XDCR FAILURE WORKAROUND, APUY/HYD SSR-3 for ACCUM P 1 xdcr</td>
<td>• HYD sys 1 Accumulator pressure</td>
<td>• GPC capability to monitor HYD Accumulator pressure lost for system 1. HYD Reservoir pressure monitoring remains</td>
</tr>
</tbody>
</table>
4.1 PRIMARY C/W
4.1a PRIMARY C/W........................................................................................... 4-4
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4.1c NONRESETTABLE MA LT OR TONE....................................................... 4-8
4.1d PRI C/W SYS ANNUNCIATES FALSE ALARM........................................ 4-11

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4.2c KLAXON – NO RAPID dP/dT.................................................................... 4-27
4.2d SIREN – NO SMOKE DETN LT............................................................... 4-29
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C/W 4.1a PRIMARY C/W

1. To extinguish PRIMARY C/W lt, remove bulbs or select (C3) C/W MODE – ACK
2. BACKUP C/W ALARM lt is not accompanied by fault msg and cannot be MSG RESET
3. All four bulbs in each MA lt will illuminate during lamp test
4. To extinguish (F7) PRIMARY C/W and BACKUP C/W ALARM lts, remove bulbs or select (C3) C/W MODE – ACK
5. Until C/W IFM cables installed, loss of ESS 1BC DA1 would not generate aural alarm so that Fuel Cell 1 could be safed. FSMs must be continually monitored
6. Redundancy can be verified by opening cb ESS 1BC C/W A (O13:A) and receiving alarm tones

Nominal Config:
(O13:A)
- cb ESS 1BC C/W A – cl
- cb ESS 2CA C/W B – cl
(C3)
C/W MODE – NORM
(R13U)
Annun lgt sys operational
Smoke detn sys operational

1 MSTR ALARM lt, C/W tone tripped?
2 PRIMARY C/W ANNUN LT FAILED ON
3 All annun lts except BACKUP C/W ALARM on?
4 BACKUP C/W ALARM lt on?
5 Cycle C/W Sys B pwr
6 C/W SYS B FAILURE
7 TRANSIENT PROBLEM IN C/W SYS B
8 C/W Sys B pwrdn
9 C/W Sys A redundancy
10

To pwrd Sys A redundantly:
- Go to CAUTION AND WARNING ELECTRONICS UNIT CONTINGENCY POWER (IFM)

8 C/W Sys B pwrdn
9 C/W Sys A redundancy
To pwrd Sys A redundantly:
- Go to CAUTION AND WARNING ELECTRONICS UNIT CONTINGENCY POWER (IFM)

Capabilities remaining:
- Bkup C/W limit sensing
- Pri C/W limit sensing
- C/W Sys A Alarms (MA lts, ACCU tone, MIDDECK SMU Byp tone, annun lts)

Items lost:
- (F2,F4,A7U,MO52J)
- Two of four bulbs in each MA lt

(F7)
- Bkup C/W Alarm Annun lt cannot be reset
- (MO58F)
- Sleep station hdst tones
- (MO28J)
- Emer tones to dedicated speaker coil

Other loss:
- Siren for (L1) SMOKE DETN B SNSRS

NOTE
- Bkup C/W Alarms must be MSG RESET to prevent masking of subsequent Bkup C/W Alarms
4.1a (Cont)

10 PRI C/W A Sys
- Refer to PRIMARY C/W PARAMETER MATRIX (Cue Card)
- C/W PARAM STATUS – TRIP

(R13U)

No param tripped

Some erroneously tripped params

Accounted for all tripped params

4.1b

11 Cycle C/W Sys A pwr
- cb ESS 1BC C/W A – op (MA), then cl (MA)
- F2 (F4,A7U)
- MSTR ALARM pb – off
- (F7) C/W PRI C/W it off?

12 For erroneously tripped param

(R13U)
- C/W PARAM SEL tw – XXX (param number)

4.1d

NO

YES

12

4.1d

13
C/W 4.1a (Cont)

7 For any nuisance alarms that cannot be inhibited, use 4.1b to pwrdn PRI C/W or use 4.1c to disable tone.

8 Notify MCC of tripped params. Param combinations will give clue to failure.

9 All primary C/W params were enabled and their limits reset to default (PROM) value when cb ESS 1BC C/W A closed.

10 Cycle C/W Sys A pwr

11 Siren A
- SMOKE DETN CKT TEST – A
- Wait 15-25 sec
- For Siren

Siren ?

YES

12 Siren B
- SMOKE DETN CKT TEST – OFF
- SMOKE DETN SNSR – RESET
- SMOKE DETN CKT TEST – B
- Wait 15-25 sec
- For Siren

Siren ?

YES

13 Cycle C/W Sys A pwr
- SMOKE DETN CKT TEST – OFF
- SMOKE DETN SNSR – RESET

14 C/W PRI CW

Sys A pwr

Sirs A

YES

NO

15 Cycle C/W Sys A pwr

16 Siren B
- SMOKE DETN CKT TEST – OFF
- SMOKE DETN SNSR – RESET

17 TRANSIENT PROBLEM IN C/W SYSTEM COMPONENT

18 C/W SYS A

Failure

19 C/W SYS A

Failure

20 C/W PRI CW

Partially Failure or Self-Test Failure

21 Reconfig

(R13U)

- Inhibit param specified on PRIMARY C/W PARAMETER MATRIX (Cue Card)
- Use C/W & FDA TABLE (REF DATA, C/W) to reset param limits for:

<table>
<thead>
<tr>
<th>CH</th>
<th>Param</th>
</tr>
</thead>
<tbody>
<tr>
<td>004</td>
<td>CAB PRESS</td>
</tr>
<tr>
<td>007</td>
<td>OMS TK P OX-L</td>
</tr>
<tr>
<td>017</td>
<td>OMS TK P FU-L</td>
</tr>
<tr>
<td>037</td>
<td>OMS TK P OX-R</td>
</tr>
<tr>
<td>047</td>
<td>OMS TK P FU-R</td>
</tr>
<tr>
<td>074</td>
<td>CAB FAN ΔP</td>
</tr>
<tr>
<td>106</td>
<td>FREON FLOW 1</td>
</tr>
<tr>
<td>116</td>
<td>FREON FLOW 2</td>
</tr>
</tbody>
</table>

(R13U)

- C/W PARAM SEL tw – > 119
C/W 4.1b ALL ANNUN LTS ON EXCEPT BACKUP C/W ALARM

1 Cycle C/W Sys A pwr
Expect MSTR ALARM:
(O13-A)
• cb ESS 1BC C/W A – op, then cl
F2(F4,A7U)
• MSTR ALARM pb – off

2 TRANSIENT INDUCED PWR SPLY OR TIMING FAILURE

3 C/W SYS A PWR SPLY OR TIMING FAILURE

4 Reconfig
(R13U)
• Inhibit param specified on PRIMARY C/W PARAMETER MATRIX
(Cue Card)
• Use C/W & FDA TABLE (REF DATA, C/W) to reset param limits for:
  CH Param
  004 CAB PRESS
  007 OMS TK P OX-L
  017 OMS TK P FU-L
  037 OMS TK P OX-R
  047 OMS TK P FU-R
  074 CAB FAN ΔP
  106 FREON FLOW 1
  116 FREON FLOW 2

5 Sys A and PRI C/W pwrdn
Expect MSTR ALARM:
(O13-A)
• cb ESS 1BC C/W A – op

Capabilities remaining:
Bkup C/W limit sensing
C/W Sys B Alarms (MSTR ALARM)
Its, ACCU, sleep station tones

Items lost:
(F7)
All C/W annun lts
(R13U)
C/W status pnl lts, functions
(F2,F4,A7U,MO52J)
Two of four bulbs in each MA lt
(A2)
Emer tones to dedicated speaker coil
(MO42F)
Bypass tones to MIDDECK SMU

Other losses:
Pri C/W limit sensing and siren for (L1)
SMOKE DETN A SNSRS
OI TLM OF MASTER ALARM

1 All primary C/W params were enabled and their limits reset to default (PROM) value when cb ESS 1BC C/W A closed
2 All four bulbs in each MA lt will illuminate during lamp test
3 Until C/W IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs must be continually monitored
4 Redundancy can be verified by opening cb ESS 2CA C/W B (O13:C) and receiving alarm tones
C/W 4.1c NONRESETTABLE MA LT OR TONE

1 Constant alarm tone?
   YES

2 (F2,F4,A7U,MO52J)
   More than one MSTR ALARM lit on?
   NO
   YES

3 LAMP DRIVER FAILED ON

4 (O13:C)
   • cb ESS 2CA CW B – op (MA)
   • F2(F4,A7U)
   • MSTR ALARM pb – off
   NO

5 C/W SYS A MSTR ALARM LT CIRCUIT FAILURE
   YES

6 Tone disable
   (O5,O9,L9,A13,R10,MO42F,MO58F)
   • AUD PWR (seven) – AUD (OFF)

7 C/W SYS B MSTR ALARM LT CIRCUIT FAILURE

8 (O13:C)
   • cb ESS 2CA CW B – cl

9 C/W SYS B EMER ALARM FAILED ON

10 C/W SYS A EMER ALARM FAILED ON

11 Disconnect OS speaker
   (O13:A)
   • cb ESS 18C C/W A – op (MA)
   • Perform OS SPEAKER BOX DISCONNECT (IFM)
   (R13U)
   • C/W TONE VOL A – ccw (using screwdriver)
   (MO42F)
   • BYP TONE VOL – ccw (using screwdriver)
   • MIDDECK SPKR AUD TONES – ACCU
   (O5,O9,L9,A13,R10,MO42F,MO58F)
   • AUDIO PWR (seven) – as reqd
   (O13:A)
   • cb ESS 18C C/W A – cl (MA)
   F2(F4,A7U)
   • MSTR ALARM pb – off

12

13

1 Illuminated MA lt bulbs are mounted in sealed assy
2 PRI C/W limit sensing and (F7) annun will still be functional
3 Until C/W IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs must be continually monitored
R13U

- Inhibit param specified on PRIMARY C/W PARAMETER MATRIX (Cue Card)
- Use C/W & FDA TABLE (REF DATA, C/W) to reset param limits for:
  - CH Param
  - 004 CAB PRESS
  - 007 OMS TK P OX-L
  - 017 OMS TK P FU-L
  - 037 OMS TK P OX-R
  - 047 OMS TK P FU-R
  - 074 CAB FAN Δ P
  - 106 FREON FLOW 1
  - 116 FREON FLOW 2

11 Illuminated MA It bulbs are mounted in sealed assy

12 Until C/W IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs must be continually monitored

13 Redundancy can be verified by opening cb ESS 2CA C/W B (O13:C) and receiving alarm tones

14 Redundancy can be verified by opening cb ESS 1BC C/W A (O13:A) and receiving alarm tones

15 All four bulbs in each MA It will illuminate during lamp test

16 To extinguish (F7) PRIMARY C/W and BACKUP C/W ALARM Its, remove bulbs or select (C3) C/W MODE – ACK

17 Lost C/W Sys B alarm tones except for emer tones in Midddeck speaker. Sleep Station Hdst has constant tone

18 Additional its which light during C/W MEM – READ indicate tripped params that are not inhibited
3. Until C/W IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs must be continually monitored.

4. Redundancy can be verified by opening CB ESS 2CA C/W B (O13:C) and receiving alarm tones.

12. Should still have PRI C/W limit sensing with (F7) Annun Its and emer tone alarms via OS speaker.

21. Inhibit tripped param (R13U)
   - C/W PARAM SEL tw – param number
   - C/W PARAM – INH

A7U(F2,F4)
   - MSTR ALARM It pb – off

MSTR ALARM It – off?

22. PRI C/W TRIGGER MEMORY FAILURE

23. Are all tripped params inhibited?
   - YES
   - NO

24. Reenable param
   - Singly enable all but last param inhibited in block 21; expect C/W Alarm with each enable
   - C/W PARAM SEL tw – Param number
   - C/W PARAM – ENA (MA)

A7U(F2,F4)
   - MSTR ALARM pb – off

(R13U)
   - C/W PARAM SEL tw – INH in block 21
   - C/W PARAM – ENA (MA)
   - Repeat last two steps for each param INH in block 21
   - C/W PARAM SEL tw – > 119

25. (R13U)
   - C/W PARAM SEL tw – > 119
   - (O5,O9,A13,R10, MO42F,MO58F)
   - AUD PWR (seven) – as reqd

26. Reenable param
   - (R13U)
   - C/W PARAM SEL tw – Param number
   - C/W PARAM – ENA (MA)

27. PRI C/W SYS PARTIAL FAILURE OR C/W SYS SELF-TEST FAILURE

28. Disable C/W Sys A tones
   - C/W TONE VOL A – ccw (using screwdriver)
   - (MO42F)
   - BYP TONE VOL – ccw
   - MIDDECK SPKR AUD TONES – ACCU
   - (O5,O9,A13,MO42F, MO58F)
   - AUD PWR (seven) – as reqd

29. C/W Sys B redundancy
   - To pwr Sys B redundantly:
     - Go to CAUTION AND WARNING ELECTRONICS UNIT CONTINGENCY POWER (IFM)
**4.1d PRI C/W SYS ANNUNCIATES FALSE ALARM**

1. Correct param inhibit status can be verified using PRIMARY C/W PARAMETER MATRIX Cue Card
2. Depending on param value, it may be extinguished by changing limits
3. To disable lts, remove illuminated bulbs or select (C3) C/W MODE – ACK
4. Prior to changing any param limit value, verify param select capability with INH/ENA capability verification using procedure in block 12

---

**Nominal Config:**
(O13:A) cb ESS 1BC C/W A – cl
(O13:C) cb ESS 2CA C/W B – cl
(C3) C/W MODE – NORM
(R13U) Annun ltg sys operational
Smoke detn sys operational

(F7) Annun lt on but indicated sys checks normal
Caused by:
Annun lt failed on PRI C/W Sys
Inhibit memory failure
Limit value failure
Limit sense failure
Signal Conditioner failure
Param Select or Multiplexer failure
Prior to changing any param limit value, √param select capability with INH/ENA capability verification using procedure in block 12

12 Param select for erroneously tripped param

(R13U)
- C/W PARAM SEL tw – XXX (param no.)
- – INH
- STATUS – INH (√status)
- – ENA (MA)
- STATUS – INH (√status)

Selected param was INH then ENA ?

13 Limits

(R13U)
C/W LIMIT SET
- LIMIT – UPPER(LOWER)
- FUNC – READ (√value)
- Repeat last two steps for LOWER limit

Limits correct ?

15 Set limits for each erroneous limit

(R13U)
C/W LIMIT SET
- VALUE tw – (correct value)
- LIMIT – UPPER (LOWER)
- FUNC – SET, then READ (√value)

Param still out-of-limit ?

17 PRI C/W DEFAULT LIMIT VALUE MEMORY FAILURE OR PARAM SELECT CKT FAILURE

18 Param shift high

(R13U)
C/W LIMIT SET
- VALUE tw – 5.95
- LIMIT – UPPER
- FUNC – SET, then READ (√value)
C/W
- PARAM STATUS – TRIP

Param still out-of-limit ?

19 Find param trip value

- Decr UPPER limit increments until MSTR ALARM tripped

20

23

30

36

47
5 Notify MCC of change in PRI C/W param and limit values

6 Bi-level params are identified in NOTES column of C/W & FDA TABLE (REF DATA, C/W)

7 If pnl indicator and PRIMARY C/W param values agree, snsr output failed
Prior to changing param limit, that desired param and an unused param are selectable using two INH/ENA cycles (see procedure in block 12), then desired limit value change capability on unused param.

(R13U)
- C/W LIMIT SET VALUE tw – 0.00
- C/W PARAM SEL tw – 000
- – INH
- – ENA
- STATUS – INH (√status)
- STATUS – INH (√status)

Determine which param INH/ENA:

<table>
<thead>
<tr>
<th>000</th>
<th>001</th>
<th>008</th>
<th>010</th>
<th>015</th>
<th>None of those listed</th>
</tr>
</thead>
<tbody>
<tr>
<td>002</td>
<td>040</td>
<td>020</td>
<td>022</td>
<td></td>
<td></td>
</tr>
<tr>
<td>004</td>
<td>080</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

31 PARAM SEL CKT FAILURE. LIMIT VALUE CHANGE CAPABILITY PROBABLY AFFECTED

(R13U)
- C/W LIMIT SET VALUE tw – 4.75
- C/W PARAM SEL tw – 119
- – INH
- STATUS – INH (√status)
- – ENA
- STATUS – INH (√status)
- Repeat above steps using param 088 and 077
- √Param select/results combinations for failure mode

Param Select/Results

<table>
<thead>
<tr>
<th>BCD Bit(s)</th>
<th>Param Select Changes, Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>119 088 077</td>
<td>Failed to 0</td>
</tr>
</tbody>
</table>
| 119 088 077 | Units 1 | Subtract 1 from XY1, XY3, XY5, XY7, XY9 *
| 119 088 075 | Units 2 | 2 from XY2, XY3, XY6, XY7 *
| 119 088 073 | Units 4 | 4 from XY4, XY5, XY6, XY7 *
| 109 088 067 | Tens 1 | Subtract 10 from X1Z, X3Z, X5Z, X1Z, X9Z *
| 119 088 057 | Tens 2 | 20 from X2Z, X3Z, X6Z, X7Z *
| 119 088 037 | Tens 4 | 40 from X4Z, X5Z, X6Z, X7Z *
| 111 080 077 | Units 8 | Subtract 8 from XY8, XY9 *
| 110 080 070 | All Units | Only param XY0 selectable |
| 119 008 077 | Tens 8 | Subtract 80 from X8Z, X9Z *
| 109 008 007 | All Tens | Only param X0Z selectable |
| 100 000 000 | All Tens & Units | Only param 000 & 100 selectable |
| 019 088 077 | Hundreds | Only param 0YZ selectable |
| 010 080 070 | Hund & Units | Only param 0Y0 selectable |
| 009 008 007 | Hund & Tens | Only param 00Z selectable |
| 000 000 000 | All | Only param 000 selectable |

NOTE
* Thumbwheel selection of identified params will result in selection of subtracted param (e.g., for Units '2' bit failed to '0', selecting 046 will result in 044)

Did one of the identified trio of Param Select/Results combinations occur?

YES NO

33 34
Prior to changing param limit, verify desired param and an unused param are selectable using two INH/ENA cycles (see procedure in block 12), then verify desired limit value change capability on unused param.

All primary C/W params were enabled and their limits reset to default (PROM) value when cb ESS 1BC C/W A closed.

Select and inhibit unused param
(R13U)
- C/W PARAM SEL tw – 089 (or other param)
- C/W PARAM – INH
- C/W PARAM STATUS – INH (√status)

Selected param INH ?

NO

- C/W PARAM – ENA
- Select another unused, uninhibited param from PRIMARY C/W PARAMETER MATRIX (Cue Card): Do not select Param 000, 001, 002, 004, 008, 016, 020, 040, or 080

YES

Limit value for bit failed to ‘1’

C/W LIMIT SET
- VALUE tw – 0.00
- LIMIT – UPPER
- FUNC – SET, then READ (√value)

Which value read ?

None of those listed

<table>
<thead>
<tr>
<th>none listed</th>
<th>0.05</th>
<th>0.10</th>
<th>0.60</th>
<th>2.00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.00</td>
<td>0.20</td>
<td>0.80</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>0.40</td>
<td>1.00</td>
<td>4.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>0.60</td>
<td>1.50</td>
<td>2.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

09/23/08 4-15 MAL/ALL/GEN J
Prior to changing param limit, that desired param and an unused param are selectable using two INH/ENA cycles (see procedure in block 12), then desired limit value change capability on unused param.

### Param sel bit failure confirmation

<table>
<thead>
<tr>
<th>BCD Bit</th>
<th>Failed to '1'</th>
<th>Param Select Changes, Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>000/001</td>
<td>078/079 Units 1</td>
<td>Add 1 to 0,2,4,6,8 Units sel</td>
</tr>
<tr>
<td>000/002</td>
<td>078/080 Units 2</td>
<td>2 0,1,4,5,8,9 Units sel *</td>
</tr>
<tr>
<td>000/004</td>
<td>078/082 Units 4</td>
<td>4 0,1,2,3,8,9 Units sel *</td>
</tr>
<tr>
<td>000/008</td>
<td>024/032 Units 8</td>
<td>8 0,1,2,3,4,5,6,7 Units sel *</td>
</tr>
<tr>
<td>000/010</td>
<td>088/098 Tens 1</td>
<td>Add 10 to 0,2,4,6,8 Tens sel *</td>
</tr>
<tr>
<td>000/020</td>
<td>088/108 Tens 2</td>
<td>20 0,1,4,5,8,9 Tens sel *(a)</td>
</tr>
<tr>
<td>000/040</td>
<td>024/064 Tens 4</td>
<td>40 0,1,2,3,8,9 Tens sel *(a)</td>
</tr>
<tr>
<td>000/080</td>
<td>024/104 Tens 8</td>
<td>80 0,1,2,3,4,5,6,7 Tens sel *(a)</td>
</tr>
<tr>
<td>000/100</td>
<td>088/None Hundreds</td>
<td>Only param 100 thru 119 selectable</td>
</tr>
</tbody>
</table>

**NOTE**

* Results > 10, carry to next digit (e.g., 099 + 4 = 103)

Results > 128, subtract 128 (e.g., 94 + 40 = 134 - 128 = 006)

Results 120 thru 127 select PRIMARY C/W self-test param. (F7) PRIMARY C/W ALARM, triggered by inhibiting or changing limit on self-test param, can only be cleared by cycling pwr using (O13) cb ESS 1BC C/W A and resetting Master Alarm

(a) Selection invalid if Hundreds selected to '1'

Did one of the identified pair of Param Select/Results combinations occur?
Prior to changing param limit, that desired param and an unused param are selectable using two INH/ENA cycles (see procedure in block 12), then desired limit value change capability on unused param.

All primary C/W params were enabled and their limits reset to default (PROM) value when cb ESS 1BC C/W A closed.

If pnl O13 cb ESS 1BC C/W A was cycled op then cl:
- Param inhibited per PRIMARY C/W PARAMETER MATRIX (Cue Card)
- Use C/W & FDA TABLE (REF DATA, C/W) to reset param limits for:
  - CH Param
    - 004 CAB PRESS
    - 007 OMS TK P OX-L
    - 017 OMS TK P FU-L
    - 037 OMS TK P OX-R
    - 047 OMS TK P FU-R
    - 074 CAB FAN ΔP
    - 106 FREON FLOW 1
    - 116 FREON FLOW 2

(R13U)
- C/W PARAM SEL tw > 119
Limit value bit failure confirmation

**Set/Read**

<table>
<thead>
<tr>
<th>BCD Bit</th>
<th>Failed to '1'</th>
<th>Limit Set Value Select Changes, Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Second</td>
<td></td>
</tr>
<tr>
<td>0.00/0.05</td>
<td>3.90/3.95</td>
<td>.05 Add .05 to 0 Hundredths value sel</td>
</tr>
<tr>
<td>0.00/0.10</td>
<td>2.60/2.70</td>
<td>Tenths 1 Add .1 to 0,2,4,6,8 Tenths values sel</td>
</tr>
<tr>
<td>0.00/0.20</td>
<td>3.90/4.10</td>
<td>Tenths 2 Add .2 to 0,1,4,5,8,9 Tenths values sel *</td>
</tr>
<tr>
<td>0.00/0.40</td>
<td>3.90/4.30</td>
<td>Tenths 4 Add .4 to 0,1,2,3,8,9 Tenths values sel *</td>
</tr>
<tr>
<td>0.00/0.80</td>
<td>2.60/3.40</td>
<td>Tenths 8 Add .8 to 0,1,2,3,4,5,6,7 Tenths values sel *</td>
</tr>
<tr>
<td>0.00/1.00</td>
<td>2.60/3.60</td>
<td>Units 1 Add 1 to 0,2,4 Units values sel *</td>
</tr>
<tr>
<td>0.00/2.00</td>
<td>4.90/0.50</td>
<td>Units 2 Add 2 to 0,1,4 Units values sel *</td>
</tr>
<tr>
<td>0.00/4.00</td>
<td>2.60/0.20</td>
<td>Units 4 Add 4 to 0,1,2,3 Units values sel *</td>
</tr>
</tbody>
</table>

NOTE

* Results > 10; carry to next digit (e.g., 4.70 + .8 = 5.50)
* Results > 6.40; subtract 6.40 (e.g., 3.50 + 4.00 = 7.50 - 6.40 = 1.10)

Did one of the identified pair of limit value Set/Read combinations occur?

YES

LIMIT SET VALUE SINGLE BIT FAILED TO '1'

NO

LIMIT VALUE CKT FAILURE. PARAM SELECT CAPABILITY PROBABLY AFFECTED

(R13U)
- C/W PARAM – ENA

47
Prior to changing param limit, that desired param and an unused param are selectable using two INH/ENA cycles (see procedure in block 12), then desired limit value change capability on unused param.

Value Results

<table>
<thead>
<tr>
<th>BCD Bit(s)</th>
<th>Limit Value Select Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.65</td>
<td>5.95</td>
</tr>
<tr>
<td>3.65</td>
<td>5.95</td>
</tr>
<tr>
<td>3.65</td>
<td>5.95</td>
</tr>
<tr>
<td>3.65</td>
<td>5.85</td>
</tr>
<tr>
<td>3.45</td>
<td>5.95</td>
</tr>
<tr>
<td>3.25</td>
<td>5.95</td>
</tr>
<tr>
<td>3.65</td>
<td>5.15</td>
</tr>
<tr>
<td>3.05</td>
<td>5.05</td>
</tr>
<tr>
<td>3.00</td>
<td>5.00</td>
</tr>
<tr>
<td>2.65</td>
<td>4.95</td>
</tr>
<tr>
<td>1.65</td>
<td>4.95</td>
</tr>
<tr>
<td>3.65</td>
<td>1.95</td>
</tr>
<tr>
<td>0.65</td>
<td>0.95</td>
</tr>
<tr>
<td>0.05</td>
<td>0.95</td>
</tr>
<tr>
<td>0.60</td>
<td>0.90</td>
</tr>
<tr>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

* Thumbwheel selection of identified limit value will result in selection of subtracted limit value (e.g., for Tenths '2' bit failed to '0', selecting 3.60 will result in 3.40).

Did one of the identified pair of limit value Set/Read combinations occur?
Prior to changing any param limit value, param select capability with INH/ENA capability verification using procedure in block 12

For Param Select tw signal short

- C/W LIMIT SET VALUE tw – 3.75
- PARAM SEL – 099
  - INH
  - STATUS – INH (√status)
  - ENA
  - STATUS – INH (√status)
- Repeat above steps using param 055
- √Param select/results combinations for failure mode

<table>
<thead>
<tr>
<th>Param Sel/Results</th>
<th>000</th>
<th>099</th>
<th>055</th>
<th>tw Bit Shorted</th>
<th>Param Select Changes, Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>015 099 055</td>
<td>Units 1</td>
<td>Param XY1, XY3, XY5, XY7, XY9 selectable *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>015 105 065</td>
<td>Units 2</td>
<td>XY2, XY3, XY6, XY7 selectable *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>015 109 065</td>
<td>Units 4</td>
<td>XY4, XY5, XY6, XY7 selectable *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>015 099 065</td>
<td>Units 8</td>
<td>XY8, XY9 selectable *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>022 099 055</td>
<td>Tens 1</td>
<td>Param X1Z, X3Z, X5Z, X7Z, X9Z selectable *</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>022 031 027</td>
<td>Tens 2</td>
<td>02Z, 03Z, 06Z, 07Z selectable *(a)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>022 031 055</td>
<td>Tens 4</td>
<td>04Z, 05Z, 06Z, 07Z selectable *(a)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>022 099 027</td>
<td>Tens 8</td>
<td>08Z, 09Z selectable *(a)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Param selections other than those indicated will cause all four bits in the failed group to become a ‘1’. For ‘Units’ failure this would add 15 to the Hundreds and Tenths selection. For ‘Tens’ failure this would add 150 to the Hundreds and Units selection. If > 128, subtract 128 from resulting number to find param selected

(a) Selection invalid if Hundreds selected to ‘1’

Did one of the identified trio of Param Sel/Results combinations occur?

YES

NO

PARAM SELECT tw SIGNAL SHORTED

PARAM SELECT CKT FAILURE

NOTE

09/23/08
Prior to changing param limit, select that desired param and an unused param are selectable using two INH/ENA cycles (see procedure in block 12), then select desired limit value change capability on unused param.

For limit value tw signal short

(R13U)
- C/W LIMIT SET VALUE tw – 3.60
- FUNC – SET, then READ (√value)
- Repeat above steps using limit value of 2.50
- Limit value Set/Read result combinations for failure mode

<table>
<thead>
<tr>
<th>Value Result</th>
<th>tw BCD Signal Shorted</th>
<th>Limit Value Select Changes, Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>3.60</td>
<td>2.50</td>
</tr>
<tr>
<td>0.60</td>
<td>3.60</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.50</td>
<td>4.50</td>
<td>2.50</td>
</tr>
<tr>
<td>1.50</td>
<td>3.60</td>
<td>3.50</td>
</tr>
<tr>
<td>1.50</td>
<td>3.60</td>
<td>2.50</td>
</tr>
<tr>
<td>1.50</td>
<td>4.50</td>
<td>3.50</td>
</tr>
</tbody>
</table>

NOTE
* Limit value selections other than those indicated will cause all bits in failed ‘Units’ or ‘Tenths’ group to become a ‘1’. For ‘Units’ failure this would add 7.00 to the Tenths and Hundredths selection. Subtract 6.40 from resulting number to determine the value selected (e.g., selecting 3.45 with Units ‘4’ bit shorted would result in 7.45 - 6.40 = 1.50). For 'Tenths' failure this would add 1.50 to selected Units and Hundredths value (e.g., selecting 3.45 with Tenths ‘2’ bit shorted would result in 1.50 + 3.05 = 4.55). If resultant number greater than 6.40, subtract 6.40 as in ‘Units’ failure.

Did one of identified trio of limit Value Result combinations occur?

YES

63 LIMIT VALUE SELECT tw SIGNAL SHORTED TO STRUCTURE

NO

8

64 LIMIT VALUE CKT FAILURE PARAM SELECT CAPABILITY PROBABLY AFFECTED

65 (R13U)
- C/W PARAM – ENA

47
**Nonresettable Backup C/W Alarm Lt**

1. **Possible Alarm Conditions**
   - APU Exhaust Gas Temp
     - Sys 1: 0460140
     - Sys 2: 0460240
     - Sys 3: 0460340
   - APU Lube Oil Temp
     - Sys 1: 0460150
     - Sys 2: 0460250
     - Sys 3: 0460350

2. **Backup C/W Alarms**
   - **Primary C/W Alarm**
   - **Backup C/W Alarm**
   - **SECOND BACKUP C/W ALARM**
   - **ALARM ANNUN LAMP FAILED ON**

3. **Nominal Config**
   - **CB ESS 1BC C/W A**
   - **CB ESS 2CA C/W B**
   - **C/W Mode - Norm**
   - **Annun Ltg Sys Operational**
   - **Smoke Dtxn Sys Operational**

4. **Light on but msg reset does not extinguish light**
   - If Annun Lt driver failed on C/W Sys A(B)
   - Backup C/W Alarm ckt failed on C/W Sys B pwr sply failure

5. **Reset Limits**
   - **Reset Backup C/W Alarm limits**
   - **MSG Reset**

6. **Enable Sys B**
   - **CB ESS 2CA C/W B**
   - **MSTR ALARM pb off**
   - **F2,(F4,A7U)**
   - ** MSG Reset**
4.2b MA LT & C/W TONE – NO ANNUN LT

If: ANNUN INTEN failure
Annun lt failure
Annun pnl pwr failure
C/W mode failure to ACK
Transient Bkup C/W sys
Alarm with C/W Sys A input failure
PRI C/W tone enable failure

Nominal Config:
(O13:A) cb ESS 1BC C/W A – cl
(O13:C) cb ESS 2CA C/W B – cl
(C3) C/W MODE – NORM
(R13U) Annun ltg sys operational
Smoke detn sys operational

1. (O6) ANNUN INTEN – other position, adjust as reqd
   (F7) C/W Annun lt on?
   NO
   YES

2. C/W ANNUN INTENSITY CKT FAILURE WITH ANNUN INTEN SW IN ORIGINAL POSITION

3. Lamp test
   (O6)(O8) ANNUN LAMP TEST – L.R
   (F7) C/W Annun lt status
   All lts good
   One lt bad
   All lts bad

4. IN ADDITION TO OTHER SYS PROBLEM, (F7) ANNUN LAMP CKT FAILED

5. (O13:A) cb ESS 1BC C/W A open?
   NO
   YES

6. (C3) C/W MODE – ACK
   (O13:A) cb ESS 1BC C/W A – cl (MA)
   cb remains closed?
   NO
   YES

7. (F7) C/W ANNUN PWR SHORT

8. PWR LOST TO PRI C/W, C/W SYS A

9. C/W MODE test
   F2(F4) MSTR ALARM pb – push (hold)
   (F7) Any Annun lts on?
   NO
   YES

10. IN ADDITION TO OTHER SYS PROBLEM, PRI C/W SYS FAILED TO ACK MODE

11. NO
5 Additional lts which light during C/W MEM – READ indicate tripped params that are not inhibited

6 All four bulbs in each MA lt will illuminate during lamp test

7 Until C/W IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs must be continually monitored

11 F2(F4)
- MSTR ALARM pb – push (hold during next step)

(C3)
- C/W MEM – READ
(F7) Any Annun lts on?

12 IN ADDITION TO TRANSIENT PROBLEM IN OTHER SYS, PRI C/W SYS FAILED TO ACK MODE

13 C3(R13U)
- C/W MEM – CLEAR

14 (R13U)
- C/W PARAM STATUS – INH
  (hold during next step)
- C/W MEM – READ
- Compare INH with MEMORY indications

MEMORY indicates tripped param not inhibited

No lts on
All tripped param INH

15 PROBLEM IN ANOTHER SYS AND PWR LOST TO (F7) ANNUN PNL

(C3)
- C/W MEM – CLEAR

16

17 PWR LOST TO PRI C/W SYS, C/W SYS A

18 Does PASS or BFS indicate BACKUP C/W ALARM?

YES

19 TRANSIENT BKUP C/W ALARM MDM OUTPUT PLUS PWR LOST TO (F7) C/W ANNUN PNL

NO

20 Sys A and PRI C/W pwrdn
(O13:A)
- cb ESS 1BC C/W A – op (MA)

Capabilities remaining:
Bkup C/W limit sensing
C/W Sys B Alarms (MSTR ALARM lts, ACCU & sleep station tones)

Items lost:
(F7)
- All C/W Annun lts

(R13U)
- C/W status pnl lts, functions
  (F2,F4,A7U,M052J)
- Two of four bulbs in each MA lt
  (A2)
- Emer tones to dedicated speaker coil
  (M042F)
- Bypass tones to MIDDECK SMU

Other losses:
Pri C/W limit sensing and Siren for (L1)
SMOKE DETN A SNSRS
OI TLM of MSTR ALARM

21 IN ADDITION TO OTHER SYS PROBLEMS, PWR LOST TO (F7) C/W ANNUN PNL
Until C/W IFM cables installed, loss of ESS 2CA DA2 would not trigger aural alarm so that Fuel Cell 2 could be safed within 9 min. FSMs must be continually monitored.

Redundancy can be verified by opening cb ESS 2CA C/W B (O13:C) and receiving alarm tones.

Usable onorbit inactive BACKUP C/W ALARM params include:
- APU Exhaust Gas Temp
  - Sys 1 – 0460140
  - Sys 2 – 0460240
  - Sys 3 – 0460340
- APU Lube Oil Temp
  - Sys 1 – 0460150
  - Sys 2 – 0460250
  - Sys 3 – 0460350
5 Additional lts which light during C/W MEM – READ indicate tripped params that are not inhibited

10 Usable SM ALERT params include:
- FC H₂O LNT
  - Sys 1 – 0450412
  - Sys 3 – 0450381
- FC H₂O VLV T
  - Sys 1 – 0450412
  - Sys 2 – 0450281
  - Sys 3 – 0450432

11 SM alert tone will trigger C/W tone without MA lt. Requires MA reset. Klaxon or Siren will also trigger C/W tone

32 (R13U)
- C/W PARAM STATUS – INH (hold during next step)
- C/W MEM – READ
- Compare INH with MEMORY (equiv to tripped) indications

33 IN ADDITION TO OTHER SYS PROBLEM, (F7) ANNUN DRIVER CKT FAILURE

34 SYS A,B C/W Tone enable ckts

35 TRANSIENT BACKUP C/W ALARM MDM OUTPUT

36 C/W SYS B PRI C/W TONE ENABLE FAILED ON

37 C/W SYS A PRI C/W TONE ENABLE FAILED ON
KLAXON – NO RAPID dP/dT

If:
- Snsr failure
- Alarm threshold shift
C/W SYS A(B)
Klaxon tone trigger or enable ckt failure

Nominal Config:
(O13:A) cb ESS 1BC C/W A – cl
(O13:C) cb ESS 2CA C/W B – cl
(C3) C/W MODE – NORM
(R13U) Annun ltg sys operational
Smoke detn sys operational

1 Loss of pwr to cb MNB PPO2 C CAB dP/dT results in loss of dP/dT and PPO2 C sensors

<table>
<thead>
<tr>
<th>C/W SYS A KLAXON TRIGGER THRESHOLD SHIFTED. SYS LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SMK DETN CKT TEST – A</td>
</tr>
<tr>
<td>• After 15-25 sec, siren (MA)</td>
</tr>
<tr>
<td>Siren with Klaxon</td>
</tr>
<tr>
<td>No Siren</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C/W SYS B KLAXON TRIGGER THRESHOLD SHIFTED. SYS LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>• CB MNB PPO2 C CAB dP/dT – op, then cl</td>
</tr>
<tr>
<td>Klaxon on Middeck Spkr</td>
</tr>
<tr>
<td>Klaxon on OS Spkr</td>
</tr>
<tr>
<td>No Klaxon</td>
</tr>
</tbody>
</table>

10 Siren A
(L1) • SMK DETN CKT TEST – A
• After 15-25 sec, siren (MA)
Siren with Klaxon
No Siren
Siren

4 Pwrdn Spkrs

11 C/W SYS A EMER TONE TRIG CKT FAILURE. KLAXON MAY BE TRIGGERED WITH SUBSEQUENT C/W TONE OR SM TONE

12 Reconfig
(L1) • SMK DETN CKT
• TEST – OFF
• SMK DETN SNSR – RESET
(A13) • OS AUD SPKR PWR – as desired
(MO42F) • MIDDECK SPKR AUD PWR – as desired
C/W 4.2c (Cont)

13 Siren B
   (L1)
   • SMOKE DETN CKT TEST – OFF
   • SMOKE DETN SNSR – RESET
   • SMOKE DETN CKT TEST – B
   • After 15-25 sec, Siren (MA)

Siren with Klaxon
No Siren
Siren

14 C/W Sys A
   KLAXON TONE
   ENABLE CKT
   FAILURE. EXPECT
   KLAXON WITH
   SIREN A, C/W
   TONE OR SM
   TONE

15 C/W Sys B
   KLAXON TONE
   ENABLE CKT
   FAILURE. EXPECT
   KLAXON WITH
   SIREN B. EXPECT
   KLAXON AFTER
   EACH SM TONE

16 C/W Sys B
   EMER TONE
   TRIGGER CKT
   FAILURE. EXPECT
   KLAXON AFTER
   EACH SM TONE

17 KLAXON
   TRIGGER CKT
   FAILURE IN C/W
   SYS A OR C/W
   SYS B

18 Reconfig
   (L1)
   SMOKE DETN CKT
   • TEST – OFF
   • SMOKE DETN SNSR – RESET
   (A13)
   • OS AUD SPKR PWR – as desired
   (MO42F)
   • MIDDECK SPKR AUD PWR – as desired

10 ACCU VOX selects C/W Sys A over C/W Sys B tone. If C/W Sys A tone not present, expect Klaxon with C/W tone.
If Smoke Detn lt failure C/W Sys A(B) Siren trigger or enable ckt failed

Nominal Config:
(O13:A) cb ESS 1BC C/W A – cl
(O13:C) cb ESS 2CA C/W B – cl
(C3) C/W MODE – NORM
(R13U) Annun ltg sys operational
Smoke detn sys operational

1 Lamp test
06(O8)
- ANNUN LAMP TEST – L (hold)
(L1) • SMOKE DETN Its
One or more annun bad
All annun good

2 Smoke Conc
Conc
(SM SYS SUMM)
Any emergency smoke param > 2.2 or increasing > .4 within 20 sec?

3 Smoke Detn A test
(L1) • SMOKE DETN SNSR – RESET
- SMOKE DETN CKT TEST – A
• Wait 15 to 25 sec
- SMOKE DETN A Its
Less than five Its on
No Siren
Siren with five Its

4 Snr reset
(L1) • SMOKE DETN CKT TEST – OFF
- SMOKE DETN SNSR – RESET

5 IN ADDITION TO SMOKE DETN OR SMOKE PROBLEM, SMOKE DETN ANNUN CKT FAILURE

6 Siren – No Smoke Detn Lt

7 C/W SYS A SIREN TRIGGER CKT FAILED ON

8 TRANSIENT FALSE SIREN OR C/W SYS A(B) SIREN ENABLE CKT FAILED ON

9 C/W SYS B SIREN TRIGGER CKT FAILED ON

10 Snsr reset
(L1) • SMOKE DETN CKT TEST – OFF
- SMOKE DETN SNSR – RESET

1 If C/W Sys A failed, Siren may occur with Klaxon, C/W tone, or SM tone
2 If C/W Sys B failed, Siren may occur with Klaxon or after SM tone. Since ACCU VOX selects C/W Sys A over C/W Sys B tone, expect Siren with C/W tone if C/W Sys A tone not present

09/23/08 4-29 MAL/ALL/GEN J
4.2e PRI C/W SYS FAILS TO ANNUNCIATE OUT-OF-LIMIT PARAM

1. \(\sqrt{\text{Param Inhibit status}}\)
   - C/W PARAM STATUS – INH
   - \(\sqrt{\text{Param in question inhibited?}}\)

2. \(\sqrt{\text{PARAM SEL for erroneously tripped param}}\)
   - C/W PARAM SEL tw – XXX (Param number)
   - C/W PARAM – INH
   - STATUS – INH (\(\sqrt{\text{status}}\))
   - - ENA
   - STATUS – INH (\(\sqrt{\text{status}}\))

3. Enable param
   - \(\sqrt{\text{NOTE}}\)
   - Annunciator It on pnl F7 and Mstr Alarm should be triggered as param is enabled
   - C/W PARAM SEL tw – (param number)
   - C/W PARAM – ENA
   - C/W PARAM STATUS – INH (\(\sqrt{\text{status}}\))
   - C/W PARAM SEL tw > 119

4. \(\sqrt{\text{Limits for new out-of-limit param}}\)
   - C/W & FDA TABLE (REF DATA, C/W) for correct limits
   - C/W PARAM SEL tw – param number
   - LIMIT SET LIMIT – UPPER(LOWER)
   - FUNC – READ (\(\sqrt{\text{value}}\))
   - Repeat last two steps for LOWER limit

5. INHIBIT MEMORY FAILURE
   - \(\sqrt{\text{Limits correct?}}\)

6. \(\sqrt{\text{PARAM INHIBITED INADVERTENTLY}}\)

7. \(\sqrt{\text{Set limits for each erroneous limit}}\)
   - C/W LIMIT SET VALUE tw – correct value
   - LIMIT – UPPER(LOWER)
   - FUNC – SET, then READ (\(\sqrt{\text{value}}\))

8. PRI C/W DEFAULT LIMIT VALUE MEMORY FAILURE OR PARAM SELECT CKT FAILURE

9. Reconfig
   - C/W PARAM SEL tw – > 119

NOTE: Annunciator It on pnl F7 and Mstr Alarm should be triggered as param is enabled.
5 Notify MCC of change in PRI C/W param and limit values

6 Bi-level params are identified in NOTES column of C/W & FDA Table (REF DATA, C/W)

7 If pnl indication and primary C/W param values agree, Snsr or Signal Conditioner failed

---

10 \( \text{Param shift high} \)

(R13U)

C/W LIMIT SET

• VALUE tw – 5.95
• LIMIT – LOWER
• FUNC – SET, then READ (\( \text{value} \))

Param trip alarm?

YES

11 \( \text{Decr LOWER limit in increments until param within limit (pnl F7 lt out)} \)

NO

12 \( \text{Param shift low} \)

(R13U)

C/W LIMIT SET

• VALUE tw – 0.00
• LIMIT – UPPER
• FUNC – SET, then READ (\( \text{value} \))

Param trip alarm?

YES

13 \( \text{Incr UPPER limit in increments until param within limit (pnl F7 lt out)} \)

NO

15 PARTIAL PRI C/W MULTIPLEXER, SNSR, OR LIMIT SENSE CRT FAILURE

16 (R13U)

• C/W PARAM SEL tw > 119

17 PARTIAL PRI C/W MULTIPLEXER, AMPLIFIER, OR LIMIT SENSE CKT FAILURE

18 PARAM SIGNAL CONDITIONER FAILURE

19 (R13U)

• C/W PARAM SEL tw > 119
DPS

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The following Fault Msgs have no corresponding MAL procedures in this book:

GPC FSM
- BCE STRG 1(2,3,4) PASS (BFS)
- BCE BYP KU
- CM BUF BSY CRT 1(2,3,4)
- DK XMTR 1(2,3,4) (BFS)
- > 3 DEU
- GPC 5
- GPC CONF
- GPC PWR (BFS)
- ILLEGAL ENTRY
- MDM OUTPUT FF(FA)
- PASS GPC BITE
- SUMWORD ICC
- TFL FAIL (BFS)
- TFL LOAD FAIL (PASS)
- TIME TONE

MEDS FSM
- CHECKSUM FAIL IDP 1(2,3,4)
- MDU LOAD FAIL mduX
- OPERATOR REQUEST FAIL mduX
- PORT CHANGE mduX
FLEX MDMs, FLEX PAIRS with exception of 'IC' buses between GPCs and dedicated 'IP' bus to PCMMUs, any GPC can command/listen on any data bus.

Mission-dependent (RMS reqd)
**5.1a CS SPLIT**

**Nominal Config:**
Single GNC Ops

**1** From ORB PKT, PASS SM GPC FAIL, step 5

**2** From ORB PKT, PASS GNC GPC FAIL, step 3

**3** CAM LT

**4** BACKUP C/W ALARM (F7)

**5** GPC 1(2,3,4)

**6** If: Fail-to-sync
   Force fail-to-sync
   IOP or CPU detected hw errors
   Illegal BCE Xmtr failed ON

**Assumptions:**
QUIT = NO GPC FUNCTION
Common set of only two GPCs (1&4)

**DPS**

**1** S/W dump SM GPC and GNC GPC if IDPs/CRTs available (do not use GPC/CRT key)

**2** Perform GPC S/W INITIATED MEM DUMP, DPS SSR-2

**3** Safe SM systems

**4** MCC for comm config and radiation constraints
   If no comm (A1U)
   • KU PWR – STBY
   • CNTL – PNL, CMD
   • Perform COMM LOST, steps 7 and 8 (ORB PKT, COMM)

**5** SM 62 PCMMU/PL COMM

**6** FORMAT FXD – ITEM 1 EXEC (*)

**7** If reqd, perform PL/DPS RECONFIG.
   Secure (PL SYS or SODF; ASSY OPS)

**8** Secure RMS
   (if reqd)

**9** If RMS active:
   SM 94 PDRS CONTROL
   • Note WR range, PL ID, PL INIT ID, EE ID, SPEC 95 overrideres

**10** Secure GPC 1 and GPC 4

**C3** DAP: FREE

**O6** GPC MODE 4 – STBY (tb-bp), HALT
   GPC MODE 1 – STBY (tb-bp), HALT
   MDM PL1, PL2 (two) – OFF, then ON

**9** Activate GPC 2 (new GNC GPC)

**O6** • GPC 2 PWR – ON
   • GPC 2 OUTPUT – NORM
   • GPC MODE 2 – STBY (tb-RUN), then RUN
   • GPC2 takes three FWD IDPs/CRTs
   (deassign CRT 3/assign CRT 4 as reqd)

**8** MC2 NBAT setup for target GPC 2

**GNC 0 GPC MEMORY**

**NOTE**
If currently active IMU was in STBY or IMU currently in STBY during time of G2 freeze-dry, do not assign associated string

**7** CONFIG – ITEM 1 +2 EXEC
   • Assign target GPC, all FC strings (except as noted above), CRTs(1,2,3), and MMUs to GPC 2
   • PL1/2 and LDBs 1,2 reassigned

**8** Perform GNC OPS Transition

**DAP**

**RESUME**

**9** MCC for resel of aff IMU

**10** Reestablish GNC Operational Config

**Pri RJD DRIVER**

**11** (eight) – as reqd

**GNC 0 GPC MEMORY**

**Assign remaining FC string to GPC 2**

**GNC, OPS 201 PRO**

**12** MCC will uplink state vector. If no comm at AOS, sel best antenna

**13** If G2FD last freeze-dried while RS in G1(G3), holding DAP: FREE pb during OPS transition avoids PRCS false jet fail-off msgs (DAP defaults to A1/AUTO/PRI)

**14** Manual antenna commanding may be reqd because orbiter state vector is not being ICC'd to SM GPC

**15** If unable to perform GPC S/W dump of GPC 1 or 4 (no IDP/CRT Interface), VMCC for possible HisAM Dump after block 9

**16** No keyboard entries or sw throws 10 sec:

**Before and after moding PASS GPCs to RUN**

**Before OPS transition or set expansion/contraction requests until new OPS base page is displayed**

**17** MCC
DPS 5.1a (Cont)

10. Activate GPC 3 (new SM GPC)

11. Perform SM OPS Transition
   - GPC 3 PWR – ON
   - GPC 2 PWR – ON
   - SM 0 GPC MEMORY
     - CONFIG – ITEM 1 +4 EXEC
     - Assign target GPC, PL 1/2,
       CRTs, LAUNCH 1, and MMUs to
       GPC 3
     - IDP/CRTX MAJ FUNC – SM
     - GPC/CRT – SM
     - SM, OPS 201 PRO
     - SM ANTENNA

12. If reqd, perform PL/DPS RECONFIG.
    Recovery (PL SYS or SODF: ASSY OPS)

13. Is GPC 1 & 4 recovery to be attempted now?
    - YES
    - NO

14. Current GPC Config:
    - GPC 1 HALT (sleep)
    - GPC 2 GNC
    - GPC 3 SM
    - GPC 4 HALT (sleep)
    - GPC 5 BFS (sleep)

15. Attempt to recover GPC 1
    - Perform GPC IPL-PASS, DPS SSR-8
    - GPC 1 recovered?
      - YES
      - NO

16. Reload TFLs
    - Perform LOAD PCMUU FORMAT
      (ORB OPS FS, COMM/INST)

17. Attempt to recover GPC 4
    - Perform GPC IPL-PASS, DPS SSR-8
    - GPC 4 recovered?
      - YES
      - NO

18. Reactivate RMS (if reqd)
    - If RMS PWR PRI (MCIU powered):
      SM 94 PDRS CONTROL
      - Expect MA, C/W
        GPC DATA II on
      - I/O ON – ITEM 5 EXEC (*) (C/W
        GPC DATA II off)
      - Update as needed: WR
        range, PL ID, PL
        INIT ID, EE ID,
        SPEC 95
      - SAFING – CANCEL (tb-bp,
        if arm deselected)

19. Reconfig for newly established SM GPC
    - Verify MCC uplinks complete, state
      vector uplink
      SM 1 DPS UTILITY
      - UL CNTL AUTO – ITEM 35
        EXEC (*)
    - GPC 3 OUTPUT – TERM (tb-bp)

20. Reestablish Attitude, as reqd
    - UNIV PTG
      - Load desired att
        (\FLIGHT PLAN)
      - Init TRK
        (MNVR) – ITEM
        19(18) EXEC
      - DAP: AUTO

21. YES
22. NO

23. 3
24. 21

3. No keyboard entries or sw throws
   10 sec:
   Before and after moding PASS GPCs
   to RUN
   Before OPS transition or set expansion/
   contraction requests
   until new OPS base page is displayed

6. MCC will utilize GPC 1 and 4 dump
   data to help determine the cause
   of CS split. Data
   analysis may take 24
   to 48 hr

9. 09/23/08
3 No keyboard entries or sw throws 10 sec: Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction requests until new OPS base page is displayed

6 MCC will utilize GPC 1 and 4 dump data to help determine the cause of CS split. Data analysis may take 24 to 48 hr

7 Upon completion of procedure, MCC may request certain IDPs/CRTs to be pwrd on 10 sec to ensure IDP/DEU EQUIV uplink I/F to both GNC and SM. If MEDS, pw-son IDP/CRT for at least 30 sec before pw-off

8 Avoid using GPC-1 or GPC-4 for critical burns or PROX OPS until GPC dump analysis confirms the GPC is not considered transient

15

21 Attempt to add recovered GPC to redundant set
NOTE
Do not assign any strings/buses to recovered GPC (another FTS could occur)
• Perform block 28 EXPAND SET

GPC failed to sync?

3

22 Safe failed GPC
(O6)
• Failed GPC PWR – OFF

23 Has GPC 4 recovery been attempted?

24 Do mission considerations drive a single G2 config (Group B Pwrdn)?

25 Configure for Single G2
• Establish G2FD in (both) recovered GPC(s)
• Perform block 29 CONTRACT SET

26 GNC Cleanups
On MCC GO
• Clear software fail votes
GNC 0 GPC MEMORY
• ERR LOG RESET – ITEM 48 EXEC
SM 0 GPC MEMORY
• ERR LOG RESET – ITEM 48 EXEC
GNC 22 S TRK/COAS CNTL
• S TRK -Y, -Z: STAR TRK – ITEM 3.4 EXEC (*
GNC 21 IMU ALIGN
• RESUME

27 Leave recovered GPC(s) in redundant set with no strings or buses until analysis is complete and/or mission considerations require dual G2 for critical operations
Whether expanding G2 set to Dual or Triple G2 config, modify only the GPC target set unless otherwise noted (don’t assign strings or buses to target GPC).

If GPC 1 previously recovered and added to RS, GPC 1 should remain in RS for Set Expansion (when adding GPC4).

GPC downlist will default to lowest ID GPC in G2 set. MCC may request downlister change following OPS Mode Recall.
### CONTRACT SET

**NOTE**

No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction
requests until new OPS base page is displayed

**CONFIGURE FOR SET CONTRACTION**

**CRT**
- If MM202: GNC, OPS 201 PRO
- GNC 0 GPC MEMORY
- CONFIG – ITEM 1 +2 EXEC
- Assign MC2 per table

**OPS MODE RECALL**

| C3(A6U) | DAP: FREE  
|---------|-----------
| STR     | 2         
| 2       | 2         
| 3       | 2         
| 4       | 2         

| C3(A6U) | DAP: VERN(ALT)
|---------|----------------
| PL 1/2  | 0             

| CRT     | EXEC
|---------|-----
| CRT 1   | 2   
| 2       | 2   
| 3       | 0   
| 4       | 2   

**FREEZE DRY GPC**

**CRTX**
- CRTX MAJ FUNC – PL
- GPC/CRT G2FD/X EXEC
- GNC 0 GPC MEMORY
- CONFIG – ITEM 45 +2 EXEC
- GPC – ITEM 46 +1(4) EXEC
- STORE – ITEM 47 EXEC
- Store complete when MC = 02 (= 30 sec)

- √ All IDPs/CRTs deassigned from FD GPC

**O6**

- GPC MODE G2FD – STBY (tb-bp)
  - HALT (tb-bp)
  - STBY (tb-RUN)
  - HALT (tb-bp)

  If reqd, repeat Freeze Dry steps for 2nd GPC

**CONFIG CLEANUP**

- GNC 22 S TRK/COAS CNTL
- S TRK -Y, -Z: STAR TRK – ITEM 3,4 EXEC (*)
- GNC 21 IMU ALIGN
- RESUME

**CLEAR SOFTWARE FAIL VOTES**

- GNC 0 GPC MEMORY
- ITEM 48 EXEC
- SM 0 GPC MEMORY
- ITEM 48 EXEC

---

11 GPC downlist will default to lowest ID GPC in G2 set.
MCC may request downlister change following OPS Mode Recall

12 Crew GO for Error Log Resets without prior MCC concurrence
DPS

5.1b ‘BFS GPC FAIL (BITE)’ (ORBIT)

If: IOP watchdog Timer times out (~3.1 sec) or two restarts within consecutive major cycles

1. Establish BFS CRT Interface
   (C2)
   - IDP/CRT3 PWR – ON
   - IDP/CRT3 MAJ FUNC – GNC
   - CRT3 MDU – ON and in DPS mode

   (C3)
   - BFC CRT DISP – ON
   - BFC CRT SEL – 3+1

   2. Big ‘X’ and ‘POLL FAIL’ driven on CRT 3 MDU?
   NO
   YES

   3. Displayed properly?
   NO
   YES

   4. BFS GPC FAILURE

   5. Pwr off failed GPC
   (O6)
   - GPC PWR – OFF

   6. Go to SINGLE GPC FAIL, GPC FRP-1

GPC ALERT

GPC BITE

GPC and BFS DIAGONAL CAM LIGHT

SM ALERT

09/23/08 5-10 MAL/ALL/GEN J
Any previously failed MMU should be prime selected for GNC prior to OPS transition.

Health of affected MMU can be verified by GNC OPS transition (with MCC concurrence), SM roll-in request, or IMU checkpoint read.

If GPC fail votes and fault msgs and 'OFF/BUSY MMU' msg(s) occur, then GPCs are in CS OPS 0. Transition unsuccessful because of MMU or commanding GPC Xmr failure, and all MMU OFF/BSY or selected for IPL. For two GPC RS, will get off-diagonal CAM lights. For three or more GPC RS, will get l-fail.

Any target GPC(s) not receiving overlay will F-T-S, but remain in OPS 0 of common set. For GPCs not receiving overlay, IDPs are still assigned per new OPS NBAT. Any IDPs targeted for F-T-S GPCs distributed to lowest number GPC of new target set.

Software uses NBAT of original OPS to select GPC to command each MMU for prepositioning.
1 Any previously failed MMU should be prime selected for GNC prior to OPS transition.

7 Software uses NBAT of target OPS to select GPC to command each MMU for the overlay reads.

8 If original transition G2/G8 and in OPS 0, transition to G2, then G8 to avoid illegal entry msg.

9 Solid State MMU power cycle shuts down the associated solid state recorders. MCC commanding may be reqd.

10 If SPEC not available, GPC may be recoverable using R/W to select LDB option.

16 \(\rightarrow\) 17 Perform OPS MODE RECALL to remove identified (selected) GPC.

18 Swap commanding GPCs for MMUs in target OPS.

19 Retry OPS transition.

20 All GPCs complete transition ?

21 Retry original OPS transition.

22 MMU AND BCE FAILURE, OR BCE(S) FAILURE(S).

23 Restore current OPS NBAT to formerconfig by placing identified (selected) GPC back to original position.

24 Perform OPS MODE RECALL to regain identified (selected) GPC.

25 On MCC GO, cycle MMU(s) pwr (O14, O15:F).

26 MMU AND BCE FAILURE OR BCE(S) FAILURE(S).

27 Any RS F-T-S GPC still in commonset ? (use GPC/CRT Key).

28 Perform OPS MODE RECALL to recover failed GPC.

29 Select alternate SW copy for GNC MF.

30 TRANSIENT MMU PROBLEM AND MMU OR BCE FAILURE.

31 Perform OPS MODE RECALL to recover failed GPC.

32 Select alternate SW copy for GNC MF.

33 GPC FAILURE.

34 RECOVERED GPC WITH XMTR-RCVR FAILURE, OR MMU AND GPC RCVR FAILURE OR GPC-TO-GPC OVERLAY AND SOURCE GPC RCVR FAILURE.

35 If DPS UTILITY SPEC available:

36 Retry transaction.

37 S/W COPY PROBLEM ON MMU(S).

38 BOTH MMUs FAILED OR BCE FAILURE(S).

39 RECOVERED GPC WITH RCVR-RCVR FAILURE, OR MMU AND GPC RCVR FAILURE OR IPL SOURCE sw AND GPC RCVR FAILURE.

40 GPC FAILURE.

41 Any target GPC(s) complete transition ?

42 MMU AND BCE FAILURE, OR BCE(S) FAILURE(S).

43 Restore current OPS NBAT to former config by placing identified (selected) GPC back to original position.

44 Perform OPS MODE RECALL to regain identified (selected) GPC.

45 Recall successful ?

46 MMU AND BCE FAILURE OR BCE(S) FAILURE(S).

47 All GPCs complete transition ?

48 Any target GPC(s) complete transition ?

49 All GPCs complete transition ?

50 Any target GPC(s) complete transition ?

51 Any target GPC(s) complete transition ?

52 Any target GPC(s) complete transition ?

53 Select alternate SW copy for GNC MF.

54 TRANSIENT MMU PROBLEM AND MMU OR BCE FAILURE.

55 Perform OPS MODE RECALL to recover failed GPC.

56 RECOVERED GPC WITH XMTR-RCVR FAILURE, OR MMU AND GPC RCVR FAILURE OR GPC-TO-GPC OVERLAY AND SOURCE GPC RCVR FAILURE.

57 GPC FAILURE.

58 RECOVERED GPC WITH RCVR-RCVR FAILURE, OR MMU AND GPC RCVR FAILURE OR IPL SOURCE sw AND GPC RCVR FAILURE.

59 NO

60 YES

61
Any previously failed MMU should be prime selected for GNC prior to OPS transition.

If original transition G2/G8 and in OPS 0, transition to G2, then G8 to avoid illegal entry msg.

Solid State MMU power cycle shuts down the associated solid state recorders. MCC commanding may be reqd.

- Cycle pwr of selected MMU
  - MMU 1(2) – OFF, then ON
  - Retry transaction
  - Transaction successful ?
    - Yes
      - Select alternate MMU to MF
      - SM 1 DPS UTILITY MMU ASSIGN
        - SM – ITEM 3(4) EXEC (*)
        - PL – ITEM 5(6) EXEC (*)
    - No
      - Alternate MMU failed previously ?
        - Yes
          - BOTH MMUs FAILED OR BCE FAILURE
          - SM 85 MASS MEMORY R/W
            - Select MMU 1(2) – ITEM 40 (41) EXEC (*)
        - No
          - I/O TRANSIENT AND ORIGINAL MMU FAILED, OR BCE FAILURE
          - Original failed transaction MM Read/Write using MASS MEMORY R/W spec ?
            - Yes
              - Select alternate MMU to Read/Write spec
            - No
              - I/O ERROR MMU 2(1)' msg ?
                - Yes
                  - Try transaction on alternate MMU
                  - I/O ERROR MMU 2(1)' msg ?
                    - Yes
                      - NO
                    - No
                      - YES
                      - OPS transition ?
                        - Yes
                          - NO
                        - No
                          - YES
                          - Select alternate S/W copy for MF of attempted transition
                            - X: GNC (PL,SM) 0 GPC MEMORY
                              - ITEM 53 (52,54) +2 EXEC
                            - TRY TRANSIENT MMU PROBLEM AND MMU OR BCE FAILURE
                              - YES
                                - NO
                              - NO
                                - YES
                                - BOTH MMUs FAILED OR BCE FAILURE(S)
                                - G3 OPS transition ?
                                  - Yes
                                    - MCC
                                  - NO
                                    - YES
                                  - G3 OPS transition ?
                                    - NO
                                    - YES
                                  - G3 OPS transition ?
                                    - NO
                                  - G3 OPS transition ?
                                    - NO
                                  - BOTH MMUs FAILED OR BCE FAILURE(S)
Selected failed MMU for GNC MF protects against GPC RCV failures occurring after OPS transition prepositioning.

Select suspect MMU for GNC MF:
- GNC ITEM 1(2) EXEC (*)
- SPEC 999 PRO

Roll-in successful?

Select suspect MMU for SM MF:
- SM ITEM 3(4) EXEC (*)
- SPEC 999 PRO

I/O ERROR MMU

Problem associated with SM GPC rather than MMU

If SM interface to this MMU reqd on MCC GO, move SM to different GPC
- Go to SM REASSIGNMENT, DPS SSR-4

11 Selecting failed MMU for GNC MF

09/23/08 5-15 MAL/ALL/GEN J
If OPX XTION and GPC fail votes and msgs occur, then GPCs are in CS OPS 0 caused by MMU or commanding GPC XMTR failure, and alternate MMU off/busy or selected for IPL. For two GPC RS, will get off-diagonal CAM lights. For three or more GPC RS, will get I-fail.

Health of affected MMU can be verified by GNC OPX XTION (with MCC concurrence) or SM roll-in request.

Solid State MMU power cycle shuts down the associated solid state recorders. MCC commanding may be reqd.
Health of affected MMU can be verified by GNC OPS XTION (with MCC concurrence) or SM roll-in request.
If GPC is on its own internal time, loss-of-sync may occur

2. If ‘I/O ERROR’ has occurred, failure caused by equipment other than MTU

3. Electronics on OSC board have failed in portion of MTU not covered by auto switch circuitry

Nominal Config:
- GPC GMT time source change
- MTU – AUTO
- cb ESS 1BC MTU
- A – cl
- cb ESS 2CA MTU
- B – cl

- Only one GPC reports ‘TIME MTU’ msg?
- Perform TRY on accumulator that is selected by common set ITEM 34(35,36) EXEC
- Did GPC that was on internal time accept accumulator time?
- GNC(SM) 2 TIME
- ‘I/O ERROR’ occurs?
- Go to FF(FA) MDM I/O ERROR (ORB PKT, DPS)
- Any ‘BCE STRG 1(2,3) MTU’ msg accompany ‘TIME MTU’ fault msg?
- Multiple ‘BCE STRG MTU’ fault msgs occur simultaneously?
- Go to BCE STRG X (ORB PKT, DPS)
- Status of MTU
- All GPCs faulted to lowest ID GPC?
- ‘↓’ displayed opposite MTU ACCUM 1(2,3) ?
- MTU ACCUM 1(2,3) FAILURE
- TRANSIENT BUS NOISE
Crew cannot tell which oscillator is currently selected.

GPCs will remain on internal time.

'\rightarrow' on any remaining accumulators does not indicate problem. As long as GPCs accepted some accumulator time, time will update properly.

MTU GMT and MET may have errors. D&C Timers are invalid until time is corrected. Action will extinguish any lt on D&C Timers and reenable MTU sync signals.

If GPS is currently in PVA mode (approximately 1 hr after MTU fails) then MCC will need to uplink a command to the GPS to fix aiding for entry.

- MCC on selecting alternate oscillator
- Manually select alternate oscillator (O6) • OSC – 2(1)
- CAUTION: Actual Time Sync may take up to 2 min to perform. Make no keyboard entries until Time Sync completes.
- After 2 min, did GPCs accept any accumulator time?
- BOTH MTU OSCs FAILED OR MTU PWR FAILURE
- GNC 55 GPS STATUS • Perform GPS TIME ADJUST ENA (ITEM 39 EXEC)
- Is BFS currently active?
- Upon BFS activation, go to BFS GMT/MET • MCC for time recovery procedure
- BFS will lose proper time if taken to HALT or powered off
- If proper time is lost:
  • MCC for time recovery procedure

•√
DPS 5.2f CHECKPOINT FAIL

Nominal Config:
- (O14:F) MMU 1 – ON
- (O15:F) MMU 2 – ON
- (O6) IPL SOURCE – OFF

If:
- MMU OFF
- MMU BUSY
- MMU selected for IPL
- Checksum Error
- I/O Transient
- MMU write failure
- MMU failure

SPEC 999 may be blank

Solid State MMU power cycle shuts down the associated solid state recorders.
MCC commanding may be req’d

MMUs may be used for all other transactions. MCC for possible S/W dump of SM GPC

Affected MMU may be used for any read transaction including OPS transitions, TFL loads, and SM roll-in displays

1. SPEC 999 Pro
2. Roll-in successful?
3. MMU 1(2) – OFF, then ON
4. On MCC GO, Cycle pwr of selected MMU 1(2)
5. POSSIBLE GPC SM CHECKPOINT S/W PROBLEM
6. Retry SM checkpoint
7. MMU 1(2) WRITE PROBLEM
8. TRANSIENT MMU 1(2) WRITE PROBLEM

1. 'I/O ERROR MMU 1(2)' fault msg also annunciated?
2. 'OFF/BUSY MMU 1(2)' fault msg also annunciated?
3. POSSIBLE GPC SM CHECKPOINT S/W PROBLEM
4. 5.2a
5. 5.2b
5.3a ‘I/O ERROR FF(FA)’

1. IOP OR BCE XMTR/RCVR FAILURE

2. Following steps may result in a GPC F-T-S
   Failure assessment to be continued at this time?

3. Dual or Triple GNC GPC config?

4. Reconfig DPS

5. Activate G2FD GPC for current OPS
   - Perform G2 SET EXPANSION to Dual G2 (ORB OPS, DPS) to dual G2 except do not assign any strings to G2FD GPC and deassign string associated with I/O ERROR

6. Aff GPC F-T-S at OPS MODE RECALL?

7. Reassign all strings
   - GNC 0 GPC MEMORY
     - Target for dual/triple GNC OPS. If dual G2, assign all FC strings to good GNC GPC. If triple G2, assign strings to good GNC GPCs (string 1&3, 2&4)
     - Reassign downlist to good GPC ITEM 44 + ____EXEC
     - Perform OPS MODE RECALL

8. IOP OR BCE XMTR/RCVR FAILURE

9. BCE XMTR/DEPENDENT FAILURE

10. BCE XMTR DEPENDENT FAILURE

11. Go to PASS GNC GPC (1st FAIL) (ORB PKT, DPS)

12. Triple GNC GPC config?

13. Reconfig DPS for dual GNC GPC
   - Restring with aff FC string assigned to good GNC GPC (string 1&3, 2&4)
   - Perform OPS MODE RECALL

14. Freeze-dry GPC with BCE XMTR fail
   - Perform G2 SET CONTRACTION (ORB OPS, DPS)

15. IMU desel
   - IMU alignment
   - ITEM 7(8,9) EXEC

16. If IMU desel
   - GNC 21 IMU ALIGN

1. Mult MDM or GPC failures indicated if ‘I/O ERROR’ msg reoccurs after restring with no F-T-S at blocks 6 or 7.

2. Go to MDM (REF) for summary of data lost on non-recovered MDM

3. BCE XMTR/RCVR failures cannot be differentiated from BCE XMTR only failures in single GNC GPC configs. Failure mode will affect DPS config in G3

4. Original GPC will F-T-S before overlays can be transferred to G2FD GPC if original GPC has BCE receiver failure on Flt Critical 1, 2, 3 if affected string is not deassigned for set expansion. Flt Critical 4 problem is handled same as Flt Critical 1, 2, 3 for procedure simplicity

5. If G8 OPS, delay G2 freeze-dry activity until after transition back to G2
DPS 5.3a (Cont)

17 Same fault msg recur during recovery attempt?

2 7

22 TOTAL MDM INPUT FAILURE

23 Pwr off MDM

(06)
• Aff MDM FF(FA) – OFF

18 MULTIPLE MDM FAILURES

19 • MCC if any unexplained msg on string during port moding

20 BCE RCVR OR XMTR/RCVR FAILURE

(06)
• GPC PWR – OFF
• Reassign IDPs as reqd

21 Safe F-T-S

24 • Time permitting, go to DPS, GPC FRP-1

25 Pwr off reconfigure equipment specific to failed MDM

FF1 FF2 FF3 FF4

(014:F)
• RJDF 1B DRIVER
(015:F)
• RJDF 1A DRIVER
(016:F)
• RJDF 2B DRIVER
(018:F)
• RJDF 2A DRIVER

(015:E)
• MNB
• RADAR ALTM 1
• MLS 1
• \ADTA 1

(015:E)
• MNB
• RADAR ALTM 2
• MLS 2
• \ADTA 2

(016:E)
• MNC
• MLS 3
• \ADTA 3
• \ADTA 4

(015:E)
• MNB
• STAR TRKR -Y

(016:F)
• \ACCEL 2

(016:F)
• \ACCEL 3

(015:F)
• \ACCEL 4

(017)
• TACAN 1
(0V103,4)
• GPS 1 (OV105)
• GPS 1 PRE AMPL UPPER (OV105)
• GPS 1 PRE AMPL LOWER (OV105)

(017)
• TACAN 2
(0V103,4)
• GPS 2 (OV105)
• GPS 2 PRE AMPL UPPER (OV105)
• GPS 2 PRE AMPL LOWER (OV105)

(017)
• TACAN 3
(0V103,4)
• GPS 3 (OV105)
• GPS 3 PRE AMPL UPPER (OV105)
• GPS 3 PRE AMPL LOWER (OV105)

(015:F)
• RJDA 1B DRIVER
(016:F)
• RJDA 2B DRIVER
(014:F)
• RJDA 1A DRIVER
(018:F)
• RJDA 2A DRIVER

(015:A)
• \RGA 1

(015:A)
• \RGA 2

(016:A)
• \RGA 3

(015:A)
• \RGA 4

(018)
• R OMS TK ISOL A – CL (tb-CL)

(015:A)
• R OMS TK ISOL A – CL (tb-CL)

(016:A)
• \RGA 3

(015:A)
• \RGA 4

09/23/08 5-23 MAL/ALL/GEN J

26 • MCC regarding powering off associated IMU

27 • Go to RCS RM LOSS (ORB PKT, RCS)
1. If VERNIER RCS sel and FF3 pwr cycled, DAP will downmode to free drift at MDM pwr cycle. Crew action reqd to resel DAP.

2. Following MDM port moding, if either ‘I/O ERROR’ or ‘MDM OUTPUT’ fault msg occurs, mode MDM ports back to PRI and YES MCC.

3. YES EMM regarding powering off associated IMU.

From ORB PKT C/L, BCE STRG X, step 4:

1. Monitor IMU STBY/OPER mode (up to 90 sec)
   - Did '*' toggle to OPER mode within 90 sec?
     - YES
     - TRANSIENT IMU OR MDM/IMU SERIAL INTERFACE PROBLEM
       - YES
       - GNC I/O RESET
         - YES
         - MCC for best att prior to IMU realign
     - NO
     - IMU pwr
       (O14,O15,O16:A)
       - YES
       - GNC I/O RESET
         - YES
         - MCC for best att prior to IMU realign
       - NO
       - IMU 1 (2,3) – OFF, then ON
         - Monitor IMU STBY/OPER mode (up to 90 sec)
         - Did '*' toggle to OPER mode within 90 sec?
           - YES
           - IMU PWR OR CONFIG PROBLEM
             - YES
             - GNC I/O RESET
               - YES
               - MCC for best att prior to IMU realign
             - NO
             - Cycle pwr on aff MDM
               - YES
               - GNC I/O RESET
                 - YES
                 - MCC for best att prior to IMU realign
               - NO
               - MDM FF1(2,3) – OFF, then ON
                 - Monitor IMU STBY/OPER mode (up to 2 min)
                 - Did '*' toggle to OPER mode within 2 min?
                   - YES
                   - TRANSIENT MDM DISCRETE OUTPUT CARD FAILURE
                     - YES
                     - IMU IS NON-RECOVERABLE
                       - YES
                       - Resel PRI ports
                         - YES
                         - ITEM XX EXEC (XX = 15,17,19)
                       - NO
                       - PORT-DEPENDENT MDM FAILURE
                         - YES
                         - MCC for best att prior to IMU realign
                       - NO
                       - IMU IS NON-RECOVERABLE
                         - YES
                         - Resel PRI ports
                           - YES
                           - ITEM XX EXEC (XX = 16,18,20)
                         - NO
                         - PORT-DEPENDENT MDM FAILURE
                           - YES
                           - MCC for best att prior to IMU realign
                         - NO
                         - IMU IS NON-RECOVERABLE
4. Go to MDM (REF) for summary of data lost on nonrecovered MDM

5. Total serial I/O card failures may result in single or multiple 'BCE STRG' msgs:

<table>
<thead>
<tr>
<th>Card Adrs</th>
<th>G2</th>
<th>G8</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>IMU</td>
<td>MTU</td>
</tr>
<tr>
<td>11</td>
<td>STKR</td>
<td>STKR</td>
</tr>
<tr>
<td>03</td>
<td>IMU</td>
<td>MTU</td>
</tr>
<tr>
<td>11</td>
<td>STKR</td>
<td>STKR</td>
</tr>
</tbody>
</table>

6. 'BCE STRG A(C)' msgs will always occur in combination with 'BCE STRG B(D)' msg (MDM card failure) or in combination with 'I/O ERROR' msg or 'MDM OUTPUT' msg (IOP or total MDM failure)

15 Multi-serial I/O msgs occur?

YES 16 MDM SERIAL I/O CARD FAILURE

NO 17 Which type of 'STRG' msg(s) indicated:

- STKR
- ADTA
- MLS

- MTU

- IMU

- NSP

- GPS

- TAC

- A and B

- C and D

- B

- D

18 Cycle LRU pwr

- Cycle cb and/or pwr sw as reqd:

| STAR TRKR - Z | O6 and O14:E |
| STAR TRKR - Y | O6 and O15:E |
| ADTA 1        | O14:E, O15, O16 |
| ADTA 2        | O14:E, O15, O16 |
| MLS1          | O8 and O14:E, O15, O16 |
| MLS2          | O8 and O14:E, O15, O16 |
| MLS3          | O8 and O14:E, O15, O16 |
| ADTA 3        | O14:E, O15, O16 |
| ADTA 4        | O14:E, O15, O16 |
| MNA           | FF1 FF2 FF3 FF4 |
| MLS 1         | FF1 FF2 FF3 FF4 |
| ADTA 1        | FF1 FF2 FF3 FF4 |
| STAR TRKR - Z | FF1 FF2 FF3 FF4 |
| STAR TRKR - Y | FF1 FF2 FF3 FF4 |

19 MTU/MDM SERIAL INTERFACE FAILURE

20 \( \text{MCC} \)

21 MDM TACAN CARD FAILURE

22 TRANSIENT LRU PWR FAILURE OR CONFIG PROBLEM

YES 23 LRU PWR OR MDM/SERIAL LRU INTERFACE FAILURE

NO 24 MDM DISCRETE OR ANALOG INPUT CARD FAILURE

25 Go to RCS RM LOSS (ORB PKT, RCS)
5.3c ‘I/O ERROR PL1(2)’
‘MDM OUTPUT PL1(2)’

1. Mode ports if not previously moded; otherwise, \( \text{\textvisibleno} \text{MCC} \)
   - If FLEX pair: (L12)
     - (Aff) FLEX PWR – OFF
     - (Alt) FLEX PWR – ON

2. ‘MDM OUTPUT’ msg occur?
   - Yes
     - Go to PASS SM GPC FAIL (ORB PKT, DPS)
   - No
     - TOTAL MDM INPUT FAILURE
         - Yes
           - Mode back to primary ports
           - If FLEX pair: (L12)
             - (Aff) FLEX PWR – ON
             - (Alt) FLEX PWR – OFF
         - No
           - Port moding and I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes

3. 140 sec pwr-amp warmup

4. PL MDM PORT DEPENDENT FAILURE

5. Original ‘I/O ERROR PL 1(2)’ msg occur for other MDM: ‘I/O ERROR PL 2(1)’?
   - Yes
     - IOP FAILURE (SINGLE-POINT)
   - No
     - TOTAL MDM INPUT FAILURE

6. If PSP reqd:
   - SM 62 PCMMU/PL COMM
     - I/O RESET PSP 1(2) – ITEM 6(7)
       - EXEC (*)
     - Reinitiate PL ops

7. If PSP reqd:
   - SM 62 PCMMU/PL COMM
     - I/O RESET PSP 1(2) – ITEM 6(7)
       - EXEC (*)
     - Reinitiate PL ops

8. TOTAL MDM INPUT FAILURE

9. Comm Config
   - If PL1 (A1L)
     - S-BAND PM MODE – TDRS
     - NSP DATA RATE (2) – HI
     - NSP CODING (2) – ON
     - ANT SW ELEC – 2
     - S BND CNTL – PNL, CMD
   - If PL 2 (C3)
     - S BND ANT – Best ANT

10. Mode back to primary ports
    - If FLEX pair: (L12)
       - (Aff) FLEX PWR – ON
       - (Alt) FLEX PWR – OFF
    - SM 1 DPS UTILITY
      - PORT ASSIGN PL 1/2 PRI – ITEM 23 EXEC (*)

11. Yes
    - 2 ‘MDM OUTPUT’ msg occur?
      - Yes
        - IOP FAILURE (SINGLE-POINT)
      - No
        - TOTAL MDM INPUT FAILURE

12. Any ‘I/O ERROR’ or ‘MDM OUTPUT’ msg occur?
    - NO
      - PL MDM PORT DEPENDENT FAILURE
    - YES
      - TOTAL MDM INPUT FAILURE

13. Comm Config
    - If PL1 (A1L)
      - S-BAND PM MODE – TDRS
      - NSP DATA RATE (2) – HI
      - NSP CODING (2) – ON
      - ANT SW ELEC – 2
      - S BND CNTL – PNL, CMD
    - If PL 2 (C3)
      - S BND ANT – Best ANT

14. From ORB PKT C/L, I/O ERROR PL 1(2), MDM OUTPUT PL 1(2)
5.3c (Cont)

11. Activate BFS to PL MDM status

(O6)
For BFS GPC:
• GPC MODE – HALT
• GPC PWR – ON
• GPC MODE – STBY (tb-RUN)
• GPC MODE – RUN (tb-RUN)

12. For bypassed PL MDM on BFS

(C3)
• BFC CRT DISP – ON
• BFC CRT SEL – as reqd

Did BFS annunciator 'I/O ERROR PL 1(2)' msg ?

YES

13. ALTERNATE MDM PORT FAILURES

NO

14. IOP XMTR/RCVR FAILURE ON SM GPC

15. Recovery reqd for current ops ?

YES

16. Mode PL 1/2 ports as desired
• MCC

NO

17. Perform SM REASSIGNMENT, DPS SSR-4
• MCC for SM GPC assignment

18. If BFS not presently reqd

(C3)
• BFC CRT DISP – OFF
• All IDPs deassigned from BFS

(O6)
For BFS GPC:
• GPC MODE – STBY (tb-RUN)
• GPC MODE – HALT (tb-bp)
• GPC OUTPUT – NORM

19. If PSP reqd:
• S-BD PL CNTL – PNL
• S-BD PL PWR SYS – 2(1)
• S-BD PL CNTL – CMD

SM 62 PCMMU/PL COMM
• PSP I/O RESET PSP 2(1) – ITEM 7(6) EXEC (*)

20. If reqd, go to PL/DPS RECONFIG (PL SYS: or SODF: ASSY OPS), Recovery Action (PL SYS, PL/DPS RECONFIG)
**SM ALERT**

I/O ERROR FLEX

If:
- MDM FLEX failure
- IOP failure
- IOP Xmtr/Rcvr failure

**Nominal Config:**
- (L12) MDM FLEX – ON
- or MDM FLEX 1(2) – ON
- MDM FLEX 2(1) – OFF

**1 Port moding and I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes**

**5.3e ‘I/O ERROR FLEX’**

1. If: MDM FLEX failure
   - IOP failure
   - IOP Xmtr/Rcvr failure
   - 'I/O ERROR FLEX' or MDM OUTPUT PL1(2)' msg also annunciated?
     - NO
     - YES
   - Try reset
     - FAULT
     - SM I/O RESET

2. 'I/O ERROR FLEX' msg recur?
   - NO
   - YES

3. Go to PL1(2) MDM I/O ERROR; PL1(2) MDM OUTPUT (ORB PKT, DPS)

4. TRANSIENT ERROR

5. Perform PL/DPS RECONFIG (PL SYS or SODF: ASSY OPS)
   - MCC go for pwr cycle?
     - NO
     - YES

6. Cycle MDM pwr
   - (L12)
     - MDM FLEX – OFF, then ON
     - SM I/O RESET
   - 'I/O ERROR FLEX' msg recur?
     - NO
     - YES

7. Is this FLEX MDM part of a FLEX pair?
   - NO
   - YES

8. FLEX MDM FAILURE

9. TRANSIENT MDM FAILURE

10. Mode Ports if payload buses not previously moded; otherwise, \(^{\text{MCC}}\)
   - (Alt) FLEX PWR – ON
   - (Alt) FLEX PWR – OFF
   - \(\text{SM 1 DPS UTILITY}^{*}\)
     - PORT ASSIGN STRING PL 1/2 SEC(PRI) – ITEM 24(23) EXEC (*)

11. Go to PL/DPS RECONFIG (PL SYS or SODF: ASSY OPS)
   - 'I/O ERROR FLEX' msg recur?
     - NO
     - YES

12. 13
Port moding and I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes.

1. MDM FLEX FAILURE
12

2. BOTH FLEX MDMs FAILED
13

3. Mode back to original payload bus ports
14

4. SM 1 DPS UTILITY
   - PORT ASSIGN STRING PL 1/2 PRI(SEC) – ITEM 23(24) EXEC (*)

5. Go to PL/DPS RECONFIG (PL SYS or SODF: ASSY OPS)
15
If:
MDM FLEX Card failure
MDM/LRU FLEX interface failure
IOP failure
IOP Xmr/Rcvr failure

Nominal Config:
(L12)
MDM FLEX – ON
or
MDM FLEX 1(2) – ON
MDM FLEX 2(1) – OFF

1 'I/O ERROR' or 'MDM OUTPUT PL1(2)' msg also annunciated ?

3 FAULT
• SM I/O RESET
'BCE BYP FLEX' msg recur ?

5
• Perform PL/DPS RECONFIG.
(PL SYS or SODF: ASSY OPS)

6 Cycle MDM pwr
(L12)
• MDM FLEX PWR – OFF, then ON
• SM I/O RESET
'BCE BYP FLEX' msg recur ?

9 TRANSIENT INPUT CARD ERROR

10 Mode PL Bus ports for selection of alt FLEX MDM if ports not previously moded; otherwise, √MCC

(L12)
• (Af) MDM FLEX PWR – OFF
• (Alt) MDM FLEX PWR – ON

11 • Go to PL/DPS RECONFIG.
(PL SYS or SODF: ASSY OPS)

12 'BCE BYP FLEX' msg recur ?

13 YES

1 Port moding or I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes
Port moding or I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes.
Port moding and I/O RESET causes fault msgs to occur for all previously bypassed LRU(s), BTU(s), Payload Signal Processor, mission selectable processes, and mission unique processes.

1. Associated GCIL Decoder now disabled

2. Nominal Config: (O6) MDM PL1,2 – ON

3. If: PL MDM Card failure
   IOP failure
   IOP XMTR/RCVR failure

4. Go to PL(2) MDM I/O ERROR; PL(2) MDM OUTPUT (ORB PKT, DPS)

5. If PSP reqd
   SM 62 PCMMU/PL COMM
   I/O RESET PSP 1(2) – ITEM 6(7) EXEC (*)

6. Cycle MDM pwr
   (O6) MDM PL1(2) – OFF, then ON
   SM I/O RESET
   'BCE BYP PL1(2)' msg recur ?

7. If PSP reqd
   SM 62 PCMMU/PL COMM
   I/O RESET PSP 1(2) – ITEM 6(7) EXEC (*)

8. If PSP reqd
   SM 62 PCMMU/PL COMM
   I/O RESET PSP 1(2) – ITEM 6(7) EXEC (*)

9. Mode Ports
   If payload buses not previously moded; otherwise, √ MCC
   (L12) (Af) FLEX PWR – ON
   (Al) FLEX PWR – OFF

10. If PSP reqd
   If reqd, perform PL/DPS RECONFIG
   (PL SYS or SODF: ASSY OPS)

11. If PSP reqd
    SM 62 PCMMU/PL COMM
    I/O RESET PSP 1(2) – ITEM 6(7) EXEC (*)

12. If PSP reqd
    SM 62 PCMMU/PL COMM
    I/O RESET PSP 1(2) – ITEM 6(7) EXEC (*)

13. If PSP reqd
    SM 62 PCMMU/PL COMM
    I/O RESET PSP 1(2) – ITEM 6(7) EXEC (*)

14. If PSP reqd
    If reqd, perform PL/DPS RECONFIG
    (PL SYS or SODF: ASSY OPS)

Any 'BCE BYP PL1(2)' msg recur ?

15. Any 'BCE BYP PL1(2)' msg recur ?

16. Any 'BCE BYP PL1(2)' msg recur ?

17. Any 'BCE BYP PL1(2)' msg recur ?

18. Any 'BCE BYP PL1(2)' msg recur ?
Because of differences between PASS/BFS SW implementation, ignore any BFS ‘I/O ERROR PCM’ fault msg.
BFS fault disp may be utilized for SM monitoring until PASS SM GPC reassigned.

- Switch to alternate PCMMU (C3)
  - OI PCMMU PWR – 2(1)
  - SM 62 PCMMU/PL COMM
    - PCMMU I/O RESET PCM – ITEM 5 EXEC (*)

- Original msg recur?
  - NO
  - PCMMU MIA XMTR/RCVR FAILURE
  - SM GPC BCE XMTR/RCVR FAILURE
  - Perform SM REASSIGNMENT, DPS SSR-4
  - MCC for SM GPC assignment
  - Switch back to original PCMMU (C3)
    - OI PCMMU PWR – 1(2)
    - SM 62 PCMMU/PL COMM
      - PCMMU I/O RESET PCM – ITEM 5 EXEC (*)

- 'I/O ERROR PCM' msg recur?
  - NO
  - Reload TFLs
    - Perform LOAD PCMMU FORMAT (ORB OPS FS)
  - IF BFS not presently reqd (O6)
    - All IDPs deassigned from BFS
    - For BFS GPC:
      - GPC MODE – HALT (tb-bp)
      - GPC OUTPUT – NORM
  - Reassign SM GPC
    - Perform SM REASSIGNMENT, DPS SSR-4
    - MCC for SM GPC assignment
  - Switch back to original PCMMU (C3)
    - OI PCMMU PWR – 1(2)
    - SM 62 PCMMU/PL COMM
      - PCMMU I/O RESET PCM – ITEM 5 EXEC (*)

- 'I/O ERROR PCM' msg recur?
  - YES
  - MCC

- YES
  - MCC
DPS 5.5b ‘I/O ERROR PCM’ (BFS)

Nominal Config:
(C3)
OI PCMMU
PWR – 1
FORMAT – GPC
(O14,O15:B)
cb MNA,MNB OI
MDM OF 1/2 A,B
(two) – cl
(O14,O16:B)
cb MNA,MNC OI
MDM OF 3/4 A,B
(two) – cl
(O17:D)
MDM OA 1/2/3 –
ON

1. Check for missing params (Ms):
   - SM SYS SUMM 2
     - None missing
     - All missing
     - Some missing

2. TRANSIENT GPC/PCMMU OI MDM PROBLEM

3. GPC TO PCMMU INTERFACE PROBLEM

4. Determine which OI MDM is missing:
   - Check OF1
     - AV BAY TEMP 3 has ‘M’
   - Check OF2
     - AV BAY TEMP 1 has ‘M’
   - Check OF3
     - AV BAY TEMP 2 has ‘M’
   - Check OF4
     - APU FU TK VLV 2 has ‘M’
   - Check OA1
     - APU OIL OUT P 1 has ‘M’
   - Check OA2
     - APU OIL OUT P 2 has ‘M’
   - Check OA3
     - APU OIL OUT P 3 has ‘M’

5. Cycle pwr on suspect MDMs OF1/2

6. Cycle pwr on suspect MDMs OF3/4

7. Data recovered?

8. TRANSIENT OI MDM FAILURE

9. MCC

10. Cycle pwr on suspect MDM

11. TRANSIENT OI MDM FAILURE

12. Cycle pwr on suspect MDMs OF3/4

13. MDM FAIL. MCC WILL UPLINK PARAMS LOST FOR SPECIFIC FAILURE

14. TRANSIENT OI MDM FAILURE

1. MCC regarding PCMMU switch. Selection of alternate PCMMU may preclude MCC viewing LDR telemetry
2. Do not cycle open cb. MCC

If: Data Path fail from OI MDM to PCMMU or from PCMMU to GPC

Data recovered?

NO

YES
1. I/O ERROR D/L

2. If:
- IOP BCE xmtr fail
- PCMMU fail

I/O ERROR D/L

1. On kybd assigned to Mem config which annunciared fault msg:
   - I/O RESET
   
   Msg recur?

   YES

   NO

2. TRANSIENT GPC TO PCMMU INTERFACE FAILURE

3. Which annunciating GPC:
   - SM
   - OPS 0/PL 9
   - GNC

5.5a

4. No immediate impact

5. 

   - MCC to continue

6. Which GNC GPC annunciared error:
   - GNC 0 GPC
     MEMORY

Anunciating GPC same as downlist GPC?

YES

NO

7. NON-DOWNLIST GPC TO PCMMU INTERFACE FAILURE: NO IMMEDIATE IMPACT

8. 

   - MCC

9. DOWNLIST GPC TO PCMMU INTERFACE FAILURE

10. GNC GPC simplex?

    YES

    NO

11. Use FD G2 GPC to provide downlist

    - Perform G2 SET EXPANSION TO DUAL GNC GPC 3 (ORB OPS, DPS), then:
    - Go to G2 SET CONTRACTION (ORB OPS, DPS), except freeze-dry GPC with failed interface

12. Select alternate downlist GPC

   - GNC 0 GPC
     MEMORY
   - DOWNLIST GPC
     ITEM 44 +1 (2,3,4,5) EXEC
MEDS OVERVIEW

[POWER AND INTERNAL 1553B DATA BUS CONFIGURATION]
DPS

5.6a  GPC ‘I/O ERROR CRT 1(2,3,4)’, ‘BITE FAIL IDP 1(2,3,4)’, ‘IDP DEFAULT LOAD FAIL’, ‘VM LOAD IN PROGRESS’

1. **CRT MDU**
   - Autonomous or blank?
   - **Yes**: Continue
   - **No**: Transient IDP PWR loss or failure.

2. If MCC GO:
   - (C2,R11)
   - (aff) IDP/CRT
   - PWR – OFF, ON
   - MDU still autonomous or blank?
   - **Yes**: Continue
   - **No**: Transient IDP PWR loss or failure.

3. **TRANSIENT IDP PWR LOSS OR FAILURE**

4. **IDP DEFAULT LOAD FAIL** or ‘VM LOAD IN PROGRESS’ msg for affected IDP?
   - **Yes**: Continue
   - **No**: Transient IDP PWR loss or failure.

5. IDP PWR LOSS OR H/W OR S/W FAILURE

6. **BIG X and POLL FAIL msg on CRT MDU?**
   - **No**: Continue
   - **Yes**: Transient IDP PWR loss or failure.

7. **BITE FAIL IDP 1(2,3,4)’ msg for affected IDP?**
   - **No**: Continue
   - **Yes**: MCC before proceeding.

8. **MCC before proceeding**

9. Perform CST on affected IDP
   - On any MDU interfacing with affected IDP:
     - **MAIN MENU:** MEDS MAINT:
     - **CST:** START IDP:
     - H/W CST
   - Record results displayed in affected IDP box on MEDS MAINT display
   - **Report to MCC**

10. Call up GPC FAULT SUMM on aff CRT MDU
    - **FAULT SUMM appear?**
    - **Yes**: Continue
    - **No**: Transient IDP BCE DK XMTR AND/OR RCVR, IDP DK XMTR AND/OR RCVR FAIL.

11. **TRANSIENT IDP BCE DK XMTR AND/OR RCVR, IDP DK XMTR AND/OR RCVR FAIL**
    - **Yes**: Continue
    - **No**: Continue

12. (C2, R11L)
    - (aff) IDP/CRT
    - PWR – OFF, ON
    - Call up GPC FAULT SUMM on aff CRT MDU
    - **FAULT SUMM appear?**
    - **Yes**: Continue
    - **No**: Continue

13. **IDP DPS MODE FAILURE**

14. **SM ALERT**
    - GPC ‘I/O ERROR CRT 1(2,3,4)’, ‘BITE FAIL IDP 1(2,3,4)’
    - ‘IDP DEFAULT LOAD FAIL’, ‘VM LOAD IN PROGRESS’

If:

- GPC BCE 6(7,8,9) XMTR and/or RCVR failure
- DK 1(2,3,4) BUS anomaly
- DK interface disabled at IDP 1(2,3,4)
- IDP 1(2,3,4) power loss
- IDP 1(2,3,4) H/W or S/W failure
- IDP 1(2,3,4) DK XMTR and/or RCVR fail

If:

- IDP 1(2,3,4) load sw failure, inadvertent IDP 1(2,3,4) load

\[\text{MCC for possible IFM replacement}\]

\[\text{Both Big X and POLL FAIL msgs appear for complete GPC Data path failure. Appearance of only 1 msg indicates an internal GPC or IDP problem}\]

\[\text{Expect GPC ‘I/O ERROR CRT X’ message if a GPC is commanding the affected IDP. All other MDUs communicating with the IDP running CST will be temporarily inoperable. IDP CST results will be blank while H/W CST is running. IDP H/W CST takes ~75 sec. Nominal IDP CST result is ‘000000’}\]

\[\text{Following blocks will test IDP capabilities remaining after BITE}\]
IDP cannot be used in DPS mode

14
- Call up ADI display on aff CRT MDU

15
(Aff CRT MDU)
- DATA BUS SELECT each FC BUS

16
IDP FLT INST CAPABILITY FAIL

17
GOOD IDP/FC CAPABILITY

18
PARTIAL IDP/FC FAILURE

19
(C2,R11L)
- (Aff) IDP/CRT PWR – OFF, ON
- Determine which condition recurs

20
IDP LOAD SW FAILURE OR IDP H/W FAILURE

21
IDP H/W FAILURE

22
UNINTENTIONAL IDP LOAD OR IDP H/W TRANSIENT

5

3

3.6a

5

}
6 Any SPEC or Roll-In DISP active or buried on IDP will be counted against two SPEC/two Roll-In DISP limit per MAJ FUNC. SPEC/Roll-In DISP can be released via an OPS transition or an IDP Equivalent RESUME (via MCC uplink)

7 GPC/CRT key input must be made on keyboard with active GPC interface. Always use PASS keyboard to avoid dual commanders. If assigning IDP to/from BFS, always deassign IDP first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry

---

To PASS GPC:
(C2/R11L)
• Select desired MAJ FUNC
• (If reqd) GPC/CRT X X EXEC

To BFS GPC:
(O6/C3)
• BFS GPC MODE – STBY
• BFC CRT DISP – ON
• BFC CRT SEL – 1+2(2+3,3+1)

`I/O ERROR CRT` message recur?

NO

25 INITIAL COMMANDING
GPC BCE DK
XMTR AND/OR RCVR FAIL

CAUTION

GPC may fail-to-sync if affected IDP is assigned to another GPC operating in redundant set

YES

24

(C2, R11L)
• (Aff) IDP/CRT PWR – OFF, ON
• Call up GPC FAULT SUMM on aff CRT MDU

FAULT SUMM appear?

NO

YES

26 TRANSIENT IDP 1(2,3,4) DK XMTR AND/OR RCVR FAIL

IDP 1(2,3,4) DK XMTR AND/OR RCVR FAIL

16 17 18

27

• Call up subsystem status display on aff CRT MDU
Display appear and no missing data?

NO

YES

30 IDP SUBSYSTEMS DISPLAY CAPABILITY FAILURE

GOOD SUBSYSTEM DISPLAY CAPABILITY FOR IDP
'POLL FAIL' msg should appear on affected MDU in DPS mode (PASS). BFS does not inhibit polling for BITE errors.

Any SPEC or Roll-In DISP active or buried on IDP will be counted against two SPEC/two Roll-In DISP limit per MAJ FUNC. SPEC/Roll-In DISP can be released via an OPS transition or an IDP Equivalent RESUME (via MCC uplink).

GPC/CRT key input must be made on keyboard with active GPC interface. Always use PASS keyboard to avoid dual commanders. If assigning IDP to/from BFS, deassign IDP first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT kybd entry.

If error is Keyboard Adapter A(B) fail, failure may be associated with a specific key input.

IDP can not be used in DPS mode. May be usable in FLT INST and subsystem display modes.
Any SPEC or Roll-In DISP active or buried on IDP will be counted against two SPEC/two Roll-In DISP limit per MAJ FUNC. SPEC/Roll-In DISP can be released via an OPS transition or an IDP Equivalent RESUME (via MCC uplink).

GPC/CRT key input must be made on keyboard with active GPC interface. Always use PASS keyboard to avoid dual commanders. If assigning IDP to/from BFS, deassign IDP first. Note that BFC CRT DISPLAY/SELECT sw will override any GPC/CRT keyboard entry.

IDP can not be used in DPS mode. May be usable in FLT INST and subsystem display modes.
Abnormal Response from Keyboard Input

If:
- Keyboard failure:
  - Key jammed
  - Key failed open circuit
  - Key shorted to ground
- IDP Kybd Adapter A(B) mal
- L(R) IDP/CRT Sel switch mal

1 Abnormal means keystroke does not appear on scratch pad line or wrong keystroke appears. User should always check IDP/CRT SEL sw position if applicable and repeat keystroke sequence prior to performing this procedure to eliminate user error and transients.

2 Any SPEC or Roll-In DISP active or buried on IDP will be counted against two SPEC/two Roll-In DISP limit per MAJ FUNC. SPEC/Roll-In DISP can be released via an OPS transition or an IDP Equivalent RESUME (via MCC uplink).

1. CRT BITE 1(2,3,4) msg being annunciated for this IDP?
   - YES 5.6b
   - NO

2. Test IDP/CRT sel switch and keyboard
   - If fwd keyboard, PWR ON both affected IDPs
   - MAIN MENU: MEDS MAINT: CST: START IDP (If fwd keyboard, call up IDP CST on both aff IDPs simo)
   - If fwd keyboard, verify ‘ACTIVE KYBD: X.X’ does not show the same keyboard active on both IDP displays
   - Monitor ‘KEYSTROKE: XXXXXXXX’ while depressing individual keystrokes
   - Test all keys (using both IDPs if fwd keyboard)
   - Record any abnormal response

3. RESPONSE NOMINAL?
   - YES
   - NO

4. TRANSIENT KEY OR KEYBOARD ANOMALY
DPS 5.6c (Cont)

4 Power cycle IDPs showing abnormal response
(C2, R11L)
• (Aff) IDP/CRT PWR – OFF, ON
• Test keyboard as in block 2
• Determine which response occurs

Keyboard test nominal

Single key constantly depressed or inoperable

Keystrokes appear on two IDPs simultaneously

Forward keyboard fail for single IDP

Single keyboard inoperable

5 TRANSIENT KEY OR KEYBOARD ANOMALY

3 JAMMED KEY

6

7 Li(R) IDP SELECT SWITCH ANOMALY

8 Keyboard should not be used or only one of the two affected IDPs can be used in DPS mode

9 IDP KEYBOARD ADAPTER A(B) FAILURE

10 If IDP 3, alternate fwd keyboard may be used

11 LEFT, RIGHT, OR AFT TOTAL KEYBOARD FAILURE

12 • IDP can be used in FLT INST and subsystem display modes or in DPS mode for monitoring only
Big 'X' appears when IDP does not receive display update commands for 3 sec. 'POLL FAIL' appears when IDP does not receive poll or time update commands for 3 sec.

User may have to establish alternate IDP interface to BFS or PASS or check with MCC as appropriate in order to observe fault msgs

GPC/CRT key input must be made on keyboard with active GPC interface. Always use PASS keyboard to avoid dual commanders. If assigning IDP to/from BFS, always deassign IDP first. BFC CRT DISPLAY/SELECT sw will override any GPC/CRT keyboard entry
3 GPC/CRT key input must be made on keyboard with active GPC interface. Always use PASS keyboard to avoid dual commanders. If assigning IDP to/ from BFS, always deassign CRT first. BFC CRT DISPLAY/ SELECT sw will override any GPC/ CRT keyboard entry.

4 Any SPEC or Roll-In DISP active or buried on IDP will be counted against two SPEC/ two Roll-In DISP limit per MAJ FUNC. SPEC/Roll-In DISP can be released via an OPS transition or an IDP Equivalent RESUME (via MCC uplink).

10 Reassign IDP to another PASS GPC in a different MAJ FUNC.
(C2/R11L)
• Select desired MAJ FUNC
• (if reqd) GPC/CRT X X EXEC

11 Reassign IDP to PASS
(C3)
• BFC CRT DISP – OFF

12 GPC S/W ERROR (BFS), BFC CRT SEL DISCRETE FAILURE, OR IPL SOURCE SWITCH FAILURE

13 Is the problem with IDP 4 ?

14 Reassign IDP to original commanding GPC
(C3,C2/R11)
• Select desired MAJ FUNC

15 GPC S/W ERROR

16 TRANSIENT GPC S/W OR PROCEDURAL ERROR

17 • Reassign IDP as desired
• MCC for possible GPC S/W dump

18 Reassign IDP with IDP 4 ?

CAUTION
If BFC CRT SEL discrete failure, other BFC CRT SEL switch positions may result in dual commanders and potential redundant set F-T-S. • MCC for further analysis

19 BIG X and/or POLL FAIL with other GPC ?

20 NO

21 YES

22 YES

23 NO

1 2 3 4 5 6 7 8 9
IDP can not be used in DPS mode. May be usable in FLT INST and subsystem display modes.

18 Test BFC CRT DISP and SEL switches. IDP 1,2,3 must all be pwrd ON and assigned to PASS for this test

(C3)
- BFC CRT DISP – OFF
- SEL – 1+2
- – 2+3
- – 3+1

Problem occurs on other IDPs?

19 BFC CRT DISP SWITCH FAILED ON

20 Attempt to clear fault by cycling switch

(C3)
- BFC CRT DISP – ON, OFF
  (several times; final sw position OFF)
- If fault does not clear, select appropriate IDP for fault
  (typically IDP 3)

21 IDP/CRT1(2,3,4) PWR – OFF, ON
  (repeat if reqd)

Problem recur with PASS?

22 IDP S/W ERROR OR IDP H/W ERROR

23 TRANSIENT IDP S/W OR H/W ERROR
MDU Anomaly

1. Internal component has reached 212 degF. Do not repower unless asked by MCC.

2. Expect GPC 'I/O ERROR CRT X' message if GPC commanding the affected IDP. All other MDUs communicating with the IDP running CST will be temporarily inoperable. IDP CST results will be blank while H/W CST is running. IDP H/W CST takes ~75 sec. Nominal IDP CST result is '000000'.

If: MDU S/W or H/W fail
Edgekey fail
IDP/FC interface fail
MDU pwr fail

1. MDU OVERTEMP msg?
   - YES
     2. (MDU)
        - (Aff MDU) MDU PWR – OFF
        - Report to MCC
     - NO

2. GPC 'I/O Error CRT X' msg annunciated?
   - YES
     5.6a 1
     - NO

3. MDU Autonomous?
   - YES
     5.6g 1
     - NO

4. VM LOAD IN PROGRESS msg?
   - YES
     5.6a 19
     - NO

5. Red 'X' over Edgekey or no response to input?
   - YES
     7. (MDU)
        - (Aff MDU) MDU PWR – OFF, ON
        - Report to MCC
     - NO

6. Call up SUBSYS STATUS (OMS/MPS, SPI HYD/APU) FLT INST, and DPS displays on aff MDU
   - NO

7. Erroneous data only on SUBSYS STATUS display(s)?
   - YES
     5.6f 1
     - NO

8. EDGE KEY FAIL OPEN OR CLOSED
   - YES
     10
     - NO

9. Perform CST on affected IDP
   - ON any MDU interfacing with affected IDP:
     - MAIN MENU:
       - MEDS MAINT:
       - CST:
         - START IDP:
         - HW CST
         - Record results displayed in affected IDP box on MEDS MAINT display
       - Report to MCC
     - YES

10. USER DEPRESSED EDGEKEY FOR > 3 SEC OR TRANSIENT EDGEKEY FAIL OPEN/CLOSE

11. Erroneous data only on FLT INST display(s)?
   - YES
     2
     - NO

12. On any MDU interfacing with affected IDP:
     - MAIN MENU:
       - MEDS MAINT:
       - CST:
         - START IDP:
         - HW CST
         - Inform MCC of display status for each FC bus
     - FLT INST display recovered?
   - YES
     15
     - NO

13. (Aff MDU) DATA BUS select each FC BUS

14. PARTIAL IDP/FC INTERFACE FAILURE

15. MDU OVERTEMP mduX msg?
   - NO

16. MDU BLANK, UNREADABLE, ABNORMAL, 'BITE FAIL mduX', 'MEDS I/O ERROR mduX', 'MDU OVERTEMP mduX', 'PROCESSOR FAIL mduX' WHERE mduX = CDR1(2), PLT1(2), MFD1(2), CRT 1(2,3,4), AFD1

17. GPC 'I/O ERROR CRT X' msg?
   - YES
     5.6a
     - NO

18. MDU OVERTEMP mduX msg?
   - NO

19. Edgekey fail IDP/FC interface fail MDU pwr fail
IDP cannot be used in FLT INST mode. May be usable in DPS and subsystem display modes.

For MDU BITE caused by EEPROM failure, CST or pwr cycle should not be performed on MDU.

Expect ‘MEDS I/O ERROR MDU X’ messages. MDU CST will take ~75 sec to reach the edgekey test. IDPs will not be able to communicate with MDU while it is executing its CST. Nominal MDU CST result is ‘0000FF’.
Expect GPC 'I/O ERROR CRT X' message if GPC commanding the affected IDP. All other MDUs communicating with the IDP running CST will be temporarily inoperable. IDP CST results will be blank while H/W CST is running. IDP H/W CST takes ~75 sec. Nominal IDP CST result is '000000'.

IDP cannot be used in DPS mode. May be used in FLT INST and subsystem display modes.
If MEDS fault msg(s) annunciated, user may need to select OMS/MPS, SPI, and HYD/APU displays for annunciating IDP(s). ADC 1A and 1B provide OMS/MPS and SPI display data. ADC 2A and 2B provide HYD/APU display data. Reference MEDS overview

ADC CST will be running while ADC CST result is blank. It will take 5 sec to complete CST. Nominal CST result is '000000'. Expect 'MEDS I/O ERROR ADCXX' msg

MCC for other params possibly lost on same DSC or MDM card

1. If MEDS fault msg(s) annunciated, user may need to select OMS/MPS, SPI, and HYD/APU displays for annunciating IDP(s). ADC 1A and 1B provide OMS/MPS and SPI display data. ADC 2A and 2B provide HYD/APU display data. Reference MEDS overview

2. ADC CST will be running while ADC CST result is blank. It will take 5 sec to complete CST. Nominal CST result is '000000'. Expect 'MEDS I/O ERROR ADCXX' msg

3. MCC for other params possibly lost on same DSC or MDM card

- If MEDS fault msg(s) annunciated, user may need to select OMS/MPS, SPI, and HYD/APU displays for annunciating IDP(s). ADC 1A and 1B provide OMS/MPS and SPI display data. ADC 2A and 2B provide HYD/APU display data. Reference MEDS overview

- ADC CST will be running while ADC CST result is blank. It will take 5 sec to complete CST. Nominal CST result is '000000'. Expect 'MEDS I/O ERROR ADCXX' msg

- MCC for other params possibly lost on same DSC or MDM card

---

1. Inform MCC of status of display(s)

2. Note config of MDU exhibiting problem:
   - MDU:
   - Selected Port/IDP:
   - Display:

3. Possible electrical problem. Do not attempt to reset cb

4. Refer to MEDS overview for lost display capabilities

5. Perform ADC CST and pwr cycle affected ADC
   - Use CRT MDU interfacing with affected ADC(s) given in block
   - MAIN MENU: MEDS MAINT: CST: START ADCXX
   - Record results that are displayed in affected ADC box on MEDS MAINT display

6. Same display for alternate port of affected ADC on CRT MDU given in block

7. Subsys XDCR, DSC, or MDM failure

8. Same display for alternate port of affected ADC on CRT MDU given in block

9. ADC PWR LOSS OR INTERNAL FAIL

10. Original port failure at ADC

11. Transient ADC anomaly

12. ADC H/W OR S/W failure

13. Original port failure at ADC

14. Transient ADC anomaly

---

09/24/08 5-53 MAL/ALL/GEN J
ADC CST will be running while ADC CST result is blank. It will take 5 sec to complete CST. Nominal CST result is '000000'. Expect 'MEDS I/O ERROR ADCXX' msg.

Purpose of this chart is to select MDU that will always be connected to other IDP on ADC associated with problem. CRT MDU is chosen since it will always be connected to that IDP.

Perform ADC CST from all IDP using CRT MDU given in block 20

- MAIN MENU: MEDS MAINT: CST: START ADCXX
- Record results that are displayed in affected ADC box on MEDS MAINT display __ __ __ __ __

Cycle ADC cb

(R14:A)
(Adj MNA(B)
ADC 1A/2A
(1B/2B)
cb – op
(Adj MNA(B)
ADC 1A/2A
(1B/2B)
cb – cl

Call up same display on MDU in same config as noted in block 2

Problem recur ?

Yes

No

Refer to MEDS OVERVIEW for lost display capabilities

MDU with Currently Use this Subsys Display problem Selected Port (noted in block 2) CRT MDU

| CRT1 | – | CRT2 |
| CDR1 | Pri | CRT4 |
| Pri | CRT2 |
| Sec | CRT2 |
| CRT3 | – | CRT4 |
| MFD1 | Pri | CRT1 |
| Sec | CRT4 |
| CRT2 | – | CRT4 |
| MFD2 | Pri | CRT2 |
| CRT1 | – | CRT1 |
| PLT1 | Pri | CRT1 |
| Sec | CRT2 |
| CRT3 | – | CRT3 |
| PLT2 | Pri | CRT4 |
| Sec | CRT1 |
| AFD1 | Sec | CRT1 |

Transient ADC ANOMALY
5 Purpose of this chart is to select MDU that will always be connected to an IDP on alternate ADC for affected data. CRT MDU is chosen since it will always be connected to that IDP.

6 Purpose of this chart is to determine MDU on which to perform ADC CST. CRT MDU is chosen, since it will always be connected to affected ADC.

7 Purpose of this chart is to select ADC on which to perform ADC CST and MDU driven by IDP on alternate port of ADC. CRT MDU is chosen since it will always be connected to that IDP.

<table>
<thead>
<tr>
<th>MDU with Subsys Disp Prob (noted in block 2)</th>
<th>Selected Port (noted in block 2)</th>
<th>Use this CRT MDU</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDR1</td>
<td>Pri CDR1</td>
<td>CRT1</td>
</tr>
<tr>
<td>CDR2</td>
<td>Sec CDR2</td>
<td>CRT4</td>
</tr>
<tr>
<td>CRT1</td>
<td>– CRT1</td>
<td>CRT4</td>
</tr>
<tr>
<td>MFD1</td>
<td>Pri MFD1</td>
<td>CRT4</td>
</tr>
<tr>
<td>CRT3</td>
<td>– CRT3</td>
<td>CRT1</td>
</tr>
<tr>
<td>MFD2</td>
<td>Pri MFD2</td>
<td>CRT4</td>
</tr>
<tr>
<td>CRT2</td>
<td>– CRT2</td>
<td>CRT4</td>
</tr>
<tr>
<td>PLT1</td>
<td>Pri PLT1</td>
<td>CRT4</td>
</tr>
<tr>
<td>PLT2</td>
<td>Sec PLT2</td>
<td>CRT4</td>
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<tr>
<td>CRT4</td>
<td>– CRT4</td>
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<td>AFD1</td>
<td>Pri AFD1</td>
<td>CRT4</td>
</tr>
<tr>
<td></td>
<td>Sec AFD2</td>
<td>CRT4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perform CST for this ADC</th>
<th>Use this CRT MDU</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADC1A</td>
<td>CRT1 or CRT2</td>
</tr>
<tr>
<td>ADC1B</td>
<td>CRT4 or CRT3</td>
</tr>
<tr>
<td>ADC2A</td>
<td>CRT1 or CRT2</td>
</tr>
<tr>
<td>ADC2B</td>
<td>CRT4 or CRT3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Affected Display (noted in block 2)</th>
<th>Selected IDP for Affected MDU (noted in block 2)</th>
<th>Perform CST for this ADC</th>
<th>Use this CRT MDU</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMS/MPS/SPI</td>
<td>IDP 1 ADC 1A CRT2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IDP 2 ADC 1A CRT1</td>
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<td></td>
<td>IDP 3 ADC 1B CRT4</td>
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<td>IDP 4 ADC 1B CRT3</td>
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</tr>
<tr>
<td>HYD/APU</td>
<td>IDP 1 ADC 2A CRT2</td>
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<td></td>
<td>IDP 2 ADC 2A CRT1</td>
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<td></td>
<td>IDP 3 ADC 2B CRT4</td>
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<tr>
<td></td>
<td>IDP 4 ADC 2B CRT3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1 If mult MDUs are autonomous, work MAL for CRT MDU

2 User may have to establish alternate IDP interface to BFS or PASS or check with MCC as appropriate in order to observe fault msgs

3 Expect 'MEDS I/O ERROR MDU X' messages. MDU CST will take ~75 sec to reach the edgekey test. IDPs will not be able to communicate with MDU while it is executing its CST. Nominal MDU CST result is '0000FF'

4

5.6g MDU IS AUTONOMOUS

1 Is a CRT MDU Autonomous ?

2 'IDP DEFAULT LOAD FAIL' msg on affected MDU ?

3 GPC I/O ERROR CRT X' msg present ?

4 • Pwr ON another MDU on same IDP (Reference MEDS OVERVIEW)

5 Attempt to establish polling between MDU just activated and affected IDP

6 (C2.R11) • Pwr ON alt IDP for affected MDU (Reference MEDS OVERVIEW)

7 IDPX 1553B FAILURE OR BITE FAIL

8 AFF MDU PORT FAIL FOR IDPX

9 MDU PRI/SEC PORT FAILURE OR BITE FAILURE

10 CRT MDU ?

11 (MDU) • (Alt) MDU OFF,ON

12 Perform CST on aff MDU

13 (MDU) • (Alt) MDU PWR – OFF,ON • PORT SELECT IDPx

14 TRANSIENT MDU ANOMALY

15 MDU HARD FAILED

16 • MCC for possible IFM

17

18

19
If MCC GO:
(C2,R11)
• (Aff) IDP OFF, ON
MDU still autonomous?

18 MDU PORT
FAILURE AS NOTED

19 TRANSIENT IDP ANOMALY

20 IDPx HARD FAILED. REFER TO MEDS OVERVIEW FOR LOST CAPABILITY
GPC FRP-1
SINGLE GPC FAIL

SINGLE GPC FAIL OBJECTIVE
Attempt failed GPC recovery following on-orbit DPS reconfiguration via APCL, OPCL, MAL, or PI procedure. If recovered, target the ‘transient’ GPC as a redundant G2, G2FD, or SM based upon operational objectives. If RNDZ, EVA, or critical burn requires Dual G2 config, recovered GPC will be made G2FD

SCOPE
Procedure designed to handle any single G2, SM, G2FD, or BFS GPC failure occurring during ascent or on-orbit prior to entry prep

ASSUMPTIONS
If multiple G2 configuration is reqd shortly following the GPC recovery attempt, such DPS reconfiguration will be performed before or after GPC recovery and is not embedded part of this FRP

1 If GPC FRP-1 following failure of ‘GNC RECOVERY VIA G2FD’ (OPCL), the following uplinks may be reqd upon a GPC recovery:
   • state vector
   • ADI quaternions
   • IMU gyro bias
   • IMU accel bias
2 S/W dump to capture GPC Sync Trace Log. MCC analysis of both S/W and HW dumps may provide insight to the cause of a PASS GPC failure
3 Prior to BFS H/W dump, current TFL must be capable of supporting a BFS downlist
4 S/W dump to verify integrity of new BFS software load
5 If GPC is recovered, upon completion of FRP, MCC may request certain IDPs be powered on for about 30 sec to ensure MCC uplink interfaces to both GNC and SM

1 GNC GPC FAILURE OR SM GPC FAILURE
2 G2FD GPC FAILURE
3 BFS GPC FAILURE
4 S/W dump a PASS GPC active at time of failure (a RS GPC preferred to a CS GPC)
   • Perform GPC S/W INITIATED MEM DUMP, DPS SSR-2
5 S/W dump GPC in RS at time of failure
   • Perform GPC S/W INITIATED MEM DUMP, DPS SSR-2
6 Failed BFS
   (O6) BFS GPC: • MODE – HALT
7 IPL BFS into GPC 2 if available
   If BFS target GPC in G2 set, deassign strings/buses:
   • Perform block 32 CONTRACT SET (omit ‘Freeze Dry GPC’ step)
   • Perform GPC IPL MENU OPTION (PASS/BFS), DPS SSR-7
8 HISAM dump failed GPC
   • Perform GPC HDW INITIATED MEM DUMP, DPS SSR-1
9 Attempt to recover failed GPC
   • Perform GPC IPL-PASS, DPS SSR-8
10 S/W dump new BFS GPC
   • Perform GPC S/W INITIATED MEM DUMP, DPS SSR-2
11 Failed GPC recovered ?
   NO
12 GPC is failed
   (O6) Failed GPC:
   • PWR – OFF
   YES
13 Secure new BFS GPC
   (C3) BFC CRT sw:
   • DISP – OFF
   • SEL – 3+1
   √ No IDPs are assigned to BFS
   (O6) BFS GPC:
   • MODE – STBY, HALT (tb-bp)
   √ OUTPUT – NORM (tb-bp)
14 Recovered GPC desired as a GNC (or G2FD) or as an SM GPC ?
15 FNL CONFIG:
   Single G2
   1 G2
   1 G2FD
   1 SM
   1 BFS
   Dual G2
   2 G2
   0 G2FD
   1 SM
   1 BFS
16 GNC or G2FD
17 SM

13

1

5

4

3

2

1

8

09/24/08 5-58 MAL/ALL/GEN J
This process establishes a GNC Major Function Base in the target G2. For the recovered GPC, the action verifies GPC can maintain redundant set sync.

Action verifies no FC MIA receiver failure exists.

‘Big Picture’ recovery overview:

If failed GPC to be used as an SM, uplinked procedure will continue FRP after re-IPLing GPC in block 9.

If failed GPC to be used as a restricted G2FD source, after re-IPLing GPC, uplinked procedure will add recovered GPC to redundant set with the affected string deassigned, collapse set with string deassigned, freeze dry GPC, and finally, reassign string and perform a GNC OPS Mode Recall.

If GPC later used as a G2FD source, string Dual G2 must be deassigned before set expansion.

After critical mission phase is complete, if OPS considerations will permit continued use of a Dual G2 config, then establish G2FD in a redundant GPC and add recovered GPC to Dual G2 set.

MCC may correct NBAT if IMU config or other considerations drive alternate stringing [1221 or 1122 NBAT]

Assign string 4 to recovered GPC during Entry phase (a transient GPC).
**ASSUMPTIONS (Block 32):**
The crew will need to adjust the GPC Target Set and nominal bus assignment table (NBAT) string/bus assignments in the "Configure For Set Contraction" step below to accommodate the actual DPS configuration (\[MCC if GPC target set or NBAT string/bus assignments unclear\])

### 32 CONTRACT SET

**NOTE**
- No keyboard entries or sw throws 10 sec:
  - Before and after moding PASS GPCs to RUN
  - Before OPS transition or set expansion/contraction requests until new OPS base page is displayed

- If RNDZ NAV enabled:
  - DAP: LVLH
  - CRT GNC UNIV PTG
  - CNCL – ITEM 21 EXEC

- **CONFIGURE FOR SET CONTRACTION**
  - If MM202: GNC, OPS 201 PRO
  - Assign MC2 per table

<table>
<thead>
<tr>
<th></th>
<th>Single</th>
<th>Dual</th>
</tr>
</thead>
<tbody>
<tr>
<td>If:</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>GPC</td>
<td>12000</td>
<td>10000</td>
</tr>
<tr>
<td>CONFIG 19*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ITEM +2 EXEC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **OPS MODE RECALL**
  - DAP: FREE
  - VERN(ALT)
  - CRT GNC, OPS 201 PRO
  - Pause ~30 sec (DAP setting), then
  - DAP: as reqd

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>STR</td>
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<tr>
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<td></td>
<td>4</td>
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<tr>
<td>PL</td>
<td>1/2</td>
<td>0</td>
</tr>
<tr>
<td>CRT</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

- **FREEZE DRY GPC**
  - CRTX MAJ FUNC – PL
  - GPC/CRT G2FD/X EXEC
  - X PL GPC MEMORY
  - CONFIG – ITEM 45 +2 EXEC
  - GPC – ITEM 46 +2(3) EXEC
  - STORE – ITEM 47 EXEC
  - Store complete when MC = 02 (~30 sec)
  - All IDPs deassigned from FD GPC

- **CLEAR SOFTWARE FAIL VOTES**
  - DAP: FREE
  - VERN(ALT)

- **CONFIG FOR CLEANUP**
  - DAP: FREE
  - VERN(ALT)

### O6 GPC MODE G2FD – STBY (tb-bp)
- HALT (tb-bp)
- STBY (tb-RUN)
- HALT (tb-bp)

- **CONFIG FOR CLEANUP**
  - GNC 22 S TRK/COAS CNTL
  - S TRK -Y, -Z: STAR TRK – ITEM 3,4 EXEC (*)
  - GNC 21 IMU ALIGN
  - RESUME

### CLEAR SOFTWARE FAIL VOTES
- GNC 0 GPC MEMORY
- ITEM 48 EXEC
- SM 0 GPC MEMORY
- ITEM 48 EXEC

---

12 GNC downlist will default to lowest ID GPC in G2 set. MCC may request downlister change following OPS Mode Recall

13 Crew "GO" for Error Log resets without prior MCC concurrence
### 33 EXPAND SET

**NOTE**

No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction requests until new OPS base page is displayed

- **If RNDZ NAV enabled:**
  
  C3(A6U)  DAP: LVLH
  CRT  GNC UNIV PTG
  CNCL – ITEM 21 EXEC

- **CONFIGURE FOR SET EXPANSION**
  
  If MM202: GNC, OPS 201 PRO
  GNC 0 GPC MEMORY
  CONFIG – ITEM 1 EXEC
  Assign MC2 per table

- **OPS MODE RECALL**
  
  C3(A6U)  DAP: FREE
  CRT  GNC, OPS 201 PRO
  Pause ~30 sec
  (DAP settling), then
  DAP: as reqd

### ASSUMPTIONS (Block 33):

The crew will need to adjust the **GPC Target Set** in “Configure For Set Expansion” step below to accommodate the actual DPS configuration (√MCC if GPC target set or NBAT string/bus assignments unclear)

Procedure assumes target GPC (recovered GPC or former SM GPC) is up and in ‘RUN’, which is normally the case. If target GPC not in common set, perform step 2 “Config G2FD GPC(s) For Set Expansion” of G2 SET EXPANSION procedure (DPS, ORB OPS)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Dual G2</th>
<th>Triple G2</th>
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<tbody>
<tr>
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<td>PL  1/2</td>
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<td>DON’T MODIFY NBAT</td>
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<tr>
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<td>2</td>
</tr>
<tr>
<td>MM  1</td>
<td>2</td>
<td>2</td>
</tr>
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</table>

14 Whether expanding G2 set to a Dual or Triple G2 config, modify only the GPC target set unless otherwise noted (don’t assign strings or buses to target GPC)

15 GPC downlist will default to lowest ID GPC in G2 set. MCC may request downlister change following OPS Mode Recall
GPC FRP-3
BFS GPC FAIL RECOVERY (ENTRY)

NOTE
Procedure assumes config shown as established by BFS GPC FAIL (ENT PKT, DPS). The following BFS uplinks may be necessary after completion of FRP:
- Guidance targets
- ADI quaternions
- IMU gyro bias
- IMU accelerometer bias
- TMBU

Procedure assumes deorbit planned. If deorbit not planned, config for ORBIT and go to SINGLE GPC FAIL, GPC FRP-1 (DPS)

NOTE
No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction requests until new OPS base page is displayed

<table>
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<tr>
<th>Initial Config FRP-3</th>
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<td>GPC 3</td>
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</tbody>
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---

a. Remove GPC2 from MC3

[GNC 0 GPC MEMORY]
- Config – ITEM 1 +3 EXEC
- Modify MC3 per table
- GNC OPS 301 PRO (√DAP)

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<thead>
<tr>
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<tr>
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</tbody>
</table>

[10340]

b. Establish new BFS in GPC 2

- Perform GPC IPL – MENU OPTION (PASS/BFS) ....... DPS SSR-7
- GPC OUTPUT – BKUP
- MODE – RUN

[GNC 50 HORIZ SIT] – √PASS R/W sel

<table>
<thead>
<tr>
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</tr>
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<tbody>
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<tr>
<td>PL</td>
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<table>
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</table>


c. Attempt recovery of failed GPC
   - Perform GPC IPL-PASS............................. DPS SSR-8
   - If GPC recovered, perform step d

<table>
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<tr>
<th>GPC</th>
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<th>3</th>
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<tr>
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<td>G3</td>
<td>BFS</td>
<td>G3</td>
<td>G3</td>
<td>-</td>
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<tr>
<td>POWER OUTPUT MODE</td>
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<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td></td>
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<tr>
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<td>NORM RUN</td>
<td>BKUP RUN</td>
<td>NORM RUN</td>
<td>HALT</td>
<td></td>
</tr>
</tbody>
</table>

| CONFIG GPC | 3 | 10340 |
| STR 1 | 1 | 2 | 3 | 4 |
| PL 1/2 | 4 | 4 |
| CRT 1 | 1 | 2 | 3 | 4 |
| L | 1 | 2 | 0 | 0 |
| MM 1 | 1 | 2 | 3 |

d. GPC recovered, establish a four GPC redundant set

| CONFIG GPC | 3 | 10345 |
| STR 1 | 1 | 2 | 3 | 4 |
| PL 1/2 | 5 |
| CRT 1 | 1 | 2 | 3 | 4 |
| L | 1 | 2 | 0 | 0 |
| MM 1 | 1 | 2 | 3 |
GCP FRP-4
PASS RECOVERY AFTER BFS ENGAGE
(ASCENT/ORBIT/ENTRY)

NOTE
Procedure can be entered from direct Ascent/Entry engagement or from BFS ENGAGE
(ORB PKT, DPS). Do not hardware dump or IPL freeze-dry GPC if activation was not attempted.
The following uplinks will be necessary during or after completion of the FRP:
State Vector
IMU desired REFSMMATs
IMU gyro bias (if reqd)
IMU accel bias (if reqd)
ADI quaternion (orbit inertial)
If immediate deorbit planned:
Guidance targets
Landing sites (if reqd)
TACAN table (if reqd)
These additional uplinks may be required after completion of the FRP (√MCC):
RNP GPS uplink load
Reapplication of GMEMs (if reqd)

NOTE
No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction
requests until new OPS base page is displayed

1. Config GPCs:
   O6 a. PASS GNC GPCs MODE – HALT
       b. BFS GPC MODE – RUN
       c. If BFS not in 301:
           C2 BFS, GNC, OPS 301 PRO
           d. Ensure BFS not hard assigned to any forward IDP:
               GPC/CRT 01 EXEC
               GPC/CRT 02 EXEC
               GPC/CRT 03 EXEC
           C3 e. BFC CRT DISP – OFF (BFS will default to IDPs 1 and 2)

2. If SM GPC currently active:
   NOTE
   Ku-Band system may be reqd to be taken to Standby
to prevent exceeding radiation constraints
   a. If AOS, √MCC for comm config and radiation constraints
      If no comm:
      A1U KU PWR – STBY
      CNTL – PNL, CMD
      If no comm, go to COMM LOST (ORB PKT, COMM) steps 7 and 8
   O6 b. If SM GPC OUTPUT – TERM:
       F7 √FLT CNTLR PWR – ON
       BFS ENGAGE pb – push (set engage discretes)
   O1 c. If SM GPC self-fail CAM it on:
      If reqd, perform PLDPS RECONFIG (PL OPS or PL SYS or SODF: ASSY OPS):
      C2 CKPT RETRIV ENA – ITEM 12 EXEC (no *)
      O6 SM GPC MODE – STBY, then RUN
      C2 SM, OPS 201 PRO
      d. If SM GPC commanding IDP 4, reconfigure displays:
         (1) BFC CRT DISP – ON
         (2) SEL – 2+3
            CRT Via IDP 1 (commanded by SM GPC):
            (3) GPC/CRT 04 EXEC
            (4) GPC/CRT 43 EXEC (BFS will continue to command IDP 3 until next step)
            C2 (5) BFC CRT DISP – OFF
            (6) Verify BFS commanding IDP 1 and 2, SM commanding IDP 3
      e. Go to step 6

3. Attempt recovery of one GPC (begin with GPC 4 and proceed in descending order until a GPC is successfully IPL’d):
   O15 a. √MMU 2 – ON
   O6 b. IPL SOURCE – MMU 1(2)
       √GPC OUTPUT 4(3,2,1) – NORM (tb-bp)
       √GPC MODE 4(3,2,1) – HALT (tb-bp)
   F7 √FLT CNTLR PWR – ON
       BFS ENGAGE pb – push (resets engage discretes)
   O6 c. GPC PWR 4(3,2,1) – OFF,ON (clears engage discretes)
       F7 √FLT CNTLR PWR – ON
       BFS ENGAGE pb – push (resets engage discretes)
   O6 d. IPL 4(3,2,1) pb – push (tb-IPL, then bp within 30 sec)
GPC FRP-4 (Cont)

e. When tb – bp or 30 sec:
   GPC MODE 4(3,2,1) – STBY (tb-RUN within 2 min)
   C2
   (1) IDP/CRT 3 MAJ FUNC – PL
   O6
   (2) GPC MODE 4(3,2,1) – RUN (tb remains RUN)
   C2
   (3) 3: PL 0 GPC MEMORY driven by IPL’d GPC
f. When tb – RUN or 2 min, determine if IPL’d GPC can command IDP:

   C2
   (1) IDP/CRT 3 MAJ FUNC – PL
   O6
   (2) GPC MODE 4(3,2,1) – RUN (tb remains RUN)
   C2
   (3) 3: PL 0 GPC MEMORY driven by IPL’d GPC

   g. If GPC cannot command IDP:

   C2
   (1) IDP/CRT 3 MAJ FUNC – PL
   O6
   (2) GPC MODE 4(3,2,1) – RUN (tb remains RUN)
   C2
   (3) 3: PL 0 GPC MEMORY driven by IPL’d GPC

   O6
   (4) GPC PWR 4(3,2,1) – OFF

   O6
   (5) IPL SOURCE – MMU 2(1)
   Go to step 3c and proceed (one time only)
   If second IPL attempt:
   GPC PWR 4(3,2,1) – OFF
   Go to step 3b for next highest numbered failed GPC
   If no GPCs recovered, \{MCC


4. For first successfully IPL’d GPC, establish SM GPC:

   C2
   (1) IDP/CRT 3 MAJ FUNC – PL
   O6
   (2) GPC MODE 4(3,2,1) – RUN (tb remains RUN)
   C2
   (3) 3: PL 0 GPC MEMORY driven by IPL’d GPC
   O6
   (4) GPC PWR 4(3,2,1) – OFF
   Go to step 3b for next highest numbered failed GPC
   If no GPCs recovered, \{MCC


5. Select MET as MISSION TIME:

   C2
   (1) MISSION TIME MET – ITEM 2 EXEC

6. Hardware dump the remaining failed GPCs during AOS (Do not dump any post-engage IPL’d GPCs):

   C2
   (1) GPC PWR 3(2,1) – ON
   O6
   (2) GPC MODE 3(2,1) – STBY (starts dump)
   C2
   (3) GPC OUTPUT 3(2,1) – TERM
   MO42F
   (1) GPC MEM DUMP – 3(2,1)
   C2
   (2) SM 0 GPC MEMORY – ITEM 1 +4 EXEC
   Assign SM GPC, PL 1/2, CRTs, LAUNCH 1, MMs
   D
   (3) SM, OPS 201 PRO
   √ 3: SM ANTENNA
   e. If reqd, go to PL/OPS RECONFIG, Recovery (PL SYS or SODF: ASSY OPS)

5. Select MET as MISSION TIME:

   C2
   (1) MISSION TIME MET – ITEM 2 EXEC

6. Hardware dump the remaining failed GPCs during AOS (Do not dump any post-engage IPL’d GPCs):

   C2
   (1) GPC PWR 3(2,1) – ON
   O6
   (2) GPC MODE 3(2,1) – STBY (starts dump)
   C2
   (3) GPC OUTPUT 3(2,1) – TERM
   MO42F
   (1) GPC MEM DUMP – 3(2,1)
   C2
   (2) SM 0 GPC MEMORY – ITEM 1 +4 EXEC
   Assign SM GPC, PL 1/2, CRTs, LAUNCH 1, MMs
   D
   (3) SM, OPS 201 PRO
   √ 3: SM ANTENNA
   e. If reqd, go to PL/OPS RECONFIG, Recovery (PL SYS or SODF: ASSY OPS)

7. Attempt recovery of each dumped GPC one at a time beginning with GPC 1:

   C2
   (1) 3: SM (GNC,PL) 1 DPS UTILITY
   √ IPL SOURCE SW MASK – ITEM 38 EXEC (no *)
   O6
   (2) IPL SOURCE – MMU 1(2)
   (3) GPC OUTPUT 1(2,3) – NORM (tb-bp)
   (4) GPC PWR 1(2,3) – OFF,ON (clears engage discretes)
   F7
   (5) FLT CNTLR PWR – ON
   BFC ENGAGE pb – push (resets engage discretes)
   O6
   (6) IPL 1(2,3) pb – push (tb-IPL, then bp within 30 sec)
   (7) When tb – bp or 30 sec:
   GPC MODE 1(2,3) – STBY (tb-RUN within 2 min)
   C2
   (a) IDP/CRT 3 MAJ FUNC – PL
   O6
   (b) GPC MODE 1(2,3) – RUN (tb remains RUN)
   C2
   (c) On PASS IDP, GPC/CRT IPL’d GPC/3 EXEC
   (d) 3: PL 0 GPC MEMORY driven by IPL’d GPC
   (8) If GPC cannot command IDP (IDP 3 ’Big X’):
   O6
   (a) GPC MODE 1(2,3) – HALT
   (b) Reconf ICPDs to make GPC 4 command IDP 3:
   C2
   (c) IDP/CRT 3 MAJ FUNC – SM
   BFC/CRT DISP – ON
   SEL – 2+3
   On IDP 1 – GPC/CRT SM GPC/3 EXEC (BFS will retain IDP 3 until next step)
   BFC/CRT DISP – OFF
   √ SM GPC commanding IDP 3
GPC FRP-4 (Cont)

(c) If first IPL attempt:
   IPL SOURCE – MMU 2(1)
   Go to step 7a(4) and proceed (one time only)
If second IPL attempt:
   GPC PWR 1(2,3) – OFF
   Go to step 7a(3) for next highest numbered failed GPC

(9) If there are any dumped GPCs remaining to be IPL’d, go to step 7a(3) for next highest numbered failed GPC

O6 (10) IPL SOURCE – OFF

O6 (11) IPL SOURCE – MMU 2

If second IPL attempt:
GPC PWR 1 – OFF
Go to step 7a(3) for next highest numbered failed GPC

If three, four, or four PASS GPCs active, go to step 9

8. If one PASS GPC active, config for ENTRY:
   a. Perform LOAD PCMMU FORMAT (ENTRY) (ORB OPS FS, COMM/INST)
   b. Reassign SM GPC to GNC Major Function:
      O6 (1) vTarget GPC OUTPUT – NORM
      (2) If reqd, perform PL/DPS RECONFIG, secure (PL SYS or SODF: ASSY OPS)
      (3) SM, OPS 000 PRO
      C2 (4) IDP/CRT 3 MAJ FUNC – GNC
         GPC 3
         CONFIG – ITEM 1 +3 EXEC
         Assign PASS GPC all FC strings, PL 1/2, CRT, and MMs
      (5) Configure for G3 Transition:
         O14, vRGAs 1,2,3,4 – ON
         O15, vRUDA/RUDF (all) – ON
         O16 vcb ADTA (four) – cl
         O8 MLS (three) – ON
      C3 (6) GNC, OPS 301 PRO:
         GPC 3
         CONFIG – ITEM 1 +3 EXEC
         Assign desired GPC(s), FC strings, CRTs, and MMs per appropriate table:
      (7) If reqd, perform PL/DPS RECONFIG, Recovery (PL SYS or SODF: ASSY OPS)
   c. Go to step 10, PASS IMU attitude reference recovery

9. If two, three, or four PASS GPCs active:
   a. OI PCMMU FORMAT – FXD
   b. Establish G3 config in lowest number GPC(s):
      C2 (1) IDP/CRT 3 MAJ FUNC – GNC
         GPC/CRT Target GNC GPC/3 EXEC
         CONFIG – ITEM 1 +3 EXEC
         Assign desired GPC(s), FC strings, CRTs, and MMs per appropriate table:
   If two GPCs recovered:
   If three GPCs recovered:
   If four GPCs recovered:
   1,2
   1,3 2,3
   1,4 2,4 3,4
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10/20/08 5-66 MAL/ALL/GEN J
GPC FRP-4 (Cont)

(2) Configure for G3 Transition:
O14,√
RGAs 1,2,3,4 – ON
O15,√
RJA/RFJ (all) – ON
O16
cb ADTA (four) – cl
O8
MLS (three) – ON

(3) Configure for GNC Downlist:
√
C3
3: GNC DEORB MNVR COAST

(4) Configure for GNC Downlist:
√
C3
3: GNC 0 GPC MEMORY

DOWNLIST GPC – ITEM 44 +X EXEC (lowest ID GNC GPC)

10. PASS IMU attitude reference recovery:

O14:E,√
a. Ensure good Star Tracker config:
O15:E
cb MNA,B STAR TRKR -Z,-Y (two) – cl
O6
√
S TRK PWR (two) – ON

(3) GNC 21 IMU ALIGN

b. Mode IMUs 1,2,3 to OPERATE:
IMU OPER 1,2,3 – ITEM 4,5,6 EXEC
(* will not appear until DISENGAGE step)

If extended loss of comm (ZOE not included) or no uplink CMD capability, recover IMU attitude reference utilizing HUD and MATRIX alignment:
c. Deselect two IMUs leaving one IMU selected:
IMU DES 123 (2,3) – ITEM 7 (8,9) EXEC (*)
d. Maneuver to attitude for subsequent HUD alignment,
STAR PAIRS PAD (ORB OPS FS, PTG)

NOTE
Establish an inertial attitude which will simplify a manual maneuver to second star

e. Perform BFS disengagement (if comm, wait for MCC GO):
C2
(1) Configure displays for disengage:
(a) BFC CRT DISP – ON
SEL – 1+2 (BFS commanding IDPs 1 and 2)
PASS GNC GPC commanding IDP 3
(b) Deassign IDP 2 from PASS
Via IDP 3, GPC/CRT 02 EXEC (BFS still commanding IDP 2)

NOTE
BFS DISENGAGE can be verified by Big X/POLL FAIL on IDP 2,
BFS GPC OUTPUT tb – bp (pnl O6), and BFC lt flashing (pnl F2/F4)

(2) Perform BFS disengage:
On MCC GO:
F6
BFC – DISENGAGE
Verify BFS disengage:
/BFS commanding IDP 1 only
/BFS GPC OUTPUT tb – bp
/BFC Light flashing or OFF

* If BFS still engaged:
* BFS, OPS 000 PRO
* GPC 5 OUTPUT – NORM
* – B/U
* Verify BFS disengage
* BFS, OPS 301 PRO

C3
(3) Post disengage reconfig:
DAP: INRTL
C2
BFS – I/O RESET
Reassign IDP 2 – GPC/CRT PASS GPC X2 EXEC
BFC CRT SEL – 3+1 (PASS commanding IDPs 1 and 2, BFS commanding IDP 3)
F6/F8
ADI ATT (two) – REF
ATT REF pb – push
10/20/08 5-68 MAL/ALL/GEN J

NOTE

'↓' will remain for accumulators not selected by GPC driving SPEC. If TRY is not successful ('↓' by MTU ACCUM 1 time), continue with procedures and √MCC

Acquire MTU time
If SM GPC available:
   SM 2 TIME
   MTU ACCUM 1 TRY – ITEM 34 EXEC

NOTE

'IMU BITE/T' may be annunciated until MMREAD is performed to restore IMU gyro delta bias terms

f. Mass Memory Read of IMU calibration data:
   GNC 21 IMU ALIGN
   Select all IMUs for MASS MEMORY READ:
   IMU 1,2,3 – ITEM 10,11,12 EXEC (*)
   Initiate MM READ:
   MM READ – ITEM 19 EXEC (*)
   When MM READ complete:
   √MM READ – ITEM 19 (no *)

g. Perform MATRIX (TORQUE) ALIGN USING HUD STAR DATA, GNC SSR-2 (GNC)

h. Reselect all deselected IMUs
   GNC 21 IMU ALIGN
   IMU DES – ITEM 7(8,9) EXEC (no *)

i. Go to step 11

If good comm and uplink CMD capability, recover IMU attitude reference utilizing Matrix Alignment using IMU data:

NOTE

The following steps assume recovery of ‘operational’ IMUs only. Operational IMUs are IMUs in OPER and not previously caged

j. Deselect two IMUs leaving best IMU selected:
   √MCC for best IMU
   IMU DES 1(2,3) – ITEM 7(8,9) EXEC (*)

k. Disengagement of BFS:
   (1) Configure displays for disengage
      C2
      (a) BFC CRT DISP – ON
           SEL – 1+2 (BFS commanding IDPs 1 and 2)
           √PASS GNC GPC commanding IDP 3
      (b) Deassign IDP 2 from PASS
           Via IDP 3, GPC/CRT 02 EXEC (BFS still commanding IDP 2)

      NOTE
      BFS DISENGAGE can be verified by Big X/POLL FAIL on IDP 2,
      BFS GPC OUTPUT tb – bp (pnl O6), and BFC lt flashing (pnl F2/F4)
   (2) Perform BFS disengage:
      On MCC GO:
      F6
      BFC – DISENGAGE

      Verify BFS disengage:
      BFS commanding IDP 1 only
      BFS GPC OUTPUT tb – bp
      BFS Light flashing or OFF

      * If BFS still engaged:
      * BFS, OPS 000 PRO
      * GPC 5 OUTPUT – NORM
      * – B/U
      * Verify BFS disengage
      * BFS, OPS 301 PRO

   C3
   O6
GPC FRP-4 (Cont)

(3) Post disengage reconfig:
   DAP: INRTL
   BFS – I/O RESET
   Reassign IDP 2 – GPC/CRT PASS GPC X/2 EXEC
   BFC CRT SEL – 3+1 (PASS commanding IDPs 1 and 2, BFS commanging IDP 3)

   NOTE
   ‘↓’ will remain for accumulators not selected by GPC driving SPEC.
   If TRY is not successful (‘↓’ by MTU ACCUM 1 time), continue with
   procedures and \MCC

   Acquire MTU time
   If SM GPC available:
     SM 2 TIME
     MTU ACCUM 1 TRY – ITEM 34 EXEC

   NOTE
   ‘IMU BITE/T’ may be annunciated until MMREAD is performed
to restore IMU gyro delta bias terms

   Mass Memory Read of IMU calibration data:
   GNC 21 IMU ALIGN
   Select all IMUs for MASS MEMORY READ:
   IMU 1,2,3 – ITEM 10,11,12 EXEC (*)
   Initiate MM READ:
   MM READ – ITEM 19 EXEC (*)
   When MM READ complete:
   \MM READ – ITEM 19 (no *)

   Confirm with MCC that REFSMMAT uplink has been performed. Do not proceed without confirmation

   Recover IMU attitude reference of one of the deselected operational IMUs, utilizing Matrix Alignment,
   aligning the IMU to itself:

   CAUTION
   Each IMU being recovered must be individually matrix aligned to
   itself in order to incorporate the uplinked REFSMMATs

   GNC 21 IMU ALIGN
   Utilize as reference one of the operational IMUs currently deselected:
   REF IMU – ITEM 14 + ___ EXEC
   TYPE – ITEM 15 EXEC (MATRIX)
   Align Reference IMU to itself:
   ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
   EXEC – ITEM 16 EXEC (*)
   \MCC to repeat step 10n with other deselected operational IMU

   Configure DAP:
   DAP: INRTL
   DAP ROT: PULSE/PULSE/PULSE

   Deselect currently selected IMU (no selected IMUs):
   IMU DES – ITEM 7(8,9) EXEC (*)

   Reselect IMU(s) aligned in step 10n:
   IMU DES – ITEM 7(8,9) EXEC (no *)

   Configure DAP:
   DAP: INRTL
   DAP ROT: DISC/DISC/DISC

   \MCC to repeat step 10n with remaining IMU

   When Matrix Align(s) using IMU data complete, reselect all recovered IMUs:
   IMU DES – ITEM 7(8,9) EXEC (no *)

   Mnvr to acquire stars using AUTO DAP for STRK align. Only Stars 11-60 are available in OPS 3:
   choose appropriate star pair from pad STAR PAIRS PAD (ORB OPS FS, PTG)
GPC FRP-4 (Cont)

v. If STAR TRKRs powered on in step 10a, configure STAR TRKRs and open doors:
   GNC I/O RESET
   GNC 22 S TRK/COAS CNTL
   O6
   S TRK DR CNTL SYS (two) – OP (start timer)
   √POS tb (two) – bp
   When both tb – OP (8-24 sec), or either tb – bp for >24 sec:
   CNTL SYS (two) – OFF
   If tb – bp > 8 sec, notify MCC
   CRT
   STAR TRK – ITEM 3,4 EXEC (*)

w. Perform IMU ALIGN – S TRK (ORB OPS, GNC)

11. If only one PASS GPC active, acquire MTU time in G2 and then go back to Entry config:
   a. Configure for G2:
      (1) √G2 NBAT (all FC strings, PL 1/2, CRT, and MMs assigned to target GPC)
      (2) GNC, OPS 201 PRO
         √GNC UNIV PTG
      NOTE
         ‘↓’ will remain for accumulators not selected by GPC driving SPEC.
         If TRY is not successful (‘↓’ by MTU ACCUM 1 time), continue with
         procedures and √MCC
   b. Acquire MTU time:
      GNC 2 TIME
      MTU ACCUM 1 TRY – ITEM 34 EXEC
   c. Configure for G3:
      GNC, OPS 301 PRO
      BFS, GNC, OPS 000 PRO
      BFS, GNC, OPS 301 PRO
   d. Entry Config Established:
      (1) Reference Final Configuration Table Set I, 5-76
      (2) As time permits, work GPC FRP-1 to Re-IPL the BFS into GPC 5 >>

12. If two PASS GPCs active and Entry Config Desired:
   a. Perform SM CHECKPOINT INITIATE (ORB OPS, DPS)
   b. Perform LOAD PCMMU FORMAT (ENTRY) (ORB OPS FS, COMM/INST)
      C3
      OI PCMMU FORMAT – GPC
   c. Configure GPCs for GNC OPS 3:
      (1) √SM GPC OUTPUT – NORM
      (2) If reqd, perform PL/DPS RECONFIG, Secure (PL SYS or SODF: ASSY OPS)
      (3) SM OPS 000 PRO
      (4) IDP/CRT X MAJ FUNC – GNC
         GNC 0 GPC MEMORY
         CONFIG – ITEM 1 +3 EXEC
      C2
      Assign desired GPCs, strings, CRTs, and MMs per appropriate NBAT table

Recovered PASS GPCs

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GPC FRP-4 (Cont)

d. Entry config established:
   (1) Reference Final Configuration Table Set II A on 5-77 and 5-78
   (2) As time permits, work GPC FRP-1 to re-IPL BFS into GPC 5 >>

If orbit configuration desired for two, three, or four PASS GPCs active:
13. Secure BFS:
   C3
   \BFC CRT DISP – ON
   SEL – 3+1
   C2
   BFS, GNC, OPS 000 PRO
   C3
   BFS CRT DISP – OFF
   \All CRTs deassigned from BFS
   O6
   BFS GPC MODE – STBY,HALT (tb-bp)
   OUTPUT – NORM

14. If two PASS GPCs active:
   a. Config GNC GPC for OPS 2:
      C2
      (1) IDP/CRT MAJ FUNC – GNC
      [GNC 0 GPC MEMORY]
      CONFIG – ITEM 1 +2 EXEC
      Assign desired GPC all FC strings, CRTs, and MMs
      (2) GNC, OPS 201 PRO
      \GNC UNIV PTG
      (3) \ appropriate DAP mode selected
      C3
      b. OI PCMMU FORMAT – GPC:
         Perform LOAD PCMMU FORMAT (ORBIT) (ORB OPS FS, COMM/INST)
      c. SM (GNC,PL) 1 DPS UTILITY
         UL CNTL AUTO – ITEM 35 EXEC (*)
      d. If required, perform LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)
      C2
      e. Configure IDPs:
         GPC/CRT 03 EXEC
         GPC/CRT X/4 EXEC
         Configure MDUs as desired
         IDP/CRT 3 PWR – OFF
      O6
      f. SM GPC OUTPUT – TERM
      g. Configure for Orbit:
         O14,
         RGAs 1,2,3,4 – OFF
         O15,
         RJDA/RJDF (all) – As reqd
         O16
         cb ADTA (four) – op
         O8
         MLS (three) – OFF
      h. Orbit config established:
         (1) Reference Final Configuration Table Set II B, 5-79 and 5-80
         (2) As time permits, work GPC FRP-1 to re-IPL the BFS into GPC 5 >>

15. If three PASS GPCs active:
   a. Config GNC GPCs for OPS 2:
      C2
      (1) IDP/CRT X MAJ FUNC – GNC
      [GNC 0 GPC MEMORY]
      CONFIG – ITEM 1 +2 EXEC
(2) Assign desired GPCs all FC strings, CRTs, and MMs per appropriate table

Recovered PASS GPCs

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(3) GNC, OPS 201 PRO

√ GNC UNIV PTG

C3(A6U)

(4) DAP: as reqd
C3

b. OI PCMMU FORMAT – GPC:
   - Perform LOAD PCMMU FORMAT (ORBIT) (ORB OPS FS, COMM/INST)
   - SM (GNC,PL) 1 DPS UTILITY
   - UL CNTL AUTO – ITEM 35 EXEC (*)

d. If reqd, perform LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)

e. Configure IDPs:

   C2
   - GPC/CRT 03 EXEC
   - GPC/CRT X/4 EXEC
   - Configure MDUs as desired
   - IDP/CRT 3 PWR – OFF

O6

f. SM GPC OUTPUT – TERM

g. Configure for Orbit:

   O14, RGAs 1,2,3,4 – OFF
   O15, RJDA/RJDF (all) – As reqd
   O16, cb ADTA (four) – op
   O8, MLS (three) – OFF

h. If Orbit config desired, establish single G2:

   C2,R11L
   1. IDP/CRT X MAJ FUNC – GNC
   - GNC 0 GPC MEMORY
   - CONFIG – ITEM 1 +2 EXEC

Assign desired GPC(s), all FC strings, CRTs, and MMs per table

Recovered PASS GPCs

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GPC FRP-4 (Cont)

C2, R11L  (2)  GNC, OPS 201 PRO

\[ \text{GNC UNIV PTG} \]

C3(A6U)  (3)  DAP: as reqd

C2  (4)  Configure OPS 0 GPC as G3FD (\(\text{SPEC } 6\)):

- IDP/CRT X MAJ FUNC – PL
  - GPC/CRT target GPC/X EXEC
- PL 0 GPC MEMORY
- CONFIG – ITEM 45 +3 EXEC
- GPC – ITEM 46 +X EXEC (X = target GPC)
- STORE – ITEM 47 EXEC
- Store complete when MC = 03

(5)  Config G3 NBAT for FD GPC per table

Recovered PASS GPCs

\[
\begin{array}{ccc}
1,2,3 & 1,3,4 & \\
1,2,4 & 2,3,4 & \\
\end{array}
\]

\[
\begin{array}{ccc}
\text{CONFIG} & 3 & 3 \\
\text{GPC} & 02000 & 00300 \\
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(6)  \(\text{All IDPs deassigned from FD GPC}\)

O6  (FD GPC) GPC MODE – STBY (tb-bp)

- HALT
- STBY (tb-RUN)
- HALT (tb-bp)

i.  Final Orbit config established:

1.  Reference Final Configuration Table Set III, 5-81

16.  If four PASS GPCs active:

a.  Config GNC GPCs for OPS 2:

C2, R11L  (1)  IDP/CRT X MAJ FUNC – GNC

\[ \text{GNC 0 GPC MEMORY} \]

\[ \text{CONFIG – ITEM } 1 +2 \text{ EXEC} \]

- Assign desired GPC(s) all FC strings, CRTs, and MMs per table

\[
\begin{array}{c}
\text{CONFIG} \\
\text{GPC} \\
12000 \\
\end{array}
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C2, R11L  (2)  GNC, OPS 201 PRO

\[ \text{GNC UNIV PTG} \]

C3(A6U)  (3)  DAP: as reqd
GPC FRP-4 (Cont)

C3  
   b. OI PCMMU FORMAT – GPC:  Perform LOAD PCMMU FORMAT (ORBIT) (ORB OPS FS, COMM/INST)  
   c. SM (GNC,PL) 1 DPS UTILITY  
      UL CNTL AUTO – ITEM 55 EXEC (*)  
   d. If required, perform LOAD PDI DECOM FORMAT (ORB OPS FS, COMM/INST)  
   e. Configure IDPs:  
      C2  
         GPC/CRT 03 EXEC  
         GPC/CRT X/4 EXEC  
         Configure MDUs as desired  
         IDP/CRT 3 PWR – OFF  
   O6  
   f. SM GPC OUTPUT – TERM  
   g. Configure for Orbit:  
      O14, RGAs 1,2,3,4 – OFF  
      O15, RJDA/RJDF (all) – as reqd  
      O16, cb ADTA (four) – op  
      O8, MLS (three) – OFF  
   h. Config GPC3 as G3 FD:  
      C2  
         (1) IDP/CRT X MAJ FUNC – PL  
            GPC/CRT 3/X EXEC  
         (2) PL 0 GPC MEMORY  
            CONFIG – ITEM 45 +3 EXEC  
            GPC – ITEM 46 +3 EXEC  
            STORE – ITEM 47 EXEC  
            Store complete when MC = 03  
         (3) Config G3 NBAT for FD GPC per table  
            Recovered PASS GPCs  
         
            1,2,3,4  
            CONFIG GPC 3 00300  
            STR 1 3  
            2 3  
            3 3  
            4 3  
            PL 1/2 0  
            CRT 1 3  
            2 3  
            3 3  
            4 0  
            L 1 0  
            2 0  
            MM 1 3  
            2 3  
   i. If single GNC GPC config desired:  
      C2,R11  
         (1) IDP/CRT X MAJ FUNC – GNC  
            GNC 0 GPC MEMORY  
            CONFIG – ITEM 1 +2 EXEC  
            Assign GPC 1, all FC strings, CRTs, and MM per table  
      C3(A6U)  
      (2) DAP: FREE  
         VERN(ALT)  
         GNC, OPS 201 PRO  
      C3(A6U)  
      (3) Pause ~30 sec (DAP settling)  
      DAP: as reqd  
      O6 (4) √All IDPs deassigned from GPC 3  
       GPC 3 MODE – STBY (tb-bp)  
          – HALT  
          – STBY (tb-RUN)  
          – HALT (tb-bp)  

GPC FRP-4 (Cont)

C2

(4) Config GPC 2 as G2 FD:
   IDP/CRT X MAJ FUnC – PL
   GPC/CRT 2/X EXEC
   PL 0 GPC MEMORY
   CONFIG – ITEM 45 +2 EXEC
   GPC – ITEM 46 +2 EXEC
   STORE – ITEM 47 EXEC
   Store complete when MC = 02

(5) All IDPs deassigned from GPC 2:
   GPC 2 MODE – STBY (tb-bp)
   – HALT
   – STBY (tb-RUN)
   – HALT (tb-bp)

j. Orbit config established:
   (1) Reference Final Configuration Table Set IV A & B, 5-82
   (2) As time permits work GPC FRP-1 to re-IPL BFS into GPC 5 >>
## Final Configuration Tables

### I. Single PASS GPC

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II. Two PASS GPCs

A. Entry Config

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Final configuration for GPCs 1,2 recovered

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Final configuration for GPCs 1,3 recovered

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Final configuration for GPCs 2,3 recovered

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#### B. Orbit Config

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- **ON**
- **NORM**
- **RUN**
- **HALT**
- **TERM**

**OUTPUT MODE**
- **OFF**
- **NORM**
- **HALT**
- **RUN**

**CONFIG**
- **GPC 2**
- **GPC 4**

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**POWER OUTPUT MODE**
- **OFF**
- **ON**
- **NORM**
- **RUN**
- **HALT**
- **TERM**

**OUTPUT MODE**
- **OFF**
- **NORM**
- **HALT**
- **RUN**

**CONFIG**
- **GPC 2**
- **GPC 4**

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Final configuration for GPCs 3, 4 recovered
### Final Configuration Tables (Cont)

#### Final configuration for GPCs 1,2,3 recovered

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| CRT 1 | 1 | 1 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 |
| L 1 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 0 | 4 |
| MM 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

#### Final configuration for GPCs 1,2,4 recovered

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| L 1 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 0 | 4 |
| MM 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

#### Final configuration for GPCs 1,3,4 recovered

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| PL 1/2 | 0 | 0 | 1 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 |
| CRT 1 | 1 | 1 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 |
| L 1 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 0 | 4 |
| MM 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

#### Final configuration for GPCs 2,3,4 recovered

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| CRT 1 | 1 | 1 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 4 | 4 |
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10/20/08 5-81 MAL/ALL/GEN J
Final Configuration Tables (Cont)

IV. Four PASS GPCs

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B. Single G2 Config

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Final configuration for GPCs 1,2,3,4 recovered

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NOTE
Procedure is designed to protect GPCs from overheating by moving G2, SM, BFS functions into cooled Av Bay GPCs (if not already there). G3FD and G2FD functions are placed into uncooled Av Bay GPCs and halted. If BFS is moved, new BFS GPC will be dumped to provide good BFS for Entry.

For Ascent, this FRP assumes LOSS OF AV BAY 1(2,3) COOLING/AV BAY 1(2,3) FIRE procedure (ASC PKT, PWRDN) has been accomplished.

If Orbit Config is G8 (FCS C/O), substitute for G2 where appropriate. If Orbit Config is G3, go to LOSS OF AV BAY 1(2,3) COOLING (ENT PKT, PWRDN) >>

Perform steps

ASCENT (G1) a-h
ORBIT (G2,G8/S2) i-q

ASCENT

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NOTE
No keyboard entries or SW throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction
requests until new OPS base page is displayed

a. Establish G2 freeze-dry GPC (Av Bay 1 – GPC 1; Av Bay 2 – GPC 2; Av Bay 3 – GPC 3)
   • Perform FREEZE-DRY REASSIGNMENT.......................... DPS SSR-5

b. Secure BFS (Av Bay 1, 3 only)
   C2
   • BFS GNC, OPS 000 PRO
   C3
   • BFC CRT DISP – OFF
   • All IDPs deassigned from BFS
   O6
   • GPC MODE 5 – STBY, HALT (tb-bp)
   • OUTPUT 5 – NORM

c. Transition to GNC OPS 2

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</table>

d. Transition to OPS 2
   • Perform SM REASSIGNMENT........................................... DPS SSR-4

e. If Av Bay 2, reassign BFS to GPC 3:
   • Perform GPC IPL MENU OPTION (PASS/BFS).................. DPS SSR-7
   • Dump newly IPL’d BFS:
     • Perform GPC SW INITIATED MEM DUMP GPC (3)
       (Target).............................................................. DPS SSR-2
   C3
   • BFC CRT DISP – OFF
     • All IDPs deassigned from BFS
    O6
    • GPC MODE 3 – STBY, HALT (tb-bp)
    • OUTPUT 3 – NORM
   Re-IPL GPC 5:
   • Perform GPC IPL – PASS............................................ DPS SSR-8
   O6
   • GPC MODE 5 – STBY (tb-bp), HALT
     • STBY (tb-RUN)
     • HALT (tb-bp)
GPC FRP-7 (Cont)

f. Perform LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

g. Config LRU switches:

<table>
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<tr>
<th>Av Bay 1</th>
<th>Av Bay 2</th>
<th>Av Bay 3</th>
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</thead>
<tbody>
<tr>
<td>O14:A</td>
<td>O15:A</td>
<td>O13:A</td>
</tr>
<tr>
<td>BRAKES MNA – OFF</td>
<td>BRAKES MNB – OFF</td>
<td>cb ESS 1BC C/W A – op</td>
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<tr>
<td>:E</td>
<td>:E</td>
<td>O7</td>
</tr>
<tr>
<td>cb MNA ADTA 1 – op</td>
<td>cb MNB ADTA 2 – op</td>
<td>TACAN 3 MODE – OFF (OV103,4)</td>
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<td>O16:A</td>
<td>O16:A</td>
<td>O7</td>
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<tr>
<td>BRAKES MNC – OFF</td>
<td>BRAKES MNC – OFF</td>
<td>GPS 3 – OFF (OV105)</td>
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<td>:E</td>
<td>O7</td>
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<tr>
<td>cb MNC ADTA 3 – op</td>
<td>cb MNC ADTA 4 – op</td>
<td>GPS 3 PRE AMPL UPPER – OFF</td>
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<tr>
<td>O7</td>
<td>O7</td>
<td>O7</td>
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<tr>
<td>TACAN 1 MODE – OFF (OV103,4)</td>
<td>TACAN 2 MODE – OFF (OV103,4)</td>
<td>GPS 3 PRE AMPL LOWER – OFF (OV105)</td>
</tr>
</tbody>
</table>

| O8       | O8       | L4:P     |
| MLS 1 – OFF | MLS 2.3 (two) – OFF | cb AC3 φA LG SNSR 1 – op |
| L4:P     |          |          |
| cb AC2 φA LG SNSR 2 – op | |

h. Config IDPs:
- GPC/CRT 03 EXEC
- GPC/CRT SM GPC/4 EXEC
- IDP/CRT3 PWR – OFF
- MDU PWR – OFF (as desired)

At deorbit prep, perform LOSS OF AV BAY AIR COOLING (DEORBIT PREP, CONTINGENCY DELTA)
Final Config matrices at end of FRP

ORBIT

i. Orbit procedure assumes nominal ORBIT DPS config. If Orbit Config is G3 of less than 2 hr from deorbit burn, go to LOSS OF AV BAY 1(2,3) COOLING (ENT PKT, PWRDN) >>

If Av Bay 3:
- If triple G2, perform FREEZE-DRY REASSIGNMENT
  (Target GPC 3) .................................................. DPS SSR-5
- Go to step p

If Av Bay 1 and config is single G2:
- Expand set to include GPC 2 (in cooled Av Bay)
- Perform GNC REASSIGNMENT .................................. DPS SSR-3

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j. Single G2 GPC ops
- Perform GNC REASSIGNMENT .................................. DPS SSR-3

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</tbody>
</table>
If Av Bay 1, use BFS for systems monitoring:
- Perform SM CHECKPOINT INITIATE (ORB OPS, DPS)
- If reqd, perform PL/DFS RECONFIG. (PL SYS or SODF: ASSY OPS)

If RMS active:
- SM 94 PDRS CONTROL
  - Note WR range, PL ID, PL INIT ID, EE ID, SPEC 95 overrides
- SM GPC MODE – STBY (tb-bp), RUN (tb-RUN)
- GPC OUTPUT 4 – NORM
- IDP/CRT3 PWR – ON
- MDU PWR – ON (as desired)

C3
- BFC CRT SEL – 3+1
- DISP – ON
- BFS GPC PWR – ON
  - MODE – RUN (during LOS for C/W tones)
  - STBY (during AOS for gnd comm mgmt)
- If no comm at next AOS, select best antenna

k. If time insufficient for complete reconfig:

<table>
<thead>
<tr>
<th>Av Bay 1</th>
<th>Av Bay 2</th>
</tr>
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<tbody>
<tr>
<td>GPC 1,4 MODE – STBY (tb-bp), HALT</td>
<td>GPC 2 MODE – STBY (tb-bp), HALT</td>
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<td>STBY (tb-RUN)</td>
<td>STBY (tb-RUN)</td>
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<tr>
<td>HALT (tb-bp)</td>
<td>HALT (tb-bp)</td>
</tr>
<tr>
<td>√5 MODE – HALT (tb-bp)</td>
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</table>

- Perform step p, and √MCC

l. Establish freeze-dry GPC (Av Bay 1 – GPC 1; Av Bay 2 – GPC 2)
  - Perform FREEZE-DRY REASSIGNMENT ..................... DPS SSR-5

m. Reassign GPC 3
If Av Bay 1, reassign SM to GPC 3:
- Perform SM REASSIGNMENT ..................................... DPS SSR-4
- IDP/CRT3 PWR OFF as desired
- MDU PWR OFF as desired
- BFS GPC MODE – STBY, HALT (tb-bp)
- BFS GPC OUTPUT – NORM
If Av Bay 2, reassign BFS to GPC3:
- Perform GPC IPL MENU OPTION (PASS/BFS) .......... DPS SSR-7

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</table>
GPC FRP-7 (Cont)

n. If time permits or multiple G2FD GPC:
   • If Av Bay 2 perform GPC IPL – PASS
     (target GPC 5) ............................................................. DPS SSR-8
   • CONFIG ITEM 1+2 EXEC
   • Modify MC 2 per table
   • GNC, OPS 201 PRO
   • Perform FREEZE-DRY REASSIGNMENT
     (Av Bay 1 – GPC 4; Av Bay 2 – GPC 5) ..................... DPS SSR-5

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o. If single G2FD config desired, halt GPCs in failed Av Bay

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<td>√ GPC 1 MODE – HALT</td>
<td>√ GPC 2 MODE – HALT</td>
</tr>
<tr>
<td>4 MODE – STBY (tb-bp), HALT</td>
<td>5 MODE – STBY (tb-bp), HALT</td>
</tr>
<tr>
<td>– STBY (tb-RUN)</td>
<td>– HALT (tb-bp)</td>
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p. Config LRU switches:

<table>
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<th>Av Bay 1</th>
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<th>Av Bay 3</th>
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</thead>
<tbody>
<tr>
<td>Perform PL PWRDN, then: (OV105)</td>
<td>Perform PL PWRDN, then: (OV105)</td>
<td>cb ESS 1BC C/W A – op</td>
</tr>
<tr>
<td>O16:A cb MNC ADTA 1 – op</td>
<td>O16:A cb MNC ADTA 2 – op</td>
<td>O7 TACAN 3 MODE – OFF (OV103,4)</td>
</tr>
<tr>
<td>O7 TACAN 1 MODE – OFF (OV103,4)</td>
<td>O7 TACAN 2 MODE – OFF (OV103,4)</td>
<td>√ TACAN 3 MODE – OFF (OV103,4)</td>
</tr>
<tr>
<td>√ GPS 1 – OFF (OV105)</td>
<td>√ GPS 1 PRE AMPL UPPER – OFF (OV105)</td>
<td>√ GPS 3 – OFF (OV105)</td>
</tr>
<tr>
<td>√ GPS 1 PRE AMPL LOWER – OFF (OV105)</td>
<td>√ GPS 3 PRE AMPL LOWER – OFF (OV105)</td>
<td>√ GPS 3 – OFF (OV105)</td>
</tr>
<tr>
<td>O8 MLS 1 – OFF</td>
<td>O8 MLS 2,3 (two) – OFF</td>
<td>√ GPS 3 PRE AMPL UPPER – OFF (OV105)</td>
</tr>
<tr>
<td>L4:P cb AC3 øA LG SNSR 1 – op</td>
<td>L4:P cb AC2 øA LG SNSR 2 – op</td>
<td>√ GPS 3 PRE AMPL LOWER – OFF (OV105)</td>
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</tbody>
</table>
q. If Av Bay 2, S/W dump newly IPL’d BFS GPC:
   • Perform GPC S/W INITIATED MEM DUMP
     (Target GPC3) ............................................................ DPS SSR-2
   • BFC CRT DISP – OFF
   • All IDPs deassigned from BFS
   • GPC MODE 3 – STBY,HALT (tb-bp)
   • OUTPUT 3 – NORM

At deorbit prep, go to LOSS OF AV BAY AIR COOLING (DEORB PREP, CONTINGENCY DELTAS)

**FINAL CONFIG**
(Ascent and Orbit with single G2FD GPC)

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* BFS for orbit: PASS OPS 0 for Ascent
### GPC FRP-7 (Cont)

**FINAL CONFIG**  
(Orbit with multiple G2FD GPCs)

<table>
<thead>
<tr>
<th>Av Bay 1</th>
<th>Av Bay 2</th>
<th>Av Bay 3</th>
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<tr>
<td><strong>GPC OPS</strong></td>
<td><strong>GPC OPS</strong></td>
<td><strong>GPC OPS</strong></td>
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<tr>
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**GPC 2**

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<th>GPC OPS</th>
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</tbody>
</table>
NOTE
Perform during AOS

O6 1. GPC MODE 1(2,3,4,5) – HALT
     PWR 1(2,3,4,5) – ON
     OUTPUT 1(2,3,4,5) – TERM
     GPC MEM DUMP – 1(2,3,4,5)
     Perform next step at noted dump time

2. SM 62 PCMMU/PL COMM
   If reqd, load dump TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

3. If PASS:
   Select failed GPC X as downlister (avoids downlist contention)
   SM(GNC) 0 GPC MEMORY
   DOWNLIST GPC – ITEM 44 +X EXEC

O6 4. GPC MODE 1(2,3,4,5) – STBY (starts dump)
     Wait: Double dump of PASS GPC complete after 4 min; single dump of BFS complete after 8 min

O6 5. GPC MODE 1(2,3,4,5) – HALT (stops dump)
     OUTPUT 1(2,3,4,5) – NORM

MO42F 6. GPC MEM DUMP – OFF

7. SM 62 PCMMU/PL COMM
   If reqd, load post dump TFL:
   LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)
NOTE
Perform AOS. This procedure will generate a complete GPC Software
Memory Dump in all in-flight OPS. Single item entry dumps must be
performed in a HDR TFL

1. SM 62 PCMMU/PL COMM
   If reqd, load dump TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

2. If PASS:
   a. If GNC, SM, or PL9 Memory Dump:
      On display assigned to GPC to be dumped,
      √
      DUMP START/STOP – ITEM 43 EXEC
      Item 40 (up), 41 (down) entries begin counting
      Dump complete when ITEMS 40,41 blank
   b. If an OPS 0 GPC Memory Dump:
      If target OPS 0 GPC MODE – HALT:
      √
      APPROPRIATE AV BAY FAN – ON
      √
      Target GPC PWR – ON
      Target GPC MODE – STBY (tb-RUN)
      – RUN (OUTPUT tb-gray)
      Assign desired IDP/CRT to OPS 0 GPC: GPC/CRT XX EXEC
      PL 0 GPC MEMORY
      DUMP START/STOP – ITEM 43 EXEC
      Item 40 (up), 41 (down) entries begin counting
      Dump complete when ITEMS 40,41 blank
      DUMP START/STOP – ITEM 43 EXEC (lowest ID GNC GPC)

3. If BFS:
   GNC 0 BFS MEMORY
   DUMP START/STOP – ITEM 24 EXEC
   Item 21 (up), 22 (down) entries begin counting
   Dump complete when ITEMS 21,22 blank (after 8 min)

4. SM 62 PCMMU/PL COMM
   If reqd, load post dump TFL:
   LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)
NOTE
No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction
requests until new OPS base page is displayed

1. If target GPC MODE – HALT:
   L1 √ Appropriate AV BAY FAN – ON
   O6 √ Target GPC PWR – ON
       MODE – STBY (tb-RUN), RUN

2. √ Target GPC OUTPUT – NORM

3. If SM GPC being deleted:
   If reqd, perform PL/DPS RECONFIG, Secure (PL SYS or SODF: ASSY OPS), then:
   Perform SM CHECKPOINT INITIATE (ORB OPS, DPS), then:
   SM(GNC) 1 DPS UTILITY
   UL CNTL
   ENA – ITEM 36 EXEC (*)

NOTE
Ku-Band system may be reqd to be taken to Standby to prevent exceeding
radiation constraints

4. If AOS:
   √ MCC for comm config and radiation constraints
   if no comm:
   A1U
   KU PWR – STBY
   CNTL – PNL, CMD
   Go to COMM LOST (ORB PKT, COMM) steps 7 and 8

5. √ All GPCs being added to current redundant set in OPS 0.
   If new GPC is in simplex ops (SM or PL), select OPS 0 via OPS 000 PRO
   C2,R11L 6. IDP/CRT1(2,3,4) MAJ FUNC – GNC
   [GNC 0 GPC MEMORY]
   CONFIG – ITEM 1 +X EXEC
   X = 1 if G1, 2 if G2, 8 if G8, 3 if G3
   Assign desired GPC(s), strings, PL 1/2 (if no SM GPC active), CRTs, and MMs
   If SM GPC active, deassign PL 1/2

7. If G3:
   O14, RGAs 1,2,3,4 – ON
   O15, √ RJDA/RJDF (all) – ON
   O16 cb ADTA (four) – cl
   O8 MLS (three) – ON
   C2,R11L 8. Using display assigned to a current redundant set GNC GPC,
   IDP/CRT MAJ FUNC – GNC
   C3 √ BFC CRT DISP – OFF

9. GNC, OPS X X X PRO (√DAP)
   XXX = 106 if G1, 201 if G2, 301 if G3, 801 if G8
   √ [GNC (Major Mode Display)]

10. If PASS and BFS in G1(G3) and BFS not engaged, BFS I/O RESET

11. √ Appropriate DAP mode selected

12. [GNC 0 GPC MEMORY]
    DOWNLIST GPC – ITEM 44 +X EXEC
    X = GNC GPC

13. Go to PL/DPS RECONFIG, Recovery (PL SYS or SODF: ASSY OPS)
NOTE
No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction
requests until new OPS base page is displayed

A1U  1. KU PWR – STBY
     CNTL – PNL, CMD
     If no comm, go to COMM LOST (ORB PKT, COMM) steps 7 and 8

2. If target GPC MODE – HALT:
    √ Appropriate AV BAY FAN – ON
    √ Target GPC PWR – ON
    MODE – STBY (tb-RUN), RUN

3. √ Target GPC OUTPUT – NORM

4. If target GPC not in OPS 0:
   
   
   GPC 0 GPC MEMORY
   CONFIG – ITEM 1 +X EXEC
   X = 2 if G2, 8 if G8, 3 if G3
   Reassign target GPC strings, CRTs, MMs
   Do not reconfig target set
   √ PL 1/2 deassigned from G2/G3/G8
   GNC, OPS X X X PRO
   DOWNS GPC – ITEM 44 +X EXEC
   X = nontargeted GNC GPC
   
   O6  
   GPC MODE (tgt) – STBY (tb-bp)
   RUN (tb-RUN)

5. If SM GPC currently active:
   If reqd, perform PL/DPS RECONFIG, Secure (PL SYS or SODF: ASSY OPS), then:
   If RMS active:
   
   SM 94 PDRS CONTROL
   Note WR range, PL ID, PL INIT ID, EE ID, SPEC 95 Overrides
   Perform SM CHECKPOINT INITIATE (ORB OPS, DPS), then:
   
   O6  
   SM GPC OUTPUT – NORM
   MODE – STBY (tb-bp), RUN (tb-RUN)

6. SM(GNC) 1 DPS UTILITY
   UL CNTL
   ENA – ITEM 36 EXEC (*)
   If checkpoint previously done, CKPT RETRV ENA – ITEM 12 EXEC (*)

C2  7. Desired IDP/CRT MAJ FUNC – SM
   If desired IDP not currently assigned to target GPC, GPC/CRT target GPC/desired IDP EXEC

8. SM 0 GPC MEMORY
   CONFIG – ITEM 1 +4(5) EXEC
   Assign desired GPC, PL 1/2, CRTs, LAUNCH 1, MMs

C2  9. SM, OPS 201(401) PRO
     √ SM ANTENNA

10. If SM-reassign performed to troubleshoot SM GPC/LRU interface:
    If original error recurs, problem at LRU:
    Reconfig to prior DPS config
    √MCC for possible IFM
    If error does not recur, problem at old SM GPC:
    Perform DPS FRP-1, then:

11. Reload TFLs, LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

12. If RMS PWR – PRI (MCIU powered):
    SM 94 PDRS CONTROL (MA, C/W GPC DATA It on)
    I/O ON – ITEM 5 EXEC (*) (C/W GPC DATA It off)
    Update as needed:
    WR range, PL ID, PL INIT ID, EE ID, SPEC 95 Overrides
    SAFING – CANCEL (tb-bp if arm deselected)
13. If permanent SM GPC being established:
   If BFS not engaged:
   Target SM GPC OUTPUT – TERM
   SM(GNC) 1 DPS UTILITY
   UL CNTL
   AUTO – ITEM 35 EXEC (*)
   If reqd, go to PL/DPS RECONFIG, Recovery (PL SYS or SODF: ASSY OPS)

14. Clear software fail votes On MCC GO:
    GNC 0 GPC MEMORY
    I/O ERR LOG RESET
    ITEM 48 EXEC
    SM 0 GPC MEMORY
    I/O ERR LOG RESET
    ITEM 48 EXEC
DPS SSR-5
FREEZE-DRY REASSIGNMENT

NOTE
No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction
requests until new OPS base page is displayed

O6
1. √ Target FD GPC PWR – ON, OUTPUT – NORM, and MODE – RUN

2. If target GPC not in OPS 0:
   Reassign target GPC strings (if reqd):
   [GNC 0 GPC MEMORY]
   CONFIG – ITEM 1 +X EXEC (X = 1 if G1; 2 if G2; 8 if G8)
   Reassign strings, CRTs, and MMs
   GNC. OPS X X X PRO
   (Tgt) GPC MODE – STBY (tb-bp)
   – RUN (tb-RUN)

C2
3. If IDP not assigned to target GPC:
   Desired IDP/CRT MAJ FUNC – PL
   GPC/CRT target GPC/desired IDP EXEC

4. [PL 0 GPC MEMORY]
   DOWNLIST GPC – ITEM 44 +X EXEC (X = active GNC GPC)
   STORE MC:
   CONFIG – ITEM 45 +2(3) EXEC
   GPC – ITEM 46 +X EXEC (X = target GPC)
   STORE – ITEM 47 EXEC
   Store complete when MC = 2(3)

5. If G3FD, config NBAT for FD GPC:
   CONFIG – ITEM 1 +3 EXEC
   Assign FD GPC, all strings, CRTs 1,2,3, and MMs

O6
6. (FD GPC) GPC MODE – STBY (tb-bp), HALT
   – STBY (tb-RUN)
   – HALT (tb-bp)
NOTE
Perform AOS

1. **SM 62 PCMMU/PL COMM**
   If reqd, load TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)

2. If PASS:
   a. On display assigned to GPC to be dumped:
      **SM(GNC) 0 GPC MEMORY**
      If GNC GPC to be dumped, \( \text{DOWNLIST GPC} – \text{ITEM 44 +X EXEC} \)
   b. If OPS 0 GPC to be dumped:
      **OPS 0 ENA – ITEM 49 EXEC (*) (TFL 163)**
      If target OPS 0 GPC MODE – HALT:
      \( \text{\wedge\text{Appropriate AV Bay Fan – ON}} \)
      \( \text{\wedge\text{Target GPC PWR – ON}} \)
      \( \text{\wedge\text{Target GPC MODE – STBY (tb-RUN),RUN}} \)
      Assign desired IDP/CRT to OPS 0 GPC: **GPC/CRT XX EXEC**
   c. MEMORY DUMP (setup):
      If partial dump required: \( \text{\wedge\text{MCC for input values in setup}} \)
      If complete dump required:
      **START ID – ITEM 40 +0 0 0 0 0 EXEC**
      **NUMBER WDS – ITEM 41 +3 2 7 6 7 9 EXEC**
      **WDS/FRAME – ITEM 42 +X X X EXEC**
      \( \text{\{128 if G1/G3, 112 if G2/G8, 48 if SM, 32 if OPS 0/PL9\}} \)
   d. MEMORY DUMP (start):
      **GNC(SM,PL) 0 GPC MEMORY**
      **DUMP START/STOP – ITEM 43 EXEC**
      Item 40 (up), 41 (down) entries begin counting
      Dump complete when ITEMs 40,41 blank
      Dump time (in min):
      | MF/OPS | GNC | SM | OPS 0 (PL9) |
      |--------|-----|----|------------|
      | 2.2    | 5.7 | 9.7|
   e. Perform step 4

3. If BFS:
   a. MEMORY DUMP (setup):
      If partial dump required: \( \text{\wedge\text{MCC for input values in setup}} \)
      If complete dump required:
      **GNC 0 BFS MEMORY**
      **START ID – ITEM 21 +0 0 0 0 0 EXEC**
      **NUMBER WDS – ITEM 22 +2 6 2 1 4 4 EXEC**
      **WDS/FRAME – ITEM 23 +3 2 EXEC**
   b. MEMORY DUMP (start):
      **GNC 0 BFS MEMORY**
      **DUMP START/STOP – ITEM 24 EXEC**
      Item 21 (up), 22 (down) entries begin counting
      Dump complete when ITEMs 21,22 blank (after 8 min)

4. **SM 62 PCMMU/PL COMM**
   If reqd, load post-dump TFL: LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)
NOTE
No keyboard entries or switch throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction
requests until new OPS base page is displayed

\*MCC for reapplication of GMEMs as reqd

1. **SM 1 DPS UTILITY**
   - IPL SOURCE SW MASK – ITEM 38 EXEC (no *)
2. IDP/CRT 3(1,2) PWR – ON
3. BFC CRT DISP – ON
   - SEL – 3+1(1+2, 2+3) (Expect big 'X', POLL FAIL on MDU in DPS mode)
4. **NPC source – MMU 1(2)**
   - GPC MODE 1(2,3,4,5) – HALT (tb-bp)
   - OUTPUT 1(2,3,4,5) – NORM (tb-bp)
5. **GPC PWR 1(2,3,4,5) – OFF, ON**
   - If BFS engaged:
     - \*cb DDU L (two) – cl
6. **IPL 1(2,3,4,5) pb – push (tb-IPL, then bp within 2 min)**
7. When tb – bp or 2 min:
   - IDP LOAD 3(1,2) – LOAD
   - GPC MODE 1(2,3,4,5) – STBY (Solid State MMU: tb remains bp, no CAM diagonal or Master Alarm expected)
8. If GPC IPL MENU does NOT appear in 2 min:
   - **GPC MODE 1(2,3,4,5) – HALT**
   - If first attempt:
     - IPL SOURCE – MMU 2(1)
     - Go to step 4 and proceed (one time only)
9. If **GPC IPL MENU** appears:
   - \*ID of GPC is correct
   - Record MSGS STILL IN LIST
   - Record ERROR/MSG CODEs in space provided below, pressing MSG RESET
to cycle through list until MSGS STILL IN LIST = 0

Nominal Codes
1. ERROR/MSG CODE______ √132 (GPC/IP XL:XX.XX.XX.XX.XX LOADED)
2. ERROR/MSG CODE______ √137 (DCP XX.XX.XX.XX.XX LOADED)
3. ERROR/MSG CODE______
4. ERROR/MSG CODE______
5. ERROR/MSG CODE______

**NOTE**
If ERROR/MSG CODEs 097 (no IDP poll response) and/or 112 (IDP BITE error) are received in addition to the two nominal codes, ignore and continue. For any other codes, STOP. √MCC

9. If PASS IPL desired:
   a. Load desired copy of PASS software from MM ITEM 1(3,5) EXEC (*) (MODE tb-RUN within 2 min) (Expect big 'X', POLL FAIL on MDU in DPS mode)
   b. When tb – RUN or 2 min:
      - GPC MODE 1(2,3,4,5) – RUN
      - \*OUTPUT 1(2,3,4,5) – NORM (tb-gray)
   c. If **GPC MEMORY** does NOT appear in 2 min:
      - **GPC MODE 1(2,3,4,5) – HALT**
      - If first attempt:
        - BFS CRT DISP – ON
        - IPL SOURCE – MMU 2(1)
        - Go to step 4 and proceed (one time only)
      - If second attempt:
        - GPC PWR 1(2,3,4,5) – OFF
DPS SSR-7 (Cont)

d. IPL SOURCE – OFF

e. Go to step 11

10. If BFS IPL desired:
   a. If orbit config:
      - On MCC GO, select PCMMU format
      - Go to step 11

   b. Load desired copy of BFS software from MM:
      - Go to step 11

   c. If 'BSL XX.XX.XX.XX.XX LOADED' does not appear within 2 min:
      - IPL SOURCE – MMU 2(1)
      - Go to step 4 and proceed (one time only)

   d. If 'BSL XX.XX.XX.XX.XX LOADED' appears (within 2 min),
      - MSG RESET pb – push (repeat until 'MSGS STILL IN LIST' = 0)

   e. Expect 'KSC XX.XX.XX.XX.XX LOADED SET MMU SEL SW TO OFF' &
      - Continue with procedure and notify MCC when convenient

   O6 f. IPL SOURCE – OFF
      - MSG RESET pb – push (repeat until 'MSGS STILL IN LIST' = 0)

   g. \IDP/CRT MAJ FUNC – GNC
      - If \[GNC \& BFS MEMORY\] does not appear within 2 min:
      - GPC MODE 1(2,3,4,5) – HALT
      - Go to step 4 and proceed (one time only)

   h. If entry config:
      - BFS/GNC, OPS 301 PRO

   i. If orbit config, verify BFS will track PASS strings:
      - When time permits, on MCC GO:

O14,O15 All RGAs – ON
O16 cb ADTA (four) – cl
O8 MLS (three) – ON
O14,O15,O16 Primary RJD LOGIC, DRIVER (sixteen) – ON
   - All strings, CRTs, MMs, assigned to current GNC GPCs in MC3
   - PASS, GNC OPS 301 PRO
   - BFS, GNC, OPS 301 PRO
   - BFS, GNC, OPS 000 PRO
   - PASS, GNC, OPS 201 PRO

O14,O15 All RGAs – OFF
O16 cb ADTA (four) – op
O8 MLS (three) – OFF
GNC 22 S TRK/COAS CNTL
S TRK Y, Z: STAR TRK – ITEM 3,4 EXEC (*)
GNC 21 IMU ALIGN; RESUME
Reconfig DAP and attitude per FLIGHT PLAN
If Group B(C) PWRDN:
\DAP: \VERN
O14,O15,O16 Primary RJD LOGIC, DRIVER (sixteen) – OFF
O14 RJDA 1A L2/R2 MANF DRIVER – ON

j. Select program PCMMU FORMAT:
   - Go to step 11

C3 \[\text{Select program PCMMU FORMAT:} \]
- Go to step 11

11. SM 1 DPS UTILITY
   - IPL SOURCE SELECT SW MASK – ITEM 38 EXEC (*)
NOTE
No keyboard entries or sw throws 10 sec:
Before and after moding PASS GPCs to RUN
Before OPS transition or set expansion/contraction
requests until new OPS base page is displayed

NOTE
\^MCC for reapplication of GMEMs as reqd

1. SM 1 DPS UTILITY
   IPL SOURCE SW MASK – ITEM 38 EXEC (no *)
   C3
2. BFC CRT DISP – OFF (BFS will default to IDPs 1,2 if engaged)
   O6
3. IPL SOURCE – MMU 1(2)
   GPC OUTPUT 1(2,3,4,5) – NORM (tb-bp)
   MODE 1(2,3,4,5) – HALT (tb-bp)
   F7
   FLT CNTLR PWR – ON
   BFS ENGAGE pb – push
   FLT CNTLR PWR – OFF
   O14:E, cb DDU L (two) – cl
   O15:E
   If off-diagonal CAM lts on, execute error log reset:
   GNC 0 GPC MEMORY
   ERR LOG RESET – ITEM 48 EXEC
   Repeat for SM, PL, OPS 0 as applicable
4. GPC PWR 1(2,3,4,5) – OFF, ON
   If BFS engaged:
   O14:E, cb DDU L (two) – cl
   O15:E
   If off-diagonal CAM lts on, execute error log reset:
   GNC 0 GPC MEMORY
   ERR LOG RESET – ITEM 48 EXEC
   Repeat for SM, PL, OPS 0 as applicable
5. IPL 1(2,3,4,5) pb – push (tb-IPL, then bp within 2 min)
6. When tb – bp or 2 min:
   GPC MODE 1(2,3,4,5) – STBY (Solid State MMU: tb RUN within 2 min, no CAM or Master Alarm
   expected)
7. When tb – RUN or 2 min, determine if IPL’d GPC can command IDP:
   If BFS not engaged:
   O6
   a. GPC MODE1(2,3,4,5) – RUN (tb remains RUN)
   OUTPUT 1(2,3,4,5) – NORM (tb-gray)
   C2, R11
   b. Desired IDP/CRT MAJ FUNC – PL
   c. GPC/CRT IPL’d GPC/desired IDP EXEC
   d. \^PL 0 GPC MEMORY driven by IPL’d GPC
   If BFS engaged:
   C3
   a. BFC CRT DISP – ON
   SEL – 3+1
   b. If BFS commanding IDP2,
   BFS – GPC/CRT 02 EXEC
   C2
   c. IDP/CRT2 MAJ FUNC – PL
   O6
   d. GPC MODE 1(2,3,4,5) – RUN (tb remains RUN)
   OUTPUT 1(2,3,4,5) – NORM (tb-bp)
   e. If another PASS GPC active, using IDP2
   GPC/CRT IPL’d GPC/2 EXEC
   \^2: PL 0 GPC MEMORY driven by IPL’d GPC
8. If GPC CANNOT command IDP:
   O6
   GPC MODE 1(2,3,4,5) – HALT
   If first IPL attempt:
   IPL SOURCE – MMU 2(1)
   C3
   BFS CRT DISP – OFF
   Go to step 4 and proceed (one time only)
   If second IPL attempt:
   GPC PWR 1(2,3,4,5) – OFF
   O6
9. IPL SOURCE – OFF
10. SM 1 DPS UTILITY
    IPL SOURCE SW MASK – ITEM 38 EXEC (*)
NOTE
Procedure assumes active PASS kybd available, functional PASS GPC in SM OPS 2/4 POST IPL OPS 0, PL9, or functional BFS GPC. If loading from BFS, note that PASS critical formats are not used by BFS. DEU has full capability and CRT can be assigned to PASS via PASS GPC/CRT kybd entry if desired and used to support all displays except the following:

<table>
<thead>
<tr>
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<tbody>
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</tr>
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<td></td>
</tr>
<tr>
<td>XXXXX MNVR YYYY</td>
<td>S TRK/COAS CNTL</td>
<td></td>
</tr>
<tr>
<td>XXXXXX TRAJ</td>
<td>IMU ALIGN</td>
<td></td>
</tr>
</tbody>
</table>

The SM common buffer is utilized during SM 2/4 DEU IPL. Other operations which contend for the buffer are TFL loads, SM checkpoint/restore, orbiter mass memory read/write SPEC operations, and crew text uplinks (TUMMS)

C2/R11L 1. √ CRT1(2,3,4) PWR – ON
   CRT1(2,3,4) MAJ FUNC – SM (use PL if loading from PL9, Post IPL OPS 0, or BFS GPC)

C3 2. √ DEU not assigned to BFS via BFC CRT DISP/SEL switches
   On active PASS kybd,
   C2/R11L GPC/CRT 0/1(2,3,4) EXEC
   O6 DEU 1(2,3,4) LOAD – LOAD (repeat if reqd)
   √ DEU LOAD msg appears on CRT
   [IF NO RESPONSE]
   C2/R11L CRT1(2,3,4) PWR – OFF, then ON
   O6 DEU 1(2,3,4) LOAD – LOAD (repeat if reqd)

3. When DEU LOAD msg appears on CRT, on active PASS/BFS kybd:
   C2/R11L GPC/CRT SM OPS 2/4 (PL9, POST IPL OPS 0, BFS) GPC/1(2,3,4) EXEC
   If ‘CM BUF BSY CRT X’ msg annunciated, wait for contending operation to complete, then retry DEU IPL:
   Go back to step 2 and proceed

4. √ ‘IPL COMPLETE’ msg followed by active display on CRT (ANTENNA for SM OPS 2/4, GPC MEMORY for POST IPL OPS 0, MASS MEMORY R/W for PL9, or blank display with active time fields for BFS)
   [IF NO RESPONSE OR ‘IPL INCOMPLETE’ MSG APPEARS ON CRT]
   C2/R11L CRT1(2,3,4) PWR – OFF, then ON
   O6 DEU 1(2,3,4) LOAD – LOAD (repeat if reqd)

5. When active display appears,
   C2/R11L CRT1(2,3,4) MAJ FUNC – GNC (SM,PL) (as desired)
   If loading from BFS, CRT can be assigned to PASS via PASS GPC/CRT kybd entry if desired. However, displays noted above will not be supported
ECLS

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The following Fault Msgs have no corresponding MAL procedures in this book:
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’S66 VAC VNT N2 TEMP’
’S78 CABIN O2 CONC’
’S66 CAB AIRLK PRESS’
‘SM1 SMOKE CAB L FD’
‘177 EXT A/L PRESS’
‘SM1 SMOKE CAB R FD’
‘177 A/L VEST DP’
‘SM1 SMOKE CAB HX’
‘177 AL H2O LCG P1(2)’
‘SM1 SMOKE BAY 1(2,3) A(B)’
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### BFS FSM INDEX

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The following Fault Msgs have no corresponding MAL procedures in this book:
- SM1 CABIN HX T
- SM2 TEMP
6.1a CABIN FAN ΔP

1. Turn on both Cabin Fans for sleep
2. MCC to determine exact failure
3. If check vlv is failed open, fan currently selected is the only operational fan available
4. May be possible to find duct leakage or blockage by checking airflow at all inlets and outlets
5. This step prevents overtempering avionics while MCC is evaluating failure

Nominal Config:
(L4:K)
cb AC1 oB CAB AIR
S/C – cl
cb AC2 CAB FAN B
(three) – cl
cb AC3 CAB FAN A
(three) – cl
(L4:L)
cb AC1 oA CAB T
CNTLR 1 – cl
cb AC2 oA CAB T
CNTLR 2 – cl
(L1)
CAB FAN A(B) – ON
CAB TEMP CNTLR – 1(2)
CAB TEMP – as reqd

1. Turn off Cabin Fan

2. Turn on alternate Cabin Fan

3. CABIN FAN ΔP INST FAILURE

4. Turn on original Cabin Fan

5. CAB FAN A(B) FAILURE, CHECK VLV FOR CAB FAN A(B) FAILED CLOSED OR CHECK VLV FOR CAB FAN B(A) FAILED OPEN

6. For debris
   • Debris trap for blockage
   • Perform FILTER CLEANING – MIDDECK FLOOR (IFM) to clean CAB FAN Filter

7. AIR DUCT LEAKAGE OR SNSR SHIFTED LOW

8. Safe avionics
   • Go to CABIN EQUIP PWRDN, ECLS SSR-6

9. CLOGGED DEBRIS TRAPS CAUSED AIR FLOW BLOCKAGE

10. Avionics
    • Perform FLIGHT DECK PORT, STBD AND MIDDECK FILTER CLEANING (IFM)

11. CLOGGED LRU FILTER(S) CAUSED AIR FLOW BLOCKAGE

12. Turn on original Cabin Fan

13. AIR DUCT BLOCKAGE OR SNSR SHIFTED HIGH DUE TO SLOPE CHANGE
Temps can be read from meter on pnl O1

MCC to determine exact failure

Temps high and increasing in more than one bay?

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

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• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)

Reconfig

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

H2O LOOP

Nominal Config:
Refer to 6.4I

Air cooling

Switch H2O Loops
Wait 5 min

H2O cooling

Switch H2O Loops
Wait 5 min

Temp XDCR FAILURE

Go to ECLS SSR-4 [4]. RECONFIG TO ALT H2O LOOP

Reconfig

Reconfig

Reconfig

If MCC not available and AV BAY TEMP ≥ 130 or on MCC GO:
• Perform DPS RECONFIG FOR LOSS OF AV BAY COOLING (ASCENT/ORBIT), GPC FRP-7 (DPS)
1. If AV BAY 1(2,3) S/C cb is open, √MCC before attempting to reset cb

2. With loss of ΔP, monitor AV BAY TEMP. If > 130 degF, there is AV BAY cooling problem. If AV BAY TEMP ~H2O LP PUMP OUT T, this is indication of fan failure or duct leakage between fan and HX

3. √MCC to determine exact failure

4. If check valve failed open, fan currently selected for that AV BAY is the only operational fan available

Nominal Config:
(L4:G)
- cb AC1 AV BAY 1 FAN A (three) – cl
- cb AC2 AV BAY 1 FAN B (three) – cl
- cb AC3 AV BAY 3 FAN A (three) – cl (L4:H)
- cb AC1 AV BAY 3 FAN B (three) – cl
- cb AC2 AV BAY 2 FAN A (three) – cl
- cb AC3 AV BAY 2 FAN B (three) – cl (L4:L)
- cb AC1 φB AV BAY 2 S/C – cl
- cb AC2 φB AV BAY 3 S/C – cl
- cb AC3 φB AV BAY 1 S/C – cl (L1)

- AV BAY 1 FAN B(A) – ON
- AV BAY 2 FAN A(B) – ON
- AV BAY 3 FAN B(A) – ON

If AV BAY 1(2,3) FAN ΔP < 2.5 or > 4.3 (3.3 if 10.2 ops)
If Upgraded AV BAY FAN:
ΔP < 4.5 or > 7.8 (5.9 if 10.2 ops)
ECLS 6.1c (Cont)

11 (CRT) AV BAY
1(2,3) TEMP normal

If 14.7 CABIN PRESS:
AV BAY 1 ~10
> AV BAY 2
AV BAY 3 ~20
< AV BAY 1

If 10.2 CABIN PRESS:
AV BAY 1 ~15
> AV BAY 2
AV BAY 3 ~25
< AV BAY 1 ?

12 For aff BAY
(CRT) AV BAY FAN ΔP

′↓′ or ′L′
′↑′ or ′H′

13 AIR DUCT LEAKAGE

14 For debris
• Debris trap for blockage
• Perform LOWER EQUIP BAY FILTER CLEANING (IFM)

15 CLOGGED DEBRIS TRAP CAUSED AIR BLOCKAGE

16 AIR DUCT BLOCKAGE

17 Safe avionics

5 MCC about checking AV BAY duct integrity after completing next step

6 MCC about performing pwrdn of affected bay before performing AV BAY filter cleaning

9

10

11

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18
If SM 2 not available, use BFS SYS SUMM 1 to monitor IMU FAN ΔP

Monitor Speed Snsr '↓' for fan failure if IMU ΔP is lost
Monitor Speed Snr ↓ for fan failure if IMU ΔP is lost

If cb MNA OI H2O BYP LOOP 1 SNSR – op, √MCC before attempting to reset cb

Fan currently selected is the only operational fan available

√MCC for proper IMU config and ops

1. If cb MNA OI H2O BYP LOOP 1 SNSR – op, √MCC before attempting to reset cb

2. Monitor Speed Snr ↓ for fan failure if IMU ΔP is lost

3. Fan currently selected is the only operational fan available

4. √MCC for proper IMU config and ops

---

**ECLS 6.1d (Cont)**

15 Turn on alternate fan

(L1)
- IMU FAN C(A,B) – ON

(CRT)
IMU FAN ΔP indicates:

<table>
<thead>
<tr>
<th>0.0 'L'</th>
<th>18</th>
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<tbody>
<tr>
<td>'↓'</td>
<td>19</td>
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<tr>
<td>Normal</td>
<td>20</td>
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<tr>
<td>'↑' or 'H'</td>
<td>21</td>
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</tbody>
</table>

22 Inlet screen for blockage

- Perform MIDDECK (OVERHEAD) FILTER CLEANING (IFM) for IMU filter only

(CRT) IMU FAN ΔP normal?

23 CLOGGED DEBRIS TRAPS CAUSED AIR BLOCKAGE

24 Turn on original fan

(L1)
- IMU FAN B(C,A) – ON
- IMU FAN C(A,B) – OFF

25 AIR DUCT BLOCKAGE

26 Restore cooling

- Go to CONTINGENCY COOLING – IMU (IFM)
2 Monitor Speed Snsr ↓ for fan failure if IMU ΔP is lost
4 Fan currently selected is the only operational fan available
5 \(\sqrt{\text{MCC}}\) for proper IMU config and ops
6 If (pnl L4) cb AC3 \(\Phi B\) SIG CONDR IMU FAN – op, \(\sqrt{\text{MCC}}\) before attempting to reset
7 Second ‘S66 CABIN IMU’ msg will be generated. This is expected as Speed Snsr S/C failure will affect each IMU Fan

28 (CRT) IMU FAN ΔP ↓’ or ‘L’?

31 IMU FAN A(B,C) CHECK VLV FAILED OPEN

32 (L1) Is IMU FAN with ‘↓’ in the ON position?

34 Ducts for leaks
- Inspect IMU ducting for possible leak
- Unstow Patch Kit
- Repair duct with Aluminum Tape

35 Switch to alternate fan

36 IMU FAN A(B,C) INST FAILURE

37 IMU FAN SPEED SNSR S/C FAILURE

39 Turn on original fan

40 IMU FAN B(C,A) SPEED SNSR FAILURE

41 Turn on original fan

18 Switch to third fan

27 (L1) IMU FAN A(B,C) – ON
- IMU FAN C(A,B) – OFF

30 Switch to alternate fan

33 IMU FAN C(A,B) ON DISCRETE IS FAILED ON

38 AIR DUCT LEAKAGE CAUSED LOW IMU FAN ΔP

42 IMU FAN C(A,B) – ON
- IMU FAN B(C,A) – OFF
3 May take several min to see change in cabin pressure

4 Vacuum vent isolation vlv orifice flows approx 3.0 ± 0.25 lb/hr when closed. If leak rate is less than 3.25 lb/hr, then leak could still be in vacuum vent line.

17 Leak source
If PL O2 leak, Spacelab flown and ASCS in control:
• Perform CONFIGURE FOR ORBITER PCS (SLM OPS, ECLSS)
  • If PL N2 leak >>

18 O2(N2) FLOW 1(2) ≈ 0 lb/hr or 'L'?

19 (MO10W)
• 14.7 CAB REG INLET SYS 1(2) vlv – OP
  • CAB P > 14.9 psia and incr?

20 Isolate small cabin leak
  •(ML31C)
  • VAC VENT ISOL VLV CNTL – CL (tb-CL)
  • O2(N2) FLOW 1(2) decreasing to ≈ 3 LB/HR?

21 (MO10W)
• PL O2(N2) SYS 1(2) – CL
  • O2(N2) FLOW 1(2) decr?

22 14.7 psi CAB REG SYS 1(2) SHIFTED HIGH

23 Go to SMALL CABIN-LEAK ISOL, ECLS SSR-8

24 (MO10W)
• 14.7 CAB REG INLET SYS 1(2) – CL

27 Reconfig
• Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

28 Reconfig
• Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

29 10.2 psi ops?

30 Did anomaly occur on PCS SYS 1?

31 LEAK IN PL O2(N2) SYS 1(2) LINE. PL O2(N2) SPLY NO LONGER AVAILABLE

32 Did anomaly occur on active PCS?

33 Reconfig
• Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

34 Remain in current PCS config
  • MCC regarding midnight PCS 1(2) config

35 (MO10W)
• PL N2 SYS 1(2) VLV – CL
  • N2 FLOW 1(2) decr?

36 Remain in current PCS config
  • MCC for P&I changes to repress procedure

37 (MO10W)
• H2O TK N2 REG INLET SYS 1(2) – CL
  • N2 FLOW 1(2) decr?

38 LEAK IN PAYLOAD N2 SYS 1(2) LINE. PL N2 SPLY NO LONGER AVAILABLE

39 LEAK IN N2 SYS 1(2) MANIFOLD BETWEEN N2 FLOW DUCER, H2O REG INLET VLV, O2/N2 CNTLR VLV, AND P/L N2

40 (L2)
• N2 SYS 1(2) REG INLET – CL (tb-CL)
This procedure should only be entered directly for CAB P ↑

1. Cabin Press Relief vsrs crack at 15.5 psid. Full flow at 16.0 psid

2. Use number in parenthesis for 10.2 psia cabin ops

3. √MCC to determine exact failure. Suspect snsr yielding alarm

4. Unless failure is linear shift of Xdcr reading, loss of cabin pressure Xdcr causes loss of BFS BU dP/dT software computation

5. This step is accomplished after SM 2 becomes available

Nominal Config:
(ORBIT)
Refer to 6.2a

CABIN PRES < 13.8 (10.0) psia
> 15.2 (10.6) psia
ECLS 6.2b (Cont)

2 Cabin Press Relief vlv's crack at 15.5 psid. Full flow at 16.0 psid

3 Use number in parenthesis for 10.2 psia cabin ops

4 If Airlk P equaled Cabin P in block 4, then failure is leak in N2 Manf. If Airlk P unavailable (no SM 2), N2 Manf leak must be assumed until confirmed by MCC

5 If N2 needed, opening N2 SYS 1,2 REG INLET could feed possible leak into cabin

6.2c

12 SM 2 available?

20 NO

21 (CRT) O2 REG P 1(2) > 85 psia?

22 YES

23 Reconfig

24 (CRT) O2 blockage in O2 manifold

25 (MO10W)

26 14.7 psi CAB REG INLET SYS 1(2) vlv – OP

27 (L2)

28 O2 REG 1(2) FAILED LOW

29 O2 REG SYS 1(2) FAILED LOW OR BLOCKAGE IN O2 SPILY 1(2) MANF

30 (CRT) PPO2 B < 2.7 psia?

31 CABIN PRESS XDCR FAILURE OR O2/N2 SYS 1 CNTLR FAILURE

32 YES

33 (CRT) O2/N2 CNTLR vlv 1(2) – OP

34 (CRT) N2 FLOW 1(2) ↑?

35 10.2 psi maintenance time

36 Is 10.2 psi maintenance time within limits?

37 NO

38 (CRT) PPO2 > 3.5 (2.9) psi and/or increasing?

39 LEAK IN N2 MANIFOLD OR CABIN PRESS XDCR FAILURE

40 (L2)

41 Reduce CABIN P

42 CAUTION

Procedure should be expedited to prevent exceeding 25% O2 for 14.7 psi ops or 28.5% for 10.2 psi ops

43 NO

44 YES

45 Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

46 MCC for possible modifications to 10.2 psi Cabin

47 Go to SMALL CABIN LEAK ISOL, ECLS SSR-8

48 (CRT) PPO2 > 3.5 (2.9) psi and/or increasing?

49 LEAK IN N2 MANIFOLD OR CABIN PRESS XDCR FAILURE

50 (L2)

51 Go to ECLS COMPUTATION INHIBIT, ECLS SSR-14, Table B and Table C

52 • Use ARLK P or EXT A/L PRESS as backup to CABIN P

53 • Go to ECLS COMPUTATION INHIBIT, ECLS SSR-14, Table B and Table C
9 Vlv normally closed except from pre-EVA PREP / POST-EVA PREP

10 O2 XOVR vlvs must be reopened to supply oxygen to LEH O2 vlvs, EMU O2 vlvs, or DIRECT O2 vlv. √MCC before taking this action

42 Determine O2 leak source upstream of O2 flow Xdcr

If bleed orifice installed: (MO69M)
- Remove bleed orifice
- LEH O2 8 – CL

9 Vlv normally closed except from pre-EVA PREP / POST-EVA PREP

10 O2 XOVR vlvs must be reopened to supply oxygen to LEH O2 vlvs, EMU O2 vlvs, or DIRECT O2 vlv. √MCC before taking this action

38 Determine O2 leak source upstream of O2 flow Xdcr

If bleed orifice installed: (MO69M)
- Remove bleed orifice
- LEH O2 8 – CL

42 Determine O2 leak source upstream of O2 flow Xdcr

If bleed orifice installed: (MO69M)
- Remove bleed orifice
- LEH O2 8 – CL

(MO69M)
ECLS 6.2b (Cont)

11 MCC is reqd to determine if leak is isolated. Leak rate thru VAC Vent Isol vlv ~3 lb/hr (dP/dT = -0.004)

12 EMU drain is lost

13 By isolating cabin leak with VAC VENT ISOL VLV CNTL, hydrogen entrapment in vacuum vent line could create hazardous condition. √MCC for impacts of leaving this vlv closed

14 Determine which previous steps isolated leak

54 Did isolating either CAB RELIEF vlv stop leak ?

YES

55 LEAKING POSITIVE PRESS RELIEF VLV

NO

56 Reenable NON-LEAKING VLV ONLY with following step

(L2)

- CAB RELIEF A,B (two) – ENA (tb-ENA)

If 14.7 psi ops:

(MO10W)

- 14.7 CAB REG INLET SYS 1(2) – OP

15 Did verifying CABIN VENT vlvs stop leak ?

YES

58 LEAKING CABIN VENT VLVS AND/OR VLVS NOT IN PROPER CONFIG

NO

59 Reconfig

(L2)

- CAB RELIEF A,B (two) – ENA (tb-ENA)

If 14.7 psi ops:

(MO10W)

- 14.7 CAB REG INLET SYS 1(2) – OP

16 Determine where leak is in vacuum vent line

(WCS)

- VAC VLV – CL

- \MCC for dP/dT

GND reported dP/dT = .000 ?

YES

61 LEAK IN VACUUM VENT LINE UPSTREAM OF WCS VAC VLV

NO

12

13

17 EMU drain for ext line leak

If no internal airlock:

(WCS)

- Remove urinal hose at hose block
- Remove hose block and filter
- Using finger or Gray Tape, block center hose in hose block (EMU drain)

GND reported dP/dT = .000 ?

YES

63 LEAK IN EMU DRAIN LINE OVERBOARD

NO

64 Disconnect EMU drain QD

(WCS)

- Remove kickplate
- Locate EMU drain hose (left center of QD row)
- Disconnect QD
- Reinstall hose block, filter, urinal hose

18 Determine where leak is in vacuum vent line

(WCS)

- VAC VLV – CL

- \MCC for dP/dT

GND reported dP/dT = .000 ?

YES

65 LEAK IN VACUUM VENT LINE DOWNSTREAM OF WCS VAC VLV, UPSTREAM OF VAC VENT ISOL VLV

NO

66 Reconfig

(L2)

- CAB RELIEF A,B (two) – ENA (tb-ENA)

If 14.7 psi ops:

(MO10W)

- 14.7 CAB REG INLET SYS 1(2) – OP

(WCS)

- VAC VLV – OP

83
14 Possible loss of O2 Supply to EMUs or O2 transfer to ISS

1. Isolate O2 leak
   - LEH O2 SPLY 1 vlv – OP

2. LEH O2 SPLY 1 vlv – OP
   - LEH O2 SPLY 1 vlv – CL
   - LEH O2 SPLY 2 vlv – OP
   - LEH O2 SPLY 2 vlv – CL

3. LEAK IN COMMON LEH O2 SPLY LINE BETWEEN CK VLVS AND LEH PNLS

4. LEAK IN EMU O2 SPLY LINE DOWNSTREAM OF ISOL VLV

5. LEAK IN EMU O2 SPLY LINE DOWNSTREAM OF ISOL VLV
   - EMU O2 ISOL VLV – CL

6. LEAK IN EMU O2 SPLY LINE DOWNSTREAM OF ISOL VLV
   - EMU O2 ISOL VLV – OP

7. LEAK IN EMU O2 SPLY LINE DOWNSTREAM OF ISOL VLV
   - EMU O2 ISOL VLV – CL

8. Reduce CABIN P
   - Go to RECONFIG TO ALT PCS SYS, (14.7 PSI OPS)
   - ECLS SSR-3 2
   - (10.2 PSI OPS)
   - ECLS SSR-3 4

9. Did anomaly occur on active PCS ?
   - Yes
   - Perform RECONFIG TO ALT PCS SYS, (14.7 PSI OPS)
   - ECLS SSR-3 2
   - (10.2 PSI OPS)
   - ECLS SSR-3 4

   - On MCC GO, reestablish Bleed Orifice Flow
     - (MO69M)
     - Reinstall Bleed Orifice
     - LEH O2 8 – OP

   - (MIDDECK FLR)
   - EMU O2 ISOL VLV – CL

10. Remain in current PCS config
   - Yes
   - √
   - MCC for P&I changes to repress procedure

11. 10.2 psi ops?
   - Yes
   - Remain in current PCS config
   - √
   - MCC for P&I changes to repress procedure

12. Did anomaly occur on active PCS ?
   - No
   - Remain on current PCS
   - √
   - MCC regarding Mid Flt PCS 1(2) Config
15 CCH has range of travel in which path to vacuum and cabin can be open simultaneously. Slow or incomplete extension of CCH may therefore result in cabin leak.

16 Maintaining VAC VLV – CL to EOM may cause odor buildup due to inability to vent wet trash overboard.

(ECLS 6.2b (Cont))

83 WCS troubleshooting check interlock

(WCS)
• Hose stowed in cradle
• MODE – AUTO
• Gently attempt to pull up Commode Control (CCH)

CCH able to come up?

NO

YES

84 (WCS)
• MODE – COMMODE/ MANUAL/EMU
• COMMODE CNTL – UP
• Gently attempt to rotate WCS MODE to AUTO

Will WCS MODE move to AUTO?

NO

YES

85 WCS INTERLOCK FAILURE

86 Check/clean Slide Valve

• Slide vlv for debris or seal cracks
• Clean any debris and report seal cracks
• COMMODE CNTL – UP
• Cycle Commode Control back and forward five times

87 Check for leak isolation

(WCS)
• COMMODE CNTL – OFF
  (back, down)
• MODE – AUTO
• VAC VLV – OP

(ML31C)
• VAC VENT ISOL VLV CNTL – OP
  (tb-OP)

Is dP/dT < .006?

NO

YES

88 Isolate WCS and go to Manual Ops

(WCS)
• VAC VLV – CL
• Go to WCS FAILED COMMODE CNTL VLV (IFM)

89 ISOLATED LEAK THRU SLIDE VLV

90 Continue normal ops

91 YES

NO
If prior to performing on-orbit PCS config, low PPO2 could be caused by PCS 14.7 CABIN REGS – CL.

After PCS config for Orbit Ops only one system active with PPO2 A tied to PCS 1 and PPO2 B tied to PCS 2. For 10.2 psi ops SYS 1 nominally configured to flow N2 and SYS 2 O2, with both 14.7 CAB

Regs – CL

2 Use number in parenthesis for 10.2 psia cabin ops

3 O2/N2 Ctrl VLV flows N2 in OP position, and O2 in CL position

Nominal Config:

(Orbit)

Refer to 6.2a

1 Cabin Press increasing in addition to PPO2 alarm?

2 Is CAB PRESS ↓, PPO2 A ↓, and PPO2 B normal?

3 SM SYS SUMM 1

SM 66

ENVIRONMENT

(CRT or O1)

PPO2 A(B):

PPO2 A reading different than PPO2 B (> 0.15 psi)

Both low

Both high

CRITICAL

• Monitor lowest reading of PPO2 SNSR A,B. If either PPO2 A or B < 2.50, do not QDM.

6.2b

YES

NO

6.2b

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6.2b
ECLS 6.2c (Cont)

17 SM2 available?

18 SM 66 ENVIRONMENT

19 Determine if cntl vlv failed

20 PPO2 CNTLR 1(2) FAILURE

21 SM SYS SUMM 1

CAB P < 14.5?

22 O2/N2 CNTLR VLV SYS 1(2) FAILURE

23 Use same PCS with reverse PPO2 Cntl

(L2)

24 Determine if cntl vlv failed

25 Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

26 (CRT) N2 FLOW SYS 1(2) > 0.0?

27 O2/N2 CNTLR VLV SYS 1(2) FAILURE

28 FAILURE IS INDETERMINATE AT THIS TIME

29 Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

30 Aut o function

(L2)

31 PPO2 CNTLR 1(2) FAILURE

32 PCS SYS 1(2) in orbit config before C/W alarm?

33 METABOLIC O2 CONSUMPTION CAUSED LOW CABIN PRESS/PPO2

34 FAILURE IS INDETERMINATE AT THIS TIME

35 Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

36 14.7 psi CABIN REG SYS 1(2) FAILED LOW, OR O2 REG SYS 1(2) FAILED LOW, OR BLOCKAGE IN O2 SPLY 1(2) MANIFOLD

37 Go to (14.7 PSI OPS) ECLS PCS 1(2) CONFIG (ORB OPS, ECLS) or (10.2 PSI OPS) 10.2 PSI MAINTENANCE (EVA)

38 Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3
3 O2/N2 CNTLR VLV flows N2 in OP position, and O2 in CL position

4 Cabin P is within no flow region on cabin regulator. √MCC for further troubleshooting of that system

6 Monitor systems performance on Reverse snsr. If 10.2 psi operations, performance of snsr cannot be determined until cabin repressed and initiation of Auto PCS control. If Reverse snsr does not control PPO2 properly, √MCC regarding Manual Cabin ATM Management

7 Only MCC can determine exact failure. Suspect snsr yielding alarm. MCC will determine whether to go to REVERSE on PPO2 SNSR/VLV

39 SM2 available?

40 SM66 ENVIRONMENT

41 PPO2 B(A) SNSR FAILED STATIC (WITHIN LIMITS)

42 PPO2 A(B) SNSR FAILED HIGH/LOW (OUT OF LIMITS)

43 If failed snsr controls PPO2:

- PPO2 SNSR/VLV – REV

44 PROBABLE PPO2 SNSR A(B) FAILURE

45 √MCC

46 Go to ECLS COMPUTATION INHIBIT, ECLS SSR-14, Table A

47 SM SYS SUMM 1

48 Determine if cntl vlv failed

- O2/N2 CNTLR VLV SYS 1(2) – OP

49 O2/N2 CNTLR VLV SYS 1(2) FAILURE

50 Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

51 (CRT) O2 FLOW SYS 1(2) > 0.0 ?

52 O2/N2 CNTLR VLV SYS 1(2) FAILURE OR N2 SYS 1(2) FAILURE

53 (CRT) CABIN PRESS > 14.5 psia?

54 14.7 psi CABIN REG 1(2) FAILURE

55 FAILURE IS INDETERMINATE AT THIS TIME

56 Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

57 ONLY MCC can determine exact failure. Suspect snsr yielding alarm. MCC will determine whether to go to REVERSE on PPO2 SNSR/VLV
If PL N2 line in use, √MCC for further isolation

**Nominal Config:**
(ORBIT) Refer to 6.2a

**Nominal Config:**
(ORBIT) Refer to 6.2a

1 If PL N2 line in use, √MCC for further isolation

- **ECLS**
  - **6.2d N2 REG P ↑↓**

- **SM ALERT**
- **S66 CAB N2 REG P 1(2)**

- **N2 REG P 1(2)**
  - > 260 psia
  - < 150 psia

- **Nominal Config:**
  - (ORBIT) Refer to 6.2a

**SM 66 ENVIRONMENT**

- Compare with alternate N2 REG P XDCR
  - (MO10W)
  - N2 XOVER vlv – OP

- **(CRT)**
  - N2 REG P 1(2) agrees with N2 REG P 2(1)?

- **YES**
  - **N2 REG 1(2) SHIFTED**

- **NO**

  - **2 N2 REG P 1(2) XDCR FAILURE**

  - **(MO10W)**
    - N2 XOVER vlv – OP

  - **3**
    - **(L2)**
      - N2 SYS 1(2) REG INLET – CL (tb-CL)
      - O2/N2 CNTLR VLV SYS 1(2) – CL

    - **(MO10W)**
      - N2 XOVER vlv – CL
      - H2O TK N2 REG INLET SYS 1 (SYS 2) vlv – CL
      - *PL N2 SYS 1 (SYS 2) vlv – CL*

    - **(CRT)**
      - N2 REG P 1(2) stabilize?

  - **YES**

  - **5 N2 LINE LEAK**

  - **(CRT)**
    - N2 REG P 1(2)

  - **NO**

  - **6 N2 REG 1(2) SHIFTED**

  - **7**
    - 10.2 psi ops?

    - **YES**
      - **11**
        - Remain on current PCS
        - √MCC regarding mid-flight PCS 1(2) config

    - **NO**
      - **9**
        - Did anomaly occur on active PCS?

        - **YES**
          - **10**
            - Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3

        - **NO**
          - **8**
            - Did anomaly occur on PCS SYS 1?

            - **NO**
              - **12**
                - Remain in current PCS config
                - √MCC for P&I changes to repress procedure

            - **YES**
              - **11**
                - Remain on current PCS

              - **10**
                - Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3


09/24/08  6-24  MAL/ALL/GEN J
Cabin press must drop low enough to open 14.7 psia CABIN REG and bleed O2 Line

High O2 REG P could possibly be caused by spec leakage through regulator

For 10.2 psi ops, O2 will be supplied as reqd, via the direct O2 vlv

Nominal Config: (ORBIT)
Refer to 6.2a

- Cabin press O2 REG P 1(2) > 145 psia

1. Bleed down O2 pressure line
   - (L2) O2/N2 CNTLR VLV SYS 1(2) – CL
   - (MO10W) O2 REG INLET SYS 1(SYS 2) vlv – CL
   - 14.7 CAB REG INLET SYS 1 (SYS 2) vlv – OP
   - 14.7 CAB REG INLET SYS 2 (SYS 1) vlv – CL

If bleed orifice installed: (MO69M)
   - LEH O2 8 vlv – CL

2. O2 REG P 1(2) ~15.0 psi?
   - NO
   - YES

3. O2 REG 1(2) SHIFTED HIGH

4. If bleed orifice installed: (MO69M)
   - LEH O2 8 vlv – OP

5. Remain in current PCS config
   - YES
   - NO

6. Did anomaly occur on active PCS?
   - YES
   - NO

7. Go to RECONFIG TO ALT PCS SYS, ECLS SSR-3
   - MCC regarding mid-flight PCS 1(2) config
   - MCC for P&I changes to repress procedure

8. Remain on current PCS
   - MCC regarding mid-flight PCS 1(2) config
**Nominal Config:** (ORBIT) Refer to 6.2a

**ECLS**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N2 QTY low in both sys? NO</td>
</tr>
<tr>
<td>2</td>
<td>Press or temp/xdcr used in qty comp failed or shifted</td>
</tr>
<tr>
<td>3</td>
<td>Leak in common N2 TK MANIF</td>
</tr>
<tr>
<td>4</td>
<td>MCC for P&amp;I changes to repress procedure</td>
</tr>
<tr>
<td>5</td>
<td>Reconfig for manual atmosphere management</td>
</tr>
<tr>
<td>6</td>
<td>Leak in MMU GN2 SPLy LINE</td>
</tr>
<tr>
<td>7</td>
<td>Check MMU/FSS QDs for possible leakage, then open SPLy vlv one at a time to see if leak isolated</td>
</tr>
<tr>
<td>8</td>
<td>Attempt LK isol (LM68B-D)</td>
</tr>
<tr>
<td>9</td>
<td>Reconfig non-leaking sys (L2)</td>
</tr>
<tr>
<td>10</td>
<td>Unisolable SYS 1 LEAK</td>
</tr>
<tr>
<td>11</td>
<td>Reactivate PCS (L2)</td>
</tr>
<tr>
<td>12</td>
<td>N2 QTY 1 decreasing? NO</td>
</tr>
<tr>
<td>13</td>
<td>Leak in N2 SYS 2 SPLy LINE</td>
</tr>
<tr>
<td>14</td>
<td>Attempt LK isol (LM68B-D)</td>
</tr>
<tr>
<td>15</td>
<td>10.2 psi ops? NO</td>
</tr>
<tr>
<td>16</td>
<td>Leak in N2 SYS 1 SPLy LINE</td>
</tr>
<tr>
<td>17</td>
<td>Reconfig non-leaking sys (L2)</td>
</tr>
<tr>
<td>18</td>
<td>Attempt LK isol (LM68B-D)</td>
</tr>
<tr>
<td>19</td>
<td>Unisolable SYS 2 LEAK</td>
</tr>
<tr>
<td>20</td>
<td>Reconfig non-leaking sys (L2)</td>
</tr>
</tbody>
</table>

**S66 CAB N2 QTY 1(2)**

- N2 QTY SYS 1(2) < 100 (two tk sys)
- < 150 (three tk sys)
- < 200 (four tk sys)

**MC to determine exact failure**

**Flight length will depend on remaining quantity**

**MCC. If cabin press decreases because of N2 TK isolation, cabin repress may be attempted. Isolate tks after each repress attempt**

**Up to four tks per sys are possible. I-load value is 100 but limit is TMBUd at OPS 2 depending on number of tks flown**
1. CRT label ‘H2O TK N2 P’ is really H2O REG 1(2) P not actual ‘TK N2 PRESS’

2. Repressurization of SPLY H2O TK may cause Flash Evap shutdn if FLASH EVAP CNTLR not turned off

3. S66 H2O SUPPLY PRESS (psia) or H2O WASTE PRESS (psig) can be used as backup to H2O TK N2 P

4. Repressurization may require up to 15 min
Repressurization of H2O tanks (except TK A) will cause H2O TK N2 P1 to decrease initially. If no leak in the common manifold is present, the H2O TK N2 P1 will increase until it stabilizes at 15.5 to 17.0 psig. SPLY H2O dumps may need to be scheduled more frequently depending upon FLASH EVAP usage. SPLY H2O pressure to the galley will be affected. This may cause Galley RHS to dispense less than dialed quantity and PHS H2O pressure may be insufficient for use. If SPLY H2O TKA is isolated, SPLY H2O to galley will only be available at FCP rate. Allows utilization of TKA H2O. Only TKs B,C,D will fill FCP H2O. To fill TKA, QD must be remated. H2O TKA damage may occur if TKA Inlet, outlet vlvvs are not closed prior to working block steps. After 30 sec: (CRT) H2O TK N2 P1 decr? SPLY H2O TKA supply to Galley. Reestablish TKA supply to Galley, MD23R, Open Middeck Pnl, disconnect lower (FC) QD on Microbial Filter. SPLY H2O TKA INLET – OP (tb-OP). If SPLY H2O XOVR vlv tb – CL(bp) (ML86B:A), cb MNB SPLY H2O TKB INLET – cl, cb MNC SPLY H2O XOVR vlv – cl (R11L). SPLY H2O TKB INLET – OP (tb-OP). After 30 sec: (CRT) H2O TK N2 P1 decr? YES, Go to FES RESTART, ECLS SSR-5. NO, Config for alternate press, MO10W, H2O TK N2 ISOL SYS 1 vlv – OP, ML28C, SPLY H2O GN2 TKA SPLY vlv – CL, Wait 15 sec, note (CRT) H2O TK N2 P1, After 30 sec: (CRT) H2O TK N2 P1 decr? LEAK IN COMMON H2O TK N2 MANF, YES, Wait until TK B qty > 5% before proceeding, NO, SPLY H2O TK A N2 LEAK. SPLY H2O TK N2 ISOL SYS 1 vlv – OP, H2O ALT PRESS – CL, H2O ALT PRESS – OP, L1, cb MNC H2O ALT PRESS – cl, cb MNB SPLY H2O TKB INLET – cl, cb MNC SPLY H2O XOVR vlv – cl (R11L). SPLY H2O TKB INLET – OP (tb-OP). SPLY H2O XOVR vlv – OP (tb-OP). If reqd, Go to FES RESTART, ECLS SSR-5.
Failed open ck vlvs downstream of each HUM SEP could allow WST TK to flood HUM SEP

\(\text{MCC to determine exact failure}\)

MCC has only indication of relative humidity

Nominal Config:
(L4:J)
cb AC1 HUM SEP A (three) – cl
cb AC2 HUM SEP B (three) – cl
cb AC3 φA SIG CONDR HUM SEP – cl
(L1) HUM SEP B(A) – ON

SM 66 HUMID SEP A(B)

1. SM 66 ENVIRONMENT
   - HUMID SEP B(A) "↓"?
     - YES
     - NO

2. (CRT) Does HUMID SEP A and/or B have "↓"?
   - YES
   - NO

3. CLASS 3 ALARM S/W FAULT OR TRANSIENT

4. (CRT) WST Qty 1 decreasing?
   - YES
   - NO

5. ⊳sw position
   - (L1) HUM SEP B(A) – ON?

6. HUMIDITY SEP B(A) INADVERTENTLY TURNED OFF

7. Go to H2O TK QTY LOW AND DECR (ORB PKT, ECLS)

8. Turn on original SEP
   - (L1) HUM SEP B(A) – ON

9. (CRT) Does HUMID SEP A,B (two) have "↓"?
   - YES
   - NO

10. HUMIDITY SEP B(A) FAILED DUE TO ELECTRICAL FAILURE

11. (L1) Is HUM SEP with "↓" in ON position?
   - YES
   - NO

12. (CRT) Does HUMID SEP A(B) have "↓" and HUMID SEP B(A) have "φA"?
    - YES
    - NO

13. HUMIDITY SEP A(B) SPEED SNSR DISCRETE FAILED TO NORM INDICATION

14. Switch to alternate SEP
    - (L1) HUM SEP • A(B) – ON
    - B(A) – OFF

15. HUMIDITY SEP B(A) AC2(1) φA OR FAN ON DISCRETE LOST

16. Switch to alternate HUM SEP
    - (L1) HUM SEP • A(B) – ON
    - B(A) – OFF

17. HUMIDITY SEP B(A) OR SPEED SNSR B(A) FAILURE

18. HUMIDITY SEP A(B) ON DISCRETE IS FAILED ON

19. HUMIDITY SEP SNSR SIG CONDITIONER FAILED

20. Monitor for visible condensation in cabin as indication of SEP failure
ECLS 6.4a EVAP OUT T

1 If OPS 2 not available, use EVAP OUT T
2 If OPS 2 not available, continue with block 7

Nominal Config:
(L4:M,N)
cb AC1,2,3
ΦA,ΦB,ΦC FREON LOOP 1,2 PUMP A,B (twelve) – cl
cb AC2,3 ΦB FREON SIG CONDR (two) – cl
cb AC2,3 ΦA FREON FLOW PROP 1,2 (two) – cl (L4:N)
cb AC2,3 ΦC RAD ISOL A – cl
cb AC3 ΦC RAD ISOL B – cl (L4:P)
cb AC1 ΦA RAD CNTLR 1B – cl
cb AC1 ΦB RAD CNTLR 2B – cl
cb AC2 ΦB RAD CNTLR 1A – cl
cb AC3 ΦB RAD CNTLR 2A – cl (O14:C)
 cb MNA RAD ISOL CONTR – cl (O14:D)
 cb MNA FREON RAD CNTL 1,2 (two) – cl (O15:D)
 cb MB FREON RAD CNTL 1,2 (two) – cl (O17:C)
 SIG CONDR – FREON A – AC2 B – AC3 (L1)
 FREON PUMP LOOP 1,2 (two) – B(A)
 RAD CNTLR – OUT TEMP – NORM
 LOOP 1,2 (two) – AUTO A(B)
 BYP VLV – MAN SEL 1,2 (two) – ctr
 MODE 1,2 (two) – AUTO
 NH3 CNTLR A,B – OFF
 FLASH EVAP CNTLR – PRI A(B) – ON
 B(A) – OFF
 SEC – A(B) SPLY OFF
(Cont in notes column)
3 Loss of RFCA – Next PLS depending on H2O quantities

10 SM OPS 2 available?

11 Both FREON LOOPS RAD OUT T > 65?

12 Switch to alternate RAD CNTLR in LOOP 1
   (L1)
   • RAD BYP VLV MODE 1 – MAN
   • RAD CNTLR LOOP 1 – AUTO B(AUTO A)
   • After 10 sec, RAD BYP VLV MODE 1 – AUTO
   FREON LOOP EVAP OUT Ts 1,2 decr to < 60 degF ~2 min after MODE 1 – AUTO?

13 Switch to alternate RAD CNTLR in warmest loop
   (L1)
   • RAD BYP VLV MODE 1(2) – MAN
   • RAD CNTLR LOOP 1(2) – AUTO B (AUTO A)
   • After 10 sec, RAD BYP VLV MODE 1(2) – AUTO
   FREON RAD OUT T decr?

14 FREON LOOP 1(2) RAD FLOW CNTL VLV FAILED IN MIN FLOW POSITION

15 FREON LOOP 1(2) RAD CNTLR AUTO A(B) CONTROLLING HIGH

16 FREON LOOP 1 RAD CNTLR AUTO A(B) FAILURE

17
ECLS 6.4a (Cont)

1. Loss of RFCA – Next PLS depending on H2O quantities

4. Loop will be reactivated for entry

5. MCC to determine failure

6. Continue to monitor RAD BYP VLV tb position. Depending upon failure mode, RAD BYP VLV may not return to BYP immediately. If RAD BYP VLV tb returns to BYP, go to block 28

17. Deactivate pump in aff loop (L1)
   • FREON PUMP LOOP 1(2) – OFF
   • Perform RAD STOW/DEPLOY (ORB OPS, ECLS)

(L2)
If FREON LOOP 1(2) deactivated:
• O2 SYS 1(2) SPLY – CL (tb-CL)
• Inhibit FREON FLOW C&W PARAMETER 106(116)

(L1)
• FLOW PROP VLV LOOP 1(2) – ICH (tb-ICH)
• Perform FES RESTART, ECLS SSR-5
• Go to LOSS OF 1 FREON LOOP (ORB PKT, PWRDN)

2. Switch to alternate RAD CNTLR in LOOP 2 (L1)
  • RAD BYP VLV MODE 2 – MAN
  • RAD CNTLR LOOP 2 – AUTO B (AUTO A)
  • After 10 sec, RAD BYP VLV MODE 2 – AUTO
  • FREON LOOP EVAP OUT Ts 1,2 decl < 60 degF
  • 2 min after MODE 2 – AUTO ?

11. NO

24. POOR HEAT REJECTION ATTITUDE OR RAD 1 OR 2 FLOW CNTL VLV FAILED IN MIN FLOW POSITION

25. MCC before deploying radiators
   (ORB OPS)
   • If Evap Out T ≤ 68 degF:
     Perform FES RESTART, ECLS SSR-5 >>
   • If Evap Out T > 68 degF, activate FES secondary controller (L1)
   • FLASH EVAP CNTLR SEC – ON
     After 30 sec:
   • EVAP OUT T ~62 degF
     If on secondary FES controller:
   • FREON FLOW PROP VLV LOOP 1,2
     (two) – ICH (tb-ICH)
   • H2O LOOP 1(2) BYP MAN – DECR (hold 35 sec)

26. Switch to alternate CNTLR in bypassed loop (L1)
  • RAD BYP VLV MODE 1(2) – AUTO
  • RAD CNTLR LOOP 1(2) – AUTO B(A) (wait 90 sec, monitor tb)

RAD BYP VLV 1(2) tb stays in BYP

RAD BYP VLV 1(2) goes to RAD then returns to BYP

RAD BYP VLV 1(2) goes to RAD then remains in RAD

29. FREON LOOP 1(2) RAD CNTLR A(B) FAILURE

28. BYPASS logic A in bypassed LOOP 1(2)
   (L1)
   • RAD BYP VLV MODE 1(2) – AUTO
   • RAD CNTLR LOOP 1(2) – OFF
   (L4-P)
   • cb AC2(AC3) φB RAD CNTLR 1A(2A) – op

(L1)
• RAD CNTLR LOOP 1(2) – AUTO B
• Wait 90 sec

RAD BYP VLV 1(2) tb go to RAD and remain in RAD?

30. FREON LOOP 1(2) RAD CNTLR A BYPASS LOGIC FAILED

32. YES

33. NO

27. RAD BYP VLV FAILED IN BYP

17. Deactivate pump in aff loop (L1)

20. TRANSIENT RAD OUT T > 68 degF CAUSED FES OVERTEMP SHUTDN

21. TRANSIENT RAD OUT T > 68 degF CAUSED BY ATTITUDE OR TEMPORARY HEAT LOAD

22. Go to FES RESTART, ECLS SSR-5

23. FREON LOOP 2 RAD CNTLR A(B) FAILURE

14

22

27
1 If OPS 2 not available, use EVAP OUT T

3 Loss of RFCA – Next PLS depending on H2O quantities

7 If RAD OUT T > 65 degF not explainable by attitude, troubleshoot radiators. Go to block 13

8 Expect same transient on next daylight pass if same attitude

9 SEC CNTLR controls at 62 degF. If EVAP OUT T < 62 degF, SEC CNTLR operation cannot be verified. Further troubleshooting reqd to determine complete failure

11-1 to maintain EVAP OUT TEMP < 65 degF
46 NH3 Leak on Freon loops

- Wait 3 min for cold Freon slug to pass through Freon-to-Water Interchanger

(L1) If any Freon loop off:
- Freon pump loop 1,2 (two) – B

47 Freon loop leaking

- Maintain high heat load (RADS HIGH or RADS BYP) until 'S88 FREON FLOW 1(2)' msg

(L1)
- Leaking Freon pump loop 1(2) – OFF
- 'Good Freon pump loop 2(1) – B
- Flow prop VLV loop 2(1) – ICH (tb-ICH)
- If RAD BYP VLV 2(1) tb – BYP
  RAD BYP VLV MODE 2(1) – AUTO
  CNTLR LOOP 2(1) – OFF, AUTO A
  Wait until EVAP OUT T ~57 and stable, then:
  - H2O pump loop 1 – GPC
  - RAD CNTLR OUT TEMP – NORM

(L2)
- O2 SYS 1(2) SPL (two) – CL (tb-CL)
- O2 SYS 2(1) SPL – OP (tb-OP)
- Stow radiator in leaking loop (RAD STOW/DEPLOY (ORB OPS, ECLS))

(R13U)
- Inhibit Freon loop 1(2) Freon flow parameter 106(116) and EVAP OUT T 1(2) parameter 107(117)
- If FES reqd, go to FES RESTART, ECLS, SSR-5
- If reqd, perform LOSS OF 1 FREON LOOP (ORB PKT, PWRDN)

48 Return to initial config

- Maintain high heat load (RADS HIGH or RADS BYP) until NH3 depleted (NH3 depletion indicated by EVAP OUT T > 55 degF for 2 min)

(L1)
- NH3 CNTLR A,B – OFF
- If RAD BYP VLV 1,2 tb – BYP
  RAD BYP VLV MODE (aff loop) – AUTO
  RAD CNTLR (aff loop) – OFF, AUTO A
  Wait until EVAP OUT T ~57 and stable (approx 3 min), then:
  - H2O pump loop 1 – GPC
  - RAD CNTLR OUT TEMP – NORM

(L2)
- O2 SYS 1,2 SPL (two) – OP

PL H2O Loop present?

NO

49 PL cooling req?

NO

50 Deactivate PL loop

YES

51 Return to initial flow prop vlv config

(L1)
- Flow prop VLV loop 1,2 (two) – ICH (tb-ICH)

YES

52 Return to initial flow prop vlv config

(L1)
- Flow prop VLV loop 1/2 – PL HX (tb-PL)
From ORB PKT, FREON FLOW LOW

1 SM 88 APU/ENVIRON THERM
   
   • Note aff loop Freon flow rate

   Aff loop FREON FLOW 'L' or 'L'? NO 32
   YES

   2 (L1)
   Is aff loop FLOW PROP VLV tb – PL? YES

   3

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   41

FREON FLOW LOW

1 FREON FLOW meter on pnl O1 may be used as alternate

2 Do not operate FREON SIG CONDR sw(s) on pnl O17 before √MCC
3 Pwrdn of some equipment may be reqd depending on heat load
4 Loss of Freon Loop next PLS entry
5 MCC to determine failure
6 With blockage in radiator, RADS may be manually bypassed to incr loop’s flow in the event of loss of other FCL
7 If blockage in radiator deactivates Freon Loop, RADS may be manually bypassed and reactivated for entry
8 If cavitation occurs frequently, loop is lost
If cavitation occurs frequently, loop is lost.

FCL1 – PORT
FCL2 – STBD

Crew may opt to have MCC manage software limits via TMBU.

Correct Freon Flow 1(2) SM ALERT limit set selection by SM preconditioning.

Limit set 1 (low: 1950; high: - -)
Limit set 2 (low: 1300; high: - -)

SELECTED SM ALERT LIMIT SET IS NOT CONSISTENT WITH VALVE STATUS. SM ALERT IN LIMIT SET 1 WHEN FLOW PROP VLV IS IN PL

Reset SM ALERT limits on aff loop

Deactivate pump in aff loop:
- FREON PUMP LOOP 1(2) – OFF

Stow radiator in aff loop:
- Perform PORT(STBD) RAD OPS, MECH SSR-1
- O2 SYS 1(2) SPLY – CL (tb-CL)
- FLOW PROP VLV LOOP 2(1) – ICH (tb-ICH)
- Inhibit FREON LOOP 1(2) FREON FLOW parameter 106 (116)
- Go to LOSS OF 1 FREON LOOP (ORB PKT, PWRDN)

FREON FLOW
- ITEM 1 +0 6 3 1 0 0 EXEC
- ITEM 2 +1 3 0 0 EXEC
Pl HX FLOW
- ITEM 1 +0 6 3 1 1 0 3 EXEC
- ITEM 2 +5 0 0 EXEC

FREON FLOW
- ITEM 1 +0 6 3 1 3 0 0 EXEC
- ITEM 2 +1 3 0 0 EXEC
Pl HX FLOW
- ITEM 1 +0 6 3 1 3 0 3 EXEC
- ITEM 2 +5 0 0 EXEC

If aff FREON LOOP FLOW < 750 lb/hr (OSL) or MCC call

Deactivate pump in aff loop:
- FREON PUMP LOOP 1(2) – OFF

Stow radiator in aff loop:
- Perform PORT(STBD) RAD OPS, MECH SSR-1
- O2 SYS 1(2) SPLY – CL (tb-CL)
3. Pwrdn of some equipment may be reqd depending on heat load

4. Loss of Freon Loop next PLS entry

3 Pwrdn of some equipment may be reqd depending on heat load

4 Loss of Freon Loop next PLS entry

41 (CRT) Note PL HX FLOW rate in aff loop

Aff loop Radiator in bypass?

42 (CRT) PL HX FLOW 1(2) < 220 lb/hr if (L1) aff loop
FLOW PROP VLV LOOP 1(2) – ICH or PL HX FLOW 1(2) < 950 lb/hr if (L1) aff loop FLOW PROP VLV LOOP 1(2) – PL HX?

43 (CRT) PL HX FLOW 1(2) > 350 lb/hr if (L1) aff loop
FLOW PROP VLV LOOP 1(2) – ICH or PL HX FLOW 1(2) > 1300 (OSH) lb/hr if (L1) aff loop FLOW PROP VLV LOOP 1(2) – PL HX?

44 XDCR SHIFT (ARS ICH LEG)

45 (CRT) PL HX FLOW 1(2) < 200 lb/hr if (L1) aff loop
FLOW PROP VLV LOOP 1(2) – ICH or PL HX FLOW 1(2) < 900 lb/hr if (L1) aff loop FLOW PROP VLV LOOP 1(2) – PL HX?

46 (CRT) PL HX FLOW 1(2) > 300 lb/hr if (L1) aff loop
FLOW PROP VLV LOOP 1(2) – ICH or PL HX FLOW 1(2) > 1300 (OSH) lb/hr if (L1) aff loop FLOW PROP VLV LOOP 1(2) – PL HX?

47 BLOCKAGE IN LOOP (ARS ICH LEG)

48 XDCR SHIFT (ARS ICH LEG)

49 XDCR SHIFT (ARS ICH LEG)

50 (CRT) Aff loop AFT CP FLOW > 450 lb/hr?

51 (CRT) Aff FREN LOOP ACCUM QTY = 3% or less?

52 FREON LOOP LEAK

53 LOOP BLOCKAGE (IN PL AND/OR ARS ICH LEG)

54 (CRT) Aff FREN LOOP ACCUM QTY > 70%?

55 N2 LEAK RESULTING IN PUMP CAVITATION AND LOOP LOSS
If:
(L1) FLOW PROP VLV LOOP 1(2) – PL HX PL HX FLOW < 500 lb/hr
With FLOW PROP VLV – ICH PL HX FLOW is TMBU – OSL

N2 leak across FCL accum bellows can cause cavitations of pump. Frequent cavitation = loop loss

MCC. With Sig Condr or sw short, do not operate FREON SIG CONDR sw(s) on pnl O17
Pwrdn of some equipment may be reqd depending on heat load and amount of blockage.

Crew may opt to have MCC manage software limits via TMBU.

- Radiator in bypass?
  - Yes: (CRT) FREON FLOW > 2000 lb/hr?
  - No: 24

- (CRT) FREON FLOW > 1900 lb/hr?
  - Yes: 23
  - No: 21

- XDCR SHIFT or small blockage in loop (PL HX LEG)
  - Yes: 25
  - No: 24

- XDCR SHIFT or small blockage in loop (PL HX LEG)
  - Yes: 25
  - No: 24

- Correct PL HX 1(2) FLOW SM ALERT limit set selection by SM preconditioning
  - Limit set 1 (low: OSL; high: - -)
  - Limit set 2 (low: 500; high: - -)

- Failure of C/W system

- Incorrect SM ALERT limit set selection by SM preconditioning due to failures at valve switch or software

<table>
<thead>
<tr>
<th>LOOP 1</th>
<th>LOOP 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREON FLOW</td>
<td>FREON FLOW</td>
</tr>
<tr>
<td>ITEM 1 +0631100 EXEC</td>
<td>ITEM 1 +0631300 EXEC</td>
</tr>
<tr>
<td>ITEM 4 +1950 EXEC</td>
<td>ITEM 4 +1950 EXEC</td>
</tr>
<tr>
<td>PL HX FLOW</td>
<td>PL HX FLOW</td>
</tr>
<tr>
<td>ITEM 1 +0631103 EXEC</td>
<td>ITEM 1 +0631303 EXEC</td>
</tr>
<tr>
<td>INH – ITEM 10 EXEC</td>
<td>INH – ITEM 10 EXEC</td>
</tr>
</tbody>
</table>
1. N2 leak across FCL ACCUM bellows. Frequent cavitation = loop lost
2. Loss of FCL definition next PLS entry

AFT CP FLOW < 200 lb/hr

S88 FRN AFT CP 1(2)

1. SM 88 APU/ENVIRON THERM
   • Note AFT CP FLOW
   NO
   YES

2. Either FREON LOOP ACCUM QTY ≥ 70% ?
   NO
   YES

3. CLASS 3 ALARM S/W FAULT OR TRANSIENT FAILURE

4. N2 LEAK RESULTING IN OCCASIONAL PUMP CAVITATION
   YES
   NO

5. (CRT) Either FREON FLOW ≤ 1950 lb/hr if (L1)
   FLOW PROP VLV LOOP 1(2) – ICH
   or FREON FLOW ≤ 1300 lb/hr if (L1)
   FLOW PROP VLV LP 1(2) – PL HX ?
   YES 6.4b 51
   NO

6. Radiators in bypass ?
   YES
   NO

7. (CRT) Either FREON FLOW ≥ 2600 lb/hr if (L1)
   FLOW PROP VLV LOOP 1(2) – ICH
   or FREON FLOW ≥ 1800 lb/hr if (L1)
   FLOW PROP VLV LP 1(2) – PL HX ?
   YES
   NO

8. BLOCKAGE IN LOOP (AFT CP LEG)

9. (CRT) Either FREON FLOW ≥ 2300 lb/hr if (L1)
   FLOW PROP VLV LOOP 1(2) – ICH
   or FREON FLOW ≥ 1700 lb/hr if (L1)
   FLOW PROP VLV LP 1(2) – PL HX ?
   YES
   NO

10. XDCR SHIFT, SMALL BLOCKAGE IN LOOP (AFT CP LEG), OR INSTRUMENTATION FAILURE

11. BLOCKAGE IN LOOP (AFT CP LEG)
1 Loss of one FREON LOOP = next PLS Entry

S88 FREON QTY 1(2)

1

SM 88 APU/ENVIRON THERM
FREON ISOL 1(2) = ISOL
FREON ISOL 1,2 ≠ ISOL

2

(CRT)
FREON LOOP 1(2)
ACCUM QTY:
≤ -5 or ≥ 12%
> -5 and < 12%

3

CLASS 3 ALARM S/W
FAULT, TRANSIENT
FAILURE, OR INSTRUMENTATION OR LOGIC
FAILURE

FREON LOOP 1(2) FLOW = 'L' ?

4

FREON LEAK
WITH ISOL S/W
FAILURE OR ISOL
MODE SWITCH IN
MANUAL

5

FREON LOOP 1(2) DEPLETED

6

1

FREON LOOP 1(2)

7

MANUALLY ISOLATE AFF RADIATOR

8

BFS

SM 0 THRM FRN

ACCUM QTY < 12%

9

10

11

12

13

14

15
1 Loss of one FREON LOOP = next PLS Entry
2 Leak isolated = Next PLS Entry, depending on Supply H2O quantities and management. Loss of RAD cooling in Aff FREON LOOP
3 FCL1 = PORT FCL2 = STBD

8 (CRT) FREON LOOP 1(2) ACCUM QTY:
   ≤ -5 or ≥ 12%
   > -5 and < 12%

7 6.4a 8

11 Evaluate Freon Loop Leak
   (CRT) FREON LOOP 1(2) ACCUM QTY:
   > ~0% and stable
decr or ~0%

13 UNISOLATED FREON LEAK OR LOOP DEPLETED

14 • Monitor Aff FREON LOOP FLOW
   • When FLOW = ‘L’ go to next step

9 INADVERTENT RAD ISOL DUE TO INSTRUMENTATION OR LOGIC FAILURE

10 Reestablish Radiator Flow
   • Go to RADIATOR ISOL RECOVERY, ECLS SSR-9

12 FREON LEAK ISOLATED TO RADIOR

15 Deactivate pump in leaking/isolated loop:
   (L1) • FREON PUMP LOOP 1(2) – OFF
   (L2) • O2 SYS 1(2) SPLY – CL (tb-CL)
   Stow radiator in affected loop:
   • Perform RAD STOW (ORB OPS, ECLS)
   (L1)
   • FLOW PROP VLV LOOP 2(1) – ICH (tb-ICH)
   (R13U)
   • Inhibit FREON LOOP 1(2) FREON FLOW param 106(116)
   • Go to LOSS OF 1 FREON LOOP (ORB PKT, PWRRDN)
Upon initial activation of heaters, FDA limits are not enabled until following time has elapsed:
- INBD: 25 min
- OUTBD: 16 min
- NOZ: 40 min

2. If noz htr failed, hi load evap still operational. If inbd/outbd duct htr failed, hi load evap lost.

3. Loss of insight requires dual htr ops when htrs are activated.

<table>
<thead>
<tr>
<th>degF</th>
<th>INBD</th>
<th>OUTBD</th>
<th>NOZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 375</td>
<td>&lt; 150</td>
<td>&gt; 330</td>
<td>&gt; 350</td>
</tr>
<tr>
<td>&lt; 150</td>
<td>&gt; 150</td>
<td>&lt; 100</td>
<td>&lt; 100</td>
</tr>
</tbody>
</table>

1. SM 0 THRM EVAP

- SM 88 APU/ENVIRON THERM
- EVAP TEMP HI LOAD INBD
- (OUTBD) DUCT (NOZ) = ‘↑’ or ‘H’ (400 degF) ?

2. (CRT) EVAP TEMP HI LOAD INBD
- (OUTBD) DUCT (NOZ) = ‘↓’ or ‘L’ (0 degF) ?

3. CLASS 3 ALARM S/W FAULT OR TRANSIENT FAILURE

4. Switch htrs
   - HI LOAD DUCT HTR – B(A,C)
   - Temp(s) incr ?

5. HTR A(B,C) THERMOSTAT OR TEMP CNTL FAILED OFF (OP)

6. Switch to dual htrs
   - HI LOAD DUCT HTR – A/B
   - Temp(s) incr ?

7. COLD ENVIRONMENT. DUAL HTR OPERATION REQU

8. Switch htrs
   - HI LOAD DUCT HTR – B(A,C)
   - Temp(s) decr ?

9. SNSR FAILURE

10. HTR A(B,C) THERMOSTAT OR TEMP CNTL FAILED ON (CLOSED)

11. HTR A(B,C) THERMOSTAT OR TEMP CNTL FAILED OFF (OPEN)
    - HI LOAD DUCT HTR – A/B
    - Monitor remaining duct temps to htr ops
6.4h  EVAP TOPPING DUCT T
FWD(AFT), L(R) ↑↓

1. SM 88 APU/ENVIRON THERM
   EVAP TEMP DUCT TOPPING FWD(AFT)
   L(R) = ‘↑’ or ‘H’ (400/250 degF) ?

   NO

2. (CRT) EVAP TEMP DUCT TOPPING FWD(AFT)
   L(R) = ‘↓’ or ‘L’ (0 degF) ?

   NO

3. CLASS 3 ALARM S/W FAULT OR TRANSIENT FAILURE

4. Switch htrs
   (L1) • TOP EVAP HTR DUCT – B(C,A)
   Temp(s) incr ?

   YES

5. HTR FAILURE

6. Switch to dual htrs
   (L1) • TOP EVAP HTR DUCT – A/B
   Temp(s) incr ?

   NO

7. COLD ENVIRONMENT. DUAL HTR OPS REQD

8. Switch htrs
   (L1) • TOP EVAP HTR DUCT – B(C,A)
   Temp(s) decr ?

   YES

9. SNSR FAILURE

10. HTR A THERMOSTAT FAILURE

11. Fwd or Aft Sensor failed ?

   YES

12. Dual htr ops
    (L1) • TOP EVAP HTR DUCT – A/B
    • Monitor remaining duct temps to htr ops

   NO

13. (L1) • TOP EVAP HTR DUCT – A(B,C)
    • Monitor remaining duct temps to htr ops
ECLS 6.4i EVAP TOPPING L(R) NOZ ↑↓

1. SM 88 APU/ENVIRON THERM
   - EVAP TEMP NOZ TOPPING L(R) = ‘↑’ or ‘H’ (250 degF) ?

   1. YES
      - 2. (CRT) EVAP TEMP NOZ TOPPING L(R) = ‘↓’ or ‘L’ (0 degF) ?
         - YES
            - 3. CLASS 3 ALARM SW FAULT OR TRANSIENT FAILURE
            - NO
            - 4. Switch htrs
               - (L1)
               - TOP EVAP HTR NOZ L(R) – B AUTO (A AUTO)
               - Temp(s) incr ?

   1. NO
      - 2. NO
         - 3. SNSR FAILURE

   1. 6. Switch htrs
       - (L1)
       - TOP EVAP HTR NOZ L(R) – B AUTO (A AUTO)
       - Temp(s) decr ?

   1. 7. HTR A(B) TEMP CNTL FAILED OFF
      - L1
      - TOP EVAP HTR NOZ L(R) – A AUTO (B AUTO)

   1. 8. HTR A(B) TEMP CNTL FAILED ON

   1. 9. HTR A(B) TEMP CNTL FAILED ON

   1. 10. HTR A(B) TEMP CNTL FAILED ON

Topping FES still operational with Noz Htr failed off as long as fwd and aft duct htrs are operational.
ECLS 6.4j EVAP FDLN TEMP FWD
(MID, AFT, TOP, HI LOAD, ACCUM) ↑↓

1. SM 88 APU/ENVIRON THERM
   EVAP FDLN T FWD A(B), MID 1A(B), MID 2 A(B), AFT A(B), TOPPING A(B), HI LOAD A(B), ACCUM A(B)= ↑ or 'H' (160 degF) ?
   YES
   NO

2. (CRT) EVAP FDLN T FWD A(B), MID 1 A(B), MID 2 A(B), AFT A(B), TOPPING A(B), HI LOAD A(B), ACCUM A(B) = ↓ or 'L' (0 degF) ?
   YES
   NO

3. CLASS 3 ALARM S/W FAULT OR TRANSIENT FAILURE

4. Switch htrs
   (L2)
   • FLASH EVAP FDLN HTR A(B) SPLY – 2(1)
   Temp(s) incr ?
   YES
   NO

5. Switch htrs
   (L2)
   • FLASH EVAP FDLN HTR A(B) SPLY – 2(1)
   Temp(s) decr ?
   YES
   NO

6. HTR 1(2) THERMOSTAT FAILURE

7. SNSR FAILURE

8. HTR 1(2) THERMOSTAT FAILURE
   (L2)
   • FLASH EVAP FDLN HTR A(B) SPLY – 1(2)

09/24/08

6-50
MAL/ALL/GEN J
**Possible next PLS: MCC**

8 If repeated occurrence (same loop), MCC for possibilities of ruptured bellows causing GN2 precharge and H2O to mix, or stuck bellows

10 Only PUMP OUT P is available on board while in BFS

11 If both loops are failed:

12 As pumps utilize H2O flow for active cooling, extreme or total blockage will result in overheating and failure of the pump within min
Possible next PLS: \^MCC

For GN2 leak from accum, PUMP OUT P will reach cabin press in the inactive loop and cabin press plus PUMP ΔP for active loop

If both loops are failed: (L1) H2O PUMP LOOP 1,2 – OFF, then go to LOSS OF 2 H2O LOOPS (ORB PKT, PWDRN)

Operation of both H2O loops will prevent loss of H2O to alt loop

Crew may opt to have MCC manage software limits via TMBU
For GN2 leak from accum, PUMP OUT P will reach cabin press in the inactive loop and cabin press plus PUMP \( \Delta P \) for active loop.

Do not deactivate loop with potential GN2 LK. Loop may not restart.

Crew may opt to have MCC manage software limits via TMBU.

Possible causes: PL-MDM failure or pump switch GPC position failure resulting in pump not receiving GPC PUMP – ON cmd; or SM preconditioning failure (pump switch contact or software) causing selection of incorrect SM ALERT limits.

Activate pump of aff loop
(L1)
• H2O PUMP LOOP 1(2) – ON

H2O LOOP1(2) PUMP \( \Delta P \) 'NORMAL'?

S88 H2O LOOP 1(2) FLOW msg also received when fault was annunciaged?

ACCUM GN2 LEAK OR PUMP OUT P XDCR SHIFT

Aff H2O LOOP PUMP sw – ON?

Go to RECONFIG TO ALT H2O LOOP, ECLS SSR-4, blocks 2 and 5

Deactivate aff loop
(L1)
• H2O PUMP LOOP 1(2) – OFF

Inhibit alarms of aff loop:
LOOP 1
LOOP 2

Install sw guard (stowed in IFM toolkit) over H2O PUMP LOOP 1(2) sw
ECLS

6.4m H2O PUMP ΔP 1(2) ↑↓

1. Preconditioning will select this limit set if (L1) H2O PUMP LOOP 1(2) – ON, or H2O PUMP LOOP 1(2) – GPC and GPC – ON signal present.

2. Preconditioning will select this limit set if (L1) H2O PUMP LOOP 1(2) – OFF, or H2O PUMP LOOP 1(2) – GPC without presence of GPC – ON signal.

3. MCC about reset cb.

Nominal Config:
Refer to 6.4l

Light on if:
H2O LOOP 1(2) PUMP ΔP
< 33 psid
> 46 psid
or
> 5 psid (inactive loop)
or, light on if:
H2O LOOP 1(2) PUMP OUT P
< 50 psia
> 75 psia
or
< 20 psia (inactive loop)

1. SM 88 APU/ENVIRON THERM
2. SM FAILURE OR TRANSIENT
3. PUMP ΔP XDCR SHIFT
4. H2O LOOP 1(2) PUMP OUT P ‘L’ and PUMP OUT T ‘L’ and ACCUM QTY ‘L’?
5. H2O LOOP 1(2) BYP CNTLR FAILED OR CNTLR PWR LOST
6. Aff LOOP PUMP sw position:
   - GPC
   - OFF
   - ON
7. H2O LOOP 1(2) PUMP OUT P:
   - > 60 psia and ≤ 67 psia
   - ≤ 60 psia
   - ≥ 67 psia

11 18 19 27 49
Possible causes: PLC/MDM failure or pump switch GPC position failure resulting in pump not receiving GPC.
PUMP – ON CMD; or SM preconditioning failure (pump switch contact or software) causing selection of incorrect SM ALERT limits.

Pump function sw ON position still available with full cooling capability.
5 Pump function sw ON position still available with full cooling capability

6 Possible causes: PL-MDM failure causing pump failed on at GPC PUMP – ON cmd termination; or SM preconditioning failure (pump switch contact or software) causing selection of incorrect SM ALERT limits

7 Crew may opt to have MCC manage software limit via TMBU

14 Correct selection of H2O LOOP PUMP ΔP 1(2) SM ALERT limits by SM Preconditioning

22 SM 60 SM TABLE MAINT
   If LOOP 1:
   • ITEM 1 +0 6 1 2 6 0 5 EXEC
   If LOOP 2:
   • ITEM 1 +0 6 1 2 7 0 5 EXEC
   Limit set 1 (low: 33; high: 46)
   Limit set 2 (low: - ; high: 5)

23 Inhibit SM ALERT limits on H2O LOOP PUMP ΔP of aff loop

24 PUMP ΔP XDCR SHIFT HIGH

25 SELECTED SM ALERT LIMIT SET IS NOT CONSISTENT WITH PUMP STATUS. SM ALERT IN LIMIT SET 2 WHEN PUMP ACTIVE

26 Deactivate aff loop (L1)
   • H2O PUMP LOOP 1(2) – OFF

27 Inhibit SM ALERT limits on H2O LOOP PUMP ΔP of aff loop

28 Correct H2O LOOP 1(2) PUMP ΔP SM ALERT limit selection by SM preconditioning

29 PUMP ΔP INST FAILURE

30 INCORRECT SM ALERT LIMIT SET SELECTION BY SM PRECONDITIONING DUE TO FAILURES AT PUMP SW CONTACT OR SOFTWARE

31 Reset SM ALERT lower limits on aff loop

32 Loop 1

PUMP OUT P
• ITEM 1 +0 6 1 2 6 0 0 EXEC
• ITEM 4 +5 0 EXEC
• ITEM 5 +7 5 EXEC
PUMP ΔP
• ITEM 1 +0 6 1 2 6 0 5 EXEC
• ITEM 4 +3 3 EXEC
• ITEM 5 +4 6 EXEC
ICH FLOW
• ITEM 1 +0 6 1 2 7 4 2 EXEC
• ITEM 4 +5 5 0 EXEC

Loop 2

PUMP OUT P
• ITEM 1 +0 6 1 2 7 0 0 EXEC
• ITEM 4 +5 0 EXEC
• ITEM 5 +7 5 EXEC
PUMP ΔP
• ITEM 1 +0 6 1 2 7 0 5 EXEC
• ITEM 4 +3 3 EXEC
• ITEM 5 +4 6 EXEC
ICH FLOW
• ITEM 1 +0 6 1 2 7 2 2 EXEC
• ITEM 4 +5 5 0 EXEC
Nominal Config:
Refer to 6.4l

1. Possible next PLS. √MCC

2. For normal water loop charge, ~ one psia change in PUMP OUT P is observed for every 10% change in ACCUM QTY

3. If both loops failed: (L1) H2O PUMP LOOP 1,2 – OFF, then go to LOSS OF 2 H2O LOOPS (ORB PKT, PWRDN)

4. √MCC about reset cb
   LOOP 1: (L4) cb AC3 ΦA
   H2O CNTLR 1
   LOOP 2: (L4) cb AC1 ΦA
   H2O CNTLR 2

5. (CRT)
   "Status of alt loop
   H2O LOOP 2(1)
   ACCUM QTY < 25% ?

6. H2O LOOP 1(2) ACCUM QTY:
   Normal

7. (CRT)
   "Status of alt loop
   PUMP OUT P and ACCUM QTY both decreasing ?

8. ACCUM QTY XDCR SHIFT LOW

9. EXTERNAL LOOP LEAK

10. (CRT)
    "H2O LOOP 1(2)
    PUMP OUT P 'L'
    and
    PUMP OUT T 'L'
    and
    PUMP ΔP 'L' ?

11. H2O LOOP 1(2) BYP CNTLR FAILURE OR CNTL PWR LOST

12. ACCUM QTY INST FAILURE
ECLS 6.4 (Cont)

1. Possible next action:
   - Deactivate affected loop if LOOP PUMP sw is not OFF

2. If LOOP PUMP OUT P is increasing or > 30 psia:
   - Deactivate affected LOOP if LOOP PUMP sw is not OFF
   - H2O PUMP LOOP 1(2) – OFF

3. If FREGON/H2O LEAKAGE AT INTERCHANGER and LOOP PUMP sw position ON when fault was annunciated:
   - Aff LOOP PUMP sw position ON when fault was annunciated

4. If ACCUM QTY XDRY SHIFT HIGH:
   - Aff LOOP PUMP sw position ON when fault was annunciated

5. For normal water loop charge, PUMP OUT P if inactive loop approaches 30 psia as ACCUM QTY approaches 100 pct in FCL/H2O interloop leakage failure. This PUMP OUT P will eventually reach equilibrium with FCL pressure at interchanger, which is greater than 60 psi normally.

6. Go to RECONFIG TO ALT H2O LOOP, ECLS SSR-4
Preconditioning will select this limit set if H2O PUMP LOOP 1(2) – ON; or H2O PUMP LOOP 1(2) – GPC and GPC – ON signal present

2 Off-scale values are selected for FDA limits by SM preconditioning if H2O PUMP LOOP 1(2) – OFF; or H2O PUMP LOOP 1(2) – GPC without presence of GPC – ON signal

3 Possible causes: PL-MDM failure or pump switch GPC failure resulting in pump not receiving GPC PUMP – ON cmd; or SM preconditioning failure (pump switch contact or software) causing selection of incorrect SM ALERT limits

4 Pump function sw ON position still available
If problem recurs, reconfig to alternate H2O LOOP, ECLS SSR-4.

ICH FLOW BYP VLV may be at full ICH flow position when fault announced.

Possible next PL: MCC

If BYP vlv drive control on both loops failed, activate both H2O LOOPS.

Wait 5 min, compare with value in block 8

(CRT) H2O LOOP 1(2) PUMP OUT T decr?

YES

H2O LOOP 1(2) ICH FLOW XDCR SHIFT

Return to Auto Mode

BYP CNTLR MTR DRIVE FAILURE, H2O LOOP 1(2) ICH FLOW INSUFFICIENT

Aff LOOP PUMP sw position ON when fault was annunciated?

Deactivate aff loop

Inhibit SM ALERT limits on H2O LOOP ICH FLOW of aff loop

SM 60 SM TABLE MAINT

If LOOP 1:

+0 6 1 2 7 4 2 EXEC

If LOOP 2:

+0 6 1 2 7 2 2 EXEC

INH – ITEM 10 EXEC

H2O LOOP 1(2) – GPC

 Return to Auto Mode

(in block 8) H2O LOOP 1(2) PUMP OUT T incr?

NO

Adjust H2O LOOP ICH FLOW

28

If aff Loop Pump sw GPC at time of fault annunciation, restore config

H2O LOOP 1(2) – GPC

Return to Auto Mode

H2O LOOP 1(2) ICH FLOW XDCR SHIFT LOW

18

Return to Auto Mode

(H1)

H2O LOOP 1(2) BYP MODE – AUTO

21

(L1)

H2O LOOP 1(2) BYP MODE – AUTO

\(\text{IFM}^{\text{YES}}\)

\(\text{IFM}^{\text{NO}}\)

H2O LOOP 1(2) ICH FLOW > 1000 lb/hr?

NO

H2O LOOP 1(2) ICH FLOW > 1000 lb/hr?

\(\text{IFM}^{\text{YES}}\)

\(\text{IFM}^{\text{NO}}\)

13

ICH FLOW BYP VLV MISPPOSITIONED OR NOT HOLDING SET POSITION

14

IFM

H2O LOOP 1(2) ICH FLOW XDCR SHIFT LOW

20

If aff LOOP PUMP sw ON at time of fault

aff LOOP PUMP sw position ON when fault was

H2O LOOP 1(2) ICH FLOW XDCR SHIFT LOW

21

Return to Auto Mode

H2O LOOP 1(2) BYP MODE – AUTO

28

19

Wait 5 min, compare with value in block 8

(CRT) H2O LOOP 1(2) PUMP OUT T decr?

NO

(CRT) H2O LOOP 1(2) PUMP OUT T incr?

YES

H2O LOOP 1(2) ICH FLOW XDCR SHIFT LOW

12

IH

16

Adjust H2O LOOP ICH FLOW

10

If BYP vlv drive control on both loops failed, activate both H2O LOOPS

9

Possible next PL: MCC

8

Manual override adjustment may still be available. \(\text{IFM}\) for possible IFM

6

ICH FLOW BYP VLV may be at full ICH flow position when fault announced.

5

If problem recurs, reconfig to alternate H2O LOOP, ECLS SSR-4

4

Wait 5 min, compare with value in block 8

(CRT) H2O LOOP 1(2) PUMP OUT T decr?

3

(CRT) H2O LOOP 1(2) PUMP OUT T decr?

YES

11

Wait 5 min, compare with value in block 8

(CRT) H2O LOOP 1(2) PUMP OUT T decr?

9

17

Adjust to decr H2O LOOP ICH FLOW of affected loop

L1

H2O LOOP 1(2) BYP MODE – AUTO

10

16

Adjust H2O LOOP ICH FLOW


Nominal Config:
Refer to 6.4l

H2O LOOP 1(2) ICH OUT T < 35 degF
H2O LOOP 1(2) CAB HX IN T < 34 degF
H2O LOOP 1(2) PUMP OUT T < 45 degF
> 90 deg F

SM ALERT

S88 H2O LOOP 1(2) TEMP

H2O LOOP 1(2) ICH OUT T ↓
H2O LOOP 1(2) CAB HX IN T ↓
PUMP OUT T ↑

6.4p H2O ICH OUT T 1(2) ↓
CAB HX IN T 1(2) ↓
PUMP OUT T 1(2) ↑↓

1

SM 88 APU/ENVIRON THERM

H2O LOOP 1(2) ICH OUT T ↓ or 'L'?

YES

2

(CRT)
Average FREON LOOP EVAP OUT T 1,2 < 35 degF?

YES

3

LOW FREON LOOP TEMP

NO

4

H2O LOOP 1(2) ICH OUT T SNSR INST FAILURE

NO

5

Inhibit SM ALERT limits on H2O LOOP ICH OUT T of aff loop

6

(CRT)
H2O LOOP 1(2) CAB HX IN T:

'L'

'↓'

Normal

31

7

(CRT)
H2O LOOP 1(2) PUMP OUT T:

Normal

'L'

'H'

'↓'

'↑'

8

CLASS 3 ALARM S/W FAULT OR SNSR TRANSIENT

14

9

H2O LOOP 1(2) PUMP OUT T SNSR FAILURE

19

10

Aff LOOP PUMP sw position – ON?

NO

16

YES

11

PUMP OUT T SNSR SHIFT LOW OR TEMP EXCURSION AT NONACTIVATED LOOP

12

Aff LOOP PUMP sw position – ON?

NO

23

13

PUMP OUT T SNSR SHIFT HIGH OR TEMP EXCURSION AT NONACTIVATED LOOP

16

31

37

14

19

11

31

37

16

23

12

13

19
1. MCC to reset LOOP 1: (L4:L) cb AC2 φA CAB T CNTLR 1
2. MCC to reset LOOP 2: (L4:L) cb AC1 φA CAB T CNTLR 2

Aff loop:

- LOOP 2
- LOOP 1

31. Aff loop:

SM 66 ENVIRONMENT
CABIN HX OUT T and CABIN T ‘L’?

34. SM 66 ENVIRONMENT
CABIN HX OUT T and CABIN T ‘L’?

38. CABIN TEMP CNTL 1 SIG CONDITIONER FAILURE

1. H2O LOOP
2(1) PUMP OUT T < 90 degF after 10 min?

32. H2O LOOP
2(1) PUMP OUT T < 90 degF after 10 min?

33. ICH PERFORMANCE DEGRADATION WITH ONE H2O LOOP

34. ICH PERFORMANCE DEGRADATION

35. ICH PERFORMANCE DEGRADATION

36. Complete reconfig

37. ICH PERFORMANCE DEGRADATION

38. SM 66 ENVIRONMENT
CABIN HX OUT T and CABIN T ‘L’?

39. Inhibit SM ALERT limits on H2O LOOP CAB HX IN T of aff loop

SM 60 SM TABLE MAINT
If LOOP 1:
- ITEM 1
  - 0 6 1 2 6 6 3 EXEC
If LOOP 2:
- ITEM 1
  - 0 6 1 2 6 6 5 EXEC
- INH – ITEM 10 EXEC

39. Inhibit SM ALERT limits on H2O LOOP CAB HX IN T of aff loop

40. Go to Priority Pwrdn Groups A and B, and CABIN EQUIP PWRDN, ECLS SSR-6

36. Complete reconfig

- Go to RECONFIG TO ALT H2O LOOP, ECLS SSR-4
SUPPLY H2O

SM 66 ENVIRONMENT
2. Dump system is not lost. MCC will update ORB OPS DUMP procedure.

3. If temperature xdr is OSH, √MCC before doing next step.

4. √MCC about looking for H2O below middeck floor.

5. MCC may be able to determine exact failure.

6. √MCC on how to store condensate from humidity separator.

7. √MCC about attempting waste water dump to remove object blocking waste tank inlet.
If SUPPLY H2O PRESS > 40.0 psia

1. WATER TKS HARD FILLED
   - Continue FES Dump initiated in OPCL and refer to SUPPLY WATER DUMP using FES (ORB OPS, ECLS)
   - If no comm: Dump H2O tanks to provide 100% total ullage in any single or combination of TKs A,B,C,D

2. If Comm, √ MCC for exact qty to dump

3. Reset TKC limit to detect next worst case failure (blockage at TKB inlet)

4. Crew may opt to have MCC make S/W limit change via TMBU

5. XDCR SHIFTED OR FAILED HIGH
   - Reset TKB limits
   - SM 60 SM TABLE MAINT
     - ITEM 1
     - +0 620 420 EXEC
     - Set upper limit to 93%

6. TK A/B CHECK VLV FAILURE

EXT AIL

6.7

6-71

MAL/ALL/GEN J
If both zone temps are indicating high, √MCC. Possible external heat load due to attitude is causing high temps.
If two or more temps are indicating high, √MCC. Possible external heat load due to attitude is causing high temps

Nominal Config:
(ML86B:C)
• cb MNA EXT ARLK HTR STRUC – cl(op)
• cb MNB EXT ARLK HTR STRUC – op(cl)
6.8a RESERVED
Only MCC can determine exact failure. Suspect snsr yielding alarm.
ECLS SSR-2
FES CORE FLUSH PROCEDURE

NOTE
This procedure is used to deice or to remove contamination from topping or hi load FES core by flowing warm Freon through core. Bypassed radiators and the Secondary FES Controller are used for the flush. A successful flush will be indicated by EVAP OUT temps stable at ~62 degF when FLASH EVAP CNTLR SEC is activated. Secondary cue is a very rapid decrease in duct temps, followed by rapid increase

SM 88 APU/ENVIRON THERM

TOPPING CORE FLUSH (RADS ACTIVATED)
L1 1. FLASH EVAP CNTLR (three) – OFF
2. TOP EVAP HTR DUCT – A/B
3. NOZ (two) – A AUTO(B AUTO)

CRT Proceed when TOP FWD(AFT) temps > 120 degF
4. RAD BYP VLV MODE (two) – MAN
5. CNTLR LOOP (two) – OFF, AUTO A
6. After 80 sec, RAD CNTLR LOOP (two) – OFF

CRT Proceed when EVAP OUT T > 90 degF for 2 min
L1 7. FLASH EVAP CNTLR SEC – ON (wait 30 sec)
8. – OFF (wait 30 sec)
9. Repeat steps 7 and 8 three times, then:
FLASH EVAP CNTLR SEC – ON

CRT 10. Proceed on MCC call, or if no comm, wait minimum 7 min, then proceed when EVAP OUT T ~62 degF and TOP FWD(AFT) > 120 degF

   * If TOP FWD(AFT) < 40 degF, then *
   * immediately perform steps 11,12,13,14 *

L1 11. FLASH EVAP CNTLR SEC – OFF
12. RAD CNTLR LOOP (two) – AUTO A
13. After 10 sec, RAD BYP VLV MODE 1,2 (two) – AUTO
   RAD CNTLR OUT TEMP – HI
14. After 5 min, RAD CNTLR OUT TEMP – NORM

If successful flush:
15. After 30 min, TOP EVAP HTR DUCT – A(B)
If FES reqd, go to FES RESTART, ECLS SSR-5

HI LOAD CORE FLUSH (RADS ACTIVATED)
L1 1. FLASH EVAP CNTLR (three) – OFF
2. HI LOAD DUCT HTR – A/B

CRT Proceed when HI LOAD INBD(OUTBD) Ts > 170 degF
L1 3. HI LOAD EVAP – ENA
4. RAD BYP VLV MODE (two) – MAN
5. CNTLR LOOP (two) – OFF, AUTO A
6. After 80 sec, RAD CNTLR LOOP (two) – OFF

CRT Proceed when EVAP OUT T > 90 degF for 2 min
L1 7. FLASH EVAP CNTLR SEC – ON (wait 30 sec)
8. – OFF (wait 30 sec)
9. Repeat steps 7 and 8 three times, then:
FLASH EVAP CNTLR SEC – ON

CRT 10. Proceed on MCC call, or if no comm, wait minimum 7 min, then proceed when EVAP OUT T ~62 degF and HI LOAD INBD(OUTBD) > 170 degF

   * If HI LOAD INBD(OUTBD) < 40 degF, then *
   * immediately perform steps 11,12,13,14 *

L1 11. FLASH EVAP CNTLR SEC – OFF
12. RAD CNTLR LOOP (two) – AUTO A
13. After 10 sec, RAD BYP VLV MODE 1,2 (two) – AUTO
   RAD CNTLR OUT TEMP – HI
14. After 5 min, RAD CNTLR OUT TEMP – NORM

If successful flush:
15. HI LOAD EVAP – OFF
16. After 30 min, HI LOAD EVAP DUCT HTR – OFF
If FES reqd, go to FES RESTART, ECLS SSR-5
TOPPING CORE FLUSH (RADS NOT ACTIVATED)

1. TOP EVAP HTR DUCT – A/B
2. FLASH EVAP CNTLR SEC – OFF
3. HI LOAD EVAP – OFF

O1 Proceed when EVAP OUT T > 90 degF for 2 min
L1 4. FLASH EVAP CNTLR SEC – ON (wait 30 sec)
5. – OFF (wait 30 sec)
6. Repeat steps 4 and 5 three times, then:
   FLASH EVAP CNTLR SEC – ON

CRT 7. Proceed on MCC call, or, if no comm, wait minimum 7 min, then proceed
   when EVAP OUT T ~62 degF and TOP FWD(AFT) > 120 degF
   * If TOP FWD(AFT) < 40 degF, then *
   * Immediately perform steps 12,13,14,15 *

L1 8. FLASH EVAP CNTLR SEC – OFF
9. HI LOAD EVAP – ENA
10. FLASH EVAP CNTLR PRI B – ON (wait 2 min)

O1 If EVAP OUT T ~39 degF (Topper recovered):
L1 11. TOP EVAP HTR DUCT – A(B) >>
12. FLASH EVAP CNTLR (three) – OFF (Topper not recovered)
13. HI LOAD EVAP – ENA
14. FLASH EVAP CNTLR SEC – ON
15. TOP EVAP HTR DUCT – A(B)

HI LOAD CORE FLUSH (RADS NOT ACTIVATED)

1. HI LOAD EVAP DUCT HTR – A/B
2. FLASH EVAP CNTLR SEC – OFF
3. HI LOAD EVAP – ON
4. FLASH EVAP CNTLR SEC – ON (wait 30 sec)
5. – OFF (wait 30 sec)
6. Repeat steps 4 and 5 three times, then:
   FLASH EVAP CNTLR SEC – ON

CRT 7. Proceed on MCC call, or, if no comm, wait minimum 7 min, then proceed
   when EVAP OUT T ~62 degF and HI LOAD INBD(OUTBD) > 170 degF
   * If HI LOAD INBD (OUTBD) < 40 degF, then *
   * Immediately perform steps 12,13,14,15 *

L1 8. FLASH EVAP CNTLR SEC – OFF
9. HI LOAD EVAP – ENA
10. FLASH EVAP CNTLR PRI B – ON (wait 2 min)

O1 If EVAP OUT T ~39 degF (HI LOAD recovered):
L1 11. HI LOAD EVAP DUCT HTR – A >>
12. FLASH EVAP CNTLR (three) – OFF (HI LOAD not recovered)
13. HI LOAD EVAP – OFF
14. FLASH EVAP CNTLR SEC – ON
15. HI LOAD EVAP DUCT HTR – A(B)
Use this procedure for complete reconfig of Auto PCS or to depress cabin back to normal pressure after N2 or O2 leak occurred inside cabin. Some sws may be in desired position.
### ECLS SSR-3 (Cont)

**If Cabin Press > 15.2 psia**

1. **(MO13Q)**
   - MIDDECK FLOODS AIRLK 2 – ON/OFF

2. **(Inner Hatch)**
   - Equalization vlv caps (two) – remove, stow
   - Equalization vlv (two) – OFF
   - Open, stow HATCH
   - Rotate vent duct into airlock

3. **(O15:D)**
   - cb MNB PPO2 C CAB dP/dT – op

4. **(AW82B)**
   - AIRLK DEPRESS vlv cap – vent, remove
   - Depress Cabin to ops level

5. **(AW82B)**
   - AIRLK DEPRESS vlv – 5
     - If ‘S66 CABIN PPO2 A(2)’
     - AIRLK DEPRESS vlv – CL
   - (C5)
   - DIRECT O2 vlv – OP
   - When PPO2 = 3.45,
   - DIRECT O2 vlv – CL
   - Continue to depress Cabin and
   - add O2 as reqd
   - When ‘S66 CAB O2(N2) FLO 1(2)’
     - If PPO2 < 3.6, continue depress until
       PPO2 < 3.6 psia
     - If PPO2 < 2.9, continue depress until
       CABIN PRESS = 14.5 psi
     - AIRLK DEPRESS vlv – CL
     - Allow CABIN PRESS and PPO2 to incr
       (~15 min). Repeat depress to CABIN
       PRESS = 14.5 until PPO2 > 2.9 psia

### Reconfig from Cabin Depress

1. **(AW82B)**
   - AIRLK DEPRESS vlv – CL, capped

2. **(O15:D)**
   - cb MNB PPO2 C CAB dP/dT – cl

### ATM PRESS CONTROL

1. **(L2)**
   - O2/N2 CNTLR VLV SYS 1 – CL (O2)
   - 2 – OP (N2)

### H2O TK N2 REG INLET SYS 1 – CL
   - 2 – OP

### P&I change to Cabin Maintenance:

- Change ‘SYS 1’ to ‘SYS 2’
- MCC for P&I changes to repress procedure

### If Cabin Press ≤ 10.6 psia >>

1. **(AW82B)**
   - AIRLK DEPRESS vlv – CL, capped

2. **(Inner Hatch)**
   - If reqd, rotate vent duct and stow on AIRLK wall
   - If reqd, close HATCH
   - EQUAL vlv – norm and capped

3. **(MO13Q)**
   - MIDDECK FLOODS AIRLK 2 – OFF/ON

---

- **09/24/08**
- **6-79**
- **MAL/ALL/GEN J**
# ECLS SSR-3 (Cont)

**SM 66 ENVIRONMENT**

- If Cabin Press > 10.6 psi
  - (O15:D) cb MNB PPO2 C CAB dP/dT – op
  - (AW82B) AIRLK DEPRESS vlv cap – vent, remove
  - Depress Cabin to ops level

  - (AW82B) AIRLK DEPRESS VLV – 5
    - If 'S66 CABIN PPO2' AIRLK DEPRESS vlv – CL
    - (MO10W) 14.7 REG INLET SYS 2 – OP or open 14.7 REG INLET configured
    - for O2 when PPO2 = 2.8
    - 14.7 REG INLET SYS 2 – CL
    - Continue to depress
    - Cabin and add O2 as reqd

- If PPO2 > 2.8, continue depress until PPO2 ≤ 2.8 and Cabin P = 10.2 < X < 10.4
- If PPO2 < 2.55
  - AIRLOCK DEPRESS vlv – CL
  - Open 14.7 psi CABIN REG INLET which is configured to flow O2 to allow cabin press and PPO2 to incr until PPO2 = 2.8. Repeat depress until Cabin P = 10.2 < X < 10.4 and PPO2 > 2.55

**7** Reconfig from cabin depress

- (AW82B) AIRLK DEPRESS vlv – CL

- (O15:D) cb MNB PPO2 C CAB dP/dT – cl

  - Go to 10.2 PSI MAINTENANCE (EVA) for subsequent cabin adjustments
1. Good H2O loop already activated?

   NO

2. (L1)
   - H2O PUMP LOOP 1(2) – ON
   - 2(1) – OFF
   - 1(2) BYP MODE – AUTO
   - 2(1) BYP MODE – MAN

3. Reason for loop reconfiguration:
   - PUMP FAILURE OR LOOP FLOW BLOCKAGE
   - LEAKS (EXTERNAL OR FREON/H2O INTERLOOP LEAKAGE) OR LOSS OF BOTH PUMP OUT P AND ACCUM QTY INST
   - BYPASS CONTROLLER FAILURE OR BUS FAILURE: AC1 (ΦA OR Φ3) OR AC3 (ΦA OR Φ3)
   - BUS FAILURE: AC3 (ΦB OR ΦC) OR NO FAILURE: BUS BALANCING REQD

4. New active loop:
   - LOOP 1
     - Inhibit LOOP 2 PUMP OUT P (param 115)
     - Change LOOP 1 PUMP OUT P (param 105) lower C/W to 1.50 vdc (45 psia)
   - Reconfig B/U C/W
     - SM 60 SM TABLE MAINT
       - ITEM 1 +0 6 1 2 7 0 0 EXEC
       - ITEM 15 EXEC
       - ITEM 1 +0 6 1 2 6 0 0 EXEC
       - ITEM 11 +4 5 EXEC

5. New active loop:
   - LOOP 1
     - Change LOOP 1 PUMP OUT P (param 105) lower C/W limit to 1.50 vdc (45 psia) and LOOP 2 (param 115) to 0.65 vdc (19.5 psia)
   - Reconfig B/U C/W
     - SM 60 SM TABLE MAINT
       - ITEM 1 +0 6 1 2 6 0 0 EXEC
       - ITEM 15 EXEC
       - ITEM 1 +0 6 1 2 7 0 0 EXEC
       - ITEM 11 +4 5 EXEC

Procedure assumes initial C/W and B/U C/W for PUMP OUT P set at 19.5 for inactive loop and 45 for active loop.

Loss of bypass controller results in loss of all instrumentation in affected loop except flow and some temperatures.

With loss of PUMP OUT P and ACCUM QTY instrumentation, Freon/H2O interloop leakage is not detectable. Affected loop should not be used unless reqd.
### 6 New active loop:

<table>
<thead>
<tr>
<th>LOOP 1</th>
<th>LOOP 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>(R13U)</em></td>
<td><em>(R13U)</em></td>
</tr>
<tr>
<td>• Inhibit LOOP 2 PUMP OUT P</td>
<td>• Inhibit LOOP 1 PUMP OUT P</td>
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<tr>
<td>(param 115)</td>
<td>(param 105)</td>
</tr>
<tr>
<td>• Change LOOP 1 PUMP OUT P</td>
<td>• Change LOOP 2 PUMP OUT P</td>
</tr>
<tr>
<td>(param 105) lower</td>
<td>(param 115) lower</td>
</tr>
<tr>
<td>C/W to 1.50 vdc (45 psia)</td>
<td>C/W to 1.50 vdc (45 psia)</td>
</tr>
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<td>Reconfig B/U C/W</td>
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</tr>
<tr>
<td>• ITEM 11 -4 5 EXEC</td>
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<td>• ITEM 1 -0 6 1 2 6 0 0 EXEC</td>
</tr>
<tr>
<td>• ITEM 15 EXEC</td>
<td>• ITEM 15 EXEC</td>
</tr>
<tr>
<td>Inhibit LOOP 2 SM ALERTS</td>
<td>Inhibit LOOP 1 SM ALERTS</td>
</tr>
<tr>
<td>• ITEM 10 EXEC</td>
<td>• ITEM 10 EXEC</td>
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<tr>
<td>• ITEM 1 -0 6 1 2 7 1 0 EXEC</td>
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</tbody>
</table>

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<tr>
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<td>(param 115) lower</td>
</tr>
<tr>
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</tr>
<tr>
<td>• ITEM 10 EXEC</td>
<td>• ITEM 10 EXEC</td>
</tr>
</tbody>
</table>
1. Prior flight experience has demonstrated that FES shutdns are most likely in this temp range

2. To ensure positive FES restart, RADs are placed in HIGH to impose a load on FES

3. TOPPING EVAP will overtemp shutdn when inlet temp exceeds ~68 degF and HI LOAD not activated

4. Heat load beyond capability of topping evap

---

ECLS SSR-5
FES RESTART

1. \text{Controllers off (L1)}
   - FLASH EVAP CNTLR
     - PRI A – OFF
     - B – OFF
     - SEC – OFF

2. SM 88 APU/ENVIRON THERM
   - FREON LOOP 1,2 EVAP OUT T between 41-47 degF ?

3. Restart Evap
   - RAD CNTLR OUT TEMP – HI

4. (CRT)
   - FREON LOOP 1,2 EVAP OUT T > 68 degF ?

5. (L1) HI LOAD EVAP enabled ?

6. Restart Evap
   - FLASH EVAP CNTLR PRI A(B) – ON
   - After ~30 sec, EVAP OUT ~39 degF

7. Use of HI LOAD EVAP prohibited due to FES or payload constraints?

8. \text{\checkmark MCC to reduce heat load}
   - Change attitude (tail sun best)
   - Power down (ORB PKT, PRIOR PWRDN)
   - Deploy radiators (if stowed)

9. Activate HI LOAD EVAP
   - HI LOAD EVAP – ENA

10. Restart Evap
    - FLASH EVAP CNTLR PRI A(B) – ON
    - After ~30 sec, EVAP OUT ~39 degF
Use one IDP/CRT with one MDU

<table>
<thead>
<tr>
<th>ID</th>
<th>Component</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>F6/F8/A6U</td>
<td>FLT CNTLR PWR (three) – OFF</td>
<td></td>
</tr>
<tr>
<td>O14:E</td>
<td>cb MNA DDU L.AFT (two) – op</td>
<td></td>
</tr>
<tr>
<td>O15:E</td>
<td>cb MNB DDU L.R (two) – op</td>
<td></td>
</tr>
<tr>
<td>O16:E</td>
<td>cb MNC DDU R.AFT (two) – op</td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td>CAB TEMP – COOL (as reqd, WARM)</td>
<td></td>
</tr>
<tr>
<td>W1-10</td>
<td>Install Window Shades (ten)</td>
<td></td>
</tr>
<tr>
<td>O19</td>
<td>TV PWR – OFF</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>MON 1,2 – OFF</td>
<td></td>
</tr>
<tr>
<td>R11</td>
<td>VTR PWR – OFF</td>
<td></td>
</tr>
<tr>
<td>MO39M</td>
<td>MIDDECK COMM CCU PWR – OFF</td>
<td></td>
</tr>
<tr>
<td>MO42F</td>
<td>MIDDECK SPKR AUD SPKR PWR – OFF</td>
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</tr>
<tr>
<td>MO58F</td>
<td>MIDDECK CCU AUD PWR – OFF</td>
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</tr>
<tr>
<td>GALLEY</td>
<td>DC PWR BUS A – OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B – OFF</td>
<td></td>
</tr>
<tr>
<td>MA73C:G</td>
<td>cb AC3 GALLEY FAN (three) – op</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or</td>
<td></td>
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<tr>
<td></td>
<td>Food Warmer – OFF, light – off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All middeck lts – off</td>
<td></td>
</tr>
</tbody>
</table>
ECLS SSR-7
FLASH EVAPORATOR CHECKOUT

NOTE
Procedure used to check all components

PRETEST SETUP

a. Rad flow, PLBD opened
L1 b. FLASH EVAP TOP DUCT HTR – A(B)
NOZ (two) – AUTO A(B)

If HI LOAD EVAP to be activated:
FLASH EVAP HI LOAD DUCT HTR – A(B)
Wait ~45 min before activating HI LOAD

L2 c. FLASH EVAP FDLN HTR A SPLY – 1(2)
B SPLY – 1(2)

R11L d. SPLY H2O TKB OUTLET – OP (tb-OP)
B SPLY ISOL VLV – OP (tb-OP)
ML31C TKD OUTLET – OP (tb-OP)

COMPONENT CHECKOUT

a. PRIMARY CNTLR A,B and TOPPING FES CHECKOUT
Perform FES RESTART, ECLS SSR-5

b. SECONDARY CNTLR and TOPPING FES CHECKOUT

NOTE
This procedure SEC CNTLR ops starting from standby mode. To check cntlr startup under load conditions,
interchange steps 2 and 3 but pause between steps to allow
EVAP OUT T to incr > 62 degF (approx 1 min)

L1 1. HI LOAD EVAP – OFF
2. FLASH EVAP CNTLR PRI A,B – OFF
SEC – ON
3. RAD BYP VLV LOOP 1,2 MODE (two) – MAN
MAN SEL (two) – BYP until tb – BYP

CRT 4. After 2 min, EVAP OUT T ~62 degF
L1 5. RAD BYP VLV LOOP 1,2 MODE (two) – AUTO
CNTLR LOOP 1,2 (two) – OFF, AUTO A(AUTO B)
After 90 sec, tb – RAD (two)
6. Perform FES RESTART, ECLS SSR-5

c. SECONDARY CNTLR, HI LOAD FES, FEEDWATER A CHECKOUT

L1 1. HI LOAD EVAP – ENA
FLASH EVAP CNTLR SEC – A SPLY
2. PRI A,B – OFF
SEC – ON
3. RAD BYP VLV LOOP 1,2 MODE (two) – MAN
MAN SEL (two) – BYP until tb – BYP

CRT 4. After 2 min, EVAP OUT T ~62 degF
L1 5. RAD BYP VLV LOOP 1,2 MODE (two) – AUTO
CNTLR LOOP 1,2 (two) – OFF, then AUTO A(AUTO B)
After 90 sec, tb – RAD (two)
6. Perform FES RESTART, ECLS SSR-5

7. HI LOAD EVAP – OFF
After 30 min,
8. FLASH EVAP HI LOAD DUCT HTR – OFF

d. SECONDARY CONTROLLER, HI LOAD FES, FEEDWATER B CHECKOUT

L1 1. HI LOAD EVAP – ENA
FLASH EVAP CNTLR SEC – B SPLY
2. PRI A,B – OFF
SEC – ON
3. RAD BYP VLV LOOP 1,2 MODE (two) – MAN
MAN SEL (two) – BYP until tb – BYP

CRT 4. After 2 min, EVAP OUT T ~62 degF
L1 5. RAD BYP VLV LOOP 1,2 MODE (two) – AUTO
CNTLR LOOP 1,2 (two) – OFF, then AUTO A(AUTO B)
After 90 sec, tb – RAD (two)
6. Perform FES RESTART, ECLS SSR-5

7. HI LOAD EVAP – OFF
After 30 min,
8. FLASH EVAP HI LOAD DUCT HTR – OFF
9. CNTLR SEC – A SPLY
ECLS SSR-7 (Cont)

e. PRIMARY CNTLR A,B, TOPPING and HI LOAD EVAP, A and B SPLY CHECKOUT

L1 1. HI LOAD EVAP – ENA
   FLASH EVAP CNTLR SEC – A SPLY(B SPLY)
2. PRI A – OFF
   B – OFF
   SEC – OFF
3. RAD BYP VLV LOOP 1,2 MODE (two) – MAN
   MAN SEL (two) – BYP until tb – BYP
CRT 4. When EVAP OUT T > 47 degF, FLASH EVAP CNTLR PRI A – ON
5. After 60 sec, \EVAP OUT T ~39 degF ± 1 degF
L1 6. FLASH EVAP CNTLR PRI A – OFF
   B – ON
CRT After 60 sec, \EVAP OUT T ~39 degF ± 1 degF
L1 7. RAD BYP VLV LOOP 1,2 MODE (two) – AUTO
   CNTLR LOOP 1,2 (two) – OFF, AUTO A(AUTO B)
   After 90 sec, \tb (two) – RAD
8. After 2 min, HI LOAD EVAP – OFF

f. PRIMARY CNTLR A,B, TOPPING, STARTUP FROM STBY CHECKOUT

CRT 1. Perform FES RESTART, ECLS SSR-5, using A CNTLR
   Pwrnd and/or change attitude if necessary
L1 3. RAD CNTLR OUT T – HIGH
CRT 4. After 2 min, \EVAP OUT T ~39 degF ± 1 degF
L1 5. FLASH EVAP CNTLR PRI A – OFF
   B – ON
CRT 6. After 60 sec, \EVAP OUT T ~39 degF ± 1 degF
L1 7. RAD CNTLR OUT T – NORM, then immediately
   FLASH EVAP CNTLR PRI B – OFF, ON
9. \RAD OUT T ~39 degF ± 1 degF
10. CNTLR OUT T – HIGH
11. After 2 min, \EVAP OUT T ~39 degF ± 1 degF
12. RAD CNTLR OUT T – NORM
13. FLASH EVAP CNTLR PRI B – OFF
ECLS SSR-8
SMALL CABIN-LEAK ISOL

NOTE
This procedure should only be performed On MCC call. MCC will call with specific steps to be performed. Steps may be sequentially performed in groups to expedite leak isolation. MCC will determine when leak has been isolated using cabin pressure decay.

LEAK ISOLATION STEPS
If spacelab module, go to ECLS SSR-1 (SLM MAL, ECLS) >>
1. If manual cabin pressure control or 10.2 psi ops, go to step 3

MO10W
2. 14.7 CAB REG INLET SYS 1, SYS 2 vlv (two) – CL

WCS
3. √COMMODE CNTL – DN/OFF (N/A if EDO WCS)

WCS/EDO/WCS
4. VAC VLV – CL

Below SIDE HATCH L2
5. NEG PRESS RELIEF vlv covers (two) – cl (push firmly)

6. CAB RELIEF A – CL (tb-CL)

7. CAB RELIEF B – CL (tb-CL)

8. If flown, deactivate CO2 RMVL SYS:
   MO51F CO2 RMVL SYS CNTLR 1(2) MODE – STBY (hold 3 sec)
   Wait 6 sec
   √CO2 RMVL SYS CNTLR 1(2) OPER lt – off
   √FAIL lt – on

CRT √VAC PRESS < 5.0
Record VAC PRESS ______________

NOTE
Suspect possible duct leakage if VAC PRESS > 5.0 H or increases after next step

MD52M On MCC GO, replace LiOH canister in POS A
MIDDECK 9. √CAB PURGE VLV – CL
   √ISOL VLV – CL

EXT A/L 10. EXT A/L DEPRESS vlv – CL
   NEG PRESS RELIEF vlv covers (two) – CL (push firmly)

ML31C 11. VAC VENT ISOL VLV CNTL – CL (tb-CL)

WCS 12. CRADLE – AUTO INHIBIT
   Remove urinal hose (at hose block), hose block, and filter
   Place Gray Tape over center tube (EMU drain)
   If SH HATCH open:
   13. Perform SH CABIN LEAK ISOLATION (Cue Card)

MIDDECK 14. A/L HATCH – CL (per decal)
   Equal vlv (two) – OFF

LEAK DETECTION AND SEALING
15. Go to LEAK DETECTION – ULTRASONIC (IFM, PROCEDURES G thru L)

If reqd (On MCC Go):
16. Go to LEAK SEALING – VACUUM (IFM, PROCEDURES G thru L)

RECOVERY STEPS (On MCC call)
L2 17. CAB RELIEF A – ENA (tb-ENA)

18. CAB RELIEF B – ENA (tb-ENA)
ECLS SSR-8 (Cont)

ML31C  19.  VAC VENT ISOL VLV CNTL – OP (tb-OP)
     If flown, reactivate CO2 RMVL SYS:
     MO51F  CO2 RMVL SYS MNA(MNC) – OFF
             AC1(AC3) – OFF (hold 3 sec)
             CNTLR 1(2) FAIL lt – off
             AC1(AC3) – ON (hold 3 sec)
             MNA(MNC) – ON
             CNTLR 1(2) MODE – OPER (hold 3 sec)
             Wait 6 sec
             CO2 RMVL SYS CNTLR 1(2) OPER lt – on

WCS/  20.  VAC VLV – OP
    EDO
    WCS

PCS CONFIG (On MCC GO)
21.  \MCC for PCS config and TIG time (if necessary)
NOTE
Procedure reestablishes radiator flow after inadvertent isolation due to instrumentation or Freon isolation logic failure. Expect possible ‘S88 EVAP OUT T 1(2)’ msg

SM 88 APU/ENVIRON THERM

L1 1. FLASH EVAP CNTLR PRI A,B,SEC (three) – OFF
   If Freon Loop 1 aff:
     2. RAD BYP VLV MODE 1 – MAN
        CNTLR LOOP 1 – OFF, then
        AUTO A(AUTO B)
     3. After 10 sec, RAD BYP VLV MODE 1 – AUTO
     4. RAD CNTLR OUT TEMP – HI
L2 5. FREON ISOL MODE – MAN
     LOOP 1 – RADATOR (hold 5 sec)
   If Freon Loop 2 aff:
L1 6. RAD BYP VLV MODE 2 – MAN
     CNTLR LOOP 2 – OFF, then
     AUTO A(AUTO B)
     7. After 10 sec, RAD BYP VLV MODE 2 – AUTO
     8. RAD CNTLR OUT TEMP – HI
L2 9. FREON ISOL MODE – MAN
     LOOP 2 – RADATOR (hold 5 sec)
L1 10. After 5 min, RAD OUT TEMP – NORM
      If FES reqd, go to FES RESTART, ECLS SSR-5
H2O PUMP OPS VIA GPC

NOTE

Provides continuous GPC commanding of the H2O loop pumps

1. Reset pump cycling constants (if comm available. MCC can TMBU if desired)

   SM 60 SM TABLE MAINT
   ITEM 16 +9 0 6 4 1 EXEC
   ITEM 17 +9 0 6 4 0 EXEC
   ITEM 17 +1 EXEC

2. If reqd, perform PL/DPS RECONFIG (PL SYS: or SODF: ASSY OPS), Secure (PL SYS)

3. Perform SM CHECKPOINT INITIATE (ORB OPS, DPS)

   If WCL 1 for continuous ops:
   If Pump A reqd:
   L4:F
   4. cb AC1 H2O LOOP PUMP 1 A/2 (three) – cl
   L1
   5. H2O PUMP LOOP 1 – A
   If Pump B reqd:
   6. \ H2O PUMP LOOP 1 – B
   7. H2O PUMP LOOP 1 – GPC
      LOOP 1 BYP MODE – AUTO
      2 BYP MODE – MAN

   O1
   8. H2O PUMP OUT PRESS – 1

   If WCL 2 for continuous ops:
   L4:F
   9. cb AC1 H2O LOOP PUMP 1 A/2 (three) – cl
   L1
   10. H2O PUMP LOOP 2 – GPC
       \ LOOP 2 BYP MODE – AUTO
       \1 BYP MODE – MAN

   O1
   11. \ H2O PUMP OUT PRESS – 2

NOTE

Ops transition in steps 14 and 15 causes MCIU to lose I/O with the GPC. Coordinate ops transition with PDRS to avoid impacts to ongoing PDRS operations. Nominal PDRS ops are recovered in step 17, if required

12. SM OPS 000 PRO

13. SM OPS 201 PRO

S88 APU/ENVIRON THERM

If H2O LOOP PUMP OUT P 1(2): 61-69

L1
14. H2O PUMP LOOP 2(1) – OFF

If reqd:
15. S94 PDRS CONTROL
   I/O ON – ITEM 5 EXEC(*)
   SAFING – CANCEL

16. SM(GNC, PL) 1 DPS UTILITY
    CKPT RETRV ENA – ITEM 12 EXEC (*)
    UL CNTL AUTO – ITEM 35 EXEC (*)

17. If reqd, perform PL/DPS RECONFIG (PL SYS: or SODF: ASSY OPS)

18. C/W update (if comm available, MCC can TMBU software limits if desired)

<table>
<thead>
<tr>
<th>Loop 1 active</th>
<th>Loop 2 active</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R13U)</td>
<td>(R13U)</td>
</tr>
<tr>
<td>• Change Loop 1 PUMP OUT P (param 105) lower C/W limit to 1.50 vdc (45 psia) and Loop 2 (param 115) to 0.65 vdc (19.5 psia)</td>
<td>• Change Loop 2 PUMP OUT P (param 115) lower C/W limit to 1.50 vdc (45 psia) and Loop 1 (param 105) to 0.65 vdc (19.5 psia)</td>
</tr>
</tbody>
</table>

Reconfig B/U C/W

SM 60 SM TABLE MAINT

| ITEM 1 +0 6 1 2 6 0 0 EXEC | ITEM 1 +0 6 1 2 7 0 0 EXEC |
| ITEM 11 +4 5 EXEC | ITEM 11 +4 5 EXEC |
| ITEM 1 +0 6 1 2 7 0 0 EXEC | ITEM 1 +0 6 1 2 6 0 0 EXEC |
| ITEM 11 +1 9 .5 EXEC | ITEM 11 +1 9 .5 EXEC |
NOTE
Procedure provides evacuation of H2O from FES Feedlines in the event of dual htr failures or htr deactivation during major pwrdn. If purge of both feedlines is to be performed or if SPLY H2O dump reqd, perform dump before performing this procedure to provide ullage.

L1 1. FLASH EVAP CNTLR PRI A,B,SEC (three) – OFF

NOTE
Have towel ready for possible release of water when mating/demating any connections.

WCS 2. Unstow and install SPLY H2O Dumpline Purge Device into CONT H2O X-TIE POT QD (lower QD with blue Velcro and “POTABLE” label)

ML86B:A 3. cb MNC SPLY H2O XOVR VLV – cl

If only B FDLN requires purging:

NOTE
After evacuation of B FDLN, SPLY H2O can be managed in normal fashion by using Nozzle dumps and/or Supply Water dumps with FES PRI A

ML31C 4. SPLY H2O TKD OUTLET – CL (tb-CL)

R11L 5. TKA,TKB,TKC OUTLET – CL (tb-CL)

\B SPLY ISOL VLV – OP
\XOVR VLV – OP (tb-OP)
\DUMP ISOL VLV – OP (tb-OP)

L1 6. RAD CNTLR OUT TEMP – HI

O1 7. When EVAP OUT T > 50 degF,
FLASH EVAP CNTLR PRI B – ON

8. When FES shuts down and EVAP OUT T again > 50 degF,
FLASH EVAP CNTLR PRI B – OFF, ON

9. Repeat step 8 until EVAP OUT T remains at ~57 degF,
then FLASH EVAP CNTLR PRI B – OFF

R11L 10. SPLY H2O B SPLY ISOL VLV – CL

L2 11. FLASH EVAP FDLN HTR B SPLV – OFF

L1 12. \CNTLR SEC – A SPLV

13. FDA RESET
If comm, MCC will TMBU limits as reqd
If no comm, change limits via table

SM 60 TABLE MAINT

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVAP TEMP FDLN T FWD (B)</td>
<td>0631871</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T MID 1 (B)</td>
<td>0631873</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T MID 2 (B)</td>
<td>0631875</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T AFT (B)</td>
<td>0631877</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T TOPPING (B)</td>
<td>0631893</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T ACCUM (B)</td>
<td>0631894</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T HI LOAD (B)</td>
<td>0631896</td>
<td>-10</td>
</tr>
</tbody>
</table>

Continue with procedure in step 27

If only A FDLN requires purging:

NOTE
After evacuation of A FDLN, SPLY H2O can be managed using Nozzle dumps and/or Supply Water dumps with FES PRI B

\XOVR VLV – CL (tb-CL)
\DUMP ISOL VLV – OP (tb-OP)
ECLS SSR-11 (Cont)

15. RAD CNTLR OUT TEMP – HI

16. When EVAP OUT T > 50 degF,
   FLASH EVAP CNTLR PRI A – ON

17. When FES shuts down and EVAP OUT T again > 50 degF,
   FLASH EVAP CNTLR PRI A – OFF, ON

18. Repeat step 17 until EVAP OUT T remains at ~57 degF,
   then FLASH EVAP CNTLR PRI A – OFF

19. FLASH EVAP FDLN HTR A SPLY – OFF

20. CNTLR SEC – B SPLY

21. FDA RESET
   If comm, MCC will TMBU limits as reqd
   If no comm, change limits via table

SM 60 TABLE MAINT

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVAP TEMP FDLN T FWD (A)</td>
<td>0631870</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T MID 1 (A)</td>
<td>0631872</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T MID 2 (A)</td>
<td>0631874</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T AFT (A)</td>
<td>0631876</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T TOPPING (A)</td>
<td>0631891</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T ACCUM (A)</td>
<td>0631892</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP FDLN T HI LOAD (A)</td>
<td>0631895</td>
<td>-10</td>
</tr>
</tbody>
</table>

Continue with procedure in step 27

If both A,B FDLNs require purging:

NOTE
SPLY H2O can be managed by normal means after lines are
refilled. Lines should be reevacuated after completion of dump

22. Perform steps 4 thru 9, then:
   FLASH EVAP CNTLR PRI A – ON

23. Perform steps 17 and 18, then:
   FLASH EVAP FDLN HTR A,B SPLY (two) – OFF

24. TOP EVAP HTR DUCT – OFF
   NOZ L,R (two) – OFF

25. FDA RESET
   If comm, MCC will TMBU limits as reqd
   If no comm, change limits via table

SM 60 TABLE MAINT

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVAP TEMP TOPPING AFT</td>
<td>0631802</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP TOPPING FWD</td>
<td>0631801</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP TOPPING L DUCT</td>
<td>0631800</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP TOPPING L NOZ</td>
<td>0631878</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP TOPPING R DUCT</td>
<td>0631810</td>
<td>-10</td>
</tr>
<tr>
<td>EVAP TEMP TOPPING R NOZ</td>
<td>0631879</td>
<td>-10</td>
</tr>
</tbody>
</table>

Also update limits per steps 13 and 21

Continue with procedure in step 27

POST-PURGE RECONFIGURATION

27. RAD CNTLR OUT TEMP – NORM

28. Remove, stow SPLY H2O Dumpline Purge Device from CONT H2O X-TIE POT QD

WCS Outbd Wall

29. \MCC for Supply Water Tank Config
30. \MCC for FES Config
1. This procedure is used to restore a single fault tolerance condition after ORB PKT, PWRDN, AV BAY FIRE has been performed. It may be necessary to repower equipment in affected Av Bay to restore Single Fault Tolerance (SFT).

2. The following Reference Table identifies location of equipment to ensure SFT for entry:

<table>
<thead>
<tr>
<th>Essential Equipment</th>
<th>Av Bay 1</th>
<th>Av Bay 2</th>
<th>Av Bay 3A</th>
<th>Av Bay 3B</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTISKID</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUD CTR</td>
<td>1,2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRAKES</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMM</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O/W</td>
<td></td>
<td>OF1</td>
<td>OF2</td>
<td>OF3</td>
</tr>
<tr>
<td>OI MDM</td>
<td>OF1</td>
<td>OF2</td>
<td>OF3</td>
<td></td>
</tr>
<tr>
<td>OI DSC</td>
<td>OF1</td>
<td>OF2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL MDM</td>
<td>PL1</td>
<td>PL2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Minimum Equip reqd for SFT Av Bay 1 Av Bay 2 Av Bay 3A Av Bay 3B
3 of 4 FF MDMS FF1 FF2 FF4 FF3
3 of 4 ADTAs 1.3 2.4
3 of 4 AAs 1.4 2.3
2 of 3 MLSs 1 2.3
2 of 3 TACANs (OV103,4) 1 2 3 2
2 of 3 GPSs (OV105) 1 2 3
2 of 3 FMCA 1 2 3
3 of 5 GPCs 1.4 2.5 3

3. Perform with MCC coverage, if possible
4. Recovery steps A, B, and C are reqd to provide valid smoke concentrations
5. Perform recovery steps D thru M if smoke conc stable or decreasing
6. FRCS dump will be 2 jet dump only
7. If recovery of the associated AC Bus, FF MDM, or FMCA is unsuccessful, MCC for vent door config. Certain failure combinations will cause multiple vent doors to remain open during entry

**CAUTION**
Do NOT close any cb(s) found open at time of fire that is normally closed. Unpower recovered component if smoke concentration increases during recovery

A. OI MDM RECOVERY (IF REQD)
If Av Bay 1 or 2 affected:
O14:B 1. cb MNA OI MDM OF 1/2 A – cl
If cb not reset then:
O15:B 2. cb MNB OI MDM OF 1/2 B – cl
If Av Bay 3A affected:
O14:B 3. cb MNA OI MDM OF 3/4 A – cl
If cb not reset then:
O16:B 4. cb MNC OI MDM OF 3/4 B – cl

SM 62 PCMMU/PL COMM
5. PCMMU I/O RESET PCM – ITEM 5 EXEC (*)

B. OI DSC RECOVERY (IF REQD)
If Av Bay 1 affected:
O14:B 1. cb MNA OI SIG CONDR OF 1/4 A – cl
If cb not reset, then:
O15:B 2. cb MNB OI SIG CONDR OF 1/4 B – cl
If Av Bay 2 or 3A affected:
O15:B 3. cb MNB OI SIG CONDR OF 2/3 A – cl
If cb not reset, then:
O16:B 4. cb MNC OI SIG CONDR OF 2/3 B – cl

C. AV BAY FAN RECONFIG

**CAUTION**
With Av Bay Fan activation, a momentary rise in smoke concentration may result. If smoke concentration continues to increase for > 1 min, unpower affected bay.
If Av Bay 1 affected:

1. cb AC2 ΦA,ΦB,ΦC AV BAY 1 FAN B (three) – cl
   Note AC2 AMPS

2. AV BAY 1 FAN B – ON
   If AC AMPS not incr 0.5-0.9 amps/Φ or
   AV BAY 1 FAN ΔP < 2.5 or > 4.3 (3.3 for 10.2 ops)

3. AV BAY 1 FAN B – OFF
   If MCC not available, unpower Av Bay 1 >>

If Av Bay 2 affected:

4. cb AC3 ΦA,ΦB,ΦC AV BAY 2 FAN B (three) – cl
   Note AC3 AMPS

5. AV BAY 2 FAN B – ON
   If AC AMPS not incr 0.5-0.9 amps/Φ or
   AV BAY 2 FAN ΔP < 2.5 or > 4.3 (3.3 for 10.2 ops)

6. AV BAY 2 FAN B – OFF
   If MCC not available, unpower Av Bay 2 >>

If Av Bay 3A affected:

7. cb AC1 ΦA,ΦB,ΦC AV BAY 3 FAN B (three) – cl
   Note AC1 AMPS

8. AV BAY 3 FAN B – ON
   If AC AMPS not incr 0.5-0.9 amps/Φ or
   AV BAY 3 FAN ΔP < 2.5 or > 4.3 (3.3 for 10.2 ops)

9. AV BAY 3 FAN B – OFF
   If MCC not available, unpower Av Bay 3 >>

D. COMM RECOVERY (FOR AV BAY 1 ONLY) (IF REQD)

C3 1. AUD CTR – 1
   If Voice comm not restored:
   2. AUD CTR – 2
   If Voice comm still not restored:
   3. AUD CTR – OFF
   4. Perform COMM SSR-1

E. COMM RECOVERY (FOR AV BAY 3A ONLY) (IF REQD)

If no comm:

A1L 1. NSP DATA RATE XMIT – HI
    RCV – HI
    UPLK DATA – S-BD
    CODING XMIT – ON
    RCV – ON
    PWR – 1
    ENCRYPTION PWR – ON
    MODE – SEL
    SEL – BYP
    S-BD PM ANT SW ELEC – 1
    PRE-AMP – 1
    PWR AMPL STBY – 1
    OPER – 1
    XPNDR – 1

C3 2. S-BD PM CNTL – PNL
   If comm not restored:
   3. Perform COMM, 2.3a, then:
ECLS SSR-12 (Cont)

F. IMU FAN RECONFIG

SM 66 ENVIRONMENT

If Av Bay 1 affected:

L1 1. IMU FAN C(B) – OFF

CRT 2. IMU FAN C(B) – ON

B(C) – OFF

CRT 3. \(\Delta P\) OK

If Av Bay 2 affected:

L1 4. IMU FAN A(C) – OFF

CRT 5. IMU FAN A(C) – ON

C(A) – OFF

CRT 6. \(\Delta P\) OK

If Av Bay 3A affected:

L1 7. IMU FAN A(B) – OFF

CRT 8. IMU FAN A(B) – ON

B(A) – OFF

CRT 9. \(\Delta P\) OK

G. CAUTION AND WARNING RECOVERY (For AV BAY 3A only)

O13:C 1. cb ESS 2CA C/W B – cl (MA)

F2(F4,A7) 2. MSTR ALARM pb – off

O13:A 3. cb ESS 1BC C/W A – cl (MA)

F2(F4,A7) 4. MSTR ALARM pb – off

NOTE

C/W parameters must be reset to nominal on-orbit config since temporary loss of pwr has set hardware C/W parameters to their default values

R13U 5. Inhibit parameters specified for on-orbit ops on PRIMARY C/W PARAMETER MATRIX Cue Card

6. Use C/W & FDA TABLE (REF DATA) to reset limits for:

<table>
<thead>
<tr>
<th>CH</th>
<th>Param</th>
</tr>
</thead>
<tbody>
<tr>
<td>004</td>
<td>CAB PRESS</td>
</tr>
<tr>
<td>007</td>
<td>OMS TK P OX – L</td>
</tr>
<tr>
<td>017</td>
<td>OMS TK P FU – L</td>
</tr>
<tr>
<td>037</td>
<td>OMS TK P OX – R</td>
</tr>
<tr>
<td>047</td>
<td>OMS TK P FU – R</td>
</tr>
<tr>
<td>074</td>
<td>CAB FAN Delta P</td>
</tr>
</tbody>
</table>

7. C/W MEM – CLEAR

8. C/W PARAM SEL tw (three) – >119

H. AC BUS RECOVERY

Only perform on MCC GO or if critical need

1. Isolate 3Φ bus per table

NOTE

3Φ AC UTIL PWR cbs are located on pnl L4:B

(L4,MA73C)

cb – open all (3Φ,φA,φB,φC) on aff AC bus

Number of cb to open:

<table>
<thead>
<tr>
<th>BUS</th>
<th>L4</th>
<th>MA73C</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC1</td>
<td>3Φ</td>
<td>1</td>
</tr>
<tr>
<td>φA</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>φB</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>φC</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>AC2</td>
<td>3Φ</td>
<td>0</td>
</tr>
<tr>
<td>φA</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>φB</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>φC</td>
<td>14</td>
<td>5</td>
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<tr>
<td>AC3</td>
<td>3Φ</td>
<td>1</td>
</tr>
<tr>
<td>φA</td>
<td>15</td>
<td>3</td>
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<tr>
<td>φB</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>φC</td>
<td>13</td>
<td>3</td>
</tr>
</tbody>
</table>

SM 67 ELECTRIC

O13:A(C,E) 2. cb ESS 1BC (2CA,3AB) AC1(AC2,AC3) SNSR – cl

NOTE

Expect S67 AC VOLTS msg and F7 AC VOLTAGE lt

R1 3. Aff AC BUS SNSR – AUTO TRIP
CAUTION
Following steps should be reviewed carefully prior to their execution since affected AC system may be tied into a short.

Repower ΦA:
4. cb aff AC CONTR ΦA – cl
   Aff INV PWR – ON
   Inv/AC BUS – ON
   CRT
   √Aff AC VOLTS > 110 and < 120
   √Aff AC AMPS < 1
If AC VOLTS, AMPS limits exceeded or F7 AC OVLD lt received:
5. Aff INV/AC BUS – OFF (tb-OFF)
   Inv PWR – OFF (tb-OFF)
6. cb aff AC CONTR ΦA – op
7. Repeat steps 4 thru 6 for ΦB, then ΦC

If no phases recovered:

O13:A(C,E)
8. cb ESS 1BC(2CA,3AB) AC1(AC2,AC3) SNSR – op
If only 1 or 2 Φs recovered:
   9. Inhibit aff AC VOLTAGE C/W Channel: 033 (043,053)
If any phase recovered:
   10. Aff AC BUS SNSR – OFF (1 sec)
      – AUTO TRIP
   11. \MCC for equipment recovery

I. GPC RECOVERY

   NOTE
   Three of five GPCs reqd for single fault tolerance

   If requirement not met:
   Perform GNC REASSIGNMENT, DPS SSR-3
   If first GPC recovery fails, then try other GPC, if available

J. FF MDM

   NOTE
   Three of four FF MDMs reqd for single fault tolerance. MDM FF2 reqd for FRCS dump

   If requirements not met, reactivate MDM(s) in affected bay:
   O6
   MDM FF1(FF2,FF3,FF4) – ON
   CRT
   GNC I/O RESET

K. PL MDM RECOVERY

   O6
   MDM PL1(PL2) – ON
   CRT
   SM I/O RESET

L. ADTA, AA, MLS, TACAN, GPS

   NOTE
   Three of four ADTAs reqd for single fault tolerance.
   Three of four AAs reqd for single fault tolerance.
   Two of three MLSs reqd for single fault tolerance.
   Two of three TACANs reqd for single fault tolerance (OV103,4).
   Two of three GPSs reqd for single fault tolerance (OV105)

   If requirement not met:
   Perform FCS CHECKOUT, DISPLAY/DPS CONFIG and ON-ORBIT FCS CHECKOUT, PART 2 (ORB OPS, GNC) to verify equipment function in the affected Av Bay for single fault tolerance (as a minimum)

   NOTE
   Following FCS CHECKOUT, recovered equipment may be unpowered until deorb prep

M. FMCA

   NOTE
   Two of three FMCAs reqd for single fault tolerance

   If requirement not met (confirmed by MCC):
   MA73C:A
   MCA LOGIC MNA(MNB,MNC) FWD 1(2,3) – ON
ECLS SSR-13
ON-ORBIT RAD CNTLR SWITCH

NOTE
Procedure switches Radiator Controllers in affected Freon Coolant Loop
Radiator. 10-sec pause is necessary to prevent movement of bypass
vlv, thus eliminating possibility of bypass vlv failing in bypass. Expect
possible 'S88 EVAP OUT T 1(2)' msg

If Freon Loop 1 aff:
- RAD BYP VLV MODE 1 – MAN
- CNTLR LOOP 1 – AUTO B(AUTO A)
- After 10 sec, RAD BYP VLV MODE 1 – AUTO

If Freon Loop 2 aff:
- RAD BYP VLV MODE 2 – MAN
- CNTLR LOOP 2 – AUTO B(AUTO A)
- After 10 sec, RAD BYP VLV MODE 2 – AUTO

If FES reqd, wait 4 min, then:
O1 If FREON EVAP OUT TEMP > 41 and ≤ 47 degF:
L1 RAD CNTLR OUT TEMP – HI
O1 When FREON EVAP OUT TEMP > 50 degF:
L1 RAD CNTLR OUT TEMP – NORM, then immediately,
FLASH EVAP CNTLR PRI A(B) – ON
O1 If FREON EVAP OUT TEMP ≤ 41 or > 47 degF:
L1 FLASH EVAP CNTLR PRI A(B) – ON
**TABLE A**

REMOVAL OF FAILED/DEGRADED PPO2 SNSR FROM O2 CONCENTRATION COMPUTATION

<table>
<thead>
<tr>
<th></th>
<th>If PPO2 SNSR A failed/degraded</th>
<th>If PPO2 SNSR B failed/degraded</th>
<th>If PPO2 SNSR C failed/degraded</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTANT ID</td>
<td>ITEM 16 +9 2 2 1 3 1 EXEC</td>
<td>ITEM 16 +9 2 2 1 3 2 EXEC</td>
<td>ITEM 16 +9 2 2 1 3 3 EXEC</td>
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<tr>
<td>Update of CONSTANT ID</td>
<td>√</td>
<td>Update of CONSTANT ID</td>
<td>Update of CONSTANT ID</td>
</tr>
<tr>
<td>CONSTANT VALUE</td>
<td>ITEM 17 +0 EXEC</td>
<td>ITEM 17 +0 EXEC</td>
<td>ITEM 17 +0 EXEC</td>
</tr>
<tr>
<td>Update of CONSTANT VALUE</td>
<td>√</td>
<td>Update of CONSTANT VALUE</td>
<td>Update of CONSTANT VALUE</td>
</tr>
</tbody>
</table>

- Notify MCC of disabled constant

**TABLE B**

O2 CONCENTRATION COMPUTATION INHIBIT

<table>
<thead>
<tr>
<th></th>
<th>ITEM 1 +9 2 2 1 0 4 EXEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update of PARAM ID</td>
<td>√</td>
</tr>
<tr>
<td>INH – ITEM 10 EXEC</td>
<td>Update of PARAM ID</td>
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</tbody>
</table>

- Notify MCC of inhibited parameter

**TABLE C**

EQUIVALENT dP/dT COMPUTATION INHIBIT

<table>
<thead>
<tr>
<th></th>
<th>ITEM 1 +9 2 4 3 3 5 EXEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update of PARAM ID</td>
<td>√</td>
</tr>
<tr>
<td>INH – ITEM 10 EXEC</td>
<td>Update of PARAM ID</td>
</tr>
</tbody>
</table>

- Notify MCC of inhibited parameter

**TABLE D**

REMOVAL OF FAILED/DEGRADED N2 TANK TEMP/PRESSURE FROM N2 QTY COMPS

Normally all temperature and pressure transducer flags are set to 1. If transducer fails, disable failed transducer’s flag. For example, if SYS 1 N2 TANK 1 TEMP has failed, disable its flag, then the comp uses TK 2 TEMP in lieu of TANK 1 TEMP in the quantity computation. √MCC for multiple failures

**TABLE E**

N2 TANK CONFIG

The following table is used to enable/disable N2 tank depending on whether or not it is flown. √MCC to verify vehicle config shown below. **” designates flight-specific tanks
FREE WATER LEAKING FROM HUM SEP

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leave one Humidity Sep running continuously. Deactivating both Humidity Separators simultaneously could cause further flooding of Humidity Sep and damage Humidity Sep when restarted</td>
</tr>
</tbody>
</table>

L1

1. HUM SEP A(B) – ON  
   B(A) – OFF  
2. Perform LIOH STOWAGE VOLUME REMOVAL (IFM)  
3. Clean up free water in Lower Equipment Bay  
   If practical, contact MCC prior to performing FREE FLUID DISPOSAL (IFM), for possible waste water dump;  
   Otherwise, use towels to soak up water  
   For remainder of flight, check pre/post-sleep daily for free water in Lower Equipment Bay  
   Report to MCC  
4. If second HUM SEP LEAKS WATER, perform the following steps:  
   If any step stops water from leaking, >>  
5. HUM SEP A,B (two) – ON  
   Monitor HUM SEP operation by checking for water around outlet screen. If over 15 min,  
   Report to MCC  
6. Depress H2O TKs:  
   \ Best HUM SEP – ON  
   \ Other HUM SEP – OFF  
   FLASH EVAP CNTLR PRI A(B) – OFF  
   H2O TK N2 ISOL SYS 1, SYS 2 vlv (two) – CL  
   ML26C  
   SPLY H2O GN2 TK VENT vlv – VENT  
   \ TKA SPLY vlv – OP  
   Expect audible vent and ‘S66 WASTE H2O PRES’ alert for Waste Press ↓ (See SSR-17 for H2O dumps)  
7. Go to HUM SEP AIR OUTLET H2O ABSORPTION (IFM)
ECLS SSR-17
WATER TANK REPRESS/DEPRESS

NOTE
This SSR may be reqd for water dumps in the event water tanks are depressed for humidity separator problems. Repressing water tanks for supply or waste water dumps decreases amount of time reqd for dump

1. Start repress ~30 min prior to water dump
2. SPLY H2O GN2 TK VENT vlv – PRESS
   √TKA SPLY vlv – OP
3. H2O TK N2 REG INLET SYS 1,SYS 2 vlv (two) – OP
   ISOL SYS 1,SYS 2 vlv (two) – CL
   Expect 'S66 CAB H2O N2 P1,P2' msgs for H2O TK N2 P ↓
4. Perform SUPPLY(WASTE) WATER DUMP (ORB OPS, ECLS)
   Depress Tanks
5. H2O TK N2 ISOL SYS 1,SYS 2 vlv (two) – CL
6. SPLY H2O GN2 TK VENT vlv – VENT
   √TKA SPLY vlv – OP
   Expect audible vent and 'S66 WASTE H2O PRES' alert for Waste Press ↓
7. Visually inspect Lower Equipment Bay for free water
   Report to MCC
SM 66 ENVIRONMENT

1. FLASH EVAP CNTLR PRI A,B – OFF
   R11L SPLY H2O XOVR vlv – CL (tb-CL)
   If no TK QTY decr or incr at a reduced rate:
   Perform steps 8, 10 >>
   MCC,CRT SPLY H2O ISOL VLV – CL (tb-CL)
   If no SPLY H2O TK QTY decr or incr at a reduced rate:
   Perform steps 8-11 >>
   R11L SPLY H2O DUMP ISOL VLV – CL (tb-CL)
   MCC,CRT SPLY H2O DUMP ISOL VLV – OP (tb-OP)

SM 177 EXTERNAL AIRLOCK

MO13Q ARLK H2O S/O VLV – CL (tb-CL)
   If H2O XFER P decr or ~0:
   Perform steps 8,9,10,12 >>
   MO13Q ARLK H2O S/O VLV – OP (tb-OP)

CRT 2. If SPLY H2O TK QTY D decr:
   ML31C SPLY H2O TK D INLET, OUTLET (two) – CL (tb-CL)
   CRT If SPLY H2O TK QTY D decr:
   Perform step 6
   Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK D on MCC call
   ML31C SPLY H2O TK D INLET, OUTLET (two) – CL (tb-CL)
   Perform steps 7-11 >>
   MCC,CRT If SPLY H2O TK QTY B decr or incr at a reduced rate:
   MCC,CRT If no SPLY H2O TK QTY decr or incr at a reduced rate:
   Perform steps 9-11 >>
   CRT 3. If SPLY H2O TK QTY A > 90% (on MCC call):
   R11L SPLY H2O TK A OUTLET – OP (tb-OP)
   CRT When SPLY H2O TK QTY A < 80% or MCC call:
   R11L SPLY H2O TK A OUTLET – CL (tb-CL)
   Go to step 4 or 5 based on H2O tank qty observation

CRT 4. If SPLY H2O TK QTY B decr:
   R11L SPLY H2O TK B INLET,OUTLET (two) – CL (tb-CL)
   CRT If SPLY H2O TK QTY B decr:
   Perform step 6
   Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK B on MCC call
   R11L SPLY H2O TK B INLET, OUTLET (two) – CL (tb-CL)
   Perform steps 7-11 >>
   AW82B If PRESS H2O decr or ~0:
   Perform steps 9-11 using FES CNTRL PRI B on MCC call
   R11L SPLY H2O TK B INLET – OP (tb-OP) >>
   MCC,CRT If SPLY H2O TK A decr or incr at reduced rate:
   MCC,CRT If SPLY H2O TK A decr or incr at reduced rate:
   R11L SPLY H2O GALLEY SPVL VLV – CL (tb-CL)
   MCC,CRT SPLY H2O GALLEY SPLY VLV – CL (tb-CL)
   MD23R Open middeck pnl and disconnect lower (FC) QD on microbial filter
   CRT If SPLY H2O TK QTY A decr:
   Perform step 6
   Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK A on MCC call
   SPLY H2O TK A INLET, OUTLET (two) – CL (tb-CL)
   Perform steps 7-11 >>
   CRT If SUPPLY H2O PRESS ~15:
   Perform steps 8-11
   √MCC to restore Galley ops >>
   MD23R Open middeck pnl and reconnect lower (FC) QD on microbial filter
   R11L SPLY H2O GALLEY SPVL VLV – OP (tb-OP)
   MD80R Open middeck pnl and inspect for free H2O
   Perform steps 6, 8, 9, 11 on MCC call
   Perform steps 8-11 on MCC call
   √MCC to restore Galley ops >>
ECLS SSR-18 (Cont)

MO10W 6. H2O TK N2 ISOL SYS 1, SYS 2 vlv – CL
ML26C SPLY H2O GN2 TANK A SPLY – OP
       VENT – VENT
   Expect audible vent and 'S66 WASTE H2O PRES' alert for Waste Pres ↓
ML26C 7. SPLY H2O GN2 TANK A SPLY – OP
       VENT – PRESS
MO10W H2O TK N2 ISOL SYS 1, SYS 2 vlv – OP
       Expect 'S66 CAB H2O N2 P1, P2' msgs for H2O TK N2 P ↓
R11L 8. SPLY H2O XOVR vlv – OP (lb-OP)
10. Perform TOPPING FES STARTUP (ORB OPS, ECLS)
11. Visually inspect LEB and perform FREE FLUID DISPOSAL (IFM) as reqd
12. Visually inspect Middeck floor (water line close out area) and Ext A/L
   Go to FREE FLUID DISPOSAL (IFM) as reqd
This procedure assumes that MCC is available for assistance.

This procedure has the waste tank pressurized for a portion of the troubleshooting.

If the WASTE TANK QTY is less than 65% at the time of tank depress, S66 WASTE H2O QTY 1 can be expected to rise to stabilize at ~ 65% for a tank or bellows leak.

Reference LiOH STOWAGE VOLUME REMOVAL (IFM C/L) to gain access to LEB.

Prior to performing LEB inspection or any waste water IFM, don goggles and gloves.

---

1. Isolate Dumpline
2. Depress Wst Tk
3. Expect 'S66 WASTE H2O PRES' msg (L1)
   - FLASH EVAP CNTLR PRI A, B – OFF
4. (MO10W)
   - H2O TK N2 ISOL SYS 1, SYS 2 vlv (two) – CL (ML26C)
   - SPLY H2O GN2 TK VENT vlv – VENT
5. (ML31C)
   - WASTE H2O TK 1 VLV – CL (tb-CL)
6. WASTE H2O QTY 1 decr?
7. When WASTE H2O PRESS IS ~0, does WASTE H2O QTY 1 stabilize at ~65%?
8. WST H2O LINE LEAK BETWEEN TK INLET AND ISOL VLV
9. Has Condensate Collection been initiated?
10. Condensate
   - (L1) HUM SEP B(A) – OFF
   - (ML31C) WASTE H2O TK 1 DRAIN VLV – CL (tb-CL)
11. WASTE H2O QTY 1 decr?
12. WST TK LEAK OR WST TK BELLOWS LEAK
13. Reconfig Wst Sys
   - Inspect LEB for free fluid and MCC for FREE FLUID DISPOSAL (IFM C/L) and Wst Dump plan
   - MCC to install CWC at WCS Urine QD
   - MCC for Wst Dump plan
   - MCC to restart Hum Sep (L1)
   - HUM SEP B(A) – ON

---

SM 66 ENVIRONMENT
- Terminate WCS Use
- Report any pungent odor to MCC

WASTE H2O DUMP ISOL VLV – CL (tb-CL)

WASTE H2O QTY 1 decr?

---

8 10

---

14

---
Prior to performing LEB inspection or any waste water IFM, don goggles and gloves.

13. Failing Waste H2O QTY 1 Transducer
   - NO
     - 15. Has Condensate Collection been initiated?
       - NO
         - 16. Restart Hum Sep (ML31C)
           - WASTE H2O TK 1 DRAIN VLV – OP (tb-OP)
           - HUM SEP B(A) – ON (L1)
       - YES
         - 17. Initiate Condensate Collection
           - Perform: SHUTTLE CONDENSATE COLLECTION (ORB OPS, ECLS)
           - HUM SEP B(A) – ON (L1)

14. Has Condensate Collection been initiated?
   - YES
     - 18. Inspect LEB
       - Inspect LEB for free fluid and
         - MCC for FREE FLUID DISPOSAL (IFM C/L)
       - MCC to install
         - CWC at WCS Urine QD
       - MCC to isolate
         - Waste Tk from N2 H2O pressure
   - NO
     - 19. Repress TKs
       - On MCC GO, repress tanks:
         - Expect 'S66 CAB H2O N2 P1, P2' msgs for H2O TK N2 P ↓
         - SPLY H2O GN2 TANK A SPLY – OP (ML26C)
         - SPLY H2O GN2 VENT – PRESS (MO10W)
         - H2O TK N2 ISOL SYS 1, 2 vlv (two) – OP
         - If FES reqd, perform:
           - TOPPING FES STARTUP (ORB OPS, ECLS)
NOTE
This procedure assumes that the Supply Water System is in a Water Transfer Configuration and MCC is available for assistance. Also note that Supply H2O tanks require pressurization during troubleshooting. Suspend galley use until procedure is complete or On MCC GO.

**SM 66 ENVIRONMENT**
L1
FLASH EVAP CNTRL PRI A,B (two) – OFF

**A. DETERMINE A/B OR C/D LEAK**

**MCC/CRT**
If SPLTY H2O QTY C,D decr or filling at a decr rate:
1. Perform steps 4-5 of CWC FILL using SHUTTLE/ISS H2O CONTAINER FILL (ORB OPS, ECLS); no samples or additives required
2. If SPLTY H2O QTY A,B > 90%, provide ullage in TKs A,B (On MCC GO):
3. Perform step 9 of CWC FILL using SHUTTLE/ISS H2O CONTAINER FILL (ORB OPS, ECLS), then:
   - If SPLTY H2O QTY C,D still decr or filling at a decr rate, continue procedure at step 31; otherwise, continue with step B

**B. DETERMINE IF EXTERNAL AIRLOCK FLOWN**

**SM 177 EXTERNAL AIRLOCK**

MO13Q
4. ARLK H2O S/O VLV – CL (tb-CL)

**MCC/CRT**
If H2O XFER P decr or ~0 (leak in External Airlock H2O Transfer Line):
5. Visually inspect middeck floor (water line closeout area) and Ext A/L
6. Perform step 54 using FES PRI B On MCC GO >>

**SM 66 ENVIRONMENT**

**C. LEAK DETERMINATION A/B SIDE**

**MCC/CRT**
If SPLTY H2O QTY A,B decr or filling at a decr rate:
1. SPLTY H2O GALLEY SPLYL VLV – CL (tb-CL)

**R11L**
7. SPLTY H2O GALLEY SPLYL VLV – CL (tb-CL)

**MCC/CRT**
If SPLTY H2O QTY A,B incr at nominal rate (leak in Galley):
8. Perform steps 53-54 using FES PRI B On MCC GO
9. MCC to restore Galley ops >>

**R11L**
10. SPLTY H2O DUMP ISOL VLV – CL (tb-CL)

**MCC/CRT**
If SPLTY H2O QTY A,B incr at nominal rate (leak in Supply H2O Dump Line):
11. Perform steps 52-55 using FES PRI B On MCC GO >>

**R11L**
12. SPLTY H2O TKA INLET – CL (tb-CL)
13. TKA,B OUTLET (two) – CL (tb-CL)

**ML86B:A**
14. cb MNB SPLTY H2O TK B INLET – cl
15. SPLTY H2O TKB INLET – OP (tb-OP)
16. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK A on MCC GO; dump TK A to ~0%, then:
   - MCC to restore Galley ops
17. Perform steps 51-55 using FES PRI B On MCC GO >>

**MCC/CRT**
If SPLTY H2O QTY A decr (leak in TK A):
18. Perform steps 51-55 using FES PRI B On MCC GO >>

**ML86B:A**
19. cb MNB SPLTY H2O TK B INLET – cl
20. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK B on MCC GO; dump TK B to ~0%, then:
   - Perform steps 51-55 using FES PRI B On MCC GO >>

**MCC/CRT**
If SPLTY H2O QTY B decr (leak in TK B):
21. Perform steps 51-55 using FES PRI B On MCC GO >>

**ML86B:A**
22. Open LEB access pnl on middeck floor and disconnect lower (FC) QD from Microbial Filter (IFM, IFM PROCEDURES, GALLEY, FAILED SUPPLY LINE, BYPASS, step 1)
23. MCC to restore Galley ops
24. Perform steps 51, 53-55 >>

**MCC/CRT**
If SPLTY H2O QTY C,D not filling or filling at a decr rate (leak in Inlet Manifold or Galley Supply Line):
25. Open LEB access pnl on middeck floor and reconnect lower (FC) QD from Microbial Filter
26. Perform steps 48-53, 55 >>

**ML86B:A**
27. cb MNB SPLTY H2O TK B INLET – cl
28. SPLTY H2O TKA,B INLET (two) – OP (tb-OP)
29. Open LEB access pnl on middeck floor and reconnect lower (FC) QD to Microbial Filter
30. Perform steps 54-55 using FES PRI B On MCC GO >>

Cont next page
ECLS SSR-20 (Cont)

D. LEAK DETERMINATION C/D SIDE

MCC/CRT
If SPLY H2O QTY C,D decr:
R11L
31. SPLY H2O B SPLY ISOL VLV – CL (tb-CL)

MCC/CRT
If SPLY H2O QTY C,D const (leak in FES Feedline B):
R11L
32. Perform step 54 using FES PRI A On MCC GO >>
ML31C
33. SPLY H2O TKC INLET,OUTLET (two) – CL (tb-CL)

MCC/CRT
If SPLY H2O QTY C,D decr (leak in FES Feedline B):
R11L
34. TKD INLET,OUTLET (two) – CL (tb-CL)

MCC/CRT
If SPLY H2O QTY C decr (leak in TK C):
R11L
35. SPLY H2O B SPLY ISOL VLV – OP (tb-OP)
ML31C
36. TKD INLET – OP (tb-OP)
37. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK C On MCC GO; dump TK C to ~0% >>

MCC/CRT
If SPLY H2O QTY D decr (leak in TK D):
R11L
38. SPLY H2O B SPLY ISOL VLV – OP (tb-OP)
39. TKC INLET – OP (tb-OP)
40. Perform SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) for TK D On MCC GO; dump TK D to ~0% >>

MCC/CRT
If SPLY H2O QTY A,B,C,D filling at a nominal rate (leak in TK C/D Outlet Manifold):
R11L
41. SPLY H2O TKC INLET – OP (tb-OP)
ML31C
42. TKD INLET – OP (tb-OP)
43. Perform steps 54-55 using FES PRI A On MCC GO >>

MCC/CRT
If SPLY H2O QTY A,B decr or filling at a decr rate (leak in TK C/D Inlet Manifold; depress H2O Tanks):
R11L
44. SPLY H2O TKC OUTLET – OP (tb-OP)
45. B SPLY ISOL VLV – OP (tb-OP)
ML31C
46. TKD OUTLET – OP (tb-OP)
47. Perform steps 48-51, 55 >>

E. CLEAN UP STEPS

MO10W
48. H2O TK N2 ISOL SYS 1,2 vlv (two) – CL
ML26C
49. SPLY H2O GN2 TK A SPLY vlv – OP

NOTE
Expect audible vent and ‘S66 WASTE H2O PRES’ alert for WASTE H2O PRESS ↓

50. SPLY H2O GN2 TK VENT vlv – VENT
R11L
51. DUMP ISOL – OP (tb-OP)
52. GALLEY SPLY VLV – OP (tb-OP)
MO13Q
53. ARLK H2O S/O VLV – OP (tb-OP)
54. If FES reqd, perform TOPPING FES STARTUP (ORB OPS, ECLS), then:
55. Visually inspect LEB and perform FREE FLUID DISPOSAL (IFM, PROCEDURES S THRU Z), as reqd
ECLS SSR-21
MANUAL RAD BYPASS VALVE CONTROL

NOTE
This procedure shall not be attempted without MCC monitoring and assistance.
This procedure provides a method of reestablishing or maintaining radiator flow
by adjusting the position of the radiator bypass valve. Expect possible 'S88 EVAP OUT T 1(2)' or 'S88 FREON RAD T 1(2)' msgs

**SM 88 APU/ENVIRON THERM**

| L1  | 1. Aff RAD CNTLR LOOP – OFF  
|     | 2. H2O PUMP LOOP 1,2 (two) – ON  
|     | 3. LOOP 1,2 BYP MODE (two) – MAN  
|     | 4. MAN (two) – DECR (hold 30 sec)  
|     | 5. FLOW PROP VLV LOOP 1,2 (two) – PL HX (tb-PL)  
|     | 6. RAD CNTLR OUT TEMP – HI  
|     | 7. FLASH EVAP CNTLR PRI A,B,SEC (three) – OFF  
|     | 8. Aff RAD BYP VLV MODE – MAN  

If Freon Loop 1 affected:

| L4:P | 9. cb AC2 φB RAD CNTLR 1A – op  
|      | If Freon Loop 2 affected:  
|      | 10. cb AC3 φB RAD CNTLR 2A – op

CRT 11. Adjust aff RAD OUT T to ~40°F by performing momentary (< 1 sec) switch movements:

| L1  | Aff RAD BYP VLV MAN SEL – RAD FLOW (if too hot), and/or  
|     | – BYP (if too cold)  

On MCC GO:

| L4:P | cb AC2 φB RAD CNTLR 1A – cl  
|      | If Freon Loop 2 affected:  
|      | cb AC3 φB RAD CNTLR 2A – cl
ECLS FRP-1
MANUAL CABIN ATMOSPHERE MANAGEMENT

NOTE
This procedure assumes Cabin P < 14.7 psi and is structured to flow N2 from PCS 1 and flow O2 from PCS 2, with metabolic makeup from Bleed Orifice

If SETUP completed, go to CABIN REPRESS

SETUP

L2  O2/N2 CNTLR VLV SYS 1 – OP
     2 – CL
C7  \LEH O2 SPLY vlv (two) – OP

MO10W  14.7 CAB REG INLET SYS 1, SYS 2 vlv (two) – CL
MO10W  O2 REG INLET SYS 1, SYS 2 vlv (two) – OP

MA9L  Unstow O2 Bleed Orifice Assembly

MO69M  \LEH O2 8 vlv – CL
MO69M  Insert O2 Bleed Orifice Assembly into LEH O2 8 QD
MO69M  LEH O2 8 vlv – OP

CABIN REPRESS

SET C&W LIMITS

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C/W</th>
<th>H/W C/W</th>
<th>ENA/</th>
<th>PARA</th>
<th>B/U C/W</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPO2 A</td>
<td>34</td>
<td>3.40</td>
<td>0612511</td>
<td>3.40</td>
<td></td>
</tr>
<tr>
<td>PPO2 B</td>
<td>44</td>
<td>3.40</td>
<td>0612513</td>
<td>3.40</td>
<td></td>
</tr>
</tbody>
</table>

NOTE
Expect possible ‘S66 CAB O2 FLO 2’ C&W alarm during execution of next step

MO10W  14.7 CAB REG INLET SYS 2 vlv – OP

* If C&W alarm:
  * CABIN ATM and/or B/U ‘S66 CABIN PPO2 A(B)’
  * NOTE
    * Expect possible ‘S66 CAB N2 FLO 1’ C&W alarm during execution of next step
    * 14.7 CAB REG INLET SYS 2 vlv – CL
    * When N2 FLOW SYS 1 < 1.0 or CABIN PRESS > 14.7,
      * 14.7 CAB REG INLET SYS 1 vlv – CL

When O2 FLOW SYS 2 < 1.0 or CABIN PRESS > 14.7,
14.7 CAB REG INLET SYS 2 vlv – CL

If prior to sleep:
14.7 CAB REG INLET vlv (two) – CL

RESET C&W LIMITS

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C/W</th>
<th>H/W C/W</th>
<th>ENA/</th>
<th>PARA</th>
<th>B/U C/W</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPO2 A</td>
<td>34</td>
<td>3.60</td>
<td>0612511</td>
<td>3.60</td>
<td></td>
</tr>
<tr>
<td>PPO2 B</td>
<td>44</td>
<td>3.60</td>
<td>0612513</td>
<td>3.60</td>
<td></td>
</tr>
</tbody>
</table>

Pen and Ink PRE-SLEEP ACTIVITY (ORB OPS, CREW SYS) to perform this procedure each sleep period if necessary
This procedure is applicable to both avionics bay fires and cabin fires

1. Every 15 min perform the following:
   a. Record MET and CSA-CP scan location (general)  
      LOCATION: ____________________
   b. Record contaminant levels from CSA-CP and CABIN O2 CONC from SYS SUMM 1
   c. Report values to MCC
   d. If HCN > 2.1 ppm replace one LiOH canister

<table>
<thead>
<tr>
<th>CRT, CSA-CP</th>
<th>Time (MET)</th>
<th>CABIN O2 CONC</th>
<th>HCN</th>
<th>HCL</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
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<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If HCN > 2.1, HCL > 1.0, or CO > 18 ppm for any CSA-CP reading:

2. If ATCO canister not yet installed, CO > 18 and HCL < 5 ppm:
   Install ATCO (in place of one LiOH canister)

3. \( ^\sqrt{\text{CAB TEMP CNTLR}} \) – OFF

4. \( ^\sqrt{\text{Pin Cab temp cntl act link – FULL COOL}} \)

5. \( ^\sqrt{\text{cb MNA,MNB WCS CNTLR (two) – cl}} \)

6. \( ^\sqrt{\text{AC1,2 WSC FAN SEP 1,2 (six) – cl}} \)

7. \( ^\sqrt{\text{WCS If Av Bay 1 Fire:}} \)
   5. \( ^\sqrt{\text{HOSE BLOCK to SEP 2}} \)
   6. \( ^\sqrt{\text{FAN SEP SEL sw – 2}} \)
   7. \( ^\sqrt{\text{MODE – COMMODE/MANUAL/EMU}} \)
   8. \( ^\sqrt{\text{COMMODE CNTL – PULL UP}} \)
      \( ^\sqrt{\text{PUSH FWD}} \)

9. Continue to monitor the cabin atmosphere per step 1

10. When CO < 18 ppm, replace ATCO canister (if installed) with a LiOH canister

11. Doff visors/QDMs and changeout LiOH canister(s) per preflight schedule on MCC call

   * If loss of communications, visors/QDMs down and continue
   * LiOH changeouts until all the following criteria are met:
     * No visible indication of smoke in cabin
     * Cabin smoke detector readings are < 1.2
     * No symptoms of smoke inhalation
     * HCN < 4.0 (2.1) ppm, HCL < 2.0 (1.0) ppm,
     * CO < 20 (18) ppm if at 14.7 (8.0) psia

12. If symptoms experienced prior to donning QDM/visor, QDM/visor may be doffed only if all crewmembers are symptom free for > 10 min

13. If QDM/visor flow must continue and/or CABIN O2 CONC \( \geq \) 25.9%, perform FIRE/HAZ SPILL O2 CONTROL, ECLS FRP-3
ECLS FRP-2 (Cont)

ON MCC CALL BACKOUT STEPS:

WCS  14. COMMODE CNTL – OFF (BACK/DN)
MD44F  15. Pin Cab temp cntl act link – PRI(SEC)
L1  16. CAB TEMP CNTLR – 1(2)

17. SMOKE DETN SNSR – RESET
18. Report used LiOH cans to MCC

When Av Bay has been purged for 7 hr:
19. Disconnect Y/Y Hose from Vacuum Vent QD
20. Remove Free Fluid Nozzle from Av Bay fire port
21. Disconnect Free Fluid Nozzle from Y/Y hose
22. Stow in Cont Hose & Cable Kit:
   Free Fluid Nozzle
   20-ft Y/Y Hose
   Gray Tape
NOTE
For Av Bay fires, ensure avionics bay purge initiated before start of cabin depress

TMAX DETERMINATION
1. Determine TMAX from Tables 1 and 2
   If ASC, use the following for N2 Qty:
   4 N2 tanks: 260 lbs N2
   5 N2 tanks: 325 lbs N2
   6 N2 tanks: 390 lbs N2

   a. Time to 8 psi +_______hr
      (from Table 1 right)
      
   b. Time of purge at 8 +_______hr
      (from Table 2 below)

   - 1:00 hr
      
   c. Latest TIG:
      TMAX =_______hr

TABLE 1.- TIME to 8 PSI (in HH:MM)

<table>
<thead>
<tr>
<th>Time to 8 psi in hrs</th>
<th>From 14.7 psi</th>
<th>From 10.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 crew</td>
<td>03:06</td>
<td>01:24</td>
</tr>
<tr>
<td>6 crew</td>
<td>02:32</td>
<td>01:09</td>
</tr>
<tr>
<td>7 crew</td>
<td>02:07</td>
<td>00:58</td>
</tr>
<tr>
<td>8 crew</td>
<td>01:49</td>
<td>00:51</td>
</tr>
</tbody>
</table>

TABLE 2.- TIME of PURGE at 8 PSIA (in HH:MM)

<table>
<thead>
<tr>
<th>Time of Purge (HH:MM)</th>
<th>N2 Quantity (lbn)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 crew</td>
</tr>
<tr>
<td>100</td>
<td>06:38</td>
</tr>
<tr>
<td>120</td>
<td>08:06</td>
</tr>
<tr>
<td>140</td>
<td>09:34</td>
</tr>
<tr>
<td>160</td>
<td>11:18</td>
</tr>
<tr>
<td>180</td>
<td>12:46</td>
</tr>
<tr>
<td>200</td>
<td>14:15</td>
</tr>
<tr>
<td>220</td>
<td>15:59</td>
</tr>
<tr>
<td>240</td>
<td>17:27</td>
</tr>
<tr>
<td>280</td>
<td>20:23</td>
</tr>
<tr>
<td>300</td>
<td>22:07</td>
</tr>
<tr>
<td>320</td>
<td>23:35</td>
</tr>
<tr>
<td>340</td>
<td>25:04</td>
</tr>
<tr>
<td>360</td>
<td>26:32</td>
</tr>
<tr>
<td>380</td>
<td>28:16</td>
</tr>
<tr>
<td>400</td>
<td>29:44</td>
</tr>
</tbody>
</table>

NOTE
When TIG < 3 hours, install ATCO if not already performed
ECLS FRP-3 (Cont)

CABIN DEPRESS AND PURGE SETUP

MO69M 2. Remove O2 BLEED ORIFICE, if installed
MO10W 3. 14.7 CAB REG INLET SYS 1,SYS 2 vlv (two) – CL
4. O2 REG INLET SYS 1 vlv – OP
2 vlv – CL

START CABIN DEPRESS TO 8 PSI

WARNING
If SYS SUMM 1 O2 CONC ≥ 40% during cabin depress
or 8 psia purge, increase the AIRLK DEPRESS vlv
position so the EQ dp/dT is equal to the next larger crew
size in table 3 below and recalculate TMAX per step 1

AW82B 5. AIRLK DEPRESS vlv cap – vent, remove, stow
6. Throttle AIRLK DEPRESS vlv until desired EQ dp/dT is established as follows per Table 3 below; tape in place
(dp/dT sensor response lags approx 1 min)

NOTE
The 5 position on the AIRLK DEPRESS vlv will produce a dp/dT of
-0.286 psia/min at 14.7 psia and -0.198 psia/min at 10.2 psia

TABLE 3.- EQ dp/dT

<table>
<thead>
<tr>
<th>Starting from 14.7 psi</th>
<th>Starting from 10.2 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 crew</td>
<td>-0.050</td>
</tr>
<tr>
<td>6 crew</td>
<td>-0.062</td>
</tr>
<tr>
<td>7 crew</td>
<td>-0.074</td>
</tr>
<tr>
<td>8 crew</td>
<td>-0.087</td>
</tr>
</tbody>
</table>

7. When Cab Press < 10.0 psia and if prior to OPS 3:
   Perform LOSS OF CAB PRESS PWRDN (ORB PKT, PWRDN)

O2 MANAGEMENT DURING 8 PSIA PURGE

When Cab Press = 8 psia:

AW82B 8. AIRLK DEPRESS vlv – CL, reinstall cap
MDDK Floor 9. CAB PURGE vlv – dial to number of crew on QDMs/visors
Near Ladder ISOL VLV – 0
L2 10. O2 XOVR SYS 1 vlv – CL
2 vlv – OP
11. O2/N2 CNTLR VLV SYS 1 – OP (N2)
2 – CL (O2)

NOTE
Maintain PPO2 between 2.8 and 3.05 psia for the duration of purge

When PPO2 ≥ 3.05:
12. O2/N2 CNTLR VLV SYS 1 – OP (N2)
When PPO2 ≤ 2.8:
13. O2/N2 CNTLR VLV SYS 1 – CL (O2)
Continue O2 mgmt per steps 12 and 13

NOTE
~82 lbm N2 reqd to repress from 8 psia to 14.7 psia

TERMINATE 8 PSIA PURGE AND INITIATE CABIN REPRESS

\^MCC to terminate 8 psia purge and repress

L2 14. O2/N2 CNTLR VLV SYS 1 – AUTO
2 – OP (N2)
MDDK Floor 15. CAB PURGE vlv – CL
Near Ladder ISOL VLV – CL
MO10W 16. 14.7 CABIN REG INLET SYS 1,SYS 2 (two) – OP
17. If avionics bay purge setup, \^MCC to terminate AV Bay purge
Disconnect, stow IFM hoses and free fluid nozzle

ON MCC Go:
18. Perform backout of LOSS OF CAB PRESS PWRDN (ORB PKT, PWRDN), then:
19. Perform PCS 1(2) CONFIG (ORB OPS, ECLS) >>
ECLS FRP-3 (Cont)

PREPARE FOR ENTRY AND CABIN REPRESS
Post D/O Burn - MCC for Purge Termination and Cabin Repress
At D/O Burn + 20 min:

20. CAB PURGE ISOL VLV – CL

At D/O Burn + 25 min:

21. VAC VENT ISOL VLV CNTL – CL (tb-CL)

22. O2/N2 CNTLR VLV SYS 1, SYS 2 (two) – OP (N2)

23. O2 XOVR VLV SYS 1, SYS 2 (two) – OP

24. 14.7 CAB REG INLET SYS 1, SYS 2 (two) – OP
ECLS FRP-4
O2 LEAK CONTROL

TMAX DETERMINATION
1. Determine TMAX from Tables 1 and 2
If ASC, use the following for N2 Qty:
4 N2 tanks: 260 lbs N2
5 N2 tanks: 325 lbs N2
6 N2 tanks: 390 lbs N2
2. Calculate total time:
   a. O2 Leak Size: =______lb/hr
      (from MCC)
   b. Time to 8 psi =________hr
      (from Table 1 right)
   c. Time of purge: +________hr
      (from Table 2 below)
   d. Latest TIG: TMAX =________hr

<table>
<thead>
<tr>
<th>N2 Quantity (lbm)</th>
<th>3 lb/hr</th>
<th>6 lb/hr</th>
<th>9 lb/hr</th>
<th>12 lb/hr</th>
<th>15 lb/hr</th>
<th>18 lb/hr</th>
<th>21 lb/hr</th>
<th>24 lb/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>12:22</td>
<td>05:51</td>
<td>03:51</td>
<td>02:47</td>
<td>02:11</td>
<td>01:47</td>
<td>01:28</td>
<td>01:14</td>
</tr>
<tr>
<td>120</td>
<td>17:19</td>
<td>08:11</td>
<td>05:24</td>
<td>03:55</td>
<td>03:04</td>
<td>02:30</td>
<td>02:04</td>
<td>01:44</td>
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<td>140</td>
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<td>05:02</td>
<td>03:56</td>
<td>03:12</td>
<td>02:40</td>
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<td>12:52</td>
<td>08:29</td>
<td>06:09</td>
<td>04:49</td>
<td>03:55</td>
<td>03:15</td>
<td>02:50</td>
</tr>
<tr>
<td>180</td>
<td>32:10</td>
<td>15:12</td>
<td>10:01</td>
<td>07:16</td>
<td>05:42</td>
<td>04:38</td>
<td>03:51</td>
<td>03:20</td>
</tr>
<tr>
<td>200</td>
<td>37:08</td>
<td>17:33</td>
<td>11:34</td>
<td>08:23</td>
<td>06:34</td>
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<td>03:50</td>
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<td>13:06</td>
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<td>05:25</td>
</tr>
<tr>
<td>280</td>
<td>56:56</td>
<td>26:54</td>
<td>17:44</td>
<td>12:52</td>
<td>10:05</td>
<td>08:13</td>
<td>06:55</td>
<td>05:55</td>
</tr>
<tr>
<td>320</td>
<td>66:50</td>
<td>31:35</td>
<td>20:49</td>
<td>15:06</td>
<td>11:50</td>
<td>09:38</td>
<td>08:13</td>
<td>07:00</td>
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<td>360</td>
<td>76:44</td>
<td>36:16</td>
<td>23:54</td>
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<td>40:57</td>
<td>27:00</td>
<td>19:35</td>
<td>15:21</td>
<td>12:30</td>
<td>10:35</td>
<td>09:06</td>
</tr>
</tbody>
</table>
DEPRESS AND PURGE SETUP

**MO10W**
3. 14.7 CAB REG INLET SYS 1, SYS 2 vlv (two) – CL
4. O2 REG INLET SYS 1 vlv – OP
   2 vlv – CL

**START DEPRESS TO 8 PSI**

**AW82B**
5. AIRLK DEPRESS vlv cap – vent, remove, stow
6. Throttle AIRLK DEPRESS vlv until desired EQ dP/dT is established as follows per table 3; tape in place (dP/dT sensor response lags approx 1 min)

**NOTE**
The 5 position on the ARLK DEPRESS vlv will produce a dP/dT of -0.286 psia/min at 14.7 psia and -0.198 psia/min at 10.2 psia

**TABLE 3.** - EQ dP/dT

<table>
<thead>
<tr>
<th>O2 Leak</th>
<th>EQ dP/dT From 14.7 psi</th>
<th>EQ dP/dT From 10.2 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 lbm/hr</td>
<td>-0.014</td>
<td>-0.012</td>
</tr>
<tr>
<td>6 lbm/hr</td>
<td>-0.029</td>
<td>-0.025</td>
</tr>
<tr>
<td>9 lbm/hr</td>
<td>-0.046</td>
<td>-0.040</td>
</tr>
<tr>
<td>12 lbm/hr</td>
<td>-0.059</td>
<td>-0.051</td>
</tr>
<tr>
<td>15 lbm/hr</td>
<td>-0.076</td>
<td>-0.065</td>
</tr>
<tr>
<td>18 lbm/hr</td>
<td>-0.093</td>
<td>-0.078</td>
</tr>
<tr>
<td>21 lbm/hr</td>
<td>-0.110</td>
<td>-0.094</td>
</tr>
<tr>
<td>24 lbm/hr</td>
<td>-0.130</td>
<td>-0.108</td>
</tr>
</tbody>
</table>

**WARNING**
If SYS SUMM 1 O2 CONC \(\geq\) 40%, increase the ARLK DEPRESS vlv position so the EQ dP/dT is equal to the next larger leak rate in table 3 above and recalculate TMAX per step 2

If prior to OPS 3, when Cab Press < 10.0 psia:
7. CM1 perform LOSS OF CAB PRESS PWRDN (ORB PKT, PWRDN), then:
   CM2 continue with procedure

**O2 MANAGEMENT DURING 8 PSIA PURGE**

When Cab press = 8 psia:
8. O2/N2 CNTLR VLV SYS 1 – OP (N2)
   2 – CL (O2)

**NOTE**
Maintain PPO2 between 2.8 and 3.05 psia for the duration of purge

When PPO2 \(\geq\) 3.05:
9. O2/N2 CNTLR VLV SYS 1 – OP (N2)
When PPO2 \(\leq\) 2.8:
10. O2/N2 CNTLR VLV SYS 1 – CL (O2)
Continue O2 mgmt per steps 9 and 10

**NOTE**
~82 lbm N2 reqd to repress from 8 psia to 14.7 psia

**TERMINATE 8 PSIA PURGE AND REPRESS**

MCC to terminate 8 psia purge and repress
11. O2/N2 CNTLR VLV SYS 1 – AUTO
   2 – OP(N2)

**AW82B**
12. AIRLK DEPRESS vlv – CL, reinstall cap

**MO10W**
13. 14.7 CABIN REG INLET SYS 1, SYS 2 (two) – OP

On MCC GO:
14. Perform backout of LOSS OF CAB PRESS PWRDN (ORB PKT, PWRDN), then:
15. Go to PCS 1(2) CONFIG (ORB OPS, ECLS)
ECLS FRP-4 (Cont)

PREPARE FOR ENTRY AND REPRESS

NOTE
When closing the Inner Hatch for Entry, take both Inner Hatch Equalization Valves to EMER with the caps removed to support the 8 psia purge during Entry.

For O2 Leak ≤ 15 lb/hr, Post D/O Burn MCC for Cabin Repress

AW82B At D/O Burn + 5 min:
16. AIRLK DEPRESS vlv – CL, reinstall cap

L2 At D/O Burn + 10 min:
17. O2/N2 CNTLR VLV SYS 1,SYS 2 (two) – OP (N2)

MO10W 18. O2 XOVR VLV SYS 1,SYS 2 (two) – OP
19. 14.7 CAB REG INLET SYS 1,SYS 2 (two) – OP
**ECLS FRP-5**  
**CABIN AMMONIA CONTAMINATION CLEANUP (ISS AMMONIA LEAK)**

**NOTE**  
This proc is to be performed simo by two crewmembers

**CM1 INITIATE CABIN AIR SCRUBBING**

**WCS**
1. MODE – COMMODE/EMANUAL/EMU
2. COMMODE CNTL – PULL UP (wait 15 sec)
   – PUSH FWD

**L1**
3. H2O PUMP LOOP 1 – ON
4. LOOP 2 BYPASS MODE – MAN
5. 1.2 BYP MAN (two) – DECR (hold 30 sec each)
6. CAB TEMP CNTLR – OFF
7. Pin Cab temp cntl act link – FULL COOL

**MD44F LiOH Box**
8. CAB FAN A, B (two) – ON
9. Connect external A/L halo inlet flex duct to halo inlet with T-handle clamp
10. As required, all crewmembers change into long pants and long sleeve shirts and don gloves

**[SM SYS SUMM T] When ‘S78 CABIN O2 CONC’**

**CRT**
11. If QDM flow must continue and S78 CABIN O2 CONC ≥ 25.9%, perform FIRE/HAZ SPILL O2 CONTROL, ECLS FRP-3

**CM2 AMMONIA DETECTION KIT PREPARATION**

12. Unstow AMMONIA DETECTION KIT
13. Remove both Draeger pumps and perform leak test using unbroken HI-Range Draeger tube in pump inlet.  
   On both pumps, ensure the bellows do not expand and flow indicator remains black with inlet ports blocked (~1 min)
14. Reset stroke counter on both pumps
15. Stow one pump back inside kit.  This pump will be used to verify doffing criteria sample at the end of 
   the procedure

**WARNING**  
Moisture droplets will produce a false low ppm if ingested into 
Sample.  Ensure Sample area is free from moisture droplets

**HI-RANGE (0.5a) DRAEGER TUBE SAMPLING**

16. Obtain HI-Range (0.5a) Draeger tube.  Inspect to ensure tube has not reacted (yellow with no dark blue)
17. Break both ends of glass Draeger tube (inside silicone tubing) using the end fittings for leverage
18. Insert Draeger tube into Draeger pump inlet with arrow pointing toward pump
19. Compress Draeger pump fully, release.  Indicator will change from black to clear to indicate end of stroke 
   (~6 sec)
20. Repeat for a maximum of 10 strokes or until tube saturated; record results below and report to MCC

**NOTE**  
Pump counter should be used as a backup only

Draeger Tube will change from yellow to dark blue in 
presence of Ammonia

Used tubes should be placed in dry trash

21. Repeat Draeger tube sampling every 30 min or on MCC call

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22. When tube reads ≤ 0.5 (500 ppm) after 10 strokes, immediately obtain another HI-Range sample to verify 
result

23. If second reading > 0.5 (500 ppm), repeat step 21
24. If second reading ≤ 0.5 (500 ppm), continue to step 25
### MED-RANGE (5a) DRAEGER TUBE SAMPLING

25. Wait 30 min from last HI-Range reading, then continue
26. Obtain MED-Range (5a) Draeger tube. Inspect to ensure tube has not reacted (yellow with no dark blue)
27. Break both ends of glass Draeger tube (inside silicone tubing) using the end fittings for leverage
28. Insert Draeger tube into Draeger pump inlet with arrow pointing toward pump
29. Compress Draeger pump fully, release. Indicator will change from black to clear to indicate end of stroke (~6 sec)
30. Repeat for maximum of 10 strokes or until tube saturated; record results below and report to MCC
31. Repeat Draeger tube sampling every 30 min or on MCC call

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32. When ppm ≤ 20 after 10 strokes, immediately obtain another MED-Range sample to verify result
33. If second reading > 20, repeat step 31
34. If second reading ≤ 20, continue to step 35

**NOTE**

LO-Range Draeger tubes are calibrated for 5 strokes

### LO-RANGE (2a) DRAEGER TUBE SAMPLING

35. Wait 15 min from last MED-Range reading, then continue
36. Obtain LO-Range (2a) Draeger tube. Inspect to ensure tube has not reacted (yellow with no dark blue)
37. Break both ends of glass Draeger tube (inside silicone tubing) using the end fittings for leverage
38. Insert Draeger tube into Draeger pump inlet with arrow pointing toward pump
39. Compress Draeger pump fully, release. Indicator will change from black to clear to indicate end of stroke (~6 sec)
40. Repeat for a maximum of 5 strokes or until tube saturated; record results below and report to MCC
41. Repeat Draeger tube sampling every 30 min or on MCC call

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42. When ppm ≤ 10 after 5 strokes, immediately obtain another LO-Range sample to verify result
43. If ppm > 10, repeat step 41
44. When ppm ≤ 10 and on MCC GO, continue to step 45

**NOTE**

~82 lbm N2 reqd to repress from 8 psia to 14.7 psia

### TERMINATE O₂ CONTROL AND REPRESS

Exit ECLS FRP-3; terminate O₂ control and repress using the following:

- **AW82B**
  - 45. AIRLK DEPRESS vlv – CL, vcap installed
- **L2**
  - 46. O₂/N₂ CNTLR VLV SYS 1 – AUTO, 2 – OP (N2)
- **MDDK**
  - 47. CAB PURGE vlv – 0
- **Floor**
  - 48. 14.7 CABIN REG INLET SYS 1, 2 (two) – OP
- **Near Ladder**
- **MO10W**
  - 49. CABIN REG INLET SYS 1, 2 (two) – OP

**Exit ECLS FRP-3; terminate O₂ control and repress using the following:**

- **AW82B**
  - 45. AIRLK DEPRESS vlv – CL, vcap installed
- **L2**
  - 46. O₂/N₂ CNTLR VLV SYS 1 – AUTO, 2 – OP (N2)
- **MDDK**
  - 47. CAB PURGE vlv – 0
- **Floor**
  - 48. 14.7 CABIN REG INLET SYS 1, 2 (two) – OP
- **Near Ladder**
- **MO10W**
  - 49. CABIN REG INLET SYS 1, 2 (two) – OP
ECLS FRP-5 (Cont)

When CABIN PRESS > 14 psi

49. Obtain alternate Draeger pump and LO-Range (2a) Draeger tube from kit. Inspect to ensure tube has not reacted (yellow with no dark blue)

50. Break both ends of glass Draeger tube (inside silicone tubing) using the end fittings for leverage

51. Insert Draeger tube into Draeger pump inlet with arrow pointing toward pump

52. Compress Draeger pump fully, release. Indicator will change from black to clear to indicate end of stroke (~6 sec)

53. Repeat for a maximum of 5 strokes or until tube saturated; record results below and report to MCC

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54. If ppm > 10, repeat steps 49-53 in 15 min or MCC call

**WARNING**

If any crewmember exhibits adverse symptoms when QDMs doffed, have affected crewmember don QDM immediately. Symptoms could include irritation of the eyes, nose, throat, skin

Anytime emergency exposure: 100ppm
1 hour exposure: 30ppm
24 hour exposure: 20ppm
7 day exposure: 10ppm

55. If ppm ≤ 10, doff QDMs per CDR directed sequence

**ON MCC CALL CABIN AIR SCRUBBING BACKOUT STEPS**

**WCS**

56. COMMODE CNTL – PULL BACK
   – PUSH DOWN

**MD44F**

57. Pin Cab temp cntl act link – PRI(SEC)

**L1**

58. CAB TEMP CNTLR – 1(2)
   SEL – as reqd

59. H2O PUMP LOOP 1 – GPC

**LIOH**

60. H2O LOOP 2 BYPASS MODE – AUTO

**Box**

61. Replace ATCO with a fresh LiOH canister

**L1**

62. √CAB FAN A – ON
    B – OFF
7.1  FC REAC/PMP/STACK T
7.1a  RESERVED ........................ not used
7.1b  ‘S69 FC STACK T 1(2,3) ↑↓’ – FC STACK T 1(2,3) ↑↓ ............................... 7-8
7.1c  ‘S69 FC H2 PUMP 1(2,3)’ – H2 PUMP ↑↓ .............................................. 7-12

7.2  FC PURGE
7.2a  RESERVED ........................ not used
7.2b  ‘FC PURGE TEMP’ – FC PURGE TEMP .............................................. 7-14
7.2c  ‘FC PURGE SEQ’ – FC PURGE SEQ ............................................... 7-15

7.3  FUEL CELL
7.3a  ‘S69 FC PH 1(2,3)’
        ‘S69 H2O LN PH’ – FC/H2O LINE pH HIGH ....................................... 7-16
7.3b  ‘S69 FC AMPS 1(2,3)’
        ‘S67 MAIN BUS V A(B,C)’
        ‘S69 FC VOLTS 1(2,3)’ – FUEL CELL VOLTS ↑↓, FUEL
        CELL AMPS ↑↓, MAIN BUS V A(B,C) ↑↓ ........................................ 7-18
7.3c  RESERVED ........................ not used
7.3d  ‘S69 FC EXIT T 1(2,3)’ – FUEL CELL EXIT T ↑↓ .................................... 7-23
7.3e  ‘S69 FC COOL P 1(2,3)’ – FUEL CELL COOL P ↑↓ (CIL) ....................... 7-26
7.3f  ‘S69 FC H2O PRI 1(2,3)’ – FUEL CELL H2O LN T ↑↓ ........................... 7-31
7.3g  ‘S69 FC H2O RLF 1(2,3)’
        ‘S69 FC H2O RLF LINE’ – FUEL CELL H2O RLF
        VLV T ↑↓, FUEL CELL H2O RLF LINE T ↑↓ ..................................... 7-32
7.3h  RESERVED ........................ not used
7.3i  ‘S69 FC PRG LN O2(H2)’ – FUEL CELL O2(H2) PURGE
        LN T ↑ .......................................................... 7-33
7.3j  ‘S69 FC O2(H2) FLOW 1(2,3)’ – FUEL CELL O2(H2) FLOW ↑ ............... 7-34
7.3k  ‘S69 FC H2O RLF HTR’ – FUEL CELL RELIEF HTR
        SW FAIL ......................................................... 7-37
7.3l  ‘S69 FC H2O ALT’ – FUEL CELL ALT H2O
        RLF T ↑↓ .................................................... 7-38
7.3m  ‘S69 DELTA AMPS 1(2,3) ↑↓’ – FC DELTA AMPS ↑↓ .......................... 7-39

7.4  RESERVED

7.5  AC VOLTAGE/OVLD
7.5a  ‘S67 AC VOLTS 1(2,3)’ – AC VOLTS 1(2,3) ↓.................................... 7-42
7.5b  ‘S67 AC OVLG 1(2,3)’ ↓ – AC OVLG 1(2,3) ↓ ................................. 7-47
7.5c  ‘S67 AC AMPS 1(2,3)’ – AC BUS CURRENT HIGH ............................... 7-51

7.6  CRYO
    CRYO TABLE A – CRYO HEATER SWITCH PROCEDURAL
    NOMENCLATURE ......................................................... 7-54
7.6a  RESERVED ........................................................ not used
7.6b  ‘S68 O2(H2) CNTL P 1(2,3,4,5)’
        ‘S68 O2(H2) TK P 1(2,3,4,5)’ – CRYO O2(H2) PRES, TK P ↑↓ .......... 7-55
7.6c  RESERVED ........................................................ not used
7.6d  ‘S68 O2(H2) MANF PRESS’ – O2(H2) MANF P ↓ .............................. 7-59
7.6e  RESERVED ........................................................ not used
7.6f  ‘S68 H2 HTR T 1(2,3,4,5)’ – H2 HTR T ............................................ 7-60
7.6g  RESERVED ........................................................ not used
7.6h  RESERVED ........................................................ not used
The following msgs have support procedures in the ORB PKT, but not in this book:

'S69 FC REAC 1(2,3)'
'S69 FC PUMP 1(2,3)'
'S69 FC DELTA V 1(2,3)'
'S69 FC H2O RLF NOZ'
'S67 ESS BUS V 1BC(2CA,3AB)'
'S67 CNTL BUS V'
'S67 CNTL RPC'

The following msgs have no support procedures in this book or in ORB PKT C/L:

'S67 APC/ALC A(B,C)'
'S67 FPC/FLC 1(2,3)'
'S67 MPC 1(2,3)'
'S68 O2(H2) MANF VLV'
'S69 FC READY 1(2,3)'
'FC PURGE 1(2,3)'

---

**7.7 SSPTS PTU (OPCU, APMC)**

7.7a 'S179 OPCU 1(2) CH A(B) AMPS' – OPCU CH AMPS ↑ .................................. 7-64
7.7b 'S179 OPCU 1(2) CH A(B) VOLT' – OPCU CH OUTPUT VOLTS ↓ ............................. 7-65
7.7c 'S179 OPCU 1(2) CH A(B) TEMP' – OPCU TEMP ↑ ........................................... 7-66
7.7d 'S179 OPCU 1(2) CH A(B) O OV' – OPCU CH OUT OVER VOLT (O OV) TRIP .......... 7-67
7.7e 'S179 OPCU 1(2) CH A(B) I OC'
    'S179 OPCU 1(2) CH A(B) I UV' – OPCU TRIP ........................................... 7-68
7.7f 'SM 179 APMC 1(2) OUT VOLT' – APMC 1(2) OUT VOLTS ↑↓ .......................... 7-69
7.7g 'SM 179 APMC 1(2) OUT AMPS'
    'SM 179 APMC 1(2) IN AMPS' – APMC OUT AMPS ↑,
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7.7h 'SM 179 APMC 1(2) OUT UV'
    'SM 179 APMC 1(2) OUT OV'
    'SM 179 APMC 1(2) OUT OC'
    'SM 179 APMC 1(2) IN UV' – APMC TRIP ................................................. 7-71

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**EPS SSR**

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SSR-2 RESERVED ....................................................................................... 7-75
SSR-3 FC SHUTDN C&W LIMIT CHANGE ...................................................... 7-76
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SSR-5 RESERVED ....................................................................................... 7-78
SSR-6 FC RESTART ...................................................................................... 7-79
SSR-7 TWO-PHASE FAN START PROCEDURE ............................................. 7-80
SSR-8 BUS LOADING – LRU SELECT ......................................................... 7-81
SSR-9 RESERVED ....................................................................................... 7-82

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The following msgs have support procedures in the ORB PKT, but not in this book:

'S69 FC REAC 1(2,3)↓'
'S69 FC PUMP 1(2,3)↓'
'S69 FC DELTA V 1(2,3)'
'S69 FC H2O RLF NOZ'
'S67 ESS BUS V 1BC(2CA,3AB)'
'S67 CNTL BUS V'
'S67 CNTL RPC'

The following msgs have no support procedures in this book or in ORB PKT C/L:

'S67 APC/ALC A(B,C)'
'S67 FPC/FLC 1(2,3)'
'S67 MPC 1(2,3)'
'S68 O2(H2) MANF VLV'
'S69 FC READY 1(2,3)'
'FC PURGE 1(2,3)'
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<td>AC1 RCS/FMC1</td>
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<td>SSR-141</td>
<td>AC2 RCS/FMC2</td>
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7-4 MAL/ALL/GEN J
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<th>AC3 RCS/FMC3</th>
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<td>ALTERNATE PRIMARY PAYLOAD PWR</td>
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<td>AC PWR TRANSFER CABLE</td>
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<td>CRYO HTR MANUAL OPS</td>
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<td>OPCU FAULT ISOLATOR TRIP RECOVERY</td>
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</table>
7.1 FC REAC/PMP/STACK T
  7.1b ‘SM1 FC STACK T 1(2,3) ↑↓’ – FC STACK T 1(2,3) ↑↓ ............................ 7-8

7.3 FUEL CELL
  7.3b ‘SM1 MAIN BUS V A(B,C)’
  ‘SM1 DC VOLT FC1(2,3)’
  ‘SM1 FC AMPS 1(2,3)’
  – FUEL CELL VOLTS ↑↓, FUEL CELL AMPS ↑↓, MAIN BUS V A(B,C) ↑↓ ............................ 7-18
  7.3d ‘SM1 FC EXIT T 1(2,3)’
  – FUEL CELL EXIT T ↑↓ .................................................. 7-23
  7.3e ‘SM1 FC COOL P 1(2,3)’
  – FUEL CELL COOL P ↑↓ .................................................. 7-26

7.5 AC VOLTAGE/OVLD
  7.5a ‘SM1 AC VOLTS 1(2,3)’
  – AC VOLTS 1(2,3) ↓↑ .................................................. 7-42
  7.5b ‘SM1 AC OVLD 1(2,3)’
  – AC OVLD 1(2,3) ↓ .................................................. 7-47

7.6 CRYO
  7.6b ‘SM2 CRYO O2(H2) PRES’
  – CRYO O2(H2) PRES,TK P ↓↑ .................................. 7-55
  7.6d ‘SM2 CRYO O2(H2) MANF’
  – O2(H2) MANF P ↓ .................................................. 7-59
  7.6i ‘SM2 CRYO O2 HTR’
  – O2 HTR T ........................................................... 7-62
7.1b FC STACK T 1(2,3) ↑↓

1. Is FC shudn? NO

2. SM 69 FUEL CELLS
   SM SYS
   SUMM 1

3. STACK T
   SNR FAILURE
   (FC OK)

4. CRT msg has
   * in text? NO

5. WARNING
   Ops at > 243 degF
   may result in FC failure

6. WARNING
   Ops < 172 degF
   may result in FC damage

7. CRT) Any other FCs with
   COOL T > 140 degF?

8. (R11U)
   • FC STARTUP
   HTR – ENA

9. (CRT)
   • Observe amps of
     aff FC and tied
     FC

10. POSSIBLE FREON LOOP
    PROBLEM

11. (CRT)
    • Perform BUS TIE
      (Cue Card)

12. FC THERMAL
    CONTROL AND
    SUSTAINER HTR
    FAILED OFF

13. (R1)
    • Maintain FC
      START sw in
      START

14. • Restore nominal
    bus-tie config

15. YES

16. NO

Nominal Config:
(L4:C)
cb AC1 φA,φB,φC
FC1 PUMPS
(three) – cl
cb AC2 φA,φB,φC
FC2 PUMPS
(three) – cl
cb AC3 φA,φB,φC
FC3 PUMPS
(three) – cl
(O14)
FC1 CNTLR – ON
(O15)
FC2 CNTLR – ON
(O16)
FC3 CNTLR – ON
(Cont in notes column)

7.1 Confirming cue of STARTUP HTR activity is READY FOR LOAD tb – bp whenever htr cycles ON

2. FC STARTUP HTR amps do not flow thru affected FC ammeter. Increased load will drop FC volts and shared load will be shifted to other FC

3. FC STARTUP HTR may be used tocntl STACK T to acceptable temp by holding or maintaining FC START sw in START

Nominal Config:
(R11U)
FC STARTUP HTR
1,2,3 (three) – ENA
If FC operating:
(R1)
FC RDY (three)
tb – gray
FC1(2,3) COOL
PUMP ΔP
tb (three) – gray
If FC shudn:
Aff FC RDY
 tb – bp
Aff FC COOL
PUMP ΔP
tb – bp
11

15

SM SYS SUMM 1
Total FC kW:

> 18

≤ 18

17 Tie all three MN Buses

(R1)

• MN BUS TIE A,B,C (three) – ON (tb-ON)

19 Disconnect aff FC from MN BUS

(R1)

• ESS BUS SOURCE FC1(FC2,FC3) – OFF

• FC/MN BUS A(B,C) – OFF (tb-OFF)

23 √Aff FC volts

(F9)

• DC Volt/Amp sel – FC1 (FC2,FC3)

> 32.5 V ?

24 Inhibit FC Startup Htr

(R11U)

• FC STARTUP HTR 1(2,3) – INH

(CRT)

• √FC volts

> 32.5 V ?

26 POSSIBLE FC INTERNAL SHORT

28 STARTUP HTR FAILED ON

58 64

31 Reconnect aff FC to MN BUS

(R1)

• FC/MN BUS A(B,C) – ON (tb-ON)

• ESS BUS SOURCE FC1(FC2,FC3) – ON

33 Is STACK T within proper limits for FC kW level ?

34 TRANSIENT ALARM OR FDA FAILURE

36

44

Loss of correct precondition check for STACK T FDA Class 3 limit set based on kW for this FC
This is the temp range that could result in low stack temp SM ALERT.

MCC will monitor FC performance by observing Δamps changes.

If loss of comm, reset Δamps limits to present value ± 40 (± 40 takes into account possible differences in FC V-I curves which would cause a Δamps change with a load change).

Depending on load, may take several hours for performance change. Do not purge FC for 5 hr.

With FCs thermally stabilized and at a constant load, a 12-amp change in delta amps would indicate approximately 3% change in KOH concentration. High concentration (indicated by improved performance) > 48% can allow O2/H2 crossover. Low concentration (indicated by degraded performance) < 26% indicates flooding.
Loss of correct precondition check for STACK T FDA Class 3 limit set based on kW for this FC

Based upon STS-2, 51, 54, & 57 data, FC STACK T and EXIT T should remain within 15 degF of each other during cooldown.

Lower limit on allowable temp for reusable FC is 48 degF (includes Xdcr error). FC must be restarted to maintain temp above 48 degF. 50.8 degF was selected due to being closest value to 48 degF in Primary C/W System.

With loss of FC STACK T, FC temp may be obtained only from FC EXIT T.

FC sustaining heater maintaining stack temp.

After cooldown, FC may be usable on cyclic basis or with extensive vehicle pwrdn.

Leave FC in STBY mode. MCC analysis may determine later need for FC shutdn.
1 Normal H2 Pump range 0.28-0.65 volt. See Table A
2 If degradation of H2 pump worsens, FC should be shut down so that pump could be used during entry
3 Non-satisfactory H2 pump ops would eventually be reflected in FC amps (low) SSDV (erratic), exit temp, and FC pH (event)
4 H2 PUMP operates at .3A/Φ for 3-phase and .45A/Φ for 2-phase operation. Coolant pump operates at .5A/Φ for 3-phase and .62A/Φ for 2-phase operation

Nominal Config:
(L4:C)
cb AC1 φA,φB,φC
FC1 PUMPS (three) – cl
cb AC2 φA,φB,φC
FC2 PUMPS (three) – cl
cb AC3 φA,φB,φC
FC3 PUMPS (three) – cl
(O14) FC1 CNTLR – ON (O15)
FC2 CNTLR – ON (O16)
FC3 CNTLR – ON (R1)
FC1,FC2,FC3 RDY tb (three) – gray
FC1,FC2,FC3 COOL PUMP ΔP tb (three) – gray

From ORB PKT, EPS, FC 1(2,3) H2 PUMP, step 4

1 SM 69 FUEL CELLS
Which conditions exist for FC H2 PUMP (VOLTS)?

   |< 0.2  | > 0.8 and ≤ 2.0 | > 2.0 and ≤ 3.0 | > 3.0 and ≤ 4.6 | > 4.6
   |       |                |                |                |        

   2 • Perform BUS TIE (Cue Card)
   3 • Perform BUS TIE (Cue Card)

4 SM SYS SUMM 1
- Note aff AC AMPS
  φA
  φB
  φC

Stop affected fuel cell
(R1) FC 1(2,3) – STOP

5 POSSIBLE 2Φ FC H2 PUMP OPS

6 POSSIBLE DEGRADED H2 PUMP

7 (CRT)
- Note aff AC AMPS
  φA
  φB
  φC

3Φ AC AMPS decr 0.7-0.9 amps/Φ or 2Φ AC AMPS decr 0.9-1.2 amps/Φ ?

8 STALLED H2 PUMP OR PUMP PWR LOSS

9 • Go to FC SHUTDOWN (Cue Card)

10 SHIFTED OR FAILED XDCR

11 Restart aff FC
- Perform FC RESTART, EPS SSR-6

12 • Perform FDA limit change by resetting high limit to present value + 0.3 volts (REF DATA, C/W and FDA OPS)
## Table A

### FC PUMP PACKAGE POWER RANGES

#### 3-PHASE OPERATION

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<th>H2 PUMP</th>
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<td>AMPS/PHASE</td>
<td>AMPS/PHASE</td>
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<td>STALL</td>
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#### 2-PHASE OPERATION

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<th>H2 PUMP</th>
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</thead>
<tbody>
<tr>
<td>NORMAL (open motor winding)</td>
<td>0.62</td>
<td>0.45</td>
</tr>
<tr>
<td>NORMAL (1Ø cb open)</td>
<td>0.62</td>
<td>0.45</td>
</tr>
<tr>
<td>STALL</td>
<td>1.0</td>
<td>1.3</td>
</tr>
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</table>
If:

- SM 69 FUEL CELLS
- FC PURGE LN O2 T < 69 degF or FC PURGE LN H2 T1 < 79 degF or FC PURGE LN H2 T2 < 40 degF
- After 27 min since AUTO PURGE SEQ started

Then:

1. GPC PURGE OR INSTRUMENTATION FAILURE. LOSS OF AUTO PURGE SEQUENCE
   - Go to FUEL CELL PURGE – MANUAL (ORB OPS, EPS)

2. GPC will terminate AUTO PURGE SEQ as indicated by (R11U)

   FC GPC PURGE SEQ tb – bp. (R11U) ON position of FC PURGE HTR sw utilizes redundant htrs
If this alarm occurs: Purge vlv commanded closed. Purge line htrs are commanded OFF. May be verified by (R11U) FC GPC PURGE SEQ tb – bp

Nominal Config:
(R11U)
FC PURGE HTR – GPC
From ORB PKT, EPS, FC pH HIGH OR H2O LINE pH HIGH, step 5

1. Note time of earliest pH ↓ msg
   ___:___:___

2. NOTE
   If following conditions are met at any time within 1 hr, FC Safing should be performed:
   FC pH ↓ or H2O LINE pH ↓ and FC SS ΔV ≥ 150 and increasing

3. Perform FC H2O TEST (IFM)
   pH < 9
   pH > 9

4. Transient pH indication or pH XDCR failure
   YES
   NO

5. Perform aff FC SAFING (ORB PKT, EPS)

6. 1 After individual pH alarm, 10 min could elapse before H2O Line pH alarm activates

2. FC health and performance will be monitored for 1 hr. If signs of FC flooding occur, FC Safing will be performed

3. May take as long as 20 min for aff FC H2O to reach galley QD

4. Waiting 1 hr may allow transient pH condition to clear
**EPS 7.3a (Cont)**

5. SPLY TKC may be contaminated. TKC will be dumped and then flushed per nominal TKC management.

6. SPLY TKA will be dumped periodically to flush pH out of the system.

6. Verify FES and SPLY H2O TK config

(L1) FLASH EVAP CNTLR
- PRI A – OFF
- PRI B – ON (if reqd)
- SEC (two) – B
- SPLY, OFF

(R11L)
- SPLY H2O TKA INLET, OUTLET (two) – CL (tb-CL)
- SPLY H2O TKB INLET – CL [tb-CL(bp)]
- SPLY H2O TKC OUTLET – CL (tb-CL)
- SPLY H2O TKD INLET – CL (tb-CL)

(ML31C)
- SPLY H2O TKD INLET – CL (tb-CL)
- Perform FC H2O SPLY LINE FLUSH (IFM)

From ORB PKT, EPS, FC DELTA V 1(2,3), step 3

7. Results of FC H2O SPLY LINE FLUSH (IFM):

TK A usable
TK A not usable (contaminated)

8. On MCC call, perform SUPPLY/WASTE H2O DUMP

9. Dump SPLY H2O TK A

(R11L)
- MCC for possible dump of additional tanks
- SPLY H2O TKB OUTLET – CL (tb-CL)
- SPLY H2O XOVR VLV – CL [tb-CL(bp)]
- SPLY H2O TKA OUTLET – OP (tb-OP)
- Perform SUPPLY/WASTE H2O DUMP (ORB OPS, ECLS) as follows
- Set tank A LL to 5% to annunciate end of dump

10. MCC for reconfiguration of the FES and SPLY H2O TKs

Water Transfer Configuration

Nominal Water Configuration

(R11L)
- SPLY H2O TKA INLET, OUTLET (two) – OP (tb-OP)
- SPLY H2O TKB OUTLET – OP (tb-OP)
- SPLY H2O XOVR VLV – CL [tb-CL(bp)]
- SPLY H2O TKB OUTLET – OP (tb-OP)
- SPLY H2O TKD INLET – OP (tb-OP)

(ML31C)
- SPLY H2O TKD INLET – OP (tb-OP)

11. Water Transfer Configuration

(R11L)
- cb MNB SPLY H2O TKB INLET – cl
- cb MNC SPLY H2O XOVR VLV – cl

(ML86B:A)
- SPLY H2O TKA OUTLET – CL (tb-CL)
- SPLY H2O TKA INLET – OP (tb-OP)
- SPLY H2O TKB INLET, OUTLET (two) – OP (tb-OP)
- SPLY H2O TKC OUTLET – OP (tb-OP)
- SPLY H2O XOVR VLV – OP (tb-OP)

(ML31C)
- SPLY H2O TKD INLET – OP (tb-OP)

(L1)
- PRI B – OFF
- Go to FES RESTART, ECLS SSR-5, using PRI A (if reqd)

12. Nominal Water Configuration

(ML68B:A)
- SPLY H2O TKA OUTLET – CL (tb-CL)
- SPLY H2O TKB INLET, OUTLET (two) – OP (tb-OP)
- SPLY H2O TKC OUTLET – OP (tb-OP)
- SPLY H2O XOVR VLV – OP (tb-OP)

From ORB PKT, EPS, FC pH HIGH OR H2O LINE pH HIGH, step 3

5. Verify FES and SPLY H2O TK config

From ORB PKT, EPS, FC pH HIGH OR H2O LINE pH HIGH, step 3

8. On MCC call, perform SUPPLY/WASTE H2O DUMP

9. Dump SPLY H2O TK A

(R11L)
- PRI A – OFF
- PRI B – ON (if reqd)
- SEC (two) – B
- SPLY, OFF

7. Results of FC H2O SPLY LINE FLUSH (IFM):

TK A usable
TK A not usable (contaminated)

10. MCC for reconfiguration of the FES and SPLY H2O TKs

Water Transfer Configuration

Nominal Water Configuration

(R11L)
- SPLY H2O TKA INLET, OUTLET (two) – OP (tb-OP)
- SPLY H2O TKB OUTLET – OP (tb-OP)
- SPLY H2O XOVR VLV – CL [tb-CL(bp)]
- SPLY H2O TKB OUTLET – OP (tb-OP)
- SPLY H2O TKD INLET – OP (tb-OP)

(ML31C)
- SPLY H2O TKD INLET – OP (tb-OP)

11. Water Transfer Configuration

(R11L)
- cb MNB SPLY H2O TKB INLET – cl
- cb MNC SPLY H2O XOVR VLV – cl

(ML86B:A)
- SPLY H2O TKA OUTLET – CL (tb-CL)
- SPLY H2O TKA INLET – OP (tb-OP)
- SPLY H2O TKB INLET, OUTLET (two) – OP (tb-OP)
- SPLY H2O TKC OUTLET – OP (tb-OP)
- SPLY H2O XOVR VLV – OP (tb-OP)

(ML31C)
- SPLY H2O TKD INLET – OP (tb-OP)

(L1)
- PRI B – OFF
- Go to FES RESTART, ECLS SSR-5, using PRI A (if reqd)
Meters on pnl F9 should be used only if SM is not available, since wiring of TM vs METER results in a different reading in the case of a shunt blowing.

FC Stack Temp Class 3 FDA may cause erroneous alarms and is unreliable. MCC will inhibit Class 3 FDA via TMBU. Class 2 FDA still exists.

If hi amps caused transient and short cleared, cockpit check should be made for open cbs or bus loss indications.

Consult MCC for powerup.

If SM OPS 2, FC amps may be approximated by utilizing React flows in the following equations:

\[ \text{AMPS} (\pm 50) = \text{O}_2 \text{ FLOW} \times 47.5 \]
\[ \text{AMPS} (\pm 68) = \text{H}_2 \text{ FLOW} \times 377 \]

FC amps up to 450 may be expected if FC pwrs MN BUS plus PRI PL Bus or FC pwrs two main buses.

**Nominal Config:**
- (O13:E)
  - PL PRI FC3 – OFF (t♭-OFF)
  - PL PRI MNB – OFF (t♭-OFF)
  - PL PRI MNC – ON (t♭-ON)

If FC operating:
- (R1)
  - FC/MAIN BUS A(B,C) – ON (t♭-ON)
  - FC(M1) REAC (six) – OP

If FC shutdn:
- Aff FC/MN BUS – OFF (t♭-OFF)
- Aff FC REAC (two) – CL

---

**From ORB PKT, EPS:**
- MN BUS U/V FC VOLTS, step 22

1. **Is FC shutdn?**
   - NO → FC VOLTS msg
   - YES → FC AMPS msg

2. **FC VOLTS msg**
   - NO → 48
   - YES → 62

3. **FC AMPS msg**
   - NO → 48
   - YES → 62

4. **S67 MAIN BUS V A(B,C)**
   - If: MNA(B,C) BUS VOLTS < 27 vdc > 32 vdc
   - S69 FC VOLTS 1(2,3)
   - S69 FC AMPS 1(2,3)

5. **If FC operating and FC AMPS:**
   - < 54
   - > 360

6. **If FC shutdn and AMPS < current C/W FDA lower limit, > current C/W FDA upper limit**

7. **SM67 ELECTRIC**

8. **If FC operating and:**
   - VOLTS < 27.5 vdc
   - VOLTS > 32.5 vdc

9. **If FC shutdn and Volts < current C/W FDA lower limit, > current C/W FDA upper limit**

10. **SM 67 ELECTRIC**

11. **SM 69 FC VOLTS**

12. **SM 69 FC AMPS**

13. **SM69 FC VOLTS 1(2,3)**

14. **SM69 FC AMPS 1(2,3)**

15. **SM 67 ELECTRIC**

16. **SM 69 ELECTRIC**

---

**Nominal Config:**
- (Cont)
  - (O13:E)
  - PL PRI FC3 – OFF (t♭-OFF)
  - PL PRI MNB – OFF (t♭-OFF)
  - PL PRI MNC – ON (t♭-ON)

If FC operating:
- (R1)
  - FC/MAIN BUS A(B,C) – ON (t♭-ON)
  - FC(M1) REAC (six) – OP

If FC shutdn:
- Aff FC/MN BUS – OFF (t♭-OFF)
- Aff FC REAC (two) – CL
7.3b (Cont)

MCC analysis reqd before increasing loads on FC

15 SM 67 ELECTRIC
   FC AMPS > 360 ?
      YES
      16 Coming thru block 4 ?
         NO
         17 Is FC VOLTS still < 27.5 or MN VOLTS still < 27.0 ?
             NO
             18 SM 69 FUEL CELLS
                Does FC AMPS (± 50) = O2 FLOW x 47.5 or FC AMPS (± 68) = H2 FLOW x 377 ?
                   NO
                   36
                   20 DEGRADED FC
                      • PL PRI (three) – OFF (tb-OFF)
                      • PL disconnect (R1)
                      FC AMPS > 360 ?
                         YES
                         22 Perform PRIORITY PWRDN (ORB PKT) as reqd
                            • FC volt/amps within .5V of nominal FC Performance Curve, FUEL CELL V-I PERFORMANCE PLOT (ORB OPS, EPS) ?
                               NO
                               30 Go to MN BUS UNDERVOLTS/ FC VOLTS, step 6 (ORB PKT, EPS)
                                  • Go to MN BUS UNDERVOLTS/ FC VOLTS, step 6 (ORB PKT, EPS)
                                     • Go to FC SAFING (ORB PKT, EPS)
                                        • Continue to use FC with bus tied and reduced loads
                                           NO
                                           21 PL disconnect
                                              • PL PRI (three) – OFF (tb-OFF)
                                              25 PAYLOAD SHORT
                                                 NO
                                                 28 If any MN BUS not pwrd:
                                                    • Perform BUS TIE (Cue Card)
                                                       YES
                                                       41
                                                       29 EXCESSIVE FC LOADING
                                                          • Go to EPS BUS LOSS, SSR-10 MNA (SSR-30 MNB, SSR-50 MNC)
                                                             NO
                                                             24 TIE BUS SHORT
                                                                • Go to EPS BUS LOSS, SSR-10 MNA (SSR-30 MNB, SSR-50 MNC)
                                                                   YES
                                                                   31
                                                                   27
                                                                      • Go to EPS BUS LOSS, SSR-10 MNA (SSR-30 MNB, SSR-50 MNC)
                                                                         NO
                                                                         19 Aff FC connected to PRI Payload Bus ?
                                                                             YES
                                                                             13 14
                                                                             NO
2 FC Stack Temp
Class 3 FDA may cause erroneous alarms and is unreliable. MCC will inhibit Class 3 FDA via TMBU. Class 2 FDA still exists

5 If SM OPS 2, FC amps may be approximated by utilizing Reac flows in the following equations:
AMPS (±50) = O2 FLOW x 47.5
AMPS (±68) = H2 FLOW x 377

8 Short on MN BUS causes FC loss. For loss of MNC, FC3 pumps will be pwrd with AC Transfer Cable and FC3 pwr will be supplied to MNB through PL pwr contactors
At FC coolant pressure of less than 20 psia, electrolyte boiling may occur (i.e., KOH escaping from cell matrix); in addition, Dual Gas Regulator may not control O2/H2 relative pressures and crossover may result.

If FC COOL P < 20 psia, allow FC to safe itself. If > 20 psia:
- Go to FC SAFING (ORB PKT, EPS)
9 At FC coolant pressure of less than 20 psia, electrolyte boiling may occur (i.e., KOH escaping from cell matrix); in addition, Dual Gas Regulator may not control O2/H2 relative pressures and crossover may result.

10 Due to limited resolution of F9 meter, close comparison may be unobtainable.
1. Transient loads may cause EXIT T < LN T for up to 2 min.
2. Data indicates H2O LN T < EXIT T by up to 15 degF.
3. FC EXIT T will quickly increase to FC STACK T if CONDENSER COOLANT FLOW is stopped while H2 PUMP is operational. FC should be quickly shutdn for possible Coolant Pump failure.
4. MCC

**Nominal Config:**
(L4:C)
<table>
<thead>
<tr>
<th>cb AC1 φA,φB,φC</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC1 PUMPS (three) – cl</td>
</tr>
<tr>
<td>cb AC2 φA,φB,φC</td>
</tr>
<tr>
<td>FC2 PUMPS (three) – cl</td>
</tr>
<tr>
<td>cb AC3 φA,φB,φC</td>
</tr>
<tr>
<td>FC3 PUMPS (three) – cl</td>
</tr>
</tbody>
</table>

**Steps:**
1. Is FC shutdn?
2. MCC, or if MCC not available, continue.
3. SM 69 FC EXIT T 1(2,3)
4. CLASS 3 C/W ALARM FAULT OR THERMAL TRANSIENT
5. SM OPS 2 (4) available?
6. FC1(FC2, FC3) H2O LN T < EXIT T?
7. FC EXIT T > 164 and incr?
8. EXIT T XDCR FAILURE
9. FC COOLANT LOOP FAILURE
10. SM OPS 2(4) available?
11. Perform MN BUS TIE (Cue Card)
12. Go to FC SHUTDOWN (Cue Card)
13. FC1, FC2, FC3 (three) COOL T > 140 degF?
14. FREON COOLANT LOOP PROBLEM

**Conditions:**
- If FC operating and Exit T < 131 degF or > 164 degF.
- If FC shutdn and Exit T > 164 degF or < 50.8 degF.

**Procedure:**
- Wait 2 min.
- NEITHER ↑ NOR ↓
- Perform MN BUS TIE (Cue Card)
MCC will monitor FC performance by observing $\Delta$amps change.

If loss of comm., reset $\Delta$amps limits to present value $\pm 40$ ($\pm 40$ takes into account possible differences in FC V-I curves which would cause a $\Delta$amps change with a load change).

High FC EXIT T will reduce H2O removal rate and may result in cell flooding. Uniform cell flooding may not be detected by change in FC SS $\Delta V$.

With FCs thermally stabilized and at a constant load, a delta amp change of 12 indicates $\sim 3\%$ change in KOH concentration. Nominal KOH concentration is $\sim 36\%$. High Concentration ($> 48\%$) would be indicative of FC dryout leading to possible O2/H2 crossover. Low concentration ($< 26\%$) would be indicative of FC flooding.

Low FC EXIT T will increase H2O removal and may result in cell dryout sufficiently to allow O2/H2 crossover. Individual cell crossover should be detected by change in FC SS $\Delta V$. Uniform cell dryout would result in increased FC performance.

Depending on extent of failure after cooldown, FC may be usable in cyclic mode.
Based upon STS-2 data, FC EXIT and STACK T should remain within 15 degF of each other during cooldown.

Lower limit on allowable temp for reusable FC is 48 degF (includes Xdcr error). FC must be restarted to maintain temp above 48 degF. 50.8 degF was selected due to being the closest value to 48 degF in the Primary C/W System.

With loss of FC EXIT T, FC temp may be obtained only from FC STACK T.
Erratic FC COOL T on SM 69 display may also be indicative of pre-htr internal leak

1. Is FC shutdn?
   - NO → 2
   - YES → 53

2. SM 69 FUEL CELLS:
   - FC COOL P is: ↓ or ↑?
     - NO → 3
     - YES → 4

3. CLASS 3 ALARM FAULT OR TRANSIENT

4. Perform BUS TIE (Cue Card)

5. Are any of the following present?
   - (R1)
     - FC1(FC2,FC3) COOL PUMP ΔP tb – bp or intermittent
   - (CRT)
     - FC1(FC2,FC3) STACK T or EXIT T unstable
     - FC1(FC2,FC3) COOL P > 75 and incr (but not 'H')

6. PRE-HTR LEAK, FC REG FAILURE, OR COOLANT LOOP LEAKAGE

7. WARNING
   - Cryo pressurization of coolant loop due to pre-htr leakage may cause FC HX failure and loss of all three FCs

8. From ORB PKT, EPS, FC COOL P, step 3

9. SM 69 FUEL CELLS:
   - FC COOL P is:
     - ↑ or 'H'
     - ↓ or 'L'

29
If GPC purge seq selected, manually closing Purge Vlv stops purge and GPC will proceed with purging next FC selected for GPC purge. GPC may or may not alert crew. 'FC PURGE 1(2,3)' msg occurs depending on when Purge Vlv manually closed.

Flows correspond to 10 kW (~350 amps) load on FC plus flow sensor accuracy.
Possible KOH in O2 sys. Do not purge suspect FC until nominal performance at this pressure demonstrated for at least 6 hr

Drop in FC volts vs amps performance that corresponds to new pressure would indicate Regulator shift. If reqd, update FC V-I Curve, FUEL CELL V-I PERFORMANCE PLOT (ORB OPS, EPS), with new nominal data after next purge

For Regulator shift, future FC ops would depend on SPLY H2O TK QTY, FES ops requirement, and FC loads. Suspect FC can be open circuited and saved for entry

FC may be usable if loads reduced to point where reactant demand can be met
For FES ops, SPLY H2O TKB, TKC, TKD may need to be repressurized.

For Dual Gas Regulator shift high, reactants may be venting through purge line. If Reac Vlvvs are not open, FC could evacuate (i.e., safe).

8

9
At FC coolant pressure of less than 20 psia, electrolyte boiling may occur (i.e., KOH escaping from cell matrix); in addition, Dual Gas Regulators may not control O2/H2 relative pressures and crossover may result.

Typical values for FC purges

With FC shutdn and no coolant flow, there exists no preheating capability of the incoming reactants. Continuous purge flow may freeze or damage regulator.
Overtemp caused by driver or thermostat failure will only occur if FC shutdn in standby, or lightly loaded. Failure at normal loads not detectable.
S69 FC H2O RLF 1(2,3)

If:
FC H2O RLF VLV T
< 60 degF
> 185 degF

S69 FC H2O RLF LINE

If:
FC H2O RLF LINE T
< 60 degF
> 185 degF

Nominal Config:
(R11U)
FC H2O LINE
HTR – A AUTO
(B AUTO)

1 Switching htr
isolated failed circuit

SM 69
FUEL CELLS
FC1(FC2,FC3) H2O
RLF VLV T (FC H2O RLF LINE T):

NEITHER ↑
NOR ↓

↑
↓

1 Switch htr
(R11U)
• FC H2O RELIEF
HTR – B AUTO
(A AUTO)

Temp incr ?

2 CLASS 3
ALARM S/W
FAULT OR
TRANSIENT

3 Switch htr
(R11U)
• FC H2O RELIEF
HTR – B AUTO
(A AUTO)

Temp decr ?

4 FC H2O
RELIEF VLV
(LINE) HTR
A(B) CIRCUIT FAILURE

5 Switch htr
(R11U)
• FC H2O RELIEF
HTR – B AUTO
(A AUTO)

Temp decr ?

6 FC H2O
RELIEF VLV
(LINE) TEMP
XDCR FAILURE

7 FC H2O
RELIEF VLV
(LINE) HTR
THERMOSTAT
A(B) FAILURE

9 Switch htr to
nominal config
(R11U)
• FC H2O RELIEF
HTR – A AUTO
(B AUTO)
1 If GPC Auto Purge in progress, expect FC PURGE SEQ msg

2 SM ALERT
FAILURE

3 Two or more of the following FC Purge Line Temps > 250 degF and rising?

- PURGE LN O2 T
- PURGE LN H2 T1
- PURGE LN H2 T2

4 SNSR
FAILURE

5 (R11U)
- FC PURGE HTR – OFF
- MCC
1 If bus short caused transient and short cleared, cockpit check should be made for open cbs or bus loss indications.

2 If FC purge in progress, alarm may have tripped because of normal load plus purge flow. If one flowmeter previously failed, assume both flows high.

3 If GPC PURGE SEQ selected, manually closing Purge Vlv stops purge and GPC will proceed with purging next FC selected for GPC purge. GPC may or may not alert crew. ‘S68 FC PURGE 1(2,3)’ msg occurs depending on when purge vlvs were manually closed.
If FC purge in progress, alarm may have tripped because of normal load plus purge flow. If one flowmeter previously failed, assume both flows high.

Turning htrs off prevents excessive heat during entry and possible htr element damage.

Reactant venting indication: Cool P ≥ 66 psia

Htrs must remain on for 30 min to bakeout purge vent lines.
Neither FC O₂ FLOW ↑ nor FC H₂ FLOW ↑
Either or both FC O₂(H₂) FLOW ↑

26 CLASS 3 ALARM FAULT OR TRANSIENT

27 • Monitor FC COOL P
Between 55 and 70 and STDY > 10 min
> 70 or < 55 or DECR at any time

28 FC O₂(H₂) FLOW XDCR SHIFT

29 Inhibit failed xdcr
If FC O₂ FLOW ↑
• ITEM 1
  + 0 4 5 0 1 6 0
  (260,360) EXEC
• ITEM 10 EXEC
If FC H₂ FLOW ↑
• ITEM 1
  + 0 4 5 0 1 7 0
  (270,370) EXEC
• ITEM 10 EXEC
Diode failure would be indicated if an A/B alarm occurred during nozzle htr ops. Alt htr could be selected to eliminate alarms.
**Nominal Config:**

(R11U)
FC H2O LINE
HTR – A AUTO
(B AUTO after Htr
reconfig in ORB
OPS)

FC ALT H2O RLF T

NEITHER

↑

↓

If:
FC ALT H2O RLF T
< 60 degF
> 185 degF

1. SM 69
FUEL CELLS
FC ALT H2O RLF T
↑ or ↓

2. CLASS 3
ALARM S/W
FAULT OR
TRANSIENT

3. (R11U)
• FC H2O LINE
HTR SW position
OFF?

4. HTRS NOT
ACTIVATED

5. Activate htr
(R11U)
• FC H2O LINE
HTR – A AUTO
(B AUTO)

6. Switch htr
(CRT) FC ALT H2O
RLF T incr?

7. HTR
FAILURE

8. Switch htr
(R11U)
• FC H2O LINE
HTR – A AUTO
(B AUTO)

9. FC ALT H2O
RLF T XDCR
FAILURE OR LINE
FROZEN

10. FC ALT H2O
RLF T HTR (A/B)
THERMOSTAT
FAILED CLOSED

11. FC ALT H2O
RLF T XDCR
FAILED OR HTR
CKT DRIVER
FAILED ON
1. Default limits are OSL, OSH.

2. A ΔAMPS shift of 12 amps between two tied FCs is equivalent to an ~300 mV degradation in one of the 96 cells of the FC. This degree of performance change, which is not related to load changes, may indicate an internal cell problem and, if allowed to continue, could lead to a crossover condition.
AC BUS VOLTAGE alarm capabilities remain. Backup C/W lost for affected phase. F9 Meter still available

3. To preclude damaging equipment, the lower limit for equipment specifications (110 volts ac) is used in lieu of AC lower alarm limit (108 volts ac)

4. Primary C/W AC VOLTAGE alarm capability remains. Backup C/W lost for affected phase. F9 Meter still available

5. AC1(2,3) BUS VOLTAGE primary C/W alarm capability lost. AUTO TRIP capability and BACKUP C/W AC VOLTAGE sensing remain

6. O/V U/V Detector Input Fuse. AC1(2,3) VOLTAGE primary C/W alarm capability lost. OVLG AUTO TRIP and BACKUP C/W AC VOLTAGE sensing remain

7. If inhibit does not extinguish light, remove bulb if desired
Backup C/W AC Voltage sensing exist. Auto Trip capability suspect.

Still have primary C/W AC VOLTAGE alarm capability. Backup C/W lost for affected phase.
EPS 7.5a (Cont)

26. \( \sqrt{ \text{AC Volts and Amps} } \)

- SM 67 ELECTRIC
- SM SYS SUMM 1

Are other AC volts < 110 or AC amps > 14.5?

27. Unpower Remaining \( \Phi \)'s of aff AC Bus

(R1)
- \( \text{cbs AC CONTR AC1(2,3) (three) - cl} \)
- \( \text{INV/AC BUS 1(2,3) - OFF (tb-OFF)} \)
- \( \text{INV PWR 1(2,3) - OFF (tb-OFF)} \)
- \( \text{cbs AC CONTR AC1(2,3) (three) - op} \)

28. Is MCC able to TMBU BACKUP C&W ALERTS?

29. SM 60 SM TABLE MAINT

Inhibit aff AC volts
- ITEM 1 + _ _ _ _ _ EXEC
- ITEM 15 EXEC

MSIDs to enter in Item 1 blanks:
- AC1 \( \Phi A \) 0761500
- AC1 \( \Phi B \) 0761501
- AC1 \( \Phi C \) 0761502
- AC2 \( \Phi A \) 0761600
- AC2 \( \Phi B \) 0761601
- AC2 \( \Phi C \) 0761602
- AC3 \( \Phi A \) 0761700
- AC3 \( \Phi B \) 0761701
- AC3 \( \Phi C \) 0761702

30. MCC will inhibit aff AC volts

31. \( \sqrt{ \text{AC Amps} } \)

- SM 67 ELECTRIC
- SM SYS SUMM 1

For aff AC1(2,3) are other \( \Phi \) amps > 10?

32. Isolate shorted \( \Phi \)

(L4, MA73C)

- Open all aff AC1(2,3) three – \( \Phi \) ganged cbs and all aff AC1(2,3) \( \Phi A(B,C) \) single – \( \Phi \) cbs as follows:

<table>
<thead>
<tr>
<th>BUS</th>
<th>L4</th>
<th>MA73C</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC1 ( \Phi A )</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>AC1 ( \Phi B )</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>AC1 ( \Phi C )</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>AC2 ( \Phi A )</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>AC2 ( \Phi B )</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>AC2 ( \Phi C )</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>AC3 ( \Phi A )</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>AC3 ( \Phi B )</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>AC3 ( \Phi C )</td>
<td>16</td>
<td>3</td>
</tr>
</tbody>
</table>

33. Perform aff Bus Loss

34. NO

21 27 36
34 Test afi Bus Snsr AUTO function
(R1)
• cb AC CONTR AC1(2,3) ΦA(B,C) – cl
• INV PWR 1(2,3) – OFF (tb-OFF)

NOTE
After next step, note if C/W ALARM immediate or delayed ~ 7 sec
• AC BUS SNSR 1(2,3) – OFF (1 sec), then AUTO TRIP

Immediate alarm
Delayed ~ 7 sec

35 AC BUS SNSR FAILURE

36 Reconfig afi Φ for possible overvolt or transient snsr problem
(R1)
• cb AC CONTR AC1(2,3) ΦA(B,C) – op

33

37 Repwr afi Φ
• AC BUS SNSR 1(2,3) – OFF
• INV PWR 1(2,3) – ON (tb-ON)
• INV/AC BUS 1(2,3) – ON (tb-ON)

38 Test afi Bus Snsr MON function

NOTE
Bus disconnect and/or C/W ALARM may occur after next step
(R1)
• AC BUS SNSR 1(2,3) – MON

Aff AC Bus disconnected (AC Volts < 110)

39

Received F7 AC VOLTAGE lt

41

No F7 AC VOLTAGE lt

44

11 AC bus voltage can be read on pnl F9
12 AC1(2,3) AC VOLTAGE primary C/W alarm and AUTO TRIP capability lost. Backup C/W AC VOLTAGE sensing remains

13 AC1(2,3) OVLD AUTO TRIP and C/W alarm capability lost

14 AC1(2,3) OVLD AUTO TRIP capability lost. AC OVLD primary C/W alarm remains
1 AC volts can be read on pnl F9
2 Lost AC1(2,3) Pri C/W OVLD alarm capability. B/U C/W alarm and Auto Trip capabilities remain
3 Lost AC1(2,3) Pri and B/U C/W OVLD alarm capability. Auto Trip capability remains
4 Lost AC1(2,3) B/U C/W OVLD alarm capability. Pri C/W alarm and Auto Trip capabilities remain
5. Lost AC1(2,3) Pri and BU C/W OVLD alarm capability. Auto Trip capability remains.
6. Pnl L4 cbs UTILITY PWR are 3p
20 Isolate aff Bus

(R1)
- cb(s) AC CONTR
  AC1(2,3) ΦA(B,C)
  three – cl
- INV/AC BUS
  1(2,3) – OFF
  (tb-OFF)
- INV PWR 1(2,3) –
  OFF (tb-OFF)
- cb(s) AC CONTR
  AC1(2,3) ΦA(B,C)
  (three) – op
- AC BUS SNSR
  1(2,3) – OFF

21 Perform aff Bus Loss

<table>
<thead>
<tr>
<th>BUS LOSS</th>
<th>EPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC1</td>
<td>SSR-110</td>
</tr>
<tr>
<td>ΦA</td>
<td>SSR-111</td>
</tr>
<tr>
<td>ΦB</td>
<td>SSR-112</td>
</tr>
<tr>
<td>ΦC</td>
<td>SSR-113</td>
</tr>
<tr>
<td>AC2</td>
<td>SSR-120</td>
</tr>
<tr>
<td>ΦA</td>
<td>SSR-121</td>
</tr>
<tr>
<td>ΦB</td>
<td>SSR-122</td>
</tr>
<tr>
<td>ΦC</td>
<td>SSR-123</td>
</tr>
<tr>
<td>AC3</td>
<td>SSR-130</td>
</tr>
<tr>
<td>ΦA</td>
<td>SSR-131</td>
</tr>
<tr>
<td>ΦB</td>
<td>SSR-132</td>
</tr>
<tr>
<td>ΦC</td>
<td>SSR-133</td>
</tr>
</tbody>
</table>

22 Single Φ Tripped
Multi Φ Tripped

23 Aff AC Bus SNSR verification

(R1)
- AC BUS SNSR
  1(2,3) – OFF

NOTE
Expect AC Voltage
alarm with next step

After next step, note
if AC OVLD alarm
immediate or not received

- AC BUS SNSR
  1(2,3) – AUTO
  TRIP

24 AC OVLD SNSR FAILURE

Immediate

No F7 AC OVLD it
or S67 AC OVLD
1(2,3) ↓ msg

26 POSSIBLE SHORT ON THE BUS

25 Repower aff Bus

(R1)
- AC BUS SNSR
  1(2,3) – OFF
- cb(s) AC CONTR
  AC1(2,3)
  ΦA(B,C) – cl
- INV/AC BUS
  1(2,3) – ON
  (tb-ON)
- cb(s) AC CONTR
  AC1(2,3)
  ΦA(B,C) – op
7 AC Volts can be read on pnl F9
8 Lost AC1(2,3) Auto Trip capability
9 Lost AC1(2,3) Prt C/W OVLD alarm capability. S67 AC Volts and S67 AC Amps msgs remain
10 Lost AC1(2,3) B/U C/W OVLD alarm capability
11 Affected AC cbs could have been opened in the OPCL AC OVLD or AC Volts procedures, or any of the AC Bus Loss SSRs in the MAL
SM ALERT

S67 AC AMPS 1(2,3)

If:
AC AMPS 1(2,3) > 10 amps

1. AC amps

SM SYS SUMM 1

More than one Φ has high amps?

Yes: On aff Bus

(MA73C)

- cb – open all except rows E & F

Any current decr?

Yes: CNTL LIMIT SW SIGNAL

FAILURE CAUSES UNWANTED RUN/STALL MTR CURRENTS

No: 3Φ LOAD EXCESSIVE

(MA73C,L4,R11)

- cb – op and cl ΦA,ΦB,ΦC together on each 3Φ load noting AC amp change on aff bus

Normal cb current listed in parentheses

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>ID (AMPS/Φ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C)</td>
<td></td>
</tr>
<tr>
<td>:E WCS Fan Sep Payload</td>
<td>AC1</td>
</tr>
<tr>
<td></td>
<td>1 (.9)*</td>
</tr>
<tr>
<td>(L4)</td>
<td></td>
</tr>
<tr>
<td>:C FC Pumps</td>
<td>1 (.8)</td>
</tr>
<tr>
<td>:D C,R ENG</td>
<td>C (&lt; 1.6)*</td>
</tr>
<tr>
<td>:E R,L ENG</td>
<td>R (&lt; 1.6)*</td>
</tr>
<tr>
<td>:F H2O Loop Pump</td>
<td>1A/2 (1.0)*</td>
</tr>
<tr>
<td>:G AV Bay Fan</td>
<td>1A (.9)*</td>
</tr>
<tr>
<td>:H AV Bay Fan</td>
<td>3B (.9)</td>
</tr>
<tr>
<td>:I IMU Fan</td>
<td>A (.2)*</td>
</tr>
<tr>
<td>:J HUM Sep</td>
<td>A (.3)*</td>
</tr>
<tr>
<td>:K CAB Fan</td>
<td>B (1.7)*</td>
</tr>
<tr>
<td>:M,N Freon Loop Pump</td>
<td>1A (1.7)*</td>
</tr>
</tbody>
</table>

(CRT) Any AC amps excessive?

Yes: 3Φ LOAD ON AC1(2,3)

No: 6 CURRENT LIMITED SHORT OR EXCESSIVE MTR LOAD

(MA73C)

- cb ΦA,ΦB,ΦC of each load – cl together while watching for AC amps change on aff bus

- cb – cl all except those feeding excess load

1. All (MA73C) 3Φ loads are transient loads normally active as response to flight crew/GPC command. All loads are on < 2 min except row E

2. Normally ‘*’ not active

3. Some mtrs have thermal cutoff sw that may remove load unexpectedly. In this event, block 4 will be inconclusive

4. AC Bus Snsr fused at 3 amps/Φ. AC volt meter and telemetry signal are fused at .5 amps/Φ
Partial short (L4,R11,MA73C)
- cb – op and cl single Φ load, one at a time
- Monitor amps for proper change on aff Φ

Normal cb current (orbit & entry prep)

<table>
<thead>
<tr>
<th>Pnl&amp; row</th>
<th>AC1</th>
<th>AC2</th>
<th>AC3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΦA</td>
<td>ΦB</td>
<td>ΦC</td>
</tr>
<tr>
<td>(L4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>K</td>
<td>&lt;.1</td>
<td>&lt;.1</td>
<td>-</td>
</tr>
<tr>
<td>L</td>
<td>5</td>
<td>&lt;.1</td>
<td>&lt;.1</td>
</tr>
<tr>
<td>N</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>O</td>
<td>&lt;.1</td>
<td>&lt;.1</td>
<td>&lt;.1</td>
</tr>
<tr>
<td>P</td>
<td>7</td>
<td>7</td>
<td>&lt;.1</td>
</tr>
<tr>
<td>Q</td>
<td>&lt;1.9</td>
<td>&lt;1.8</td>
<td>&lt;2</td>
</tr>
<tr>
<td>R</td>
<td>&lt;.5</td>
<td>&lt;.2</td>
<td>-</td>
</tr>
<tr>
<td>(MA73C)</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>F</td>
<td>&lt;1.3</td>
<td>&lt;1.3</td>
<td>&lt;.5</td>
</tr>
</tbody>
</table>

(CRT) Any cb with excessive load ?

- Current snsr
  - (R1)
    - cb AC CONTR AC1(2,3) ΦA(ΦB,ΦC) – cl
    - INV/AC BUS 1(2,3) – OFF (tb-OFF)
  - (CRT)
    - Read AC1(2,3) ΦA(ΦB,ΦC) amps
    - INV/AC BUS 1(2) – ON (tb-ON)

Amps > 1 with INV/AC BUS disconnected ?

- SOFT SHORT
  - ON LOAD
  - OFF LOAD

Which equip shows excessive current:
- FC PUMPS
- OTHER

- Monitor FC for performance change

Select alternate system
- cb – op system with high amps

Maintain AC BUS 1(2,3) Φ amps < 8 for continuous loads by transferring following loads:
- FREON LOOP PUMP
- CABIN FAN
- AV BAY FAN
- H2O LOOP PUMP
- IMU FAN
- HUM SEP
- PL AC2 3φ
- PL AC3 3φ

Monitor Bus for performance change
If shorted bus is AC2(3), CABIN FAN B(A) will not start on remaining two phases.

- Isolate shorted phase.

(L4, MA73C)
- cb – open all AC1(2,3) φA(φB, φC) cbs (including 3φ ganged cbs) on failed bus

<table>
<thead>
<tr>
<th>BUS</th>
<th>L4</th>
<th>MA73C</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC1 3φ</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>φA</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>φB</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>φC</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>AC2 3φ</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>φA</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>φB</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>φC</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>AC3 3φ</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>φA</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>φB</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>φC</td>
<td>12</td>
<td>3</td>
</tr>
</tbody>
</table>

(R1)
- cb AC CONTR AC1(2,3) φA(φB, φC) – cl

**NOTE**
Expect C/W AC VOLTAGE alarm after next step
- INV/AC BUS 1(2,3) – OFF (tb-OFF)
- INV PWR 1(2,3) – OFF (tb-OFF)
- cb AC CONTR AC1(2,3) φA(φB, φC) – op

BUS LOSS
- EPS
  - AC1 φA SSR-111
  - φB SSR-112
  - φC SSR-113
  - AC2 φA SSR-121
  - φB SSR-122
  - φC SSR-123
  - AC3 φA SSR-131
  - φB SSR-132
  - φC SSR-133
### CRYO TABLE A

**CRYO HEATER SWITCH PROCEDURAL NOMENCLATURE**

#### OXYGEN

<table>
<thead>
<tr>
<th>HEATER SET</th>
<th>FIVE-TK SET</th>
<th>FIVE-TK SET + PALLET</th>
</tr>
</thead>
<tbody>
<tr>
<td>O2 TK 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>O2 TK1 HTR A (R1)</td>
<td>O2 TK1 HTR A (R1)</td>
</tr>
<tr>
<td>B</td>
<td>O2 TK1 HTR B</td>
<td>O2 TK1 HTR B</td>
</tr>
<tr>
<td>O2 TK 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>O2 TK2 HTR A</td>
<td>O2 TK2 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>O2 TK2 HTR B</td>
<td>O2 TK2 HTR B</td>
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<tr>
<td>O2 TK 3</td>
<td></td>
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<tr>
<td>A</td>
<td>O2 TK3 HTR A</td>
<td>O2 TK3 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>O2 TK3 HTR B</td>
<td>O2 TK3 HTR B</td>
</tr>
<tr>
<td>O2 TK 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>CRYO TK4 HTR O2 A (A11)</td>
<td>CRYO TK4 HTR O2 A (A11)</td>
</tr>
<tr>
<td>B</td>
<td>CRYO TK4 HTR O2 B</td>
<td>CRYO TK4 HTR O2 B</td>
</tr>
<tr>
<td>O2 TK 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>CRYO TK5 HTR O2 A (A15)</td>
<td>CRYO TK5 HTR O2 A (A15)</td>
</tr>
<tr>
<td>B</td>
<td>CRYO TK5 HTR O2 B</td>
<td>CRYO TK5 HTR O2 B</td>
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</tbody>
</table>

#### HYDROGEN

<table>
<thead>
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<th>HEATER SET</th>
<th>FIVE-TK SET</th>
<th>FIVE-TK SET + PALLET</th>
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</thead>
<tbody>
<tr>
<td>H2 TK 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>H2 TK1 HTR A (R1)</td>
<td>H2 TK1 HTR A (R1)</td>
</tr>
<tr>
<td>B</td>
<td>H2 TK1 HTR B</td>
<td>H2 TK1 HTR B</td>
</tr>
<tr>
<td>H2 TK 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>H2 TK2 HTR A</td>
<td>H2 TK2 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>H2 TK2 HTR B</td>
<td>H2 TK2 HTR B</td>
</tr>
<tr>
<td>H2 TK 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>H2 TK3 HTR A</td>
<td>H2 TK3 HTR A</td>
</tr>
<tr>
<td>B</td>
<td>H2 TK3 HTR B</td>
<td>H2 TK3 HTR B</td>
</tr>
<tr>
<td>H2 TK 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>CRYO TK4 HTR H2 A (A11)</td>
<td>CRYO TK4 HTR H2 A (A11)</td>
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<td>B</td>
<td>CRYO TK4 HTR H2 B</td>
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<td>H2 TK 5</td>
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<tr>
<td>A</td>
<td>CRYO TK5 HTR H2 A (A15)</td>
<td>CRYO TK5 HTR H2 A (A15)</td>
</tr>
<tr>
<td>B</td>
<td>CRYO TK5 HTR H2 B</td>
<td>CRYO TK5 HTR H2 B</td>
</tr>
</tbody>
</table>
1. Use pnl O2 meter for TK P if SM2 not available
2. O2(H2) TK AUTO Control
   pressure ranges:
   TK 1/2: 803-854 (200-226)
   TK 3-5: 832-882 (217-243)
3. AUTO htr ops still available with failure of this Xdcr
4. Loss of ESS bus, cb failed open, or loss of htr cntlr results in P Xdcr reading off-scale low
   (O2: 515 psia, H2: 145 psia) and loss of AUTO capability

Nominal Config:
(Cont): (O15:C)
  cb MNB CRYO O2 HTR TK2 SNSR
  2 – cl (O16:C)
  cb MNC CRYO O2 HTR
  TK1 SNSR 2 – cl (ML86B:F)
  cb MNA,MNB,MNC CRYO O2 HTR
  TK3,4,5 SNSR 1,2 (six) – cl (A15)
  cb PALLET ESS 1BC,2CA TK7,8,9
  CNTLR O2,H2 (eight) – cl (R14:B)
  cb PALLET MNA TK6-9
  O2 SNSR 1 (four) – cl (R14:B)
  cb PALLET MNB
  TK6-9 O2 SNSR 2 (four) – cl
2 O2(H2) TK AUTO Control pressure ranges: TK 1/2: 803-854 (200-226) TK 3-5: 832-882 (217-243)

5 For destratified tk, natural heat leak into tk will eventually build pressure back up

6 Operating htrs below critical pressure could be hazardous in presence of two-phase fluid. Therefore, htrs are left deactivated

10 P↑ P↓

11 All TKs in common MANF < 800 (200) psia ?

12 TANK LEAK OR DESTRATIFICATION

13 SYSTEM LEAK OR HTR FAILURE

14 Go to CRYO O2(H2) LEAK (ORB PKT, EPS)

9 • Perform BUS LOSS ACTIONS (ORB PKT, EPS) if any for the ESS subbus which affected the tank listed below:

Sub-buses are:

TK1: ESS2CA O13 & R14
TK2: ESS1BC O13 & R14
TK3: ESS3AB ML86B
TK4: ESS1BC ML86B
TK5: ESS2CA ML86B

15 • Go to BUS LOSS SSR-84 (75, 95, 73, 85) for aff TK 1(2,3,4,5)

16 • Go to CRYO O2(H2) LEAK (ORB PKT, EPS)
10

16 Aff TK P decreasing?

17 AUTO PRESSURE CONTROL LOGIC FAILURE

18 Aff system

19

• Aff O2 TK HTR – TEST

20 LINE BLOCKAGE OR HTR FAILED ON IN TK READING HIGH

21 Leave aff htrs deactivated until MCC develops consumable management plan

22 TK HTR FAILED ON

23 Do not reset aff Tk Htr Snsr

1 Use pnl O2 meter for TK P if SM2 not available

7 Once htrs are deactivated in tk with high P, the P should decrease to normal value

8 Even with htrs OFF, environmental heat leak will eventually cause tk relief vlv to crack

9 Failed-on htr may require temporarily dropping a main bus until IFM ‘CRYO TANK HEATER FUSE REMOVAL’ can be performed. If pressure exceeds 1,000(300) psi, overboard relief vlv may open
10 Check nominal config column for cb location

11 Could take 3 hr to bleed pressures down

12 For P xdr failed low, tk can be operated in AUTO only if tk can run simultaneously with a tk paired within its logic. Logic pairings for P controllers are:

1,2
3,4
TK5 not paired

13 TKs 1,2 cannot be operated simultaneously if a manifold vlv is closed
Assumes both Manf vlv are open. If indicative of continuing system problem, there would have been previous alarms for P and TK P low.

Nominal Config: Refer to 7.6b
Failed-on htr may require temporarily dropping a main bus until IFM 'CRYO TANK HEATER FUSE REMOVAL' can be performed. If pressure exceeds 300 psi, overboard relief valve may open.

Stratification normally occurs when htrs are operating for long periods of time and during periods of attitude holds.

MCC will determine cryo management plan.

If:

\[ H_2 \ HTR \ T > 210 \ degF \]

1. SM 68 CRYO SYSTEM
   - Deact all htrs in aff tk(s)
   - Config aff HTRS – OFF per CRYO TABLE A

2. TANK AT RESIDUAL QTY
   - \( H_2 \) HTR T > 130 degF

3. AFF P increasing?
   - NO
   - YES

4. FAILED-ON HTR
   - NO
   - YES

5. \( \sqrt{MCC} \)

6. TRANSUDER FAILURE OR POSSIBLE TANK STRATIFICATION
   - ANY unaffected H2 TK HTR in AUTO
   - H2 MANF VLV TK 1,2 (two) – op (tb-op)

7. Reconfig to htrs in alternate tank
   - NO
   - YES
1. Use CRYO Table A to determine switch nomenclature.

2. A single htr in an undepleted tk should support vehicle power loads. If manifold pressures cannot be maintained, additional htrs may be required.

If HTR CUR SNSR = '↓' (tripped):

1. Was aff tk htr switch OFF at time of failure?
   - YES
   - NO

2. ALERT IS PROBABLY CAUSED BY FALSE TRIP INDICATION

   CAUTION
   Do not operate htr ckt in which trip occurred. Do not reset htr trip indication

3. MCC for htr config
   - YES
   - NO

4. Deact both htrs in aff tk

5. MCC available?
   - YES
   - NO

6. MCC for htr config
   - YES
   - NO

7. Htr config (R1)
   - O2 MANF VLV TK 1,2 (two) – OP

8. Is QTY > 10% in any unaff tk with htr(s) in AUTO?
   - YES
   - NO

9. Configure htrs
   - Htr A – AUTO in an unaff tk with QTY > 10%

10. POSSIBLE INTERNAL SHORT CAUSING HTR TO BE DISABLED AUTOMATICALLY

   CAUTION
   Do not operate htr circuit in which trip occurred. Do not reset htr trip indication

   POSSIBLE INTERNAL SHORT CAUSING HTR TO BE DISABLED AUTOMATICALLY
1. Stratification normally occurs when htrs are operating for long periods of time or during periods of attitude holds.

2. MCC will determine cryo management plan.

3. Failed-on htr may require temporarily dropping a main bus until IFM ‘CRYO TANK HEATER FUSE REMOVAL’ can be performed. If pressure exceeds 1,000 psi, overboard relief valve may open.

4. Tank 5 has no associated hardware C/W.

Nominal Config: Refer to 7.6b
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The OPCU output current should not be greater than 75 unless its output voltage is low (output power capability equals ~2kw per channel).

1. **Dual PTU Config:**
   - OPCU 1(2)
   - PTU/MAIN BUS A, B - ON
   - OPCU 1(2) CONV - ON

2. **Single PTU Config:**
   - OPCU 1(2)
   - PTU/MAIN BUS A(B) - ON
   - OPCU 1(2) CONV - ON

3. If PTU 1(2) OPCU A(B) AMPS > 75:
   - ALERT OPCU CONV VOLS

4. Are all PTU 1(2) OPCU A(B) OUT VOLS < 27.5?
   - YES
     - Short on PTU/MAIN BUS CABLING
   - NO
     - Continue nominal ops

5. If PTU 1(2) OPCU A(B) AMPS > 75:
   - ALERT OPCU CONV VOLS

6. MCC
   - Deactivate all OPCU and disconnect aff PTU from Min Bus
   - OPCU 1(2) CONV - OFF
   - CB CNTL PWR PTU 1(2) – CL
   - PTU/MAIN BUS A(B) – OFF (tb-OFF)
Telemetry for each OPCU Channel requires 120 V house keeping power. If ISS Input Power removed, Telemetry will read OSL (‘L’).

2. For Fault Isolator trip, input power (ISS RPCMs) must be cycled to reset the Fault Isolator circuit.

3. If PTU connected to Main Bus, possible Main Bus SHORT.

4. OPCU VOLT Class 3 FDA may cause erroneous alarms and is unreliable. MCC will inhibit Class 3 FDA via TMBU.

5. POSSIBLE MAIN BUS OR OPCU SHORT

6. SENSOR FAILURE

7. Isolate OPCU
   • OPCU 1(2)
   • OPCU 1(2) CONV – OFF
   • cb CNTL PWR PTU 1(2) – cl
   • PTU/MAIN BUS A(B) – OFF

8. Continue nominal ops

9. • MCC
The PTU box should not overheat with only 1 of its 3 converters (OPCU CH A, OPCU CH B, or APCU) activated.

OPCU is being deactivated in order to reduce over all heat load on PTU.

MCC will determine how to reduce load on OPCU in order to reactivate it.
An OPCU 'Output Over Voltage' will cause both OPCU channels A and B to trip. If single OPCU channel is failed power transfer can continue using other channel.

A SPEC 179 OPCU CH A/B VOLT message will be received if 1 of the 2 channels is not activated (all associated TLM is OSL).

OPCU TRIP = OUT OV if Output Volts > 32 volts.

Dual PTU Config:
(A15) cb CNTL PWR PTU 1,2 (two) – cl PTU/MAIN BUS A,B (two) – ON OPCU 1,2 CONV (two) – ON

Single PTU Config:
(A15) cb CNTL PWR PTU 1,2 – cl PTU/MAIN BUS A(B) – ON OPCU 1,2 CONV – ON
If both OPCU CH A and CH B converters are activated, MCC will command ISS RPC input power off one at a time to determine which OPCU converter (Channel A or B) is failed. If only one OPCU converter is activated, MCC will determine desired reconfiguration.

3 If both OPCU CH A and CH B converters are activated, MCC will command ISS RPC input power off one at a time to determine which OPCU converter (Channel A or B) is failed. If only one OPCU converter is activated, MCC will determine desired reconfiguration.
1. A SPEC 179 OPCU CH A(B) VOLTS message will be received if 1 of the 2 channels is not activated (all associated TLM is OSL).

2. An OUT UV Trip will not trip the OPCU converter OFF when the PTU is not connected to the Main Bus.

3. MCC will command off ISS RPC input power to failed OPCU Channel Converter.

4. For an OUT UV indication, one of three layers of output over voltage protection might be lost on the unaffected OPCU Channel converter.

- OPCU I OC (In Over Current) If Input Current > 22 amps
- OPCU I UV (In Under Volt) If Input Voltage < 119 volts
- OPCU O UV (Out Under Volt) If Output Voltage < 10 volts (broken sense line)

Dual PTU Config:
(A15)
- cb CNTL PWR PTU 1,2 (two) – cl
- PTU/MAIN BUS A,B (two) – ON
- OPCU 1,2 CONV (two) – ON

Single PTU Config:
(A15)
- cb CNTL PWR PTU 1(2) – cl
- PTU/MAIN BUS A(B) – ON
- OPCU 1(2) CONV – ON
EPS 7.7f APCU 1(2) OUT VOLTS ↑↓

If PTU 1(2) APCU OUT VOLTS > 127 ↑ or < 122 ↓

Dual PTU Config:
(A15) cb CNTL PWR PTU 1,2 (two) – cl PTU/MAIN BUS A,B (two) – ON OPCU 1,2 CONV (two) – ON

Single PTU Config:
(A15) cb CNTL PWR PTU 1(2) – cl PTU/MAIN BUS A(B) – ON OPCU 1(2) CONV – ON

1. APCU STATUS
   SM 179 POWER TRANSFER
   Any APCU TRIP indication
   Any APCU OUT AMPS >14.7
   Are APCUs connected in parallel config (√MCC)

2. APCU FAILED
3. APCU OVERLOAD
4. TRANSIENT VOLTAGE SHIFT
5. Continue nominal ops

6. APCU OUT VOLTS
   SM 179 POWER TRANSFER
   APCU 1 and 2 OUT VOLTS < 122 or > 127 ?
   YES
   7. VOLTAGE REGULATION FAILURE
      2 3 8
      9. TLM FAILURE
      10. Continue nominal ops
      11. Deactivate aff APCU
          (A15)
          APCU 1(2) CONV – OFF
      12. √MCC

8. POSSIBLE VOLTAGE REGULATION FAILURE

11. SM ALERT

09/25/08 7-70 MAL/ALL/GEN J
If PTU 1(2) APCU OUT AMPS > 14.7

If PTU 1(2) APCU IN AMPS > 85

Dual APCU Config:
(A15) cb CNTL PWR PTU 1,2 (two) – cl
PTU/MAIN BUS A,B (two) – ON
APCU 1,2 CONV (two) – ON

Single APCU Config:
(A15) cb CNTL PWR PTU 1(2) – cl
PTU/MAIN BUS A(B) – ON
APCU 1(2) CONV – ON

1. APCU STATUS
   SM 179 POWER TRANSFER
   Aff APCU IN AMPS > 65 and OUT AMPS > 14.7
   Any APCU TRIP indication
   None

2. APCU OVERLOAD

3. Deactivate aff APCU
   (A15) APCU 1(2) CONV – OFF

4. TRANSIENT CONDITION OR TLM FAILURE
   Continue nominal ops

5. ✗ MCC

6. Continue nominal ops
Dual APCU Config:
(A15)
- cb CNTL PWR PTU
- 1,2 (two) – cl
- PTU/MAIN BUS A,B (two) – ON
- APCU 1,2 CONV (two) – ON

Single APCU Config:
(A15)
- cb CNTL PWR PTU
- 1(2) – cl
- PTU/MAIN BUS A(B) – ON
- APCU 1(2) CONV – ON

APCU OUT UV
(Out Under Volt)
If Output Volts < 115 volts

APCU OUT OV
(Out Over Volt)
If Output Volts > 130.5 volts

APCU OUT OC
(Out Over Current)
If Output Amps > 14.8 amps

APCU IN UV
(In Under Volt)
If Input Volts < 23 volts

APCU OUT UV
(Out Under Volt)
If Output Volts < 115 volts

APCU OUT OV
(Out Over Volt)
If Output Volts > 130.5 volts

APCU OUT OC
(Out Over Current)
If Output Amps > 14.8 amps

APCU IN UV
(In Under Volt)
If Input Volts < 23 volts

Dual APCU Config:
(A15)
- cb CNTL PWR PTU
- 1,2 (two) – cl
- PTU/MAIN BUS A,B (two) – ON
- APCU 1,2 CONV (two) – ON

Single APCU Config:
(A15)
- cb CNTL PWR PTU
- 1(2) – cl
- PTU/MAIN BUS A(B) – ON
- APCU 1(2) CONV – ON
APCU 7.7i APCU AMPS ↑

Nominal Config:
(R1)
PRI PL MNC – ON (tb.ON)
PL CAB – MNA(MNB)
PL AUX – ON
PL AFT MNB – ON (L12/SSP 2)
cb SW PWR 1 – cl

Nominal APCU Activated Config:
L12 (SSP 2)
APCU 1 CONV – ON (tb-gray)
APCU 1 OUTPUT RLY – CLOSE (tb-gray)

If any APCU CONV AMPS ≥ 8.5

1. APCU 1(2) TRIP > -4.40
2. Go to (APCU TRIP), block 1

3. APCU 1(2) CONV A(B) AMPS (two) > 8.5
4. Go to (APCU TRIP), block 19

5. APCU 1(2) CONV A(B) AMPS > 8.5?
6. LCS Status
   - Perform LCC DEACT (Cue Card, LCS), then:
   - Perform LCC ACT (Cue Card, LCS), then:

7. APCU 1(2) CONV A AMPS = CONV B AMPS ± 3?
8. Quick View scan screen updating?
9. SHORT IN LCS ELECTRONICS
   - Go to LCC DEACT (Cue Card, LCS)

10. TRANSIENT CONDITION
11. TRANSDUCER SHIFT OR SINGLE CONV FAILURE
12. Continue nominal operations
13. CONV A AND CONV B OUTPUTS NOT BALANCED
14. MCC
15. APCU 1 CONV A AMPS + CONV B AMPS > 14.7?
16. CONV A AND CONV B OUTPUTS NOT BALANCED
17. MCC

1. APCU 1 and 2 provide redundant power to LCS when OBSS is on the RMS
2. MCC will determine between a transducer shift and a real circuitry failure
3. Total output for each APCU must be maintained less than 14.7 amps and each CONV output must be maintained less than 8.5 amps
SPEC voltage for APCU is 122 to 126.5 volts. If APCU volts are outside this range but stable and usable, consideration will be given to continuing APCU operation.
1 SPEC voltage for APCU is 122 to 126.5 volts. If APCU volts are outside this range but stable and usable, consideration will be given to continuing APCU operation.

2 There is a single point failure that will cause both the HIGH and LOW RES VOLTS to read low (broken wire).
APCU 7.7k APCU TEMP ↓↑

1. Loss of APCU 1 or 2 results in loss of redundant 120 V power to LCS/IDC
2. MCC will determine between a transducer shift and a real circuitry failure

Nominal Config:
(R1) PRI PL MNC – ON (tb-ON)
PL CAB – MNA(MNB)
PL AUX – ON
PL AFT MNB – ON
L12 (SSP 2)
cb SW PWR 1
(CB2) – Close

Nominal APCU Activated Config:
L12 (SSP 2)
APCU 1 CONV – ON (tb-gray)
APCU 1 OUTPUT RLY – CLOSE (tb-gray)

APCU Status
SM 200 APCU STATUS

• Determine the following:
APCU 1(2) TRIP
> -4.40
Any APCU 1(2)
CONV A(B) AMPS
> 8.5
APCU 1(2) VOLTS
RES HIGH < 122 or
> 126.5
All APCU 1,2 CONV
A,B TEMPS (four)
≥ 130 or rising or ≤ 20?

None of the above

1. Single CONV TEMP
≥ 130 or ≤ 20?

2. Go to (APCU TRIP), block 1

3. Go to (APCU AMPS ↑), block 1

4. Go to (APCU VOLTS ↑↓), block 1

5. ORBITER COOLING PROBLEM

6. All APCU Power OFF

7. CONV A and CONV B TEMPS in a single operating APCU ≥ 130 and rising or ≤ 20?

8. Single CONV TEMP
≥ 130 or ≤ 20?

9. TRANSIENT TEMPERATURE SHIFT OR TRANSUDER SHIFT

10. TEMP

11. TEMP

12. SINGLE APCU COOLING PROBLEM OR CIRCUIT FAILURE

13. Continue nominal operations

14. (L12/SSP )
Affected APCU
• APCU 1(2) CONV – OFF (tb-bp)
• APCU 1(2) OUTPUT RLY – OP (tb-bp)

15. •√

16. MCC

17. •√

18. MCC

19. MCC
APCU Temp ↓↑, block 2
APCU Volts ↑↓, block 2
APCU Amps ↑, block 2

SM ALERT

S200 APCU 1(2) TRIP

If APCU TRIP > -4.4
APCU TRIP STATUS TABLE

Nominal Config:
(R1)
PRI PL MNC – ON (tb-ON)
PL CAB – MNA(MNB)
PL AUX – ON
PL AFT MNB – ON
L12 (SSP 2)
cb SW PWR – Close

Nominal APCU
Activated Config:
L12 (SSP 2)
APCU 1 CONV – ON (tb-gray)
APCU 1 OUTPUT RLY – CLOSE (tb-gray)

7.7I APCU TRIP

1. \*APCU Status
   • Determine the following:
   (L12/SSP 2)
   APCU 1.2 CONV (two) tb-bp
   and
   APCU 1.2 OUTPUT RLY (two) tb-bp
   and
   SM 200 APCU STATUS
   both
   APCU 1 TRIP and
   APCU 2 TRIP approx = 0
   APCU 1(2) TRIP
   > -4.40
   None of the above

2. (ORB R1)
   • PL AFT switches
   R1 PL AFT MNB(C)
   (two) OFF?
   YES
   NO

3. POSSIBLE PL AFT SHORT
   • □ MCC

4. PL AFT BUS DISCONNECTION
   • □ MCC

5. • □ MCC

6. • □ MCC

7. TRANSIENT TRIP INDICATION
   • □ MCC

8. • Continue nominal operations

9. • Affected APCU CONV amps
   Both A and B amps = 0.3L?
   YES
   NO

10. • Affected APCU CONV amps
    CONV A amps = 0.3L or CONV B amps = 0.3L?
    YES
    NO

11. FALSE TRIP INDICATOR
    • □ MCC

12. BOTH A AND B CONVERTERS TRIPPED
    • □ MCC

13. SINGLE CONVERTER TRIPPED
    • □ MCC

14. • Continue nominal operations

15. • Deactivate affected APCU
    (L12/SSP 2)
    APCU 1(2) CONV – OFF (tb-bp)
    APCU 1(2) OUTPUT RLY – OP (tb-bp)

16. SM 200 APCU STATUS
    • Record Trip Status: ______
    • \*APCU TRIP STATUS TABLE
    • Remaining converter will trip if CONV amps ≥ 8.5

17. POSSIBLE SHORT, OR APCU CIRCUIT FAILURE
    • □ MCC

18. • □ MCC

1. MCC will determine cause of interruption of power or signal to the APCUs
2. MCC will coordinate recovery of the PL AFT bus and equipment
3. LCS/IDC is redundantly powered from APCU 1 & 2
ON MCC GO Only: Recovery Attempt with APCU Power Cycle (APCU AMPS ↓↑), block 4

19
SM 200 APCU STATUS
- Record TRIP Status: ____

APCU TRIP STATUS TABLE
(L12/SSP 2)
- Affected APCU 1(2) CONV – OFF (tb-bp)
- APCU 1(2) OUTPUT RLY – OPEN (tb-bp)

20
(L12/SSP 2)
- Affected APCU CONV – ON (tb-gray)
- Affected APCU CONV amps and TRIP STATUS
  Affected APCU TRIP > -4.40 or
  Affected APCU CONV A amps +
  CONV B amps > 14.7
  or
  Single CONV amps > 8.5?

21
UNISOLATABLE SHORT IN
AFFECTED APCU OR TRIP
CIRCUITRY FAILURE
- Yes
- Deactivate affected APCU
  (L12/SSP 2)
  APCU 1(2) CONV – OFF (tb-bp)
  APCU 1(2) OUTPUT RLY – OP (tb-bp)

22
INADVERTENT TRIP OR POSSIBLE SHORT DOWNSTREAM OF AFFECTED APCU
- No

23
- Deactivate affected APCU
  (L12/SSP 2)
  APCU 1(2) CONV – OFF (tb-bp)
  APCU 1(2) OUTPUT RLY – OP (tb-bp)

4
Loss of APCU 1 or 2 results in loss of redundant 120 volt power for LCS/IDC
Table 1. APCU Trip Status

<table>
<thead>
<tr>
<th>TRIP (STATUS VOLTAGE)</th>
<th>TRIP CAUSE(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OV</td>
</tr>
<tr>
<td>+4.88</td>
<td>X</td>
</tr>
<tr>
<td>+4.23</td>
<td>X</td>
</tr>
<tr>
<td>+3.59</td>
<td>X</td>
</tr>
<tr>
<td>+2.95</td>
<td>X</td>
</tr>
<tr>
<td>+2.27</td>
<td>X</td>
</tr>
<tr>
<td>+1.62</td>
<td>X</td>
</tr>
<tr>
<td>+0.98</td>
<td>X</td>
</tr>
<tr>
<td>+0.34</td>
<td>X</td>
</tr>
<tr>
<td>-0.30</td>
<td></td>
</tr>
<tr>
<td>-0.95</td>
<td>X</td>
</tr>
<tr>
<td>-1.59</td>
<td></td>
</tr>
<tr>
<td>-2.23</td>
<td></td>
</tr>
<tr>
<td>-2.91</td>
<td></td>
</tr>
<tr>
<td>-3.56</td>
<td></td>
</tr>
<tr>
<td>-4.20</td>
<td></td>
</tr>
<tr>
<td>-4.86 (no trip)</td>
<td></td>
</tr>
</tbody>
</table>

NOTE
OV: Output Overvoltage
OUV: Output Undervoltage
OC: Output Overcurrent
IUV: Input Undervoltage
Tolerance for all reported voltages is ± 0.20V
EPS SSR-1
FC MONITORING SYS (FCMS) OPS

NOTE
The FCMS application has capability to display FC single cell voltages and also to record those cell voltages in ASCII data file. Primary mode of operation will be to connect WinDecom using the FCMS data cable, bring up the WinDecom-FCMS application, start the FCMS application to record data, then downlink the data file to MCC via OCA for analysis.

The recorded data file names will have format fcDDDHHMM.fcv or fcDDDHHMM.ZIP where “DDDHHMM” references the GMT of the first data point of the file. Data files recorded will contain the single cell voltages from all three fuel cells. If recording a full rate data file, temporarily terminate all other applications on the same PGSC

FCMS DATA DIAGRAM

FCMS Cable
Part #SED39131027-301

FC1
PCM MASTER UNIT

FC2
SLAVE UNIT 1

FC3
SLAVE UNIT 2

Orbiter Timing Buffer

Payload Bay

Crew Compartment

FCMS Cable

WinDecom PGSC
or PGSC w/PCMMU Expansion Unit

PCMMU EXP PORT

PCMMU 2 OUTLET

PNL O5

*Optional

Network Cable
or RS-232 Cable

END USER PGSC
FCMS Application
(if used)

*The FCMS Application can be run on any one of the following PGSCs
a. WinDecom PGSC or PGSC with PCMMU Expansion Unit
b. Any End User Networked PGSC using network cable
c. Any End User PGSC connected to WinDecom serial port (com 1) using RS232Y Cable

ACTIVATION
1. On PGSC with PCMMU Expansion Unit to be used for FCMS operations, terminate all applications using Telemetry Server, and verify Telemetry Server not active (no green “GO,” yellow “TFL,” or red “STOP”) sign in lower right corner of PGSC display

If using WinDecom PGSC:
2. Double-click ‘Shuttle Apps’ > ‘WinDecom’ > ‘WinDecom shutdown’
3. Sel ‘OK’ to shutdown Telemetry System
4. Disconnect PCMMU cable from PCMMU expansion card port on WinDecom PGSC
5. If reqd, disconnect PCMMU cable from pnl O5 PCMMU 2 outlet

NOTE
FCMS cable pin out is different than standard PCMMU data cable
6. Connect FCMS cable from pnl O5 PCMMU 2 outlet to PCMMU expansion card port on PGSC that will run WinDecom-FCMS

ML86B:E 7. cb MNA FC PCM – cl

Starting WinDecom-FCMS
8. Double-click ‘Shuttle Apps’ > ‘WinDecom’ > ‘WinDecom-FCMS’
9. Expect TLM Monitor, TLM Pkt-net, and TLM Pkt-com windows to appear (possibly minimized). Data should be incrementing in TLM Pkt-net window

FCMS Application
11. Verify data being received on crew FCMS display (data updating and GMT incrementing on FCMS display, green “GO” sign in lower right hand corner of PGSC display)

If fuel cell open circuit voltage recording requested, following steps will be coordinated with MCC:
12. BUS TIE ____,____ (two) – ON (tb-ON)
13. ESS BUS SOURCE FC ___ – OFF
14. FC/MN BUS ___ – OFF
15. Record data file using record option specified by MCC (Either full rate or one sample every X seconds for X hours)
16. When recording is complete, notify MCC. The zip data file is in the C:\SPOCAPPS\FCMS directory

If fuel cell open circuit voltage recording was performed, on MCC GO:
17. FC/MN BUS ___ – ON
18. ESS BUS SOURCE FC ___ – ON
19. Bus Tie config per MCC

DEACTIVATION
ML86B:E 1. cb MNA FC PCM – op
2. Close FCMS application
3. Double-click ‘Shuttle Apps’ > ‘WinDecom’ > ‘WinDecom Shutdown’
4. Disconnect and stow FCMS cable
5. Reconfigure WinDecom PGSC as reqd per WINDECOM OPS (ORB OPS, PGSC)
Lower limit on FC temp during cooldown is 48 degF to protect from ice formation. Closest value > 48 degF that PRI C&W system can be set is 50.8 degF.

1. Lower limit on FC temp during cooldown is 48 degF to protect from ice formation. Closest value > 48 degF that PRI C&W system can be set is 50.8 degF.

2. Which FC is being shut down?

<table>
<thead>
<tr>
<th></th>
<th>FC1</th>
<th>FC2</th>
<th>FC3</th>
</tr>
</thead>
</table>

3. Change FC1 STACK T PRI C&W lower limit to 50.8 degF and inhibit FC1 O2,H2 REAC VLV and FC1 PUMP PRI C&W

(R13U)
- C/W PARAM Sel tw (three) – 002
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 012
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 092
- C/W PARAM – INH
- C/W PARAM STATUS – INH, hold
- VPARAM 002,012,092 inhibited
- C/W PARAM SEL tw (three) – 120

4. Change FC2 STACK T PRI C&W lower limit to 50.8 degF and inhibit FC2 O2,H2 REAC VLV and FC2 PUMP PRI C&W

(R13U)
- C/W PARAM SEL tw (three) – 002
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 012
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 092
- C/W PARAM – INH
- C/W PARAM STATUS – INH, hold
- VPARAM 002,012,092 inhibited
- C/W PARAM SEL tw (three) – 120

5. Change FC3 STACK T PRI C&W lower limit to 50.8 degF and inhibit FC3 O2,H2 REAC VLV and FC3 PUMP PRI C&W

(R13U)
- C/W PARAM SEL tw (three) – 002
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 012
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – 092
- C/W PARAM – INH
- C/W PARAM STATUS – INH, hold
- VPARAM 002,012,092 inhibited
- C/W PARAM SEL tw (three) – 120
Equal to value set in PRIMARY C&W SYSTEM. Lower limit on FC temp during cooldown is 48 degF to protect from ice formation. Closest value > 48 degF that PRI C&W system can be set is 50.8 degF.
Decrease in FC COOL P with fuel cell shutdn and REAC vlv's closed may indicate internal leak, crossover, or reactant leak.

FC SUBSTACK \( \Delta \text{VOLTS} \) are not usable when fuel cell is shut down.

Change FC1 H2O LN T SM ALERT lower limit to 50.8 degF

- \( +0.45 \) EXEC
- \( +5.08 \) EXEC

Change FC2 H2O LN T SM ALERT lower limit to 50.8 degF

- \( +0.45 \) EXEC
- \( +5.08 \) EXEC

Change FC3 H2O LN T SM ALERT lower limit to 50.8 degF

- \( +0.45 \) EXEC
- \( +5.08 \) EXEC

Inhibit FC1 \( \Delta V \) SS 1,2,3 SM ALERT

- \( +0.45 \) EXEC
- \( +1.00 \) EXEC
- \( +5.00 \) EXEC

Inhibit FC2 \( \Delta V \) SS 1,2,3 SM ALERT

- \( +0.45 \) EXEC
- \( +1.00 \) EXEC
- \( +5.00 \) EXEC

Inhibit FC3 \( \Delta V \) SS 1,2,3 SM ALERT

- \( +0.45 \) EXEC
- \( +1.00 \) EXEC
- \( +5.00 \) EXEC

Inhibit FC1 H2 PUMP STATUS SM ALERT

- \( +0.45 \) EXEC
- \( +1.00 \) EXEC
- \( +5.00 \) EXEC

Inhibit FC2 H2 PUMP STATUS SM ALERT

- \( +0.45 \) EXEC
- \( +1.00 \) EXEC
- \( +5.00 \) EXEC

Inhibit FC3 H2 PUMP STATUS SM ALERT

- \( +0.45 \) EXEC
- \( +1.00 \) EXEC
- \( +5.00 \) EXEC

Inhibit FC1 READY SM ALERT

- \( +0.45 \) EXEC
- \( +1.00 \) EXEC
- \( +5.00 \) EXEC

Inhibit FC2 READY SM ALERT

- \( +0.45 \) EXEC
- \( +1.00 \) EXEC
- \( +5.00 \) EXEC

Inhibit FC3 READY SM ALERT

- \( +0.45 \) EXEC
- \( +1.00 \) EXEC
- \( +5.00 \) EXEC
**Decrease in FC VOLTS while fuel cell is shut down may indicate internal load, crossover, or reactant leak.**

**Increase in FC O2, H2 FLOWS while fuel cell is shut down may indicate internal load or reactant leak.**

**Increase in FC O2, H2 FLOWS while fuel cell is shut down may indicate internal load or reactant leak.**

---

<table>
<thead>
<tr>
<th>Question</th>
<th>FC1</th>
<th>FC2</th>
<th>FC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>Change FC1 VOLTS SM ALERT lower limit to present value minus 2.0 volts and upper limit to 40.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 1</td>
<td>+0.450100 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 2</td>
<td>+0 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+4000 EXEC</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Change FC2 VOLTS SM ALERT lower limit to present value minus 2.0 volts and upper limit to 40.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 1</td>
<td>+0.450200 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 2</td>
<td>+0 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+4000 EXEC</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Change FC3 VOLTS SM ALERT lower limit to present value minus 2.0 volts and upper limit to 40.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 1</td>
<td>+0450300 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 2</td>
<td>+0 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+4000 EXEC</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Change FC1 AMPS SM ALERT lower limit to -10.00 and upper limit to +20.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 1</td>
<td>+0.450101 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 2</td>
<td>-1000 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+2000 EXEC</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Change FC2 AMPS SM ALERT lower limit to -10.00 and upper limit to +20.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 1</td>
<td>+0.450201 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 2</td>
<td>-1000 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+2000 EXEC</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Change FC3 AMPS SM ALERT lower limit to -10.00 and upper limit to +20.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 1</td>
<td>+0450301 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 2</td>
<td>-1000 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+2000 EXEC</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Change FC1 O2 FLOW and H2 FLOW SM ALERT to 0.50 and 0.20, respectively</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 1</td>
<td>+0.450160 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+0.50 EXEC</td>
<td></td>
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<tr>
<td></td>
<td>ITEM 1</td>
<td>+0.450170 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+0.20 EXEC</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Change FC2 O2 FLOW and H2 FLOW SM ALERT to 0.50 and 0.20, respectively</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 1</td>
<td>+0.450260 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+0.50 EXEC</td>
<td></td>
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<tr>
<td></td>
<td>ITEM 1</td>
<td>+0.450270 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+0.20 EXEC</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>Change FC3 O2 FLOW and H2 FLOW SM ALERT to 0.50 and 0.20, respectively</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 1</td>
<td>+0.450360 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+0.50 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 1</td>
<td>+0.450370 EXEC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ITEM 3</td>
<td>+0.20 EXEC</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>FC shutdn complete</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Yes**

**No**

---

**MCC will uplink ORB PKT, EPS, P&I procedures to be used until aff FC recovered.**
1. Decrease in FC VOLTS beyond FDA limit while fuel cell is in STANDBY may indicate internal load, crossover, or reactant leak.

2. FC SUBSTACK ΔVOLTS are not usable when fuel cell is in STANDBY.

Is MCC able to TMBU Backup C&W and SM ALERT?

SM 60 SM TABLE MAINT

Which FC to STANDBY?

<table>
<thead>
<tr>
<th>FC1</th>
<th>FC2</th>
<th>FC3</th>
</tr>
</thead>
</table>

3. Change FC1 H2O LN T SM ALERT lower limit to 50.8 degF
   - ITEM 1: +0.450181 EXEC
   - ITEM 2: +5.080 EXEC

4. Change FC2 H2O LN T SM ALERT lower limit to 50.8 degF
   - ITEM 1: +0.450281 EXEC
   - ITEM 2: +5.080 EXEC

5. Change FC3 H2O LN T SM ALERT lower limit to 50.8 degF
   - ITEM 1: +0.450381 EXEC
   - ITEM 2: +5.080 EXEC

6. Change FC1 VOLTS SM ALERT lower limit to 31.0 volts and upper limit to +37.5
   - ITEM 1: +0.450100 EXEC
   - ITEM 2: +3.10 EXEC
   - ITEM 3: 3.750 EXEC

7. Change FC2 VOLTS SM ALERT lower limit to 31.0 volts and upper limit to +37.5
   - ITEM 1: +0.450200 EXEC
   - ITEM 2: +3.10 EXEC
   - ITEM 3: 3.750 EXEC

8. Change FC3 VOLTS SM ALERT lower limit to 31.0 volts and upper limit to +37.5
   - ITEM 1: +0.450300 EXEC
   - ITEM 2: +3.10 EXEC
   - ITEM 3: 3.750 EXEC

9. Inhibit FC1 ΔV SS 1,2,3 SM ALERT
   - ITEM 1: +0.450102 EXEC
   - ITEM 10 EXEC
   - ITEM 1: +0.450103 EXEC
   - ITEM 10 EXEC
   - ITEM 1: +0.450104 EXEC
   - ITEM 10 EXEC

10. Inhibit FC2 ΔV SS 1,2,3 SM ALERT
    - ITEM 1: +0.450202 EXEC
    - ITEM 10 EXEC
    - ITEM 1: +0.450203 EXEC
    - ITEM 10 EXEC
    - ITEM 1: +0.450204 EXEC
    - ITEM 10 EXEC

11. Inhibit FC3 ΔV SS 1,2,3 SM ALERT
    - ITEM 1: +0.450302 EXEC
    - ITEM 10 EXEC
    - ITEM 1: +0.450303 EXEC
    - ITEM 10 EXEC
    - ITEM 1: +0.450304 EXEC
    - ITEM 10 EXEC

12. EXEC

13. EXEC

14. EXEC
3. Increase in FC Amps beyond the FDA limit while fuel cell is in STANDBY may indicate external load on the fuel cell.

NOTE
The following steps will bring the FC out of STANDBY conditions. Taking FC out of STANDBY will nominally be performed with MCC concurrence/coverage.

16
(R1)
- FC/MN BUS A(B,C) – ON (tb-ON)
- ESS BUS SOURCE FC1(2,3) – ON
- ΔP (tb gray)
- Ready for load (tb-gray)
- REAC O2, H2 – OP (tb-OP)
- Expect SM Alerts

Is MCC able to TMBU Backup C&W and SM ALERT?

YES  NO

SM 60 SM TABLE MAINT
Which FC out-of-STANDBY?

FC1 FC2 FC3

18. Change FC1
H2O LN T SM ALERT lower limit to 60 degF
- ITEM 1
  +0 4 5 0 1 8 1 EXEC
- ITEM 2
  +6 0 0 0 EXEC

19. Change FC2
H2O LN T SM ALERT lower limit to 60.0 degF
- ITEM 1
  +0 4 5 0 2 8 1 EXEC
- ITEM 2
  +6 0 0 0 EXEC

20. Change FC3
H2O LN T SM ALERT lower limit to 60.0 degF
- ITEM 1
  +0 4 5 0 3 8 1 EXEC
- ITEM 2
  +6 0 0 0 EXEC
<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Change FC1</td>
<td>VOLTS SM ALERT lower limit to 27.5 volts and the upper limit to 32.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 1 0 0 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 2 +2 7 5 0 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 3 +3 2 5 0 EXEC</td>
</tr>
<tr>
<td>22</td>
<td>Change FC2</td>
<td>VOLTS SM ALERT lower limit to 27.5 volts and the upper limit to 32.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 2 0 0 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 2 +2 7 5 0 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 3 +3 2 5 0 EXEC</td>
</tr>
<tr>
<td>23</td>
<td>Change FC3</td>
<td>VOLTS SM ALERT lower limit to 27.5 volts and the upper limit to 32.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 3 0 0 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 2 +2 7 5 0 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 3 +3 2 5 0 EXEC</td>
</tr>
<tr>
<td>24</td>
<td>Enable FC1</td>
<td>ΔV SS 1,2,3 SM ALERT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 1 0 2 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 9 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 1 0 3 EXEC</td>
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<tr>
<td></td>
<td></td>
<td>• ITEM 9 EXEC</td>
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<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 1 0 4 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 9 EXEC</td>
</tr>
<tr>
<td>25</td>
<td>Enable FC2</td>
<td>ΔV SS 1,2,3 SM ALERT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 2 0 2 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 9 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 2 0 3 EXEC</td>
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<td>• ITEM 9 EXEC</td>
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<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 2 0 4 EXEC</td>
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<tr>
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<td></td>
<td>• ITEM 9 EXEC</td>
</tr>
<tr>
<td>26</td>
<td>Enable FC3</td>
<td>ΔV SS 1,2,3 SM ALERT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 3 0 2 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 9 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 3 0 3 EXEC</td>
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<td></td>
<td></td>
<td>• ITEM 9 EXEC</td>
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<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 3 0 4 EXEC</td>
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<tr>
<td></td>
<td></td>
<td>• ITEM 9 EXEC</td>
</tr>
<tr>
<td>27</td>
<td>Change FC1</td>
<td>AMPS SM ALERT lower limit to +54.0 and upper limit to +150.00</td>
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<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 1 1 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 2 +5 4 0 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 3 +3 6 0 0 EXEC</td>
</tr>
<tr>
<td>28</td>
<td>Change FC2</td>
<td>AMPS SM ALERT lower limit to +54.0 and upper limit to +150.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 2 1 EXEC</td>
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<tr>
<td></td>
<td></td>
<td>• ITEM 2 +5 4 0 EXEC</td>
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<tr>
<td></td>
<td></td>
<td>• ITEM 3 +3 6 0 0 EXEC</td>
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<tr>
<td>29</td>
<td>Change FC3</td>
<td>AMPS SM ALERT lower limit to +54.0 and upper limit to +150.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 1 +0 4 5 0 3 1 EXEC</td>
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<tr>
<td></td>
<td></td>
<td>• ITEM 2 +5 4 0 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ITEM 3 +3 6 0 0 EXEC</td>
</tr>
<tr>
<td>30</td>
<td>FC</td>
<td>out-of-STANDBY complete</td>
</tr>
</tbody>
</table>
FC may be restarted on two φs. Loss of AC1(2,3) φA cb causes loss of FC1(2,3) pH sensing. Loss of AC2 φB cb causes loss of common pH sensing.

1. Fuel Cell prep
   (L4:C)
   • cb AC1 (AC2,AC3)
   • φA,φB,φC
   • FC1(FC2,FC3) PUMPS – cl
   (O14,O15,O16)
   • φC1(FC2,FC3) CNTLR – ON
   (R11U)
   • FC STARTUP HTR 1(2,3) – ENA
   • Aff FC PURGE VLV 1(2,3) – GPC
   • FC PURGE HTR – ON
   (R1)
   • φC/MN BUS A(B,C) tb – OFF
   • ESS BUS SOURCE FC1 (FC2,FC3) – OFF
   • FC1(2,3) REAC O2,H2 – OP

Is SM available?

YES → 19

NO → 19

Is MCC able to TMBU BACKUP C&W and SM ALERT?

YES → 19

NO → 2
13 If previously changed, reset FC1 AMPS SM ALERT upper limit to 360.0
- ITEM 1
  +0 4 5 0 1 0 1 EXEC
- ITEM 3
  +3 6 0 0 EXEC

14 If previously changed, reset FC2 AMPS SM ALERT upper limit to 360.0
- ITEM 1
  +0 4 5 0 2 0 1 EXEC
- ITEM 3
  +3 6 0 0 EXEC

15 If previously changed, reset FC3 AMPS SM ALERT upper limit to 360.0
- ITEM 1
  +0 4 5 0 3 0 1 EXEC
- ITEM 3
  +3 6 0 0 EXEC

16 If previously changed, reset FC1 FLOW O2,H2 SM ALERT upper limits to 11.1 and 1.6, respectively
- ITEM 1
  +0 4 5 0 1 6 0 EXEC
- ITEM 3
  +1 1 1 0 EXEC
- ITEM T
  +0 4 5 0 1 7 0 EXEC
- ITEM 3
  +1 6 0 EXEC

17 If previously changed, reset FC2 FLOW O2,H2 SM ALERT upper limits to 11.1 and 1.6, respectively
- ITEM 1
  +0 4 5 0 2 6 0 EXEC
- ITEM 3
  +1 1 1 0 EXEC
- ITEM T
  +0 4 5 0 2 7 0 EXEC
- ITEM 3
  +1 6 0 EXEC

18 If previously changed, reset FC3 FLOW O2,H2 SM ALERT upper limits to 11.1 and 1.6, respectively
- ITEM 1
  +0 4 5 0 3 6 0 EXEC
- ITEM 3
  +1 1 1 0 EXEC
- ITEM T
  +0 4 5 0 3 7 0 EXEC
- ITEM 3
  +1 6 0 EXEC

19 SM SYS SUMM 1
SM 69 FUEL CELLS
- Prior to FC start, note and record the following:
  FC1(2,3) VOLTS: __________ volts
  FC1(2,3) O2 FLOW: __________ lb/hr
  FC1(2,3) H2 FLOW: __________ lb/hr
  AC1(2,3) ΦA AMPS: __________ amps
  ΦB AMPS: __________ amps
  ΦC AMPS: __________ amps

20
2 May expect FC pH FSM when FC is started on some fuel cells due to addition of pH self-test capability

3 Expected AC currents are an increase of ~0.8 amps/Φ (0.55 amps/Φ for COOL PUMPS and 0.25 amps/Φ for H2 mtr)

4 Failure of COOL PUMP ΔP tb will inhibit FC startup. Holding sw in START for > 30 sec will bypass Logic Timer and allow COOL PUMP and H2 mtr to run
5 Expected indications of operating STARTUP HTR are:
- FC VOLTS ~32V
- FC O2 Flow ~1.4 lb/hr
- FC H2 FLOW ~0.2 lb/hr

Placing FC on MAIN BUS will generate sufficient heat to raise FC temp to operating levels.
32 FC3 Startup ?

33 Was MNC shorted ?

34 Connect FC3 to MNB through PRI PL bus

35 Reconnect FC to MAIN and ESS BUS

36 Monitor FC performance

37 Did any of the conditions exist ?

38 Break Bus Tie

If no MCC:
- Go to FC SHUTDN, EPS SSR-2 (Cue Card)

If MCC:
- Continue

- YES

- NO

- YES

- NO
Which FC is being restarted?

<table>
<thead>
<tr>
<th>FC1</th>
<th>FC2</th>
<th>FC3</th>
</tr>
</thead>
</table>

40 If reqd, change FC1 STACK T PRI
C&W lower limit to 172.5 degF and enable FC1 O2,H2 REAC VLV and FC1 PUMP PRI C&W

(R13U)
- C/W PARAM SEL tw (three) – 062
- C/W LIMIT SET VALUE tw (three) – 3.30
- C/W LIMIT SET LIMIT – LOWER
- C/W LIMIT SET FUNC – SET, then READ, hold
- STATUS lts – 3.30
- C/W PARAM SEL tw (three) – 002
- C/W PARAM – ENA
- C/W PARAM SEL tw (three) – 012
- C/W PARAM – ENA
- C/W PARAM SEL tw (three) – 092
- C/W PARAM – ENA
- C/W PARAM STATUS – INH, hold
- PARAM 002,012,092 not inhibited
- C/W PARAM SEL tw (three) – 120

41 If reqd, change FC2 STACK T PRI
C&W lower limit to 172.5 degF and enable FC2 O2,H2 REAC VLV and FC2 PUMP PRI C&W

(R13U)
- C/W PARAM SEL tw (three) – 072
- C/W LIMIT SET VALUE tw (three) – 3.30
- C/W LIMIT SET LIMIT – LOWER
- C/W LIMIT SET FUNC – SET, then READ, hold
- STATUS lts – 3.30
- C/W PARAM SEL tw (three) – 022
- C/W PARAM – ENA
- C/W PARAM SEL tw (three) – 032
- C/W PARAM – ENA
- C/W PARAM SEL tw (three) – 102
- C/W PARAM – ENA
- C/W PARAM STATUS – INH, hold
- PARAM 022,032,102 not inhibited
- C/W PARAM SEL tw (three) – 120

42 If reqd, change FC3 STACK T PRI
C&W lower limit to 172.5 degF and enable FC3 O2,H2 REAC VLV and FC3 PUMP PRI C&W

(R13U)
- C/W PARAM SEL tw (three) – 082
- C/W LIMIT SET VALUE tw (three) – 3.30
- C/W LIMIT SET LIMIT – LOWER
- C/W LIMIT SET FUNC – SET, then READ, hold
- STATUS lts – 3.30
- C/W PARAM SEL tw (three) – 042
- C/W PARAM – ENA
- C/W PARAM SEL tw (three) – 052
- C/W PARAM – ENA
- C/W PARAM SEL tw (three) – 112
- C/W PARAM – ENA
- C/W PARAM STATUS – INH, hold
- PARAM 042,052,112 not inhibited
- C/W PARAM SEL tw (three) – 120

43 Is SM available?

- Go to FUEL CELL PURGE – MANUAL (ORB OPS, EPS) on aff fuel cell

44

45 Is MCC able to TMBU BACKUP C&W and SM ALERTS?

- Fuel cell restart complete. Use standard ORB PKT, EPS procedures as reqd
61 If reqd, enable FC1 READY SM ALERT
   • ITEM 1 +0450105 EXEC
   • ITEM 9 EXEC

62 If reqd, enable FC2 READY SM ALERT
   • ITEM 1 +0450205 EXEC
   • ITEM 9 EXEC

63 If reqd, enable FC3 READY SM ALERT
   • ITEM 1 +0450305 EXEC
   • ITEM 9 EXEC

64 If reqd, change FC1 COOL PRESS SM ALERT lower limit to 50.0 psi
   • ITEM 1 +045014Z EXEC
   • ITEM 2 +5000 EXEC

65 If reqd, change FC2 COOL PRESS SM ALERT lower limit to 50.0 psi
   • ITEM 1 +045024Z EXEC
   • ITEM 2 +5000 EXEC

66 If reqd, change FC3 COOL PRESS SM ALERT lower limit to 50.0 psi
   • ITEM 1 +045034Z EXEC
   • ITEM 2 +5000 EXEC

67 If reqd, change FC1 H2O LN T SM ALERT lower limit to 60 degF
   • ITEM 1 +0450181 EXEC
   • ITEM 2 +6000 EXEC

68 If reqd, change FC2 H2O LN T SM ALERT lower limit to 60 degF
   • ITEM 1 +0450281 EXEC
   • ITEM 2 +6000 EXEC

69 If reqd, change FC3 H2O LN T SM ALERT lower limit to 60 degF
   • ITEM 1 +0450381 EXEC
   • ITEM 2 +6000 EXEC

70
   • Go to FUEL CELL AUTO PURGE (ORB OPS, EPS)

FC startup complete.

   • Use standard ORB PKT, EPS procedures as reqd
EPS SSР-7
TWO-PHASE FAN START PROCEDURE

NOTE
This procedure assumes the EPS MAL BUS LOSS SSR for the affected phase (not shorted) has already been completed. This procedure will be performed during MCC coverage.

1. Which Fan to be started?
   - AV BAY FAN
   - CABIN FAN

2. Which AC Bus affected?
   - AC1
   - AC3

3. Which AC Bus affected?
   - AC2
   - AC3

4. (R1)
   - AC BUS SNSR 2 – OFF (1 sec), then MON

5. NOTE
   - Expect S88 and S66 msgs
   - IMU FAN B – ON
   - HUM SEP B – ON
   - AV BAY 1 FAN B – ON, A – OFF
   - AV BAY 2 FAN A – ON, B – OFF
   - H2O PUMP LOOP 1 (two) – ON, B
   - FREON PUMP LOOP 1 – B
   - If flown:
     - (MO13Q)
     - ARLK FAN B – ON
   - (L4:K)
     - \(\text{cb AC2 CAB FAN B (three)} \rightarrow \text{cl}

6. On MCC GO:
   - (L1)
     - CAB FAN A – OFF, B – ON

7. 

1. Reconfig 3Φ AC equipment to bus with lost phase to create an induced voltage reqd to start large fan
2. Off time not to exceed 20 min due to DDU cooling constraints
3 Value in ( ) is the ΔP when the Cabin Press is at 10.2 psi
4 Switch guard installed to prevent CAB Fan from being turned off during LOH changeout and cabin fan filter cleaning
5 May receive ‘S67 AC AMPS’ msg
6 Reconfig back to alternate equipment

7 SM 66 ENVIRONMENT
CAB FAN ΔP > 4.49 (2.8) ?

YES

8 (L4:K)
• cb AC2 aff phase
  CAB FAN B – op

(L1)
• Install sw guard
  (stowed in IFM Tool Kit) over
  CAB FAN B sw

9 (L1)
• CAB FAN B – OFF, A – ON

Report the status of
the following circuit
breakers, then:
(L4:K)
• cb AC2 CAB FAN B (three) – op

10 NOTE
Expect S88 and S66 msgs
(L1)
• FREON PUMP LOOP 1 – A
• H2O PUMP LOOP 1 (two) – GPC, A
• AV BAY 1 FAN A – ON, B – OFF
• AV BAY 2 FAN B – ON, A – OFF
• HUM SEP B – OFF
• IMU FAN B – OFF

If flown:
(MO13Q)
• ARLK FAN B – OFF

11 (R1)
• AC BUS SNSR 2 – OFF (1 sec), then AUTO TRIP
• MCC for further action
1. Reconfig 30 AC equipment to bus with lost phase to create an induced voltage reqd to start large fan
2. Off time not to exceed 20 min due to DDU cooling constraints
3. Value in ( ) is the ΔP when the Cabin Press is at 10.2 psi
4. Switch guard installed to prevent CAB Fan from being turned off during LiOH changeout and cabin fan filter cleaning
5. May receive 'S67 AC AMPS' msg
6. Reconfig back to alternate equipment
1. Reconfig 30 AC equipment to bus with lost phase to create an induced voltage reqd to start large fan

3. Value in ( ) is the ΔP when the Cabin Press is at 10.2 psi

5. May receive ‘S67 AC AMPS’ msg

6. Reconfig back to alternate equipment

7. Off time not to exceed 26 min due to GPC cooling constraints. If GPC 3 Off, time not to exceed 1 hr due to Caution & Warning cooling constraints

8. The Av Bay air cooled equipment must be powered down due to loss of Av Bay Air Cooling
Reconfig 30 AC equipment to bus with lost phase to create an induced voltage reqd to start large fan

Value in ( ) is the \( \Delta P \) when the Cabin Press is at 10.2 psi

May receive 'S67 AC AMPS' msg

Reconfig back to alternate equipment

Off time not to exceed 26 min due to GPC cooling constraints. If GPC 3 Off, time not to exceed 1 hr due to Caution & Warning cooling constraints

The Av Bay air cooled equipment must be powered down due to loss of Av Bay Air Cooling
### Table: EPS SSR-8 BUS LOADING – LRU SELECT

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 1 | To load MAIN A, select: | **NOTE**
Do not change LRU config on LRU(s) configured for Cryo O2/H2 conservation, thermal control, or failure. Only LRUs with > 100 watts load and powered from single bus are listed |
| (L1) | 1. TOP EVAP HTR DUCT – A | |
|   | 2. AV BAY 1 FAN A – ON | B – OFF |
|   | 3. 3 FAN B – ON | A – OFF |
|   | 4. FREON PUMP LOOP 1 – A | 2 – B |
| 2 | To load MAIN B, select: | **NOTE**
Do not change LRU config on LRU(s) configured for Cryo O2/H2 conservation, thermal control, or failure. Only LRUs with > 100 watts load and powered from single bus are listed |
| (L2) | 6. FES FEEDLINE HTR A SUP – 1 |
|   | 7. FES FEEDLINE HTR B SUP – 2 |
| (R1/A11/A15) | 8. CRYO O2,H2 TK 1,3,5 HTR A (six) – AUTO (as reqd) | |
|   | CRYO O2,H2 TK 1,2,3,4,5 HTR B (ten) – OFF | |
|   | CRYO O2,H2 TK 2,4 HTR A (four) – OFF |
| (A12) | APU HTR |
| 9. | GAS GEN/FUEL PUMP 1 – A AUTO |
| 10. | GAS GEN/FUEL PUMP 3 – B AUTO |
| 11. | LUBE OIL LN 1 – A AUTO |
| 12. | LUBE OIL LN 3 – A AUTO |
| 13. | TK/FU LN/H2O SYS 1A,3B (two) – AUTO | |
|   | TK/FU LN/H2O SYS 1B,3A (two) – OFF |
|   | HYD HTR |
| 14. | RUD SPDDBK A – AUTO | B – OFF |
| 15. | BDY FLP A – AUTO | B – OFF |
| 16. | ELEV A – AUTO | B – OFF |
| 17. | CIRC PUMP 3 – MNA |
| (A14) | RCS/OMS HTR |
| 18. | FWD RCS – A AUTO |
| 19. | L POD A – A AUTO | B – OFF |
| 20. | R POD B – B AUTO | A – OFF |
| 21. | OMS CRSFSD LINES – A AUTO |
| 3 | To load MAIN C, select: | **NOTE**
Do not change LRU config on LRU(s) configured for Cryo O2/H2 conservation, thermal control, or failure. Only LRUs with > 100 watts load and powered from single bus are listed |
| (R1/A11/A15) | 37. CRYO O2,H2 TK 1,3,4 HTR B (six) – AUTO (as reqd) | |
|   | CRYO O2,H2 TK 1,2,3,4,5 HTR A (ten) – OFF | |
|   | CRYO O2,H2 TK 1,5 HTR B (four) – OFF |
| (A12) | APU HTR |
| 39. | GAS GEN/FUEL PUMP 1 – B AUTO |
| 40. | GAS GEN/FUEL PUMP 2 – A AUTO |
| 41. | LUBE OIL LN 1 – B AUTO |
| 42. | LUBE OIL LN 2 – A AUTO |
| 43. | TK/FU LN/H2O SYS 1B,2A (two) – AUTO | |
|   | TK/FU LN/H2O SYS 1A,2B (two) – OFF |
|   | HYD HTR |
| 44. | RUD SPDDBK B – AUTO | A – OFF |
| 45. | BDY FLP B – AUTO | A – OFF |
| 46. | ELEV B – AUTO | A – OFF |
| 47. | CIRC PUMP 1 – MNB |
| (A14) | RCS/OMS HTR |
| 48. | FWV RCS – B AUTO |
| 49. | L POD B – B AUTO | A – OFF |
| 50. | R POD A – A AUTO | B – OFF |
| 51. | OMS CRSFSD LINES – A AUTO |
EXPLANATORY NOTES FOR BUS LOSS SSRs

Bus Loss SSRs contain all the orbiter reconfig steps necessary following a bus loss for > 100 electrical power buses. SSRs also list all orbiter equipment lost and resultant onboard crew indications for each bus loss. If a bus powers one or more sub-buses, the sub-bus SSRs do not need to be utilized unless referenced in the SSR (i.e., each stands alone).

The ORB PKT BUS LOSS ACTIONS lists all the reconfig steps that need to be accomplished immediately following recognition of a bus loss. Following completion of the ORB PKT BUS LOSS ACTIONS, the action contained in the BUS LOSS SSR should be accomplished as soon as practical. The following buses are not included in the ORB PKT BUS LOSS ACTIONS listings as no loss of equipment requires quick reconfig:

MNA MMC1, MMC3, AMC1, O14&A8, R1A1, A6&A14, ML86B
MNB MMC1, MMC2, MMC3, MMC4, AMC2, R14, O15&A8, R1A1, A6&A14, ML86B
MNC MPC3, APC3, FMC3, MMC2, MMC4, AMC3, O16RJD, R1A1, A6&A14, ML86B
ESS1BC FP&LC1, ML86B
ESS2CA FP&LC2
ESS3AB FP&LC3, O13, ML86B
AC1 FMC1, MMC1, MMC3, AMC1
AC2 FMC2, MMC1, MMC2, MMC3, MMC4, AMC2
AC3 FMC3, MMC2, MMC4, AMC3

Entry into a BUS LOSS SSR may be from a MAL procedure, from the Bus Loss ID Tables in the PKT C/L, from a direct readout of bus power loss by crew or MCC, or from the PKT C/L BUS LOSS ACTION.

The following additional information refers to each column of SSR-10 thru SSR-148:

1. ACTIONS

The ACTIONS column lists, by panel, all the orbiter reconfig steps necessary following a bus loss. Reconfig performed prior to starting the ACTIONS, such as from PKT C/L BUS LOSS ACTIONS, is repeated in the ACTIONS column for completeness. No trouble-shooting steps are listed based on the assumption that the bus loss has been confirmed prior to starting the SSR. ACTIONS are config independent, making many of the switch position listings verification steps. Equipment or function loss that necessitates each reconfig step is listed adjacent to that step in the EQUIP/FUNCTION LOST column.

2. BUS ISOLATION

The BUS ISOLATION steps do not have to be performed following a bus loss since equipment being unpowered is already unpowered if the bus is dead. The BUS ISOLATION column can be used as a shopping list if power must be reduced on a particular bus for any reason. Any equipment loss resulting in each isolation step is listed adjacent to the step in the EQUIP/FUNCTION LOST column if the same equipment is not already listed adjacent to a reconfig ACTION step. Equipment isolation steps listed in the ACTIONS column are not repeated in the BUS ISOLATION column.

3. EQUIP/FUNCTION LOST

This column lists all equipment of the functions that are lost because of a bus loss. If reconfig action is necessary because of equipment loss, the equipment is listed adjacent to the appropriate ACTIONS column step(s). If no reconfig is necessary, but equipment may be isolated from bus, the equipment is listed adjacent to BUS ISOLATION STEP. Equipment lost for which there is no reconfig or isolation is listed separately. Equipment that is used only during ascent, such as the ET door system, is not included.
EXPLANATORY NOTES FOR BUS LOSS SSRs (Cont)

4. CREW INDICATIONS

Onboard crew indications that occur when a bus fails are grouped according to the type of indication. C/W lights are listed together, as are Fault Summary Messages and lights lost. Dedicated displays and tbs are grouped by the panels on which they are located. Indications listed would occur immediately when bus failed; exceptions are explained by a note or preceded by a qualifier. Indications that are config dependent are preceded by a qualifier such as “If H2O Loop 2 Pump Action.”

If a Fault Summary Message (FSM) is available in OPS 2 only, without a similar message in BFS or OPS 3, the FSM is followed by ‘(2)’. If FSM is available in OPS 3 only or BFS only, the FSM is followed by ‘(3)’ or ‘(B)’. If FSM is available in OPS 3 and BFS, the FSM is followed by ‘(3,B)’. Nothing is listed for FSMs that are available in all mission phases (available in OPS 2 and OPS 3 or in OPS 2 and BFS). OPS 1 and 8 were not considered.
### ACTIONS
- Perform FC1 SHUTDN (FC SHUTDN Cue Card)

### EQUIP/FUNCTION LOST
1. **FC1 PUMPS, pH Snr**
   - Purge Vlv
   - O2, H2 Flow Xdcrs
2. **Cell Perf Monitor**
3. **AUX PLA Bus pwr**
4. **MNA pwr to ESS2CA**
5. **ESS3AB**
6. **CNTLAB1, 2, 3**
7. **CNTLCA1, 2, 3**

### CREW INDICATIONS
- **MASTER ALARM Light/Tone** – on
- **SM ALERT Light/Tone** – on

### NOTES
1. **Buses remained pwrd**
2. Pwrs PL Timing Buffer and OIU 1 (if flown). OIU 1 redundant pwrs MNB MPC2 via CAB PL3
3. **Indications do not appear until jet commanded**
4. **TIME CRITICAL**
5. If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
6. **S66 WSB T1 if in BLR CNTLR/HTR 1B. S66 WSB T3 if in BLR CNTLR/HTR 3A**

### CREW INDICATIONS (Continued)
- **AC1 φA, φB, φC Inverters**
- **Cryo O2, H2 Tk1 Htrs A**
- **Cryo O2, H2 Tk3 Htrs A**
- **Cryo O2, H2 Tk5 Htrs A**
- **Av Bay 3 Agent discharge capability**
- **EMU 1, 2 PWR/BATT Charger**
- **MNA pwr**
- **Brake Htrs A**
- **APU 1 GG/Fu Pump Htrs A**
- **APU 3 GG/Fu Pump B**
- **APU 1 Lube Oil Line Htrs A**
- **3 Lube Oil Line Htrs B**
- **1 Tk/Fu Ln Htrs A**
- **APU(1, 2, 3) GG Inj H2O Tk Htrs A**
- **APU 1, 2, 3 GG Inj H2O Ln Htrs A**
- **3 GG Inj H2O Ln Htrs B**
- **3 Tk/Fu Ln Htrs B**
- **Rud/Spd Brake Htr A**
- **Body Flap Htr A**
- **Elevon Actr Htrs A**

### NOTES (Continued)
- **AC1 φA, φB, φC AC volts**
- **ind – < 90 DC VOLTS MNA ind – OSL**
- **(FSMs)**
  - S86 HYD RSVR Q 1
  - SM2 HYD QTY 1
  - S86 WSB T
  - SM0 THRMD HYD
  - S66 AV BAY 3 FAN
  - S66 AV BAY 2 FAN
  - S66 CABBIN FAN
  - S66 CABBIN PPCO2
  - S66 IMU FAN DP
  - S66 CABBIN PPCO2 A
  - S66 CABBIN PRESS
  - SM1 CABBIN DP/DT BU
  - S67 AC VOLTS 1
  - S69 FC PUMP 1
  - S69 FC H2 PUMP 1
  - S88 FREON FLOW 2
  - S88 FRN AFT CP 2
  - S88 FRN PL HX 2
  - S88 H2O LOOP 1 FLOW
  - S88 H2O LOOP 2 QTY
  - S88 H2O LOOP 2 TEMP
  - S88 H2O PUMP P 2
  - I/O ERROR CRT 1
  - S67 MAIN BUS V
### ACTIONS

<table>
<thead>
<tr>
<th>(A12)</th>
<th>HYD CIRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>• PUMP PWR 1 – MNB</td>
<td></td>
</tr>
<tr>
<td>• 3 – MNC</td>
<td></td>
</tr>
</tbody>
</table>

If RAD CNTLR LOOP 1,2 – AUTO B:
- Perform ON-ORBIT RAD CNTLR SWITCH, ECLS SSR-13 for Freon Loop 1,2 (L1)
- FLASH EVAP CNTLR PRI B – OFF
- If FES reqd, go to FES RESTART USING FES PRI A, ECLS SSR-5
- TOP EVAP HTR NOZ L – B AUTO
- TOP EVAP HTR DUCT – B AUTO

If HI LOAD EVAP enabled:
- HI LOAD DUCT HTR – B (C)

Maintain LiOH Canister(s) changeout per cue card and FLIGHT PLAN

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>Freon Loop 1 Rad Cntlr B</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Rad Cntlr B</td>
</tr>
</tbody>
</table>

**FES Pri B Cntlr**

Top Evap L Noz Htr A

Top Evap Duct L,R,Fwd,Aft Htrs A

Hi Load Duct Outbd,Inbd Noz Htrs A

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>HYD/PU</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYD QTY 1 ind – 0%</td>
</tr>
</tbody>
</table>

**APU**

HYD H2O QTY ind – 0%

**RCS**

RCS OMS Prplt Qty Gage blanks

Mission Timer blanks

### NOTES

1. Maintain LiOH Canister(s) changeout per cue card and FLIGHT PLAN

2. If RAD CNTLR LOOP 1,2 – AUTO B:
   - Perform ON-ORBIT RAD CNTLR SWITCH, ECLS SSR-13 for Freon Loop 1,2 (L1)
   - FLASH EVAP CNTLR PRI B – OFF
   - If FES reqd, go to FES RESTART USING FES PRI A, ECLS SSR-5
   - TOP EVAP HTR NOZ L – B AUTO
   - TOP EVAP HTR DUCT – B AUTO

3. If HI LOAD EVAP enabled:
   - HI LOAD DUCT HTR – B (C)

4. Maintain LiOH Canister(s) changeout per cue card and FLIGHT PLAN

5. If OBSS berthed:
   - STBD RMS HTR A – OFF
   - STBD RMS HTR B – AUTO

6. If OBSS berthed:
   - PORT RMS HTR A – OFF
   - PORT RMS HTR B – OFF
   - AUTO

7. If OBSS berthed:
   - STBD RMS HTR A – OFF
   - STBD RMS HTR B – AUTO

8. (F6,F8)
   - HSI SEL SOURCE – other than MLS, (OV103,4) TACAN 1 or (OV105) GPS 1
   - RDR ALTM – 2

9. (O6)
   - ANNUN BUS SEL ACA 1 – MNB
   - UHF EVA STRING – 2

10. For attitude control, LOSS OF VERNIER (ORB OPS, RCS)

11. Refer to OMS/RCS Slide Rule for vlv info

12. Reconfig following vlv(s) only if leak isolation reqd:

13. AFT L RCS He PRESS A,B

14. FWD RCS He PRESS A

15. (Continued)
### ACTIONS

**[GNC 23 RCS]**
- Reprioritize L, R Manf 2 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc
- Set aft pod(s) PRI JET FAIL LIMIT to 6

**[O8]**
- If Straight Feed config, Left OMS XFEED B – OP (tb-OP). Otherwise, \( \gamma \)MCC

**[C2]**
- L IDP/CRT SEL – 3
- GPC/CRT 01 EXEC

**[C16:D]**
- cb MNC
- (OV103) GPS PRE AMPL UC – cl
- (OV103) GPS PRE AMPL LC – cl

**[SM 1 DPS UTILITY]**

**[G2,G5,S2]**
- MMU ASSIGN
- GNC ITEM 1 EXEC
- SM ITEM 4 EXEC
- PL ITEM 6 EXEC

**[R11U]**
- FC H2O LINE HTR – B AUTO
- FC H2O RELIEF HTR – B AUTO

**[R11L]**
- MS AUD CNTL – PS

**[L9]**
- \( \gamma \)PS AUD PNL config for use

**[A13]**
- (OV103) GPS PRE AMPL UC – MNC
- (OV103) GPS PRE AMPL LC – MNC

**[A14]**
- RCS/OMS HTR
  - FWD RCS – B AUTO
  - L POD (two) – A OFF, B AUTO
  - R POD (two) – B OFF, A AUTO
  - OMS CRSFD LINES – A OFF, B AUTO

**[ML86B:A]**
- cb MNB H2O LINE HTR B – cl

**[ML86B:C]**
- cb MNB EXT ARLK HTR
  - STRUC Z1/2/3 – cl
  - cb MNB EXT ARLK HTR
  - LN ZN 1, ZN 2 (two) – cl

If in Rendezvous or Docked:
- cb MNB EXT ARLK HTR VEST Z1/2/3 – cl

**[ML86B]:**
- cb MNB
- MMU PORT, STBD HTR B (two) – cl

**[Continued]**

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aft RCS L, R Jet 2 Hrs</td>
<td>1 All brakes ON and safing initiated</td>
</tr>
<tr>
<td>OMS Eng/Xfeed Vlv Redundancy</td>
<td>15 Vlv holds position</td>
</tr>
<tr>
<td>IDP 1 MDU CRT 1 MDU MFD 2 MDU PLT 1</td>
<td>19 Maintains deorbit capability for MNB DA2 failure</td>
</tr>
<tr>
<td>FD H2O Line Htrs A</td>
<td>21 Loss of redundant port to the following: MDU CDR 1 (S) MDU CDR 2 (P)</td>
</tr>
<tr>
<td>MMU 1</td>
<td>22 Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning</td>
</tr>
<tr>
<td>Fwd RCS A Hrs (all)</td>
<td>23 Listen only capability regained when headset used on MS CCU (from PS ATU) as FD speaker is also failed</td>
</tr>
<tr>
<td>L Pod A Hrs (all)</td>
<td>24 Loss of MS ATU causes loss of redundant path for ACCU config control bits, loss of xmit capability from CCU, and loss of FD Spkr</td>
</tr>
<tr>
<td>R Pod B Hrs (partial)</td>
<td>25 Htr B remains</td>
</tr>
<tr>
<td>OMS Crsfd Ln A Hrs (all)</td>
<td>26 Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge</td>
</tr>
<tr>
<td>H2O Line Htrs A: Waste Dump Line Htr A Sply Dump Line Htr A Vac Vent Line Htr A</td>
<td>27 Htr A remains</td>
</tr>
<tr>
<td>Ext Arlk Htrs A: Structural Htrs A Water Line Htrs A</td>
<td></td>
</tr>
</tbody>
</table>
### ACTIONS

For PLBD ops:
- OP/CL Drs in man mode

28 Save L OMS for deorbit (If reqd for on-orbit burn, √MCC)

28 Prior to using L(R) OMS:
- (O8)

30 L(R) OMS He PRESS/VAP
- ISOL A – OP
- B – GPC

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>PLBD</th>
<th>C/L Lat 1-4, 5-8, 9-12 Mtrs 1 Port,Stbd Fwd Blkhd Mtrs 1 Port Aft Blkhd Mtr 1 Stbd Door Mtr 1 Port Door Mtr 2 CL Limit sw Stbd Door Mtr 1 OP Limit sw</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 L OMS GN2 Press Vlv Op TM</td>
<td>28 L OMS He Pr Isol A GPC OP Cntl</td>
</tr>
<tr>
<td>29 L,R OMS He Vap Isol 1 GPC OP Cntl</td>
<td>29 L,R OMS He Pr Isol A GPC OP Cntl</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

- If OMS Gmbl Cmd Abs value > 2 deg and Sec TVC selected:
  - C/W OMS TVC lt – on 'R OMS GMBL' (3,B)
- If Hum Sep A ON:
  - 'S66 HUMID SEP A'
- If H2O Loop 1 Pump A active:
  - 'S88 H2O LOOP 1 FLOW' 'S88 H2O LOOP 1 TEMP' 'S88 H2O PUMP P 1'

### NOTES

- √MCC for additional direction
- Sys A Sec Cntlr man on capability remains
- May be repwrd after AC Pwr Transfer Cable connected
**EPS SSR-10 (Cont)**

**BUS LOSS: MNA DA1**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>36</strong> SM 60 TABLE MAINT</td>
<td></td>
<td></td>
<td><strong>36</strong> Inhibits H2O Loop 2 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, Cabin HX in T, H2O Loop 1 Ich Flow respectively</td>
</tr>
<tr>
<td>• Inhibit 0612705, 0612700, 0612740, 0612710, 0612665, 0612742 (WCS) • MODE – AUTO • CRADLE – AUTO • Hose stowed in cradle • WCS ON it – OFF • FAN SEP SEL sw – OFF • HOSE BLOCK – SEP 2 • In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete • FAN SEP SEL sw – 2</td>
<td>WCS Fan/Sept 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Mtr Relay</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>37</strong></td>
<td></td>
<td></td>
<td><strong>37</strong> H2O Loop 2 Byp vlv holds position</td>
</tr>
<tr>
<td><strong>38</strong></td>
<td></td>
<td></td>
<td><strong>38</strong> H2O Loop 2 Pump Out Press, Pump ΔP, Accum Qty, Pump Out Temp snrs lost</td>
</tr>
<tr>
<td><strong>39</strong></td>
<td></td>
<td></td>
<td><strong>39</strong> May be repwrd after AC Pwr Transfer Cable connected</td>
</tr>
<tr>
<td><strong>40</strong></td>
<td></td>
<td></td>
<td><strong>40</strong> AV Bay 2 Fan ΔP, Air Out Temp snrs lost</td>
</tr>
<tr>
<td><strong>41</strong> During sleep periods:</td>
<td></td>
<td></td>
<td><strong>41</strong> Use streamers (if flown) or monitor by feel during wake period if Cabin Air Sig Condr not recovered</td>
</tr>
<tr>
<td>• CAB FAN (two) – ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>(Continued)</strong></td>
<td><strong>(Continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUS ISOLATION</td>
<td>EQUIP/FUNCTION LOST</td>
<td>CREW INDICATIONS</td>
<td>NOTES</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>-------</td>
</tr>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MDU CRT 1 PWR – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MDU MFD 2 PWR – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MDU PLT 1 PWR – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• IDP/CRT 1 PWR – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O6)</td>
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<td>• SSR TRKR PWR -Z – OFF</td>
<td>-Z Star Trkr Dr OP capability</td>
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<td>• (OV105) GPS 1 PWR – OFF</td>
<td>(OV105) GPS 1</td>
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<td>• (OV105) GPS 1 PRE AMPL UPPER – OFF</td>
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<td>• RADAR ALTM 1 – OFF</td>
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<td>• MLS 1 – OFF</td>
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<td>cb MNA</td>
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<tr>
<td>• OI SIG CONDR OF 1/4 A – op</td>
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<td>• OI SIG CONDR OM 1/2 A – op</td>
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<td>• OI MDM OF 1/2 A – op</td>
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<tr>
<td>3/4 A – op</td>
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<td>• OI H2O BYP LOOP 1 SNSR – op</td>
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<tr>
<td>• MNC CONTR – op</td>
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<td>• MSN TIMER FWID – op</td>
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<td>• EVENT TIMER AFT – op</td>
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<tr>
<td>• (OV103,4) TACAN 1 – op</td>
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<td>• SMOKE DETN L/R FLT DK – op</td>
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<td>• SMOKE DETN BAY 2A/3B – op</td>
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<td>• FIRE SUPPR BAY 3 – op</td>
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<td>• UTIL PWR O19/M052J – op</td>
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<td>• FLOOD L CNSL – op</td>
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<td>• ANNUN FWD ACA 1 – op</td>
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<td>• cb MNA CRYO O2 HTR TK1 SNSR 1 – op</td>
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<td>• cb RAD ISOL CONTR – op</td>
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<tr>
<td>• FREON RAD CNTLR 1 – op</td>
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<td>47 FREON RAD CNTLR 2 – op</td>
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<td>• N2 SPLY 1 – op</td>
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<td>• O2/N2 CNTLR 1 – op</td>
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<td>• O2 XOV R 1 – op</td>
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<td>• N2 REG INLET 1 – op</td>
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<td>• CAB VENT – op</td>
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<td>• VENT ISOL – op</td>
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<td>• (OV105) GPS 1 PRE AMPL UPPER – op</td>
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<td>• (OV105) GPS 1 PRE AMPL LOWER – op</td>
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<tr>
<td>• (OV103) GPS PRE AMPL UC – op</td>
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<tr>
<td>• (OV103) GPS PRE AMPL LC – op</td>
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(Continued)
### EPS SSR-10 (Cont)

#### BUS LOSS: MNA DA1

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<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tr>
<td><strong>ONLY ON MCC CALL, PERFORM</strong></td>
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<tr>
<td>(O14:E) cb MNA</td>
<td>ADTA 1</td>
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<tr>
<td>• RDR ALT 1 – op</td>
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<tr>
<td>• MLS 1 – op</td>
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</tr>
<tr>
<td>• ADTA 1 – op</td>
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<tr>
<td>• S TRK-Z – op</td>
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<tr>
<td>• ACCEL 1 – op</td>
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<tr>
<td>• DDU L – op</td>
<td>AA 1</td>
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<tr>
<td>• AFT – op</td>
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<tr>
<td>• NWS – op</td>
<td>NWS 1</td>
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<tr>
<td>(O14:F) cb MNA</td>
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<tr>
<td>43</td>
<td>ATVC 2 Isol ME</td>
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<tr>
<td>48</td>
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</tbody>
</table>

(R11U) cb MNA  | | | |
| • FC PURGE VLV 1 – CL | FC1 Startup Htr Inh capability | | |
| • FC STARTUP HTR 1 – ENA | | | |
| (R14:A) cb MNA | | | |
| • cb MNA AUD MS – op | MS ATU | | |
| • ADC 1A/2A – op | FD Spkr | | |
| • MDU MFD 2 – op | | | |
| • PLT 1 – op | | | |
| (R14:B) cb MNA | | | |
| 43 | UHF Spkx Pwr Amp | | |
| 48 | GCIL MNA pwr | | |
| | MNA pwr for Cntl BC1,2,3 Buses | | |

(R14:C) cb UHF EVA – op | | SSOR EVA STRG 1 | |
(R14:D) cb MNA TV C CAMR | | TV C Camr and Pan-Tilt | |
| • CAMR/PTU – op | TV C Aft Bay Camr Htr | | |
| • CAMR HTR – op | TV C Camr Pan-Tilt Htr and Illum | | |
| • ILLUM/PTU HTR – op | | | |
| cb MNA TV | Video Cntl Unit MNA pwr | | |
| • CONTR UNIT – op | CTVM 1 | | |
| • MON 1 – op | | | |

(R14:E) cb MNA PS FLOOD – op | | PS Floodlt | |
| cb MNA D CAMR | TV D Camr and PAN-TILT | | |
| • CAMR/PTU – op | TV D Camr Htr | | |
| • CAMR HTR – op | TV D Camr PAN-TILT Htr and Illum | | |
| • ILLUM/PTU HTR – op | | | |

(A7U) PL BAY | | PLB Aft Stbd Floodlt | |
| • FLOOD AFT STBD – OFF | Fwd Port Floodlt | | |
| • FWD PORT – OFF | Docking Floodlt | | |
| • DOCKING – OFF | Port RMS lt | | |
| • PORT RMS LIGHT – OFF | | | |

(A6L) IF DOCKING MISSION | | | |
| • cb ESS 1BC DEP SYS 1 VENT ISOL – op | Vest DEP Vlv Sys 1 Vent | | |
| • cb MN A DEP SYS 1 VENT – op | Vent Isol | | |

(Continued) | (Continued) | | |

43 Redundant pwr source remains for equipment
48 NWS 2 is still available
49 Six vlvs fail to non-isolation position
50 Capability to xmit to gnd from UHF degraded
51 GCIL also pwrd via MNC cb
52 MNB pwr may be selected via TV pwr sw (pnl A7) or GCIL if reqd
<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
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</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td>MNA A7</td>
<td>DSP SYS PWR SYS 1 tb – OFF</td>
<td>15 Vlv holds position</td>
</tr>
<tr>
<td>[A6L] IF DOCKING MISSION cb MN A DOCK LT • TRUSS FWD – op • VEST PORT – op • SYS PWR MNA – OFF • PSU PWR MNA – OFF cb MNA • LOGIC 1 – op • 3 – op • PYRO PWR MNA – OFF LIGHTS • AIRLK 1/4 MNA – OFF</td>
<td>Fwd Truss Docking lt Port Vestibule Docking lt DSP SYS PWR MN A</td>
<td>25 Htr B remains</td>
<td></td>
</tr>
<tr>
<td>[A7L] MADS • STRAIN GAGE – OFF • W/B/ACIP PCM – OFF</td>
<td>PSU PWR MN A</td>
<td>3 All docking mechanisms will have single mtr times</td>
<td></td>
</tr>
<tr>
<td>[MA73C:A,B] MCA LOGIC MNA • FWD 1 – OFF • AFT 1 – OFF • MID 1,3 (two) – OFF</td>
<td>MNA pwr to DSP Logic buses 1,3</td>
<td>54 Logic buses 1(3) remain pwrd via MNB(MNC)</td>
<td></td>
</tr>
<tr>
<td>[ML86B:A] • cb MNA H2O LINE HTR A – op • cb MNA SUPPLY H2O TKA INLET – OP • cb MNA SUPPLY H2O TKB OUTLET – OP • cb MNA WASTE H2O DUMP VLV/NOZ HTR – OP</td>
<td>MNA FMC1 Bus pwrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ML86B:B] • cb MNA WASTE H2O TK1 VLV – op • cb MNA SPLY H2O TKD OUTLET – op • cb MNA WASTE H2O DUMP ISOL – op • cb MNA VAC VENT ISOL VLV – op • cb MNA WCs CNTLR – op • cb MNA GALLEY OVEN – op</td>
<td>15 Sply H2O TKA Inlet Vlv Cntl</td>
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<tr>
<td>[ML86C:C] • cb MNA EXT ARLK HTR STRUC Z1/2/3 – op • cb MNA EXT ARLK HTR LN ZN1, ZN2 (two) – op • cb MNA EXT ARLK HTR VEST Z1/2/3 – op</td>
<td>15 Sply H2O TKD Outlet Vlv Cntl</td>
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<tr>
<td>[ML86D] • cb MNA MMU • PORT/STBD HTR A (two) – op • GN2 SPLY ISOL VLV A – op</td>
<td>15 Waste H2O Dump Isol Cntl</td>
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<tr>
<td>[ML86B:E] • cb MNA EMU 2 H2O • SPLY – op • WASTE – op • cb MNA FLOOD • TNL ADAPT 2 – op</td>
<td>Ext Arlk Htrs A</td>
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**EPS SSR-10 (Cont)**

**BUS LOSS: MNA DA1**

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<th>EQUIP/FUNCTION LOST</th>
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<tr>
<td><strong>ONLY ON MCC CALL, PERFORM</strong></td>
<td></td>
<td>Ctr MPS He reg A &lt; 680 during entry (MM303)</td>
<td><strong>7</strong> Vlv holds position. N2 Sys 2 remains</td>
</tr>
<tr>
<td><em>(ML86B:F)</em></td>
<td>Middeck floodlt 1,8</td>
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<td><strong>13</strong> Vlv holds position</td>
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<tr>
<td>cb MNA FLOODS</td>
<td>WMC Floodlt, M013q pnl It 2</td>
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<td><strong>20</strong> Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge</td>
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<tr>
<td>• MIDDECK 1/8 – op</td>
<td>Airlk Floodlt 1</td>
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<td><strong>46</strong> Current Snsr 2 remains</td>
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<tr>
<td>• WMC/MO13Q – op</td>
<td>Cryo O2 Tk3 Htr Current Snsr 1</td>
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<td><strong>55</strong> Snsr 2 remains</td>
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<tr>
<td>• AIRLK 1 – op</td>
<td>Cryo O2 Tk5 Htr Current Snsr 1</td>
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<td><strong>56</strong></td>
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<tr>
<td>cb MNA CRYO</td>
<td>Cryo O2 Tk 6-9 Htr Current Snsr 1</td>
<td></td>
<td><strong>57</strong> Unable to confirm redundant coils</td>
</tr>
<tr>
<td>• O2 HTR TK3 SNSR 1 – op</td>
<td></td>
<td></td>
<td><strong>58</strong> Redundant coils remain</td>
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<tr>
<td>• O2 HTR TK5 SNSR 1 – op</td>
<td>MCD HUD</td>
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<td><strong>59</strong> MCC for OMS Qty. All Qty's are frozen on</td>
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<tr>
<td><em>(A15:H,I,J,K)</em></td>
<td>Port, Stbd Rad Dpy/Sto Mtr 1</td>
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<td><strong>60</strong> GNC SYS SUMM 2</td>
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<tr>
<td>• cb MNA TK6-TK9 O2 HTR SNSR 1 – op</td>
<td>Port, Stbd Rad Lat 1-6, 7-12 Mtrs 1</td>
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<td><strong>61</strong> Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running</td>
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<tr>
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<td>Fwd RCS Jet 1 Hrs</td>
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<td><strong>62</strong> Vlv fails closed. Redundant vlv remains</td>
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<tr>
<td></td>
<td>L OMS Purge Vlv 1,2</td>
<td></td>
<td><strong>63</strong> Pwr Sply A remains. Turbine speed ind lost</td>
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<tr>
<td></td>
<td>L OMS Eng Pr Vlv Coil 1</td>
<td></td>
<td><strong>64</strong> Loss of Hyd Sys 1 deploy capability for all Ldg Gear. Pyro backup release sys will deploy Ldg Gear. NLG can also be deployed by Hyd Sys 2</td>
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<tr>
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<td>L OMS Cntl Vlv 1,2 Coils 1</td>
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<td><strong>65</strong> Hyd Sys 2 still available for NWS</td>
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<td>R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coils 2</td>
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<td><strong>66</strong> Mtr 2 remains</td>
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<td>OMS Qty Gaging</td>
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<td><strong>67</strong> Redundant RPC remains</td>
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<td>APU 1 Cntl Pwr Sply A</td>
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<td><strong>68</strong> MNB pwr select capability remains</td>
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<tr>
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<td>1 Fu Tk Vlv A</td>
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<td>3 Cntl Pwr Sply B</td>
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<td>3 Fu Tk Vlv B</td>
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<td>Hyd Revr 1 Qty Snsr</td>
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<td>15 TVC Hyd Sys 1 Isol Cntl</td>
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<td>15 Hyd Brake Isol Vlv 1 Cntl</td>
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<td>63 LG Extend Isol Vlv</td>
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<td>63 Vlv 1</td>
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<td>64 NWS Hyd Sys 1</td>
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<td>Y Star Trkr Dr Sys 1 OP/CL capability</td>
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<td>LH Vents 5,6,8,9 Mtrs 1</td>
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<td>RH Vents 1,2,3,5,6 Mtrs 1</td>
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<td>L ADP Deploy Mtr 1</td>
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<td>Htr Cntl 1</td>
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<td>Hyd Main Pump 1 Depress Solenoid RPC A</td>
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<td>Hyd Main Pump 3 Depress Solenoid RPC B</td>
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<td>7 Atm Press Cntl O2 Sys 1 Sply Vlv Cntl</td>
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<td>26 EMU 2 Sply and Waste H2O Vlv Cntl</td>
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<td>68 EMU 1,2 Pwr/Batt Chgr MNA pwr</td>
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<td>PL Reten Sys A Rel/Lat Mtrs</td>
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## BUS ISOLATION

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<td>69 Ctr Eng He Intercon Outlet Vlv</td>
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<td>61 Ctr Eng He Isol A</td>
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<td>61 Pneu He Isol 1</td>
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<tr>
<td>70 He Sply Blowdn Vlv 1,2</td>
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<tr>
<td>71 Prplt F/D Inbd LH2 Vlv</td>
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<td>72 ET Door Mtrs:</td>
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<td>C/L Lat Actr 1 Mtr 1</td>
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<td>2 Mtr 1</td>
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<td>L Dr Closure Mtr 1</td>
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<td>Uplock Lat Mtr 1</td>
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<td>73 Ku-Bd Jettison Sys A</td>
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<td>73 Stbd RMS:</td>
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<td>Jett/Guil Sys A</td>
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<td>Deadface Relays</td>
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<tr>
<td>74 Freon Loop 1,2 Cntrl B Rad Byp Vlv Mtrs</td>
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<td>Ops Hyd Actr Instr</td>
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## EQUIP/FUNCTION LOST

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<thead>
<tr>
<th>CREW INDICATIONS</th>
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<tbody>
<tr>
<td>61 Vlv fails closed. Redundant vlv remains</td>
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</tr>
<tr>
<td>69 Vlv fails closed</td>
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</tr>
<tr>
<td>70 Vlv fails closed. Aft compartment, OMS pods, ET umbilical cavity will not be purged during entry (MM304)</td>
<td></td>
</tr>
<tr>
<td>71 Vlv holds position. Loss of manual capability to inert LH2 Manf</td>
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</tr>
<tr>
<td>72 Redundant mtr remains</td>
<td></td>
</tr>
<tr>
<td>73 Sys B remains</td>
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</tr>
<tr>
<td>74 Bypass vlv holds position and Cntrl A Rad Byp Vlv Mtr remains</td>
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</tbody>
</table>
### ACTIONS
1. Perform FC1 SHUTDN (FC SHUTDN Cue Card), pwrdn not needed, then:

   (R1)
   - cb AC CONTR AC1 φA, φB, φC (three) – cl
   - INV/AC BUS 1 – OFF (tb-OFF)
   - INV PWR 1 – OFF (tb-OFF)
   - cb AC CONTR AC1 φA, φB, φC (three) – op
   - AC1 BUS SNSR – OFF

2. Maintain LiOH canister(s) changeout per cue card and FLIGHT PLAN

   Refer to OMS/RCS Slide Rule for viv loss info

3. Reconf following vlv(s) only if isolation reqd:

   (OS)
   - FWD RCS He PRESS A

4. If EMU(s) in battery charge mode:

   (AW 18M)
   - PW/BATT CHGR EMU 1(2) BUS SEL – MNB

5. If OBSS berthed:

   (A8L)
   - PORT RMS HTR A – AUTO
   - PORT RMS HTR B – AUTO

### EQUIP/FUNCTION LOST
1. FC1 Pumps & pH Snr
2. AC1 φA, φB, φC Inverters
3. Fwd RCS He Press Isol A
4. MDU CRT 1
5. EMU 1,2 Pwr/Batt Chgr MNA pwr
6. IDP 1
7. MMU 1

### CREW INDICATIONS
1. Master Alarm
2. Light/Tone – on CRT 1 blanks
3. F/C Pump lt – on
4. AC1 Volts < 90

### NOTES
1. Time Critical
2. FC1 must be shutdn within 9 min to avoid potentially hazardous condition
3. Will be repwrd after AC Pwr Transfer Cable connected
4. Do not reconf for reg switch or I’CNCT procedures
5. Viv holds position. Man OP capability remains. Isol B remains
6. Loss of redundant port to the following: MDU CDR 1 (S) MDU CDR 2 (P) MDU MFD 2(P) MDU PLT 1 (S)
7. S86 WSB T1 if in BLR CNTRL/HTR 1B. S86 WSB T3 if in BLR CNTRL/HTR 3A
8. Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning
9. Temp sensing lost
10. All brakes ON and safing initiated
11. Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists. May be repwrd after AC Pwr Transfer Cable connected
12. Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists. May be repwrd after AC Pwr Transfer Cable connected
13. H2O PWR/BATT CHGR EMU 1
14. May be repwrd after AC Pwr Transfer Cable connected
15. Viv holds position

---

(Continued)
### ACTIONS

If Cab Temp Cntlr 2 active:
- CAB TEMP CNTLR - OFF
  - CAB TEMP CNTLR – OFF
  - Remove pin from SEC Actuator and BYP vlv linkage, connect linkage to PRI Actuator
- CAB TEMP CNTLR – 1
  - H2O LOOP 2 OUT P
  - C/W PARAM SEL tw – 115
  - PARAM - INH
  - C/W PARAM SEL tw – > 119

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>EQUIP/FUNCTION LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Cabin Temp Cntlr 2, Hx BypVlv Mtr 2</td>
</tr>
</tbody>
</table>
| 17     | Hyd H2O Blr 1 Cntlr B
|        | Rsrv 1 Qty Snsr     |
| 18     | H2O Loop 2 Byp Cntlr, Sig Condr |
|        | H2O Loop 2 Byp Vlv prw
|        | 2 Pump GPC Cntl
|        | 1 Pump A             |
| 19     | Av Bay 1 Fan A       |
|        | Av Bay 2 Sig Condr, Xdcrs
|        | (ECLS SC3)           |
|        | Av Bay 3 Fan B       |
|        | Freon Loop 1 Pump A
|        | 2 Pump B             |
| 20     | Arlk/Tnl Fan A      |
| 21     | Cabin Air Sig Condr (ECLS SC6) |
| 22     | WCS Fan-Sep 1       |

### CREW INDICATIONS

- STAR TRKR DR POS - Y
- OP/CL time incr from 8 to 16 sec
- If H2O PUMP LOOP 1 A active:
  - ‘S88 H2O LOOP 1 FLOW’
  - ‘S88 H2O LOOP 1 TEMP’
  - ‘S88 H2O PUMP P1’
- If FREON PUMP LOOP 2 B – ON:
  - ‘S88 FREON FLOW 2’
  - ‘S88 FRN AFT CP 2’
  - ‘S88 FRN PL HX 2’
- H2O PUMP OUT PRESS
  - LOOP 1 ind – 20-25 psia
  - FREON FLOW LOOP 2
  - ind – 578 pph
- If Hum Sep A ON:
  - ‘HUMID SEP A’
- If IMU Fan A ON:
  - ‘S66 IMU FAN DP’
  - ‘S66 IMU FN SPD A’
- If APUs active and using BLR CNTLR/HTR 1B or 3A:
  - C/W APU TEMP lt – on after ~2 min
- RMS D&C tb – bp except:
  - BRAKES tb – OFF
  - RATE MIN tb – OFF
  - RATE HOLD tb – OFF
  - SOFT STOP tb – gray
  - RATE SCALE tb – gray

### NOTES

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>All brakes ON and safing initiated</td>
</tr>
<tr>
<td>16</td>
<td>Lose Auto Temp Cntl via Cntlr 2 and H2O Loop 2 Cabin Hx In Temp snrs. Hx Byp Vlv holds position. May be repwrd after AC Pwr Transfer Cable connected</td>
</tr>
<tr>
<td>17</td>
<td>Inhibits H2O Loop 2 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, respectively</td>
</tr>
<tr>
<td>18</td>
<td>H2O Loop 2 Byp Vlv holds position</td>
</tr>
<tr>
<td>19</td>
<td>H2O Loop 2 Pump Out Press, Pump ΔP, Accum Qty, Pump Out Temp snrs lost</td>
</tr>
<tr>
<td>20</td>
<td>Av Bay 2 Fan ΔP, Air Out Temp snrs lost</td>
</tr>
<tr>
<td>21</td>
<td>Use streamers (if flown) or monitor by feel during wake periods if Cabin Air Sig Condr not recovered</td>
</tr>
<tr>
<td>22</td>
<td>CO2 partial Press and Cabin Fan ΔP snrs lost</td>
</tr>
</tbody>
</table>

(Continued)
**BUS LOSS: MNA FPC1**

### BUS ISOLATION

- **ONLY ON MCC CALL, PERFORM**
  - • MDU CRT 1 PWR – OFF
  - (C2)
    - • IDP/CRT 1 PWR – OFF
  - (O1)
    - • (OV105) GPS 1 PWR – OFF
    - • (OV105) GPS 1 PRE AMPL UPPER – OFF
    - • (OV105) GPS 1 PRE AMPL LOWER – OFF
  - (O14:C)
    - • cb MNA FIRE
      - SUPPR BAY 3 – op
  - (O14:D)
    - • (OV105) GPS 1 PRE AMPL UPPER – op
    - • (OV105) GPS 1 PRE AMPL LOWER – op
  - (O14:F)
    - • MMU 1 – OFF
  - (MA73C:A)
    - • MCA LOGIC MNA FWD 1 – OFF

### EQUIP/FUNCTION LOST

- (OV105) GPS 1

### CREW INDICATIONS

- 23 AC1 Bus Isolation for AC Pwr Transfer Cable installation accomplished in MNA FPC1 ACTIONS column. No additional bus isolation steps reqd.
- 24 Mtr 2 remains
- 25 Htr Cntr 2 remains
- 26 Loss of Hyd Sys 1 deploy capability for all Ldg Gear. Pyro backup Release Sys will deploy Ldg Gear. NLG can also be deployed by Hyd Sys 2
- 27 Buses remain pwr
d
- 28 Redundant mtrs remain
- 29 Hyd Sys 2 still available for NWS
- 30 Bypass vlv holds position and Cntr A Rad Byp Vlv Mtr remains

### NOTES

- 23 AC1 Bus Isolation for AC Pwr Transfer Cable installation accomplished in MNA FPC1 ACTIONS column. No additional bus isolation steps reqd.
- 24 Mtr 2 remains
- 25 Htr Cntr 2 remains
- 26 Loss of Hyd Sys 1 deploy capability for all Ldg Gear. Pyro backup Release Sys will deploy Ldg Gear. NLG can also be deployed by Hyd Sys 2
- 27 Buses remain pwr
d
- 28 Redundant mtrs remain
- 29 Hyd Sys 2 still available for NWS
- 30 Bypass vlv holds position and Cntr A Rad Byp Vlv Mtr remains
### ACTIONS

1. Perform MNA BUS TIE (BUS TIE Cue Card)
2. Monitor, record lamp status between FC1 and tied FC
3. PL CAB – MNB

### EQUIP/FUNCTION LOST

1. FC1 Purge Vlv O2, H2 Flow Xdcrs
2. MNA pwr to CABPL1, 2, 3 buses

### CREW INDICATIONS

1. Loss of FC1 Purge capability
2. Loss of MNL pwr to CABPL1, 2, 3

### BUS ISOLATION

Only on MCC call, perform

1. FC PURGE VLV 1 – CL
2. FC STARTUP HTR 1 – ENA

### PLBD CONFIG'

1. Dummy
2. Buffers and OIU 1
3. OIU 1 redundant power feed for all OBSS subsystems

### NOTES

1. Buses are tied due to loss of FC1 Purge capability
2. As FC1 loses performance, tied FC will pick up load, slowing FC1 degradation. If degradation projection exceeds nominal EOM, FC1 will be shut down.
3. V)(C)
4. B/U pwr remains
5. PLB Floodlts:
6. SM (BFS, SM) 63 PL BAY DOORS
7. PLB Floodlts:
8. Hyd Bk Htr A
9. During MAN
10. PLB Floodlts:
11. single mtr run time noted on actuators listed at left

### BUS LOSS: MNA MPC1

(Includes MNA MMC1 & MNA MMC3)

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FC1 Startup Htr Inh capability</td>
<td>1. FC1 Purge Vlv O2, H2 Flow Xdcrs</td>
<td>1. Loss of FC1 Purge capability</td>
</tr>
<tr>
<td>2. PLB Floodlts:</td>
<td>2. MNA pwr to CABPL1, 2, 3 buses</td>
<td>2. Loss of MNL pwr to CABPL1, 2, 3</td>
</tr>
<tr>
<td>3. Vest Dep Vlv Sys 1 Vent</td>
<td>3. O2 Sys 1 SPLY tb – CL</td>
<td>3. FC1 Startup Htr is disconnected</td>
</tr>
</tbody>
</table>

During MAN, OBSS piloting, single mtr time noted on actuators listed at left.
### Actions

<table>
<thead>
<tr>
<th>(A7L) IF DOCKING MISSION</th>
<th>(A7L) MADS</th>
</tr>
</thead>
<tbody>
<tr>
<td>cb DOCK LT MNA</td>
<td>cb STRAIN GAGE – OFF</td>
</tr>
<tr>
<td>TRUSS FWD – op</td>
<td>WB/ACIP PCM – OFF</td>
</tr>
<tr>
<td>VEST PORT – op</td>
<td>MCA LOGIC MNA MID 1,3</td>
</tr>
<tr>
<td>SYS PWR SYS 1 MNA – OFF</td>
<td>(two) – OFF</td>
</tr>
<tr>
<td>PSU PWR MNA – OFF cb MNA</td>
<td>MCA LOGIC MNA MID 1,3</td>
</tr>
<tr>
<td>LOGIC 1 – op</td>
<td>MCA LOGIC MNA MID 1,3</td>
</tr>
<tr>
<td>PYRO PWR MNA – OFF LIGHTS</td>
<td>MCA LOGIC MNA MID 1,3</td>
</tr>
<tr>
<td>AIRLK 1/4 MNA – OFF</td>
<td>MCA LOGIC MNA MID 1,3</td>
</tr>
</tbody>
</table>

### Equipment/Function Lost

<table>
<thead>
<tr>
<th>MNA A7</th>
<th>MADS W/B FDM, WBSC, SGSC, ACIP PCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fwd Truss Docking It</td>
<td>MNA pwr to DSP Logic buses 1,3</td>
</tr>
<tr>
<td>Port Vestibule Docking It</td>
<td>MNA Pyro System</td>
</tr>
<tr>
<td>DSP SYS 1 Pwr</td>
<td>External Airlock Its 1,4</td>
</tr>
<tr>
<td>PSU MNA Pwr</td>
<td></td>
</tr>
</tbody>
</table>

### Crew Indications

<table>
<thead>
<tr>
<th>DSP SYS PWR SYS 1 tb – OFF</th>
</tr>
</thead>
</table>

### Notes

- Vlv holds position. Sys 2 remains
- MNB htrs remain
- All docking mechanisms will have single mtr times
- Logic buses 1(3) remain pwrd via MNB(MNC)
- Buses remain pwrd
- Cntrls A,B Rad Byp Vlv mtrs auto cntl and Cntrl A Rad Byp Vlv mtr remain
- Snr 2 remains
- Lost capability to observe and record FC single cell voltages
EPS SSR-13
BUS LOSS: MNA APC1

**ACTIONS**

For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)

Refer to OMS/ RCS Slide Rule for vlv loss info (use APC 4 Slide for Alt RCS)

**EQUIP/FUNCTION LOST**

1. MASTER ALARM
   Light/Tone – on
   (F7)
   C/W RCS JET lt – on
   (FSM)
   L RCS D(L) JET
   If OMS GMBL cmd abs value > 2 deg:
   C/W OMS TVC lt
   'L OMS GMBL' (3,B)
   If OMS GMBL cmd abs value > 2 deg and Sec TVC selected:
   C/W OMS TVC lt
   'R OMS GMBL' (3,B)

2. RCS Manf L5 RJD pwr
   (L5L,L5D)

3. Alt L R RCS He Pr Isol A
   GPC Cntl and Man CL capability

**CREW INDICATIONS**

1. MASTER ALARM
   Light/Tone – on
   (F7)
   C/W RCS JET lt – on
   (FSM)
   L RCS D(L) JET
   If OMS GMBL cmd abs value > 2 deg:
   C/W OMS TVC lt
   'L OMS GMBL' (3,B)
   If OMS GMBL cmd abs value > 2 deg and Sec TVC selected:
   C/W OMS TVC lt
   'R OMS GMBL' (3,B)

**NOTES**

1. Indications do not appear until jet commanded

2. Manf status not automatically declared closed. Fail-offs will occur when jets commanded

3. Vlv holds position. Man OP capability remains

4. Maintains control capability for APC6 failure

5. Do not reconfig for reg switch or I’CNCT procedures

6. Vlv holds position. Man CL and full GPC cntl remain

7. In event of APU 1 auto shutdn, vlv remains OP until APU FU TK VLV – CL

8. Htr B remains

9. Htr A remains

10. Lost TM:
    RCS/OMS HTRS
    • L Pod (two) – A OFF, B AUTO
    • R Pod (two) – B OFF, A AUTO
    • OMS CRSFD LINES
      (two) – A OFF, B AUTO

11. Prior to using L(R) OMS:
    • L(R) OMS He PRESS/VAP
      • ISOL A – OP
      • B – GPC

12. Maintains He Isol redundancy

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

09/25/08
7-117
MAL/ALL/GEN J
### ACTIONS

<table>
<thead>
<tr>
<th>(A12)</th>
<th>APU HTR GAS GEN/FUEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>• PUMP 1 – B AUTO</td>
</tr>
<tr>
<td>2</td>
<td>• 3 – A AUTO</td>
</tr>
<tr>
<td>APU HTR</td>
<td></td>
</tr>
<tr>
<td>LUBE OIL LINE 1 – B AUTO</td>
<td></td>
</tr>
<tr>
<td>LUBE OIL LINE 3 – A AUTO</td>
<td></td>
</tr>
<tr>
<td>APU HTR TK/FU LN/H2O 2</td>
<td></td>
</tr>
<tr>
<td>SYS 1A – OFF</td>
<td></td>
</tr>
<tr>
<td>1B – AUTO</td>
<td></td>
</tr>
<tr>
<td>3A – AUTO</td>
<td></td>
</tr>
<tr>
<td>3B – OFF</td>
<td></td>
</tr>
<tr>
<td>HYD HTR</td>
<td></td>
</tr>
<tr>
<td>RUD SPD BK A – OFF</td>
<td></td>
</tr>
<tr>
<td>BKY B – AUTO</td>
<td></td>
</tr>
<tr>
<td>BDY FLP A – OFF</td>
<td></td>
</tr>
<tr>
<td>ELEVON A – OFF</td>
<td></td>
</tr>
<tr>
<td>ELEVON B – AUTO</td>
<td></td>
</tr>
<tr>
<td>HYD CIRC PUMP</td>
<td></td>
</tr>
<tr>
<td>PWR 1 – MNB</td>
<td></td>
</tr>
<tr>
<td>3 – MNC</td>
<td></td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>APU 1 GG/Fu Pump Htrs A</td>
</tr>
<tr>
<td>3 GG/Fu Pump Htrs B</td>
</tr>
<tr>
<td>APU 1 Lube Oil Line Htr A</td>
</tr>
<tr>
<td>APU 3 Lube Oil Line Htr B</td>
</tr>
<tr>
<td>APU 1 Tk/Fu Ln Htrs A</td>
</tr>
<tr>
<td>3 Tk/Fu Ln Htrs B</td>
</tr>
<tr>
<td>R Rud/Spd Brake Htr A</td>
</tr>
<tr>
<td>Body Flap Htr A</td>
</tr>
<tr>
<td>Elevon Actr Htrs A</td>
</tr>
<tr>
<td>Circ Pump 1 MNA pwr</td>
</tr>
<tr>
<td>3 MNA pwr</td>
</tr>
<tr>
<td>FES Pri B Cntlr</td>
</tr>
<tr>
<td>Top Evap L Noz Htr A</td>
</tr>
<tr>
<td>Top Evap Duct L/R Htrs A</td>
</tr>
<tr>
<td>Hi Load Duct Noz Htr A</td>
</tr>
<tr>
<td>Hyd H2O Blr 1 Cntlr B</td>
</tr>
<tr>
<td>3 Cntlr A</td>
</tr>
<tr>
<td>FES H2O Fdln A Htrs 1 (all except MID 2)</td>
</tr>
<tr>
<td>FES H2O Fdln B Htrs 2 (all except MID 2)</td>
</tr>
<tr>
<td>Hyd H2O Blr 1 Cntlr B</td>
</tr>
<tr>
<td>3 Cntlr A</td>
</tr>
<tr>
<td>RCS Manf L5 RJD pwr (L5L,L5D)</td>
</tr>
<tr>
<td>L Pod A Htrs (all)</td>
</tr>
<tr>
<td>R Pod B Htrs (partial)</td>
</tr>
<tr>
<td>OMS Crsfd Ln A Htrs (all)</td>
</tr>
<tr>
<td>Alt L/R RCS He Pr Isol A</td>
</tr>
<tr>
<td>GPC Cntl and man CL capability</td>
</tr>
<tr>
<td>Alt L/R RCS He Pr Isol B man OP capability</td>
</tr>
<tr>
<td>AFT L/R ACS TK ISOL 3/4/5 A – GPC (tb-bp)</td>
</tr>
<tr>
<td>AFT R ACS TK ISOL 3/4/5 A – GPC (tb-bp)</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MASTER ALARM</td>
</tr>
<tr>
<td>Light/Tone – on</td>
</tr>
<tr>
<td>(F7) C/W RCS JET lt – on</td>
</tr>
<tr>
<td>SM ALERT Light/Tone – on</td>
</tr>
<tr>
<td>(FSMs) L RCS D(L) JET</td>
</tr>
<tr>
<td>3 HYD BRAKE ISOL VL 1 tb – OP</td>
</tr>
<tr>
<td>4 LG EXTEND ISOL VL 2 tb – OP</td>
</tr>
<tr>
<td>5 HYD MPS/TVC ISOL VLV</td>
</tr>
<tr>
<td>SYS 1 tb – CL</td>
</tr>
<tr>
<td>(O7) AFT L RCS He PRESS A tb – bp</td>
</tr>
<tr>
<td>5 AFT R RCS He PRESS A tb – bp</td>
</tr>
<tr>
<td>6 AFT L/R ACS TK ISOL 3/4/5 A tb – bp (if vlv in CL position)</td>
</tr>
<tr>
<td>(F7) If APUs active, and using BLR CNTLR/HTR 1B or 3A; C/W APU TEMP lt – on after ~2 min</td>
</tr>
<tr>
<td>If OMS GMBL cmd abs value &gt; 2 deg:</td>
</tr>
<tr>
<td>C/W OMS TVC lt</td>
</tr>
<tr>
<td>L OMS GMBL (3,B)</td>
</tr>
<tr>
<td>If OMS GMBL cmd abs value &gt; 2 deg and TVC selected:</td>
</tr>
<tr>
<td>C/W OMS TVC lt</td>
</tr>
<tr>
<td>R OMS GMBL (3,B)</td>
</tr>
<tr>
<td>If cooling by FES B only:</td>
</tr>
<tr>
<td>C/W FREON LOOP lt</td>
</tr>
<tr>
<td>'S88 EVAP OUT T1'</td>
</tr>
<tr>
<td>'S88 EVAP OUT T2'</td>
</tr>
</tbody>
</table>

### NOTES

1 Indications do not appear until jet commanded
2 Vlv holds position
3 Vlv holds position. Loss of Hyd Sys 1 deploy capability for all Ldg Gear. Pyro backup release sys will deploy Ldg Gear. NLG can also be deployed by Hyd Sys 2
4 Full vlv capability remains
5 Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position
6 Manf status not automatically declared closed. Fail-offs will occur when jet commanded
7 Htr B remains
8 Htr A remains
9 Do not reconfig for reg switch or ICNCT procedures
10 Do not reconfig for reg switch or ICNCT procedures
11 Vlv holds position. Man CL, full GPC Cntl remains

---

[Continued]
### EPS SSR-14 (Cont)

**BUS LOSS: MNA APC4**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GNC 23 RCS</strong> &lt;br&gt;• Reprioritize L,R Manf 2 Jets to first priority: DES INH twice all other jets, highest priority first, then next highest, etc.</td>
<td>Aft RCS L,R Jet 2 Hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 DES INH on L Manf 3 Jets:</td>
<td>L OMS GN2 Press Vlv OP TM Eng Pr Vlv Coil 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ITEM 2 EXEC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• L3L ITEM 12 EXEC (*)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• L3D ITEM 28 EXEC (*)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• L3A ITEM 30 EXEC (*)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Set aft pod(s) PRI JET FAIL LIMIT to 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GNC XXXXX</strong> &lt;br&gt;<strong>MNVR YYYYY</strong> (3,B) &lt;br&gt;Sel L OMS SEC TVC:</td>
<td>L OMS Pri TVC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• L OMS GMBL SEC – ITEM 30 EXEC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sel R OMS PRI TVC:</td>
<td>R OMS Sec TVC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• R OMS GMBL PRI – ITEM 29 EXEC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If reqd during entry (&lt; 120K ft):</td>
<td></td>
<td>No purge. Wait 10 min between burns</td>
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<tr>
<td>• NH3 CNTLR B – PRI/GPC</td>
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<tr>
<td>If NH3 CNTLR A(B) – SEC/ON reqd, then:</td>
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<tr>
<td>• H2O PUMP LOOP 1,2 (two) – ON</td>
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<tr>
<td>• FLOW PROP VLV LOOP 1,2 (two) – ICH</td>
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<tr>
<td>• Activate PL H2O LOOP(s) (if applicable)</td>
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<tr>
<td><strong>BUS ISOLATION</strong> &lt;br&gt;ONLY ON MCC CALL, PERFORM (MA73C:B)</td>
<td>MNA AMC1 Bus pwr LH Vent 8.9 Mtr 1</td>
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<tr>
<td>• MCA LOGIC MNA AFT 1 – OFF</td>
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<tr>
<td><strong>CAUTION</strong></td>
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## BUS ISOLATION

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
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<tbody>
<tr>
<td>3</td>
<td>Hyd Brake Isol Vlv Cntl</td>
<td>Ctr MPS He reg A &lt; 680 during entry (MM303)</td>
<td>③ Vlv holds position</td>
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<tr>
<td>4</td>
<td>LG Extend Isol Vlv Cntl</td>
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<td>④ Vlv holds position. Loss of Hyd Sys 1 deploy capability for all Ldg Gear. Pyro backup release sys will deploy Ldg Gear. NLG can also be deployed by Hyd Sys 2</td>
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<tr>
<td>3</td>
<td>TVC Hyd Sys 1 Isol Cntl</td>
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<td>26</td>
<td>NWS Hyd Sys 1</td>
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<td>27</td>
<td>Hyd Main Pump 1 Depress</td>
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<td>27</td>
<td>Solenoid RPC A</td>
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<td>Hyd Main Pump 3 Depress</td>
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<td>Solenoid RPC B</td>
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<td>28</td>
<td>ATVC 2 Isol ME</td>
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<td>29</td>
<td>L OMS Purge Vlv 1,2 Qty gauging</td>
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<td>30</td>
<td>Pneu He Isol 1</td>
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<td>30</td>
<td>Ctr Eng He Isol A</td>
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<td>29</td>
<td>Ctr Eng He Intercon Outlet Vlv</td>
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<td>He Sply Blowdn Vlv 1,2</td>
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<td>32</td>
<td>Prptl F/D Inbd LH2 Vlv</td>
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<td>33</td>
<td>ET Door Mtrs:</td>
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<td>33</td>
<td>C/L Lat Actr 1 Mtr 1 GPC Cntl</td>
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<td>33</td>
<td>C/L Lat Actr 2 Mtr 1 GPC Cntl</td>
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<tr>
<td>33</td>
<td>L Dr Closure Mtr 1 GPC CL capability</td>
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<td>33</td>
<td>L Dr Uplock Lat Mtr 1 GPC Lat capability</td>
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<td>34</td>
<td>AC pwr removal capability via limit sw for ET Dr Mtrs:</td>
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<td>34</td>
<td>C/L Lat Actr 1 Mtr 1</td>
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<td>34</td>
<td>2 Mtr 1</td>
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<td>34</td>
<td>L Dr Closure Mtr 1</td>
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<td>34</td>
<td>Uplock Lat Mtr 1</td>
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### CREW INDICATIONS

- Ctr MPS He reg A < 680 during entry (MM303)

### NOTES

- ③ Vlv holds position
- ④ Vlv holds position. Loss of Hyd Sys 1 deploy capability for all Ldg Gear. Pyro backup release sys will deploy Ldg Gear. NLG can also be deployed by Hyd Sys 2
- ⑥ Redundant RPC remains
- ② Six vlvs fail to non-isolation position
- ④ Vlv fails closed. Redundant vlv remains
- ⑤ Vlv fails closed. Aft compartment, OMS pods, and ET Umbilical cavity will not be purged during entry (MM304)
- ⑥ Vlv holds position. Loss of manual capability to inert LH2 manf
- ⑥ Redundant mtrs remain
- ⑥ Actuators continue to operate until Stow, Rel/Lat, or OP/CL sw is taken to GND or OFF
## ACTIONS

| 2 | Refer to OMS/RCS Slide Rule for vlv loss info
|  | Reconfig following vlv(s) only if leak isolation reqd:
|  | (O8)
|  | • FWD RCS He PRESS A

| 4 | Override F1 Manf status to CL:
|  | • RCS FWD – ITEM 1 EXEC
|  | • MANF VLVS 1 OVRD – ITEM 40 EXEC

**Pre-seat ingress for entry:**
- Discharge handheld fire ext into AV BAY 3

## EQUIP/FUNCTION LOST

| 1 | Fwd RCS He Press Isol GPC CNTL and MAN CL capability
|  | (O8)
|  | • RCS Manf F1 RJD pwr (F1F,F1L,F1U,F1D)

**Av Bay 3 agent discharge capability**

## CREW INDICATIONS

| 1 | MASTER ALARM
|  | Light/Tone – on (F7)
|  | C/W RCS JET lt – on (FSM)
|  | F RCS D(F,L,U) JET (O8)
|  | FWD RCS He PRESS A tb – bp

## NOTES

1. Vlv holds position. Man OP capability remains
2. Do not reconfig for reg switch or I’CNCT procedures
3. Indications do not appear until jet commanded
4. Manf status not automatically declared closed. Jet fail-offs may occur
5. Htr Cntr 2 remains
### ACTIONS

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<thead>
<tr>
<th>A12</th>
<th><strong>APU HTR</strong></th>
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<tbody>
<tr>
<td>2</td>
<td><strong>GAS GEN/FUEL</strong></td>
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<tr>
<td></td>
<td>PUMP 1 – B AUTO</td>
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<tr>
<td>2</td>
<td><strong>GAS GEN/FUEL</strong></td>
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<tr>
<td></td>
<td>PUMP 3 – A AUTO</td>
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<tr>
<td>2</td>
<td><strong>LUBE OIL LN 1 – B AUTO</strong></td>
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<tr>
<td>2</td>
<td><strong>APU HTR TK/FLU LN/H2O</strong></td>
</tr>
<tr>
<td>2</td>
<td><strong>SYS 1A – OFF</strong></td>
</tr>
<tr>
<td>2</td>
<td>3A – AUTO</td>
</tr>
<tr>
<td>2</td>
<td>3B – OFF</td>
</tr>
<tr>
<td></td>
<td><strong>HYD HTR</strong></td>
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<td><strong>BDY FLAP A – OFF</strong></td>
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<tr>
<td></td>
<td><strong>ELEV A – OFF</strong></td>
</tr>
<tr>
<td></td>
<td><strong>B – AUTO</strong></td>
</tr>
<tr>
<td></td>
<td><strong>HYD CIRC PUMP</strong></td>
</tr>
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<td></td>
<td><strong>PWR 1 – MNB</strong></td>
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<td></td>
<td>3 – MNC</td>
</tr>
</tbody>
</table>

| L1 | **FLASH EVAP CNTLR PRI A(SEC) – ON** (if reqd) |
|    | **TOP EVAP HTR NOZ L – B AUTO** |
|    | **TOP EVAP HTR DUCT – B** If Hi Load Evap enabled |
|    | **HI LOAD DUCT HTR – B(C)** |

| L2 | **FLASH EVAP FDLN HTR** |
|    | **A SPLY – 2** |
|    | **B SPLY – 1** |

| R2 | **BLR CNTLR/HTR 1 – A** |
|    | 3 – B |

For attitude control:
- Perform LOSS OF VERNIERS (ORB OPS, RCS)

### EQUIP/FUNCTION LOST

| **APU 1 GG/Fu Pump Htrs A** |
| **APU 3 GG/Fu Pump Htrs B** |
| **APU 1 Lube Oil Line Htrs A** |
| **APU 3 Lube Oil Line Htrs B** |
| **APU 1 Tk/Fu Ln Htrs A** |
| **3 Tk/Fu Ln Htrs B** |
| **Body Flap Htr A** |
| **Elevon Actr Htrs A** |
| **Circ Pump 1 MNA pwr** |
| **3 MNA pwr** |

| **FES Pri B Cntlr** |
| **Top Evap L Noz Htr A** |
| **Top Evap Duct L,R Htrs A** |
| **Hi Load Duct Noz Htr A** |
| **FES H2O Fdln A Htrs 1 (all except MID 2)** |
| **FES H2O Fdln B Htrs 2 (all except MID 2)** |
| **Hyd H2O Blr 1 Cntlr B** |
| **3 Cntlr A** |
| **RCS Manf L5 RJD pwr** |
| **L5L,L5D** |
| **OMS Csrd Ln A Htrs (partial)** |

### CREW INDICATIONS

| **MASTER ALARM** |
| **Light/Tone – on** |

### NOTES

1. Indications do not appear until jet commanded
   - **TIME CRITICAL**
   - If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp

2. Vlv holds position

3. Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position

4. HYD H2O Blr and Tk Htrs still operative, but GN2 SOV fails open and steam vent htr and spray logic are disabled. Alternate controller must be selected

5. Manf status not automatically declared closed. Fail-offs will occur when jet commanded

6. Do not reconfig for reg switch or I’CNCT procedures

7. Vlv holds position. Man CL and full GPC Cntl remain
# EPS SSR-16 (Cont)
## BUS LOSS: MNA ALC1

### ACTIONS

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<tbody>
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<td>1. If ICNCT config: (07)</td>
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<tr>
<td>5. AFT L RCS TK ISOL 3/4/5 A – GPC (tb-bp)</td>
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<tr>
<td>8. AFT R RCS TK ISOL 3/4/5 A – GPC (tb-bp)</td>
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<tr>
<td>10. Save L OMS eng for deorbit (If reqd for additional on-orbit burns, √MCC)</td>
<td></td>
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<tr>
<td>11. Prior to using OMS: (08)</td>
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<tr>
<td>12. L(R) OMS He PRESS/VAP</td>
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<td>13. ISOL A – OP</td>
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<tr>
<td>14. B – GPC</td>
<td></td>
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<tr>
<td>15. If reqd during entry (&lt; 120K ft): (L1)</td>
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<tr>
<td>16. NH3 CNTLR B – PRI/GPC</td>
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<tr>
<td>17. If NH3 CNTLR A(B) – SEC/ON reqd, then: (L1)</td>
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<tr>
<td>18. H2O PUMP LOOP 1,2 (two) – ON</td>
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<tr>
<td>19. √FLOW PROP VLV LOOP 1,2 (two) – PL HX</td>
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<tr>
<td>20. If applicable</td>
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<tr>
<td>21. Activate PIL H2O LOOP(s)</td>
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### EQUIP/FUNCTION LOST

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<tr>
<td>1. AFT L,R RCS TK ISOL 3/4/5 A CL microswitch feedback</td>
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<tr>
<td>2. L OMS GN2 Press Vlv OP TM</td>
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<tr>
<td>3. L OMS Eng Pr Vlv Coil 1</td>
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</tr>
<tr>
<td>4. L R OMS He Pr Isol A GPC Cntl</td>
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<tr>
<td>5. NH3 Sys A Pri Ctrlr &amp; Auto sw over to Sec Ctrlr</td>
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### CREW INDICATIONS

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<tbody>
<tr>
<td>9. Ctr MPS He Reg A &lt; 680 during entry (MM303)</td>
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<tr>
<td>10. Lost TM: GNS SYS SUMM 2</td>
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<tr>
<td>11. L OMS N2 P VLV: If Eng – ARM/PRESS, assume vlv OP</td>
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<tr>
<td>12. NH3 CNTLR A(B) – SEC/ON reqd, then: (L1)</td>
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<tr>
<td>13. H2O PUMP LOOP 1,2 (two) – ON</td>
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<tr>
<td>14. √FLOW PROP VLV LOOP 1,2 (two) – PL HX</td>
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<td>15. If applicable</td>
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<tr>
<td>16. Activate PIL H2O LOOP(s)</td>
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### NOTES

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<tbody>
<tr>
<td>3. Vlv holds position</td>
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<tr>
<td>4. Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position</td>
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<tr>
<td>5. √MCC for OMS Qty. Disregard Qty on meter and GNC SYS SUMM 2</td>
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<tr>
<td>6. Lost TM: GNS SYS SUMM 2</td>
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<td>7. L OMS N2 P VLV: If Eng – ARM/PRESS, assume vlv OP</td>
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<tr>
<td>8. Unable to confirm redundant coils</td>
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<tr>
<td>9. Maintains He Isol redundancy</td>
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<tr>
<td>10. Vlv fails closed. Man cntl remains. Isol B remains</td>
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<tr>
<td>11. Sys A Sec Ctrlr man on capability remains</td>
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<td>12. Redundant coils remains</td>
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<tr>
<td>13. No purge. Wait 10 min between burns</td>
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<tr>
<td>14. Vlv fails closed</td>
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<tr>
<td>15. Vlv holds position. Loss of manual capability to inert LH2 Manf</td>
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<tr>
<td>16. Vlv fails closed. Redundant vlv remains</td>
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<tr>
<td>17. Vlv fails closed. Aft compartment, OMS pods, and ET umbilical cavity will not be purged during entry (MM304)</td>
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### EPS SSR-17
**BUS LOSS: MNA FMC1**

<table>
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<th>ACTIONS</th>
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<th>NOTES</th>
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<tr>
<td>(L1)</td>
<td>H2O PUMP LOOP 1 – B</td>
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<td>• H2O PUMP LOOP 1 – B</td>
<td>H2O Loop 1 Pump A</td>
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<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info</td>
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<td>[GNC 23 RCS]</td>
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<tr>
<td>Override F1 Manf status to OP:</td>
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<tr>
<td>• RCS FWD ITEM 1 EXEC</td>
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<tr>
<td>• MANF VLVS 1 OV/RD ITEM 40 EXEC</td>
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<td>[BUS ISOLATION]</td>
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<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
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<tr>
<td>(L1)</td>
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<tr>
<td>• H2O PUMP LOOP 1 – OFF</td>
<td>MNA FMC 1 Bus pwr</td>
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<td>(MA73C:C)</td>
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<tr>
<td>• MCA LOGIC MNA FWD 1 – OFF</td>
<td>RH Vent 1,2 Mtr 1</td>
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<td>3</td>
<td>L ADP Deploy Mtr 1</td>
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<td>4</td>
<td>-Y Star Trkr Dr Sys 1 OP/CL capability</td>
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<th>NOTES</th>
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<tbody>
<tr>
<td>①</td>
<td>Vlv holds position</td>
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<tr>
<td>②</td>
<td>If this action taken, H2O Pump Loop 2 must be pwrd</td>
</tr>
<tr>
<td>③</td>
<td>Mtr 2 remains</td>
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<tr>
<td>④</td>
<td>Htr Cntr 2 remains</td>
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### EPS SSR-18
**BUS LOSS: MNA MMC1**

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<tr>
<td>• cb MCA PWR AC1 3Φ MID 1 – op</td>
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<tr>
<td>For PLBD ops:</td>
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<tr>
<td>• OP/CL Drs in man mode</td>
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<tr>
<td>1</td>
<td>Port Rad Lat 1-6,7-12 Mtrs 1 Limit sw</td>
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<td>Port Rad Dpy/Sto Mtr 1</td>
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<tr>
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<td>Stbd Rad Dpy/Sto Mtr 2 Limit sw</td>
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<td>PLBD:</td>
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<td>C/L Lat 9-12 Mtr 1</td>
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<td>Port/Stbd Fwd Bkhd Lat Mtrs 1</td>
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<td>Port Door Mtr 1 CL Limit sw</td>
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<tr>
<td>Stbd Door Mtr 1 OP Limit sw</td>
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<tr>
<td>MNA MMC1 Bus pwr</td>
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<td>Port RMS Mid MRL Mtr 1</td>
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<td>Stbd RMS Fwd MRL Mtr 2</td>
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<tr>
<td>①</td>
<td>If AC1 MMC1 cb not opened, Lat Mtrs 1 of both Port Lat 1-6,7-12 Actuators continue to run until Sys A Lat Cntl sw placed to OFF</td>
</tr>
<tr>
<td>②</td>
<td>Mtr 2 will continue to drive until Sys A Cntl sw is taken to OFF</td>
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<tr>
<td>③</td>
<td>Mtr 2 will continue to drive closed until PL BAY DR – STOP</td>
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<tr>
<td>④</td>
<td>Mtr 1 will continue to drive open until PL BAY DR – STOP</td>
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<td>⑤</td>
<td>Single mtr time</td>
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<tr>
<td>⑥</td>
<td>Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</td>
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## EPS SSR-19
### BUS LOSS: MNA MMC3

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<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>(MA73C:D)</td>
<td>Stbd Rad Lats 1-6,7-12 Mtrs 1 Limit sw</td>
<td>(R13L)</td>
<td>1 If AC1 MM3 cb not opened, Lat Mtrs 1 of both Stbd Rad Lats 1-6,7-12 Actuators continue to run until Sys A Lat Cntl sw placed to OFF</td>
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<td></td>
<td>Stbd Rad Dpy/Sto Mtr 1</td>
<td>RAD CNTL PORT tb – bp</td>
<td>2 Mtr 2 will continue to drive until Sys B Cntl sw is taken to OFF</td>
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<td>Port Rad Dpy/Sto Mtr 2 Limit sw</td>
<td>If STBD RAD pnl stowed:</td>
<td>3 Single mtr time</td>
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<td>PLBD: G/L Lat 1-4,5-8 Mtr 1</td>
<td>RAD CNTL STBD tb – bp</td>
<td>4 Single mtr time</td>
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<td>Port Aft Blkhd Lats Mtr 1</td>
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<td>One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</td>
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</table>

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

(MA73C:B)

- MCA LOGIC MNA MID 3 – OFF
- MNA MMC3 Bus pwr
- LH Vents 5,6 Mtr 1
- Port RMS Aft MRL Mtr 2
- Stbd RMS Aft MRL Mtr 1

### CREW INDICATIONS

(R13L)

- RAD CNTL PORT tb – bp
- RAD CNTL STBD tb – bp

- SM (BFS SM 63) PL BAY DOORS
- If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg 'S63 PBD CONFIG'
- During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left

- STARBOARD RMS:
  - RETEN LAT tb – bp
  - R-F-L AFT tb – bp

### CREW INDICATIONS

- SM 94 PDRS CONTROL
  - PORT RMS Indication lost: Aft MRL Mtr 2
  - LAT/REL/RDY
- STBD RMS Indications lost: Aft MRL Mtr 1
  - LAT/REL/RDY

For PLBD ops:

- • OP/CL Drs in man mode

1 If AC1 MM3 cb not opened, Lat Mtrs 1 of both Stbd Lats 1-6,7-12 Actuators continue to run until Sys A Lat Cntl sw placed to OFF
2 Mtr 2 will continue to drive until Sys B Cntl sw is taken to OFF
3 Single mtr time
4 Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
**EPS SSR-20**
**BUS LOSS: MNA AMC1**

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<td><strong>MCA LOGIC MNA AFT 1 – OFF</strong></td>
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<td><strong>1. LG EXTEND ISOL VLV tb – OP</strong></td>
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## EPS SSR-21

### BUS LOSS: MNA R14

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R11L)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>MS AUD CNTL – PS</td>
<td></td>
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<tr>
<td></td>
<td>(L9)</td>
<td></td>
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<tr>
<td></td>
<td>IPS ATU PNL config</td>
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<td>for use</td>
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<td>(O6)</td>
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<tr>
<td></td>
<td>UHF EVA STRING – 2</td>
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<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
</tr>
<tr>
<td>(R14:A)</td>
</tr>
<tr>
<td>cb MNA AUD MS – op</td>
</tr>
<tr>
<td>ADC 1A/2A – op</td>
</tr>
<tr>
<td>MDU MFD 2 – op</td>
</tr>
<tr>
<td>MDU PLT 1 – op</td>
</tr>
<tr>
<td>(R14:B)</td>
</tr>
<tr>
<td>cb PALLET/DSC</td>
</tr>
<tr>
<td>1A/2B – op (EDO)</td>
</tr>
<tr>
<td>3A – op (EDO)</td>
</tr>
<tr>
<td>cb MNA</td>
</tr>
<tr>
<td>UHF – op</td>
</tr>
<tr>
<td>GCILC – op</td>
</tr>
<tr>
<td>CNTL BUS BC 1/2/3 – op</td>
</tr>
</tbody>
</table>

| (R14:C)       |
| cb UHF EVA – op |
| (R14:D)       |
| cb MNA TV C CAMR |
| CAMR/PTU – op |
| CAMR HTR – op |
| ILLUM/PTU HTR – op |
| cb MNA TV |
| CONTR UNIT – op |
| MON 1 – op |
| (R14:E)       |
| cb MNA PS FLOOD – op |
| cb MNA D CAMR |
| CAMR/PTU – op |
| CAMR HTR – op |
| ILLUM/PTU HTR – op |
| MDU MFD 2 PWR – OFF |
| MDU PLT 1 PWR – OFF |

| 2              | MS ATU, CCU, FD Spkr |
| 3              | SSOR 1               |
| 4              | MS ATU FD Spkr       |
| 5              | MS ATU               |
| 6              | FD Spkr              |
| 7              | PS Floodlt           |
| 8              | CCTV Video lost if MNA selected for VCU |
|                | CCTV Mon 1 lost      |
|                | (F7)                 |
|                | MDU MFD 2 blanks     |
|                | (F8)                 |
|                | MDU PLT 1 blanks     |

### CREW INDICATIONS

- PS Floodlt lost
- MS, OS
- CCTV Video lost if MNA selected for VCU
- CCTV Mon 1 lost
- (F7) MDU MFD 2 blanks
- (F8) MDU PLT 1 blanks

### NOTES

1. Listen only capability regained when headset used on MS CCU (from PS ATU) as FD speaker is also failed
2. Causes loss of redundant path for ACCU config control bits, loss of xmit capability via CCU, loss of FD spkr
3. Redundant pwr source remains for equipment
4. Possible loss of capability for xmitting to gnd via UHF
5. GCILC also pwrd via MNC cb
6. Buses remain powered
7. MNB pwr may be selected via TV pwr sw (pnl A7) or GCILC, if reqd
8. IDP 1 and IDP 2 ADC data lost. MDU port select may be reqd

09/26/08 7-127 MAL/ALL/GEN J
## EPS SSR-22
### BUS LOSS: MNA O14 & A8

### ACTIONS

<table>
<thead>
<tr>
<th>(A8L)</th>
<th>PORT RMS HTR A – OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PORT RMS HTR B – AUTO</td>
</tr>
</tbody>
</table>

If OBSS berthed:
| (A8L) | STBD RMS HTR A – OFF |
|       | STBD RMS HTR B – AUTO |

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>RMS: Port Primary pwr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Payload pwr</td>
</tr>
<tr>
<td>MCIU Port Htr A</td>
</tr>
<tr>
<td>Stbd Htr A</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>RMS D&amp;C tb – bp except:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRAKES tb – OFF</td>
</tr>
<tr>
<td>RATE MIN tb – OFF</td>
</tr>
<tr>
<td>RATE HOLD tb – OFF</td>
</tr>
<tr>
<td>SOFT STOP tb – gray</td>
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<tr>
<td>RATE SCALE tb – gray</td>
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### BUS ISOLATION

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<thead>
<tr>
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<tbody>
<tr>
<td>NONE</td>
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<tr>
<th>ON control for RCS Manf F1</th>
</tr>
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<tbody>
<tr>
<td>RJD pwr (F1F,F1L,F1U,F1D)</td>
</tr>
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</table>

### NOTES

1. B/U drive capability remains. All brakes ON and safing initiated
2. All brakes ON and safing initiated
3. When the OBSS is grappled by the RMS, the OBSS uses the RMS Payload power feed for all OBSS subsystem heater and operational power, except LCS
4. If driver sw OFF when bus failed, F1 Manf Drivers lost
### ACTIONS

**[R1]**
- MN BUS TIE C – ON (tb-ON)

**[L1]**
- If RAD CNTLR LOOP 1,2 – AUTO B:
  - Perform ON-ORBIT RAD CNTLR SWITCH, ECLS SSR-13 for Freon Loop 1,2

**[L2]**
- FREON ISOL MODE – OFF

**[F6,F8]**
- HSI SEL SOURCE – other than MLS, (OV103,4)
- TACAN 1 or (OV105) GPS 1
- RDR ALTM – 2

**[O6]**
- ANNUN BUS SEL ACA 1 – MNB

If on PCS 1:
- Perform RECONFIG TO ALT PCS SYS, ECLS SSR-3

### EQUIP/FUNCTION LOST

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<td>2 H2O Loop 1 Intchg rate and IMU fan #:P snrs lost</td>
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<tr>
<td>3 ACA recovered by switching to alternate pwr</td>
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<tr>
<td>4 After MET 3:30, tb already bp</td>
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<td>5 Vlv holds position</td>
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<td>BUS ISOLATION</td>
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<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
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<tr>
<td>(O6) • S TRK PWR -Z – OFF</td>
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<td>(O7) • (OV105) GPS 1 PWR – OFF</td>
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<td>(O8) • RDR ALTM 1 – OFF</td>
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<td>cb MNA OI H2O</td>
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### EPS SSR-24
**BUS LOSS: MNA R1A1**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>MNA pwr to CNTL buses AB1,AB2,AB3,CA1,CA2,CA3</td>
<td>NONE</td>
<td>① Buses remain pwrd</td>
</tr>
<tr>
<td></td>
<td>MNA pwr to ESS2CA, ESS3AB</td>
<td></td>
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**BUS ISOLATION**
ONLY ON MCC CALL, PERFORM
NONE

### EPS SSR-25
**BUS LOSS: MNA A6&A14**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNC 23 RCS</td>
<td>Fwd RCS Jet 1 Htrs</td>
<td>(A6U) PL RETEN RDY tb – bp RETEN/LAT tb – bp</td>
<td>① Single mtr time</td>
</tr>
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**BUS ISOLATION**
ONLY ON MCC CALL, PERFORM
NONE

<table>
<thead>
<tr>
<th>ROEU</th>
<th>PL Reten Sys A Rel/Lat Mtrs</th>
<th>SM 97 PL RETENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Indication lost: RELAX DEMATE MATE</td>
</tr>
<tr>
<td>1</td>
<td>Logic Pwr Sys 1 Orbiter arm drive mtr (ODM mtr 1 – mate A, demate A, relax A)</td>
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</tr>
<tr>
<td>1</td>
<td>ODA mtr 1 latch/release</td>
<td></td>
</tr>
<tr>
<td>ACTIONS</td>
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<td>CREW INDICATIONS</td>
</tr>
<tr>
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<td>------------------</td>
</tr>
<tr>
<td>(ML86B:A) • cb MNB H2O LINE HTR B – cl</td>
<td>H2O Line Htrs A: Waste Dump Line Htr A Sply Dump Line Htr A Vac Vent Ln Htr A</td>
<td></td>
</tr>
<tr>
<td>(ML86B:D) cb MNB MMU • PORT,STBD HTR B (two) – cl</td>
<td>MMU Port,Stbd Htr A</td>
<td></td>
</tr>
<tr>
<td>If Waste H2O Dump reqd: • Perform WASTE WATER SYS BACKUP DUMP (IFM)</td>
<td>Waste H2O: Dump Vlv Cntl Noz Htr</td>
<td></td>
</tr>
<tr>
<td>(ML31C) • VAC VENT ISOL VLV BUS SEL – MNB</td>
<td>Vac Vent Isol MNA Cntl</td>
<td></td>
</tr>
<tr>
<td>(WCS) • MODE – AUTO • CRADLE – AUTO • Hose stowed in cradle • WCS ON IT – OFF • FAN SEP SEL sw – OFF • HOSE BLOCK – SEP 2</td>
<td>WCS Sep Fan 1 Mtr Relay</td>
<td></td>
</tr>
<tr>
<td>In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete • FAN SEP SEL sw – 2</td>
<td>Galley Electronics Assy</td>
<td></td>
</tr>
<tr>
<td>(GALLEY) • OVEN/RHS – OFF • OVEN FAN: OFF • Config for backup H2O dispense per ECLS</td>
<td>Oven</td>
<td></td>
</tr>
<tr>
<td>(ML86B:C) • cb MNB(MNC) EXT ARLK HTR LINE ZN1 – cl</td>
<td>Ext A/L H2O and Structural Htrs MNA pwr</td>
<td></td>
</tr>
<tr>
<td>• cb MNB(MNC) EXT ARLK HTR LINE ZN2 – cl</td>
<td></td>
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<tr>
<td>• cb MNB EXT ARLK HTR STRUC – cl</td>
<td></td>
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</tr>
<tr>
<td>If in Rendezvous or Docked: • cb MNB EXT ARLK HTR VEST Z1/2/3 – cl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:B) • cb MNA WASTE H2O • LINE HTR A – op • cb MNA SPLY H2O • TKA INLET – op • TKB OUTLET – op</td>
<td>2 Sply H2O TkA Inlet Cntl</td>
<td></td>
</tr>
<tr>
<td>• cb MNA WASTE H2O • DUMP VLV/NOZ HTR – op</td>
<td>2 Sply H2O TkB,D Outlet Vlv Cntl</td>
<td></td>
</tr>
<tr>
<td>(ML86B:B) • cb MNA WASTE H2O • TK1 VLV – op • DUMP ISOL – op</td>
<td>Waste H2O Dump Isol Cntl Tk1 Inlet Vlv Cntl</td>
<td></td>
</tr>
<tr>
<td>• cb MNA SPLY H2O • TKD OUTLET – op • cb MNA VAC • VENT ISOL VLV – op • cb MNA • WCS CNTLR – op</td>
<td>Galley Oven Electronics Assy</td>
<td></td>
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<tr>
<td>• GALLEYSacen – op</td>
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</tbody>
</table>

**BUS ISOLATION**

**ONLY ON MCC CALL, PERFORM**

(ML86B:A) cb MNA H2O • LINE HTR A – op • cb MNA SPLY H2O • TKA INLET – op • TKB OUTLET – op • cb MNA WASTE H2O • DUMP VLV/NOZ HTR – op

<table>
<thead>
<tr>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Htr B remains</td>
</tr>
<tr>
<td>2 Vlv holds position</td>
</tr>
<tr>
<td>3 Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge</td>
</tr>
<tr>
<td>4 Without circulation, H2O will lose heat with time and never reheat to nominal temp</td>
</tr>
<tr>
<td>5 MNB and MNC line htrs remain. MNB struc and vestibule htrs remain</td>
</tr>
</tbody>
</table>

**CONTINUATION**

(Continued)
# EPS SSR-26 (Cont)

## BUS LOSS: MNA ML86B

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>(ML86B:F)</td>
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<tr>
<td>6</td>
<td>cb MNA CRYO O2 HTR</td>
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<td></td>
<td>TK3 SNSR 1 – op</td>
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<tr>
<td></td>
<td>cb MNA CRYO O2 HTR</td>
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<td></td>
<td>TK5 SNSR 1 – op</td>
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<tr>
<td>(ML86B:D)</td>
<td>cb MNA MMU</td>
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<tr>
<td></td>
<td>PORT, STBD HTR A</td>
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<tr>
<td></td>
<td>(two) – op</td>
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<tr>
<td></td>
<td>GN2 SPL ISOL VLV A –</td>
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<tr>
<td></td>
<td>op</td>
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<tr>
<td></td>
<td>cb MNA PYRO JETT SYS A</td>
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<td></td>
<td>KU ANT – op</td>
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<td></td>
<td>STBD RMS – op</td>
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<tr>
<td>(ML86B:E)</td>
<td>cb MNA EMU 2 H2O</td>
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<td>SPLY – op</td>
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<td>WASTE – op</td>
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<td></td>
<td>cb MNA FLOOD</td>
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<tr>
<td>(ML86B:F)</td>
<td>cb MNA FLOODS</td>
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<td>MIDDECK 1/8 – op</td>
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<td>WMC/MO13Q – op</td>
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<td>AIRLK 1 – op</td>
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<tr>
<td>(ML86B:C)</td>
<td>cb MNA EXT ARLK HTR</td>
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<td></td>
<td>LINE ZN1 – op</td>
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<td></td>
<td>cb MNA EXT ARLK HTR</td>
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<td></td>
<td>LINE ZN2 – op</td>
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<td></td>
<td>cb MNA EXT ARLK HTR</td>
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<td></td>
<td>STRUC – op</td>
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<td></td>
<td>cb MNA EXT ARLK HTR</td>
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<td></td>
<td>VEST Z1/2/3 – op</td>
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<tr>
<td>(ML86B:D)</td>
<td>cb MNA FC PCM – op</td>
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</tbody>
</table>

### CREW INDICATIONS

1. Htr B remains
2. Vlv holds position
3. Vlv holds position. May have to interface EMU 2 with SCU 1 to provide total H2O servicing/recharge
4. MNB and MNC line htrs remain. MNB struc and vestibule htrs remain
5. Current Snsr 2 remains
6. Sys B remains
7. Lost capability to observe and record FC single cell voltages
### EPS SSR-29
**BUS LOSS: MNA A7**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NONE</strong></td>
<td><strong>VEST DEP VLV SYS 1 VENT ISOL tb – bp</strong>&lt;br&gt;<strong>VEST DEP VLV SYS 1 VENT tb – bp</strong>&lt;br&gt;<strong>DSP SYS PWR SYS 1 tb – OFF</strong></td>
<td><strong>1 DSP SYS 1 PWR still available to all users except MNA A7</strong></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

- ONLY ON MCC CALL, PERFORM
- (A6L) IF DOCKING MISSION<br>cb DEP MNA SYS 1<br>• VENT ISOL – op<br>• VENT – op<br>LIGHTS<br>• AIRLK 1/4 MNA – OFF<br>cb DOCK LT<br>• MNA TRUSS FWD – op

- Vestibule Depress Vlv Sys 1<br>- Vent Isol<br>- Vestibule Depress Vlv Sys 1<br>- Vent<br>- External Airlock Its 1,4<br>- Fwd Truss Docking Lt

- **cb DEP MNA SYS 1**<br>- **cb DOCK LT**

---

**VENT ISOL – op**

**VENT – op**

**LIGHTS**

**AIRLK 1/4 MNA – OFF**

**Fwd Truss Docking Lt**
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**EPS SSR-30**  
**BUS LOSS: MNB DA2**

(Includes all MNB sub-buses and AC2)

### ACTIONS
- Perform FC2 SHUTDN (FC SHUTDN Cue Card)
- Perform LOSS OF 1 FC (ORB PKT, PWRDN)
- PL CAB – MNA
- cb AC CONTR AC2 ΦA,ΦB,ΦC (three) – cl
- INV/AC BUS 2 – OFF (t-b-off)
- INV PWR 2 – OFF (t-b-off)
- cb AC CONTR AC2 ΦA,ΦB,ΦC (three) – op
- AC2 BUS SNSR – OFF
- O2,H2 TK1 HTRS A – AUTO
- O2,H2 TK1 HTRS B – OFF
- O2,H2 MANF vlv TK1, TK2 – OP
- O2,H2 TK2,3 HTRS ΦA,ΦB,ΦC (eight) – OFF
- O2,H2 TK4 HTRS ΦA,ΦB,ΦC (four) – OFF
- O2,H2 TK5 HTR A (two) – AUTO
- APU HTR
- GAS GEN/FUEL PUMP 1 – AUTO
- GAS GEN/FUEL PUMP 2 – B AUTO
- LUBE OIL LN 1 – A AUTO
- LUBE OIL LN 2 – B AUTO
- APU HTR TK/FU LN/H2O
- SYS 1A – AUTO
- 1B – OFF
- 2A – OFF
- 2B – AUTO
- HYD HTR
- RUD SPD BK A – AUTO
- B – OFF
- BDY FLP A – AUTO
- B – OFF
- ELEV A – AUTO
- B – OFF
- AFT FUS A – OFF
- B – AUTO
- HYD CIRC
- PUMP PWDR 1 – MNA
- 2 – MNC

### EQUIP/FUNCTION LOST
1. FC2 Pumps and pH Snr
2. Purge Vlv
3. O2,H2 Flow Xdcrs
4. Cell Perf Monitor
5. AUX PL B pwr
6. MNB pwr to ESS1BC
7. ESS3AB
8. CNTLAB1,2,3
9. CNTLC1,2,3
10. MNB pwr to CABPL 1,2,3

### CREW INDICATIONS
- MASTER ALARM Light/ Tone – on
- SM ALERT Light/Tone – on
- MDU CDR 2 blanks
- MDU CRT 2 blanks
- MDU MFD 1 blanks
- C/W CABIN ATM lt – on
- C/W MN BUS UNDERVOLT lt – on
- C/W FC PUMP lt – on
- C/W FREON LOOP lt – on
- C/W RGS JET lt – on

### NOTES
- Buses remain pwrd
- Pwrs PL Timing Buffer, OIU 1, and OIU 2 (if flown). OIU 1 redundant pwr MNA MPC1 via CAB PL3
- Indications do not appear until jet commanded
- TIME CRITICAL
  - If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp

* (Includes all MNB sub-buses and AC2)
**EPS SSR-30 (Cont)**

**BUS LOSS: MNB DA2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A1L)</td>
<td>S-BD PM</td>
<td>(FSM)</td>
<td>3  Indications do not appear until jet</td>
</tr>
<tr>
<td></td>
<td>• ANT SW ELEC – 2</td>
<td>S67 MPC 2</td>
<td>commanded</td>
</tr>
<tr>
<td></td>
<td>• XPNDR – 2</td>
<td>S67 APC/ALC B</td>
<td>Vlv holds position</td>
</tr>
<tr>
<td></td>
<td>• PWR AMPL OPER – 2</td>
<td>RM DLMA MANF</td>
<td>REACQ and PSP</td>
</tr>
<tr>
<td></td>
<td>• STBY – 2</td>
<td>If ADTA 2, MLS 2</td>
<td>reconfg procedures are flight specific.</td>
</tr>
<tr>
<td></td>
<td>• PRE AMP – 2</td>
<td>- Y STAR TRKR pwrd:</td>
<td>If reqd, procedures are found in payload</td>
</tr>
<tr>
<td></td>
<td>• PWR – 2</td>
<td>‘BCE STRG 2 ADTA’ (3,B)</td>
<td>or ISS specific books</td>
</tr>
<tr>
<td></td>
<td>(if reqd)</td>
<td>‘BCE STRG 2 MLS’ (3)</td>
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<tr>
<td></td>
<td>(Continued)</td>
<td>‘BCE STRG 3 STKR’</td>
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</tr>
<tr>
<td>(A1L)</td>
<td>If PSP and/or INTRG reqd for PL or ISS ops:</td>
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<td></td>
<td>• S-BD PL PWR SYS – 2</td>
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<tr>
<td></td>
<td>• CNTL – PNL</td>
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<td></td>
<td>• – CMD</td>
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<tr>
<td>(A1L)</td>
<td>Reconfig PSP</td>
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<td>(if reqd)</td>
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<tr>
<td>(A1R)</td>
<td>S-BD FM PWR – 2</td>
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<td>If no comm:</td>
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<td></td>
<td>• S-BD FM CNTL – PNL</td>
<td>(Continued)</td>
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<td></td>
<td>• – CMD</td>
<td>(Continued)</td>
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<tr>
<td>(L1)</td>
<td>Perform ON-ORBIT RAD CTNLR SWITCH. ECLS SSR-13 for Freon Loop 1.2</td>
<td>(Continued)</td>
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<td></td>
<td>• FLASH EVAP CTNLR PRI A(B) – ON (if reqd)</td>
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<tr>
<td></td>
<td>• TOP EVAP HTR NOZ L – A AUTO</td>
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<td>• TOP EVAP HTR NOZ R – B AUTO</td>
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<td></td>
<td>• TOP EVAP HTR DUCT – A(C)</td>
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<td>If Hi Load Evap enabled:</td>
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<td></td>
<td>• Hi LOAD DUCT HTR – A(C)</td>
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<tr>
<td>(L2)</td>
<td>FLASH EVAP FDNL HTR A SPL V – 1</td>
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<td>(L4,P)</td>
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<td>(Continued)</td>
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<td>(A8L)</td>
<td>PORT RMS HTR B – OFF</td>
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<td>PORT RMS HTR A – AUTO</td>
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<td>If OBSS berthed:</td>
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<td>• STBD RMS HTR B – OFF</td>
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<td>• STBD RMS HTR A – AUTO</td>
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<td>(F6)</td>
<td>HSI SEL SOURCE – other than MLS, (OV103,4) TACAN 2 or (OV105) GPS 2</td>
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<td>(F6,F8)</td>
<td>RDR ALTM – 1</td>
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(Continued)

09/26/08 7-137 MAL/ALL/GEN J
### EPS SSR-30 (Cont)
#### BUS LOSS: MNB DA2

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<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<td>ANNUN BUS</td>
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<tr>
<td>• SEL ACA 1 – MNA</td>
<td>A1 MNB pwr 2/3 MNB pwr</td>
<td>5 (ML31C)</td>
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<tr>
<td>• 2/3 – MNC</td>
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<td></td>
<td>For attitude control,</td>
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<td></td>
<td>perform LOSS OF</td>
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<td>VERNIERS (ORB OPS,</td>
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<td>Refer to OMS/RCS Slide</td>
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<td></td>
<td>Rule for vlv loss info</td>
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<td>16 Reconfig following vlvs only if</td>
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<td></td>
<td>dP/dT Snsr (ML86B:D)</td>
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<tr>
<td></td>
<td>F,R LCS He Pr Isol A man</td>
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<td>OP capability</td>
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<td>F,R RCS He Pr Isol B GPC</td>
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<td>Cntl, man CL capability</td>
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<td>(ML86B:A)</td>
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<td>AFT L RCS He PRESS A</td>
<td>RCS Manf R5 RJD pwr</td>
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<td>FWD RCS He PRESS A,B</td>
<td>RCS manf F2 RJD pwr (F2F,F2R,R2U,F2D)</td>
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<td>• R IDP/CRT SEL – 3</td>
<td>IDP 2</td>
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<td>• GPC/CRT O2 EXEC</td>
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<tr>
<td>(SM 1 DPS UTILITY)</td>
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<td>(G2,G8,S2)</td>
<td>MMU ASSIGN</td>
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<td>• GNC – ITEM 2 EXEC</td>
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<td>• SM – ITEM 3 EXEC</td>
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<td>• PL – ITEM 5 EXEC</td>
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<td>• ANNUN BUS SEL – MNC</td>
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<tr>
<td>RCS/OMS HTR</td>
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<tr>
<td>• FWD RCS – A AUTO</td>
<td>Fwd RCS Htrs B (all)</td>
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<td>• L POD (two) – A AUTO,</td>
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<td>• B AUTO</td>
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<td>18 F,R RCS He Pr Isol B GPC Cntl, man CL capability</td>
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<td>19 If Site AOS and using S-BD</td>
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<td>'ANTENNA' (2)</td>
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<td>If NSP 1 selected:</td>
<td>'BCE STRG 1 NSP'</td>
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<td>If Hum Sep B ON:</td>
<td>'S66 HUMID SEP B'</td>
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<td>C/W AV BAY/CAB AIR it – on</td>
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<td>• R POD (two) – A OFF, B AUTO</td>
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<td>25 R Pod A Htrs (all)</td>
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<td>26 OMS CrsfLn Htrs B (all)</td>
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</table>
### ACTIONS

For PLBD ops:
- OP/CL Drs in man mode

Prior to using L(R) OMS:
1. OP/CL Drs in man mode
2. PLBD:
   - LAT 13-16 Mtr 2
   - Port Door Mtr 2
   - Port, Stbd Fwd Bkhd Mtr 2
   - Port, Stbd Door Mtr 1, CL

Prior to using L(R) OMS:
- OMS He Pr Isol B and Vap Isol 1 CL
- A/B – GPC
- B/A – CL

If Supply H2O Dump reqd and DUMP ISOL VLV failed closed:
- Perform SUPPLY WATER DUMP USING FES (ORB OPS, ECSL)

If EMU(s) in battery charge mode:
- PWR/BATT CHGR EMU 1(2) BUS SEL – MNA

### EQUIP/FUNCTION LOST

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<td>PLBD:</td>
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<td>Port, Stbd Door Mtr 2</td>
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<td>Port, Stbd Fwd Bkhd Mtr 2</td>
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<tr>
<td>Port, Stbd Door Mtr 1 CL</td>
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</tbody>
</table>

### CREW INDICATIONS

- If Freon sig condr A(B) on pnl O17.C in AC2 position:
  - 'S88 FREON FLOW 2(1)' |
  - 'S88 FREON QTY 2(1)' |
  - FREON FLOW LOOP 2(1) Ind = 443 pph

### NOTES

- L OMS ENG VLV 2: Assume VLV 2 status same as VLV 1
- Maintains He Isol redundancy
- Not yet active on all vehicles
- APU H2O QTY 1 Ind = 0% if BLR CNTL/HTR 1A selected. APU H2O QTY 2 Ind = 0% if BLR CNTL/HTR 2B selected
- Hyd QTY 2 Ind = 0% APU 1 SPEED % Ind = 0
### EPS SSR-30 (Cont)
#### BUS LOSS: MNB DA2

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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</thead>
</table>
| If AC Pwr Transfer Cable to be installed to regain AC:  
- Go to EPS SSR-200; otherwise, continue with Bus Loss Actions | | | |
| (WCS)  
- \^MODE – AUTO  
- \^CRADLE – AUTO  
- \^Hose stowed in cradle  
- \^WCS ON lt – OFF  
- FAN SEP SEL sw – OFF  
- HOSE BLOCK – SEP 1  
- In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete  
- FAN SEP SEL sw – 1 | Hyd H2O Blr 1 Cntr B  
- 2 Cntr B | 36 Av Bay 3 Fan \( \Delta P \), Air Out Temp Snsrs lost |
| (R2)  
- BLR CNTLR/HTR 1 – B  
- 2 – A | | 37 Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsrs lost |
| (L4:F)  
- cb AC1 H2O LOOP PUMP 1A/2 (three) – cl | | 38 Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snsrs lost |
| (L1)  
- HUM SEP B – OFF  
- A – ON  
- IMU FAN B – OFF  
- A(C) – ON  
- H2O PUMP LOOP 1 – A  
- CAB FAN B – OFF  
- A – ON  
- 2 FAN A – OFF  
- B – ON  
- AV BAY 1 FAN A,B  
- (two) – ON  
- FREON PUMP LOOP 1 – A | Hum Sep B  
- IMU Fan B  
- H2O Loop 1 Pump B  
- Cabin Fan B  
- AV Bay 1 Fan B  
- AV Bay 2 Fan A  
- AV Bay 3 Sig Condr, Xdcrs (ECLS SC4)  
- Freon Loop 1 Pump B | 39 Lose Auto Temp Cntrl via Cntrl 1 and Cabin Temp, Cabin Hx Air Out Temp, and H2O Loop 1 Cabin Hx In Temp snsrs. Hx Byp Viv holds position |
| (M013Q)  
If Arlk/Tnl Fan active:  
- ARLK FAN B – OFF  
- \^A – ON | Arlk/Tnl Fan B | |
| (O17:C)  
- SIG CONDR FREON A – AC3  
- SIG CONDR FREON B – AC3 | | |
| (CDRs SEAT)  
- SEAT PWR BUS SEL – AC3 | | |
| (PLTs SEAT)  
- SEAT PWR BUS SEL – AC3 | | |
| If Cab Temp Cntrl 1 active:  
(L1)  
- CAB TEMP CNTLR – OFF | | |
| (M044F)  
Remove pin from PRI Actuator BYP viv linkage, connect linkage to SEC Actuator | | |
| (L1)  
- CAB TEMP CNTLR – 2 | | |
### EPS SSR-30 (Cont)
### BUS LOSS: MNB DA2

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<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
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<tr>
<td>• UTIL PWR F1/MO13Q – op</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• FLOOD R CNSL – op</td>
<td></td>
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<tr>
<td>• L CTR – op</td>
<td></td>
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<tr>
<td>• ANNUN FWD ACA 1 – op</td>
<td></td>
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<tr>
<td>• ANNUN FWD ACA 2/3 – op</td>
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<tr>
<td>• ANNUN AFT ACA 4/5 – op</td>
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<tr>
<td>• CRYO O2 HTR TK2 SNSR 2 – op</td>
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<tr>
<td>• (OV104.5) GPS 2 PRE AMPL UPPER – op</td>
<td></td>
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</tr>
<tr>
<td>(A13)</td>
<td></td>
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</tr>
<tr>
<td>• (OV104) GPS 2 PWR – OFF</td>
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<tr>
<td>• (OV104) GPS 2 PRE AMPL UPPER – OFF</td>
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<tr>
<td>• (OV104) GPS 2 PRE AMPL LOWER – OFF</td>
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<tr>
<td>(A15:H.J.K)</td>
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<tr>
<td>• cb MNB TK6-TK9 O2 HTR SNSR 2 – op</td>
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<tr>
<td>(O15.D)</td>
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<tr>
<td>• cb MNB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FREON RAD CNTLR 1 – op</td>
<td></td>
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<tr>
<td>• FREON RAD CNTLR 2 – op</td>
<td></td>
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</tbody>
</table>

(Continued)

**AC2 Bus Isolation**

- For AC Pwr Transfer Cable installation accomplished in MNB DA2 Actions column.
- No additional bus isolation steps req’d

**If this action taken, activate H2O Pump Loop 2**

- Motor B remains

**Redundant pwr source remains for equipment**

**H2O Loop 2 ICH Flow Rate snsr lost**

**Other detn in Av Bay remains**

**Current Snsr 1 remains**

**Cntlr B remains**

**Ac2 Bus Isolation**

For AC Pwr Transfer Cable installation accomplished in MNB DA2 Actions column. No additional bus isolation steps req’d.

If this action taken, activate H2O Pump Loop 2.

Motor B remains.

Redundant pwr source remains for equipment.

H2O Loop 2 ICH Flow Rate snsr lost.

Other detn in Av Bay remains.

Current Snsr 1 remains.

Cntlr B remains.
### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**
- PPO2 C CAB dP/dT – op
- (OV104.5) GPS 2 PRE AMPL LOWER – op
- N2 SPLY 2 – op
- O2/N2 CNTLR – op
- O2 XOVR 2 – op
- N2 REG INLET 2 – op
- CAB RELIEF A – op
- NWS – op

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
</tr>
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<tbody>
<tr>
<td>(O15:E) cb MNB</td>
<td>Cabin Relief Vlv A Cntl</td>
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<tr>
<td></td>
<td>NWS – 2</td>
</tr>
<tr>
<td>(R11U)</td>
<td>Tacan 2</td>
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<td></td>
<td>ADTA 2</td>
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<tr>
<td>(R14:A)</td>
<td>AA2</td>
</tr>
<tr>
<td>(R14:B)</td>
<td>Drag Chute, PLT Arm</td>
</tr>
<tr>
<td>(R14:C)</td>
<td>ASA 4 Isol</td>
</tr>
<tr>
<td>(R14:D)</td>
<td>ATVC 3 Isol ME</td>
</tr>
<tr>
<td>(R14:E)</td>
<td>4 Isol ME</td>
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### CREW INDICATIONS

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>① Buses remain pwrd</td>
</tr>
<tr>
<td></td>
<td>② Vlv holds position</td>
</tr>
<tr>
<td></td>
<td>③ Redundant pwr source remains for equipment</td>
</tr>
<tr>
<td></td>
<td>④ NWS 1 still available</td>
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<tr>
<td></td>
<td>⑤ CDR Arm remains</td>
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<tr>
<td></td>
<td>⑥ Six vlvs fail to non-isolation position</td>
</tr>
<tr>
<td></td>
<td>⑦ KU-BAND ANTENNA: CONTINGENCY STOW – W/EVA ANT GIMBAL ALIGNMENT (IFM) reqd to stow Ku-Bd. Jettison reqd if antenna cannot be positioned within GO FOR PLBD CLOSURE envelope</td>
</tr>
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</table>

### NOTES
- ① Buses remain pwrd
- ② Vlv holds position
- ③ Redundant pwr source remains for equipment
- ④ NWS 1 still available
- ⑤ CDR Arm remains
- ⑥ Six vlvs fail to non-isolation position
- ⑦ KU-BAND ANTENNA: CONTINGENCY STOW – W/EVA ANT GIMBAL ALIGNMENT (IFM) reqd to stow Ku-Bd. Jettison reqd if antenna cannot be positioned within GO FOR PLBD CLOSURE envelope
### BUS LOSS: MNB DA2

#### BUS ISOLATION

<table>
<thead>
<tr>
<th>ONLY ON MCC CALL, PERFORM</th>
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<tbody>
<tr>
<td>(A7U) PL BAY FLOOD</td>
</tr>
<tr>
<td>• FWD BHD – OFF</td>
</tr>
<tr>
<td>• MID PORT – OFF</td>
</tr>
<tr>
<td>• FWD STBD – OFF</td>
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</table>

#### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>DSP SYS PWR SYS 2 tb – OFF</th>
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<tbody>
<tr>
<td>PLB Fwd Blkhd Floodlt</td>
</tr>
<tr>
<td>Mid Port Floodlt</td>
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<tr>
<td>Fwd Stbd Floodlt</td>
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| Vest Dep Vlv Sys 2 Vent  |
| Leg Isol |

#### (A7L) IF DOCKING MISSION

<table>
<thead>
<tr>
<th>MNB A7</th>
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<tbody>
<tr>
<td>Aft Truss Docking It</td>
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<tr>
<td>Stbd Vestibule Docking It</td>
</tr>
<tr>
<td>DSP SYS 2 Pwr</td>
</tr>
<tr>
<td>PSU MNB Pwr</td>
</tr>
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</table>

| MNB pwr to DSP Logic buses 1,2 |

| External Airlock lts 2,3 |

#### (A7L) IF DOCKING MISSION cb DOCK LT MNB

<table>
<thead>
<tr>
<th>MCA LOGIC MNB</th>
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<tbody>
<tr>
<td>FWD 2 – OFF</td>
</tr>
<tr>
<td>AFT 2 – OFF</td>
</tr>
<tr>
<td>MID 1,2,3,4 (four) – OFF</td>
</tr>
</tbody>
</table>

#### LIGHTS

| AIRLK 2/3 MNB – OFF |

#### (A7L) IF DOCKING MISSION

<table>
<thead>
<tr>
<th>cb MNB</th>
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<tbody>
<tr>
<td>LOGIC 1 – op</td>
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<tr>
<td>2 – op</td>
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#### (ML86B:A)

<table>
<thead>
<tr>
<th>MNB</th>
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<tbody>
<tr>
<td>H2O LINE HTR B – op</td>
</tr>
<tr>
<td>SUPPLY H2O TKB</td>
</tr>
<tr>
<td>INLET – op</td>
</tr>
<tr>
<td>SUPPLY H2O TKC</td>
</tr>
<tr>
<td>OUTLET – op</td>
</tr>
<tr>
<td>SUPPLY H2O DUMP ISOL – op</td>
</tr>
<tr>
<td>SUPPLY H2O B SPLY ISOL VLV – op</td>
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</table>

#### (ML86B:B)

<table>
<thead>
<tr>
<th>MNB</th>
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<tbody>
<tr>
<td>VAC VENT NOZ HTR – op</td>
</tr>
<tr>
<td>WASTE H2O TK1</td>
</tr>
<tr>
<td>DRAIN – op</td>
</tr>
<tr>
<td>SUPPLY H2O TKD</td>
</tr>
<tr>
<td>INLET – op</td>
</tr>
<tr>
<td>VAC VENT ISOL VLV – op</td>
</tr>
<tr>
<td>WCS CNTLR – op</td>
</tr>
<tr>
<td>GALLEY H2O HTR – op</td>
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#### (ML86B:C)

<table>
<thead>
<tr>
<th>MNB</th>
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<tbody>
<tr>
<td>EXT ARLK HTR STRUC Z1/2/3 – op</td>
</tr>
<tr>
<td>EXT ARLK HTR LN ZN 1, ZN 2 (two) – op</td>
</tr>
<tr>
<td>EXT ARLK HTR VEST Z1/2/3 – op</td>
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#### (ML86B:D)

<table>
<thead>
<tr>
<th>MNB</th>
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</thead>
<tbody>
<tr>
<td>MMU Port, Stbd Htr B – op</td>
</tr>
<tr>
<td>GN2 SPLY ISOL VLV B – op</td>
</tr>
<tr>
<td>MNB PYRO JETT SYS A</td>
</tr>
<tr>
<td>PORT RMS – op</td>
</tr>
</tbody>
</table>

#### (ML86B:E)

<table>
<thead>
<tr>
<th>MNB</th>
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</thead>
<tbody>
<tr>
<td>MNB SEAT</td>
</tr>
<tr>
<td>L – op</td>
</tr>
<tr>
<td>R – op</td>
</tr>
<tr>
<td>MNB FLOOD</td>
</tr>
<tr>
<td>TNL ADAPT 3 – op</td>
</tr>
</tbody>
</table>

#### CREW INDICATIONS

<table>
<thead>
<tr>
<th>DSP SYS PWR SYS 2 tb – OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Sply H2O TKB Inlet Vlv Cntl</td>
</tr>
<tr>
<td>5 Sply H2O TKC Outlet Vlv Cntl</td>
</tr>
<tr>
<td>5 Sply H2O B Sply ISOL Vlv Cntl</td>
</tr>
<tr>
<td>Waste H2O Vac Vent Noz Htr</td>
</tr>
<tr>
<td>Tk1 Drain Vlv Cntl</td>
</tr>
<tr>
<td>Sply H2O TKD Inlet Vlv Cntl</td>
</tr>
<tr>
<td>WCS Press Xdcr</td>
</tr>
<tr>
<td>Galley H2O Htrs</td>
</tr>
<tr>
<td>Ext Arlk Struc Htrs B</td>
</tr>
<tr>
<td>Ext Arlk H2O Ln Htrs B</td>
</tr>
<tr>
<td>Ext Arlk Vest Htrs B</td>
</tr>
<tr>
<td>MMU Port, Stbd Htr B</td>
</tr>
<tr>
<td>GN2 Sply Isol Vlv B</td>
</tr>
<tr>
<td>Port RMS: Jett/Guil Sys A</td>
</tr>
<tr>
<td>Deadface Relays</td>
</tr>
<tr>
<td>TA Floodlt 3</td>
</tr>
</tbody>
</table>

#### NOTES

- Vlv holds position
- Truss Aremains
- All docking mechanisms will have single mtr times
- Logic buses 1(2) remain pwr via MNA(MNC)
- No redundancy
- One failure away from loss of jettison capability
<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ML86B:F) cb MNB FLOODS</td>
<td>Midddeck Floods 2,6 Bunk Floods 2/4</td>
<td>L MPS He reg A &lt; 680 during entry (MM 303)</td>
<td>5 Vlv holds position</td>
</tr>
<tr>
<td>• MIDDECK 2/6 – op</td>
<td>PHS Floods</td>
<td>5 Vlv holds position. Loss of redundant hyd NLG deploy and NWS redundancy if failed closed</td>
<td></td>
</tr>
<tr>
<td>• BUNK 2/4 – op</td>
<td>Airlk Flood 3 Cryo O2: Tk 3 Htr Current Snsr 2 4 Htr Current Snsr 1</td>
<td>46 Current Snsr 1 remains</td>
<td></td>
</tr>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td>Port, Stbd Rad Mtrs 2 Dpy capability Port, Stbd Rad Lat 1-6 Mtrs 2</td>
<td>56 Current Snsr 2 remains</td>
<td></td>
</tr>
<tr>
<td>• PHS – op</td>
<td>Fwd RCS Jet 2 Htrs</td>
<td>57 Mtr 2 stow capability unaffected</td>
<td></td>
</tr>
<tr>
<td>• Airlk 3 – op</td>
<td>L OMS ENG Press Vlv Coil 2, Cntl Vlv 1,2, Coil 2</td>
<td>58 Redundant coils remain</td>
<td></td>
</tr>
<tr>
<td>cb MNB CRYO O2</td>
<td>OMS Qty Gauging for all L OMS single engine burns</td>
<td>59 MCC for OMS Qty</td>
<td></td>
</tr>
<tr>
<td>• HTR TK3 SNSR 2 – op</td>
<td>Hyd Brake Isol Vlv 2 Cntl APU 1 Cntl Pwr Sply B</td>
<td>60 Pwr supply A remains. Turbine speed ind lost</td>
<td></td>
</tr>
<tr>
<td>• TK4 SNSR 1 – op</td>
<td>1 Fuel Tk Vlv B 2 Cntl Pwr Sply A 2 Fuel Tk Vlv A</td>
<td>61 Vlv fails closed. Redundant vlv remains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>APU 2 GBX GN2 Repress Vlv</td>
<td>62 Pwr supply B remains. GG Bed T and GBX P lost when APU running</td>
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<tr>
<td></td>
<td>Hyd Rsr 2 Qty Snsr</td>
<td>63 Cnttrs A,B Rad Byp Vlv Mtrs Auto Cntl and Cntl B Rad Byp Vlv Mtr Man Cntl remain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Freon Loop 2 Cntlr A Rad Byp Vlv Mtr Man Cntl</td>
<td>64 Bypass vlv holds position and Cntlr B Rad Byp Vlv Mtr remains</td>
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<tr>
<td></td>
<td>Freon Loop 1 Cntlr A Rad Byp Vlv Mtr</td>
<td>65 Mtr 1 remains</td>
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<td></td>
<td>Freon Loop 1 Flow Prop Vlv</td>
<td>66 Htr Cntlr 1 remains</td>
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<tr>
<td></td>
<td>Freon Loop 1 Cold Plate Flow Xdcr</td>
<td>67 MCC for stow reqmts</td>
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<td>L,R ADP Dpy Mtrs 2 Htr Cntl 9</td>
<td>68 Vlv fails closed</td>
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<tr>
<td></td>
<td>RH Vents 1,2,6,8,9 Mtrs 2 LH Vents 1,2,3,5,8,9 Mtrs 2</td>
<td>69 Vlv holds position. Loss of manual capability to inert LO2 and LH2 Manf</td>
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<tr>
<td></td>
<td>NLG B/U Rel and Ext Sys 2 LMG, RMG B/U Rel Sys 2</td>
<td>70 Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304)</td>
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<tr>
<td></td>
<td>-Y Star Trkr Dr OP and Sys 2 CL capability -Z Star Trkr Dr Sys 1 OP/CL capability</td>
<td>71 Redundant mtrs remain</td>
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<tr>
<td></td>
<td>PL Reten Sys B Rel/Lat Mtrs Ku Ant Sto/Dpy Mtr 2</td>
<td>72 Hyd Sys 1 still available for NWS</td>
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<tr>
<td></td>
<td>MPS:</td>
<td>73 Redundant RPC remains</td>
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<tr>
<td></td>
<td>L Eng He Intercon Outlet Vlv</td>
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<td>L Eng He Isol A</td>
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<td>Pneu He Isol 2</td>
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<td>Prptl F/D Inbd LO2 Vlv</td>
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<td>Outbd LH2 Vlv</td>
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<td>Manf Repress LH2 Vlv 1,2</td>
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<td>ET Door Mtrs:</td>
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<tr>
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<td>C/L Lat Acr 1 Mtr 2 L Dr Uplock Lat Mtr 2 R Dr Closure Mtr 2 Unlock Lat Mtr 2</td>
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<td></td>
<td>NWS Hyd Sys 2</td>
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<td>LG Extend Vlv 2</td>
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<td>Ops Hyd Acr Instr</td>
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<td>Hyd Main Pump 2 Depress Solenoid RPC A</td>
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<td>Hyd Main Pump 1 Depress Solenoid RPC B</td>
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**EPS SSR-30 (Cont)**

**BUS LOSS: MNB DA2**

<table>
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<th>NOTES</th>
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<tbody>
<tr>
<td>6 Vlv holds position</td>
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<tr>
<td>7 Vlv holds position. Loss of redundant hyd NLG deploy and NWS redundancy if failed closed</td>
</tr>
<tr>
<td>46 Current Snsr 1 remains</td>
</tr>
<tr>
<td>56 Current Snsr 2 remains</td>
</tr>
<tr>
<td>57 Mtr 2 stow capability unaffected</td>
</tr>
<tr>
<td>58 Redundant coils remain</td>
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<tr>
<td>59 MCC for OMS Qty</td>
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<tr>
<td>60 Pwr supply A remains. Turbine speed ind lost</td>
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<tr>
<td>65 Mtr 1 remains</td>
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<tr>
<td>66 Htr Cntlr 1 remains</td>
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<td>67 MCC for stow reqmts</td>
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<tr>
<td>71 Redundant mtrs remain</td>
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<tr>
<td>72 Hyd Sys 1 still available for NWS</td>
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<tr>
<td>73 Redundant RPC remains</td>
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<tr>
<td>ACTIONS</td>
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### ACTIONS

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<tr>
<th>DPS UTILITY (G2,G8,S2)</th>
<th>MMU ASSIGN</th>
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<tbody>
<tr>
<td>GNC – ITEM 2 EXEC</td>
<td></td>
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<tr>
<td>SM – ITEM 3 EXEC</td>
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</tr>
<tr>
<td>PL – ITEM 5 EXEC</td>
<td></td>
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<tr>
<td>OPS 0 – ITEM 7 EXEC</td>
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</tr>
</tbody>
</table>

If EMU(s) in battery charge mode:

- PWR/BATT CHGR EMU
- AW18H

Pre-seat ingress for Entry:
- Discharge handheld fire ext into AV BAY 1

If AC Pwr Cable to be installed to regain AC:
- Go to EPS SSR-200; otherwise, continue with Bus Loss Actions

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>MMU 2</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>EMU 1, 2 Pwr/Batt Chgr MNB pwr</td>
</tr>
<tr>
<td>Av Bay 1 agent discharge capability</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSN and EVENT TIME ind – blank</td>
</tr>
<tr>
<td>L/R ADP deploy times incr from 15 to 30 sec</td>
</tr>
<tr>
<td>If site AOS and using S-BD Ant Elec 1: ‘ANTENNA’</td>
</tr>
</tbody>
</table>

### NOTES

- Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning
- FSM caused by antenna miscompare
- AV Bay 3 Fan ΔP Air Out Temp Snsrs lost
- Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate and Accum Qty Snsrs lost
- Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate and Accum Qty Snsrs lost

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>If Freon Sig Condr A(B)</td>
</tr>
<tr>
<td>S88 FREON FLOW 2(1)</td>
</tr>
<tr>
<td>S88 FRN AFT CP 1’</td>
</tr>
<tr>
<td>S88 FRN PL HX 1’</td>
</tr>
</tbody>
</table>

### NOTES

- If APUs active and using H2O Blr Cntlr 1A(2B): C/W APU TEMP lt after ~2 min
- During Rad Dpy/Sto ops: RAD LAT CNTL tbs (two) indicate single mtr ops

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>If Freon Sig Condr A(2)</td>
</tr>
<tr>
<td>S88 FREON FLOW 1’</td>
</tr>
<tr>
<td>S88 FRN AFT CP 1’</td>
</tr>
<tr>
<td>S88 FRN PL HX 1’</td>
</tr>
</tbody>
</table>

### NOTES

- If H2O Loop 1 Pump B ON: C/W H2O LOOP lt after ~2 min
- During Rad Dpy/Sto ops: RAD LAT CNTL tbs (two) indicate single mtr ops
### EPS SSR-31 (Cont)

#### BUS LOSS: MNB FPC2

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CDR's SEAT)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CDR SEAT PWR BUS SEL – AC3</td>
<td>CDR Seat Adj via AC2 pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(PLT's SEAT)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• PLT SEAT PWR BUS SEL – AC3</td>
<td>PLT Seat Adj via AC2 pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If Cab Temp Cntrl 1 active: (L1)</td>
<td>Cabin Temp Cntrl 1 and Hx Byp vlv Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MD44F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Remove pin from PRI Actuator and BYP vlv linkage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Connect linkage to SEC Actuator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CAB TEMP CNTLR – 2</td>
<td>Freon Loop 1 Cntlr A Rad Byp Vlv Mtr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perform LOSS OF 1 FC (ORB PKT, PWRDN)</td>
<td>Freon Loop 1 Flow Prop Vlv</td>
<td></td>
<td></td>
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<tr>
<td>BUS ISOLATION ONLY ON MCC CALL, PERFORM</td>
<td>Freon Loop 1,2 Rad Isol Motor A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• H2O PUMP LOOP 1 – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 2 – ON</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(L4:N)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• cb AC2 φC RAD ISOL A – op</td>
<td></td>
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</tr>
<tr>
<td>• MDU CRT 2 PWR – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• IDP/CRT 2 PWR – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV105) GPS 2 PWR – OFF</td>
<td>(OV105) GPS 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV105) GPS 2 PRE AMPL UPPER – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV105) GPS 2 PRE AMPL LOWER – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O15:F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MMU 2 – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A7L)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MADS RCDR PWR – OFF</td>
<td>MADS Rcdr</td>
<td></td>
<td>All MADS and ACIP data</td>
</tr>
<tr>
<td>(A13)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV104) GPS 2 PWR – OFF</td>
<td>GPS 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV104) GPS 2 PRE AMPL UPPER – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV104) GPS 2 PRE AMPL LOWER – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73CA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MCA LOGIC MNB FWD 2 – OFF</td>
<td>MNB FMC2 Bus pwr</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

- (O15:C)
  - cb MNB
  - FIRE SUPPR BAY 1 – op
  - (OV104.5) GPS 2 PRE AMPL UPPER – op

- (O15:D)
  - (OV104.5) cb MNB GPS 2 PRE AMPL LOWER – op

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>BUS</th>
<th>EQUIP/FUNCTION LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>MNB Pwr to CNTL Buses AB1,AB2,AB3,BC1,BC2,BC3</td>
</tr>
<tr>
<td>22</td>
<td>NLG B/U Rel and Ext Sys 2 LMG, RMG B/U Rel Sys 2 LG Extend Vlv 2</td>
</tr>
<tr>
<td>23</td>
<td>NWS Hyd Sys 2 -Y Star Trkr Dr Sys 2 OP/CL capability -Z Star Trkr Dr Sys 1 OP/CL capability</td>
</tr>
<tr>
<td>24</td>
<td>L,R ADP Dpy Mtrs 2 Htr Cntlr 2 RH Vents 1,2,6,8,9 Mtrs 2 LH Vents 1,2,3,5,8,9 Mtrs 2</td>
</tr>
<tr>
<td>25</td>
<td>ET Door Mtrs: C/L Lat Actr 1 Mtr 2 L Dr Uplock Lat Mtr 2 R Dr Closure Mtr 2 Upload Lat Mtr 2</td>
</tr>
<tr>
<td>26</td>
<td>RMS: Port MPM Mtr 2 Stbd MPM Mtr 1 Port Fwd MRL Mtr 1 Port Mid MRL Mtr 2 Stbd Mid MRL Mtr 1 Stbd Aft MRL Mtr 2 D&amp;C B/U edge ltg</td>
</tr>
<tr>
<td>27</td>
<td>PL Reten Sys B Rel/Lat Mtrs Port, Stbd Rad Lat 1-6 Mtrs 2</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

2 Will be repwrd after AC Pwr Transfer Cable connected

21 Buses remain pwrd

22 Vlv holds position. Loss of redundant hyd NLG deploy and NWS hyd redundancy, if failed closed

23 Hyd Sys 1 still available for NWS

24 Redundant mtrsn remain

25 Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison. May be repwrd after AC Pwr Transfer Cable connected

26 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists. May be repwrd after AC Pwr Transfer Cable connected

27 Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists. May be repwrd after AC Pwr Transfer Cable connected

28 MCC for stow reqmts
**EPS SSR-32**  
**BUS LOSS: MNB MPC2**  
(Includes MNB MMC1, MNB MMC2, MNB MMC3, MNB MMC4)

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FC2 Purge Vlv</td>
<td>(L2) Buses are tied due to:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O2/H2 Flow Xdcrs</td>
<td>Loss of FC2 Purge Capability. As FC2 loses performance, tied FC will pick up load, slowing FC2 degradation. If degradation projection does not allow nominal EOM, Fuel Cell will be shut down.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SS ΔV Snsrs</td>
<td>≥140</td>
<td>MCC</td>
</tr>
<tr>
<td>(R1)</td>
<td>MNB pwr to CABPL1,2,3</td>
<td>Loss of FC2 SS ΔV Snsrs. Change in ΔAmps &gt; 12 amps indicates possible cell crossover problem. The ΔAmps shift due to loss of FC2 purge capability is indicated by change in ΔAmps between pre- and post-purge readings. MCC will aid in this determination.</td>
<td></td>
</tr>
<tr>
<td>(ABL)</td>
<td>PORT RMS HTR B – OFF</td>
<td>1 Vlv holds position</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PORT RMS HTR A – AUTO</td>
<td>Pwrs PL Timing Buffer, OIU 1, and OIU 2 (if flown). OIU 1 redundant pwr MNA MPC1 via CAB PL3</td>
<td></td>
</tr>
<tr>
<td>If OBSS berthed:</td>
<td></td>
<td>When the OBSS is grappled by the RMS, the Cabin Payload A or B power feeds are used to pass MPC1 or MPC2 power, respectively, to the Payload Cabin 3 power bus for distribution to all OBSS equipment, except for LCS</td>
<td></td>
</tr>
<tr>
<td>(ABL)</td>
<td>STBD RMS HTR B – OFF</td>
<td>5 Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison</td>
<td></td>
</tr>
<tr>
<td></td>
<td>STBD RMS HTR A – AUTO</td>
<td>6 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>TOP EVAP HTR DUCT – A</td>
<td>7 Single mtr time. One failure away from loss of MRL latching capability. EVA or RMS jettison capability exists</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If Hi Load Evap enabled</td>
<td>8 If AC2 cbs not opened, Lat Mtrs 2 of actuators for Port and Stbd Rad Lat 1-6 continues to run until Sys B Lat Ctrl sw placed to OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HI LOAD DUCT HTR – A/C</td>
<td>MNA htrs remain</td>
<td></td>
</tr>
<tr>
<td>(L2)</td>
<td>FLASH EVAP FDLN HTR A SPLY – 1</td>
<td>9 MNA htrs remain</td>
<td></td>
</tr>
<tr>
<td>(A12)</td>
<td>HYD HTR AFT FUS B – AUTO</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HYD HTR AFT FUS A – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C.C.D)</td>
<td>Sbtd Rad Lat 1-6 Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>cb MCA PWR AC2 3Φ MID 2 – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>cb MCA PWR AC2 3Φ MID 4 – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For PLBD ops:</td>
<td>Stbd Rad Lat 1-6 Mtr 2 Limit sw</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OP/CL Drs in man mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R14:C)</td>
<td>C/L Lat 13-16 Mtr 2</td>
<td>Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stbd Aft Blkhd Lat Mtr 2</td>
<td>Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port Door Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port,Stbd Fwd Blkhd Lat Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stbd Aft Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port,Stbd Door Mtr 1 CL Limit sw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:C)</td>
<td>Ext A/L Structural Htrs MNB pwr</td>
<td>Single mtr time. One failure away from loss of MRL latching capability. EVA or RMS jettison capability exists</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>OIU 2</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>OIU 1 MNB pwr</td>
<td></td>
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</tr>
</tbody>
</table>

(Continued)
### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

(R11U)
* FC PURGE VLV 2 – CL
* FC STARTUP HTR 2 – ENS

(A7U)
PL BAY FLOOD
* FWD BHD – OFF
* MID PORT – OFF
* FWD STBD – OFF

(A7L)
IF DOCKING MISSION
* cb DEP MNB SYS 2 VENT ISOL – op
* cb DEP MNB SYS 2 VENT – op

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R11U)</td>
<td>FC2 Startup Htr Inhibit capability</td>
</tr>
<tr>
<td>(A7U)</td>
<td>PLB Fwd Bkhd Floodlt Mid Port Floodlt Fwd Stbd Floodlt</td>
</tr>
<tr>
<td>(A7L)</td>
<td>Vest Dep Vlv Sys 2 Vent Vent Is</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

- DSP SYS PWR SYS 2 tb – OFF

### NOTES

- MNB htrs remain
- All docking mechanisms will have single mtr times
- Logic buses 1(2) remain pwrd via MNA(MNC)
- Cntrs, A,B Rad Byp Vlv Mtr Auto Cntl and Cntl B Rad Byp Vlv Mtr Man Cntl remain
- Mtr 2 stow capability remains
- Buses remain pwrd
- With an inoperative limit sw, mtr will continue to run until DPY/STO sw placed to GND position
- KU-BAND ANTENNA: CONTINGENCY STOW – W/EVA ANT GIMBAL ALIGNMENT (IFM) reqd to stow Ku-Bd, Jettison reqd if ant cannot be positioned within GO FOR PLBD CLOSURE envelope
- MNC MMC2 pwr for Ku-Bd Xmit Enable signal remains
- MNC MMC2 pwr remains to supply pwm to Boom stow Enable II signal for stow mtrs
- Snr 1 remains
**EPS SSR-33**

**BUS LOSS: MNB APC2**

### ACTIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info.</td>
<td>Reconfig following vlv(s) only if leak isolation reqd:</td>
</tr>
<tr>
<td><strong>(O7)</strong></td>
<td><strong>AFT R RCS He PRESS A,B</strong></td>
</tr>
<tr>
<td></td>
<td><strong>L RCS He PRESS A</strong></td>
</tr>
<tr>
<td></td>
<td>For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)</td>
</tr>
<tr>
<td>(A12)</td>
<td>APU HTR TK/FU LINE/H2O</td>
</tr>
<tr>
<td></td>
<td><strong>SYS 1A – AUTO</strong></td>
</tr>
<tr>
<td></td>
<td><strong>1B – OFF</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Prior to using L(R) OMS:</strong></td>
</tr>
<tr>
<td></td>
<td><strong>(O8)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>L OMS He PRESS/VAP ISOL</strong></td>
</tr>
<tr>
<td></td>
<td><strong>A – GPC</strong></td>
</tr>
<tr>
<td></td>
<td><strong>B – OP</strong></td>
</tr>
<tr>
<td></td>
<td><strong>R OMS He PRESS/VAP ISOL</strong></td>
</tr>
<tr>
<td></td>
<td><strong>A(B) – GPC</strong></td>
</tr>
<tr>
<td></td>
<td><strong>B(A) – CL</strong></td>
</tr>
<tr>
<td>(A14)</td>
<td><strong>RCS/OMS HTR</strong></td>
</tr>
<tr>
<td></td>
<td><strong>R POD (two) – A OFF, B AUTO</strong></td>
</tr>
<tr>
<td></td>
<td><strong>OMS CRSFD LINES – A AUTO, B OFF</strong></td>
</tr>
<tr>
<td></td>
<td><strong>L POD (two) – A AUTO, B OFF</strong></td>
</tr>
<tr>
<td>GNC XXXXX</td>
<td>MNVR YYYY</td>
</tr>
<tr>
<td>Sel L OMS PRI TVC:</td>
<td>GMBL L PRI – ITEM 28 EXEC</td>
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### EQUIP/FUNCTION LOST

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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>1</strong></td>
<td>Aft L R RCS He Pr Isol A man OP capability</td>
</tr>
<tr>
<td></td>
<td>Aft R RCS He Pr Isol B GPC Cntl and man CL capability</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>RCS Manf R5 RJD pwr (R5R,R5D)</td>
</tr>
<tr>
<td></td>
<td>APU 1 GG Inj H2O Htrs B</td>
</tr>
<tr>
<td></td>
<td>APU 2 Fu TK Vlv A CL capability via APU 2 Auto Shutdn Signal</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Left OMS He Pr Isol B and Vap Isol 2 GPC Cntl</td>
</tr>
<tr>
<td></td>
<td>Right OMS He Pr Isol A,B man Cntl and Vap Isol 1.2 man A,B Cntl</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td>Right Pod A Htrs (all)</td>
</tr>
<tr>
<td></td>
<td>Left Pod B Htrs (partial)</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>OMS Crsfd Ln B Htrs (all)</td>
</tr>
<tr>
<td></td>
<td>L OMS Sec TVC</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td></td>
</tr>
<tr>
<td><strong>13</strong></td>
<td></td>
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### CREW INDICATIONS

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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>2</strong></td>
<td>MASTER ALARM Light/ Tone – on</td>
</tr>
<tr>
<td></td>
<td>If OMS GMBL cmd abs value &gt; 2 deg and Sec TVC selected:</td>
</tr>
<tr>
<td></td>
<td>C/W OMS TVC It – on</td>
</tr>
<tr>
<td><strong>(F7)</strong></td>
<td>L OMS GMBL’ (3,B)</td>
</tr>
<tr>
<td><strong>(FSM)</strong></td>
<td>C/W RCS JET It – on</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>R RCS D, R JET</td>
</tr>
<tr>
<td><strong>(F7)</strong></td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Man CL and full GPC cntl remains. Vlv holds position</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Indications do not appear until jet commanded</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Do not reconfig for reg switch or I’CNCT procedures</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Man OP capability remains. Vlv holds position</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Manf status not automatically declared closed. Fail-offs will occur when jet commanded</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>In event of APU 2 auto shutdn, vlv remains OP until pwr removed by APU FUEL TK VLV sw throw</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>Lost TM: GNC SYS SUMM 2</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>L OMS ENG VLV 2: assume VLV 2 status same as VLV 1</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td>Maintains He Isol redundancy</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>Man cntl remains. Vap Isol closes. Pr Isol normally closed</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td>GPC cntl remains. Vlv fail closed</td>
</tr>
<tr>
<td><strong>13</strong></td>
<td>B Htrs remain</td>
</tr>
<tr>
<td><strong>14</strong></td>
<td>A Htrs remain</td>
</tr>
<tr>
<td><strong>14</strong></td>
<td>Six vlvls fail to non-isolation position</td>
</tr>
</tbody>
</table>
### ACTIONS

<table>
<thead>
<tr>
<th>(A12)</th>
<th>APU HTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>GAS GEN/FUEL</td>
</tr>
<tr>
<td>2</td>
<td>PUMP 1 – A AUTO</td>
</tr>
<tr>
<td>2</td>
<td>GAS GEN/FUEL</td>
</tr>
<tr>
<td>2</td>
<td>PUMP 2 – B AUTO</td>
</tr>
<tr>
<td>2</td>
<td>LUBE OIL LINE 1 – A AUTO</td>
</tr>
<tr>
<td>2</td>
<td>LUBE OIL LINE 2 – B AUTO</td>
</tr>
<tr>
<td>2</td>
<td>APU HTR TK/FU LINE/H2O</td>
</tr>
<tr>
<td>2</td>
<td>SYS 1A – AUTO</td>
</tr>
<tr>
<td>1B</td>
<td>– OFF</td>
</tr>
<tr>
<td>2A</td>
<td>– OFF</td>
</tr>
<tr>
<td>2B</td>
<td>– AUTO</td>
</tr>
<tr>
<td>2B</td>
<td>– AUTO</td>
</tr>
<tr>
<td>2B</td>
<td>– AUTO</td>
</tr>
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<table>
<thead>
<tr>
<th>(L1)</th>
<th>HYD HTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>RUD SPD BK A – AUTO</td>
</tr>
<tr>
<td>1B</td>
<td>B – OFF</td>
</tr>
<tr>
<td>2A</td>
<td>BDY FLP A – AUTO</td>
</tr>
<tr>
<td>2B</td>
<td>B – OFF</td>
</tr>
<tr>
<td>2A</td>
<td>ELEV A – AUTO</td>
</tr>
<tr>
<td>3A</td>
<td>B – OFF</td>
</tr>
<tr>
<td>2B</td>
<td>HYD CIRC PUMP</td>
</tr>
<tr>
<td>2B</td>
<td>PWR 1 – MNA</td>
</tr>
<tr>
<td>2B</td>
<td>– MNC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(L2)</th>
<th>FLASH EVAP FD LN HTR A SPLY – 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>FES Sec Cntlr</td>
</tr>
<tr>
<td>3A</td>
<td>Top Evap L Noz Htr B</td>
</tr>
<tr>
<td>3A</td>
<td>Top Evap R Noz Htr A</td>
</tr>
<tr>
<td>3A</td>
<td>Top Evap Duc L,R Htrs B</td>
</tr>
<tr>
<td>3A</td>
<td>Hi Load Duc L,R Htrs B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(R2)</th>
<th>BLR CNTLR/HTR 1 – B</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>Hyd H2O Blr 1 Cntlr A</td>
</tr>
<tr>
<td>3A</td>
<td>2 Cntlr B</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>(A12)</th>
<th>APU 1 GG/Fu Pump Htrs B</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>APU 2 GG/Fu Pump Htrs A</td>
</tr>
<tr>
<td>3A</td>
<td>APU 1 Lube Oil Htrs B</td>
</tr>
<tr>
<td>3A</td>
<td>APU 2 Lube Oil Htrs A</td>
</tr>
<tr>
<td>3A</td>
<td>APU 1 Tx/Fu Line Htr B</td>
</tr>
<tr>
<td>3A</td>
<td>GG Inj H2O Htrs B</td>
</tr>
<tr>
<td>3A</td>
<td>2 Tx/Fu Line Htr A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(L1)</th>
<th>Body Flap Htr B</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>Elev Act Htr B</td>
</tr>
<tr>
<td>3A</td>
<td>Rudder/Speed Brake Htr B</td>
</tr>
<tr>
<td>3A</td>
<td>Circ Pump 1 MNB pwr</td>
</tr>
<tr>
<td>3A</td>
<td>2 MNB pwr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(R2)</th>
<th>FES Sec Cntlr</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>Top Evap L Noz Htr B</td>
</tr>
<tr>
<td>3A</td>
<td>Top Evap R Noz Htr A</td>
</tr>
<tr>
<td>3A</td>
<td>Top Evap Duc L,R Htrs B</td>
</tr>
<tr>
<td>3A</td>
<td>Hi Load Duc L,R Htrs B</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

1. MASTER ALARM
   - Light/Tone – on

2. HYD MPS/TVC ISOL VLV
   - SYS 2 tb – CL

3. HYD BRAKE ISOL VLV 2
tb – OP

4. AFT R RCS He PRESS B
tb – bp

5. APT L RCS TS KOL 3/4/5 B tb – bp (if vlv in CL position)

6. AFT L RCS JET IT – on

7. APU H2O QTY 1 Ind – 0%
   - 2 Ind – 0%
   - 1 SPEED % Ind – 0

### NOTES

1. Indications do not appear until jet commanded
2. TIME
   - * CRITICAL *
   - If not done within 20 min, may freeze N2H4 and lose APU.
   - However, SM ALERT occurs above freezing temp
3. Vlv holds position
4. Vlv holds position. Loss of redundant hyd NLG deploy and NWS hyd redundancy if failed closed
5. Man OP capability remains. Vlv holds position
6. Full vlv capability remains. If switch in CL, vlv will continuously drive to CL position
7. APU H2O QTY 1 Ind – 0% if BLR CNTLR/HTR 1A(2B) selected. APU H2O QTY 2 Ind – 0% if BLR CNTLR/HTR 2B selected
8. Man CL and GPC cntl remains. Vlv holds position
9. Do not reconfig for reg switch or ICNCT procedures

<table>
<thead>
<tr>
<th>(FSM)</th>
<th>RCS Manf R5 RJD pwr</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>(R5R,R5D)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(O7)</th>
<th>AFT L RCS He Pr Isol A man OP capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>AFT R RCS He Pr Isol A man OP capability</td>
</tr>
<tr>
<td>3A</td>
<td>AFT R RCS He Pr Isol B GPC Cntl and man CL capability</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

1. L OMS GMBL’ (3)

2. ‘RM FAIL RGA’ (3)

3. ‘L OMS GMBL’ (3)

4. ‘L OMS GMBL’ (3)

5. ‘RCS JET’ (1)

6. ‘RCS D,R JET’ (1)

### HYD/APU

7. APU H2O QTY 1 Ind – 0% if BLR CNTLR/HTR 1A(2B) selected. APU H2O QTY 2 Ind – 0% if BLR CNTLR/HTR 2B selected

### GNC 23 RCS

1. Reprioritize L,R Manf 1 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc
2. Set aft pod(s) PRI JET FAIL LIMIT to 3

If ICNCT config:

<table>
<thead>
<tr>
<th>(O7)</th>
<th>AFT L RCS TK ISOL 3/4/5 B – GPC (tb-bp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3A</td>
<td>AFT R RCS TK ISOL 3/4/5 B – GPC (tb-bp)</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

1. AFT L,R RCS TK ISOL 3/4/5 B CL microswitch feedback

### CREW INDICATIONS
### Actions

<table>
<thead>
<tr>
<th>A14</th>
<th>RCS/OMS HTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>R Pod (two) – A OFF, B AUTO</td>
</tr>
<tr>
<td>•</td>
<td>L Pod (two) – A AUTO, B OFF</td>
</tr>
<tr>
<td>•</td>
<td>CRSFD LINES A,B (two) – A AUTO, B OFF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B11</th>
<th>RCS/OMS HTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>Right OMS TK ISOL A – CL (tb-CL)</td>
</tr>
</tbody>
</table>

**Prior to using L(R) OMS:**

<table>
<thead>
<tr>
<th>B15</th>
<th>L OMS He PRESS/VAP ISOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>A – GPC</td>
</tr>
<tr>
<td>•</td>
<td>B – OP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B19</th>
<th>R OMS He PRESS/VAP ISOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>A(B) – GPC</td>
</tr>
<tr>
<td>•</td>
<td>B(A) – CL</td>
</tr>
</tbody>
</table>

**For SSME Hyd Repress:**

<table>
<thead>
<tr>
<th>C14</th>
<th>HYD MPS/TVC ISOL LVLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>SYS 1,3 (two) – OP, wait 10 sec, then CL</td>
</tr>
</tbody>
</table>

**CNC XXXXX**

<table>
<thead>
<tr>
<th>D17</th>
<th>Sel L OMS PRI TVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>GMBL L PRI – ITEM 28 EXEC</td>
</tr>
</tbody>
</table>

**If reqd during entry (< 120K ft):**

| D20 | NH3 CNTLR A(B) – PRC/GPC |

**MCA LOGIC MNB AFT 2 – OFF**

<table>
<thead>
<tr>
<th>E20</th>
<th>Aft PL MNB pwr</th>
</tr>
</thead>
</table>

**RGA 2 – OFF**

<table>
<thead>
<tr>
<th>E23</th>
<th>ASA 4 Isol</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>ATVC 3 Main Eng Isol</td>
</tr>
<tr>
<td>•</td>
<td>4 Main Eng Isol</td>
</tr>
</tbody>
</table>

**L OMS PRI TVC**

<table>
<thead>
<tr>
<th>E24</th>
<th>MCA LOGIC MNB AFT 2 – OFF</th>
</tr>
</thead>
</table>

**MNB AMC 2 Bus pwr**

<table>
<thead>
<tr>
<th>F22</th>
<th>L OMS Eng Press Vlv Coil 2, Cntl Vlv 1,2 Coil 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>OMS Qty Gaging for all L OMS Single engine burns</td>
</tr>
</tbody>
</table>

**NWS Hyd Sys 2**

<table>
<thead>
<tr>
<th>F24</th>
<th>Hyd Main Pump 1 Depress Solenoid RPC B</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>Hyd Main Pump 2 Depress Solenoid RPC A</td>
</tr>
</tbody>
</table>

### Equipment/Function Lost

<table>
<thead>
<tr>
<th>A11</th>
<th>R Pod A Htrs (all)</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>L Pod B Htrs (partial)</td>
</tr>
<tr>
<td>•</td>
<td>OMS Crsfd Ln Htrs B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B13</th>
<th>OMS Engine/Crossfeed Valve Redundancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>OMS Eng/XFeed Redundancy</td>
</tr>
</tbody>
</table>

**Prior to using L(R) OMS:**

<table>
<thead>
<tr>
<th>B16</th>
<th>Left OMS He Pr Isol B and Vap Isol 2 GPC Cntl</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>Right OMS He Pr Isol A,B man Cntl and Vap Isol 1,2 man OP</td>
</tr>
</tbody>
</table>

**OMS Engine/Crossfeed Valve Redundancy**

<table>
<thead>
<tr>
<th>C17</th>
<th>Maintains deorbit capability for MNC DA3 failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>Maintains deorbit capability for CNTL AB1 failure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D15</th>
<th>Maintains He Isol redundancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>Man cntl remains. Vlv isol closes. Primary Isol normally closed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E17</th>
<th>L OMS ENG VLV 2: Assume Vlv 2 status same as Vlv 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>GPC cntl remains. Vlv fails closed</td>
</tr>
</tbody>
</table>

**OMS Engine/Crossfeed Valve Redundancy**

<table>
<thead>
<tr>
<th>E19</th>
<th>Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk</th>
</tr>
</thead>
</table>

**OMS Engine/Crossfeed Valve Redundancy**

<table>
<thead>
<tr>
<th>F19</th>
<th>Sys B Pri Cntl, auto switchover to Sec Cntl remain</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>Six vlv fails to nonisolation position</td>
</tr>
<tr>
<td>•</td>
<td>Redundant coils remain</td>
</tr>
<tr>
<td>•</td>
<td>MCC for OMS Qys</td>
</tr>
</tbody>
</table>

**OMS Engine/Crossfeed Valve Redundancy**

<table>
<thead>
<tr>
<th>F21</th>
<th>Hyd Sys 1 still available for NWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>Vlv holds position. Loss of redundant hyd NLG deploy and NWS hyd redundancy if failed closed</td>
</tr>
</tbody>
</table>

**OMS Engine/Crossfeed Valve Redundancy**

| F22 | Redundant RPC remains |

**L OMS ENG VLV 2: Assume Vlv 2 status same as Vlv 1**

**GNC SYS SUMM 2**

**L OMS ENG VLV 2: Assume Vlv 2 status same as Vlv 1**

**Lost TM:**

**GNC SYS SUMM 2**

| G17 | NH3 Sys B Sec Cntlr man ON capability |

**NWS Hyd Sys 2**

| G21 | NH3 CNTLR A(B) – PRC/GPC |

**NWS Hyd Sys 2**

<table>
<thead>
<tr>
<th>G24</th>
<th>Hyd Main Pump 1 Depress Solenoid RPC B</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>Hyd Main Pump 2 Depress Solenoid RPC A</td>
</tr>
</tbody>
</table>
## BUS LOSS: MNB APC5

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freon Loop 1 Cold Plate Flow Xdcr</td>
</tr>
<tr>
<td>APU 1 Cntr Pwr Sply B Fu Tk Vlv B</td>
</tr>
<tr>
<td>2 Cntr Pwr Sply A Fu Tk Vlv A GBX GN2 Repress Vlv</td>
</tr>
<tr>
<td>MPS: L Eng He Intercon Outlet Vlv</td>
</tr>
<tr>
<td>L Eng He Isol A</td>
</tr>
<tr>
<td>Pnpu He Isol 2</td>
</tr>
<tr>
<td>Prplt F/D Inbd LO2 Vlv</td>
</tr>
<tr>
<td>Outbd LH2 Vlv</td>
</tr>
<tr>
<td>Manf Repress LH2 Vlv 1,2</td>
</tr>
<tr>
<td>ET Door Mtr: C/L Lat Actr 1 Mtr 2 GPC Cntl</td>
</tr>
<tr>
<td>L Dr Uplock Lat Mtr 2 GPC Lat capability</td>
</tr>
<tr>
<td>R Dr Uplock Lat Mtr 2 GPC Lat capability</td>
</tr>
<tr>
<td>R Dr Closure Mtr 2 GPC CL capability</td>
</tr>
<tr>
<td>L,R DR RTL Ind 3</td>
</tr>
<tr>
<td>AC pwr removal capability via Limit sw for ET Dr Mtrs: C/L Lat Actr 1 Mtr 2</td>
</tr>
<tr>
<td>L Dr Uplock Lat Mtr 2</td>
</tr>
<tr>
<td>R Dr Uplock Lat Mtr 2 Closure Mtr 2</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>L MPS He Reg A &lt; 680 during entry (MM 303)</td>
</tr>
</tbody>
</table>

### NOTES

<table>
<thead>
<tr>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 Pwr Sply A remains. Turbine speed ind lost</td>
</tr>
<tr>
<td>28 Vlv A remains</td>
</tr>
<tr>
<td>29 Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running</td>
</tr>
<tr>
<td>30 Vlv B remains</td>
</tr>
<tr>
<td>31 Vlv fails closed</td>
</tr>
<tr>
<td>32 Vlv fails closed. Redundant vlv remains</td>
</tr>
<tr>
<td>33 Vlv holds position. Loss of manual capability to inert LO2 and LH2 mafs</td>
</tr>
<tr>
<td>34 Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304)</td>
</tr>
<tr>
<td>35 Redundant mtrs and m/s remain</td>
</tr>
<tr>
<td>36 Actuators continue to operate until Stow, Rel/Lat, or OP/CL sw is taken to OFF</td>
</tr>
</tbody>
</table>
### ACTIONS

Refer to OMS/RCS Slide Rule for valve loss info. 

Reconfig following vlv(s) only if leak isolation reqd: 

(A8) FWD RCS He PRESS A,B

(S-BD) PM
- ANT SW ELEC – 2
- XPNDR – 2
- PWR AMPL OPER – 2
- STBY – 2
- PRE AMP – 2
- NSP PWR – 2

If PSP and/or INTRG reqd for PL or ISS ops:
- S-BD PL SYS – 2
- cntl – PNL
- – CMD

Reconfig PSP

Perform PL INTRG REACQ (if reqd)

If no comm:
- (C3) S-BD PM CNTL – PNL
- – CMD

If OIU reqd:
- (SSP) OIU PWR – OIU 2 ON
- OIU tb – DN
- \(^{1}\)MCC, OIU reconfig

(A1R) S-BD FM PWR – 2

**GNC 23 RCS**

Override F2 Manf status to CL:
- RCS FWD – ITEM 1
- EXE
- MANF VLVS 2 OVRD – ITEM 41

Pre-seat ingress:
- Discharge handheld fire ext into AV BAY 1

### EQUIP/FUNCTION LOST

| 2 | Fwd RCS He Press Isol A man OP capability |
| 4 | Fwd RCS He Press Isol B man CL and GPC Cntl |

S-BD PM Sys 1:
- Xpnndr 1
- Pre Amp 1
- Pwr Amp 1
- FM, PM Auto sw 1

NSP 1

S-BD PL Instr 1

PSP 1

### CREW INDICATIONS

1. MASTER ALARM
   - Light/Tone – on (F7)
   - C/W RCS JET lt – on (COMM LOST)
2. All S-BD A/G voice lost if Sys 1 selected
3. ‘F RCS D(F,R,U) JET’
4. If site AOS and using S-BD ANTE ELEC 1: ‘ANTENNA’
5. If sys 1 pwrd: ‘S62 BCE BYP PSP1’
   - Loss of PL TLM and CMD
6. If PDI FDA enabled: ‘S62 PDI DECOM FAIL’
7. If NSP 1 selected, ‘BCE STRG 1 NSP’
8. LDG GEAR L, NOSE tb – bp (O8)
9. FWD RCS He PRESS B tb – bp

### NOTES

1. Man CL and full GPC cntl remains. Vlv holds position
2. Indications do not appear until jet commanded
3. Do not reconfig for reg switch or I’CNCT procedures
4. Man OP capability remains. Vlv holds position
5. FSM caused by antenna miscompare
6. REACQ and PSP reconfig procedures are flight specific. If reqd, procedure can be found in payload or ISS specific books
7. When gear deployed, tb will not indicate DN
8. OIU 2 interfaces with PSP 2 for commanding
9. Manf status not automatically declared closed. Jet fail-offs may occur
10. Htr Cntr 1 remains

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

(O15:C)
- cb MBN FIRE SUPPR BAY 1 – op

L,R ADP Htr Cntr 2

LMG, NLG, B/U Rel 2 Fire 2, Arm
### ACTIONS

<table>
<thead>
<tr>
<th>(A12)</th>
<th>APU HTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>GAS GEN/FUEL</td>
</tr>
<tr>
<td>2</td>
<td>PUMP 1 – A AUTO</td>
</tr>
<tr>
<td>2</td>
<td>PUMP 2 – B AUTO</td>
</tr>
<tr>
<td>2</td>
<td>LUBE OIL LINE 1 – A AUTO</td>
</tr>
<tr>
<td>2</td>
<td>LUBE OIL LINE 2 – B AUTO</td>
</tr>
<tr>
<td>2</td>
<td>APU HTR TK/FU LINE/H2O</td>
</tr>
<tr>
<td>2</td>
<td>SYS 1A – AUTO</td>
</tr>
<tr>
<td>2</td>
<td>1B – OFF</td>
</tr>
<tr>
<td>2</td>
<td>2A – OFF</td>
</tr>
<tr>
<td>2</td>
<td>2B – AUTO</td>
</tr>
<tr>
<td>2</td>
<td>HYD HTR</td>
</tr>
<tr>
<td>2</td>
<td>RUD SPD BRK A – AUTO</td>
</tr>
<tr>
<td>2</td>
<td>B – OFF</td>
</tr>
<tr>
<td>2</td>
<td>BDY FLT A – AUTO</td>
</tr>
<tr>
<td>2</td>
<td>R – B AUTO</td>
</tr>
<tr>
<td>2</td>
<td>ELEV A – AUTO</td>
</tr>
<tr>
<td>2</td>
<td>B – OFF</td>
</tr>
<tr>
<td>2</td>
<td>HYD CIRC PUMP</td>
</tr>
<tr>
<td>2</td>
<td>PWR 1 – MNA</td>
</tr>
<tr>
<td>2</td>
<td>2 – MNC</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

|  | APU 1 GG/Fu Pump Htrs B |
|  | APU 2 GG/Fu Pump Htrs A |
|  | APU 1 Lube Oil Line Htrs B |
|  | APU 2 Lube Oil Line Htrs A |
|  | APU 1 Tk/Fu Line Htr B |
|  | APU 2 Tk/Fu Line Htr A |
|  | Body Flap Htr B |
|  | Elev Act Htr B |
|  | Rud/Spd Brake Htr B |
|  | Circ Pump 1 MNB pwr |
|  | 2 MNB pwr |
|  | FES Sec Cntlr |
|  | Top Evap L Noz Htr B |
|  | R Noz Htr A |
|  | Duct L,R Htrs B |
|  | HI Load Duct Noz Htr B |
|  | FES H2O Fdln A Htrs 2 (all except Mid 2) |
|  | Hyd H2O Blr 1 Cntlr A |
|  | 2 Cntlr B |
|  | Aft L,R RCS He Pr Isol A man |
|  | Sys 2 pwr capnlty |
|  | Aft L,R RCS Jct Htrs |
|  | RCS Manf R5 RJD pwr |
|  | (R5R,R5D) |

### CREW INDICATIONS

1. MASTER ALARM Light/Tone – on
2. HYD BRAKE ISOL VLV 2 tb – OP
3. HYD MPS/TVC ISOL VLV SYS 2 tb – CL
4. AFT R RCS He PRESS B tb – bp
5. AFT L,R RCS TK ISOL 3/4/5 B tb – bp (if vlv in CL position)
6. C/W APU TEMP II – on after ~2 min
7. C/W RCS JET lt – on
8. APU H2O QTY 1 ind – 0% 2 ind – 0%
9. APUs active and using BLR Cntlr/Htr 1A or 2B: C/W APU TEMP – on

### NOTES

1. Indications do not appear until jet commanded
2. If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
3. Vlv holds position. Loss of redundant hyd NLG deploy and NWS hyd redundancy if failed closed
4. Vlv holds position
5. Man Op capability remains. Vlv holds position
6. Full vlv capability remains. If switch in Cl, vlv will continuously drive to Cl position
7. APU H2O QTY 1 ind – 0% if BLR Cntlr/Htr 1A selected. APU H2O QTY 2 ind – 0% if BLR Cntlr/Htr 2B selected
8. HYD H2O Blr and Tk Htrs still operative, but GN2 SOV fails open and steam vent htr and spray logic are disabled. Alternate controller must be selected
9. Man CL and full GPC Cntl remains. Vlv holds position
10. Do not reconfig for reg switch or I’CNCT procedures
11. Manf status not automatically declared closed. Fail-offs will occur when jet commanded
### EPS SSR-36 (Cont)

#### BUS LOSS: MNB ALC2

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6</strong></td>
<td>AFT L,R RCS TK ISOL 3/4/5 B CL microswitch feedback</td>
<td>L MPS He Reg A &lt; 680 during entry (MM303)</td>
<td><strong>3</strong> Vlv holds position. Loss of redundant hyd NLG deploy and NWS hyd redundancy if failed closed</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>AFT L,R RCS TK ISOL 3/4/5 B CL microswitch feedback</td>
<td></td>
<td><strong>4</strong> Vlv holds position</td>
</tr>
<tr>
<td><strong>(O8)</strong></td>
<td>OMS Eng/Xfeed Redundancy</td>
<td></td>
<td><strong>5</strong> Full vlv capability remains. If switch in CL, vlv will continuously drive to Cl position</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td>L OMS He Pr Isol B GPC Cntl</td>
<td></td>
<td><strong>12</strong> Maintains deorbit capability for CNTL AB1 failure</td>
</tr>
<tr>
<td><strong>14</strong></td>
<td>MPS/TVC Hyd Sys 2 Isol Cntl</td>
<td></td>
<td><strong>13</strong> To maintain He Isol redundancy</td>
</tr>
<tr>
<td><strong>15</strong></td>
<td>NH3 Sys B Sec Cntlr man ON capability</td>
<td></td>
<td><strong>14</strong> Man cntl remains</td>
</tr>
<tr>
<td><strong>16</strong></td>
<td>L OMS Eng Pr Vlv Coil 2 and Cntlr Vlv 1,2 Coils 2</td>
<td></td>
<td><strong>15</strong> Sys B Pri Cntlr, auto switchover to Sec Cntlr remain</td>
</tr>
<tr>
<td><strong>16</strong></td>
<td>OMS Qty gauging for all L OMS single engine burns</td>
<td></td>
<td><strong>16</strong> MCC for OMS Qtsy</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>APU 1 Fu Tk Vlv B</td>
<td></td>
<td><strong>17</strong> Vlv fails closed. Redundant vlv remains</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>2 Fu Tk Vlv A</td>
<td></td>
<td><strong>18</strong> Hyd Sys 1 still available for NWS</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>TVC Hyd Sys 2 Isol Cntl</td>
<td></td>
<td><strong>19</strong> Vlv fails closed</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>Hyd Brake Isol 2 Cnt</td>
<td></td>
<td><strong>20</strong> Vlv holds position. Loss of manual capability to inert LO2,LH2 Manfs</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>NWS Hyd Sys 2</td>
<td></td>
<td><strong>21</strong> Vlv fails closed. LH2 Manf will not be pressurized with He during entry (MM304)</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>L Eng He Intercon Outlet Vlv</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>L Eng He Isol A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>Pneu He Isol 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>Prptl F/D Inbd LO2 Vlv</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>Outbd LH2 Vlv</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>Manf Repress LH2 Vlv 1,2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

<table>
<thead>
<tr>
<th>NONE</th>
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</thead>
<tbody>
<tr>
<td><strong>14</strong></td>
<td>L OMS Eng Pr Vlv Coil 2 and Cntlr Vlv 1,2 Coils 2</td>
</tr>
<tr>
<td><strong>16</strong></td>
<td>OMS Qty gauging for all L OMS single engine burns</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>APU 1 Fu Tk Vlv B</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>2 Fu Tk Vlv A</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>TVC Hyd Sys 2 Isol Cntl</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>Hyd Brake Isol 2 Cnt</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>NWS Hyd Sys 2</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>L Eng He Intercon Outlet Vlv</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>L Eng He Isol A</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>Pneu He Isol 2</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>Prptl F/D Inbd LO2 Vlv</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>Outbd LH2 Vlv</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>Manf Repress LH2 Vlv 1,2</td>
</tr>
</tbody>
</table>
### EPS SSR-37
**BUS LOSS: MNB FMC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4-F)</td>
<td>cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</td>
<td>MASTER ALARM Light/ Tone – on</td>
<td>1 Redundant mtr remains</td>
</tr>
<tr>
<td>(L1)</td>
<td>H2O PUMP LOOP 1 – A</td>
<td>SM ALERT Light/Tone – on</td>
<td>2 Htr Cntrl 1 remains</td>
</tr>
<tr>
<td></td>
<td>Refer to OMS/RCS Slide Rule for vlv loss info</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GNC 23 RCS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Override F2 Manf status to OP</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RCS FWD ITEM 1 EXEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MANF VLVs 2 OVRD ITEM 41 EXEC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**
ONLY ON MCC CALL, PERFORM

|                      |                      |                      | |
|----------------------|----------------------|----------------------||
| (MA73CA)             | MCA LOGIC MNB FWD 2 – OFF | MNB FMC2 Bus pwr | |
|                      | L,R Vents 1,2 Mtrs 2 | 1 | |
|                      | ADP Deploy Mtrs 2 | 2 | |
|                      | Deploy Disc 2 | | |
|                      | Htr Cntrl 2 | | |
|                      | 1 - Y Star Trkr Dr Sys 2 OP/CL capability | | |
|                      | 1 - Z Star Trkr Dr Sys 1 OP/CL capability | | |

### EPS SSR-38
**BUS LOSS: MNB MMC1**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>NONE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**
ONLY ON MCC CALL, PERFORM

|                      |                      |                      | |
|----------------------|----------------------|----------------------||
| (MA73CA)             | MCA LOGIC MNB MID 1 – OFF | MNB MMC1 Bus pwr | |
|                      | LH Vent 5 Mtr 2 | | |

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASTER ALARM Light/ Tone – on</td>
<td>1 Redundant mtr remains</td>
</tr>
<tr>
<td>SM ALERT Light/Tone – on</td>
<td>2 Htr Cntrl 1 remains</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FWD RCS MANF ISOL 2 tb – bp</td>
<td></td>
</tr>
<tr>
<td>H2O PUMP OUT PRESS LOOP 1 ind – 20-25 psia</td>
<td></td>
</tr>
<tr>
<td>STAR TRKR DRS POS -Y,-Z OP/CL time incr from 8 to 16 sec</td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

- Redundant mtr remains
- Htr Cntrl 1 remains
### Actions

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>cb MCA PWR AC2 3φ MID 2 – op</td>
</tr>
<tr>
<td>2</td>
<td>OP/CL Drs in man mode MANUAL PLBD CLOSING (DEORBIT PREP)</td>
</tr>
</tbody>
</table>

#### For PLBD ops:
- OP/CL Drs in man mode

### Equip/Function Lost

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stbd Rad Lat 1-6 Mtr 2 Limit sw</td>
</tr>
<tr>
<td>2</td>
<td>Stbd Rad Mtr 2 Dpy capability</td>
</tr>
<tr>
<td>3</td>
<td>PLBD: C/L Lat 13-16 Mtr 2 Stbd Aft Blkhd Lat Mtr 2 Port Door Mtr 2 Stbd Door Mtr 1 CL Limit sw</td>
</tr>
</tbody>
</table>

### Bus Isolation

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73CA)</td>
<td>MCA LOGIC MNB MID 2 – OFF</td>
</tr>
</tbody>
</table>

### Crew Indications

<table>
<thead>
<tr>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>SM (BFS SM 63)</td>
</tr>
<tr>
<td>PL BAY DOORS</td>
</tr>
<tr>
<td>If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg 'S63' PBD CONFIG'</td>
</tr>
<tr>
<td>During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABL</td>
</tr>
<tr>
<td>PORT RMS: RETEN LAT tb – bp R-F-L FWD tb – bp</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNB MMC2 Bus pwr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMS: Port MPM Mtr 2 Stbd MPM Mtr 1 Port Fwd MRL Mtr 1 Stbd Aft MRL Mtr 2</td>
</tr>
</tbody>
</table>

### Notes

1. If AC2 cb not opened, Lat Mtr 2 of Stbd Lat 1-6 Actuator continues to run until Sys B Lat Control sw placed to OFF
2. Mtr 2 stow capability remains
3. Single mtr time. One failure away from EVA to stow PMP or from RMS/OBSS jettison
4. Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
5. Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
### EPS SSR-40
**BUS LOSS: MNB MMC3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
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</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C:B)
- MCA LOGIC MNB MID 3 – OFF

MNB MMC3 Bus pwr

### EPS SSR-41
**BUS LOSS: MNB MMC4**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:D)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>cb MCA PWR AC2 3Φ MID 4 – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For PLBD ops:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• OP/CL Drs in man mode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MANUAL PLBD CLOSING (DEORBIT PREP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Port Rad Lat 1-6 Mtr 2 Limit sw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Port Rad Mtr 2 Dpy capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLBD:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Port,Stbd Fwd Blkhd Lat Mtrs 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Stbd Door Mtr 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Port Door Mtr1 CL Limit sw</td>
<td></td>
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</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C:B)
- MCA LOGIC MNB MID 4 – OFF

MNB MMC4 Bus pwr

RH Vent 6 Mtr 2

RMS:

3 | Port Mid MRL Mtr 2 |
4 | Stbd Fwd MRL Mtr 1 |
5 | Stbd Mid MRL Mtr 1 |
6 | Ku Ant Sto/Dpy Mtr 2 Sto and Dpy Limit sw |
7 | Redundant Ku-Band Xmit Enable |
8 | Redundant Boom Stow Enable II Excitation Signal |

SM (6FS SM 63) PL BAY DOORS

If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg `(S63) PBD CONFIG`

During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left

(R13L)
During Rad Dpy ops, RAD CNTL PORT tb indicates single mtr ops

(A8L)
STARBOARD RMS:

- RETEN LAT tb – bp
- R-F-L FWD tb – bp
- R-F-L MID tb – bp

SM 94 PDRS CONTROL

PORT RMS Indications lost:

- MPM Mtr 2 STO/DPY Mid MRL Mtr 2
- LAT/REL/RDY

STBD RMS Indications lost:

- MPM Mtr 1 STO/DPY Fwd MRL Mtr 1
- LAT/REL/RDY Mid MRL Mtr 1
- LAT/REL/RDY

**NOTES**

1 | If AC2 cb not opened, Lat Mtr 2 of Port Lat 1-6 Actuator continues to run until Sys B Lat Cntl sw placed to OFF |
2 | Mtr 2 stow capability remains |
3 | Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists |
4 | Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists |
5 | With inoperative limit sw, mtr will continue to run until DPY/STO sw is placed in GND position |
6 | Redundant pwr (MNC) enables Ku-Band xmit |
7 | MNC MMC2 pwr remains to supply pwr to Boom Stow Enable II signal for stow mtrs |
### EPS SSR-42
### BUS LOSS: MNB AMC2

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>MNB AMC2 Bus pwr</td>
<td>NONE</td>
<td>1 Redundant mtrs and m/s remain</td>
</tr>
<tr>
<td></td>
<td>LH,RH Vents 8,9 Mtrs 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUS ISOLATION</td>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td>2 Actuators continue to operate until the Stow, Rel/Lat, or OP/CL sw is taken to OFF</td>
</tr>
<tr>
<td>(MA73C:B)</td>
<td>• MCA LOGIC MNB AFT 2 – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 ET Door Mtrs:</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>C/L Lat Actr 1 Mtr 2 GPC</td>
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<tr>
<td></td>
<td>Cntl</td>
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</tr>
<tr>
<td></td>
<td>L Dr Uplock Lat Mtr 2 GPC</td>
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</tr>
<tr>
<td></td>
<td>Lat capability</td>
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<td></td>
<td>R Dr Uplock Lat Mtr 2 GPC</td>
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<tr>
<td></td>
<td>Lat capability</td>
<td></td>
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<tr>
<td></td>
<td>R Dr Closure Mtr 2 GPC CL</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>capabilty</td>
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<td></td>
<td>L,R DR RTL Ind 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 AC pwr removal capability via Limit sw for ET Dr Mtrs:</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>C/L Lat Actr 1 Mtr 2</td>
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</tr>
<tr>
<td></td>
<td>L Dr Uplock Lat Mtr 2</td>
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<tr>
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<td>R Dr Uplock Lat Mtr 2</td>
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<tr>
<td></td>
<td>Closure Mtr 2</td>
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</table>
### EPS SSR-43
**BUS LOSS: MNB R14**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| (A7U) If CCTV reqd:  
- TV PWR CONTR UNIT – MNA | Video Cntl Unit MNB pwr |  
- MDU CDR 2 |  
- MDU MFD 1  
- ADC 1B/2B | CCTV Video and TV Annun  
Its lost if MNB selected for VCU | 1 IDP3, IDP4 ADC data lost. MDU port select may be reqd |
| (R14:C)  
- cb MNC KU SIG PROC – op | VPU | OS Floodlt lost | 2 MNA and MNC pwr sources remain |
| (R12) If VPU flown  
- VPU PWR – OFF | VPU OSVS OUT 2A video input to VPU | (FSM)  
'BCE BYP KU' (2) | 3 Redundant pwr source remains for equipment |

**BUS ISOLATION**
***ONLY ON MCC CALL, PERFORM***

- MDU CDR 2 PWR – OFF  
- MDU MFD 1 PWR – OFF | MNB pwr for CNTL CA1,2,3 Buses | 4 KU-BAND ANTENNA: CONTINGENCY STOW – W/E VA ANT GIMBAL ALIGNMENT (IFM) reqd to stow Ku-Bd. Jettison reqd if antenna cannot be positioned within GO FOR PLBD CLOSURE envelope |
- cb MNB AUD MIDDECK  
- SPKR – op  
- ADC 1B/2B  
- MDU MFD 1 – op  
- MDU CDR 2 – op | Middeck ATU | |
- cb PALLET/DSC  
- 1B – op (EDO)  
- 4B – op (EDO) | Middeck Spkr | |
- cb MNB KU  
- ELEC – op  
- ANT HTR – op  
- CABLE HTR – op | 2 MNB pwr for CNTL CA1/2/3 Buses | |
- cb MNB TV A CAMR  
- CAMR/PTU – op  
- CAMR HTR – op  
- ILLUM/PTU HTR – op  
- cb MNB TV  
- CONTR UNIT – op  
- MON 2 – op | TV A Camr and Pan-Tilt  
TV A Camr Htr  
TV A Camr Pan-Tilt Htr and Illum | |
- cb MNB OS FLOOD – op  
- cb MNB RMS CAMR  
- CAMR/PTU – op  
- WRIST ILLUM/CAMR  
- HTR – op  
- ELB ILLUM/PTU HTR – op | CCTV Mon 2  
OS Floodlt  
RMS: Camr/Pan-Tilt  
Carr Htr and Wrist Illum  
Carr Pan-Tilt Htr and Elb Illum | |

### EPS SSR-44
**BUSS LOSS: MNB O15&A8**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| (A8L) PORT RMS HTR B – OFF  
PORT RMS HTR A – AUTO  
If OBSS berthed:  
(A8L)  
STBD RMS HTR B – OFF  
STBD RMS HTR A – AUTO | RMS:  
B/U pwr  
Port Htr B  
Stbd Htr B | NONE | 1 If Driver sw OFF when bus failed, F2 Manf Drivers lost |

**BUS ISOLATION**
***ONLY ON MCC CALL, PERFORM***

- MSTR MADS PWR – OFF | All MADS equipment | |

- RJD1 1A Drivers ON Cntl  
(Jets F2F,F2R,F2U,F2D) | 1 RJDF 1A Drivers ON Cntl (Jets F2F,F2R,F2U,F2D) |
### ACTIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>(R1)</td>
<td></td>
</tr>
</tbody>
</table>
|  1  | BUS TIE MNA – ON  
(ON)  |

| (L1) |   |
|  •  | Perform ON-ORBIT RAD CNTLR SWITCH, ECLS SSR-13 for Freon Loop 1,2  
|  •  | HSI SEL SOURCE – other than MLS, (OV103,4) TACAN 2 or (OV105) GPS 2  
|  (F6,F8) |   |
|  •  | RADAR ALTM – 1  
|  (O6) | ANUN BUS SEL  
|  •  | ACA 1 – MNA  
|  •  | 2/3 – MNC  
|  (A6U) | ANNUN BUS SEL – MNC  

If on PCS 2:  
• Perform RECONFIG TO ALT PCS SYS, ECLS SSR-3

| SM 60 SM TABLE MAINT |   |
|  7  |   |
|   | Inhibit 0612513, 0612205, 0612554, 0612722  
|   | Perform ECLS COMPUTATION INHIBIT ECLS SSR-14 Table A  
| (R13 U) |   |
|  8  | C/W PARAM SEL tw (three) – 044, 024, 064  
|   | C/W PARAM – INH  
|   | C/W MEM – CLEAR  
|   | C/W PARAM SEL tw (three) – > 119  

• Prior to seat ingress for entry: discharge handheld ext into AV BAY 1

### EQUIP/FUNCTION LOST

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Freon Loop 1,2 Rad Contlr A</td>
<td></td>
</tr>
</tbody>
</table>
| (O1) | CABIN dP/dT ind – 45  
| (O2) | O2/N2 FLOW SNSR 1 ind – 0 pph  
| (PPO2) | PPO2 SNSR B,C ind – 0 psia  
| (FSMs) | S66 CABIN PPO2 B,C  
| S88 H2O LOOP 2 FLOW  
| SM0 TIRE PRESS |   |

If ADTA 2, MLS 2:  
• Y Star Trkr pwrd:  
BCE STRG 2 ADTA (3,B)  
BCE STRG 2 MLS (3)  
BCE STRG 3 STRKR (2,3)

### CREW INDICATIONS

<p>| | |</p>
<table>
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</thead>
</table>
| MASTER ALARM | Light/Tone – on  
| (F7) | C/W CAB ATM lt  
| (A4) | MSN TIME ind blank  
| (O1) | CABIN dP/dT ind – 45  
| (A2) | O2/N2 Cntl Vlv 2 normally closed when unpowered  

### NOTES

1 FC1 only one failure away (loss of ESS1BC) from inability to bus tie
2 ACAs recovered by switching to alternate pwr
3 Vlv holds position
4 O2/N2 Cntl Vlv 2 normally closed when unpowered
5 Vlv fails closed. IFM or real-time flow test will be required.
6 MCC for additional direction
7 Current Snsr 1 remains
8 Inhibits Primary C/W for Cabin PPO2 B, Cabin O2 Flow 2, and H2O Loop ICH Flow 2 respectively
9 Inhibits Primary C/W for Cabin PPO2 B, Cabin O2 Flow 2, and Cabin N2 Flow 2 respectively

### SM 60 SM TABLE MAINT

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Av Bay 1 Agent discharge capability</td>
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<tr>
<td>(Continued)</td>
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</table>

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<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O6)</td>
<td>• STAR TRKR PWR -Y – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O7)</td>
<td>• (OV105) GPS 2 PWR – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• (OV105) GPS 2 PRE AMPL UPPER – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• (OV105) GPS 2 PRE AMPL LOWER – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O8)</td>
<td>• RADAR ALTM 2 – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• MLS 2 – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O15:B)</td>
<td>cb MNB</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OI SIG CONDR OF 1/4 B – op</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• OI SIG CONDR OF 2/3 A – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OI SIG CONDR OM 1/2 B – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OI MDM OF 1/2 B – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OI SIG CONDR OM3 A – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OI H2O BYP LOOP 2 SNSR – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OI TIRE PRESS – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• MNA CONTR – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• MSN TIMER AFT – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• EVENT TIMER FWD – op</td>
<td></td>
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<tr>
<td>(O15:C)</td>
<td>cb MNB</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• (OV103) TACAN 2 – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• SMOKE DETN BAY 1B/3A – op</td>
<td></td>
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<tr>
<td></td>
<td>• FIRE SUPPR BAY 1 – op</td>
<td></td>
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<tr>
<td></td>
<td>• UTIL PWR F1/MO13Q – op</td>
<td></td>
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<tr>
<td></td>
<td>• FLOOD R CNSL – op</td>
<td></td>
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<tr>
<td></td>
<td>• L CTR – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ANNUN FWD ACA 1,2/3 (two) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ANNUN AFT ACA 4/5 – op</td>
<td></td>
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<tr>
<td></td>
<td>• CRYO O2 HTR TK2 SNSR 2 – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• (OV104,5) GPS 2 PRE AMPL UPPER – op</td>
<td></td>
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<tr>
<td>(O15:D)</td>
<td>cb MNB</td>
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<tr>
<td></td>
<td>• FREON RAD CNTLR 1,2 (two) – op</td>
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<tr>
<td></td>
<td>• PPO2 C CAB dp/dT – op</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• N2 SPLY 2 – op</td>
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<td></td>
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<tr>
<td></td>
<td>• O2/N2 CNTLR 2 – op</td>
<td></td>
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<tr>
<td></td>
<td>• O2 XOVR 2 – op</td>
<td></td>
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<tr>
<td></td>
<td>• N2 REG INLET 2 – op</td>
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</tr>
<tr>
<td></td>
<td>• CAB RELIEF A – op</td>
<td></td>
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<tr>
<td></td>
<td>• NWS – op</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• (OV104,5) GPS 2 PRE AMPL LOWER – op</td>
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(Continued)

(Continued)
### EPS SSR-45 (Cont)
**BUS LOSS: MNB O15**

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<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
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<tr>
<td>(O15:E)</td>
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</tr>
<tr>
<td>cb MNB</td>
<td>Tacan 2</td>
<td></td>
<td>⑨ Redundant pwr source remains</td>
</tr>
<tr>
<td>• RADAR ALTM 2 – op</td>
<td>ADTA 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MLS 2 – op</td>
<td>AA2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV104) TACAN 2 – op</td>
<td>9 Left DDU MNB pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ADTA 2 – op</td>
<td>9 Right DDU MNB pwr</td>
<td></td>
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</tr>
<tr>
<td>• STAR TRKR -Y – op</td>
<td>Drag Chute, PLT Arm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ACCEL 2 – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• DDU L – op</td>
<td>GPS 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• R – op</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• DRAG CHUTE SYS 2 – op</td>
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<tr>
<td>(A13)</td>
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<tr>
<td>• (OV104) GPS 2 PWR – OFF</td>
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<tr>
<td>• (OV104) GPS 2 PRE AMPL UPPER – OFF</td>
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<tr>
<td>• (OV104) GPS 2 PRE AMPL LOWER – OFF</td>
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### EPS SSR-46
**BUS LOSS: MNB R1A1**

<table>
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<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>1 MNB pwr to CNTLAB 1,2,3</td>
<td>NONE</td>
<td>① Buses remain pwrd</td>
</tr>
<tr>
<td></td>
<td>CNTLBC 1,2,3</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>ESS1BC</td>
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</tr>
<tr>
<td></td>
<td>ESS3AB</td>
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<td></td>
</tr>
</tbody>
</table>

| BUS ISOLATION | |
|---------------| |
| ONLY ON MCC CALL, PERFORM | NONE | |

| CREW INDICATIONS | |
|------------------| |
| NONE | |

| NOTES | |
|-------| |
| ① Buses remain pwrd | |
## EPS SSR-47
### BUS LOSS: MNB A6&A14

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNC 23 RCS</td>
<td>Fwd RCS Jet 2,3 Htrs</td>
<td>SM 97 RETENTION</td>
<td>1 Single mtr time</td>
</tr>
<tr>
<td>• Reprioritize Fwd Manf 2,3 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc</td>
<td></td>
<td>Indication lost: RELAX DEMATE MATE</td>
<td></td>
</tr>
<tr>
<td>• Set forward pod PRI JET FAIL LIMIT to 4</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>BUS ISOLATION</td>
<td>PL Reten Sys B Rel/Lat Mtrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td>All MADS equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C3)</td>
<td>ROEU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MSTR MADS PWR – OFF</td>
<td>Logic Pwr Sys 2</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Orbiter arm drive mtr (ODM mtr 2 – mate B, demate B, relax B)</td>
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</tr>
<tr>
<td></td>
<td>ODA mtr 2 latch/release</td>
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</tbody>
</table>
**EPS SSR-48**  
**BUS LOSS: MNB ML86B**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ML86B:A)</td>
<td>H2O Line Htr B: Waste Dump Line Sply Dump Line Vac Vent Line</td>
<td>(R11L)</td>
<td>1. Vlv holds position</td>
</tr>
<tr>
<td>• cb MNA H2O LINE HTR A – cl</td>
<td></td>
<td></td>
<td>2. Htr A remains</td>
</tr>
<tr>
<td>(ML86:B:D)</td>
<td></td>
<td></td>
<td>3. MNA,MNC line htrs remain. MNA struct htrs remain</td>
</tr>
<tr>
<td>cb MNA MMU PORT,STBD HTR A (two) – cl</td>
<td>2. MMU Port,Stbd Htr B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML31C)</td>
<td>VAC VENT ISOL VLV BUS SEL – MNA</td>
<td>(R13L)</td>
<td></td>
</tr>
<tr>
<td>• VAC VENT ISOL VLV BUS SEL – MNA</td>
<td>Vac Vent Isol Vlv MNB Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(WCS)</td>
<td>WCS Sep Fan 2 Mtr Relay</td>
<td>(ML31C)</td>
<td></td>
</tr>
<tr>
<td>• MODE – AUTO</td>
<td>WASTE H2O TK1 DRAIN VLV tb – bp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CRADLE – AUTO</td>
<td>SPLY H2O TKD INLET tb – bp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Hose stowed in cradle</td>
<td>(LIGHTS LOST)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• WCS ON it – OFF</td>
<td>Middeck Floodlts 2,6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FAN SEP SEL sw – OFF</td>
<td>Bunk Floodlts 2/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• HOSE BLOCK – SEP 1</td>
<td>PHS Floodlt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete</td>
<td>Airlk Floodlt 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete</td>
<td>TA Floodlt 3 (SL only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FAN SEP SEL sw – 1</td>
<td>(M013Q)</td>
<td></td>
<td></td>
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<tr>
<td>(CDR’s SEAT)</td>
<td>ARLK H2O S/O VLV – bp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CDR SEAT PWR BUS SEL – AC3 (dn)</td>
<td>CDR Seat Adj via AC2 pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(PLT’s SEAT)</td>
<td></td>
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</tr>
<tr>
<td>• PLT SEAT PWR BUS SEL – AC3 (dn)</td>
<td>PLT Seat Adj via AC2 pwr</td>
<td></td>
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</tr>
<tr>
<td>If Supply H2O Dump reqd and dump ISOL VLV is failed closed:</td>
<td>1 Sply H2O Dump Isol Vlv Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS)</td>
<td>(Continued)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:C)</td>
<td>Ext A/L H2O and Structural Htrs MNB pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNA(MNC) EXT ARLK HTR LINE ZN1 – cl</td>
<td></td>
<td></td>
<td>(Continued)</td>
</tr>
<tr>
<td>• cb MNA(MNC) EXT ARLK HTR LINE ZN2 – cl</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• cb MNA EXT ARLK HTR STRUC – cl</td>
<td></td>
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</table>
## EPS SSR-48 (Cont)

### BUS LOSS: MNB ML86B

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(ML86B:A)</strong></td>
<td></td>
<td></td>
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<tr>
<td>cb MNB</td>
<td>Sply H2O:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Tk B Inlet Vlv Cntl</td>
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<tr>
<td></td>
<td>1 Tk C Outlet Vlv Cntl</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>1 B Sply Isol Vlv Cntl</td>
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<tr>
<td><strong>(ML86B:B)</strong></td>
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</tr>
<tr>
<td>cb MNB</td>
<td>Waste H2O Vac Vent NozHtr</td>
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</tr>
<tr>
<td></td>
<td>1 Tk 1 Drain Vlv Cntl</td>
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</tr>
<tr>
<td></td>
<td>Sply H2O Tk D Inlet Vlv Cntl</td>
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<tr>
<td></td>
<td>Wcs Press Xdcr</td>
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<tr>
<td></td>
<td>Galley Hot H2O Htr (Five of six htr strips lost)</td>
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<tr>
<td><strong>(ML86B:D)</strong></td>
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<tr>
<td>cb MNB</td>
<td>MMU Port Htr B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 MMU Port Htr B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Stbd Htr B</td>
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<tr>
<td></td>
<td>G2 Sply Isol Vlv B – op</td>
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<tr>
<td>cb MNB</td>
<td>Port RMS:</td>
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<tr>
<td></td>
<td>Jet/Guil Sys A</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Deadface Relays</td>
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<td></td>
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<tr>
<td><strong>(ML86B:E)</strong></td>
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</tr>
<tr>
<td>cb MNB</td>
<td>TA Floodlt 3</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>(ML86B:F)</strong></td>
<td>Middeck Floodlts 2,6</td>
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<tr>
<td></td>
<td>Bunk Floodlts 2/4</td>
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<tr>
<td></td>
<td>PHS Floodlt</td>
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<td></td>
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<tr>
<td></td>
<td>Airlk Floodlt 3</td>
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<td></td>
</tr>
<tr>
<td><strong>(ML86B:C)</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>cb MNB</td>
<td>Ext A/L H2O Line and Structural Htrs MNB pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Ext A/L H2O Line and Structural Htrs MNB pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A/L H2O Isol Vlv Cntl</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Vlv holds position
2. Htr A remains
3. MNA,MNC line htrs remain. MNA struct htrs remain
4. No redundancy
5. One htr strip pwrd by MNA ML86B still remains. Water will still heat, but at a very slow rate
6. One failure away from loss of jettison capability
7. Current Snsr 1 remains
8. Current Snsr 2 remains
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td>Vestibule Depress Vlv Sys 2 Vent</td>
<td>1 DSP SYS 2 pwr still available to all users except MNB A7</td>
</tr>
<tr>
<td>BUS ISOLATION</td>
<td></td>
<td>Vestibule Depress Vlv Sys 2 Vent</td>
<td></td>
</tr>
<tr>
<td>ONLY ON MCC CALL,</td>
<td></td>
<td>Vent</td>
<td></td>
</tr>
<tr>
<td>PERFORM</td>
<td></td>
<td>Vestibule Depress Vlv Sys 2 Vent</td>
<td></td>
</tr>
<tr>
<td>(A6L)</td>
<td></td>
<td>Vent</td>
<td></td>
</tr>
<tr>
<td>IF DOCKING MISSION</td>
<td></td>
<td>Vent</td>
<td></td>
</tr>
<tr>
<td>• cb MNB DEP SYS 2</td>
<td></td>
<td>Vent</td>
<td></td>
</tr>
<tr>
<td>VENT – op</td>
<td></td>
<td>Vest Isol</td>
<td></td>
</tr>
<tr>
<td>• cb ESS 2CA DEP SYS 2</td>
<td></td>
<td>Aft Truss Docking lt</td>
<td></td>
</tr>
<tr>
<td>VENT ISOL – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNB DOCK LT AFT –</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• LT TRUSS AFT – OFF</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**EPS SSR-49c**

**BUS LOSS: MNB A7**
**EPS SSR-50**

**BUS LOSS: MNC DA3**

(Includes all MNC sub-buses & AC3)

### ACTIONS

1. Perform FC3 SHUTDN (FC SHUTDN Cue Card)
2. Perform LOSS OF 1 FC (ORB PKT, PWRDN)

### EQUIP/FUNCTION LOST

1. FC3 Pumps and pH Snsr
2. O2,H2 Flow Xdcrs
3. Cell Perf Monitor
4. MNC pwr to ESS1B/C
5. ESS2CA
6. CNTLBC1,2,3
7. CNTLCA1,2,3

### CREW INDICATIONS

1. SM ALERT Light/Tone – on
2. MASTER ALARM
3. Light/Tone – on
4. MDU CDR 1 blanks
5. MDU PLT 2 blanks
6. AFT
7. MDU AFD 1 blanks
8. (F6)
9. MDU CDR 1 blanks
10. (F7)
11. C/W MN BUS UNDERVOLT
12. It – on
13. BACKUP C/W ALARM
14. It – on
15. C/W FREON LOOP It – on
16. C/W FC PUMP It – on
17. C/W AC VOLT It – on
18. C/W H2O LOOP It – on
19. MDU CRT 3,4 blank

### NOTES

1. Because of FC3 Purge Vlv loss, FC3 will remain isolated to limit voltage degradation and allow FC3 to MNB use during entry via PL Bus contactors
2. May be respwrd after AC Pwr Transfer Cable connected
3. Buses remain pwrd
4. If Aud Ctr 2 selected, all intercomm, A/G, and recorded voice lost until AUD CTR 1 selected
5. Loss of redundant port to the following:
6. MDU MFD 1 (S)
7. MDU MFD 2 (S)
8. IDP 3
9. MDU MFD 1 (P)

If not found within 20 min, may freeze N2/H4 and lose APU. However, SM ALERT occurs above freezing temp.

---

09/26/08 7-170 MAL/ALL/GEN J
## EPS SSR-50 (Cont)

### BUS LOSS: MNC DA3

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A12)</td>
<td><strong>APU HTR TK/FU LN/H2O SYS</strong></td>
<td><strong>CREW INDICATIONS</strong></td>
<td><strong>NOTES</strong></td>
</tr>
<tr>
<td>2A – AUTO</td>
<td>APU 2 Tk/Fu Ln Htr B</td>
<td>(FSMs)</td>
<td>9</td>
</tr>
<tr>
<td>2B – OFF</td>
<td>APU 3 GG Inj H2O Htrs 3A, 23A</td>
<td>I/O ERROR CRT 3</td>
<td>TIME CRITICAL</td>
</tr>
<tr>
<td>3A – OFF</td>
<td>Aft Fuselage Hyd Htrs B</td>
<td>I/O ERROR CRT 4</td>
<td></td>
</tr>
<tr>
<td>3B – AUTO</td>
<td>S-BD Fm Sig Proc 2, Xmtr 2</td>
<td>RM DLMA MANF</td>
<td></td>
</tr>
<tr>
<td>HYD HTR</td>
<td>Audio Ctr 2</td>
<td>S67 FPC/FLC3</td>
<td></td>
</tr>
<tr>
<td>• AFT FUS A – AUTO</td>
<td>Flash Evap Cntrl Pri A</td>
<td>S67 MPC 3</td>
<td></td>
</tr>
<tr>
<td>• B – OFF</td>
<td>Topping Evap R Noz Htr B</td>
<td>S67 APC/ALC C</td>
<td></td>
</tr>
<tr>
<td>(A1R)</td>
<td>Topping Evap Duct Fwd,Aft Htrs C</td>
<td>If NSP 2 selected:</td>
<td></td>
</tr>
<tr>
<td>• S-BD FM PWR – 1</td>
<td>Hi Load Duct Inbd,Outbd, Noz Htrs C</td>
<td>BCE STRG 3 NSP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If no comm:</td>
<td>If cooling by FES only:</td>
<td></td>
</tr>
<tr>
<td>(C3)</td>
<td>• S-BD PM CNTL – PNL</td>
<td>‘C/W FREON LOOP It – on ‘S88 EVAP OUT T1’</td>
<td></td>
</tr>
<tr>
<td>• AUD CTR – 1</td>
<td>• 2A – AUTO</td>
<td>‘S88 EVAP OUT T2’</td>
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</tr>
<tr>
<td></td>
<td>• 2B – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>• 3A – OFF</td>
<td>HYD/PU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 3B – AUTO</td>
<td>HYD QTY 3 ind – 0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• TOP EVAP HTR DUCT – A(B)</td>
<td>APU H2O QTY ind – 0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If Hi Load Evap enabled:</td>
<td>If SYS 2 pwrd:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• HI LOAD DUCT HTR – A(B)</td>
<td>‘S62 BCE BYP PSP2’</td>
<td></td>
</tr>
<tr>
<td>(L2)</td>
<td>• FLASH EVAP FDLN HTR B</td>
<td>Loss of PL TLM and CMD</td>
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</tr>
<tr>
<td></td>
<td>SPLY – 2</td>
<td>If PDI FDA enabled:</td>
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<tr>
<td></td>
<td>• FLASH EVAP CNTLR PRI A</td>
<td>‘S62 PDI DECOM FAIL’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• FLASH EVAP CNTLR PRI B(SEC) – ON (If reqd)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• TOP EVAP HTR NOZ R – A AUTO</td>
<td>(O1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• TOP EVAP HTR DUCT – A(B)</td>
<td>H2O PUMP OUT PRESS LOOP 1 ind – 0 psia</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&amp;P tb – bp</td>
<td>One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</td>
</tr>
<tr>
<td>(F6,F8)</td>
<td></td>
<td>H2O PUMP OUT PRESS LOOP 2 ind – 20-25 psia</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>• Prox Snsr Electronics Box 1</td>
<td>&amp;R LCS MANF ISOL 4 tb – bp</td>
<td>Single mtr time.</td>
</tr>
<tr>
<td></td>
<td>• Av Bay 2 Agent discharge capability</td>
<td>&amp;R LCS MANF ISOL 5 tb – bp</td>
<td>One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>16</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>17 Do not reconfig for reg switch or I’CNCT procedures</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18 Man CL and GPC cntrl remains</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>19 If SPLY H2O DUMP VLV ENA/NOZ HTR – OFF, tb upward and already bp</td>
</tr>
<tr>
<td></td>
<td>• For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(F6,F8)</td>
<td>• HSI SEL SOURCE – other than MLS, (OV103,4)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>TACAN 3 or (OV105) GPS 3</td>
<td>AFT L RCS He PRESS B tb – bp</td>
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<tr>
<td></td>
<td>(O6)</td>
<td>• ANNUN BUS SEL ACA 2/3 – MNB</td>
<td>AFT L RCS MANF ISOL 5 tb – bp</td>
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<td></td>
<td>10</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>11 APU H2O QTY 3 if in BLR CNTLR/HTR 3B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12 APU H2O QTY 2 if in BLR CNTLR/HTR 2A. APU H2O QTY 3 if in BLR CNTLR/HTR 3B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13 Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>14 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>15 Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16 Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>17 Do not reconfig for reg switch or I’CNCT procedures</td>
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<td></td>
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<td></td>
<td>18 Man CL and GPC cntrl remains</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>19 If SPLY H2O DUMP VLV ENA/NOZ HTR – OFF, tb upward and already bp</td>
</tr>
</tbody>
</table>

### NOTES

- If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
- Viv holds position
- Indicates DN when NLG down
- Will not indicate DN when RMG down
- For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)
### ACTIONS

<table>
<thead>
<tr>
<th>(O8)</th>
<th>FWD RCS He PRESS B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(GNC 23 RCS)</td>
<td>Reprioritize L,R Manf 3,4 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest priority, etc. Set aft pod(s) PRI JET FAIL LIMIT of 6</td>
</tr>
<tr>
<td>(O8)</td>
<td>Prior to using L(R) OMS:</td>
</tr>
<tr>
<td>(O2)</td>
<td>R OMS He PRESS/VAP ISOL</td>
</tr>
<tr>
<td>(O8)</td>
<td>L OMS He PRESS/VAP ISOL</td>
</tr>
<tr>
<td>(GNC XXXXX)</td>
<td>MNVR VYYYY (3,B)</td>
</tr>
<tr>
<td>(A6U)</td>
<td>ANNUN BUS SEL – MNB</td>
</tr>
<tr>
<td>(A12)</td>
<td>HYD CIRC PUMP</td>
</tr>
<tr>
<td>(A14)</td>
<td>RCS/OMS HTR</td>
</tr>
<tr>
<td>(AW18D)</td>
<td>AIRLK AUD CNTL – MIDDECK</td>
</tr>
<tr>
<td>(R11U)</td>
<td>FC H2O LINE HTR – A AUTO</td>
</tr>
<tr>
<td>(AW82D)</td>
<td>FC H2O RELIEF HTR – A AUTO</td>
</tr>
</tbody>
</table>

For PLBD ops:
- OP/CL Drs in man mode

If supply H2O dump reqd:
- For TK A and/or TK B
- Perform SUPPLY H2O SYS BACKUP DUMP TK A,B (IFM)
- For TK C and/or TK D
- Perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS) using FLASH EVAP CNTLR PRI B

### EQUIP/FUNCTION LOST

| (R11L) | SPLY H2O GALLEY SPLY VLV tb – bp |
| (R11L) | SPLY H2O TKC INLET tb – bp |
| (R13L) | RAD CNTL STBD,PORT (two) tb – bp |
| (A8L) | PORT RMS: |
| (AW82D) | EMU 1 H2O SPLY,WASTE tb – CL |
| (A6U) | ACA 4/5 Mnc pwr |
| (A12) | MNC Circ Pump 2 pwr |
| (A14) | L,R Pod Htr B (partial) |
| (R11U) | AL ATU,EMU CCU 1,2 |
| (AW18D) | PLBD: |
| (AW18D) | CAB RELIEF B tb – bp |

### CREW INDICATIONS

| (R11L) | SPLY H2O Dump Viv Cntl Noz Htr |
| (A12) | STBD,PORT (two) tb – bp |

### NOTES

- Vlv holds position
- Lost TM:
- GNC SYS SUMM 2 R OMS ENG VLV 2: Assume VLV 2 status same as VLv 1 R OMS N2 P VLV: IF ENG – ARM/PRESS, assume vlv OP
- Unable to confirm redundant coil
- Maintains He Isol redundancy
- Vlv norm closed. Manual cntl remains
- Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk
- FSM caused by Antenna miscompare
- During MAN PLBD OP/CL, single mtr run time noted on actuators
### ACTIONS

If reqd during entry (< 120K ft):
- NH3 CNTL A – PRI/GPC
- NH3 CNTL B – SEC/ON

If AC Pwr Transfer Cable to be installed to regain AC:
- Go to EPS SSR-200; otherwise, continue with bus loss actions

(R2)
- BLR CNTL/HTR 2 – B
- 3 – A

(L1)
- IMU FAN B(A) – ON
- C – OFF
- Perform SSR-10 (H2O Loop 2 only), H2O PUMP OPS via GPC; ECLS
- CAB FAN A – OFF
- B – ON
- AV BAY 1 FAN A(B)
  (two) – ON
- AV BAY 2 FAN A – ON
- B – OFF
- 3 FAN A – OFF
- 3 – B
- FREON PUMP LOOP 2 – B

(O17:C)
- SIG CONDR FREON A – AC2
- SIG CONDR FREON B – AC2

(CDR SEAT PNL)
- CDR SEAT PWR BUS SEL – AC2 (up)

(PLT SEAT PNL)
- PLT SEAT PWR BUS SEL – AC2 (up)

(O8)
- Right OMS XFEED B – OP (lb-OP)
- SM 60 SM TABLE MAINT

- Inhibit 0612605, 0612600, 0612640, 0612610

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>Lane</th>
<th>Equipment/Floor Function Lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>MPS/TVC Hyd Sys 3 Isol Ctrl</td>
</tr>
<tr>
<td>27</td>
<td>NH3 Sys A Sec Cntl man On capability</td>
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<tr>
<td>28</td>
<td>NH3 Sys B Pri Cntl</td>
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<tr>
<td>29</td>
<td>FC2 Redundant Reac Vlv Cntl on pnl C3</td>
</tr>
<tr>
<td>30</td>
<td>IMU Fan C</td>
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<tr>
<td>31</td>
<td>H2O Loop 2 Pump man On capability</td>
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<tr>
<td>32</td>
<td>H2O Loop 1 Byp Cntl, Sig Condr</td>
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<tr>
<td>33</td>
<td>Av Bay 1 Sig Condr, Xdcrs (ECLS SC2)</td>
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<td>34</td>
<td>Freon Loop 2 Pump A</td>
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<tr>
<td>35</td>
<td>Freon S/C A AC3 pwr (ECLS SC 1A)</td>
</tr>
<tr>
<td>36</td>
<td>Freon S/C B AC3 pwr (ECLS SC 1B)</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

- SM (BFS, SM) 63 PL BAY DOORS
- If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg ‘(S63) PBD CONFIG’
- During Rad Dpy/Sto ops: RAD LAT CNTL lb (two) indicate single mtr ops

### NOTES

- Vlv holds position
- Sys A Pri Cntl, auto switchover to Sec Cntl remain
- Sys B Sec Cntl man On capability remains
- Not yet active on all vehicles
- H2O Loop 1 Pump Out P, Pump ΔP, Accum Qty, Pump Out Temp snrs lost
- Av Bay 1 Fan ΔP, Air Out Temp snrs lost
- Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snrs lost
- Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snrs lost
- Maintains deorbit capability for CNTL BC1 failure
- Inhibits H2O Loop 1 Pump ΔP, Pump Out Temp, Accum Qty, respectively
### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**
- MDU CRT 3 PWR – OFF
- MDU CDR 1 PWR – OFF
- MDU PLT 2 PWR – OFF

**IDP/CRT 3 PWR – OFF**

**Bus Isolation Equipment/Function Lost**

<table>
<thead>
<tr>
<th>36</th>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>37 Freon Loop 1,2 Rad Isol Motor B</td>
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<td>Aft Payload C pwr</td>
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<td>(OV105) GPS 3</td>
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<td>R Seat/Ctr Cnsl Floodnts</td>
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<td>38</td>
<td>OI SIG CONDR OM3B – op</td>
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<td></td>
<td>OI SIG CONDR OF 2/3 – op</td>
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<td>OI MDM OF 3/4B – op</td>
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<tr>
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<td>MNB CONTR – op</td>
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<tr>
<td></td>
<td>AUX TIMING BUFFER – op</td>
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<td>39</td>
<td>Cryo O2 Tk1 Htr Current Snsr 2</td>
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<td>Cryo O2 Tk2 Htr Current Snsr 1</td>
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</table>

**DAA ACTIONS** column. No additional bus isolation steps reqd

**Motor A remains**

**Redundant pwr source remains**

**Current Snsr 1 remains**

**Current Snsr 2 remains**

**If Emer O2 Mission Kit not flown, cb is open prelaunch**

---

(Continued)
### EPS SSR-50 (Cont)

**BUS LOSS: MNC DA3**

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tr>
<td>(O16:E) cb MNC</td>
<td>ADTA 3, 4 αop</td>
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<tr>
<td>• ADTA 3, 4 (two) – αop</td>
<td>RCS/OMS Prplt Qty Gauge</td>
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<tr>
<td>• MLS 3 – αop</td>
<td>Drag Chute, CDR Arm</td>
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<tr>
<td>• DDU R/RAFT (two) – αop</td>
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<tr>
<td>• R/RAFT R/MS PRPT QTY GAUGE – αop</td>
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<td>• DRAG CHUTE SYS 1 – αop</td>
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<td>ATVC 1 Isol ME</td>
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<td>(A7U) PL BAY</td>
<td>PLB Aft Port Floodlt</td>
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<td>• FLOOD AFT PORT – OFF</td>
<td>Mid Stbd Floodlt</td>
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<tr>
<td>• MID STBD – OFF</td>
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<td>(A7L) IF DOCKING MISSION</td>
<td>MNC Pyro system</td>
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<td>cb MNC</td>
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<td>• PYRO PWR MNC – OFF</td>
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<tr>
<td>• LOGIC 2 – αop</td>
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<td>• 3 – αop</td>
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<td>(A13)</td>
<td>MNC pwr to DSP Logic buses 2,3</td>
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<td>• (OV103) GPS – OFF</td>
<td>GPS 2</td>
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<td>• (OV103) GPS PRE AMPL UC – OFF</td>
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<td>• (OV103) GPS PRE AMPL LC – OFF</td>
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<tr>
<td>(R11U)</td>
<td>FO3 Start Up Htr Inhibit capability</td>
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<td>• FC PURGE VLV 3 – CL</td>
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<td>• FC START UP HTR 3 – ENA</td>
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<td>• IDP/CRT 4 PWR – OFF</td>
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<tr>
<td>• M Duo CRT 4 PWR – OFF</td>
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<tr>
<td>• M Duo AFD 1 PWR – OFF</td>
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<tr>
<td>(R14:A) cb MNC</td>
<td>UHF redundant pwr</td>
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<tr>
<td>• AUD CTR 2 – αop</td>
<td>GCIL redundant pwr</td>
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<td>• AUD PS/AIRLK – αop</td>
<td>MDM cmd to CCTV Sys</td>
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<td>• M Duo CDR 1 – αop</td>
<td>MNC pwr for CNTLAB 1,2,3 Buses</td>
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<tr>
<td>• M Duo PLT 2 – αop</td>
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<td>• M Duo AFD 1 – αop</td>
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<tr>
<td>(R14:B) cb PALLE/T/DSC</td>
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<tr>
<td>• 2A – op (EDO)</td>
<td>Ku-Bd Sys Rdr &amp; Comm I/F Cont Unit (EA1), Ku Comm Sig Proc</td>
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<tr>
<td>• 3B4/A – op (EDO)</td>
<td>SSOR EVA STRG 2</td>
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<td>(R14:C)</td>
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<td>• cb UHF EVA – αop</td>
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<td>• tv B Camr/PTU – αop</td>
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<td>• CAMR HTR – αop</td>
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<tr>
<td>• ILLUM/PTU HTR – αop</td>
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<tr>
<td>• tv B Camr TV CAB – αop</td>
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<td>(R14:D)</td>
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<td>• cb MNC TV B CAMR</td>
<td>TV B Camr/Pan-Tilt</td>
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<td>• TV B Camr Htr</td>
<td>TV B Camr Pan/Tilt Htr and Illun</td>
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<tr>
<td>• ILLUM/PTU HTR – αop</td>
<td>Filt/Middeck TV Camrs and VFMs</td>
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<td>• tv B Camr TV CAB – αop</td>
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<td>• cb MNC MS FLOOD – αop</td>
<td>MS Floodlt</td>
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<td>(Continued)</td>
<td>(Continued)</td>
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</table>

**CREW INDICATIONS**

42: PLT Arm remains
43: Six vlvs fail to non-isolation position
44: Logic buses 2(3) remain pwr’d via MNB(MNA)
45: Redundant pwr source remains for equipment
46: Ku Comm and RDR function lost. KU-BAND CONT STOW – EA1 ALTERNATE POWER IFM reqd to stow antenna. Jettison reqd if antenna cannot be positioned within GO FOR PLBD CLOSURE envelope
## BUS LOSS: MNC DA3

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
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<tr>
<td>(ML86B:F)</td>
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<td>cb MNC FLOODS</td>
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<tr>
<td>∙ MIDDECK 5/7 – op</td>
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<tr>
<td>∙ MIDDECK 3/4/MO13Q – op</td>
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<tr>
<td>∙ BUNK 1/3 – op</td>
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<tr>
<td>∙ AIRLK 4 – op</td>
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<td>(MA73C:A,B)</td>
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<tr>
<td>∙ MCA LOGIC MNC FWD 3 – OFF</td>
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<td>∙ MCA LOGIC MNC MID 2 – OFF</td>
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<td>∙ MCA LOGIC MNC MID 4 – OFF</td>
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<tr>
<td>∙ MCA LOGIC MNC AFT 3 – OFF</td>
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<td>∙ KU ANT – op</td>
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<td>∙ R – op</td>
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<tr>
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- Middeck Floodlts 3,4,5,7 MO13Q Pnl Lt 1
- Bunk Floodlts 1/3 Airlock Lt 4
- MNC FMC3 Bus pwr
- MMC2 Bus pwr
- MMC4 Bus pwr
- AMC3 Bus pwr

- Ku Ant Sto/Dpy Mtr 1
- R HUD - Z Star Trkr Dr Sys 2 OP/CL capability
- Port,Stbd Rad Dpy/Sto Mtr 2
- Port,Stbd Rad Lat 7-12 Mtrs 2
- R ADP Dpy Mtr 1 Htr Cntl 1
- LH Vents 1,2,3 Mtrs 1 6 Mtrs 2
- RH Vents 8,9 Mtrs 1 3.5 Mtrs 2
- NLG Extend Sys 1 NLG,LMG,RMG Bkup Rel Sys 1
- Sply H2O TK A Out Vlv Cntl
- Sply H2O TK C In Vlv Cntl
- Galley H2O Sply Cntl
- Ku-Bd Jettison Sys A
- RMS/OBSS Jett/Guil Sys B
- EMU 1 Waste H2O Vlv Cntl Sply H2O Vlv Cntl
- TA Floodlt 4
- Cryo O2 Tk4 Htr Current Snsr 2
- Cryo O2 Tk5 Htr Current Snsr 2

- Vlv holds position
- Current Snsr 1 remains
- Ku Ant stow reqmts
- Redundant mtr remains
- Htr Cntl 2 remains
- SYS A remains
- One failure away from loss of jettison capability
- MCC for Ku Ant stow reqnts
- NLG can also be deployed by Hyd Sys 2
- NLG extension pwr assist available from redundant sys. NLG
- One failure away from loss of jettison capability

- MCA LOGIC MNC FWD 3 – OFF
- MCA LOGIC MNC MID 2 – OFF
- MCA LOGIC MNC MID 4 – OFF
- MCA LOGIC MNC AFT 3 – OFF

- MCA LOGIC MNC FWD 3 – OFF
- MCA LOGIC MNC MID 2 – OFF
- MCA LOGIC MNC MID 4 – OFF
- MCA LOGIC MNC AFT 3 – OFF
## EPS SSR-50 (Cont)

### BUS LOSS: MNC DA3

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<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
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<td>53 R OMS ENG Pr Vlv Coil 1</td>
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<td>54 R OMS ENG Cntl Vlv 1,2 Coils 1</td>
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<td>55 R OMS Purge Vlv 1,2</td>
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<td>56 OMS QTY Gauging for all R OMS Single Engine burns Press Vlv Op Sig</td>
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<td>57 APU 2 Cntl Sply B pwr</td>
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<td>58 3 Cntl Sply A pwr</td>
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<td>59 2 Fu Tk Vlv B</td>
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<td>60 3 Fu Tk Vlv A</td>
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<td>APU 3 GBX GN2 Repress Vlv</td>
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<td>10 HYD BK ISOL VLV 3 Cntl</td>
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<td>10 EMU 1 Waste H2O Vlv Cntl</td>
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<td>60 Freon Loop 1 Cntlr A Rad Byp Vlv Mtr man Cntlr</td>
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<td>61 Freon Loop 2 Cntlr A Rad Byp Vlv Mtr</td>
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<td>60 Freon Loop 2 Flow Prop vlv Freon Loop 2 Cold Plate Flow Xdcr</td>
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<td>MPS: 62 R Eng He Intercon Outlet Vlv</td>
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<td>62 L Eng He Xovr Vlv</td>
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<td>59 R Eng He Isol A</td>
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</tr>
<tr>
<td>65 ET Door Mtrs: C/L Lat Actr 2 Mtr 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66 No WOW Relay K9,K11,K13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>67 Hyd Main Pump 3 Depress Solenoid RPC A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>67 Hyd Main Pump 2 Depress Solenoid RPC B</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CAUTION**

No purge. Wait 10 min between burns

- MCC for OMS Tot Qtys. Aft Qtys are found on GNC SYS SUMM 2
- Pwr Sply A remains. Turbine speed ind lost
- Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running
- Vlv fails closed. Redundant vlv remains
- Cntlrs A,B Rad Byp Mtrs Auto Cntlr and Cntlr B Rad Byp Vlv Mtr remain
- Bypass vlv holds position and Cntlr B Rad Byp Vlv Mtr remains
- Vlv fails closed
- Vlv fails closed. LO2 manf will not be pressured with He during entry (MM304)
- Vlv holds position. Loss of manual capability to inert LO2 manf
- Redundant mtrs remain
- Brake/Skid Cntlr Box A,B enabled before WOW
- Redundant RPC remain

**NOTES**

- Vlv holds position
- Unable to confirm redundant coils
- Redundant coils remain
- Vlv fails closed
### EPS SSR-51
**BUS LOSS: MNC FPC3** (Includes MNC FLC3, MNC FMC3, AC3)

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Perform FC3 SHUTDN (FC SHUTDN Cue Card), pwrdn not needed, then:</td>
<td><strong>2</strong> FC3 Pumps and pH Snsr</td>
<td><strong>1</strong></td>
</tr>
<tr>
<td>(R1)</td>
<td>• cb AC CONTR AC3 φA, φB, φC (three) – cl</td>
<td><strong>AC3 φA,φB,φC Inverters</strong></td>
<td><strong>1</strong> FC3 must be shutdn within 9 min to avoid potentially hazardous condition</td>
</tr>
<tr>
<td></td>
<td>• INV/AC BUS 3 – OFF (tb-OFF)</td>
<td><strong>INV PWR 3 – OFF (tb-OFF)</strong></td>
<td><strong>2</strong> Will be repwrd after AC Pwr Transfer Cable connected</td>
</tr>
<tr>
<td></td>
<td>• INV PWR 3 – OFF (tb-OFF)</td>
<td><strong>• cb AC CONTR AC3 φA, φB, φC (three) – op</strong></td>
<td><strong>3</strong> Loss of redundant port to the following: IDP 3</td>
</tr>
<tr>
<td></td>
<td>• AC3 BUS SNSR – OFF (tb-OFF)</td>
<td><strong>• AC3 BUS SNSR – OFF</strong></td>
<td><strong>IDP 3</strong></td>
</tr>
<tr>
<td>(C2)</td>
<td>• L IDP CRT SEL – 1</td>
<td><strong>• MDU CRT 3,4</strong></td>
<td><strong>MDU CDR 1 (P)</strong></td>
</tr>
<tr>
<td></td>
<td>• R IDP CRT SEL – 2</td>
<td></td>
<td><strong>MDU MFD 1 (S)</strong></td>
</tr>
<tr>
<td></td>
<td>On MCC GO:</td>
<td></td>
<td><strong>MDU MFD 2 (S)</strong></td>
</tr>
<tr>
<td></td>
<td>• GPC/CRT 03 EXEC</td>
<td></td>
<td><strong>MDU PLT 2 (P)</strong></td>
</tr>
</tbody>
</table>
| | • 04 EXEC | | |}

- **(A1L)** S-BD PM
- **(A1R)** S-BD FM PWR – 1
- **(A1T)** S-BD PM CRT
- **(A1U)** MDU CRT
- **(A1V)** MDU CRT

- **(A2L)** S-BD PM
- **(A2R)** S-BD FM PWR – 1
- **(A2T)** S-BD FM CRT
- **(A2U)** MDU CRT
- **(A2V)** MDU CRT

If no comm:
- **(C3)** S-BD PM CRT – PNL
- • CMD

If OIU reqd:
- **(SSP)** OIU PWR – OIU 1 ON
- • OIU tb – UP
- • OIU CND, OIU reconf

**Refer to OMS/RCS Slide Rule for vlv loss info**
- Reconf following vlv(s) only if leak isolation reqd:

- **(O8)** FWD RCS He PRESS B
- **(O9)** Fwd RCS He Press B
- • For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)

- **(L4,P)** cb AC2 φA LG SNSR 2 – cl
- **(L4,P)** Refer to OMS/RCS Slide Rule for vlv loss info
- **(L4,P)** Reconf following vlv(s) only if leak isolation reqd:

- **(O8)** FWD RCS He PRESS B
- **(O9)** Fwd RCS He Press B
- • For attitude control, perform LOSS OF VERNIERS (ORB OPS, RCS)

<table>
<thead>
<tr>
<th>(L4,P)</th>
<th></th>
<th><strong>CRITICAL</strong></th>
<th><strong>NOTES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>1</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TIME</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CRITICAL</strong></td>
<td><strong>3</strong></td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>Fwd RCS He Press Isol B man OP capability</td>
<td></td>
<td><strong>4</strong></td>
</tr>
<tr>
<td></td>
<td>RCS Manf F5 RJD pwr (F5L,F5R)</td>
<td></td>
<td><strong>5</strong></td>
</tr>
<tr>
<td></td>
<td>RCS Manf F4 RJD pwr (F4R,F4D)</td>
<td></td>
<td><strong>6</strong></td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>Ku-Bd Sys Rdr &amp; Comm I/F Cont Unit (EA1)</td>
<td></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>

(Continued)
**EPS SSR-51 (Cont)**

**BUS LOSS: MNC FPC3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-seat ingress for Entry: • Discharge handheld fire ext into AV BAY 2</td>
<td>Av Bay 2 agent discharge capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If AC Pwr Transfer Cable to be installed to regain AC: • Go to EPS SSR-200; otherwise, continue with bus loss actions</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SM 60 SM TABLE MAINT

18
- **INHIBIT** 0612605, 0612600, 0612640, 0612610

### (CDR SEAT PNL)

- CDR SEAT PWR BUS SEL – AC2 (up)
- CDR Seat Adj via AC3 pwr

### (PLT SEAT PNL)

- PLT SEAT PWR BUS SEL – AC2 (up)
- PLT Seat Adj via AC3 pwr

### (O17)

- SIG CONDR FREON A – AC2
- SIG CONDR FREON B – AC2

### (R2)

- BLR CNTLR/HTR 2 – B
  - 3 – A
- APU/HYD Blr Cntrl/Htr 2A
- Hyd Rsrv 3 Qty Snsr

### (L1)

- IMU FAN B(A) – ON
  - C – OFF
- IMU Fan C
- H2O Loop 2 Pump man ON capability
- H2O Loop 1 Byp Cntrl, Sig Condr

### (R)

- CAB FAN A – OFF
- B – ON
- AV BAY 1 FAN (two) – ON
-AV BAY 2 FAN A – ON
- B – OFF
- 3 FAN A – OFF
- B – ON
- FREDON PUMP LOOP 2 - B

### (O1)

- H2O PUMP OUT PRESS LOOP 1 ind – 0 psia
- H2O PUMP OUT PRESS LOOP 2 ind – 20-25 psia
- AIR TEMP AV BAY ind – 45 degF
- FREON FLOW 1 ind – 578 pph
- R ADP deploy time incr from 15 to 30 sec

### (O8)

- FWD RCS
- TK ISOL 1/2 tb – bp
- MANF ISOL 4 tb – bp
- 5 tb – bp

### (F7)

- If APUs active and using BLR CNTLR/HTR 2A or 3B: C/W APU TEMP lt – on after ~2 min

### (Continued)

12
- APU H2O QTY 2
  - if in BLR CNTLR/HTR 2A. APU H2O QTY 3 if in BLR CNTLR/HTR 3B

13
- MPM and MRLS may be repwrd after AC Pwr Transfer Cable connected

14
- Single mtr time. One failure away from loss of MPM, one failure away from RMS/OBSS jettison. May be repwrd after AC Pwr Transfer Cable connected

15
- Single mtr time. If unlatched, one failure away from loss of two out of three MRLs. If latched, one failure away from inability to use RMS

16
- Vlv holds position

17
- Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists. May be repwrd after AC Pwr Transfer Cable connected

18
- Inhibits H2O Loop 1 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, respectively

19
- Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsrs lost

20
- Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snsrs lost

21
- Freon Loop 1 Pump Out P, Pump ΔP, Accum Qty, Pump Out Temp snsrs lost

22
- AV Bay 1 Fan ΔP, Air Out Temp snsrs lost
EPS SSR-51 (Cont)
BUS LOSS: MNC FPC3

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td>Freon Loop 1,2 Rad Isol Motor B</td>
<td></td>
<td>16 Vlv holds position</td>
</tr>
<tr>
<td>• MDU CRT 3 PWR – OFF</td>
<td>(OV105) GPS 3</td>
<td>23 AC3 Bus Isolation for AC Pwr Transfer</td>
<td></td>
</tr>
<tr>
<td>(L4:N)</td>
<td></td>
<td></td>
<td>Cable installation accomplished in MNC FPC 3 ACTIONS column. No additional bus isolation steps reqd</td>
</tr>
<tr>
<td>• cb AC3 φC RAD ISOL B – op</td>
<td>(OV105) GPS 3</td>
<td></td>
<td>24 Motor A remains</td>
</tr>
<tr>
<td>(C2)</td>
<td></td>
<td></td>
<td>25 Mtr 2 remains</td>
</tr>
<tr>
<td>• IDP/CRT 3 PWR – OFF</td>
<td></td>
<td></td>
<td>26 Htr Cntr 2 remains</td>
</tr>
<tr>
<td>(O7)</td>
<td></td>
<td></td>
<td>27 LG can still be deployed by Pri Hyd System or by redundant Pyro Backup Release System 2. NLG extension pwr assist still available from redundant sys. NLG can also be deployed by Hyd Sys 2</td>
</tr>
<tr>
<td>• (OV105) GPS 3 PWR – OFF</td>
<td></td>
<td></td>
<td>28 Redundant mtrs remain</td>
</tr>
<tr>
<td>(OV105) GPS 3 PRE AMPL UPPER – OFF</td>
<td></td>
<td></td>
<td>29 Bypass vlv holds position and Cntr B Rad Byp Vlv Mtr remains</td>
</tr>
<tr>
<td>• (OV105) GPS 3 PRE AMPL LOWER – OFF</td>
<td></td>
<td></td>
<td>30 •MCC for Ku Ant stow reqmts</td>
</tr>
<tr>
<td>(O16:C)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## ACTIONS

| 1 | 1. Perform MNC BUS TIE (BUS TIE Cue Card) |
|   | 2. Monitor, record Jamps between FC3 and tied FC |
|   | (L2) 3. FLASH EVAP FDNL HTR B SPLY – 2 |
|   | (A12) 4. HYD HTR AFT FUS A – AUTO |
|   | 5. HYD HTR AFT FUS B – OFF |
|   | (R11U) 6. FC H2O LINE HTR – A AUTO |
|   | 7. FC H2O RELIEF HTR – A AUTO |
|   | (MA73C:C,D) 8. MCA PWR AC3 3Φ MID 2 – op |
|   | 9. MCA PWR AC3 3Φ MID 4 – op |
| 2 | For PLBD ops: |
|   | 3. TOP EVAP HTR DUCT – A(B) |
|   | 4. If Hi Load Evap enabled: |
|   | 5. HI LOAD DUCT HTR – A(B) |

## BUS ISOLATION

- ONLY ON MCC CALL, PERFORM
  - (A7U) PL BAY FLOOD
  - AFT PORT – OFF
  - MID STBD – OFF
  - (A7L) IF DOCKING MISSION
    - PYRO PWR MNC – OFF
    - cb MNC
    - LOGIC 2 – op
    - cb MNC
    - LOGIC 3 – op
  - (O16:A) RGA 3 – OFF
  - (R11U) FC PURGE VLV 3 – CL
  - FC STARTUP HTR 3 – ENA
  - (MA73C:A,B) MCA LOGIC MNC MID 2.4 (two) – OFF

## EQUIP/FUNCTION LOST

| 1 | FC3 Purge Vlv |
|   | O2,H2 Flow Xdrcs SS ΔV Snsrs |
|   | FES H2 Odln B Mid 2 Htr 1 |
|   | Aft Fuselage Hyd Htrs B |
|   | FC H2O Line Htrs B |
|   | Relief Htrs B Noz Htr |
|   | Port,Stbd Rad Lat 7-12 Mtr 2 |
|   | Limit sw |
|   | Port,Stbd Rad Dpy/Sto Mtrs 1 |
|   | Limit sw |
|   | Port,Stbd Rad Dpy/Sto Mtrs 2 |
|   | PLBD: |
|   | C/L Lat 13-16 Mtr 1 |
|   | 1-4,5-8,9-12 Mtr 2 |
|   | Stbd Aft Blkhd Rad Mtr 1 |
|   | Port Aft Blkhd Rad Mtr 2 |
|   | Door Mtr 1 |
|   | Stbd Door Mtr 2 CL Limit sw |
|   | Hi Load Duct Inbd,Outbd Htr C |
|   | MNC Pyro system |
|   | MNC pwr to DSP Logic buses 2,3 |
|   | RGA 3 |
|   | FC3 Startup Htr INH capability |
|   | MNC MMC2, MNC MMC4 Bus pwr |
|   | MNC pwr to ESS1BC,2CA |
|   | Freon Loop 1 Cntl A Rad Byp Vlv Mtr Man Cntl |
|   | PLB Aft Port Floodlt |
|   | PLB Mid Stbd Floodlt |
|   | STBD RMS Indications lost: |
|   | MPM Mtr 2 STO/DPY Mid Mrl Mtr 2 |
|   | LAT/REL/RYD |
|   | RGA 3 |
|   | Logic buses 2(3) remain pwrd via MNB(MNA) |

## CREW INDICATIONS

| (R13L) | RAD CNTL PORT,STBD (two) tb – bp |
| (Lights Lost) | PLB Floodlts Aft Port, Mid Stbd |
|   | If first RGA failure and rates sensed: |
|   | ‘RM FAIL RGA’ (3) |
|   | If FC H2O Rlf Htrs in B AUTO: |
|   | SM ALERT Light/Tone – on |
|   | ‘S69 FUEL CELL’ |
| SM (BFS SM 63) PL BAY DOORS | If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg ‘(S63) PBD CONFIG’ |
|   | During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left |
| (A8L) | PORT RMS: |
|   | DPY/STO tb – bp |
|   | RETEN LAT tb – bp |
|   | R-F-L AFT tb – bp |
| STARBOARD RMS: | DPY/STO tb – bp |
| SM 94 PDRS CONTROL | PORT RMS Indications lost: |
|   | MPM Mtr 1 STO/DPY Fwd Mrl Mtr 2 |
|   | LAT/REL/RYD Aft Mrl Mtr 1 |
|   | LAT/REL/RYD Aft Mrl Mtr 2 |
| STBD RMS Indications lost: | MPM Mtr 2 STO/DPY Mid Mrl Mtr 2 |
|   | LAT/REL/RYD |
| NOTES | 1. Buses are tied due to: |
|   | Loss of FC3 Purge capability. As FC3 loses performance the tied FC will pick up load, slowing FC3 degradation. If degradation projection does not allow for nominal EOM, Fuel Cell will be shut down. √MCC |
|   | Loss of FC3 SS ΔV Snsrs. Change in ΔAmps >12 amps indicates possible cell crossover problem. ΔAmps shift due to loss of FC3 purge capability is indicated by change in ΔAmps between pre- and post-purge readings. MCC will aid in this determination |
| 2 | If AC3 MMC2 and MMC4 cbs not opened, Lat Mtrs 2 of actuators for Port,Stbd Rad Lat 7-12 continues to run until Sys B Lat Cntl sw placed to OFF |
| 3 | Mtrs 1 will continue to drive until Sys A,B Cntl sw are taken to OFF |
| 4 | Logic buses 2(3) remain pwrd via MNB(MNA) |
| 5 | Buses remain pwrd |
| 6 | Cntlr A Rad Byp Mtrs Auto Cntl and Cntlr B Rad Byp Vlv Mtr Man Cntl remains |

(Continued)
**BUS LOSS: MNC MPC3**

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMS:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Port MPM Mtr 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Stbd MPM Mtr 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Port Fwd MRL Mtr 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Port Aft MRL Mtr 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Stbd Mid MRL Mtr 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RH Vent 3 Mtr 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Mtr 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LH Vent 3 Mtr 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Mtr 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Ku Ant Dpy/Sto Mtr 1 Limit sw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Redundant Ku Band Xmit Enable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Redundant Boom Stow Enable II Excitation Signal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC2 Redundant Reac Vlv Close Cntl on pnl C3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|               |                     |                 |       |

7 Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison.
8 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists.
9 Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists.
10 With an inop limit sw, mtr will continue to run until primary sw returned to GND.
11 Redundant sig (MNB) enables Ku Band Xmit.
12 MNB MMC4 pwr remains to supply pwr to Boom Stow Enable II signal for stow mtrs.
## Actions

**[GNC 23 RCS]**

1. DES INH on L Manf 3 Jets:
   - ITEM 2 EXEC
   - LSL ITEM 12 EXEC (*)
   - L3D ITEM 28 EXEC (*)
   - L3A ITEM 30 EXEC (*)
   - Set aft pod(s) PRI JET FAIL LIMIT to 6

Refer to OMS/RCS Slide
- Rule for vlv loss info (use APCS Slide for All RCS)
- Reconfig following vlv(s) only if leak isolation reqd:
  - AFT L RCS He PRESS B
  - R RCS He PRESS B

(A12)
- APU HTR TK/FU LN/H2O
  - SYS 3B – AUTO
  - SYS 3A – OFF

(A14)
- RCS/OMS HTR
  - L POD (two) – A AUTO, B OFF
  - R POD (two) – A AUTO, B OFF

(A7)
- AFT L RCS He PRESS B
  - GPC Cntl, man CL

(A7)
- AFT R RCS He PRESS B
  - man OP capability

Set aft pod(s) PRI JET FAIL LIMIT to 6

## Equipment/Function Lost

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aft L RCS He Press Isol B</td>
</tr>
<tr>
<td>2</td>
<td>GPC Cntl, man CL</td>
</tr>
<tr>
<td>3</td>
<td>Aft R RCS He Press Isol B</td>
</tr>
<tr>
<td>4</td>
<td>man OP capability</td>
</tr>
<tr>
<td>5</td>
<td>Aft L, R RCS Manf Isol 5 Cntl</td>
</tr>
</tbody>
</table>

## Crew Indications

If OMS GMBL cmd abs value > 2 deg:
- C/W OMS TVC lt – on
- 'R OMS GMBL' (3,B)

**R OMS Eng Vlv 2:**
- Assume Vlv 2 status same as Vlv 1

## Notes

1. Maintains control capability for APC4 failure
2. Vlv holds position
3. Do not reconfig for reg switch or I'CNCT procedures
4. Man CL and GPC cntl remains
5. Lost TM:
6. Maintains He Isol redundancy
7. Vlv normally closed. Man cntl remains
8. Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk
9. Vlv normally closed. GPC cntl remains
10. Vlv fails closed. Redundant vlv remains

## BUS Isolation

**ONLY ON MCC CALL, PERFORM**

(R1)
- PL AFT MNC – OFF

## GNC XXXXX

[MNVR YYYY (3,B)]

Sel R OMS SEC TVC:
- GMBL SEC R – ITEM 31 EXEC

## Crew Indications

- OMS Pri TVC

## Notes

- OMS BPV 2 OP sig
- APU 2 Fu Tk Vlv B
# Actions

| L1 | Flash Evap Cntrl Pri A – Off |
| L2 | Flash Evap Fdln Htr B Sply – 2 |
| L3 | Reprioritize L R Manf 3,4 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc |
| R2 | BLR Cntrl/Htr 2 – B |
| A12 | APU Htr Tk/Fu Ln/H2O Sys 2A – AUTO 2B – OFF Sys 3A – OFF 3B – AUTO |
| A14 | RCS/OMS Htr L Pod (two) – A AUTO, B OFF R Pod (two) – A AUTO, B OFF |

# Equip/Function Lost

| L1 | Flash Evap Cntrl Pri A |
| L2 | Flash Evap Fdln Htr B Sply – 2 |
| L3 | DES INH on L Manf 3 Jets: Item 2 Exec L3L Item 12 Exec (*) L3D Item 28 Exec (*) L3A Item 30 Exec (*) Set aft pod(s) Pri Jet Fail Limit to 6 |
| R2 | Blr Cntrl/Htr 2 – B 3 – A |
| A12 | APU Htr Tk/Fu Ln/H2O Sys 2A – AUTO 2B – OFF Sys 3A – OFF 3B – AUTO |
| A14 | RCS/OMS Htr L Pod (two) – A AUTO, B OFF R Pod (two) – A AUTO, B OFF |

# Crew Indications

| R4 | HYD Bk Isol Vlv 3 Tb – Op |
| L4 | HYD MPS/TVC Isol Vlv Sys 3 Tb – Cl |
| O7 | Aft L RCS He Press B Tb – Bp Aft L R RCS Manf Isol 5 (two) Tb – Bp |
| F7 | If Cooling by Fes Only: C/w Freon Loop It – On ‘S88 Evap Out T 1’ ‘S88 Evap Out T 2’ |

# Notes

1. Vlv holds position
2. Do not reconfig for reg switch or ICNCT procedures
3. Man CL and GPC cntrl remains
4. Maintains control capability for APC1 failure
5. Time Critical

If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
**ECS SSR-54 (Cont)**

**BUS LOSS: MNC APC6**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Save R OMS Eng for deorbit (if reqd for additional on-orbit burns, (\sqrt{MCC}))</td>
<td>6 R OMS GN2 Press Viv OP TM</td>
<td>① Vlv holds position</td>
</tr>
<tr>
<td></td>
<td>Prior to using L(R) OMS: (08)</td>
<td>7 R OMS Eng Pr Viv Coil 1</td>
<td>② Lost TM:</td>
</tr>
<tr>
<td>8</td>
<td>R OMS He PRESS/VAP ISOL</td>
<td>9 R OMS He Vap Isol 2 GPC Cntl</td>
<td>GNC SYS SUMM 2</td>
</tr>
<tr>
<td>10</td>
<td>L OMS He PRESS/VAP ISOL</td>
<td>9 R OMS He Pr Isol B GPC Cntl</td>
<td>R OMS N2 P VLV</td>
</tr>
<tr>
<td></td>
<td>A(B) – GPC</td>
<td>11 L OMS He Pr/Vap Isol A,B man Cntl</td>
<td>If Eng – ARM/PRESS assume vlv OP</td>
</tr>
<tr>
<td></td>
<td>B(A) – CL</td>
<td></td>
<td>R OMS ENG Viv 2: assume Viv 2 status same as Viv 1</td>
</tr>
<tr>
<td></td>
<td>GNC XXXXX MNR YYYY (3,B)</td>
<td>⑦ Unable to confirm redundant coils</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sel R OMS SEC TVC:</td>
<td>⑧ Maintains He Isol redundancy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• GMBL SEC R – ITEM 31 EXEC</td>
<td>⑨ Vlv normally closed. Man cntl remains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For SSME Hyd Repress: (R4)</td>
<td>⑩ Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• HYD MPS/TVC ISOL VLV SYS 1.2 (two) – OP, wait 10 sec, then CL</td>
<td>⑪ Vlv normally closed. GPC cntl remains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If reqd during entry (&lt; 120K ft): (L1)</td>
<td>⑫ Sys A Pri Cntr, auto switchover to Sec Cntr remain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• NH3 CNTLR A – PRI/GPC</td>
<td>⑬ Sys B Sec Cntr man On capability remains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If reqd for Post Rollout: (L1)</td>
<td>⑭ Six vlvs fail in non-isolation position</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• NH3 CNTLR B – SEC/ON</td>
<td>⑮ Pwr Sply A remains. Turbine Speed ind lost</td>
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</tr>
<tr>
<td></td>
<td>If NH3 CNTLR A(B) – SEC/ON reqd, then: (L1)</td>
<td>⑯ Vlv fails closed. Redundant vlv remains</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1,2 (two) – ON</td>
<td>⑰ Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• √FLOW PROP VLV LOOP 1,2 (two) – ICH</td>
<td>⑱ Redundant RPC remains</td>
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</tr>
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<td></td>
<td>If applicable:</td>
<td></td>
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<tr>
<td></td>
<td>• Activate PL H2O LOOP(s)</td>
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</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(R1) • PL AFT MNC – OFF

(MA73C:B) • MCA LOGIC MNC AFT 3 – OFF

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aft Payload C pwr</td>
<td>① Vlv holds position</td>
</tr>
<tr>
<td></td>
<td>PL MNC Cur Sig Condr</td>
<td>② Lost TM:</td>
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<tr>
<td></td>
<td>ATVC 1 Isol ME</td>
<td>GNC SYS SUMM 2</td>
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<tr>
<td></td>
<td>MNC AMC3 Bus pwr</td>
<td>R OMS N2 P VLV</td>
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<tr>
<td></td>
<td>RH Vents 8,9 Mtr 1</td>
<td>If Eng – ARM/PRESS assume vlv OP</td>
</tr>
<tr>
<td></td>
<td>Freon Loop 2 Cold Plate Flow Xdc</td>
<td>R OMS ENG Viv 2: assume Viv 2 status same as Viv 1</td>
</tr>
<tr>
<td></td>
<td>APU 2 Cntr Pwr Sply B</td>
<td>⑦ Unable to confirm redundant coils</td>
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<tr>
<td></td>
<td>⑧ Maintains He Isol redundancy</td>
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<td></td>
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<td></td>
<td>⑩ Prevents simultaneous opening of parallel reg paths and possibly rupturing burst disk</td>
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<tr>
<td></td>
<td>APU 3 GBX GN2 Repress Vlv</td>
<td>⑪ Vlv normally closed. GPC cntl remains</td>
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<tr>
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<td>Hyd Main Pump 3 Depress Solenoid RPC A</td>
<td>⑫ Sys A Pri Cntr, auto switchover to Sec Cntr remain</td>
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<tr>
<td></td>
<td>Hyd Main Pump 2 Depress Solenoid RPC B</td>
<td>⑬ Sys B Sec Cntr man On capability remains</td>
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<td>⑭ Six vlvs fail in non-isolation position</td>
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<td>⑯ Vlv fails closed. Redundant vlv remains</td>
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<td>⑰ Pwr Sply B remains. GG Bed T and GBX P ind lost when APU running</td>
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<td>⑱ Redundant RPC remains</td>
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## BUS LOSS: MNC APC6

### BUS ISOLATION

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<th>EQUIP/FUNCTION LOST</th>
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<tbody>
<tr>
<td>1</td>
<td>Hyd Brake Isol 3 Cntl</td>
</tr>
<tr>
<td>19</td>
<td>R OMS Cntl Vlv 1,2 Coils 1</td>
</tr>
<tr>
<td>20</td>
<td>OMS Qty Gauging for all</td>
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<tr>
<td>21</td>
<td>R OMS Purge Vlv 1,2</td>
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<tr>
<td>21</td>
<td>Aft RCS L,R Jet 5 Htr</td>
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<tr>
<td></td>
<td><strong>MPS:</strong></td>
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<tr>
<td>22</td>
<td>R Eng He Intercon Outlet Vlv</td>
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<tr>
<td>23</td>
<td>R Eng He Isol A</td>
</tr>
<tr>
<td>22</td>
<td>L Eng He Xovr Vlv</td>
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<tr>
<td>24</td>
<td>Manf Repress LO2 Vlv 1,2</td>
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<tr>
<td>25</td>
<td>Prplt F/D Outbd LO2 Vlv</td>
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<tr>
<td>26</td>
<td>ET Door Mtrs:</td>
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<tr>
<td></td>
<td>C/L Lat Actr 2 Mtr 2 GPC Cntl</td>
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<tr>
<td></td>
<td>L Dr Closure Mtr 2 GPC CL capability</td>
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<tr>
<td></td>
<td>R Dr Closure Mtr 1 GPC CL capability</td>
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<td>R Dr Uplock Lat Mtr 1 GPC Lat capability</td>
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<tr>
<td></td>
<td>AC Pwr removal capability via Limit sw for ET Dr Mtrs:</td>
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<td></td>
<td>C/L Lat Actr 2 Mtr 2</td>
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<tr>
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<td>L Dr Closure Mtr 2</td>
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<tr>
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<td>R Dr Closure Mtr 1</td>
</tr>
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<td>Uplock Lat Mtr 1</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

|   | R MPS He reg A < 680 during entry (MM303)                                           |

### NOTES

| 1 | Vlv holds position                                                                  |
| 19| Redundant coils remain                                                              |
| 20| MCC for OMS Qys                                                                      |
| 21| CAUTION                                                                             |

- No purge. Wait 10 min between burns

| 22| Vlv fails closed                                                                     |
| 23| Vlv fails closed.                                                                 |
| 24| Vlv fails closed. LO2 Manf will not be pressurized with He during entry (MM304)      |
| 25| Vlv holds position. Loss of manual capability to inert LO2 manf                      |
| 26| Redundant mtrs remain                                                                |
## EPS SSR-55
### BUS LOSS: MNC FLC3

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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</thead>
<tbody>
<tr>
<td>(A1L)</td>
<td>S-BD PM</td>
<td>(COMM LOST)</td>
<td>1</td>
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<td>• ANT SW ELEC – 1</td>
<td>All S-BD A/G voice lost if</td>
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<td></td>
<td>• XPNDR – 1</td>
<td>Sys 2 selected</td>
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<tr>
<td></td>
<td>• PWR AMPL OPER – 1</td>
<td>(F7)</td>
<td>2</td>
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<td>• PWR AMPL STBY – 1</td>
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<td>• PRE AMP – 1</td>
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<td>• NSP</td>
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<td>• PWR – 1</td>
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<td>If PSP and/or INTRG reqd for</td>
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<td>PL or ISS ops:</td>
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<td>• S-BD PL PWR SYS – 1</td>
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<td>• CNTL – PNL</td>
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<td></td>
<td>• – CMD</td>
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<td>(A1R)</td>
<td>• S-BD FM PWR – 1</td>
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<td>If no comm:</td>
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<td>• S-BD PM CNTL – PNL</td>
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<td>• – CMD</td>
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<td>If OIU reqd:</td>
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<td>(SSP)</td>
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<td></td>
<td>• OIU PWR – OIU 1 ON</td>
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<td>• OIU tb – UP</td>
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<td></td>
<td>• MCC, OIU reconfig</td>
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<td></td>
<td>If SYS 2 pwrd:</td>
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<td>(O8)</td>
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<td></td>
<td>• FWD RCS MANF ISOL 5</td>
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<tr>
<td></td>
<td>• tb – bp</td>
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<tr>
<td>C</td>
<td>If NSP 2 selected:</td>
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<td>7</td>
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<tr>
<td></td>
<td>• 'BCE STRG 3 NSP'</td>
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<tr>
<td></td>
<td>If site AOS and using S-BD</td>
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<tr>
<td></td>
<td>• ANT Elect 2:</td>
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<td>• 'ANTELENA' (2)</td>
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<td>If Sys 2 pwrd:</td>
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<td>(FSMs)</td>
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<td>• RCS D(R) JET</td>
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<td>8</td>
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<tr>
<td></td>
<td>• RM DLMA MANF</td>
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<td>• If NSP 2 selected:</td>
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<td>• 'BCE STRG 3 NSP'</td>
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<td>• If site AOS and using S-BD</td>
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<td>• If Sys 2 pwrd:</td>
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<td>(O8)</td>
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<td>• FWD RCS MANF ISOL 5</td>
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<td>• tb – bp</td>
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<td>G</td>
<td>Override F4 Manf status to</td>
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<td>CINX</td>
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<td>• RCS FWD – ITEM 1 EXEC</td>
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<td>• MANF VLVS 4 OVRD – ITEM 43 EXEC</td>
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<td>Refer to OMS/RCS Slide Rule for vlv loss info</td>
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<td></td>
<td>(O8)</td>
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<td></td>
<td>• FWD RCS He PRESS B</td>
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<tr>
<td></td>
<td>• Pre-seat ingress for Entry, discharge hand-held fire ext into AV BAY 2</td>
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<tr>
<td>B</td>
<td>If Reg switch or I'CNCT procedures</td>
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<tr>
<td></td>
<td>Only On MCC CALL, PERFORM</td>
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<td></td>
<td>(O16:C)</td>
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<td>• cb MNC FIRE SUPPR</td>
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<td>• BAY 2 – op</td>
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</tbody>
</table>

### CREW INDICATIONS

1. C/W RCS JET Lt – on
2. LDG GEAR R tb – bp
3. LDG GEAR NOSE tb – bp
4. FWD RCS MANF ISOL 5 tb – bp
5. F RCS D(R) JET RM DLMA MANF
6. OIU PWR – OIU 1 ON
7. MCC, OIU reconfig
8. Fwd RCS He Press Isol B man OP capability
9. Fwd RCS He Press Isol B man OP capability
10. NLG, RMG B/U Rel 1 Fire 2, Arm

### NOTES

1. Indications do not appear until jets commanded
2. Does not indicate DN when RMG down
3. Indicates DN when Nose Gear down
4. Vlv holds position
5. REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books
6. FSM caused by Antenna miscompare
7. OIU 1 interfaces with PSP 1 for commanding
8. Manf status not automatically declared closed. Jet fail-offs may occur when commanded
9. Do not reconfig for reg switch or I'CNCT procedures
10. Htr Cntr 2 remains
<table>
<thead>
<tr>
<th>ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(L1)</strong></td>
</tr>
<tr>
<td>• FLASH EVAP CNTLR PRI A – OFF</td>
</tr>
<tr>
<td>• FLASH EVAP CNTLR PRI B(SEC) – ON (If reqd)</td>
</tr>
<tr>
<td>• TOP EVAP HTR NOZ R – A AUTO</td>
</tr>
<tr>
<td>If HI LOAD EVAP enabled:</td>
</tr>
<tr>
<td>• HI LOAD DUCT HTR – A(B)</td>
</tr>
<tr>
<td><strong>(L2)</strong></td>
</tr>
<tr>
<td>• FLASH EVAP FDLN HTR B SPLY – 2</td>
</tr>
<tr>
<td>Refer to OMS/RCS Slide Rule for bus loss info</td>
</tr>
<tr>
<td>Reconfig following vlv(s) only if leak isolation reqd:</td>
</tr>
<tr>
<td><strong>(O7)</strong></td>
</tr>
<tr>
<td>• AFT R RCS He PRESS B</td>
</tr>
<tr>
<td>• L RCS He PRESS B</td>
</tr>
<tr>
<td><strong>GNC 23 RCS</strong></td>
</tr>
<tr>
<td>• Reprioritize L,R Manf 3,4 Jets to first priority: DES INH twice all other jets; highest priority first, then next highest, etc</td>
</tr>
<tr>
<td>• Set aft pod(s) PRI JET FAIL LIMIT to 6</td>
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<tr>
<td><strong>(R2)</strong></td>
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<td>• BLR CNTLR/HTR 2 – B</td>
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<td>• 3 – A</td>
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<td>• APU HTR TK/FU LN/H2O</td>
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<td>• SYS 2A – AUTO</td>
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<td>• 2B – OFF</td>
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<td>• 3A – OFF</td>
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<tr>
<td>• 3B – AUTO</td>
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<td>• APU HTR GAS GEN/FUEL</td>
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<td>• APU HTR LUBE OIL</td>
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<td>• HYD CIRC</td>
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<tr>
<td>• PUMP PWR 2 – MNB</td>
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<td>• R OMS He PRESS/VAP ISOL</td>
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<tr>
<td>• A – GPC</td>
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<td>• B – OP</td>
</tr>
<tr>
<td>Prior to using R OMS:</td>
</tr>
<tr>
<td><strong>(F7)</strong></td>
</tr>
<tr>
<td>If APUs active and using BLR CNTLR/HTR 2A or 3B:</td>
</tr>
<tr>
<td>C/W APU TEMP lt – on after ~2 min</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(R4)</strong></td>
</tr>
<tr>
<td>1 HYD BK ISOL VLV 3 tb – OP</td>
</tr>
<tr>
<td>1 HYD MPS/TVC ISOL VLV SYS 3 tb – CL</td>
</tr>
<tr>
<td><strong>(O7)</strong></td>
</tr>
<tr>
<td>1 AFT L RCS He PRESS B tb – bp</td>
</tr>
<tr>
<td>1 AFT L RCS MANF ISOL 5 (two) tb – bp</td>
</tr>
<tr>
<td><strong>(FSMs)</strong></td>
</tr>
<tr>
<td>RCS PWR FAIL</td>
</tr>
<tr>
<td>If cooling by FES only:</td>
</tr>
<tr>
<td>C/W FREON LOOP lt – on</td>
</tr>
<tr>
<td>‘S88 EVAP OUT T1’</td>
</tr>
<tr>
<td>‘S88 EVAP OUT T2’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Vlv holds position</td>
</tr>
<tr>
<td>2 Do not reconfig for reg switch or I’CNCT procedures</td>
</tr>
<tr>
<td>3 HYD H2O Blr and Tk Htrs are still operative, but GN2 SOV fails open and steam vent htr and spray logic are disabled. Alternate controller must be selected</td>
</tr>
<tr>
<td>4 TIME CRITICAL</td>
</tr>
<tr>
<td>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</td>
</tr>
<tr>
<td>5 Lost TM:</td>
</tr>
<tr>
<td><strong>GNC SYS SUMM 2</strong></td>
</tr>
<tr>
<td>R OMS N2 P VLV</td>
</tr>
<tr>
<td>If Eng – ARM/PRESS, assume vlv OP</td>
</tr>
<tr>
<td>6 Unable to confirm redundant coils</td>
</tr>
<tr>
<td>7 Maintains He Isol redundancy</td>
</tr>
<tr>
<td>8 Vlv normally closed. Man cntl remains</td>
</tr>
</tbody>
</table>

(Continued)
### ACTIONS

<table>
<thead>
<tr>
<th>If reqd during entry (&lt; 120K ft): (L1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• NH3 CNTLR A – PRI/GPC</td>
</tr>
<tr>
<td>If reqd for Post Rollout:</td>
</tr>
<tr>
<td>• NH3 CNTLR B – SEC/ON</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If NH3 CNTLR A(B) – SEC/ON reqd, then: (L1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• H2O PUMP LOOP 1,2 (two) – ON</td>
</tr>
<tr>
<td>• FLOW PROP VLV LOOP 1,2 (two) – ICH</td>
</tr>
<tr>
<td>If applicable:</td>
</tr>
<tr>
<td>• Activate PL H2O LOOP(s)</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>9 NH3 Sys A Sec Cntrl man On capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 NH3 Sys B Pri Cntrl and Auto sw over to Sec Cntrl</td>
</tr>
</tbody>
</table>

### BUS ISOLATION

<table>
<thead>
<tr>
<th>ONLY ON MCC CALL, PERFORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
</tr>
</tbody>
</table>

| 11 R OMS Eng Cntrl Vlv 1,2 Coils 1 |
| 12 OMS Qty Gauging for all R OMS Single Engine burns |
| 13 R OMS Purge Vlv 1,2 Aft RCS LR Jet 5 Htr |
| 1 Hyd Brake Isol 3 Cntrl |
| 14 APU 2 Fu Tk Vlv B |
| 14 3 Fu Tk Vlv A |

<table>
<thead>
<tr>
<th>MPS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 R Eng He Intercon Outlet Vlv</td>
</tr>
<tr>
<td>14 R Eng He Isol A</td>
</tr>
<tr>
<td>15 L Eng He Xovr Vlv</td>
</tr>
<tr>
<td>16 Manf Repress LO2 Vlv 1,2</td>
</tr>
<tr>
<td>17 Prplt F/D Outbd LO2 Vlv</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

| R MPS He reg A < 680 during entry (MM303) |

### NOTES

1. Vlv holds position
2. Sys A Pri Cntrl, auto switchover to Sec Cntrl remain
3. Sys B Sec Cntrl man On capability remains
4. Redundant coils remain
5. MCC for OMS Qty
6. No purge. Wait 10 min between burns
7. Vlv fails closed. Redundant vlv remains
8. Vlv fails closed.
10. L02 Manf will not be pressurized with He during entry (MM304)
11. Vlv holds position. Loss of manual capability to inert LO2 manf
**EPS SSR-57**

**BUS LOSS: MNC FMC3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Refer to OMS/RCS Slide Rule for vlv loss info</td>
<td>(FSM) RM DLMA MANF</td>
<td>1 Vlv holds position</td>
<td></td>
</tr>
<tr>
<td>GNC 23 RCS Override F4 Manf status to OP</td>
<td>(O8) FWD RCS TK ISOL 1/2</td>
<td>2 Mtr 2 remains</td>
<td></td>
</tr>
<tr>
<td>• RCS FWD – ITEM 1 EXEC</td>
<td>FWD RCS MANF ISOL 4</td>
<td>3 Htr Cntr 2 remains</td>
<td></td>
</tr>
<tr>
<td>• MANF VLVs 4 OVRD – ITEM 43 EXEC</td>
<td>tb – bp</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

**ONLY ON MCC CALL, PERFORM**

| (MA73C:A) | | | |
| • MCA LOGIC MNC FWD 3 – OFF | | | |

| (MA73C:A) | | | |
| • MCA LOGIC MNC FWD 3 – OFF | | | |

**EPS SSR-58**

**BUS LOSS: MNC MMC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MCA PWR AC3 3ф MID 2 – op</td>
<td>(R13L) RAD CNTL PORT tb – bp If STBD RAD pnl deployed:</td>
<td>1 If AC3 MMC2 cb not opened, Lat Mtr 2 of Stbd Lat 7-12 Actuator continues to run until Sys B Lat Cntl sw placed to OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RAD CNTL STBD tb – bp</td>
<td>2 Mtr 1 will continue to drive until Sys B Cntl sw is taken to OFF</td>
<td></td>
</tr>
<tr>
<td>For PLBD Ops:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• OP/CL Drs in man mode, MANUAL PLBD CLOSING (DEORBIT PREP)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

**ONLY ON MCC CALL, PERFORM**

| (MA73CA) | | | |
| • MCA LOGIC MNC MID 2 – OFF | | | |

**NOTES**

1 Vlv holds position
2 Mtr 2 remains
3 Htr Cntr 2 remains

1 If AC3 MMC2 cb not opened, Lat Mtr 2 of Stbd Lat 7-12 Actuator continues to run until Sys B Lat Cntl sw placed to OFF
2 Mtr 1 will continue to drive until Sys B Cntl sw is taken to OFF
3 With an inoperative limit switch, mtr will continue to run until stow sw returned to gnd
4 Redundant sig (MNB) enables Ku-Band Xmit
5 MNB MMC4 pwr remains to supply pwr to Boom Stow Enable II Signal for Stow mtrs
6 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
7 Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
## EPS SSR-59
### BUS LOSS: MNC MMC4

#### ACTIONS
1. cb MCA PWR AC3 3φ MID 4 – op
   - For PLBD ops: OP/CL Drs in man mode, MANUAL PLBD CLOSING (DEORBIT PREP)

2. (MA73C:D)
   - Port Rad Lat 7-12 Mtr 2 Limit sw
   - Port Rad Dpy/Sto Mtr 2
   - Stbd Rad Dpy/Sto Mtr 1 Limit sw

#### EQUIP/FUNCTION LOST
- Port Rad Lat 7-12 Mtr 2 Limit sw
- Port Rad Dpy/Sto Mtr 2
- Stbd Rad Dpy/Sto Mtr 1 Limit sw

#### BUS ISOLATION
- ONLY ON MCC CALL, PERFORM

#### CREW INDICATIONS
- RAD CNTL STBD tb – bp
- If PORT RAD pnl deployed:
  - RAD CNTL PORT tb – bp
  - SM (BFS SM 63) PL BAY DOORS
  - If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg ‘PBD CONFIG’

#### NOTES
1. If AC3 MMC4 cb not opened, Lat Mtr 2 of Port Lat 7-12 Actuator continues to run until Sys B Lat Control sw placed to OFF
2. Mtr 1 will continue to drive until Sys A Cntl sw is taken to OFF
3. Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
4. Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>RH Vents 8,9 Mtr 1</td>
<td>NONE</td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

Only on MCC call, perform:

- MCA logic MNC AFT 3 – OFF
- MNC AMC3 Bus pwr

1 ET Door Mtrs:
- C/L Lat Actr 2 Mtr 2 GPC Cntl
- L Dr Closure Mtr 2 GPC CL capability
- R Dr Closure Mtr 1 GPC CL capability
- R Dr Uplock Lat Mtr 1 GPC Lat capability

AC pwr removal capability via Limit sw for ET Dr Mtrs:
- C/L Lat Actr 2 Mtr 2
- L Dr closure Mtr 2
- R Dr closure Mtr 1
- Uplock Mtr 1

① Redundant mtrs remain
# EPS SSR-61
## BUS LOSS: MNC R14

### ACTIONS

<table>
<thead>
<tr>
<th></th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Audio Center 2</td>
<td>MS Floodlt lost</td>
<td>1 If AUD CTR 2 selected, all intercom, A/G, recorded voice lost until AUD CTR 1 selected</td>
</tr>
<tr>
<td></td>
<td>A/I ATU, EMU CCU 1,2</td>
<td>Comm via PS ATU lost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PS ATU, CCU</td>
<td>If Aud Ctr 2 selected, all comm lost</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 If operating Ku-Band comm, no U/L voice</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>AUD CTR 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

(R14:A)
- cb MNC
- AUD AUD CTR 2 – op
- PS/AIRLK – op
- MDU CDR 1 – op
- MDU PLT 2 – op
- MDU AFD 1 – op

(R14:B)
- cb MNC
- UHF – op
- GCILC – op
- CNTL BUS AB1/2/3 – op

(R14:C)
- cb MNC KU SIG PROC – op
- cb UHF EVA – op

(R14:D)
- cb MNC TV CAB – op
- cb MNC TV B CAMR
- CAMR/PTU – op
- CAMR HTR – op
- ILLUM/PTU HTR – op

(R14:E)
- cb MNC MS FLOOD – op
- MDU CDR 1 PWR – OFF
- MDU PLT 2 PWR – OFF
- MDU AFD 1 PWR – OFF

### CREW INDICATIONS

1 MS Floodlt lost
2 Comm via PS ATU lost
3 If Aud Ctr 2 selected, all comm lost
4 If operating Ku-Band comm, no U/L voice

### NOTES

1 If AUD CTR 2 selected, all intercom, A/G, recorded voice lost until AUD CTR 1 selected
2 Ku comm function lost. RDR function OK
3 Redundant pwr source remains for equipment

1 If AUD CTR 2 selected, all intercom, A/G, recorded voice lost until AUD CTR 1 selected
2 Ku comm function lost. RDR function OK
3 Redundant pwr source remains for equipment
## EPS SSR-62
### BUS LOSS: MNC O16RJD

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>ON Cntl of RCS F4 Manf Drivers (F4D,F4R)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

NONE

## EPS SSR-63
### BUS LOSS: MNC O16

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R1)</td>
<td>BUS TIE MNB – ON (tb-ON)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O6)</td>
<td>ANNUN BUS SEL ACA 2/3 – MNB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(F6,F8)</td>
<td>HSI SEL SOURCE – other than MLS, (OV103,4) TACAN 3 or (OV105) GPS 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A6U)</td>
<td>ANNUN BUS SEL – MNB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O14:D)</td>
<td>cb MNA</td>
<td>MLS 3 (OV103,4) TACAN 3 (OV105) GPS 3</td>
<td></td>
</tr>
<tr>
<td>(A13)</td>
<td>(OV103) GPS PRE AMPL UC – MNA</td>
<td>A2/3 MNC pwr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(OV103) GPS PRE AMPL LC – MNA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

1 FC2 only one failure away (loss of ESS2CA) from inability to bus tie
2 ACAs recovered by switching to alternate pwr
3 If EMER O2 Mission Kit not flown, cb is opened prelaunch
### ACTIONS

- Pre-seat ingress for entry,
- Discharge handheld fire extinguisher into AV BAY 2

### EQUIP/FUNCTION LOST

- Av Bay 2 Agent discharge capability
- R Seat/Ctr Cnsl Floodlights
- Orbiter Timing Buffer
- Tcanc 3
- Cabin Smoke Detector
- Av Bay 1 Smoke Detector A
- MNC Utility pwr
- Cryo O2 Tk1 Htr Current Snr 2
- Cryo O2 Tk2 Htr Current Snr 1
- H2O Alternate Press Valve
- Emer O2 Sply Valve
- Cabin Relief Valve B
- ADTA 3,4
- MF 3 – op
- DDU R, AFT (two) – op
- RCS/OMS Prplt Qty Gauge – op
- DRAG CHUTE SYS 1 – op
- ADTA 3,4
- MNC Utility pwr
- RCS/OMS Prplt Qty Gauge
- Drag Chute, CDR Arm

### BUS ISOLATION

<table>
<thead>
<tr>
<th>ONLY ON MCC CALL, PERFORM (O16:O16)</th>
<th>cb MNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLS 3 – OFF</td>
<td></td>
</tr>
<tr>
<td>R SEAT/CTR CNSL Flood – OFF</td>
<td></td>
</tr>
<tr>
<td>OI SIG CONDR OM3 B – op</td>
<td></td>
</tr>
<tr>
<td>OI SIG CONDR OF 2/3 B – op</td>
<td></td>
</tr>
<tr>
<td>OI MDM OF 3/4 B – op</td>
<td></td>
</tr>
<tr>
<td>MNB CONTR – op</td>
<td></td>
</tr>
<tr>
<td>AUX TIMING BUFF – op</td>
<td></td>
</tr>
<tr>
<td>OI SIG CONDR OM3 B – op</td>
<td></td>
</tr>
<tr>
<td>OI MDM OF 3/4 B – op</td>
<td></td>
</tr>
<tr>
<td>MNB CONTR – op</td>
<td></td>
</tr>
<tr>
<td>AUX TIMING BUFF – op</td>
<td></td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

- R Seat/Cnsl Floodlights
- Orbiter Timing Buffer
- Tcanc 3
- Cabin Smoke Detector
- Av Bay 1 Smoke Detector A
- MNC Utility pwr
- Cryo O2 Tk1 Htr Current Snr 2
- Cryo O2 Tk2 Htr Current Snr 1
- H2O Alternate Press Valve
- Emer O2 Sply Valve
- Cabin Relief Valve B
- ADTA 3,4
- MF 3 – op
- DDU R, AFT (two) – op
- RCS/OMS Prplt Qty Gauge
- Drag Chute, CDR Arm

### NOTES

- If EMER O2 Mission Kit not flown, cb is opened prelaunch
- Redundant pwr remains
- L,R L+ DK smoke detectors remain
- Current Snr 1 remains
- Current Snr 2 remains
- Vlv remains closed
- Vlv holds position
- MCC for total OMS Qtys. Aft Qtys are found on GNC SYS SUMM 2
- PLT Arm remains
### EPS SSR-64
#### BUS LOSS: MNC R1A1

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>MNC pwr to CNTLBC1,2,3 and CNTLCA1,2,3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MNC pwr to ESS1BC, ESS2CA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

---

### EPS SSR-65
#### BUS LOSS: MNC A14

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>[GNC 23 RCS]</td>
<td>Fwd RCS Jet 4,5 Hrs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

---

### EPS SSR-66
#### BUS LOSS: MNC ML86B

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(PLT SEAT PNL)</td>
<td>CDR Seat Adj via AC3 pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• PLT SEAT PWR BUS SEL – AC2 (up)</td>
<td>PLT Seat Adj via AC3 pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(CDR SEAT PNL)</td>
<td>Supply H2O:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CDR SEAT PWR BUS SEL – AC2 (up)</td>
<td>Dump Vlv Cntl &amp; Noz Htr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If Supply H2O Dump reqd: For TK A and/or TK B</td>
<td>Xovr Vlv Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS), using FLASH EVAP CNTLR PRI A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For TK C and/or TK D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS), using FLASH EVAP CNTLR PRI B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNA(MNB) EXT ARLK HTR LINE ZN1 – cl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MNA(MNB) EXT ARLK HTR LINE ZN2 – cl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(AW82D)</td>
<td>EMU 1 H2O SPLY tb – CL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R11L)</td>
<td>SPLY H2O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• TKA OUTLET tb – bp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>DUMP VLV tb – bp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>XOVR VLV tb – bp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>GALLEY SPLY VLV tb – bp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(LIGHTS LOST)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middeck Floodlts 3,4,5,7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bunk Floodlts 1/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airlock Floodlt 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO13Q Pnl lt 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TA Floodlt 4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1 Vlv holds position
2 If SPLY H2O DUMP VLV ENA/NOZ HTR – OFF, tb unpwrd and already bp
3 MNA,MNB line htrs remain
## EPS SSR-66 (Cont)

**BUS LOSS: MNC ML86B**

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:A)</td>
<td>cb SPLY H2O</td>
<td>1</td>
<td>Galley H2O Sply Vlv Cntl</td>
</tr>
<tr>
<td></td>
<td>• GALLEY SPLY – op</td>
<td>1</td>
<td>Sply H2O Tk C In Vlv Cntl</td>
</tr>
<tr>
<td></td>
<td>• XOVR VLV – op</td>
<td></td>
<td>Tk A Out Vlv Cntl</td>
</tr>
<tr>
<td></td>
<td>• TK C INLET – op</td>
<td></td>
<td>Dump Noz Htr</td>
</tr>
<tr>
<td></td>
<td>• DUMP VLV/NOZ HTR – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:D)</td>
<td>cb MNC PYRO JETT SYS B</td>
<td>4</td>
<td>Ku-BD Jettison Sys B</td>
</tr>
<tr>
<td></td>
<td>• KU ANT – op</td>
<td></td>
<td>RMS/OBSS</td>
</tr>
<tr>
<td></td>
<td>• PORT RMS – op</td>
<td></td>
<td>Jett/Guil Sys B</td>
</tr>
<tr>
<td></td>
<td>• STBD RMS – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:E)</td>
<td>cb MNC EMU 1 H2O</td>
<td>1</td>
<td>EMU 1 Waste H2O Vlv Cntl</td>
</tr>
<tr>
<td></td>
<td>• WASTE – op</td>
<td>1</td>
<td>Sply H2O Vlv Cntl</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TA Floodlt 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cb MNC FLOOD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• TNL ADAPT 4 – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:F)</td>
<td>cb MNC FLOODS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• MIDDECK 5/7 – op</td>
<td></td>
<td>Middeck Floodlts 3,4,5,7</td>
</tr>
<tr>
<td></td>
<td>• MIDDECK 3/4/MO13Q – op</td>
<td></td>
<td>MO13Q Pnl lt 1</td>
</tr>
<tr>
<td></td>
<td>• BUNK 1/3 – op</td>
<td></td>
<td>Bunk Floodlts 1/3</td>
</tr>
<tr>
<td></td>
<td>• AIRLK 4 – op</td>
<td></td>
<td>Airlk Floodlt 4</td>
</tr>
<tr>
<td></td>
<td>cb MNC CRYO</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• O2 HTR TK4 SNSR 2 – op</td>
<td></td>
<td>Cryo O2 Tk4</td>
</tr>
<tr>
<td></td>
<td>• O2 HTR TK5 SNSR 2 – op</td>
<td></td>
<td>Current Snsr 2</td>
</tr>
<tr>
<td>(ML86B:C)</td>
<td>cb MNC EXT ARLK HTR LINE ZN1 – op</td>
<td></td>
<td>Ext A/L H2O Line Htrs MNC pwr</td>
</tr>
<tr>
<td></td>
<td>cb MNC EXT ARLK HTR LINE ZN2 – op</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Vlv holds position
2. MNA,MNB line htrs remain
3. Sys A remains
4. One failure away from loss of jettison capability
5. Current Snsr 1 remains
# EPS SSR-70
## BUS LOSS: ESS1BC DA1

### ACTIONS

| 1 | Perform FC1 SHUTDN |
| 2 | FC1 Controller and Pumps |
| 3 | MNA pwr to CABPL 1,2,3 buses |
| 4 | L Audio pwr |
| 5 | MTU Pwr Sply A/Osc 1 |
| 6 | L Glareshield Floodlts via pnl O6 sw |
| 7 | Cryo O2,H2 Tk4 Htrs Auto ops if O2,H2 Tk4 Htrs A(B) in AUTO |
| 8 | Cryo Tk3 Htrs in AUTO ops if Tk4 in AUTO |
| 9 | Cryo Tk4 Htrs Auto ops |
| 10 | GPC Mode sw Halt Contacts for GPCs 1,4 (pnl O6) |
| 11 | GPC Output sw Terminate capability for GPCs 1,4 |
| 12 | If SSPTS: OPCU 1 Voltage Adjust Capability via switch |

### EQUIP/FUNCTION LOST

| 1 | FC1 Controller and Pumps |
| 2 | MNA pwr to CABPL 1,2,3 buses |
| 3 | L Audio pwr |
| 4 | MTU Pwr Sply A/Osc 1 |
| 5 | L Glareshield Floodlts via pnl O6 sw |
| 6 | Cryo O2,H2 Tk4 Htrs Auto ops if O2,H2 Tk4 Htrs A(B) in AUTO |
| 7 | Cryo Tk3 Htrs in AUTO ops if Tk4 in AUTO |
| 8 | Cryo Tk4 Htrs Auto ops |
| 9 | GPC Mode sw Halt Contacts for GPCs 1,4 (pnl O6) |
| 10 | GPC Output sw Terminate capability for GPCs 1,4 |

### CREW INDICATIONS

| 1 | C/W PARAM SEL tw (three) – 010, 030, 060, 080 |
| 2 | C/W PARAM – INH |
| 3 | C/W PARAM SEL tw (three) – > 119 |

### NOTES

- FC1 must be shut down within 9 min to avoid potentially hazardous condition.
- No intercom, A/G, or recorded voice from CDR ATU. When L AUD CNTL switched to RIGHT, only listen capability restored.
- FC/MN BUS A and MN BUS TIE A sws work, but tbs are lost.
- Switch works but tb lost.
- Flood lts available via EMER LGT (C3.ML18F).
- AC1 remains pwrd, but tb lost. INV/AC BUS 1 sw inop. INV PWR 1 sw also inop.
- Vlv holds position, but tb and sw lost.
- FC1 Coolant Pump ΔP tb lost.
- Unable to HALT or terminate GPC, IPL GPC, or perform HISAM dump. Do not pwr off GPCs 1 or 4 since they must be transitioned thru HALT to force RUN state.
- Inhibits Primary C/W for O2 and H2 Tk 2 and 4 Control Pressure.
- Caused by loss of purge vlv sw position TM.
- OPCU 1 Voltage Adjust Capability still exists via MCC CMDs.
## EPS SSR-70 (Cont)

### BUS LOSS: ESS1BC DA1

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O13:A) cb ESS 1BC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• C/W A – op</td>
<td>Pri C/W Sys, Annun pnl F7 AC1 Bus Snr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MTU A – op</td>
<td>Cryo O2,H2 Tk2 Htrs Auto op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O13:B) cb ESS 1BC</td>
<td>Cryo O2,H2 Tk2 Qty Xdcrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CRYO CNTLR O2,H2 TK2 (two) – op</td>
<td>Airlock Floodlt 2 lost Tnl Adapt Floodlt 1 lost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CRYO QTY O2,H2 TK2 (two) – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R14:F) cb ESS 1BC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FLOOD L GLRSHLD – op</td>
<td>Airlock Floodlt 2 Tnl Adapt Floodlt 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AUD L – op</td>
<td>Cryo O2,H2 Tk4 Htrs Auto op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ML86B:G) cb ESS 1BC</td>
<td>Cryo O2,H2 Tk4 Qty Xdcrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FLOOD AIRLK 2 – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FLOOD TNL ADAPT 1 – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CRYO CNTLR O2,H2 TK4 (two) – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CRYO QTY O2,H2 TK4 (two) – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV105) GPS 1 PWR – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV105) GPS 1 PRE AMPL UPPER – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV105) GPS 1 PRE AMPL LOWER – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O14:D) cb MNA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV105) GPS 1 PRE AMPL UPPER – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (OV105) GPS 1 PRE AMPL LOWER – op</td>
<td></td>
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</tbody>
</table>

### CREW INDICATIONS

**(F9)**

<table>
<thead>
<tr>
<th>SM 67 ELECTRIC</th>
<th>ESS 1BC VOLTS &lt; 20</th>
</tr>
</thead>
</table>

### NOTES

3 FC/MN BUS A and MN BUS TIE A sws work, but tbs are lost

5 Retain backup C/W thru Sys B. Ref C/W Mal 4.1b for C/W capabilities lost. Only two of four bulbs lit in MA Lt

18 Disables AC1 AUTO TRIP. AC1 Voltage and OVLD c/w lost

19 AC1 inverters and buses remain pwrd, but sws and tb lost. INV/AC BUS 1 sw inop. INV PWR 1 sw also inop

20 Vlv closes. Redundant vlv B remains

---

09/26/08 7-199 MAL/ALL/GEN J
### EPS SSR-71
#### BUS LOSS: ESS1BC FP&LC1

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>AC1 Inverters Input DC pwr Cntl</td>
<td>(R1) INV PWR 1 tb – OFF</td>
<td>① Inverters remain pwrd, but tb and sw lost</td>
</tr>
<tr>
<td>BUS ISOLATION</td>
<td>ONLY ON MCC CALL, PERFORM</td>
<td>Capability to switch to MADS Rcdr Trk Seq 2</td>
<td></td>
</tr>
</tbody>
</table>

### EPS SSR-72
#### BUS LOSS: ESS1BC MPC1

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 • Perform FC1 SHUTDN (FC SHUTDN Cue Card)</td>
<td>FC1 Controller and Pumps FC1 Reac Vlv Cntl via pnl R1 sw</td>
<td>MASTER ALARM Light/Tone – on (F7)</td>
<td>① TIME CRITICAL FC1 must be shut down within 9 min to avoid potentially hazardous condition</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUS ISOLATION</td>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td>② Vlv holds position, but tb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains</td>
</tr>
<tr>
<td>NONE</td>
<td>Cryo O2, H2 Tk1 Manf Vlv Cntl</td>
<td></td>
<td>③ FC1 Coolant Pump ΔP tb lost</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
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</tbody>
</table>

**NOTES**
1 Inverters remain pwrd, but tb and sw lost.
2 Vlv holds position, but tb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains.
3 FC1 Coolant Pump ΔP tb lost.
### ACTIONS

<table>
<thead>
<tr>
<th>(A11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• CRYO TK4 HTR O2,H2 A,B (four) – OFF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(R13U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• C/W PARAM SEL tw (three) – 030, 080</td>
</tr>
<tr>
<td>• C/W PARAM – INH</td>
</tr>
<tr>
<td>• MEM – CLEAR</td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

Cryo Tk3 O2,H2 Htrs Auto ops if O2,H2 Tk4 Htrs A(B) in Auto  
Cryo Tk4 O2,H2 Htrs Auto ops

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>MASTER ALARM</th>
<th>Light/Tone – on</th>
</tr>
</thead>
<tbody>
<tr>
<td>(F7)</td>
<td>C/W O2 PRESS It</td>
</tr>
<tr>
<td>(FSMs)</td>
<td>S68 H2 CNTL P 4</td>
</tr>
<tr>
<td>(O2)</td>
<td>CRYO O2,H2 QTY TK4 meters (two) = 0%</td>
</tr>
<tr>
<td>AIRL Floodlt 2 lost</td>
<td>TA Floodlt 1</td>
</tr>
</tbody>
</table>

### NOTES

1 Inhibits Primary C/W for O2 and H2 Tk 4 Control Pressure

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

<table>
<thead>
<tr>
<th>(ML86B:G) cb ESS 1BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>• FLOOD AIRLK 2 – op</td>
</tr>
<tr>
<td>• FLOOD TNL ADAPT 1 – op</td>
</tr>
<tr>
<td>• CRYO CNTLR O2,H2 TK4 (two) – op</td>
</tr>
<tr>
<td>• CRYO QTY O2,H2 TK4 (two) – op</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AIRL Floodlt 2</th>
<th>TA Floodlt 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryo O2,H2 Tk4 Qty Xdcrs</td>
<td></td>
</tr>
</tbody>
</table>

09/26/08 7-201 MAL/ALL/GEN J
### ACTIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Perform FC1 SHUTDOWN (FC SHUTDOWN Cue Card), then:</td>
</tr>
<tr>
<td></td>
<td>PL CAB – MNB</td>
</tr>
<tr>
<td>2</td>
<td>If GPC 1 or 4 dump reqd, attempt S/W dump in RUN</td>
</tr>
<tr>
<td></td>
<td>When reqd:</td>
</tr>
<tr>
<td></td>
<td>For FC1, perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS)</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FC1 Controller and Pumps</td>
</tr>
<tr>
<td>2</td>
<td>MNA pwr to CABPL 1,2,3 Buses</td>
</tr>
<tr>
<td>3</td>
<td>GPC Mode sw Halt Contacts for GPCs 1,4 (pnl O6)</td>
</tr>
<tr>
<td></td>
<td>GPC Output sw Terminate capability for GPCs 1,4 (pnl O6)</td>
</tr>
<tr>
<td>4</td>
<td>FC1 Auto purge capability</td>
</tr>
<tr>
<td>5</td>
<td>OIU 1 MNA pwr</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MASTER ALARM Light/Tone – on</td>
</tr>
<tr>
<td>2</td>
<td>C/W FC PUMP lt</td>
</tr>
<tr>
<td>3</td>
<td>FC1 RDY tb – bp</td>
</tr>
<tr>
<td>4</td>
<td>FC1 COOL PUMP ΔP tb – bp</td>
</tr>
<tr>
<td>5</td>
<td>GPCs 1,4 (pnl O6)</td>
</tr>
<tr>
<td>6</td>
<td>GPC Output sw Terminate capability for GPCs 1,4 (pnl O6)</td>
</tr>
<tr>
<td>7</td>
<td>GPC Mode sw Halt Contacts for GPCs 1,4 (pnl O6)</td>
</tr>
<tr>
<td>8</td>
<td>GPC Output sw Terminate capability for GPCs 1,4 (pnl O6)</td>
</tr>
</tbody>
</table>

### NOTES

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TIME CRITICAL</td>
</tr>
<tr>
<td>2</td>
<td>FC1 must be shut down within 9 min to avoid potentially hazardous condition</td>
</tr>
<tr>
<td>3</td>
<td>Pwrs PL Timing Buffer and OIU 1 (if flown). OIU 1 redundant pwr MNB MPC2 via CAB PL3</td>
</tr>
<tr>
<td>4</td>
<td>Unable to HALT or terminate GPC, IPL GPC, or perform HISAM dump. Do not pwr off GPCs 1 or 4 since they must be transitioned through HALT to force RUN state</td>
</tr>
<tr>
<td>5</td>
<td>FC1 Coolant Pump ΔP tb lost</td>
</tr>
<tr>
<td>6</td>
<td>Caused by loss of purge vlv sw position TM</td>
</tr>
<tr>
<td>7</td>
<td>OIU 1 redundant pwr MNB MPC2 via CAB PL3</td>
</tr>
<tr>
<td>8</td>
<td>AC1 inverters and buses remain pwrd. INV PWR 1 and INV/AC BUS 1 switches and INV PWR 1 tb lost</td>
</tr>
</tbody>
</table>

### BUS ISOLATION

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td>NONE</td>
</tr>
</tbody>
</table>

### BUS ISOLATION

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<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AUX PL A Bus pwr</td>
<td>AC1 Inverters:</td>
</tr>
<tr>
<td></td>
<td>Input DC Pwr Cntl</td>
</tr>
<tr>
<td></td>
<td>Inv/AC Bus Cntl</td>
</tr>
<tr>
<td>Cryo O2 Tk2,4 Htr Snsr Test/Reset sw</td>
<td>(OV103,4) TACAN 1 Auto Self-Test</td>
</tr>
</tbody>
</table>

### BUS ISOLATION

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>OPCU 1 Voltage Adjust Capability via switch</td>
<td>OPCU 1 Voltage Adjust Capability still exists via MCC CMDs</td>
</tr>
</tbody>
</table>
### ACTIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>1</strong></td>
<td><strong>L AUD CNTL – R</strong></td>
</tr>
<tr>
<td><strong>(O5)</strong></td>
<td><strong>MTU – OSC 2</strong></td>
</tr>
<tr>
<td><strong>(R1)</strong></td>
<td><strong>O2,H2 TK1,3 HTRS A</strong></td>
</tr>
<tr>
<td><strong>(O6)</strong></td>
<td><strong>(four) – AUTO</strong></td>
</tr>
<tr>
<td><strong>(four) – OFF</strong></td>
<td><strong>O2,H2 TK2 HTRS A,B</strong></td>
</tr>
<tr>
<td><strong>(two) – OP</strong></td>
<td><strong>O2,H2 MANF VLV TK2</strong></td>
</tr>
</tbody>
</table>

If add’l ltg reqd:
- **(C3)**
  - **EMER LTG – ON/OFF**

To release crewmember from constant monitoring requirement:
- **Perform C&W EU CONTINGENCY POWER (IFM)**

### EQUIP/FUNCTION LOST

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>1</strong></td>
<td><strong>L Audio pwr</strong></td>
</tr>
<tr>
<td><strong>(O6)</strong></td>
<td><strong>MTU Pwr Sply A/Osc 1</strong></td>
</tr>
<tr>
<td><strong>(R1)</strong></td>
<td><strong>Cryo Tk1 O2,H2 Htrs Auto</strong></td>
</tr>
<tr>
<td><strong>(two) – OP</strong></td>
<td><strong>Cryo Tk2 O2,H2 Htrs Auto</strong></td>
</tr>
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</table>

### CREW INDICATIONS

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td><strong>MASTER ALARM</strong></td>
</tr>
<tr>
<td><strong>(F7)</strong></td>
<td><strong>Light/Tone – on</strong></td>
</tr>
<tr>
<td><strong>(FSMs)</strong></td>
<td><strong>L Audio lost</strong></td>
</tr>
<tr>
<td><strong>(R1)</strong></td>
<td><strong>L Glrshld Floodlt lost</strong></td>
</tr>
<tr>
<td><strong>(O6)</strong></td>
<td><strong>Two of four bulbs in MA Lts</strong></td>
</tr>
<tr>
<td><strong>(R1)</strong></td>
<td><strong>not ON</strong></td>
</tr>
<tr>
<td><strong>(O6)</strong></td>
<td><strong>SM ALERT Light/Tone – on</strong></td>
</tr>
<tr>
<td><strong>(FSMs)</strong></td>
<td><strong>S68 H2 CNTL P 2</strong></td>
</tr>
<tr>
<td><strong>(O6)</strong></td>
<td><strong>S68 O2 CNTL P 2</strong></td>
</tr>
</tbody>
</table>

### NOTES

1. No intercom, A/G, or recorded voice from CDR ATU. When L AUD CNTL switched to RIGHT, only listen capability is restored
2. Retain BACKUP C/W thru Sys B. Ref C/W MAL 4.1b for C/W capabilities lost. Only two of four bulbs lit in MA Lts
3. Floodlts available via EMER LTG (C3, ML18F)
4. AC1 bus remains pwrd. INV/AC BUS 1 sw works, but tb lost
5. Until IFM cables installed:
   a) Loss of ESS2CA DA2 would not generate aural alarm so that Fuel Cell 2 could be safed within 9 min. FSM should be closely monitored.
   b) Loss of C/W B system would not be annunciated and subsequent orbiter problems would not trigger aural alarm
6. IFM procedure recovers C/W A system by providing pwrs source, which bypasses failed ESS1BC O13&R14 bus
7. Inhibits Primary C/W for O2 and H2 Tk 2 Control Pressure

(Continued)
**EPS SSR-75 (Cont)**

**BUS LOSS: ESS1BC O13&R14**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O13:A) cb ESS1BC</td>
<td>Pri C/W Sys, Annun Pnl F7 AC1 Bus Snsr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• C/W A – op</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AC1 SNSR – op</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MTU A – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O13:B) cb ESS1BC</td>
<td>Cryo O2,H2 Tk2 Htrs Auto ops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CRYO CNTLR O2,H2 TK2 (two) – op</td>
<td>Cryo O2,H2 Tk2 Qty Xdcrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CRYO QTY O2,H2 TK2 (two) – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R14:F) cb ESS1BC</td>
<td>LG ARM/DN Reset capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FLOOD L GLRSHLD – op</td>
<td>ESS pwr to FC/MN BUS A and MN BUS TIE A Pwr Contactor Cntl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AUD L – op</td>
<td></td>
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</tbody>
</table>

2 Retain BACKUP C/W thru Sys B. Ref C/W MAL 4.1b for C/W capabilities lost. Only two of four bulbs lit in MA lts

3 Disables AC1 Auto Trip. AC1 Voltage and OVLDP C/W lost

5 Switches and tbs still operate
**EPS SSR-80**  
**BUS LOSS: ESS2CA DA2**  
(Indicates all ESS2CA sub-buses)

### ACTIONS

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>Perform FC2 SHUTDN (FC SHUTDN)</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>PL CAB – MNA</td>
</tr>
<tr>
<td>4</td>
<td>AUD CTR – 2</td>
</tr>
<tr>
<td>(C3)</td>
<td></td>
</tr>
<tr>
<td>(R1)</td>
<td>O2, H2 MANF VLV TK1 (two) – OP</td>
</tr>
<tr>
<td>(C3)</td>
<td>O2, H2 TK1 HTRS A, B</td>
</tr>
<tr>
<td>(O9)</td>
<td></td>
</tr>
<tr>
<td>(O6)</td>
<td></td>
</tr>
<tr>
<td>(O6)</td>
<td>O2, H2 TK2, 3 HTRS A, B</td>
</tr>
<tr>
<td>(C3)</td>
<td></td>
</tr>
<tr>
<td>(A15)</td>
<td>O2, H2 TK5 HTR A, B</td>
</tr>
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</table>

### EQUIP/FUNCTION LOST

<p>| | |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FC2 Controller and Pumps</td>
</tr>
<tr>
<td>2</td>
<td>Audio Center 1</td>
</tr>
<tr>
<td>3</td>
<td>R Audio pwr</td>
</tr>
<tr>
<td>4</td>
<td>PL CAB – MNA</td>
</tr>
<tr>
<td>5</td>
<td>MNB pwr to CABPL 1, 2, 3 Buses</td>
</tr>
<tr>
<td>6</td>
<td>MTU Pwr Sply B/Osc 2</td>
</tr>
<tr>
<td>7</td>
<td>R Glareshield Floodlt via pnl O8 sw</td>
</tr>
<tr>
<td>8</td>
<td>Cryo O2, H2 Tk2 Manf Vlv Ctrl</td>
</tr>
<tr>
<td>9</td>
<td>All FC Auto Purge capability</td>
</tr>
<tr>
<td>10</td>
<td>GPC Mode sw Halt Contacts for GPCs 2.5 (pnl O6)</td>
</tr>
<tr>
<td>11</td>
<td>C/W PARAM SEL tw (three) – 000, 040, 050, 090</td>
</tr>
<tr>
<td>12</td>
<td>If SSPTS: OPCU 2 Voltage Adjust Capability via switch</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>All comm lost via AUD CTR 1</td>
</tr>
<tr>
<td>2</td>
<td>R AUDIO lost</td>
</tr>
<tr>
<td>3</td>
<td>R Glareshield Floodlt lost</td>
</tr>
<tr>
<td>4</td>
<td>FC2 must be shut down within 9 min to avoid potentially hazardous condition</td>
</tr>
<tr>
<td>5</td>
<td>If Aud Ctr 1 active, all intercom, A/G, and recorded voice lost until Aud Ctr 2 selected. No intercom A/G, or recorded voice from PLT ATU. When R AUD CNTL switched to LEFT, only listen capability restored</td>
</tr>
<tr>
<td>6</td>
<td>If GPC 2 or 5 dump reqd, attempt S/W dump in RUN</td>
</tr>
<tr>
<td>7</td>
<td>Floodlt available via EMER LGT (C3, ML18F)</td>
</tr>
<tr>
<td>8</td>
<td>Vlv holds position, but lb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains</td>
</tr>
<tr>
<td>9</td>
<td>Pwrs PL Timing Buffer, VTR, and one string of OBSS power while attached to SRMS</td>
</tr>
<tr>
<td>10</td>
<td>Retain C/W Sys A Alarm tones (Pri &amp; B/U) Ref C/W MAL 4.1a [3] for capabilities lost. Only two of four bulbs lit in MA lt. PRIMARY C/W and BACKUP C/W ALARM lts are not resettable</td>
</tr>
<tr>
<td>11</td>
<td>Vlv holds position, but lb and sw lost</td>
</tr>
<tr>
<td>12</td>
<td>Caused by loss of FC Purge Htr – GPC sw position TM pwr</td>
</tr>
<tr>
<td>13</td>
<td>Unnable to HALT or terminate GPC, IPL GPC, or perform HISAM dump. Do not pwrs-off GPC 2 since it must be transitioned thru HALT to force RUN state. GPC 5 (BFS) may be pwrd off, but pwrd up in STBY</td>
</tr>
<tr>
<td>14</td>
<td>Inhibits Primary C/W for O2 and H2 Tk 1 and 5 Control Pressure</td>
</tr>
<tr>
<td>15</td>
<td>OPCU 2 Voltage Adjust Capability still avail via MCC CMDs</td>
</tr>
</tbody>
</table>

### NOTES

<p>| | |</p>
<table>
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<tr>
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<tbody>
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<td>(Continued)</td>
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</tbody>
</table>

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(Continued)
### ACTIONS

13. To release crewmember from constant monitoring requirement:
   - Perform C&W EU CONTINGENCY POWER (IFM)

14. 

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

(O13:C)
- cb ESS 2CA
- C/W B – op
- AC2 SNSR – op
- MTU B – op

(O13:D)
- cb ESS 2CA
- CRYO CNTLR
  - O2,H2 TK1 (two) – op
  - CRYO QTY O2,H2 TK1 (two) – op

(R14:F)
- cb ESS 2CA
- FLOOD R GLRSHLD – op
- AUD R – op
- CTR 1 – op

(ML86B:G)
- cb ESS 2CA
- CRYO CNTLR O2,H2 TK5 (two) – OP
- CRYO QTY O2,H2 TK5 (two) – OP

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| C/W Sys B Alarm Tones | C/W Sys B Alarm Tones | 3. FC/MN BUS B and MN BUS TIE B sws work, but tbs lost
| AC2 Bus Snsr | | 8. Vlv holds position, but tb and sw lost
| Cryo O2,H2 Tk1 Htrs Auto ops | Cryo O2,H2 Tk1 Qty Xdcrs | 13. Until IFM cables installed:
| Cryo O2,H2 Tk5 Qty Xdcr | | a) Loss of ESS1BC DA1 would not generate aural alarm so that Fuel Cell 1 could be safed within 9 min. FSM should be closely monitored.
| | | b) Loss of C/W A system would not be annunciated and subsequent orbiter problems would not trigger aural alarm
| Cryo O2 Tk1 Htr Snsr Test/Reset sw | Cryo O2 Tk5 Htr Snsr Test/Reset sw | 14. IFM procedure recovers C/W B system by providing pwr source, which bypasses failed ESS 2CA DA2 bus
| AUX PL B BUS AC2 Inverters: | | 15. AC2 Inverters and buses remain pwrd, but switches and tbs lost
| Input DC Pwr Cntl | | 16. FC2 Coolant Pump ΔP tb lost
| INV/AC BUS Cntl | | 17. Retain C/W Sys A Alarm tones (Pri & B/U) Ref C/W MAL 4.1a [8] for capabilities lost. Only lower two of four bulbs lit in MA lt. PRIMARY C/W and BACKUP C/W ALARM lts are not resettable
| ESS pwr to FC/MN BUS B and MN BUS TIE B Pwr Contactor Cntl | | 18. Disables AC2 AUTO Trip. AC2 Voltage and OVLD C/W lost
| MNB/PRIPL and MNC/PRIPL pwr-off capability via Spacelab Pwr-Kill Signal | | 19. FC3/PRIPL pwr-off capability of SL not affected. MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected
| (OV103,4) TACAN 2 Auto Self-Test | | 20. Vlv closes. Redundant vlv B remains
| (OV105) GPS 2 | |
### EPS SSR-81
**BUS LOSS: ESS2CA FP&LC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td>(R1) INV PWR 2 tb – OFF</td>
<td>Loss of tb and sw. Inverters remain pwrd</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

### EPS SSR-82
**BUS LOSS: ESS2CA MPC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 • Perform FC2 SHUTDN (FC SHUTDN Cue Card)</td>
<td>FC2 Controller and Pumps</td>
<td>MASTER ALARM Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>2 FC2 Reac Vlv Cntl via pnl R1 sw</td>
<td>C/W FC REAC lt</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C/W FC PUMP lt</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SM ALERT Light/Tone</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(R1) O2 MANF VLV TK2 tb – CL</td>
<td></td>
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<tr>
<td></td>
<td>H2 MANF VLV TK2 tb – CL</td>
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<tr>
<td></td>
<td>FC2 REAC (two) tb – CL</td>
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<tr>
<td></td>
<td>RDY tb – bp</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>FC2 COOL PUMP ΔP tb – bp</td>
<td></td>
<td>TIME CRITICAL</td>
</tr>
<tr>
<td></td>
<td>(FSMs) S69 FC PUMP 2</td>
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<tr>
<td></td>
<td>S69 FC REAC 2</td>
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<tr>
<td></td>
<td>S69 FC H2 PUMP 2</td>
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</tr>
<tr>
<td></td>
<td>S68 H2 MANF VLV</td>
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<tr>
<td></td>
<td>S68 O2 MANF VLV</td>
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<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

1 Vlv holds position, but tb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains

2 Vlv holds position, but tb and sw lost

3 MNB/PRIPL sw, MNC/PRIPL sw, pnl R1 not affected

4 FC3/PRIPL pwrf-off capability of SL not affected

5 FC2 Coolant Pump ΔP tb lost
## AIRCRAFT SYSTEMS

### EPS SSR-83

#### BUS LOSS: ESS2CA FD

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>• Perform FC2 SHUTDN (FC SHUTDN Cue Card)</td>
<td>1 FC2 Controller and Pumps</td>
<td><strong>MASTER ALARM</strong></td>
</tr>
<tr>
<td></td>
<td>(R1) • PL CAB – MNA</td>
<td>2 MNB pwr to CABPL 1,2,3 Buses</td>
<td><strong>Light/Tone – on</strong></td>
</tr>
<tr>
<td></td>
<td>When reqd: • Perform FUEL CELL PURGE – MANUAL (ORB OPS, EPS)</td>
<td>3 All FC Auto Purge capability</td>
<td><strong>(F7)</strong></td>
</tr>
<tr>
<td>5</td>
<td>If GPC 2 or 5 dump reqd, attempt S/W dump in RUN</td>
<td>5 GPC Mode sw Halt Contacts for GPCs 2,5 (Pnl O6)</td>
<td><strong>FC2 RDY tb – bp</strong></td>
</tr>
<tr>
<td></td>
<td>(R1) • O2,H2 TK3 HTR A (two) – AUTO • O2,H2 TK3 HTR B (two) – OFF</td>
<td>5 GPC Output sw Terminate capability for GPCs 2,5 (pnl O6)</td>
<td><strong>FC2 COOL PUMP ΔP tb – bp</strong></td>
</tr>
<tr>
<td></td>
<td>If OIU reqd: (SSP 1) • OIU PWR – OIU 1 ON (AIL) • S-BD PL PWR SYS – 1 • CNTL – PNL • – CMD</td>
<td></td>
<td><strong>(FSMs)</strong></td>
</tr>
<tr>
<td></td>
<td>2 OIU 2</td>
<td><strong>S69 FUEL CELL</strong></td>
<td><strong>S69 FC PUMP 2</strong></td>
</tr>
<tr>
<td></td>
<td>OIU 1 MNB pwr</td>
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<td><strong>S69 FUEL CELL</strong></td>
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<td><strong>SM 67 ELECTRIC</strong></td>
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<tr>
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<td><strong>ESS2CA DC VOLTS – OSL</strong></td>
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<tr>
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<td><strong>SM 62 PCMMU</strong></td>
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<td><strong>S62 PDI DECOM FAIL</strong></td>
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<td><strong>S 212 OIU</strong></td>
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<td><strong>OIU 2 TEMP ≥ 140</strong></td>
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<td><strong>OIU 2 TEMP ≥ 140</strong></td>
</tr>
<tr>
<td>6</td>
<td>AUX PL B Bus pwr AC2 Inverters: Input DC Pwr Cntl Inv/AC Bus Cntl</td>
<td>4 FC2 RDY tb – bp</td>
<td><strong>TIME CRITICAL</strong></td>
</tr>
<tr>
<td></td>
<td>(OV103,4) TACAN 2 Auto Self-Test</td>
<td>4 FC2 COOL PUMP ΔP tb – bp</td>
<td>FC2 must be shut down within 9 min to avoid potentially hazardous condition</td>
</tr>
<tr>
<td></td>
<td>Cryo O2 Tk1 Htr Snsr Test/Reset sw</td>
<td></td>
<td><strong>(R1)</strong></td>
</tr>
<tr>
<td></td>
<td>Cryo O2 Tk5 Htr Snsr Test/Reset sw</td>
<td></td>
<td><strong>FC2 COOL PUMP ΔP tb – bp</strong></td>
</tr>
<tr>
<td></td>
<td>7 If SSPTS: OPCU 2 Voltage Adjust Capability via switch</td>
<td></td>
<td><strong>(FSMs)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>S69 FUEL CELL</strong></td>
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<td></td>
<td><strong>S69 FC PUMP 2</strong></td>
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<td></td>
<td><strong>SM 67 ELECTRIC</strong></td>
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<td><strong>ESS2CA DC VOLTS – OSL</strong></td>
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<td><strong>SM 62 PCMMU</strong></td>
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<td><strong>S62 PDI DECOM FAIL</strong></td>
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<td></td>
<td></td>
<td><strong>S 212 OIU</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>OIU 2 TEMP ≥ 140</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>OIU 2 TEMP ≥ 140</strong></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

NONE

6 AC2 inverters and buses remain pwr. INV PWR 2 and INV/AC BUS 2 switches lost and INV PWR 2 tb lost

7 OPCU 2 Voltage Adjust Capability still avail via MCC CMDs
### ACTIONS

<table>
<thead>
<tr>
<th></th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Audio Center 1</td>
<td>All Comm lost via AUD CTR 1 selected</td>
<td>1 If Audio Ctr 1 active, all intercom, A/G, and recorded voice lost until Audio Ctr 2 selected</td>
</tr>
<tr>
<td>2</td>
<td>R Audio pwr</td>
<td>R Audio lost</td>
<td>2 No intercom, A/G, or recorded voice from PLT. ATU until R AUD CNTL switched to LEFT which then restores only listen capability</td>
</tr>
<tr>
<td>(O6)</td>
<td>MTU – OSC 1</td>
<td>MASTER ALARM</td>
<td>3 Floodlt available via EMER LTG (C3, ML18F)</td>
</tr>
<tr>
<td>(O13)</td>
<td>O2,H2 MANF VLV TK1 (two) – OP</td>
<td>C/W O2 PRESS it – on</td>
<td>5 Until IFM cables installed: a) Loss of ESS1BC DA1 would not generate aural alarm so that Fuel Cell 1 could be safed within 9 min. FSM should be closely monitored. b) Loss of C/W A system would not be annunciacted and subsequent orbiter problems would not trigger aural alarm</td>
</tr>
<tr>
<td>(C3)</td>
<td>AUD CTR – 2</td>
<td>C/W PRI C/W it – on</td>
<td>6 AC2 bus remains pwrd. INV/AC BUS 2 sw works, but tb lost</td>
</tr>
<tr>
<td>(O13)</td>
<td>CRYO CNTLR O2,H2 TK1 (two) – op</td>
<td>C/W BACKUP C/W ALARM it – on</td>
<td>7 IFM procedure recovers C/W B system by providing pwr source, which bypasses failed ESS2CA O13&amp;R14 bus</td>
</tr>
<tr>
<td>(O2)</td>
<td>CRYO QTY O2,H2 TK1 (two) – op</td>
<td>Two of four bulbs in MA lts – inoperative</td>
<td>8 Inhibits Primary C/W for O2 and H2 Tk 1 Control Pressure</td>
</tr>
<tr>
<td>(O13:D)</td>
<td>cb ESS 2CA</td>
<td>CRYO O2,H2 Qty Tk1 Meter (two) – 0%</td>
<td>9 Disables AC2 Auto Trip. AC2 Voltage and OVLD C/W lost</td>
</tr>
<tr>
<td>(R14:F)</td>
<td>cb ESS 2CA</td>
<td></td>
<td>10 Switches and tbs still operate</td>
</tr>
</tbody>
</table>

### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

- (O13:C) cb ESS 2CA
- (O2) C/W B – op
- (O13:D) cb ESS 2CA
- (R14:F) cb ESS 2CA

### NOTES

- (Continued)
### EPS SSR-85

**BUS LOSS: ESS2CA ML86B**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| If Tk5 in use:  
(R1)  
• O2,H2 TK3 HTR A – AUTO  
• O2,H2 TK3 HTR B – OFF  
(A15)  
• O2,H2 TK5 HTR A,B  
(four) – OFF  
(R13U)  
• C/W PARAM SEL tw (three) – 040, 090  
• C/W PARAM – INH  
• MEM – CLEAR  
• C/W PARAM SEL tw (three) – > 119 | Cryo Tk5 O2,H2 Htrs if in Auto | MASTER ALARM  
Light/Tone – on  
(F7)  
C/W O2 PRESS lt  
C/W H2 PRESS lt  
(FSMs)  
S68 O2 CNTL P 5  
S68 H2 CNTL P 5 | (O2)  
CRYO O2,H2 QTY Tk5 = 0% |

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th></th>
</tr>
</thead>
</table>
| (ML86B:G) cb ESS 2CA  
• CRYO CNTLR O2,H2 TK5  
(two) – op  
• CRYO QTY O2,H2 TK5  
(two) – op | Cryo O2,H2 Tk5 Qty Xdcrs | |

**NOTES**

1 Inhibits Primary C/W for O2 and H2 Tk 5 Control Pressure
**Actions**

1. Perform FC3 SHUTDN (FC SHUTDN Cue Card)
   - O2,H2 MANF VLV TK1,2 (four) – OP
   - O2,H2 TK1,2 HTRS A (four) – AUTO
   - O2,H2 TK1,2 HTRS B (four) – OFF
   - O2,H2 TK3 HTRS A,B (four) – OFF

2. If GPC 3 dump reqd, attempt S/W dump in RUN

3. C/W PARAM SEL tw (three) – 020, 070
   - C/W PARAM – INH
   - C/W MEM – CLEAR
   - C/W PARAM SEL tw (three) – > 119

**Equip/Function Lost**

1. FC3 Controller and Pumps
   - Reac Vlv Cntl via pnl
   - R1 sw

2. Cryo Tk3 O2,H2 Htrs Auto ops
   - Cryo O2,H2 Tk4 Htr Auto ops if O2,H2 Tk3 Htrs A(B) in Auto

3. FC GPC Purge Seq Start sw

4. GPC Mode sw Halt Contacts for GPC 3 (pnl O6)

5. GPC Output sw Terminate capability for GPC 3 (pnl O6)

6. C/W O2 PRESS lt – on
   - C/W H2 PRESS lt – on
   - C/W FC REAC lt – on
   - C/W FC PUMP lt – on
   - SM ALERT lt/Tone – on

7. AC3 Snsr – op
   - GPC STAT – op

8. Emer Ltg capability (Middeck Floodlts 6, 7, 8, L/R Girshld Floodlts, QS Floodlt)

9. AC3 Bus Snsr
   - Computer Status Matrix (pnl O1) and CCIU

10. Emer Ltg capability (Middeck Floodlts 6, 7, 8, L/R Girshld Floodlts, QS Floodlt)

11. Cryo O2,H2 Tk3 Htrs Auto ops
   - Cryo O2,H2 Tk3 Qty Xdcrs

12. Cryo Tk2 Htr Snsr Test/Reset sw

13. GPC Purge Seq Start capability remains using TMBU or SM 60 constant. MCC will normally initiate auto purge via TMBU

**Crew Indications**

1. MASTER ALARM
   - Light/Tone – on

2. C/W O2 PRESS lt – on
   - C/W H2 PRESS lt – on
   - C/W FC REAC lt – on
   - C/W FC PUMP lt – on
   - SM ALERT lt/Tone – on

3. AC3 Snsr – op
   - GPC STAT – op

4. FC3 STRUCT RTN tb – OFF

5. SM 67 ELECTRIC
   - GPC status lts lost

6. GPC Purge Seq Start capability remains using TMBU or SM 60 constant. MCC will normally initiate auto purge via TMBU

7. GPC Purge Seq Start capability remains using TMBU or SM 60 constant. MCC will normally initiate auto purge via TMBU

**Notes**

1. FC3 must be shut down within 9 min to avoid potentially hazardous condition

2. FC/MN BUS C and MN BUS TIE C switches work, but lts are lost

3. Vlv holds position, but tb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains

4. Switch works, but tb lost

5. AC3 inverters and buses remain pwrd. INV PWR 3 and INV/AC BUS 3 switches and lts lost

6. GPC Purge Seq Start capability remains using TMBU or SM 60 constant. MCC will normally initiate auto purge via TMBU

7. Unable to HALT or terminate GPC, IPL GPC, or perform HISAM dump. Do not pwff-off GPC 3 since it must be transitioned thru HALT to force RUN state

8. FC3 Coolant Pump ΔP tb lost

9. Inhibits Primary C/W for O2 and H2 Tk 3 Control Pressure

10. Disables AC3 Auto Trip. AC3 Voltage and OVLV C/W lost

11. Lig pwr remains via individual lt sws
### EPS SSR-90 (Cont)
**BUS LOSS: ESS3AB DA3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Lost BFS select and BF engage capability to all GPCs</td>
<td></td>
<td>2 FC/MN BUS C and MN BUS TIE C switches work, but tbs are lost</td>
</tr>
<tr>
<td>13</td>
<td>FC3/PRIPL pwr-off capability via Spacelab Pwr-Kill Signal</td>
<td></td>
<td>12 Pressing Engage button will cause all PASS GNC GPCs to go to software halt</td>
</tr>
<tr>
<td>2</td>
<td>ESS pwr to FC/MN BUS C and MN BUS TIE C Pwr Contactor Cntl</td>
<td></td>
<td>13 MNB/PRIPL and MNC/PRIPL pwr-off capability of SL not affected FC3/PRIPL sw, pnl R1 not affected</td>
</tr>
<tr>
<td>14</td>
<td>APU 3 Fu Tk Vlv A</td>
<td></td>
<td>14 Vlv closes. Redundant vlv B remains</td>
</tr>
<tr>
<td>(OV103,4)</td>
<td>TACAN 3 Auto Self-Test</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

- **1** INV PWR 3 tb – OFF

### BUS ISOLATION

- **ONLY ON MCC CALL, PERFORM**
  - (C3) EMER LTG – OFF/ON
  - (ML18F) EMER LTG – ON/OFF

### NOTES

- 1 Inverters remain pwrd, but tb and sw lost
- 2 Ltg pwr remains via individual lt switches

---

### EPS SSR-91
**BUS LOSS: ESS3AB FP&LC3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>AC3 Inverters Input DC Pwr Cntl Emer Ltg capability (Middeck Floodlts 6,7,8, L,R</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glareshield Floodlts, OS Floodlt)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

- **(R1)** INV PWR 3 tb – OFF

### BUS ISOLATION

- **ONLY ON MCC CALL, PERFORM**
  - (C3) EMER LTG – OFF/ON
  - (ML18F) EMER LTG – ON/OFF

### NOTES

- 1 Inverters remain pwrd, but tb and sw lost
- 2 Ltg pwr remains via individual lt switches
### ACTIONS

1. Perform FC3 SHUTDN
2. FC3 Reac Vlv Cntl via pnl R1 sw

### EQUIP/FUNCTION LOST

1. FC3 Controller and Pumps
2. FC3 Reac Vlv Ctl via pnl R1 sw

### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

NONE

### CREW INDICATIONS

- MASTER ALARM Light/Tone – on
- C/W FC REAC lt – on
- C/W FC PUMP lt – on
- FC3 REAC (two) tb – CL
- FC3 RDY tb – bp
- FC3 COOL PUMP ΔP tb – bp
- FC3 REAC (two) tb – CL
- FC3 RDY tb – bp
- FC3 COOL PUMP ΔP tb – bp
- S69 FC PUMP 3
- S69 FC REAC 3
- S69 FC H2 PUMP 3

### NOTES

1. **TIME CRITICAL**
   - FC3 must be shut down within 9 min to avoid potentially hazardous condition
2. Vlv holds position, but tb and sw lost. Redundant Reac Vlv Close Cntl on pnl C3 remains
3. MNB/PRIPL and MNC/PRIPL pwr-off capability of SL not affected. FC3/PRIPL sw pnl R1 not affected
4. FC3 Coolant Pump ΔP tb lost
### ACTIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>• Perform FC3 SHUTDN (FC SHUTDN Cue Card)</td>
</tr>
<tr>
<td>3</td>
<td>• If GPC 3 dump reqd, attempt S/W dump in RUN</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FC3 Controller and Pumps</td>
</tr>
<tr>
<td>2</td>
<td>FC GPC Purge Seq Start sw</td>
</tr>
<tr>
<td>3</td>
<td>GPC Mode sw Halt Contact for GPC 3 (pnl O6)</td>
</tr>
<tr>
<td></td>
<td>GPC Output sw Terminate capability for GPC 3 (pnl O6)</td>
</tr>
</tbody>
</table>

### BUS ISOLATION

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(C3)</td>
<td>ONLY ON MCC CALL, PERFORM</td>
</tr>
<tr>
<td></td>
<td>(ML18F)</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MASTER ALARM</td>
<td>Light/Tone – on</td>
</tr>
<tr>
<td>C/W FC PUMP lt</td>
<td></td>
</tr>
<tr>
<td>FC3 RDY tb – bp</td>
<td>FC3 COOL PUMP ΔP tb – bp</td>
</tr>
<tr>
<td>GPC Mode sw Halt Contact for GPC 3 (pnl O6)</td>
<td></td>
</tr>
<tr>
<td>GPC Output sw Terminate capability for GPC 3 (pnl O6)</td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

1. **TIME CRITICAL**
   - FC3 must be shut down within 9 min to avoid potentially hazardous condition
2. GPC Purge Seq Start capability remains using TMBU or SM 60 constant. MCC will normally initiate auto purge via TMBU
3. Unable to HALT or terminate GPC, IPL GPC, or perform HISAM dump. Do not pwr-off GPC 3 since it must be transitioned thru HALT to force RUN state
4. FC3 Coolant Pump ΔP tbs lost
5. Ltg pwr remains via individual lt sws
6. Pressing the engage button will cause all PASS GNC GPCs to go to software halt
7. AC3 Inverters and Buses remain pwrd. INV PWR 3 and INV/AC BUS 3 switches lost and INV PWR 3 tb lost

---

**09/26/08**

**7-214**

**MAL/ALL/GEN J**
**EPS SSR-94**  
**BUS LOSS: ESS3AB O13**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>ESS pwr to FC/MN BUS C and MN BUS TIE C pwr Contractor Cntl</td>
<td>(R1) INV/AC BUS 3 tb – OFF</td>
<td>(1) Switches and tbs still operate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(O1) GPC status lts lost</td>
<td></td>
</tr>
<tr>
<td>BUS ISOLATION</td>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td>(2) AC1 Bus remains pwrd. INV/AC BUS 3 sw works but tb lost</td>
</tr>
<tr>
<td>(O13:E)</td>
<td>cb ESS 3AB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AC3 SNSR – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• GPC STAT – op</td>
<td></td>
<td></td>
<td>(3) Disables AC3 Auto Trip. AC3 Voltage and OVLD C/W lost</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R1)</td>
<td>Cryo Tk3 O2,H2 Htrs Auto op</td>
<td>MASTER ALARM</td>
<td>(1) Inhibits Primary C/W for O2 and H2 Tk 3 Control Pressure</td>
</tr>
<tr>
<td>(O2)</td>
<td>Cryo O2,H2 Tk4 Htr Auto ops if O2,H2 Tk3 Htrs A(B) in Auto</td>
<td>Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>(R13U)</td>
<td>C/W PARAM SEL tw (three) – 020, 070</td>
<td>(F7) C/W O2 PRESS lt</td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM – INH</td>
<td>Cryo Tk3 O2,H2 QTY TK3 METER (two) ind – 0%</td>
<td>C/W H2 PRESS lt</td>
<td></td>
</tr>
<tr>
<td>• MEM – CLEAR</td>
<td></td>
<td>(FSMs) S68 H2 CNTRL P 3</td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
<td></td>
<td>S68 O2 CNTRL P 3</td>
<td></td>
</tr>
</tbody>
</table>

**EPS SSR-95**  
**BUS LOSS: ESS3AB ML86B**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R1)</td>
<td>Cryo Tk3 O2,H2 Htrs Auto op</td>
<td>MASTER ALARM</td>
<td>(1) Inhibits Primary C/W for O2 and H2 Tk 3 Control Pressure</td>
</tr>
<tr>
<td>(O2)</td>
<td>Cryo O2,H2 Tk4 Htr Auto ops if O2,H2 Tk3 Htrs A(B) in Auto</td>
<td>Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>(R13U)</td>
<td>C/W PARAM SEL tw (three) – 020, 070</td>
<td>(F7) C/W O2 PRESS lt</td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM – INH</td>
<td>Cryo Tk3 O2,H2 QTY TK3 METER (two) ind – 0%</td>
<td>C/W H2 PRESS lt</td>
<td></td>
</tr>
<tr>
<td>• MEM – CLEAR</td>
<td></td>
<td>(FSMs) S68 H2 CNTRL P 3</td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
<td></td>
<td>S68 O2 CNTRL P 3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>ONLY ON MCC CALL, PERFORM</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(ML86B:G)</td>
<td>cb ESS 3AB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CRYO CNTLR O2,H2 TK3 (two) – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CRYO QTY O2,H2 TK3 (two) – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cryo O2,H2 Tk3 Qty Xdcrs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### ACTIONS

<table>
<thead>
<tr>
<th>(A12)</th>
<th>APU HTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GAS GEN/FUEL PUMP 1 – B AUTO</td>
</tr>
<tr>
<td>1</td>
<td>GAS GEN/FUEL PUMP 3 – A AUTO</td>
</tr>
<tr>
<td>1</td>
<td>LUBE OIL LINE 1 – B AUTO</td>
</tr>
<tr>
<td>1</td>
<td>APU HTR TK/FU LINE/H2O/</td>
</tr>
<tr>
<td>1</td>
<td>SYS 1A – OFF</td>
</tr>
<tr>
<td>1</td>
<td>1B – AUTO</td>
</tr>
<tr>
<td>1</td>
<td>3A – AUTO</td>
</tr>
<tr>
<td>1</td>
<td>3B – OFF</td>
</tr>
<tr>
<td>HYD HTR</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>ELEV A – OFF</td>
</tr>
<tr>
<td>1</td>
<td>B – AUTO</td>
</tr>
<tr>
<td>1</td>
<td>AFT FUS A – OFF</td>
</tr>
<tr>
<td>1</td>
<td>HYD CIRC PUMP</td>
</tr>
<tr>
<td>1</td>
<td>PWR 1 – MNB</td>
</tr>
<tr>
<td>1</td>
<td>3 – MNC</td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>(A12)</th>
<th>APU 1 GG/Fu Pump Htrs A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>APU 3 GG/Fu Pump Htrs B</td>
</tr>
<tr>
<td>1</td>
<td>APU 1 Lube Oil Line Htrs A</td>
</tr>
<tr>
<td>1</td>
<td>1Tx/Fu Ln Htrs A</td>
</tr>
<tr>
<td>1</td>
<td>APU 1,2 GG Inj H2O Htrs 4,5A</td>
</tr>
<tr>
<td>1</td>
<td>APU 3 Tx/Fu Ln Htrs B</td>
</tr>
<tr>
<td>1</td>
<td>Elevon Actr Htrs A</td>
</tr>
<tr>
<td>1</td>
<td>Aft Fuselage Htrs A</td>
</tr>
<tr>
<td>1</td>
<td>Circ Pump 1 MNA pwr 3 MNA pwr</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>CRT 1 blanks</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM ALERT Light/Tone – on</td>
</tr>
<tr>
<td>(FSMs)</td>
</tr>
<tr>
<td>S68 H2 MANF VLV</td>
</tr>
<tr>
<td>S68 O2 MANF VLV</td>
</tr>
<tr>
<td>S86 APU/HYD APU</td>
</tr>
<tr>
<td>SM0 THRM HYD</td>
</tr>
<tr>
<td>S67 CNTL BUS V</td>
</tr>
<tr>
<td>S69 FC REAC 1</td>
</tr>
</tbody>
</table>

### NOTES

1. **TIME CRITICAL**
   - If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
2. MSG occurs only if A AUTO (pnl R12U) selected for FC H2O Relief Htr
3. Pri B Man ON Sel capability remains. Pri A and Sec Cntrls remain
4. Viv holds position. Viv B remains
5. Do not reconfig for reg switch or I’CNCT procedures
6. Viv holds position
7. Viv normally closed
8. Pwr to MCA Drivers lost through ENABLE sw
### ACTIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>(C2)</td>
<td></td>
</tr>
<tr>
<td>• L IDP/CRT SEL – 3 On MCC GO:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• GPC/CRT 01 EXEC</td>
</tr>
<tr>
<td>(G2,G8,S2)</td>
<td></td>
</tr>
<tr>
<td>MMU ASSIGN</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 • GNC – ITEM 1 EXEC</td>
</tr>
<tr>
<td></td>
<td>• SM – ITEM 4 EXEC</td>
</tr>
<tr>
<td></td>
<td>• PL – ITEM 6 EXEC</td>
</tr>
<tr>
<td></td>
<td>• OPS 0 – ITEM 8 EXEC</td>
</tr>
<tr>
<td>(R11U)</td>
<td></td>
</tr>
<tr>
<td>FC H2O RELIEF HTR – B AUTO</td>
<td></td>
</tr>
<tr>
<td>FC H2O LINE HTR – B AUTO</td>
<td></td>
</tr>
</tbody>
</table>

**When reqd:**
- For FC1, perform FUEL CELL PURGE – AUTO (ORB OPS, EPS)

### EQUIP/FUNCTION LOST

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>(C2A2)</td>
<td></td>
</tr>
<tr>
<td>• MDU CRT 1 IPD 1</td>
<td></td>
</tr>
<tr>
<td>(O14)</td>
<td></td>
</tr>
<tr>
<td>• MMU 1</td>
<td></td>
</tr>
<tr>
<td>(R11U)</td>
<td></td>
</tr>
<tr>
<td>FC H2O Relief:</td>
<td></td>
</tr>
<tr>
<td>Vlv Htrs A</td>
<td></td>
</tr>
<tr>
<td>Vent Line Htrs A</td>
<td></td>
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<tr>
<td>Barrel Htrs A</td>
<td></td>
</tr>
<tr>
<td>Noz Htrs A</td>
<td></td>
</tr>
<tr>
<td>H2O Line Htrs A</td>
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</tr>
</tbody>
</table>

### CREW INDICATIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>7 Vlv normally closed</td>
</tr>
<tr>
<td></td>
<td>9 Loss of redundant port to the following:</td>
</tr>
<tr>
<td></td>
<td>• MDU CDR 1 (S)</td>
</tr>
<tr>
<td></td>
<td>• MDU CDR 2 (P)</td>
</tr>
<tr>
<td></td>
<td>• MDU MFD 2 (P)</td>
</tr>
<tr>
<td></td>
<td>• MDU PLT 1 (S)</td>
</tr>
<tr>
<td></td>
<td>10 Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning</td>
</tr>
<tr>
<td></td>
<td>11 Noz Htr A not wired; Noz Htr B still operates in A AUTO position. Other A Relief Htrs lost</td>
</tr>
<tr>
<td></td>
<td>12 Right Trim and Body Flap cntl remains. Left Trim and Body Flap cntl function is regained after the lost contacts have been deselected in OPS-8 (3,B)</td>
</tr>
<tr>
<td></td>
<td>13 B Htrs remain</td>
</tr>
<tr>
<td></td>
<td>14 Sys A Pri Cntr, Auto switchover to Sec Cntr remains</td>
</tr>
<tr>
<td></td>
<td>15 When SM not available, use NSP block to inhibit UL cmds. 'BCE STRG 1(3) NSP' annunciates and it requires GNC I/O RESET after UPLK – ENA for AOS</td>
</tr>
</tbody>
</table>

### NOTES

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</tbody>
</table>
### ACTIONS

If CCTV reqd:
- TV PWR CONTR UNIT – MNB

### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**
- MDU CRT 1 PWR – OFF
- IDP/CRT1 PWR – OFF
- MMU 1 – OFF
- TRIM RHC PNL – ENA
- PNL – OFF
- MPS FILL/DRAIN LH2 INBD – GND
- cb MNA TV CONTR UNIT – op
- FLOOD AFT STBD – OFF
- FLOOD FWD PORT – OFF
- FLOOD FWD BHD – OFF
- Prplt F/D Inbd LH2 Vlv Man OP cap
- PLB Floodlt: Aft Stbd Fwd Port Bldhd
- Man ON Cntl of Cryo Q2,H2 Tk1 Htrs B, Tk3 Htrs A Cryo Q2,H2 Tk1 Manf Vlv Cntl
- Port RMS: Fwd MRL Mtr 1 Mid MRL Mtr 1 Aft MRL Mtr 2
- STBD RMS: Fwd MRL Mtr 2 Mid MRL Mtr 1 Aft MRL Mtr 1
- AC1 PBM MMC 1 pwr to: Orbiter arm drive mtr (ODM mtr 1 – mate A, demate A, relax A) ODA mtr 1 latch/ release
- FC1 Reac Vlv Cntl via pnl R1 sw FC1 STOP capability via START/STOP sw (pnl R1)
- Ctr MPS He Isol A Man Cntl
- FC3 Redundant Reac Vlv Close Cntl
- Atm Press Cntl Q2 Sys 1 Sply Vlv Cntl
- Freon Loop 1,2 Cntrl B Rad Byp Vlv Mtrs Man Cntl

### CREW INDICATIONS

- Vlv holds position
- Loss of manual capability to inert LH2 Manf
- Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired
- Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
- Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
- Single mtr time
- Vlv holds position. FC1 Redundant Reac Vlv Close Cntl on pnl C3 remains
- Vlv holds position. Sys 2 remains
- Cntrls A,B Rad Byp Vlv Mtrs Auto Cntl and Cntlr A Rad Byp Vlv Mtr Man Cntl remain

### NOTES

- 6 Vlv holds position
- 16 Loss of manual capability to inert LH2 Manf
- 17 Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired
- 18 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
- 19 Single mtr time
- 20 Single mtr time
- 21 Vlv holds position. FC1 Redundant Reac Vlv Close Cntl on pnl C3 remains
- 22 Vlv holds position. Sys 2 remains
- 23 Cntrls A,B Rad Byp Vlv Mtrs Auto Cntl and Cntlr A Rad Byp Vlv Mtr Man Cntl remain
### BUS ISOLATION

| 24 | (O14) | RJDF 1B F1 Manf Logic sw pwr (F1F,F1L,F1U,F1D) |
| 26 | (F6A1) | L ADI Att Ref Set capability |
| 27 | (R13A2) | Rad Cntl Sys: |
|  |  | Port Lat 7-12 Mtr 1 |
|  |  | Dpy/Sto Mtr 1 |
|  |  | Stbd Lat 1-6 Mtr 1 |
|  |  | Dpy/Sto Mtr 2 |
| 28 | (F6A1) | L ADI Att Ref Set capability |
| 29 | (R2) | APU 1 Fu Tk Vlv A |
|  |  | Cntl Pwr Sply A |
|  | (F3) | EMU 1,2 Pwr/Batt chgr MNA pwr |
| 29 | (R4) | TVC Hyd Sys 1 Isol man Cntl |
|  |  | Hyd Brake Isol 1 man Cntl (F6A6,F8A5) |
|  |  | NLG Backup Rel and Ext Sys 2 |
|  |  | LMG, RMG Backup Rel Sys 2 |
| 30 | (C3A5) | L ADP Dpy Mtr 1 |
| 30 | (A6A1) | PL Reten Sys A Rel/Lat Mtrs |
| 31 | (FPC1/AW18H) | EMU 1,2 Pwr/Batt chgr MNA pwr |
| 32 | (O6) | -Y Star Trkr Dr Sys 1 OP/CL capability |
| 33 | (C3A1) | L OMS Arm 1, Arm/Press 1 sw Contacts |
| 34 | (A14) | 6 Ku-Band Temp Meas PA, Rcvr, A&B Gimbal, Rate Snsr, Ant Feed |
| 35 | (C3A1) | L OMS Eng Pr Vlv Coil 1, Cntl Vlv 1,2 Coils 1 |
| 36 | (R2) | ET Door Mtrs: |
|  |  | C/L Lat Actr 1 Mtr 1 man STO capability |
|  |  | C/L Lat Act 2 Mtr 1 man STO capability |
|  |  | L Dr Closure Mtr 1 man Cntl |
|  |  | L Dr Uplock Lat Mtr 2 man Cntl |
|  |  | R Dr Uplock Lat Mtr 2 man Cntl |

### EQUIP/FUNCTION LOST

| 24 | (F3) | NWS fail lt (for actuator pressure sw) |
| 25 | (O6) | -Y Star Trkr Dr Sys 1 OP/CL capability |
| 26 | (C3A5) | L ADP Dpy Mtr 1 |
| 27 | (C3A1) | L OMS Arm 1, Arm/Press 1 sw Contacts |

### CREW INDICATIONS

| 6 | Vlv holds position |
| 24 | NWS fail light still driven by miscompare logic feedback on rollout |
| 25 | Redundant mtrs remain |
| 26 | Vlv closes. Redundant vlv remains |
| 27 | Redundant pwr sply remains. GG Bed T and GBX P ind lost when APU running |
| 28 | Redundant RPC remains |
| 29 | Vlv holds position. GPC OP capability remains during entry |
| 30 | Loss of redundant hyd NLG deploy and NWS redundancy |
| 31 | Hyd Sys 1 still available for NWS |
| 32 | MNB pwr select capability remains |
| 33 | Mtr 2 remains |
| 34 | Htr Cntlr 2 remains |
| 35 | L OMS auto shutdown if Pc < 80% and '↓' on MNVR EXEC display |

### CAUTION

| 36 | No purge. Wait 10 min between burns |
| 37 | Redundant coils remain |
### ACTIONS

- **APU HTR**
  - **(A12)**
  - **GAS GEN/FUEL PUMP 1 – B AUTO**
  - **APU HTR TRK/FU LINE/H2O/2**
  - **SYS 1A – OFF**
  - **1B – AUTO**
  - **3A – AUTO**
  - **3B – OFF**

- **HYD HTR**
  - **(L1)**
  - **H2O LOOP 1 – B**
  - **FLASH EVAP CNTLR PRI A – ON (if reqd)**
  - **TOP EVAP HTR NOZ L – A AUTO**
  - **TOP EVAP HTR DUCT – B**

If Hi Load Evap enabled
- **(L2)**
- **FLASH EVAP Fdln HTR A SPLY – 2**

### EQUIP/FUNCTION LOST

- **(A12)**
- **APU 1 GG/Fu Pump Htrs A**
- **APU 1 Tk/Fu Ln Htrs A**
- **APU GG Inj H2O Tank Htrs 1A,2A**
- **APU 3 Tk/Fu Ln Htrs B**
- **Rud/Spd Brk Htr A**

- **(A2)**
- **GD/GT Htrs A**
- **HYD HTR**
  - **Rud/Spd Brk Htr B – AUTO**
  - **SYS 1B – AUTO**
  - **SYS 3A – AUTO**
  - **SYS 3B – OFF**

- **HYD HTR**
  - **Rud/Spd Brk Htr A**
  - **CIRC PUMP PWR 1 – MNB**

### CREW INDICATIONS

- **(F7)**
- **C/W RCS JET lt – on**
- **SM ALERT Light/Tone – on**

### NOTES

1. Indications do not appear until jet commanded

2. If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp

3. Pri B GPC Sel capability remains. Pri A and Sec Cntls remain

4. In OPS 2, FES GPC cmd is not present, but one may be sent if reqd

5. Vlv holds position. Isol B remains

6. Do not reconfig for reg switch or I’CNCT procedures

7. Vlv holds position

8. Pwr to MCA Drivers lost through ENABLE sw

9. Vlv holds position. GPC OP capability remains during entry
### ACTIONS

- **(R1)**
  - If TK1 in use:
    - O2,H2 TK1
    - HTR A (two) – AUTO
    - B (two) – OFF
  - If TK3 in use:
    - O2,H2 TK3 HTR
    - HTR A (two) – OFF
    - B (two) – AUTO

- **(R2)**
  - BLR CNTLR/HTR 1 – A

### EQUIP/FUNCTION LOST

- **(R1A2)**
  - Cryo O2,H2 Tk1 Manf Vlv Cntl
  - Cryo O2,H2 Tk1 Htrs B
  - Cryo O2,H2 Tk3 Htrs A

### CREW INDICATIONS

- **(R2)**
  - Hyd H2O Blr 1 Cntlr B

### NOTES

- **(R1)** Manf status not automatically declared closed. Jet fail-offs may occur
- **(R2)** Selecting failed MMU for GNC MF protects against GPC MMU Rcvr failure after OPS XTION prepositioning
- **(R3)** When SM unavailable, use NSP block to inhibit UL Cmds.
- **(R4)** ‘BCE STRING 1(3) NSP’ annunciates and it requires GNC I/O RESET after UPLK – ENA for AOS
- **(R5)** Vlv normally closed
- **(R6)** B Htrs remain

### GNC 23 RCS

- Override F1 Manf status to CL:
  - RCS FWD – ITEM 1 EXEC
  - MANF VLVS
  - 1 OVRD – ITEM 40 EXEC

### SM 1 DPS UTILITY

- **(G2,G8,S2)**
  - MMU ASSGN
- **(G1)**
  - GNC – ITEM 2 EXEC
  - SM – ITEM 3 EXEC
  - PL – ITEM 5 EXEC
  - OPS 0 – ITEM 7 EXEC

### Network Sig Proc

- Encryption Select – Bypass
- UPLK – NSP BLK

- When reqd:
  - Perform FC1 purges in AUTO mode (ORB OPS)

### SM 1 DPS UTILITY

- **(A1L)**
  - NSP ENCRYPTION
  - MODE – SEL
  - NSP ENCRYPTION
  - SEL – BYP

- **(A1U)**
  - SENSE – X
  - Wait at least 1 sec, then reposition as desired

- **(A1L)**
  - NSP ENCRYPTION
  - MODE – SEL
  - NSP ENCRYPTION
  - SEL – BYP

- **(A6A1)**
  - SENSE – X
  - Wait at least 1 sec, then reposition as desired

- **(A1A2)**
  - COMSEC 1,2 Key
### ACTIONS

If reqd during entry (< 120K ft):
- NH3 CNTLR A(B) – PRI/GPC

**BUS LOSS: CNTLAb2**

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>16</th>
<th>L1A2</th>
<th>NH3 Sys B Sec Cntlr man ON capability</th>
</tr>
</thead>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>7</th>
<th>Vlv holds position</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Sys B Pri Cntlr, Auto switchover to Sec Cntlr remain</td>
</tr>
<tr>
<td>17</td>
<td>Loss of manual capability to inert LH2 Manf</td>
</tr>
<tr>
<td>18</td>
<td>Six vlvls fail to non-isolation position</td>
</tr>
<tr>
<td>19</td>
<td>Vlv holds positions. FC1 Redundant Reac Vlv Close Cntlr on pnl C3 remains</td>
</tr>
<tr>
<td>20</td>
<td>FC1 can be stopped via FC1 CNTLR sw (O14:A)</td>
</tr>
<tr>
<td>21</td>
<td>Vlv holds position. Sys 2 remains</td>
</tr>
<tr>
<td>22</td>
<td>Redundant mtrls remain</td>
</tr>
<tr>
<td>23</td>
<td>Mtr 2 remains</td>
</tr>
<tr>
<td>24</td>
<td>Htr Cntlr 2 remains</td>
</tr>
</tbody>
</table>

### NOTES

- **WARNING**

Driver pwr to L5 jets lost if L5/F5/R5 Driver sw OFF (O16:F)
## BUS ISOLATION

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R2)</td>
<td>ET Door Mtrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>C/L Lat Actr 1 Mtr 2 man</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Stow capability</td>
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</tr>
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<td></td>
<td>Stow capability</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>L Dr Uplock Lat Mtr 2 man Cntl</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>R Dr Closure Mtr 2 man Cntl</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>R Dr Uplock Lat Mtr 2 man Cntl</td>
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<tr>
<td>(C3A1)</td>
<td>L OMS ARM 2, ARM/PRESS 2 sw Contacts</td>
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<td></td>
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<tr>
<td>26</td>
<td>L OMS Eng Pr Vlv Coil 2, Cntl Vlv 1,2 Coils 2</td>
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</tr>
<tr>
<td>(R2)</td>
<td>APU 2 Fu TK Vlv B</td>
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<td></td>
</tr>
<tr>
<td>28</td>
<td>Hyd Main Pump 1 Depress Solenoid RPC A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Hyd Main Pump 3 Depress Solenoid RPC B</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

- **22** Redundant mtrs remain
- **25** L OMS auto shutdown if Pc < 80% and ‘↓’ on MNVR EXEC display
- **27** Redundant coils remain
- **28** Vlv closes. Redundant vlv remains
- **29** Redundant RPC remains

### CAUTION
- No purge. Wait 10 min between burns
### Actions

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<tr>
<th>(A12)</th>
<th>APU HTR</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>GAS GEN/FUEL PUMP 1 - AUTO</td>
</tr>
<tr>
<td></td>
<td>LUBE OIL LINE 1 - AUTO</td>
</tr>
<tr>
<td></td>
<td>SYS 1A - OFF</td>
</tr>
<tr>
<td>1</td>
<td>1B - AUTO</td>
</tr>
<tr>
<td>1</td>
<td>3A - AUTO</td>
</tr>
<tr>
<td>1</td>
<td>3B - OFF</td>
</tr>
</tbody>
</table>

- HYD HTR
  - BDY FLP A - OFF
  - B - AUTO
  - CIRC PUMP PWR 1 - MNA

- (R2)
  - BLR CNTRL/HTR 1,3 (two) - B

- (A14)
  - RCS/OMS HTR
  - OMS CRSF LINE - A OFF, B AUTO

- (L1)
  - H2O PUMP LOOP 1 - B
  - TOP EVAP HTR DUCT - B

- If Hi Load Evap enabled:
  - HI LOAD DUCT HTR - B(C)

- Refer to OMS/RCS Slide Rule for vlv loss info

- (MA73C:C,D)
  - cb MCA PWR AC1 3Φ
  - MID 1,3 (two) - op

- For PLBD ops:
  - OP/CL Drs in man mode

Do not perform if AB1,2,3 unpwr at same time:

- GNC 23 RCS
  - Override F1 Manf status to OP:
    - RCS FWD - ITEM 1 EXEC
    - MANF VLVS 1 OVRD - ITEM 40 EXEC

- PLT RHC pb - push, if BFS engage reqd

### Equip/Function Lost

<table>
<thead>
<tr>
<th>(A12)</th>
<th>APU 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GG/Fu Pump Htrs B 1</td>
</tr>
<tr>
<td></td>
<td>Lube Oil Line Htrs B 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(A14)</th>
<th>OMS Crsfd Ln Htrs A</th>
</tr>
</thead>
</table>

| (L1A2) | H2O Loop 1 Pump A
|--------|-------------------|
|        | Top Evap Duct Fwd,Aft Htrs A

<table>
<thead>
<tr>
<th>(R2)</th>
<th>Hyd H2O BLR 1,3 Cntrl A</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>(MA73C)</th>
<th>Port,Stbd Rad Lat 1-6,7-12 Mtrs 1 Limit sw</th>
</tr>
</thead>
</table>

| (MA73C) | PLBD; C/L Lat 1-4,5-8,9-12 Mtrs 1
|--------|-----------------------------------|
|        | Port,Stbd Fwd Blkhd Mtrs 1
|        | Port Aft Blkhd Mtr 1
|        | Stbd Door Mtr 1
|        | Port Door Mtr 2 CL Limit sw

### Crew Indications

- SM ALERT Light/Tone - on
  - 'S67 CNTL/ESS V'
  - 'S88 THERMAL FRN'

- (FSM)
  - RM DLMA MANF

- (L1)
  - FLOW PROP VLV LOOP 1 tb - bp

- (O8)
  - FWD RCS
  - TK ISOL 3/4/5 tb - bp

- (R13L)
  - RAD CNTL STBD tb - bp
  - PORT tb - bp

- SM 67 ELECTRIC
  - CNTL AB3 Volts < 20

- LADP deploy time incr from 15 to 30 sec

- (F7)
  - If APUs active and using H2O BLR CNTRL/HTR 1A or 3A:
    - C/W APU TEMP lt – on after ~2 min

- (Continued)

### Notes

- TIME CRITICAL:
  - If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
  - Freon Loop 1

- Freon Loop 1

- Flow Prop Vlv operation not affected

- Vlv holds position

- Vlv holds position

- GPC OP capability remains. Isol B remains. Auto Overpress protection lost on R RCS A reg
**EPS SSR-102 (Cont)**

**BUS LOSS: CNTLAB3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>If AB 1,2,3 unpwrd at same time: (A1A2) COMSEC 1,2 Key</td>
</tr>
<tr>
<td></td>
<td>NSP ENCRYPTION MODE – SEL NSP ENCRYPTION SEL – BYP</td>
</tr>
<tr>
<td></td>
<td>STAR TRKR DR POS - Y OP/CL time incr from 8 to 16 sec</td>
</tr>
<tr>
<td></td>
<td>If H2O PUMP LOOP1,A ON: C/W H2O LOOP lt – on</td>
</tr>
<tr>
<td></td>
<td>‘S88 H2O PUMP P1’ ‘S88 H2O LOOP 1 FLOW’</td>
</tr>
<tr>
<td></td>
<td>‘S88 H2O LOOP 1 TEMP’ (O1) H2O PUMP OUT PRESS LOOP 1 ind – 20-25 psia</td>
</tr>
<tr>
<td></td>
<td>No SM GPC or LOS: (C3) UPLK – NSP BLK</td>
</tr>
<tr>
<td></td>
<td>When SM not available, use NSP block to inhibit UL cmdns. BCE STRG 1(3) NSP annunciates and it requires GNC I/O RESET after UPLK – ENA for AOS</td>
</tr>
<tr>
<td></td>
<td>Lose Hyd deploy capability for all Ldg Grs. Pyro backup release sys will deploy Ldg Grs. NLG can also be deployed by Hyd Sys 2</td>
</tr>
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<td></td>
<td>Lose Hyd deploy capability for all Ldg Grs. NLG can also be deployed by Hyd Sys 2</td>
</tr>
<tr>
<td></td>
<td>Fwd Pnl Trans X,Y Norm, Pulse, and Fwd Pnl Roll, Pitch, Yaw Disc Rate, Pulse, Select capability</td>
</tr>
<tr>
<td></td>
<td>Fwd Pnl Trans Z High, Norm, Pulse Sel capability</td>
</tr>
<tr>
<td></td>
<td>Fwd Pnl Trans Low Z Sel capability</td>
</tr>
<tr>
<td></td>
<td>Fwd Pnl PRI,ALT,VERN Sel capability</td>
</tr>
<tr>
<td></td>
<td>Fwd Pnl PCT Exec capability</td>
</tr>
<tr>
<td></td>
<td>MPS Inbd LH2 Prplt Vlv man Cntl</td>
</tr>
<tr>
<td></td>
<td>MPS Pneu He Isol 1 man Cntl R MPS He Isol B man Cntl</td>
</tr>
<tr>
<td></td>
<td>ET Door Mtrs: C/L Lat Actr 1 Mtr 1 GPC Cntl C/L Lat Actr 2 Mtr 1 GPC Cntl L Dr Closure Mtr 1 GPC CL capability L Dr Uplock Lat Mtr 1 GPC Lat capability</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

**ONLY ON MCC CALL, PERFORM**

**CREW INDICATIONS**

| STAR TRKR DR POS - Y OP/CL time incr from 8 to 16 sec |
| No SM GPC or LOS: (C3) UPLK – NSP BLK |

**NOTES**

- When SM not available, use NSP block to inhibit UL cmdns. BCE STRG 1(3) NSP annunciates and it requires GNC I/O RESET after UPLK – ENA for AOS
- Lose Hyd deploy capability for all Ldg Grs. Pyro backup release sys will deploy Ldg Grs. NLG can also be deployed by Hyd Sys 2
- Fwd Pnl Trans X,Y Norm, Pulse, and Fwd Pnl Roll, Pitch, Yaw Disc Rate, Pulse, Select capability
- Fwd Pnl Trans Z High, Norm, Pulse Sel capability
- Fwd Pnl Trans Low Z Sel capability
- Fwd Pnl PRI,ALT,VERN Sel capability
- Fwd Pnl PCT Exec capability
- MPS Inbd LH2 Prplt Vlv man Cntl
- MPS Pneu He Isol 1 man Cntl R MPS He Isol B man Cntl
- ET Door Mtrs: C/L Lat Actr 1 Mtr 1 GPC Cntl C/L Lat Actr 2 Mtr 1 GPC Cntl L Dr Closure Mtr 1 GPC CL capability L Dr Uplock Lat Mtr 1 GPC Lat capability

09/26/08 7-225 MAL/ALL/GEN J
## BUS LOSS: CNTLAB3

### ACTIONS

<table>
<thead>
<tr>
<th>Equip/Function Lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C) AC pwr removal capability via Limit sw for ET Door Mtrs: C/L Lat Actr 1 Mtr 1 2 Mtr 1 L Dr Closure Mtr 1 Uplock Lat Mtr 1</td>
</tr>
<tr>
<td>Port RMS: Mid MRL Mtr 1 Aft MRL Mtr 2</td>
</tr>
<tr>
<td>STBD RMS: Fwd MRL Mtr 2 Aft MRL Mtr 1</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

<table>
<thead>
<tr>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists.</td>
</tr>
<tr>
<td>17 Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists.</td>
</tr>
</tbody>
</table>
## EQUIP/FUNCTION LOST

| ACTIONS |
|---|---|
| (A12) | APU 1 GG/Fu Pump Htrs B |
| (A12) | APU 2 GG/Fu Pump Htrs A |
| (A12) | APU 1 1.2 GG Inj H2O Htrs 4B,5B |
| (A12) | APU 2 Lube Oil Line Htrs A |
| (A12) | Body Flap Htr B |
| (A12) | MNB Circ Pump 1 pwr |
| (A12) | MNB Circ Pump 2 pwr |
| (A1) | S-BD PM Sys 1: |
| (A1) | Xpndr 1 |
| (A1) | Pre-Amp 1 |
| (A1) | Pwr 1 |
| (A1) | PM Ant 1 |
| (A1) | FM Ant 1 |
| (A1) | NSP 1/COMSEC 1 |
| (A1) | S-BD PL INTRG 1 |
| (A1) | PSP 1 |
| (A1A2) | S-BD PM Sys 1: |
| (A1A2) | Xpndr 1 |
| (A1A2) | Pre-Amp 1 |
| (A1A2) | Pwr 1 |
| (A1A2) | PM Ant 1 |
| (A1A2) | FM Ant 1 |
| (A1A3) | S-BD FM Sys 1 |

## CREW INDICATIONS

| CREW INDICATIONS |
|---|---|
| MASTER ALARM | Light/Tone – on |
| SM ALERT Light/Tone – on |
| SM 67 ELECTRIC | CNTL BC1 Volts < 20 |
| C/W RCS JET lt – on |
| SM 67 ELECTRIC | APU 1 Tk/Fu Ln Htr B |
| APU 1.2 GG Inj H2O Htrs 4B,5B |
| APU 2 Tk/Fu Line Htr A |
| Body Flap Htr B |
| MNB Circ Pump 1 pwr |
| MNB Circ Pump 2 pwr |
| SM (BFS,SM) 86 APU/HYD | APU 1 SPEED % Ind – 0 |
| CCTV Video and Annun is lost if MNB selected for VCU |
| PLB Floodlts lost: |
| Fwd Stbd |
| Mid Port |

## NOTES

<table>
<thead>
<tr>
<th>NOTES</th>
<th>TIME CRITICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</td>
<td></td>
</tr>
<tr>
<td>Indications do not appear until jet commanded</td>
<td></td>
</tr>
<tr>
<td>FSM caused by antenna miscompare</td>
<td></td>
</tr>
<tr>
<td>REACQ and PSP reconfig procedures are flight specific. If reqd, procedures can be found in payload or ISS specific books</td>
<td></td>
</tr>
<tr>
<td>OIU 2 interfaces with PSP 2 for commanding</td>
<td></td>
</tr>
<tr>
<td>Pwr to MCA Drivers lost through ENABLE sw</td>
<td></td>
</tr>
</tbody>
</table>
### Actions

<table>
<thead>
<tr>
<th>(O8)</th>
<th>(O8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>If Straight feed config, Right OMS Crossfeed A – OP (tb-OP). Otherwise, *MCC</td>
<td></td>
</tr>
<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info Reconfig following vlv(s) only if leak isolation reqd:</td>
<td></td>
</tr>
<tr>
<td>AFT R RCS He PRESS B</td>
<td></td>
</tr>
<tr>
<td>L OMS XFEED B</td>
<td></td>
</tr>
<tr>
<td>R OMS XFEED B</td>
<td></td>
</tr>
<tr>
<td>FWD RCS He PRESS B</td>
<td></td>
</tr>
</tbody>
</table>

If BC1,2,3 unpwrd at same time:

#### GNC 23 RCS

Override F2 Manf status to CL:
- RCS FWD – ITEM 1 EXEC
- MANF VLVS 2 OVRD – ITEM 41 EXEC

For attitude control, perform RCS LOSS OF VERNIERS (ORB OPS)

#### RCS/OMS HTR

- RCS/OMS HTR
- FWD RCS – A AUTO
- L POD (two) – A AUTO, B OFF
- R POD (two) – A OFF, B AUTO

#### FC H2O

- LINE HTR – A AUTO
- RELIEF HTR – A AUTO

When reqd:
- For FC2, perform FUEL CELL PURGE – AUTO (ORB OPS, EPS)

Prior to using L(R) OMS:

<table>
<thead>
<tr>
<th>(O8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L, R OMS He PRESS/VAP</td>
</tr>
<tr>
<td>ISOL A (two) – OP, then</td>
</tr>
<tr>
<td>- GPC</td>
</tr>
<tr>
<td>B (two) – GPC</td>
</tr>
</tbody>
</table>

If CCTV reqd:

<table>
<thead>
<tr>
<th>(A7U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV PWR CONTR UNIT – MNA</td>
</tr>
</tbody>
</table>

#### CREW INDICATIONS

<table>
<thead>
<tr>
<th>(A14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aft RCS L,R Jet 1 Htrs</td>
</tr>
</tbody>
</table>

When reqd:
- For FC2, perform FUEL CELL PURGE – AUTO (ORB OPS, EPS)

### Equp/FunctiOn LOST

<table>
<thead>
<tr>
<th>(O8)</th>
<th>(O8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMS Eng/Xfeed Vlv Redundancy</td>
<td></td>
</tr>
<tr>
<td>F,R,RCS He Press Isol B man CL capability</td>
<td></td>
</tr>
<tr>
<td>L OMS Tk Isol B man CL capability</td>
<td></td>
</tr>
<tr>
<td>L,R OMS Xfeed Vlv B man CL capability</td>
<td></td>
</tr>
</tbody>
</table>

### Notes

- Maintains deorbit capability for MNC DA3 failure
- Vlv holds position. Man OP and full GPC cntl remains
- Do not reconfig for reg switch or ICNCT procedures
- Manf status not automatically declared closed. Fail-offs will occur when jet commanded
- NOZ Htr A not wired
- Vlv normally closed. GPC cntl remains. Man override of GPC OP CMD is lost

(Continued)
## EPS SSR-103 (Cont)

### BUS LOSS: CNTLBC1

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| **If EMU(s) in battery charge mode:**  
(AW18H)  
• PWR/BATT CHGR EMU 1(2) BUS SEL – MNA | (FPC2/AW18H)  
EMU 1.2 Pwr/Batt Chgr MNB pwr | | |
| **During OPS 8:**  
**[GNC 43 CONTROLLERS]**  
Deselect L Pnl Trim L2:  
• DES PNL TRIM L2 – ITEM 37 EXEC  
Deselect L Bdy Flp UP/DN L2:  
• DES BDY FLP L2 – ITEM 20 EXEC | (F6A7)  
L Trim RHC – INH capability  
(L2A1)  
L Bdy Flp Cntl | | |
| For SSME Hyd Repress:  
(R4)  
• HYD MPS/TVC ISOL VLV SYS 1.3 (two) – OP  
• Wait 10 sec, then CL | (R4)  
MPS/TVC Hyd Sys 2 Isol man Cntl | | |
| **BUS ISOLATION**  
**ONLY ON MCC CALL,**  
**PERFORM** | | | |
| (F3)  
• TRIM RHC – ENA  
• PNL – OFF | | | |
| (R4)  
MPS  
• FILL/DRAIN LO2 INBD – GND  
• FILL/DRAIN LH2 OUTBD – GND | (R4)  
Prplt F/D Inbd LO2 Vlv man OP capability  
Prplt F/D Outbd LH2 Vlv man Cntl | | |
| (O15:A)  
• RGA 2 – OFF | (O15)  
RGA 2 | | |
| (R14:D)  
cb MNB  
• TV CONTR UNIT – op | (OV103.4)  
GPS 2 | | |
| (A13)  
• (OV103.4) GPS PWR – OFF  
• (OV103.4) GPS PRE AMPL UPPER – OFF  
• (OV103.4) GPS PRE AMPL LOWER – OFF | | | |
| (A7U)  
PL BAY FLOOD  
• MID PORT – OFF  
• FWD STBD – OFF | (A7A1)  
PLB Mid Port Floodlt  
Fwd Stbd Floodlt | | |
| (R1A2)  
Cryo O2,H2 Tk2,4 Htrs A man On Cntl  
Cryo O2,H2 Tk2 Manf Vlv Cntl | | | |
| (R2)  
R MPS He isol B man Cntl | (A15)  
Cryo O2,H2 Tk5 Htr B man On Cntl | | |
| (R1A2)  
FC2 Reac Vlv Cntl via pnl R1 sw  
FC2 Stop capability via START/STOP sw (pnl R1) | (C3)  
FC1 Redundant Reac Vlv Cntl | | |
| (L1A2)  
Freon Loop 1 Cntl A Rad Byp Vlv Mtr man Cntl | | | |

(Continued)
### BUS ISOLATION

<table>
<thead>
<tr>
<th>BUS LOSS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2A1</td>
<td>Atm Press Cntl O2 Sys 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sply Vlv Cntl</td>
<td></td>
</tr>
<tr>
<td>F8</td>
<td>R HUD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rt ADI Alt Ref Set capability</td>
<td></td>
</tr>
<tr>
<td>C3A5</td>
<td>L/R AOP Dpy Mtrs 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Probe Htr Cntlr 2</td>
<td></td>
</tr>
<tr>
<td>ABL</td>
<td>Port RMS:</td>
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</tr>
<tr>
<td></td>
<td>MPM Mtr 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fwd MRL Mtr 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mid MRL Mtr 2</td>
<td></td>
</tr>
<tr>
<td>STBD</td>
<td>MPM Mtr 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mid MRL Mtr 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alt MRL Mtr 2</td>
<td></td>
</tr>
<tr>
<td>ROEU</td>
<td>AC2 pwr to:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Orbitr arm drive mtr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ODM mtr 2 – mate B, demate B, relax B)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ODA mtr 2 latch/ release</td>
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</tr>
<tr>
<td></td>
<td>(O6)</td>
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</tr>
<tr>
<td></td>
<td>-Y Star Trkr Dr Sys 2 CL capability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Z Star Trkr Dr Sys 1 OP/CL capability</td>
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<tr>
<td></td>
<td>(O15)</td>
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<tr>
<td></td>
<td>RJDF 1A F2 Manf Logic pwr</td>
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</tr>
<tr>
<td></td>
<td>(F2F,F2R,F2U,F2D)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(R2)</td>
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</tr>
<tr>
<td></td>
<td>APU 1 Cntlr Pwr Sply B</td>
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<tr>
<td></td>
<td>Hyd Main Pump 2 Depress Solenoid RPC A</td>
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</tr>
<tr>
<td></td>
<td>Hyd Main Pump 1 Depress Solenoid RPC B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>APU 1 Fu Tx Vlv B</td>
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</tr>
<tr>
<td></td>
<td>(F6A5,F8A5)</td>
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</tr>
<tr>
<td></td>
<td>NLG Ext 2 Fire 1, Fire 2 NLG,LMG,RMG Bkup Rel 2 Fire 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(R4)</td>
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<tr>
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<td>LG Extend Vlv 2</td>
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<td></td>
<td>NWS Hyd Sys 2</td>
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<tr>
<td></td>
<td>(R13A2)</td>
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<tr>
<td></td>
<td>Rad Cntl sys:</td>
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</tr>
<tr>
<td></td>
<td>Stbd Rad Lat 1-6 Mtr 2 Dpy/Sto Mtr 1</td>
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</tr>
<tr>
<td></td>
<td>Port Rad Lat 1-6 Mtr 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(R13A2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PL Relen Sys B Rad/Lat Mtrs Ku Ant Sto/Dpy Mtr 2</td>
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</tr>
<tr>
<td></td>
<td>Direct Stow Mtr 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Redundant Stow Initiate Signal to Ku-Band</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(F2,F3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CDR Dpy Fire 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jett Fire 2</td>
<td></td>
</tr>
</tbody>
</table>

#### CREW INDICATIONS

- Vlv holds position. Sys 1 remains
- Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
- Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
- Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
- Redundant pwr sply remains. Turbine speed ind lost
- Redundant RPC remains
- Vlv closes. Redundant vlv A remains
- Loss of redundant hyd NLG deploy and NWS redundancy
- Hyd Sys 1 still available for NWS
- Vlv holds position. GPC cntl remains. Loss of redundant hyd NLG deploy and NWS redundancy if failed closed
- Mtr 1 remains
- Redundant stow initiate sig (CNTL CA1) to Ku-Band remains
- Pit Dpy/Jett remains
### Actions

<table>
<thead>
<tr>
<th>[A1L]</th>
<th>S-BD PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ANT SW ELEC – 1</td>
</tr>
<tr>
<td>1</td>
<td>XPNDR – 1</td>
</tr>
<tr>
<td>1</td>
<td>PWR AMP OPER – 1</td>
</tr>
<tr>
<td>1</td>
<td>PRE AMP – 1</td>
</tr>
<tr>
<td>1</td>
<td>PWR – 1</td>
</tr>
<tr>
<td>If PSP and/or INTRG reqd for PL or ISS ops:</td>
<td></td>
</tr>
<tr>
<td>S-BD PL PWR SYS – 1</td>
<td></td>
</tr>
<tr>
<td>CNTL – PNL</td>
<td></td>
</tr>
<tr>
<td>CMD</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Reconfig PSP</td>
</tr>
<tr>
<td>3</td>
<td>Perform PL INTRG REACQ</td>
</tr>
</tbody>
</table>

### Equip/Function Lost

<table>
<thead>
<tr>
<th>[A1A2]</th>
<th>S-BD PM Sys 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xpnrd 2</td>
<td></td>
</tr>
<tr>
<td>Pre Amp 2, Pwr Amp 2</td>
<td></td>
</tr>
<tr>
<td>PM and FM Ant sw 2</td>
<td></td>
</tr>
<tr>
<td>NSP 2/COM SEC 2</td>
<td></td>
</tr>
<tr>
<td>S-BD PL Intrg 2</td>
<td></td>
</tr>
<tr>
<td>PSP 2</td>
<td></td>
</tr>
</tbody>
</table>

### CREW Indications

<table>
<thead>
<tr>
<th>All S-BD A/G voice lost if sys 2 selected</th>
<th>CRT 2 blanks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCS JET C/W lt – on</td>
<td>SM ALERT Light/Tone – on</td>
</tr>
<tr>
<td>S88 APU/HYD W/B</td>
<td>SM0 THR M HYD</td>
</tr>
<tr>
<td>BCE STRG 3 NSP (if using NSP 2)</td>
<td></td>
</tr>
<tr>
<td>S67 CNTL/ESS V</td>
<td>DISPLAY SW R</td>
</tr>
<tr>
<td>F.L.R RCS (F.R.L.U.D) JET I/O ERROR CRT2</td>
<td></td>
</tr>
</tbody>
</table>

### Crew Indications

<table>
<thead>
<tr>
<th>SM 67 ELECTRIC</th>
</tr>
</thead>
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<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info</td>
</tr>
<tr>
<td>Reconfig following vlv(s) only if leak isolation reqd:</td>
</tr>
<tr>
<td>(R8)</td>
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<tr>
<td></td>
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<tr>
<td>(R1) If Tk2 in use:</td>
</tr>
<tr>
<td>O2, H2 TK2</td>
</tr>
<tr>
<td>HTR A (two) – OFF</td>
</tr>
<tr>
<td>B (two) – AUTO</td>
</tr>
<tr>
<td>(R1A2)</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>(A11) If Tk4 in use:</td>
</tr>
<tr>
<td>O2, H2 TK4</td>
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<tr>
<td>HTR A (two) – OFF</td>
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<td>(R2)</td>
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<tr>
<td>(R2A)</td>
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<td>(A11)</td>
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<tr>
<td>override F2 Manf status to</td>
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<tr>
<td>CL:</td>
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<tr>
<td>ITEM 1, 41 EXEC</td>
</tr>
<tr>
<td>(C3)</td>
</tr>
<tr>
<td>FC1 Redundant Reac Vlv</td>
</tr>
<tr>
<td>Close Cntl</td>
</tr>
<tr>
<td>(C3A5)</td>
</tr>
<tr>
<td>Uplink switch GPC Block of UL Cmd capability</td>
</tr>
<tr>
<td>(F8)</td>
</tr>
<tr>
<td>AIR DATA – NAV</td>
</tr>
<tr>
<td>ADI ATT – LVLH</td>
</tr>
<tr>
<td>ERR – MED</td>
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<tr>
<td>RATE – MED</td>
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<tr>
<td>HSI SEL MODE – ENTRY</td>
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<tr>
<td>HSI SEL SOURCE (two) – NAV 3</td>
</tr>
<tr>
<td>RADAR ALTM – 1</td>
</tr>
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<th>NOTES</th>
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| When reqd:  
  • For FC2, perform FUEL CELL PURGE – AUTO (ORB OPS, EPS) | (R11U)  
  FC2 Purge Vlv man Cntl | | |
| (A6U)  
  If SENSE – -Z:  
  • SENSE – -X  
  • Wait 1 sec, reposition as desired | (A6A1)  
  3-Level sw RM for -X Sense | | |
| During OPS 8:  
  GNC 43 CONTROLLER  
  Diesel R Pnl Trim R2:  
  • DES PNL TRIM R2 ITEM 39 EXEC  
  Diesel R Bdy Flp up/dn R2:  
  • DES BDY FLP UP/DN R2 ITEM 22 EXEC | (F8)  
  R Trim RHC INH capability  
  (C3A1)  
  R Trim Pnl ON capability  
  (R4)  
  MPS/TVC Hyd Sys 2 Isol man Cntl | | |
| For SSME Hyd Repress:  
  (R4)  
  HYD MPS/TVC ISOL VLV SY 1,3 – OP, wait 10 sec, then CL | (L1)  
  NH3 CNTLR A – PRI/GPC  
  If reqd for Post Rollout:  
  (L1)  
  NH3 CNTLR B – SEC/ON | | |
| If NH3 CNTLR A/B – SEC/ON reqd, then:  
  (L1)  
  H2O PUMP  
  • LOOP 1 (two) – ON, A(B)  
  • LOOP 2 – ON  
  • iFLOW PROP VLV LOOP (two) – ICH  
  • Activate PL H2O loop(s) (if applicable) | (L1A2)  
  NH3 SYS B Pri Cntlr and Auto Swover to Sec Cntlr | | |
| (A14)  
  RCS/OMS HTR  
  • FWD RCS – A AUTO  
  • L POD (two) – A AUTO, B OFF  
  • R POD (two) – A OFF, B AUTO | (A14)  
  Fwd RCS B Htrs (all)  
  (L2)  
  L Pod B Htrs (partial)  
  (R2)  
  L MPS He Intercon Vlv man Cntl | | |
| BUS ISOLATION  
  ONLY ON MCC CALL, PERFORM  
  • MDU CRT 2 PWR – OFF  
  (C2)  
  IDP/CRT2 PWR – OFF  
  (F3)  
  R TRIM RHC/PNL – ENA  
  • PNL – OFF  
  (R2)  
  MPS He I’CNECT L – GPC  
  (R4)  
  MPS FILL/DRAIN LO2 INBD – GND | (R2)  
  L MPS He Intercon Vlv man Cntl  
  (R4)  
  MPS Prplt F/D Inbd LO2 Vlv man OP capability | | |

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<td>C MPS He Isol B man Cntl</td>
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<td>R ADI Att Ref set capability</td>
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<tr>
<td>29</td>
<td>-Z Star Trkr Dr Sys 1 CL capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(F6A5, F8A5)</td>
<td>NLG Bkup Release,Extension Sys 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>LMG, RMG Bkup Release Sys 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>NWS Hyd Sys 2</td>
<td></td>
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<tr>
<td>33</td>
<td>LG Extend Vlv 2</td>
<td></td>
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<tr>
<td>(R13A2)</td>
<td>PL Reten Sys B Rel/Lat Mtrs</td>
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<tr>
<td>(R13A2)</td>
<td>Ku Ant Sto/Dpy Mtr 2 Direct Sto Mtr 2</td>
<td></td>
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<tr>
<td>(R2)</td>
<td>APU 2 Cntr pwr Sply A APU 2 GBX GN2 Repress Vlv</td>
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<tr>
<td>35</td>
<td>Hyd Main Pump 2 Depress Solenoid RPC A</td>
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<tr>
<td>36</td>
<td>Hyd Main Pump 1 Depress Solenoid RPC B</td>
<td></td>
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<tr>
<td>(ABL)</td>
<td>Port RMS: MPM Mtr 2</td>
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<td></td>
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<tr>
<td>37</td>
<td>Fwd MRL Mtr 1</td>
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<td></td>
</tr>
<tr>
<td>38</td>
<td>Mid MRL Mtr 2</td>
<td></td>
<td></td>
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<tr>
<td>37</td>
<td>STBD RMS: MPM Mtr 1</td>
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</tr>
<tr>
<td>39</td>
<td>Mid MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Aft MRL Mtr 2</td>
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</table>

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<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(O17)</td>
<td>Freon Loop 1 Cold Plate Flow Xdcr Aft PL MNB current Xdcr</td>
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<tr>
<td>(R2)</td>
<td>APU 2 Fu Tk Vlv B</td>
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<tr>
<td>40</td>
<td></td>
<td></td>
<td>40 Vlv closes. Redundant Vlv A remains</td>
</tr>
<tr>
<td>41</td>
<td></td>
<td></td>
<td>41 PLT Dpy/Jett remains</td>
</tr>
<tr>
<td>41</td>
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</tbody>
</table>
### EPS SSR-105
**BUS LOSS: CNTLBC3**

**NOTES**

1. **TIME CRITICAL:**
   - If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp

2. Viv holds position

3. In OPS 2, FES GPC cmd is not present, but one may be sent if reqd

4. Sec Cntlr On sel capability remains. Pri A,B Cntlr remains

5. If AC2 cbs not opened, Lat Mtrs 2 of actuators for Port,Stbd Rad Lat 1-6 continue to run until Sys B Lat Cntlr sw placed to OFF. Other equip pwrd by AC2 MMC2 and AC2 MMC4 lost because of MNB MMC2 and MNB MMC4 loss

6. Sys A Sec Cntlr man On capability remains

---

** ACTIONS **

<table>
<thead>
<tr>
<th>1</th>
<th>APU HTR</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>GAS GEN/FUEL PUMP 2 – A AUTO</td>
</tr>
<tr>
<td>1</td>
<td>LUBE OIL LINE 2 – A AUTO</td>
</tr>
<tr>
<td>1</td>
<td>APU HTR TK/FU LINE/H2O</td>
</tr>
<tr>
<td>1</td>
<td>SYS 1A – AUTO</td>
</tr>
<tr>
<td>1</td>
<td>1B – OFF</td>
</tr>
<tr>
<td>1</td>
<td>2A – OFF</td>
</tr>
<tr>
<td>1</td>
<td>2B – AUTO</td>
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** EQUIP/FUNCTION LOST **

<table>
<thead>
<tr>
<th>2</th>
<th>APU 2 Tk/Fu Line Htr A</th>
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<tbody>
<tr>
<td>2</td>
<td>Erp/Spd Bk Htr B</td>
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** CREW INDICATIONS **

<table>
<thead>
<tr>
<th>3</th>
<th>H2O PUMP LOOP 1, B – ON:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>C/W H2O LOOP lt – on</td>
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<tr>
<td>3</td>
<td>’S88 H2O PUMP P 1’</td>
</tr>
<tr>
<td>3</td>
<td>’S88 H2O LOOP 1 FLOW’</td>
</tr>
<tr>
<td>3</td>
<td>’S88 H2O LOOP 1 TEMP’</td>
</tr>
</tbody>
</table>

| 4 | H2O PUMP OUT PRESS LOOP 1 meter ind – 20-25 psia |

<table>
<thead>
<tr>
<th>5</th>
<th>if APU active and using H2O BLR CNTLR/HTR 1A or 2A:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>H2O PUMP OUT PRESS LOOP 1 meter ind – 20-25 psia</td>
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** CREW INDICATIONS **

<table>
<thead>
<tr>
<th>6</th>
<th>NH3 CNTLR B – PRI/GPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>NH3 Sys A Pri Cntlr and Auto Swover to Sec Cntlr</td>
</tr>
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</table>

(Continued)
### Actions

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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</thead>
<tbody>
<tr>
<td>Port RMS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MPM Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fwd MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid MRL Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STBD RMS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MPM Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fwd MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aft MRL Mtr 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### BUS ISOLATION

ONLY ON MCC CALL, PERFORM

- **L1**
  - **SMOKE DETN CKT TEST – OFF**

- **L1A1**
  - Smoke Detn Test capability (all dets)

- **O16**
  - RJDF 2B F4/F5 Manf Logic pwr (F4R,F4D,F5L,F5R)

- **O17**
  - TVC 3 Isol ME

- **R1A2**
  - Man ON Cntl of Cryo O2,H2 Tk 2,4 Htr B

- **MA73C**
  - L Vents 1,2,3,5,8,9 Mtrs 2
  - R Vents 1,2,6,8,9 Mtrs 2

- **C3A6**
  - Fwd Pnl Trans X,Y Norm, Pulse, Fwd Pnl Rot Roll, Pitch,Yaw Disc Rate, Pulse Sel capability

- **MA73C**
  - Fwd Pnl Trans Z High,Norm, Pulse Sel capability

- **R2**
  - Pneu He Isol 2 man Cntl
  - L MPS He Isol A man Cntl (F6A5, F8A5)
  - NLG, LMG, RMG Bkup Rel Sys 1, NLG Pyro Extension Sys 1

- **MA73C**
  - Port,Stbd Rad Mtrs 2 Dpy capability
  - Y Star Trkr Dr Sys 2 OP/CL capability
  - Z Star Trkr Dr Sys 1 OP/CL capability
  - L,R ADP Htr Cntlr 2 Deploy Mtrs 2 Deploy Disc 2

---

**WARNING**

Driver pwr to F4/F5 Jets lost only if both RJDF 2B and L5/F5/R5 Driver sws (pnl O16:F) OFF simultaneously

- **11** Six vlvs fail to non-isolation position
- **12** Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired
- **13** Use pb on AFT pnl A6
- **14** Stow capability remains

---

**7** Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison

**8** Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists

**9** Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists

---

**10** Six vlvs fail to non-isolation position

**11** Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired

**13** Use pb on AFT pnl A6

**14** Stow capability remains

---

**WARNING**

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- **14** Stow capability remains

---

**10** Six vlvs fail to non-isolation position

**11** Auto Cntl of these Htrs also lost if single Htr Ops and tank not paired

**13** Use pb on AFT pnl A6

**14** Stow capability remains
<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>ET Door Mtrs:</td>
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</tr>
<tr>
<td>(MA73C)</td>
<td>C/L Lat Actr 1 Mtr 2 GPC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L Dr Uplock Lat Mtr 2 GPC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lat capability</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>R Dr Uplock Lat Mtr 2 GPC</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Lat capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R Dr Closure Mtr 2 GPC CL capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C)</td>
<td>AC pwr removal capability via Limit sw for ET Dr Mtrs: C/L Lat Actr 1 Mtr 2 L Dr Uplock Lat Mtr 2 R Dr Uplock Lat Mtr 2 Closure Mtr 2</td>
<td></td>
<td></td>
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<tr>
<td>16</td>
<td>Ku Ant Sto/Dpy Mtr 2 Sto and Dpy Limit sw</td>
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</tr>
<tr>
<td>(MA73C)</td>
<td>Redundant Ku-Bd Xmit Enable Signal</td>
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<tr>
<td>17</td>
<td>Redundant Ku-Bd Boom Stow Enable II Excitation Signal</td>
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<tr>
<td>(R2)</td>
<td>APU 3 Fu Tk Viv B</td>
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<tr>
<td>19</td>
<td>APU 3 Fu Tk Viv B</td>
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</tr>
<tr>
<td>15</td>
<td>Redundant mtrs remain</td>
<td></td>
<td></td>
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<tr>
<td>16</td>
<td>With inoperative limit sw, mtr will continue to run until DPY/STO sw is placed to GND position</td>
<td></td>
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<tr>
<td>17</td>
<td>MNC MMC2 pwr for Ku-Bd Xmit Enable signal remains</td>
<td></td>
<td></td>
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<tr>
<td>18</td>
<td>MNC MMC2 pwr remains to supply pwr to Boom stow enable II signal for stow mtrs</td>
<td></td>
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<tr>
<td>19</td>
<td>Viv closes. Redundant Viv A remains</td>
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## Actions

<p>| | |</p>
<table>
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<tr>
<td>(A12)</td>
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<tr>
<td>APU HTR</td>
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</tr>
<tr>
<td>1</td>
<td>GAS GEN/FUEL</td>
</tr>
<tr>
<td>1</td>
<td>PUMP 2 – A AUTO</td>
</tr>
<tr>
<td>1</td>
<td>GAS GEN/FUEL</td>
</tr>
<tr>
<td>1</td>
<td>PUMP 3 – B AUTO</td>
</tr>
<tr>
<td>1</td>
<td>LUBE OIL LINE 3 – B AUTO</td>
</tr>
<tr>
<td>1</td>
<td>APU HTR TK/FU LN/H2O</td>
</tr>
<tr>
<td>1</td>
<td>SYS 2A – AUTO</td>
</tr>
<tr>
<td>1</td>
<td>2B – OFF</td>
</tr>
<tr>
<td>1</td>
<td>3A – OFF</td>
</tr>
<tr>
<td>1</td>
<td>3B – AUTO</td>
</tr>
<tr>
<td>HYD HTR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AFT FUS A – AUTO</td>
</tr>
<tr>
<td></td>
<td>B – OFF</td>
</tr>
<tr>
<td>HYD CIRC PUMP PWR</td>
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</tr>
<tr>
<td>2</td>
<td>– MNB</td>
</tr>
<tr>
<td>3</td>
<td>– MNA</td>
</tr>
<tr>
<td>(L1)</td>
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</tr>
<tr>
<td>H2O PUMP LOOP 2 – ON</td>
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</tr>
<tr>
<td>H2O PUMP LOOP 1 – GPC</td>
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<tr>
<td>FLASH EVAP CNTLR PRI A – ON</td>
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<tr>
<td>(if using A Cntlr)</td>
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<tr>
<td>TOP EVAP HTR NOZ R – A AUTO</td>
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<tr>
<td>If HI LOAD EVAP enabled:</td>
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<tr>
<td>HI LOAD DUCT HTR – A(B)</td>
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<tr>
<td>(L2)</td>
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</tr>
<tr>
<td>FLASH EVAP FDLN HTR B SPLY – 1</td>
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<tr>
<td>(C2)</td>
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</tr>
<tr>
<td>L IDP/CRT SEL – 1</td>
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<tr>
<td>R IDP/CRT SEL – 2</td>
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<tr>
<td>On MCC GO:</td>
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<tr>
<td>GPC/CRT 03 EXEC</td>
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<td>(R2)</td>
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</tr>
<tr>
<td>BLR CNTLR/HTR 3 – A</td>
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</tr>
<tr>
<td>If BFS in GPC 3 or 5, move BFS</td>
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</tr>
<tr>
<td>If BFS in GPC 1, 2, or 4; and if engage reqd, use pb CDR RHC</td>
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</tr>
<tr>
<td>If CA1,2,3 unpwr at same time:</td>
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<tr>
<td>GNC 23 RCS</td>
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<tr>
<td>Override F3 Manf status to CL:</td>
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<tr>
<td>RCS FWD – ITEM 1 EXEC</td>
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<tr>
<td>MANF VLVS 3 OVRD – ITEM 42 EXEC</td>
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<tr>
<td>RCS/OMS HTR R POD (two) – A AUTO, B OFF</td>
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<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info</td>
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<tr>
<td>Reconfig following vlv(s) only if leak isolation reqd:</td>
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<td>(O7)</td>
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<tr>
<td>AFT L RCS He Press B</td>
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</tr>
<tr>
<td>TK 1/2</td>
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<tr>
<td>XFEED 1/2</td>
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<tr>
<td>R RCS TK 1/2</td>
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## Equipment/Function Lost

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<td>(A12)</td>
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</tr>
<tr>
<td>APU 2 GG/Fu Pump Htr B</td>
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</tr>
<tr>
<td>APU 3 GG/Fu Pump Htr A</td>
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</tr>
<tr>
<td>3 Lube Oil Ln Htr A</td>
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</tr>
<tr>
<td>2 Tk/Fu Ln Htr B</td>
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</tr>
<tr>
<td>APU 3 Tk/Fu Ln Htr A</td>
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</tr>
<tr>
<td>Aft Fuselage Htrs B</td>
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</tr>
<tr>
<td>Circ Pump 2 MNC pwr</td>
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</tr>
<tr>
<td>3 MNC pwr</td>
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<tr>
<td>(L1A2)</td>
<td></td>
</tr>
<tr>
<td>H2O Loop 2 Pump GPC Cntl</td>
<td></td>
</tr>
<tr>
<td>2 FES Cntlr Pri A GPC Sel capability</td>
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</tr>
<tr>
<td>Topping Evap R Noz Htr B</td>
<td></td>
</tr>
<tr>
<td>Topping Evap Duct L,R Fwd, Aft Htr C</td>
<td></td>
</tr>
<tr>
<td>Hi Load Duct Inbd,Outbd Htrs C</td>
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</tr>
<tr>
<td>(L2A1)</td>
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</tr>
<tr>
<td>FES H2O Fdln B Htrs 2 (all)</td>
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</tr>
<tr>
<td>(C2A2)</td>
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</tr>
<tr>
<td>MDU CRT 3</td>
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</tr>
<tr>
<td>(R2)</td>
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</tr>
<tr>
<td>APU/HYD Blr Cntlr/Htr 3B</td>
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<tr>
<td>(F6A5)</td>
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</tr>
<tr>
<td>GPC 3,5 engage capability</td>
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<tr>
<td>PLT BFS engage capability</td>
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</tr>
<tr>
<td>(O16)</td>
<td></td>
</tr>
<tr>
<td>RCS Manf F3 RJD pwr (F3F, F3L,F3U,F3D)</td>
<td></td>
</tr>
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<td>(A14)</td>
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<tr>
<td>R Pod Htrs B (all)</td>
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<td>(Continued)</td>
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## Crew Indications

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</tr>
</thead>
<tbody>
<tr>
<td>F7</td>
<td></td>
</tr>
<tr>
<td>SM ALERT Light/Tone – on CRT 3 blanks</td>
<td></td>
</tr>
<tr>
<td>(FSMs)</td>
<td></td>
</tr>
<tr>
<td>S69 FC REAC</td>
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</tr>
<tr>
<td>S67 CNTLR BUS V</td>
<td></td>
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<tr>
<td>I/O ERROR CRT3</td>
<td></td>
</tr>
<tr>
<td>SM 67 ELECTRIC</td>
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</tr>
<tr>
<td>CNTL CA1 &lt; 20 V</td>
<td></td>
</tr>
<tr>
<td>During Rad Dpy/Sto ops:</td>
<td></td>
</tr>
<tr>
<td>(R13L)</td>
<td></td>
</tr>
<tr>
<td>RAD CNTLR PORT tb indicates single mtr ops</td>
<td></td>
</tr>
<tr>
<td>RAD LAT CNTLR STBD tb indicates single mtr ops</td>
<td></td>
</tr>
<tr>
<td>R ADP deploy time incr from 15 to 30 sec</td>
<td></td>
</tr>
<tr>
<td>2 Pri A man On Sel capability remains. Pri B and Sec Cntlr remain</td>
<td></td>
</tr>
<tr>
<td>(F7)</td>
<td></td>
</tr>
<tr>
<td>If APUs active and using BLR CNTLR/HTR 3B:</td>
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<tr>
<td>C/W APU TEMP lt – on after ~2 min</td>
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<tr>
<td>3 Wrong FDA limit set is selected by SM preconditioning software due to loss of H2O Loop 2 pump On switch scan</td>
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<tr>
<td>4 Loss of redundant port to the following:</td>
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<tr>
<td>MDU CDR 1 (P)</td>
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<tr>
<td>MDU MFD 1 (S)</td>
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<tr>
<td>MDU MFD 2 (S)</td>
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<tr>
<td>MDU AFD 1 (S)</td>
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<tr>
<td>MDU PLT 2 (P)</td>
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<tr>
<td>(C2)</td>
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<tr>
<td>SM 88 APU/ENVIRON THERM</td>
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<tr>
<td>H2O LOOP 2 PUMP ΔP↑</td>
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## Notes

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<tr>
<td>1</td>
<td>TIME CRITICAL</td>
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<tr>
<td>2</td>
<td>If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp</td>
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<tr>
<td>3</td>
<td>Pri A man On Sel capability remains. Pri B and Sec Cntlr remain</td>
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<td>4</td>
<td>Wrong FDA limit set is selected by SM preconditioning software due to loss of H2O Loop 2 pump On switch scan</td>
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<td>5</td>
<td>Do not reconfig for reg switch or I’CNCT procedures</td>
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## ACTIONS

<table>
<thead>
<tr>
<th>(O8)</th>
<th>R OMS TK ISOL B</th>
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</thead>
</table>

### GNC 23 RCS

- Reprioritize L, R Manf 3 Jets to first priority; DES INH twice all other jets, highest priority first, then next highest, etc
- Set aft pod(s) PRI JET FAIL LIMIT to 3

### BUS LOSS: CNTLCA1

**CREW INDICATIONS**

**NOTES**

- Vlv normally closed
- Loss of manual capability to inert LO2 Manf
- Six vlvs fail to non-isolation position
- Redundant mtr remains
- Vlv holds position. FC3
- Redundant Reac Vlv Close Cntl on pnl C3 remains
- FC3 can be stopped via FC3 CNTLR sw (O16:A)

### BUS ISOLATION ONLY ON MCC CALL, PERFORM

<table>
<thead>
<tr>
<th>(O8)</th>
<th>R OMS Tk Isol B man CL capability</th>
</tr>
</thead>
</table>

### CREW INDICATIONS

**NOTES**

- R OMS Tk Isol B man CL capability
- Aft RCS L, R Jet 3 Hrs
- FC3 Purge Vlv man Cntl
- L OMS He Press Isol A man Cntl, He Vap Isol 1,2 man A Cntl
- MPS/TVC Hyd Sys 3 Isol man Cntl
- NH3 Sys B Sec Cntl man On capability

### CREW INDICATIONS

**NOTES**

- MDU CRT 3 PWR – OFF
- IDP/CRT3 PWR – OFF
- MPS He I’CNECT R – GPC
- MPS FILL/DRAIN LO2 OUTBD – GND
- RGA 3 – OFF
- RGA 3
- ATVC 1 Isol ME

### BUS ISOLATION

- L OMS He PRESS/VAP ISOL
- A – GPC
- B – OP

### CREW INDICATIONS

**NOTES**

- NH3 CNTLR A(B) – PRI/GPC
- MPS He PRESS/VAP ISOL
- L OMS He PRESS/VAP ISOL
- A – GPC
- B – OP

### BUS ISOLATION

- L OMS He PRESS/VAP ISOL
- A – GPC
- B – OP

### CREW INDICATIONS

**NOTES**

- NH3 CNTLR A(B) – PRI/GPC
**BUS LOSS: CNTLCA1**

### BUS ISOLATION

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C3)</td>
<td>FC2 Redundant Reac Vlv Close Cntl</td>
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<tr>
<td>(R1A2)</td>
<td>Cryo O2,H2 Tk1 Htrs A man On and Tk3 Htrs B man On Cntl</td>
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<tr>
<td>(R2)</td>
<td>L MPS He Isol B man Cntl</td>
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<tr>
<td>(R13A2)</td>
<td>Cryo O2,H2 Tk5 Htr A man On Cntl</td>
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<tr>
<td>(R13A2)</td>
<td>PLBD: C/L Lat 1-4, 5-8 Mtrs 2 Port Aft Blkhd Mtr 2</td>
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<tr>
<td>(ABL)</td>
<td>Port RMS: Fwd MRL Mtr 2 Mid MRL Mtr 2 Aft MRL Mtr 1 STBD RMS: Fwd MRL Mtr 1 Mid MRL Mtr 2 Aft MRL Mtr 2</td>
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<td>(L1A2)</td>
<td>Freon Loop 2 Cntlr A Rad Byp Vlv Mtr man Cntl</td>
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<tr>
<td>(A6A1)</td>
<td>Aft ADI Att ref set capability</td>
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<tr>
<td>(O16)</td>
<td>RJDF 2A F3 Manf Logic pwr F3L,F3D,F3U,F3F</td>
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<td>(C3A1)</td>
<td>R OMS Eng Pr Vlv Coil 1 and Cntl Vlv 1,2 Coils 1</td>
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<tr>
<td>(R4)</td>
<td>R OMS Arm 1, Arm/Press 1 sw contacts</td>
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<tr>
<td>(F6A5,F8A5)</td>
<td>HYD BK ISOL VLV 3 man Cntl</td>
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<tr>
<td>(O6)</td>
<td>LG Extend Vlv 1</td>
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<td>(O6)</td>
<td>-Z Star Trkr Dr Sys 2 OP/CL capability</td>
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<tr>
<td>(R13A2)</td>
<td>Rad Cntl Sys: Stbd Rad Lat 7-12 Mtr 2 Port Rad Dpy/Sto Mtr 2</td>
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<tr>
<td>(R2)</td>
<td>ET Door Mtrs: C/L Lat Actr 1 Mtr 1 man Sto capability C/L Lat Actr 2 Mtr 1 man Sto capability L Dr Closure Mtr 2 man Cntl L Dr Uplock Lat Mtr 1 man Cntl R Dr Uplock Lat Mtr 1 man Cntl</td>
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<tr>
<td>26</td>
<td>Ku Ant Sto/Dpy Mtr 1 Direct Sto Mtr 1</td>
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<tr>
<td>27</td>
<td>Redundant Sto Initiate Signal to Ku-Band</td>
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<tr>
<td>28</td>
<td>APU 1 Fu Tk Vlv B</td>
<td></td>
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<tr>
<td>29</td>
<td>Hyd Main Pump 3 Depress Solenoid RPC A</td>
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<td>29</td>
<td>Hyd Main Pump 2 Depress Solenoid RPC B</td>
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<tr>
<td>30</td>
<td>PLT Dpy Fire 2</td>
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<tr>
<td>30</td>
<td>Jett Fire 2</td>
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</table>

NOTES:
26 Mtr 2 remains
27 Redundant stow initiate sig (CNTL BC1) to Ku-Band remains
28 Vlv fails closed. Redundant vlv remains
29 Redundant RPC remains
30 CDR Dpy/Jett remains
### ACTIONS

1. APU HTR GAS GEN/FUEL PUMP 3 – B AUTO
   - APU HTR TK/FU LN/H2O
2. SYS 2A – AUTO
3. 2B – OFF
4. 3A – OFF
5. 3B – AUTO
6. HYD CIRC PUMP PWR 3 – MNA

#### EQUIP/FUNCTION LOST

1. APU 3 GG/Fu Pmp Htrs A
   - 2 Tk/Fu Ln Htrs B
   - APU 3 Tk/Fu Ln Htrs A
2. APU 3 GG Inj H2O Htrs 3A,23A
3. Circ Pump 3 MNC pw

#### CREW INDICATIONS

1. MASTER ALARM
   - Light/Tone – on
2. SM ALERT
   - Light/Tone – on
   - C/W FREON LOOP lt – on
3. CRT 4 blanks
4. S67 DISPLAY SW A (2)
5. F RCS D(L,U,F) JET
6. I/O ERROR CRT4

#### NOTES

1. TIME CRITICAL
   - If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
2. If FES Cntlr Pri A in ON position and cooling by FES only
3. Indications do not appear until jets commanded
4. If GPC commands CRT
5. Pri A GPC Sel capability remains. Pri B and Sec Cnttrs remain
6. Loss of redundant port to the following: MDU AFD 1 (P)
BUS LOSS: CNTLCA2

**EQUIP/FUNCTION LOST**

7
- AFT L,R RCS TK 1/2
- XFEED 1/2

8
- AFT L RCS:
  - Tk Isol 1/2 man CL capability
  - He Press Isol B man Cntl, GPC CL capability
  - Xfeed vlv 1/2 man CL capability
- AFT R RCS:
  - Tk Isol 1/2 man CL capability
  - Xfeed vlv 1/2 man CL capability

9
- RCS FWD – ITEM 1 EXEC
- OVRD MANF VLVS STAT 3 – ITEM 42 EXEC

10
- RCS FWD – ITEM 1 EXEC
  - OVRD MANF VLVS STAT 3 – ITEM 42 EXEC
  - 3-level sw RM for -X Sense

**CREW INDICATIONS**

7
- Do not reconfig for reg switch or I’CNCT procedures

8
- Vlv normally closed

9
- Manf status not automatically declared closed. Jet fail-offs may occur

10
- RM sw downmodes to 2-level for -X position

**NOTES**

7
- Do not reconfig for reg switch or I’CNCT procedures

8
- Vlv normally closed

9
- Manf status not automatically declared closed. Jet fail-offs may occur

10
- RM sw downmodes to 2-level for -X position
**EPS SSR-107 (Cont)**

**BUS LOSS: CNTLCA2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>During OPS 8:</td>
<td>(F8A7)</td>
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<tr>
<td>Deselect R Pnl Trim R1:</td>
<td>(F8A7)</td>
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<tr>
<td>• DES PNL TRIM R1 – ITEM 38 EXEC</td>
<td>R Trim RHC – INH capability</td>
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<tr>
<td>Deselect R BDY FLP UP/DN R1:</td>
<td>(C3A1)</td>
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<tr>
<td>• DES BDY FLP R1 – ITEM 21 EXEC</td>
<td>R Bdy Flp – UP/DN capability</td>
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<tr>
<td>If reqd during entry (&lt; 120K ft):</td>
<td>(R4)</td>
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<tr>
<td>(L1)</td>
<td>MPS/TVC Hyd Sys 3 Isol man Cntl</td>
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<tr>
<td>• NH3 CNTLR A(B) – PRI/GPC</td>
<td>NH3 Sys A Sec Cntl man On capability</td>
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<td><strong>BUS ISOLATION</strong></td>
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<td>ONLY ON MCC CALL, PERFORM</td>
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<td>(F3)</td>
<td>(O6)</td>
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<td>• TRIM RHC – ENA</td>
<td>-Z Star Trkr Dr Sys 2 CL capability</td>
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<tr>
<td>• PNL – OFF</td>
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<td>(R11L)</td>
<td>(R1A2)</td>
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<tr>
<td>• IDP/CRT4 PWR – OFF</td>
<td>FC3 Reac Vlv Cntl via pnl R1 sw</td>
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<tr>
<td>• MDU CRT 4 PWR – OFF</td>
<td>FC3 STOP capability via START/STOP sw</td>
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<td>(A6A1)</td>
<td>(C3A5)</td>
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<tr>
<td>17 Aft Panel Trans X,Y, Norm, Pulse, Rot Roll, Pitch, Yaw Disc Rate, and Pulse Sel capability</td>
<td>R ADP Dpy Mtr 1</td>
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<tr>
<td>17 Aft Pnl Trans Z High,Norm Pulse Sel capability</td>
<td>Htr Cntl 1</td>
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<td>17 Aft Pnl Trans Low Z Sel capability</td>
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<td>17 Aft Pnl PRI,ALT,VERN Sel capability</td>
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<td>17 Aft Pnl PCT Exec capability</td>
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<td>(F6A5,F8A5)</td>
<td>(C3A1)</td>
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<td>NLG Ext Sys 1</td>
<td>R OMS Eng Pr Vlv Coil 2 and Cntl Vlv 1,2 Coil 2</td>
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<tr>
<td>R MPS He Isol A man Cntl</td>
<td>R OMS Arm 2, Arm/Press 2 sw contacts</td>
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<td>(R13A2)</td>
<td>(F6A5,F8A5)</td>
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<td>Rad Cntl Sys: Port RAD Lat 7-12 Mtr 2 Dpy/Sto Mtr 2</td>
<td>NLG,LMG,RMG Bkup Rel Sys 1</td>
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**CAUTION**

No purge. Wait 10 min between burns.
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<td>Port RMS MPM Mtr 1</td>
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<td>Stbd RMS MPM Mtr 2</td>
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<td>13</td>
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<tr>
<td>13</td>
<td>ET Door Mtrs:</td>
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<tr>
<td>13</td>
<td>C/L Lat Actr 1 Mtr 2 man</td>
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<td>Stow capability</td>
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<td>19</td>
<td>L Dr Uplock Lat Mtr 1 man</td>
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<td>R Dr Closure Mtr 1 man</td>
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<td>Ku Ant Sto/Dpy Mtr 1</td>
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<td>Direct Sto Mtr 1</td>
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<td>22</td>
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<tr>
<td>22</td>
<td>APU 2 Fu Tk Vlv A</td>
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<td>Cntlr Pwr Sply B</td>
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<td>23</td>
<td>Hyd Main Pump 3 Depress</td>
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<td>Solenoid RPC A</td>
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<td>Solenoid RPC B</td>
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<td>25</td>
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<td>C/L Lat 9-12 Mtr 2</td>
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<td>13-16 Mtr 1</td>
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<td>Stbd Aft Blkhdl Mtr 1</td>
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<td>27</td>
<td>(F3,F4)</td>
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<td>27</td>
<td>Jett Fire 1</td>
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</table>

| 13 | Redundant mtrs remain |
| 20 | Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison |
| 21 | Mtr 2 remains |
| 22 | Vlv closed. Redundant vlv remains |
| 23 | Redundant pwr sply remains. Turbine speed ind lost |
| 24 | Redundant RPC remains |
| 25 | During PLBD OP/CL, single mtr times noted on actuators |
| 26 | Pwr to MCA Drivers lost through ENABLE sw |
| 27 | CDR Dpy/Jett remains |
## ACTIONS

<table>
<thead>
<tr>
<th>(A12)</th>
<th>APU HTR</th>
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<tbody>
<tr>
<td>1. APU GAS GEN/FUEL</td>
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<td>2. PUMP 3 – AUTO</td>
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<tr>
<td>3. LUBE OIL LINE 3 – AUTO</td>
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<td>4. APU HTR TK/FU LN/H2O</td>
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<td>5. SYS 2A – AUTO</td>
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<td>6. 2B – OFF</td>
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<td>7. 3A – OFF</td>
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<td>8. 3B – AUTO</td>
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<td>9. HYD CIRC</td>
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<td>10. PUMP PWR 3 – MNC</td>
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## EQUIP/FUNCTION LOST

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<th>APU 3 GG/Fu Pump Htrs B</th>
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<td>APU 3 Lube Oil Ln Htr B</td>
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<td>APU 2 Tk/Fu Ln Htr B</td>
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<td>(A12)</td>
<td>APU 3 Tk/Fu Ln Htr A</td>
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<tr>
<td>(R1A2)</td>
<td>Hyd Circ Pump 3 MNA pwr</td>
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## CREW INDICATIONS

| MASTER ALARM |
| Light/Tone – on |
| (F7) |
| SM ALERT Light/Tone – on |
| (FSM) |
| S67 CNTL BUS V |
| RM DLMA MANF |

| SM 67 ELECTRIC |
| CNTL CA3 Volts < 20 |
| (O8) |
| FWD RCS TK ISOL 1/2 tb – bp |
| (2) |
| FWD RCS MANF ISOL 3,4 tb – bp |
| (2) |
| RAD BYP VLV 1 tb – bp |
| (3) |
| FLOW PROP VLV LOOP 2 tb – bp |
| (3) |
| RAD CNTL (two) tb – bp |
| (5) |
| R ADP deploy time incr from 15 to 30 sec |
| (R13L) |
| STAR TRKR DR POS -Z OP/CL time incr from 8 to 16 sec |
| (F7) |
| If APUs active, using BLR CNTLR/HTR 2A or 3A: C/W APU TEMP lt – on after ~2 min |

## NOTES

1. TIME CRITICAL
2. If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
3. If AC3 cbs not opened, Lat Mtrs 2 of actuators for Port,Stbd Rad Lat 7-12 would continue to run until Sys B Lat Cntl sw placed to OFF. Other equip pwrd by AC3 MMC2 and AC3 MMC4 is lost because of MNC MMC2 and MNC MMC4 loss
4. Refer to EPS 7.6 CRYO TABLE A for switch nomenclature

---

**EPS SSR-108**
**BUS LOSS: CNTLCA3**

(Includes MNC FMC3, MNC MMC2, MNC MMC4, MNC AMC3)

**CREW INDICATIONS**

| MASTER ALARM |
| Light/Tone – on |
| (F7) |
| SM ALERT Light/Tone – on |
| (FSM) |
| S67 CNTL BUS V |
| RM DLMA MANF |

| SM 67 ELECTRIC |
| CNTL CA3 Volts < 20 |
| (O8) |
| FWD RCS TK ISOL 1/2 tb – bp |
| (2) |
| FWD RCS MANF ISOL 3,4 tb – bp |
| (2) |
| RAD BYP VLV 1 tb – bp |
| (3) |
| FLOW PROP VLV LOOP 2 tb – bp |
| (3) |
| RAD CNTL (two) tb – bp |
| (5) |
| R ADP deploy time incr from 15 to 30 sec |
| (R13L) |
| STAR TRKR DR POS -Z OP/CL time incr from 8 to 16 sec |
| (F7) |
| If APUs active, using BLR CNTLR/HTR 2A or 3A: C/W APU TEMP lt – on after ~2 min |

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2. If not done within 20 min, may freeze N2H4 and lose APU. However, SM ALERT occurs above freezing temp
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4. Refer to EPS 7.6 CRYO TABLE A for switch nomenclature
# EPS SSR-108 (Cont)
## BUS LOSS: CNTLCA3
### ACTIONS
For PLBD ops:
- OP/CL Drs in man mode

| (MA73C) | Port/Stbd Rad Dpy/Sto Mtrs 2 PLBD:  
| C/L Lat 1-4,5-8,9-12 Mtrs 2  
| 13-16 Mtr 1  
| Port Aft Bikhd Mtr 2  
| Stbd Aft Bikhd Mtr 1  
| Port Door Mtr 1  
| Stbd Door Mtr 2 CL Limit sw |
| (L1) | TOP EVAP HTR DUCT – A(B)  
If HI LOAD EVAP enabled:  
* Hi LOAD DUCT HTR – A(B) |

### BUS ISOLATION
ONLY ON MCC CALL, PERFORM

- (A14)  
  Aft RCS L,R Jet 5 Htrs
- (R2)  
  C MPS He Isol B man Cntl
- (MA73C)  
  - Z Star Trkr Dr Sys 2 OP/CL capability  
  R ADP Deploy Mtr 1  
  Deploy Dsc 1  
  Htr Cntl 1
- (MA73C)  
  LH Vents 1,2,3 Mtrs 1  
  Vent 6 Mtr 2  
  RH Vents 8,9 Mtrs 1  
  Vent 3 Mtr 2  
  Vent 5 Mtr 2
- (MA73C)  
  ET Door Mtrs:  
  C/L Lat Actr 2 Mtr 2 GPC Cntl  
  L Dr Closure Mtr 2 GPC CL capability  
  R Dr Closure Mtr 1 GPC CL capability  
  R Dr Uplock Lat Mtr 1 GPC Lat capability
- (MA73C)  
  AC pwr removal capability via Limit sw for ET Dr Mtrs:  
  C/L Lat Actr 2 Mtr 2  
  L Dr Closure Mtr 2  
  R Dr Closure Mtr 1  
  Uplock Lat Mtr 1
- (ABL)  
  PORT RMS:  
  MPM Mtr 1  
  Fwd MRL Mtr 2  
  Aft MRL Mtr 1
- STBD RMS:  
  MPM Mtr 2  
  Mid MRL Mtr 2

### CREW INDICATIONS

#### SM (BFS,SM) 63 PL BAY DOORS
If in AUTO OP/CL for PLBDs, sequence terminates immediately and msg ‘(S63) PBD CONFIG’
During MAN PLBD OP/CL, single mtr run time noted on actuators listed at left

#### SM 94 PDRS CONTROL
PORT RMS Indications lost:  
MPM Mtr 1 STO/DPY  
Fwd MRL Mtr 2  
LAT/REL/RDY  
Aft MRL Mtr 1  
LAT/REL/RDY
STBD RMS Indications lost:  
MPM Mtr 2 STO/DPY  
Mid MRL Mtr 2  
LAT/REL/RDY

### NOTES

1. Mtr 2 remains
2. Htr Cntl 2 remains
3. Redundant mtrs remain
4. Single mtr time. One failure away from EVA to stow MPM or from RMS/Obss jettison
5. Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
6. Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists

(Continued)
<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
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<td>Ku Ant Sto/Dpy Mtr 1 Limit sw</td>
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<td>Redundant Ku-Bd Xmit Enable Signal</td>
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### CONTROL BUS – PANEL WIRING MATRIX

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**NOTE**

This table shows control bus and “daisy-chained” panels that make up that particular control bus.
### ACTIONS
1. Perform FC1 SHUTDN (R1)
2. AC1 BUS SNSR – OFF (R2)
3. BLR CNTLR/HTR 1 – A (L1)
4. HUM SEP A – OFF
5. IMU FAN A – OFF
6. H2O PUMP LOOP 1 – B
7. H2O LOOP 1 BYP
8. H2O PUMP LOOP 2 – OFF
9. AV BAY 1 FAN A – OFF
10. AV BAY 2 FAN (two) – ON
11. F freon PUMP LOOP 1 – B
12. FREON PUMP LOOP 2 – A (MO13Q)
13. CAB FAN (two) – ON (R13U)
14. C/W PARAM SEL tw (three) – 115, 074, 092, 062
15. C/W PARAM – INH
16. C/W PARAM SEL tw (three) > 119
17. SM 60 SM TABLE MAINT
18. Modes – AUTO
19. CRADLE – AUTO
20. Mode on – OFF
21. F freon ON it – OFF
22. F freon SEP SEL sw – OFF
23. HOSE BLOCK – SEP 2
24. In next step, alternate fan sep will turn on for 30 sec.
25. Normal ops may proceed after 30-sec run complete

### EQUIP/FUNCTION LOST
1. FC1 Pumps and sensor
2. Hyd H2O Bir 1 Cntlr B
3. 3 Cntlr A
4. Humidity Sep A
5. IMU Fan A
6. H2O Loop 2 Byp Cntlr, Sig Condr
7. Freon Loop 1 Pump A
8. Freon Loop 2 Pump B

### CREW INDICATIONS
1. MASTER ALARM
   - Light/Tone – on
   - LIGHTS LOST:
   - C/W FC PUMP lt – on
   - C/W AC VOLT lt – on
   - C/W FREON LOOP lt – on
   - C/W AV BAY/CAB AIR lt – on
   - C/W H2O LOOP lt – on

### NOTES
1. Time Critical:
   - FC1 must be shutdn within 9 min to avoid potentially hazardous condition
   - Use streamers (if flown) or monitor by feel during wake period
3. CO2 partial Press and Cabin Fan ΔP
   - Inhibits Primary C/W for CAB Fan ΔP, H2O Loop 2 Pump P, FC1 stack Temp, FC1 Cool Pump ΔP
4. SM ALERT
   - S67 AC VOLTS 1
   - S86 HYD RSVR Q
   - S86 WSB T
   - S2 HYD QTY
   - S66 AV BAY 3 FAN
   - S66 AV BAY 2 FAN
   - S69 FC PUMP 1
   - S69 FC H2 PUMP 1
   - S88 FREON FLOW 2
   - S88 FRN AFT CP 2
   - S88 FRN PL HX 2
   - S88 H2O PUMP P 2
   - S88 H2O LOOP 2 QTY
   - S88 H2O LOOP 2 TEMP
   - Cast Cool PUMP ΔP
### ACTIONS

| If CAB TEMP CNTLR 2 active (L1) | Cabin Temp Cntlr 2, Hx Byp Vlv Mtr 2 |
| If CAB TEMP CNTLR – OFF (MD44F) | |
| Remove pin from SEC ACTUATOR and BYP vlv linkage, connect linkage to PRI ACTUATOR (L1) | |
| CAB TEMP CNTLR – 1 | |

Refer to OMS/RCS Slide Rule for vlv loss info (use FPC1 Slide for Aft RCS and FMC1 Slide for Fwd RCS)

### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

- **(MA73C.C)**
  - cb MCA PWR
  - AC1 3φ FWD 1 – op
  - MID 1 – op

- **(MA73C.D)**
  - cb MCA PWR
  - AC1 3φ MID 3 – op
  - AFT 1 – op

- **(MA73C.E)**
  - cb AC1 WCS FAN SEP 1 (three) – op

- **(MA73C.F)**
  - cb RMS PRI φA – op
  - MAR 3φ – op
  - OPS INST HYD ACTR φC – op

- **(MA73C.G)**
  - IF DOCKING MISSION
    - cb AC1 ARLK/TNL FAN A (three) – op

### EQUIP/FUNCTION LOST

| 10 | AC1 FMC1 Bus pwr |
|    | RH Vent 1.2 Mtr 1 |
|    | Y Star Trkr Dr Sys 1 OPT/CAP capability |
| 11 | L ADP Dpy Mtr 1 |
|    | AC1 MMC1 Bus pwr |
|    | RH Vents 3,5,6 Mtrs 1 |
|    | PL Reten Sys A Reil/Lat Mtrs Port Rad Lat 1-6, 7-12 Mtrs 1 |
|    | Port Rad Dpy/Sto Mtr 1 |
|    | PLBD: |
|    | C/L Lat 9-12 Mtr 1 |
|    | Port Stbd Fwd Blkhd Mtrs 1 Stbd Door Mtr 1 |
| 11 | PLBD: |
|    | C/L Lat 1-4, 5-8 Mtrs 1 |
|    | Port, Aft Blkhd Mtr 1 AC1 MMC3 Bus pwr |
|    | AMC1 Bus pwr |
|    | LH Vent 8,9 Mtr 1 |
| 12 | RMS: |
|    | Port Mid MRL Mtr 1 |
|    | Port Aft MRL Mtr 2 |
|    | Stbd Fwd MRL Mtr 2 Stbd Aft MRL Mtr 1 |
|    | D&C Primary ltg Shldr Brace release AC1 Middeck Utility Pnl (MUP) |
|    | Ops Hyd Actr Instr Arlk/Tnl Fan A |
| 13 | PLBD OP/CL, single mtr run time noted on actuators listed at left During Rad Dpy/Sto ops: (R13L) RAD CNTL lbs (four) indicate single mtr ops |

### CREW INDICATIONS

- **If IMU FAN A ON:**
  - ‘S66 IMU FN SPD A’
  - ‘S66 IMU FAN DP’
- **If APUs active and using H2O BLR CNTLR/HTR 1B or 3A, then C/W APU TEMP It on after ~2 min:**
  - STAR TRKR DR POS -Y OP/CL time incr from 8 to 16 sec
  - L ADP deploy time incr from 15 to 30 sec
- **If Freon Loop 2 Pump B on:**
  - ‘S88 FREON FLOW 2’
  - ‘S88 FRN AFT CP 2’
  - ‘S88 FRN PL HX 2’

### NOTES

- **(O1)** FREON FLOW LOOP 2 ind – 578 pph
- **SM (BFS SM 63) PL BAY DOORS**
  - During PLBD OP/CL, single mtr run time noted on actuators listed at left
  - During Rad Dpy/Sto ops: (R13L) RAD CNTL lbs (four) indicate single mtr ops
- **10** Lose Auto Temp Cntlr via Cntlr 2 and H2O Loop 2 Cabin Hx In Temp Snrs. Hx Byp Vlv holds position
- **11** Redundant mtr remains
- **12** Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
- **13** Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
### BUS ISOLATION

**ONLY ON MCC CALL, PERFORM**

- (MA73C:H,J)
  - cb AC1 FWD RCS VLV (three) – op
  - cb AC1 AFT POD VLV GP 1 (three) – op

- (L4:A-E)
  - cb UTIL PWR F1/MO52J
  - AC1 – op

- cb AC1
  - FC1 PUMPS (three) – op
  - CTR ENG (three) – op
  - R ENG (three) – op

- (L4:F-J)
  - cb AC1
  - \( ^\circ \)h2O LOOP PUMP 1A/2 (three) – op
  - AV BAY 1 FAN A (three) – op
  - AV BAY 3 FAN B (three) – op
  - IMU FAN A (three) – op
  - HUM SEP A (three) – op

- (L4:K)
  - cb AC1
  - \( ^\phi \)A H2O CNTLR 2 – op
  - \( ^\phi \)B CAB AIR S/C – op

- (L4:L)
  - cb AC1
  - \( ^\phi \)A CAB T CNTLR 2 – op
  - \( ^\phi \)B AV BAY 2 S/C – op

- (L4:MN)
  - cb AC1 \( ^\phi \)A, \( ^\phi \)B, \( ^\phi \)C
  - FREON LOOP 1 PUMP A (three) – op
  - FREON LOOP 2 PUMP B (three) – op

- (L4:O)
  - cb AC1
  - \( ^\phi \)A RAD CNTLR 1B – op
  - \( ^\phi \)B RAD CNTLR 2B – op

- (L4:Q)
  - cb AC1
  - \( ^\phi \)A LTG PNL L/CTR – op
  - \( ^\phi \)B LTG PNL L OVHD – op
  - \( ^\phi \)C LTG INST OS – op

### EQUIP/FUNCTION LOST

- AC1 Util pwr (F1/MO52J)

### CREW INDICATIONS

- Hyd Rsrv 1 Qty Snsr

### NOTES

- 14 Bypass vlvs hold position and Cntlr A Rad Byp Vlv Mtrs remain

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(Continued)

(Continued)

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<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
</tr>
<tr>
<td>(L4,R) cb AC1</td>
</tr>
<tr>
<td>• ΦA LG INST R – op</td>
</tr>
<tr>
<td>• ΦB NUMERIC FWD – op</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inst Its R</td>
</tr>
<tr>
<td>Numeric Its (plns O3,F7)</td>
</tr>
<tr>
<td>(RCS/OMS Prplt Qty, Gauge, Mission and Event Timers)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH Vents 5,6 Mtrs 1</td>
</tr>
<tr>
<td>Stbd Rad 1 Lat 1-6,7-12 Mtrs 1</td>
</tr>
<tr>
<td>Stbd Rad Dpy/Sto Mtr 1</td>
</tr>
<tr>
<td>ET Door Mtrs:</td>
</tr>
<tr>
<td>C/L Lat Actr 1,2 Mtr 1</td>
</tr>
<tr>
<td>L Dr Closure Mtr 1</td>
</tr>
<tr>
<td>Uplock Lat Mtr 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>① Redundant mtr remains</td>
</tr>
<tr>
<td>⑩ MCC for total OMS Qtys. Aft Qtys are found on GNC SYS SUMM 2</td>
</tr>
</tbody>
</table>
### ACTIONS

<table>
<thead>
<tr>
<th>(L1)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• HUM SEP A – OFF</td>
<td></td>
</tr>
<tr>
<td>• IMU FAN A – OFF</td>
<td></td>
</tr>
<tr>
<td>• H2O LOOP 1 BYP MODE – AUTO</td>
<td></td>
</tr>
<tr>
<td>• H2O LOOP 2 – OFF</td>
<td></td>
</tr>
<tr>
<td>• FREON LOOP 1 – B</td>
<td></td>
</tr>
<tr>
<td>• FREON LOOP 2 – A</td>
<td></td>
</tr>
<tr>
<td>• AV BAY 1 FAN A – OFF</td>
<td></td>
</tr>
<tr>
<td>• B – ON</td>
<td></td>
</tr>
<tr>
<td>• 3 FAN A – ON</td>
<td></td>
</tr>
<tr>
<td>• B – OFF</td>
<td></td>
</tr>
</tbody>
</table>

### EQUIP/FUNCTION LOST

1. 1Φ of Hum Sep A
2. 1Φ of IMU Fan A
3. H2O Loop 2 Byp Cntlr, Sig
4. Condor, Byp Vlv pwr
5. 1Φ of H2O Loop 2 Pump
6. GPC Cntlr pwr
7. 1Φ of H2O Loop 1 Pump A
8. Freon 1 Pump A
9. 2 Pump B
10. 1Φ of Av Bay 1 Fan A
11. 1Φ of Av Bay 3 Fan B
12. 1Φ of Arlk/Tnl Fan A
13. 1Φ of H2O Loop 2 Pump
14. 1Φ of H2O Loop 1, A active:
15. 'S88 H2O PUMP P 1'
16. 1Φ of FC1 H2 Pump
17. 1Φ of FC1 Coolant Pump
18. 4 Cabin Temp Cntlr 2, Hx Byp Vlv Mtr 2
19. 1Φ of WCS Fan/Sept

### CREW INDICATIONS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>MASTER ALARM</td>
<td></td>
</tr>
<tr>
<td>Light/Tone – on</td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

1. H2O Loop 2 Byp Vlv holds position and H2O Loop 2 Pump Out Press, Pump A
2. Accum Qty, Pump Out Temp snrs lost
3. Inhibits H2O Loop 2 Pump A, Pump Out Temp, Accum Qty, and Cabin HX In Temp respectively
4. Lose Auto Temp Cntrl via Cntlr 2 and H2O Loop 2 Cabin Hx In Temp snrs. Hx Byp vlv holds position
5. Inhibits Primary C/W for AC1 voltage and H2O Loop 2 Pump P
6. 2Φ ops will result in degraded airflow. Crew actions will pwr fans thru alt pwr source with full 3Φ power

(Continued)
### Actions

8 If bus shorted:
- Open all AC1 φA cbs that pow 3φ loads on pnls L4: C-J,M,N (10 cbs), MA73C: E,G,H,I (4 cbs)
- Open all AC1 3φ ganged cbs on pnls L4: B (1 cb), MA73C: C,D,F (5 cbs)

9 If bus not shorted:
- Perform the following BUS ISOLATION steps

### Bus Isolation

**IF BUS NOT SHORTED, PERFORM**

- (L4,K)
  - cb AC1 φA H2O CNTLR 2 – op
- (L4,L)
  - cb AC1 φA CAB T CNTLR 2 – op
- (L4,O)
  - cb AC1 φA BLR HYD BYP 1B – op
- (L4,P)
  - cb AC1 φA RAD CNTLR 1B – op
- (L4,Q)
  - cb AC1 φA LTG PNL L/CTR – op
- (L4,R)
  - cb AC1 φA INST R – op
- (MA73C:F)
  - cb AC1 RMS PRI φA – op

### Equip/Function Lost

<table>
<thead>
<tr>
<th></th>
<th>Actions</th>
<th>Crew Indications</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>1φ of AC Utility Power outlets at F1 and MO52J</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>AC1 FMC1 Bus pwr</td>
<td></td>
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<tr>
<td></td>
<td>MMC1 Bus pwr</td>
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<tr>
<td></td>
<td>MMC3 Bus pwr</td>
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<tr>
<td></td>
<td>AMC1 Bus pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Freon Loop 1 Cntlr B Rad Byp Vlv Mtr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pnl lts L/Ctr (pnls L1,L2,L4, C2,C3,F2,F6,F7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Instr lts R (pnls C2,F8,F9)</td>
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<tr>
<td></td>
<td>RMS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1φ of Port Mid MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port Aft MRL Mtr 2</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Stbd Fwd MRL Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stbd Aft MRL Mtr 1</td>
<td></td>
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<tr>
<td></td>
<td>D&amp;C Primary Ltg</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Shldr Brace Release</td>
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<td></td>
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<tr>
<td></td>
<td>FC1 pH Snsr</td>
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<td></td>
</tr>
</tbody>
</table>
### ACTIONS

<table>
<thead>
<tr>
<th>(L1)</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• HUM SEP A – OFF</td>
<td>1Φ of Hum Sep A</td>
<td>MASTER ALARM</td>
<td>1 If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W</td>
</tr>
<tr>
<td>• B – ON</td>
<td>1Φ of IMU Fan A</td>
<td>Light/Tone – on</td>
<td>2 Av Bay 2 Fan ΔP, Air Out Temp snrs lost</td>
</tr>
<tr>
<td>• IMU FAN A – OFF</td>
<td>1Φ of H2O Loop 2 Pump GPC Cntrl rwr</td>
<td>(F7)</td>
<td>3 Crew and gnd have lost PPCO2 Xdcr</td>
</tr>
<tr>
<td>• B(C) – ON</td>
<td>1Φ of H2O Loop 1 Pump A</td>
<td>C/W AC VOLT lt – on</td>
<td>4 Use streamers (if flown) or monitor by feel during wake period</td>
</tr>
<tr>
<td>• H2O PUMP LOOP 2 – ON</td>
<td>2 Av Bay 2 Sig Condr, Xdcrs (ECLS SC3)</td>
<td>C/W AV BAY/CAB AIR lt – on</td>
<td>5 CO2 partial Press and Cabin Fan ΔP snrs lost</td>
</tr>
<tr>
<td>• H2O PUMP LOOP 1 (two) – GPC, B</td>
<td>1Φ of Freon Loop 1 Pump A</td>
<td>(L)</td>
<td>6 Inhibits Primary C/W for AC1 voltage and Cabin Fan ΔP</td>
</tr>
<tr>
<td>• AV BAY 2 FAN (two) – ON</td>
<td>2 Pump B</td>
<td>Event Time ind blank</td>
<td>7 2Φ ops will result in degraded airflow. Crew actions will pwr fans thru alt pwr source with full 3Φ power</td>
</tr>
<tr>
<td>• FREN PUMP LOOP 1 – B</td>
<td>1Φ of AV Bay 1 Fan A</td>
<td>(F9)</td>
<td>8 MCC will provide equipment reconfig info if reqd</td>
</tr>
<tr>
<td>• FREN PUMP LOOP 2 – A</td>
<td>1Φ of AV Bay 3 Fan B</td>
<td>AC1 φB volts &lt; 90</td>
<td></td>
</tr>
<tr>
<td>• AV BAY 1 FAN A – OFF</td>
<td>1Φ of Arlk/Tnl Fan A</td>
<td>(FSMs)</td>
<td></td>
</tr>
<tr>
<td>• B – ON</td>
<td>1Φ of Arlk/Tnl Fan A</td>
<td>S67 AC VOLTS 1</td>
<td></td>
</tr>
<tr>
<td>• 3 FAN A – ON</td>
<td></td>
<td>S69 FC H2 PUMP 1</td>
<td></td>
</tr>
<tr>
<td>• B – OFF</td>
<td></td>
<td>S86 HYD RSVR Q</td>
<td></td>
</tr>
<tr>
<td>(MO13Q)</td>
<td>4 Cab Air Sig Cond (ECLS SC6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If Arlk/Tnl Fan active:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ARLK FAN A – OFF</td>
<td></td>
<td>SM ALERT Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td>• B – ON</td>
<td></td>
<td>(B)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Maintain LiOH canister(s) changeout per cue card and FLIGHT PLAN During sleep periods: (L1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>• CAB FAN (two) – ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R13U)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – 033, 074</td>
<td></td>
<td>(FSMs)</td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM – INH</td>
<td></td>
<td>S66 AV BAY 2 FAN</td>
<td></td>
</tr>
<tr>
<td>• MEM – CLEAR</td>
<td></td>
<td>S66 CAB PPCO2</td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
<td></td>
<td>S66 CABIN FAN</td>
<td></td>
</tr>
<tr>
<td>(R1)</td>
<td></td>
<td>S88 H2O LOOP 2 TEMP</td>
<td></td>
</tr>
<tr>
<td>• AC1 BUS SNSR – OFF</td>
<td></td>
<td>HYD QTY 1 – 0%</td>
<td></td>
</tr>
<tr>
<td>(1 sec)</td>
<td></td>
<td>(O1)</td>
<td></td>
</tr>
<tr>
<td>• AC1 BUS SNSR – AUTO TRIP</td>
<td></td>
<td>AIR TEMP AV BAY 2 – 45 degF</td>
<td></td>
</tr>
<tr>
<td>(WCS)</td>
<td></td>
<td>(O3)</td>
<td></td>
</tr>
<tr>
<td>• MODE – AUTO</td>
<td></td>
<td>RCS/OMS PRPLT QTY Gage and MSN TIME ind blank</td>
<td></td>
</tr>
<tr>
<td>• CRADLE – AUTO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Hose stowed in cradle</td>
<td></td>
<td>If H2O PUMP LOOP 1,A active:</td>
<td></td>
</tr>
<tr>
<td>• WCS ON lt – OFF</td>
<td></td>
<td>• H2O LOOP C/W lt</td>
<td></td>
</tr>
<tr>
<td>• WCS ON lt – OFF</td>
<td></td>
<td>’S88 H2O PUMP P 1’</td>
<td></td>
</tr>
<tr>
<td>• FAN SEP SEL sw – OFF</td>
<td>1</td>
<td>(O1)</td>
<td></td>
</tr>
<tr>
<td>• HOSE BLOCK – SEP 2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete.</td>
<td></td>
<td>H2O PUMP OUT PRESS LOOP 1 – 40-45 psia</td>
<td></td>
</tr>
<tr>
<td>• FAN SEP SEL sw – 2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(SM 60 SM TABLE MAINT)</td>
<td></td>
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</tr>
<tr>
<td>• Reset upper limit of 0450114 (FC1 H2 PUMP STATUS) to current value + 0.3 volts</td>
<td>1Φ of FC1 H2 Pump</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Φ of FC1 Coolant Pump</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1Φ of AC Utility Power Outlets at F1 and MO52J</td>
<td></td>
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<tr>
<td></td>
<td>(Continued)</td>
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</tbody>
</table>
### EPS SSR-112 (Cont)

#### BUS LOSS: AC1 φB

<table>
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<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| **9** If bus shorted:  
  • Open all AC1 φφ cbs that pwr 3φ loads on pns L4: C-J,M,N (10 cbs), MA73C: E,G,H,I (4 cbs)  
  • Open all AC1 φφ ganged cbs on pns L4:B (1 cb), MA73C: C,D,F (5 cbs) | 9 AC1 FMC1 Bus pwr  
  MMC1 Bus pwr  
  MMC3 Bus pwr  
  AMC1 Bus pwr | | ⑦ Ganged cb.  
 Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short.  
 After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unpowering sub-buses: SSR-114, SSR-115, SSR-116, SSR-117 |
| **10** If bus not shorted:  
  • Perform the following BUS ISOLATION steps | | | |
| **BUS ISOLATION**  
 **IF BUS NOT SHORTED, PERFORM** | | | |
| (L4,K)  
  • cb AC1 φB CAB AIR S/C – op | Hyd Rsr 1 Qty Snr | | |
| (L4,L)  
  • cb AC1 φB AV BAY 2 S/C – op | Freon Loop 2 Cntlr B Rad Byp Vlv Mtr | | |
| (L4,O)  
  • cb AC1 φB HYD QTY 1 – op | Pnl Its L/OH (pns L4:O5,O6,O7, O13,O14,015) | | |
| (L4,P)  
  • cb AC1 φB RAD CNTLR 2B – op | Hyd Rsvr 1 Qty Snsr | | |
| (L4,Q)  
  • cb AC1 φB LTG PNL L OVHD – op | | | |
| (L4,R)  
  • cb AC1 φB NUMERIC FWD – op | | | |
| **PRELIMINARY NOTES**  
  9 Ganged cb.  
 Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short.  
 After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unpowering sub-buses: SSR-114, SSR-115, SSR-116, SSR-117  
 10 For unshorted bus, perform single φ isolation steps to prevent powering single phase loads with coupled energy from remaining two phases  
 11 Bypass vlv holds position and Cntlr A Rad Byp Vlv Mtr remains  
 12 √MCC for total OMS Qtys. Aft Qtys are found on GNC SYS SUMM 2 |

---

### EPS SSR-113

#### BUS LOSS: AC1 φC

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| **(R2)**  
  • BLR CNTLR/HTR 3 – B | Hyd H2O Blr 3 Cntrl A  
  1φ of Hum Sep A  
  1φ of IMU Fan A  
  1φ of H2O Loop 2 Pump GPC Cntrl pwr  
  1φ of H2O Loop 1 Pump A  
  1φ of Freon Loop 1 Pump A  
  1φ of Freon Loop 2 Pump B  
  1φ of AV Bay 1 Fan A  
  1φ of AV Bay 1 Fan A  
  1φ of AV Bay 3 Fan A  
  1φ of Arlk/Tnl Fan A | **MASTER ALARM**  
  Light/Tone – on  
  C/W AC VOLT lt – on  
  SM ALERT Light/Tone – on  
  AC1 φC AC volts < 90  
  Orbt Sta Instr Its (pns A1,A2)  
  S67 AC VOLS 1  
  S69 FC H2 PUMP 1  
  S86 WSB T  
  SM0 THR MLY HYD (B)  
  HYD/APU  
  APU H2O QTY 3 – 0% | ① For unshorted bus, perform single φ isolation steps to prevent powering single phase loads with coupled energy from remaining two phases  
 ② If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W |
| **(L1)**  
  • HUM SEP A – OFF  
  • IMU FAN A – OFF  
  • H2O PUMP LOOP 2 – ON  
  • H2O PUMP LOOP 1 (two) – GPC, B  
  • FREN PUMP LOOP 1 – B  
  • AV BAY 1 FAN A – OFF  
  • 3 FAN A – ON  
  • B – OFF | | |
| **(MO13Q)**  
  If Arlk/Tnl Fan active:  
  • ARLK FAN A – OFF  
  • B – ON | | |

---

09/26/08 7-259 MAL/ALL/GEN J
### EPS SSR-113 (Cont)

#### BUS LOSS: AC1 φC

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R13U)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – 033 (AC1 voltage)</td>
<td>If H2O PUMP LOOP 1, A active: C/W H2O LOOP lt – on 'S88 H2O PUMP P 1' (O1) H2O PUMP OUT PRESS LOOP 1 – 40-45 psia</td>
<td>2</td>
<td>If H2O Loop 1 Pump A active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W</td>
</tr>
<tr>
<td>• C/W PARAM – INH</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>• C/W MEM – CLEAR</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>(R1)</td>
<td>1Φ of WCS Fan/Sep 1</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>(WCS)</td>
<td>1Φ of FC1 H2 Pump</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>• MODE – AUTO</td>
<td>1Φ of FC1 Coolant Pump</td>
<td>1Φ of AC Utility Power Outlets at F1 and MO52J</td>
<td></td>
</tr>
<tr>
<td>• CRADLE – AUTO</td>
<td></td>
<td>5</td>
<td>AC FMC1 Bus pwr MMC1 Bus pwr MMC3 Bus pwr AMC1 Bus pwr</td>
</tr>
<tr>
<td>• Hose stowed in cradle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• WCS ON lt – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FAN SEP SEL sw – OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• HOSE BLOCK – SEP 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FAN SEP SEL sw – 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(SM 60 SM TABLE MAINT)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Reset upper limit of 0450114 (FC1 H2 PUMP STATUS) to current value + 0.3 volts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If bus shorted:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Open all AC1 φC cbs that pwr 3φ loads on pns L4: C-J,M,N (10 cbs), MA73C: E,G,H,I (4 cbs)</td>
<td>Orbit Sta Instr lts (Pnls A1,A2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Open all AC1 3φ ganged cbs on pns L4:B (1 cb), MA73C: C,D,F (5 cbs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If bus not shorted:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perform the following BUS ISOLATION steps</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### BUS ISOLATION

**IF BUS NOT SHORTED, PERFORM**

<table>
<thead>
<tr>
<th>(L4:O)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• cb AC1 φC BLR HYD BYP 3A – op</td>
<td></td>
</tr>
<tr>
<td>(L4:Q)</td>
<td></td>
</tr>
<tr>
<td>• cb AC1 φC LTG INST OS – op</td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:F)</td>
<td>Ops Hyd Actr Instr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC1 OPS INST HYD</td>
<td>RMS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACTR φC – op</td>
<td>1φ of Port Mid MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port Aft MRL Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stbd Fwd MRL Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stbd Aft MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### EPS SSR-114
**BUS LOSS: AC1 FMC1**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>AC1 FMC1 Bus pwr</td>
<td>L ADP deploy time incr from 15 to 30 sec</td>
<td>① Redundant mtr remains</td>
</tr>
<tr>
<td></td>
<td>RH Vent 1,2 Mtr 1</td>
<td>-Y Star Trkr OP/CL time incr from 8 to 16 sec</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 L ADP Dpy Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 -Y Star Trkr Dr Sys 1 OP/CL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>capability</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C.C)
- cb MCA LOGIC MCA PWR
- AC1 3φ FWD 1 – op

---

### EPS SSR-115
**BUS LOSS: AC1 MMC1**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>SM (BFS SM 63) PL BAY DOORS</td>
<td>During PLBD OP/CL, single mtr run time noted on actuators listed at left</td>
<td>① Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>During Rad Dpy/Sto ops: (R13L) RAD CNTL STBD tb (two) indicates single mtr ops</td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C.C)
- cb MCA LOGIC MCA PWR
- AC1 3φ MID 1 – op

**CREW INDICATIONS**

- SM (BFS SM 63) PL BAY DOORS

**NOTES**

1. Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
2. Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
3. Single mtr time

**CREW INDICATIONS**

- SM (BFS SM 63) PL BAY DOORS

---

### EPS SSR-116
**BUS LOSS: AC1 MMC3**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>SM (BFS SM 63) PL BAY DOORS</td>
<td>During PLBD OP/CL, single mtr run time noted on actuators listed at left</td>
<td>① Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>During Rad Dpy/Sto ops: (R13L) RAD CNTL STBD tb (two) indicates single mtr ops</td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C:D)
- cb MCA LOGIC MCA PWR
- AC1 3φ MID 3 – op

**NOTES**

1. Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
2. Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
### EPS SSR-117

**BUS LOSS: AC1 AMC1**

<table>
<thead>
<tr>
<th>ACTION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BUS ISOLATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONLY ON MCC CALL, PERFORM (MA73C:D)</td>
<td>AC1 AMC1 Bus pwr, LH Vent 8,9 Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb MCA PWR AC1 3Φ AFT 1 – op</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 ET Door Mtrs: C/L Lat Actr 1 Mtr 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Mtr 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L Dr Closure Mtr 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uplock Lat Mtr 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EPS SSR-120

**BUS LOSS: AC2**

**ACTIONS**

1. Perform FC2 SHUTDN (FC SHUTDOWN Cue Card)
2. AC2 BUS SNSR – OFF
3. BLR CNTLR/HTR 1 – B
4. BLR CNTLR/HTR 2 – A
5. cb AC1 H2O LOOP PUMP 1A/2 (three) – cl

<table>
<thead>
<tr>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC2 Pumps and pH Snsr</td>
<td>MASTER ALARM Light/Tone – on</td>
<td>1 Redundant mtrs remain</td>
</tr>
<tr>
<td>Hyd H2O Blr 1 Cntlr A</td>
<td>C/W FC PCP It – on</td>
<td></td>
</tr>
<tr>
<td>2 Cntlr B</td>
<td>C/W AC VOLT It – on</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C/W FREON LOOP It – on</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SM ALERT Light/Tone – on</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C/W AV BAY/CABIN AIR It</td>
<td></td>
</tr>
<tr>
<td>Hyd Sep B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabin Fan B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMU Fan B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2O Loop 1 Pump B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Av Bay 1 Fan B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Av Bay 2 Fan A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Av Bay 3 Sig Condrr, Xdcrs (ECLS SC4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freon Loop 1 Pump B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arlk/Tnl Fan B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prox Snsr Elec Box 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freon Sig Condrr B AC2 pwr (ECLS SC1A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freon Sig Condrr B AC2 pwr (ECLS SC1B)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDR Seat Adj via AC2 pwr</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1. FC2 must be shut down within 9 min to avoid potentially hazardous condition
2. Av Bay 3 Fan ΔP, Air Out Temp snsrs lost
3. Freon Loop 2 pump switched to avoid having both loops powered by AC 1
4. Brake/Skid Cntlr Box A,B enabled before WOW
5. Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsrs lost
6. Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate and Accum Qty snsrs lost
7. When gear deployed, tb will not indicate DN
8. APU H2O QTY 1 ind – 0% if BLR CNTLR/HTR 1A active.

**HYD/APU**

| 7-263 | MAL/ALL/GEN J |
BUS LOSS: AC2

**ACTIONS**
- PLT SEAT PNL
- PLT SEAT PWR BUS SEL – AC3 (dn)
- C/W PARAM SEL tw (three) – 072,102
- C/W PARAM – INH
- C/W PARAM SEL tw (three) – > 119

**EQUIP/FUNCTION LOST**
- PLT Seat Adj via AC2 pwr

**CREW INDICATIONS**
- FC2 COOL PUMP \(\Delta P\) tb – bp
- AIR TEMP AV BAY 3 – 45 degF
- FREON FLOW LOOP 2 – 578 pph
- AIR TEMP CAB HX OUT – 45 degF

**NOTES**
- Inhibits Primary C/W for FC2 Stack Temp, and Pump \(\Delta P\)
- Inhibit Loop 1 Cabin HX In Temp
- Lose Auto Temp Cntl via Cntl 1 and Cabin Temp, Cabin Hx Air Out Temp and H2O Loop 1 Cabin Hx In Temp snr. Hx Byp Vlv holds position
- Redundant mtr remains

**SM 60 SM TABLE MAINT**
- Inhibit 0612663

**WCS**
- MODE – AUTO
- CRADLE – AUTO
- Hose stowed in cradle
- WCS ON It – OFF
- FAN SEP SEL sw – OFF
- HOSE BLOCK – SEP 1
- In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete
- FAN SEP SEL sw – 1

If CAB TEMP CNTLR 1 active:
- CAB TEMP CNTLR – OFF

Remove pin from PRI ACTUATOR and BYP Vlv linkage, connect linkage to SEC ACTUATOR

If H2O Loop 1 Pump B active:
- H2O LOOP C/W It
- S88 H2O LOOP 1 FLOW
- S88 H2O LOOP 1 TEMP
- S88 H2O PUMP P1

**BUS ISOLATION**
ONLY ON MCC CALL, PERFORM
- AC2 FMC2 Bus pwr
- L,R Vents 1,2 Mtrs 2
- ADP Deploy Mtrs 2
- Y Star Trkr Dr Sys 2 OP/CL capability
- Z Star Trkr Dr Sys 1 OP/CL capability
- AC2 MNC1 Bus pwr
- LH Vent 5 Mtr 2
- AC2 MMC2 Bus pwr
- PLBD C/L Lat 13-16 Mtr 2
- Stbd Aft Blkhd Mtr 2
- Port Door Mtr 2
- Stbd Rad Lat 1-6 Mtr 2
- LH Vent 3 Mtr 2

**SM (BPS SM 63) PL BAY DOORS**
During PLBD OP/CL, single mtr run time noted on actuators listed at left

(L1) During Rad Dpy/Sto ops: RAD LAT CNTL lbs (two) indicate single mtr ops

(Continued)
### EPS SSR-120 (Cont)

#### BUS LOSS: AC2

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:D) cb MCA PWR</td>
<td>• AC2 3ф AFT 2 – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• AC2 3ф MID 3 – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• AC2 3ф MID 4 – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:E)</td>
<td>• cb AC2 WCS FAN SEP 2 (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• cb AC2 PAYLOAD 3ф – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:F) cb AC2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• RMS B/U φA – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OPS INST HYD ACTR φC – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:G) IF DOCKING MISSION</td>
<td>• cb AC2 ARLK/TNL FAN B (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:H,I) cb AC2</td>
<td>• FWD RCS VLV (three) – op</td>
<td>Arlk/Tnl Fan B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• AFT POD VLV GP 2 (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:C-E) cb AC2</td>
<td>• FC2 PUMPS (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• CTR ENG (three) – op</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• L ENG (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:F-I) cb AC2</td>
<td>• H2O LOOP PUMP 1B (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• AV BAY 1 FAN B (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• AV BAY 2 FAN A (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• IMU FAN B (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:J-K) cb AC2</td>
<td>• HUM SEP B (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• CAB FAN B (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:L) cb AC2</td>
<td>• φA CAB T CNTLR 1 – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• φB AV BAY 3 S/C – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:M) cb AC2</td>
<td>• FREON LOOP 1 PUMP B (three) – op</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>(Continued)</td>
<td>(Continued)</td>
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</tr>
</tbody>
</table>

**NOTES:**
- (13) MCC for Ku Ant stow reqmts
- (14) Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
- (15) Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
- (16) Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
**Actions**

ONLY ON MCC CALL, PERFORM

<table>
<thead>
<tr>
<th>(L4:N) cb AC2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• φA FREON FLOW PROP 1 – op</td>
</tr>
<tr>
<td>• φB FREON SIG CONDR – op</td>
</tr>
<tr>
<td>• cb AC2 φC RAD ISOL A – op</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(L4:O) cb AC2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• φA BLR HYD BYP 1A – op</td>
</tr>
<tr>
<td>• φB HYD QTY 2 – op</td>
</tr>
<tr>
<td>• φC BLR HYD BYP 2B – op</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(L4:P) cb AC2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• φA LG SNSR 2 – op</td>
</tr>
<tr>
<td>• φB RAD CNTLR 1A – op</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(L4:Q) cb AC2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• φA LTG PNL R OVHD – op</td>
</tr>
<tr>
<td>• φB LTG PNL R – op</td>
</tr>
<tr>
<td>• φC LTG NUMERIC OS – op</td>
</tr>
</tbody>
</table>

| (L4:R) cb AC2 φB LTG INST OVHD – op |

**EQUIP/FUNCTION LOST**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>17 Freon Loop 1 Flow Prop Vlv</td>
<td></td>
</tr>
<tr>
<td>18 Freon Loop 1,2 Rad Isol Motor A</td>
<td></td>
</tr>
<tr>
<td>19 Freon Loop 1 Cntlr A Rad Byp Vlv Mtr</td>
<td></td>
</tr>
<tr>
<td>12 ET Doors Mtrs: C/L Lat Actr 1 Mtr 2 L Dr Uplock Lat Mtr 2 R Dr Closure Mtr 2 Uplock Lat Mtr 2</td>
<td></td>
</tr>
<tr>
<td>20 DTV Vertical Interval Processor (VIP)</td>
<td></td>
</tr>
</tbody>
</table>

**CREW INDICATIONS**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Hyd Resv 2 Qty Snsr</td>
<td></td>
</tr>
<tr>
<td>R Ovhd Pnl Lts</td>
<td></td>
</tr>
<tr>
<td>R Pnl Lts</td>
<td></td>
</tr>
<tr>
<td>OS Numeric lts</td>
<td></td>
</tr>
<tr>
<td>Ovhd Inst lts</td>
<td></td>
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</table>

**Notes**

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<table>
<thead>
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<th></th>
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<tbody>
<tr>
<td>12 Redundant mtr remains</td>
<td></td>
</tr>
<tr>
<td>17 Flow prop vlv holds position</td>
<td></td>
</tr>
<tr>
<td>18 Motor B remains</td>
<td></td>
</tr>
<tr>
<td>19 Bypass vlv holds position and Cntlr B Rad Byp Vlv Mtr remains</td>
<td></td>
</tr>
<tr>
<td>20 MCC for Reconfig</td>
<td></td>
</tr>
</tbody>
</table>
## EPS SSR-121
### BUS LOSS: AC2 φA

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4:F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</td>
<td>1φ of Hum Sep B</td>
<td>MASTER ALARM</td>
<td>1 If H2O Loop 1 Pump B active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W</td>
</tr>
<tr>
<td>(L1)</td>
<td>• HUM SEP A – ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• B – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• IMU FAN A(C) – ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• B – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(two) – GPC,A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• H2O PUMP LOOP 2 – ON</td>
<td>1φ of Freon Loop 1 Pump B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(two) – A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• AV BAY 1 FAN A – ON</td>
<td>1φ of AV Bay 1 Fan B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• B – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 2 FAN A – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• B – ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MO13Q)</td>
<td>If Arlk/Tnl Fan active:</td>
<td>1φ of WCS Fan/Sept 2</td>
<td>(Continued)</td>
</tr>
<tr>
<td>(L4-P)</td>
<td>• cb AC3 φA LG SNSR 1 – cl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R2)</td>
<td>• BLR CNTLR/HTR 1 – B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(WCS)</td>
<td>• MODE – AUTO</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• CRADLE – AUTO</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Hose stowed in cradle</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• WCS ON it – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• FAN SEP SEL sw – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• HOSE BLOCK – SEP 1</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• FAN SEP SEL sw – 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If Cab Temp Cntlr 1 active: (L1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• CAB TEMP CNTLR – OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MD44F)</td>
<td>• Remove pin from PRI Actuator and BYP vlv linkage, connect linkage to SEC Actuator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>• CAB TEMP CNTLR – 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Continued)</td>
<td>Cabin Temp Cntlr 1, Hx Byp Vlv Mtr 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CREW INDICATIONS
- MASTER ALARM
  - Light/Tone – on
- C/W AC VOLT lt – on
- SM ALERT Light/Tone – on
- AC2 φA AC volts < 90
- LIGHTS LOST
  - R Ovhd pnl lts (pnlts 01,02,03,08,09,016,017)
- APU H2O QTY 1 ind – 0%
- APU H2O QTY 1 ind – 0% if BLR CNTLR/HTR 1A active
- Brake/Skid Cntlr Box A,B enabled before WOW
- 2φ ops will result in degraded airflow. Crew actions will pwr fans thru alt pwr source with full 3φ power
- Lose Auto Temp Cntl via Cntlr 1 and Cabin Temp, Cabin Hx A Out Temp and H2O Loop 1 Cabin Hx In Temp snsrs Hx Byp Vlv hold position
**EPS SSR-121 (Cont) BUS LOSS: AC2 °A**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R13U)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – 043 (AC2 voltage)</td>
<td>1° of FC2 H2 Pump</td>
<td>8 Inhibit Loop 1 Cabin HX In Temp</td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM – INH</td>
<td>1° of FC2 Coolant Pump</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MEM – CLEAR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• C/W PARAM SEL tw (three) – &gt; 119</td>
<td></td>
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<tr>
<td>(R1)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• AC2 BUS SNSR – OFF (1 sec)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AC2 BUS SNSR – AUTO TRIP</td>
<td></td>
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<tr>
<td>[SM 60 SM TABLE MAINT]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Reset upper limit of 0450214 (FC2 H2 PUMP STATUS) to current value + 0.3 volts</td>
<td>9 If bus shorted: AC2 payload 3° Bus pwr (pwrs MS, PS Patch panel)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Inhibit 0612663</td>
<td></td>
<td></td>
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<tr>
<td>If bus shorted:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Open all AC2 °A cs that pwr 3° loads on pnl L4: C-K, M (10 cbs), pnl MA73C: E,G,H,I (4 cbs)</td>
<td>10 AC2 FMC2 Bus pwr</td>
<td>5 Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from two phases into short. After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unpwring sub-buses: SSR-124, SSR-125, SSR-126, SSR-127, SSR-128, SSR-129</td>
<td></td>
</tr>
<tr>
<td>• Open all AC2 3° ganged cs on pnl MA73C: C-G (9 cbs)</td>
<td>MMC1 Bus pwr</td>
<td></td>
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<tr>
<td>•</td>
<td>MMC2 Bus pwr</td>
<td></td>
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<tr>
<td>•</td>
<td>MMC3 Bus pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>MMC4 Bus pwr</td>
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<td></td>
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<tr>
<td>10 If bus shorted:</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>•</td>
<td>AMC2 Bus pwr</td>
<td></td>
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<tr>
<td>If bus not shorted:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perform the following BUS ISOLATION steps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 BUS ISOLATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF BUS NOT SHORTED, PERFORM</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(L4-L)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC2 °A CAB T CNTLR 1 – op</td>
<td></td>
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<tr>
<td>(L4-N)</td>
<td></td>
<td></td>
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<tr>
<td>• cb AC2 °A FREON FLOW PROP 1 – op</td>
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<tr>
<td>(L4-O)</td>
<td></td>
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<tr>
<td>• cb AC2 °A BLR HYD BYP 1A – op</td>
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<tr>
<td>(L4-P)</td>
<td></td>
<td></td>
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<tr>
<td>• cb AC2 °A LG SNSR 2 – op</td>
<td></td>
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<tr>
<td>(L4-Q)</td>
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<tr>
<td>• cb AC2 °A LTG PNL R OVHD – op</td>
<td></td>
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<td></td>
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<tr>
<td>(MA73C:F)</td>
<td></td>
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<tr>
<td>• cb AC2 RMS B/U °A – op</td>
<td></td>
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</tr>
<tr>
<td>11 For unshorted bus, perform single ° isolation steps to prevent pwrng single phase loads with coupled energy from remaining two phases</td>
<td></td>
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<tr>
<td>12 DTV Vertical Interval Processor (VIP)</td>
<td></td>
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</tr>
<tr>
<td>13 Freon Loop 1 Flow Prop Vlv</td>
<td></td>
<td></td>
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<tr>
<td>R Ovhd pnl Its (pnl's O1,O2, O3,O6,O9,016,017)</td>
<td></td>
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</tr>
<tr>
<td>RMS: 1° of Port MPM Mtr 2</td>
<td></td>
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</tr>
<tr>
<td>Sbhd MPM Mtr 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port Fwd MRL Mtr 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port Mid MRL Mtr 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sbhd Mid MRL Mtr 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sbhd Aft MRL Mtr 2</td>
<td></td>
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<tr>
<td>D&amp;C B/U edge ltg</td>
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<tr>
<td>NLG, LMG B/U Rel 2 Fire 2, Arm</td>
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<tr>
<td>FC2 pH Snsr</td>
<td></td>
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</tbody>
</table>
### ACTIONS

| L4:F | cb AC1 H2O LOOP PUMP 1A/2 (three) – cl |
| L1 | HUM SEP A – ON |
|  | • B – OFF |
|  | • IMU FAN A(C) – ON |
|  | • B – OFF |
|  | • H2O PUMP LOOP 1 (two) – GPC,A |
|  | • H2O PUMP LOOP 2 – ON |
|  | • AV BAY 3 FAN (two) – ON |
|  | • FREON PUMP LOOP 1.2 (two) – A |
|  | • AV BAY 1 FAN A – ON |
|  | • B – OFF |
|  | • 2 FAN A – OFF |
|  | • B – ON |

### EQUIP/FUNCTION LOST

| 1 | 1φ of Hum Sep B |
| 2 | 1φ of IMU Fan B |
| 3 | 1φ of H2O Loop 1 Pump B |
| 4 | AV Bay 3 Sig Condr,Xdcrs (ECLS SC4) |
| 5 | 1φ of Av Bay 2 Fan A |
| 6 | 1φ of Cabin Fan B |
| 7 | Freon Sig Condr A AC2 pwr (ECLS SC1A) |
| 8 | Freon Sig Condr B AC2 pwr (ECLS SC1B) |

### CREW INDICATIONS

- MASTER ALARM
  - Light/Tone – on
- C/W AC VOLT lt
- C/W FREON LOOP lt
- SM ALERT Light/Tone

### NOTES

1. If H2O Loop 1 Pump B active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W.
2. Av Bay 3 Fan ΔP, Air Out Temp snsrs lost
3. Freon Loop 2 pump switched to avoid having both Freon loops powered by AC1
4. Freon Loop 1 P/L Ht Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsrs lost
5. Freon Loop 2 P/L Ht Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snsrs lost
6. 2φ ops will result in degraded airflow. Crew actions will pwr fans thru alt pwr source with full 3φ power
### ACTIONS

**If bus shorted:**
- Open all AC2 φB cbs that pwr 3φ loads on pnl L4: C-K,M (10 cbs), pnl MA73C: E,G,H,I (4 cbs)
- Open all AC2 3φ ganged cbs on pnl MA73C: C-G (9 cbs)

**If bus not shorted:**
- Perform the following BUS ISOLATION steps

### EQUIP/FUNCTION LOST

**If bus shorted:**
- AC2 payload 3φ Bus pwr (pwrs MS, PS Patch panel)
- AC2 FMC2 Bus pwr
- MMC1 Bus pwr
- MMC2 Bus pwr
- MMC3 Bus pwr
- MMC4 Bus pwr
- AMC2 Bus pwr

### CREW INDICATIONS

**7**
- Ganged cb.
  - Isolation of shorted phase req’d to prevent coupling of energy from remaining two phases into short.
  - After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unpwring sub-buses:
    - SSR-124, SSR-125, SSR-126, SSR-127, SSR-128, SSR-129

**8**
- Ganged cb.
  - Isolation of shorted phase req’d to prevent coupling of energy from remaining two phases into short

**9**
- For unshorted bus, perform single φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases

**10**
- Bypass vlv holds position and Cntlr B Rad Byp Vlv Mtr remains

### BUS ISOLATION

**IF BUS NOT SHORTED, PERFORM**

(L4:L)
- cb AC2 φB AV BAY 3 S/C – op

(L4:N)
- cb AC2 φB FREON SIG CONDR – op

(L4:O)
- cb AC2 φB HYD QTY 2 – op

(L4:P)
- cb AC2 φB RAD CNTLR 1A – op

(L4:Q)
- cb AC2 φB LTG PNL R – op

(L4:R)
- cb AC2 φB INST OVHD – op

### NOTES

**7**
- Ganged cb.
  - Isolation of shorted phase req’d to prevent coupling of energy from remaining two phases into short.

**8**
- Ganged cb.
  - Isolation of shorted phase req’d to prevent coupling of energy from remaining two phases into short

**9**
- For unshorted bus, perform single φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases

**10**
- Bypass vlv holds position and Cntlr B Rad Byp Vlv Mtr remains

**RMS:**
- 1φ of Port MPM Mtr 2
- Stbd MPM Mtr 1
- Port Fwd MRL Mtr 1
- Port Mid MRL Mtr 2
- Stbd Mid MRL Mtr 1
- Stbd Aft MRL Mtr 2

**1φ of AC2 payload**
- 3φ Bus pwr (pwrs MS, PS Patch pnl)
**EPS SSR-123**

**BUS LOSS: AC2 φC**

### ACTIONS

| (L4:F) | • cb AC1 H2O LOOP PUMP 1A/2 (three) – cl |
| (L1)   | • HUM SEP A – ON  
|        | • B – OFF  
|        | • IMU FAN A(C) – ON  
|        | • B – OFF  
|        | • H2O PUMP LOOP 1 (two) – GPC,A  
|        | • H2O PUMP LOOP 2 – ON FREN PUMP LOOP 1,2 (two) – A  
|        | • AV BAY 1 FAN A – ON  
|        | • B – OFF  
|        | • 2 FAN A – OFF  
|        | • B – ON  
| (MO13Q) | If Arlk/Tnl Fan active:  
|        | • ARLK FAN B – OFF  
|        | • √ A – ON  
| (R2)   | • BLR CNTRL/HTR 2 – A  
| (R13U) | • C/W PARAM SEL tw (three) – 043 (AC2 voltage)  
|        | • C/W PARAM – INH  
|        | • C/W MEM – CLEAR  
|        | • C/W PARAM SEL tw (three) – > 119  
| (R1)   | • AC2 BUS SNSR – OFF (1 sec)  
|        | • AC2 BUS SNSR – AUTO TRIP  
| (SM 60 SM TABLE MAINT) | • Reset upper limit of 0450214 (FC2 H2 PUMP STATUS) to current value + 0.3 volts  
| (WCS)  | • √ MODE – AUTO  
|        | • √ CRADLE – AUTO  
|        | • √ Hose stowed in cradle  
|        | • WCS ON it – OFF  
|        | • FAN SEP SEL sw – OFF  
|        | • HOSE BLOCK – SEP 1  
|        | • In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete  
|        | • FAN SEP SEL sw – 1  

### EQUIP/FUNCTION LOST

| 1Φ of Hum Sep B |
| 1Φ of IMU Fan B |
| 1Φ of H2O Loop 1 Pump B |
| 1Φ of Freon Loop 1 Pump B |
| 1Φ of Freon Loop 1 Pump B AV Bay 1 Fan B |
| 1Φ of Av Bay 2 Fan A |
| 1Φ of Arlk/Tnl Fan B |
| 1Φ of Cabin Fan B |

### CREW INDICATIONS

| MASTER ALARM  
| Light/Tone – on  
| (F7)  
| C/W AC VOLT lt  
| SM ALERT Light/Tone  
| (LIGHTS LOST)  
| Orbit Sta Numeric (pnl A2,A4)  
| (FSM)  
| S67 AC VOLTS 2  
| 3  
| SM ALERT lt after ~2 min  
| (O1)  
| H2O PUMP OUT PRESS LOOP 1 = 40-45 psia  
| (HYD/APU)  
| If APU QTY 2 ind – 0%  

### NOTES

1. If H2O Loop 1 Pump B active, Loop 1 Pump Out Press must drop below 45 psia to trigger C/W  
2. Freon Loop 2 pump switched to avoid having both loops powered by AC1  
3. APU H2O QTY 2 ind – 0% if in BLR CNTRL/HTR 2B  
4. 2Φ ops will result in degraded airflow. Crew actions will pwr fans thru alt pwr source with full 3Φ power  

(Continued)

(Continued)
### EPS SSR-123 (Cont)
#### BUS LOSS: AC2 φC

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
</table>
| 5 If bus shorted:  
• Open all AC2 φC cbs that pwr 3Φ loads on pnl L4: C-K,M (10 cbs), pnl MA73C: E,G,H,I (4 cbs)  
• Open all AC2 3Φ ganged cbs on pnl MA73C: C-G (9 cbs) | 6 If bus shorted:  
AC2 payload 3Φ Bus pwr  
(pwrs MS, PS Patch panel)  
5 AC2 FMC2 Bus pwr  
MMC1 Bus pwr  
MMC2 Bus pwr  
MMC3 Bus pwr  
MMC4 Bus pwr  
AMC2 Bus pwr | 5 Ganged cb.  
Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short.  
After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unpwring sub-buses: SSR-124, SSR-125, SSR-126, SSR-127, SSR-128, SSR-129 | 5 Ganged cb.  
Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short  
8 Motor B remains |
| 7 If bus not shorted:  
• Perform the following BUS ISOLATION steps | | 6 Ganged cb.  
Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short  
7 For unshorted bus, perform single isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases | 6 Ganged cb.  
Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short  
7 For unshorted bus, perform single isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases |
| **BUS ISOLATION**  
IF BUS NOT SHORTED, PERFORM  
(L4,N)  
• cb AC2 φC RAD ISOL A – op  
(L4,O)  
• cb AC2 φC BLR HYD BYP 2B – op  
(L4.Q)  
• cb AC2 φC LTG NUMERIC OS – op  
(MA73C:F)  
• cb AC2 OPS INST HYD ACTR φC – op | 8 Freon Loop 1,2 Rad Isol  
Motor A  
Orbit Sta Numeric Ltg (pnls A2,A4)  
Ops Hyd Act Inst  
RMS:  
1Φ of Port MPM Mtr 2  
Stbd MPM Mtr 1  
Port Fwd MRL Mtr 1  
Port Mid MRL Mtr 2  
Stbd Mid MRL Mtr 1  
Stbd AR MRL Mtr 2  
1Φ of AC2 payload  
3Φ Bus pwr (pwrs MS, PS Patch pnl) | 8 Freon Loop 1,2 Rad Isol  
Motor A  
Orbit Sta Numeric Ltg (pnls A2,A4)  
Ops Hyd Act Inst  
RMS:  
1Φ of Port MPM Mtr 2  
Stbd MPM Mtr 1  
Port Fwd MRL Mtr 1  
Port Mid MRL Mtr 2  
Stbd Mid MRL Mtr 1  
Stbd AR MRL Mtr 2  
1Φ of AC2 payload  
3Φ Bus pwr (pwrs MS, PS Patch pnl) | 8 Freon Loop 1,2 Rad Isol  
Motor A  
Orbit Sta Numeric Ltg (pnls A2,A4)  
Ops Hyd Act Inst  
RMS:  
1Φ of Port MPM Mtr 2  
Stbd MPM Mtr 1  
Port Fwd MRL Mtr 1  
Port Mid MRL Mtr 2  
Stbd Mid MRL Mtr 1  
Stbd AR MRL Mtr 2  
1Φ of AC2 payload  
3Φ Bus pwr (pwrs MS, PS Patch pnl) |
### EPS SSR-124
**BUS LOSS: AC2 FMC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td>L/R ADP deploy times incr from 15 to 30 sec</td>
<td>1 Redundant mtr remains</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C:C)
- cb MCA LOGIC MCA PWR
- AC2 3φ FWD 2 – op

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
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<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AC2 FMC2 Bus pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L/R Vents 1,2 Mtrs 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADP Dpy Mtrs 2</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Y Star Trkr Dr Sys 2 OP/CL capability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z Star Trkr Dr Sys 1 OP/CL capability</td>
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</table>

### EPS SSR-125
**BUS LOSS: AC2 MMC1**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C:C)
- cb MCA LOGIC MCA PWR
- AC2 3φ MID 1 – op

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AC2 MMC1 Bus pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LH Vent 5 Mtr 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EPS SSR-126
**BUS LOSS: AC2 MMC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C:C)
- cb MCA LOGIC MCA PWR
- AC2 3φ MID 2 – op

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RMS:</td>
<td>SM (BFS SM 63)</td>
<td>1 Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison</td>
</tr>
<tr>
<td></td>
<td>Port MPM Mtr 2</td>
<td>PL BAY DOORS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stbd MPM Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port Fwd MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stbd Aft MRL Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>During PLBD OP/CL, single mtr run time noted on actuators listed at left</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(R13)</td>
<td>2 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AC2 MMC2 Bus pwr</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PLBD C/L Lat 13-16 Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stbd Aft Bkhd Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port Door Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sstd Rad Lat 1-6 Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LH Vent 3 Mtr 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

1. Redundant mtr remains
2. Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
3. Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
### EPS SSR-127
**BUS LOSS: AC2 MMC3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td>NONE</td>
<td>1 Single mtr time</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C.D)
- cb MCA LOGIC MCA PWR
- AC2 3φ MID 3 – op

- AC2 MMC3 Bus pwr
- PL Reten Sys B Rel/Lat Mtrs
- ROEU
- Orbiter arm drive mtr (ODM mtr 2 – mate B, demate B, relax B)
- ODA mtr 2 latch/release

### EPS SSR-128
**BUS LOSS: AC2 MMC4**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td>SM (BFS SM 63) PL BAY DOORS</td>
<td>1 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C.D)
- cb MCA LOGIC MCA PWR
- AC2 3φ MID 4 – op

- AC2 MMC4 Bus pwr
- PLBD Port, Stbd Fwd Bkhd Mtrs 2
- PLBD Stbd Door Mtr 2
- Port Rad Lat 1-6 Mtr 2
- RH Vent 6 Mtr 2
- RMS:
  1 Port Mid MRL Mtr 2
  2 Stbd Mid MRL Mtr 1
  3 Ku Ant Sto/Dpy Mtr 2

**CREW INDICATIONS**

During PLBD OP/CL, single mtr run time noted on actuators listed at left

(R13L)

During Rad Dpy/Sto ops: RAD LAT CNTL PORT tb indicates single mtr ops

### EPS SSR-129
**BUS LOSS: AC2 AMC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td>NONE</td>
<td>1 Redundant mtrs remain</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C.D)
- cb MCA LOGIC MCA PWR
- AC2 3φ AFT 2 – op

- AC2 AMC2 Bus pwr
- LH, RH Vents 8,9 Mtr 2
- ET Door Mtrs:
  1 C/L Lat Actr 1 Mtr 2
  2 L Dr Uplock Lat Mtr 2
  3 R Dr Closure Mtr 2
  4 Uplock Lat Mtr 2

**NOTES**

1 Single mtr time.
2 Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
3 MCC for Ku Ant stow reqmts
### ACTIONS

1. Perform FC3 SHUTDN (EC SHUTDN Cue Card) then:
   - (R1) AC3 BUS SNSR - OFF
   - (R2) BLR CNTLR/HTR 2 - B
   - (R3) 3 - A

   **(L1)**
   - IMU FAN B(A) – ON
   - C – OFF
   - Perform (H2O Loop 2 only), H2O PUMP OPS via GPC, ECLS SSR-10
   - CAB FAN A – OFF
   - CAB FAN B – ON
   - AV BAY 1 FAN (two) – ON
   - AV BAY 2 FAN A – ON
   - AV BAY 2 FAN B – OFF
   - 3 FAN A – OFF
   - 3 FAN B – ON
   - FREON PUMP LOOP 2 – B

   **(L2)**
   - cb AC2 ±0A LG SNSR 2 – cl
   - SIG CONDR FREON A – AC2
   - SIG CONDR FREON B – AC2

   **(CDR SEAT PNL)**
   - CDR SEAT PWR BUS SEL – AC2 (up)
   - PLT SEAT PNL
   - SEAT PWR BUS SEL – AC2 (up)

   **(SM 60 SM TABLE MAINT)**
   - Inhibit 0612605, 0612600, 0612640, 0612610

   **(R13U)**
   - C/W PARAM SEL tw (three) – 082, 112, 105
   - C/W PARAM – INH
   - C/W MEM – CLEAR
   - C/W PARAM SEL tw (three) – > 119

   Refer to OMS/ RCS Slide Rule for vlv loss info (use FPC3 Slide for Aft RCS, and FMC3 for Fwd RCS)

### EQUIP/FUNCTION LOST

- FC3 Pumps and pH Snsr
- Hyd H2O Blr 2 Cntr A
- Hyd H2O Blr 2 Cntr B
- IMU Fan C
- H2O Loop 2 Pump man ON capability
- H2O Loop 1 Byp Cntr, Sig Condr
- Av Bay 1 Sig Condr, Xdcrs (ECLS SC2)
- Av Bay 2 Fan B
- Av Bay 3 Fan A
- Freon Loop 2 Pump A
- Freon Sig Condr A AC3 pwr (ECLS SC1A)
- Freon Sig Condr B AC3 pwr (ECLS SC1B)
- Prox Snsr Elec box 1
- Freon Loop 2 Pump A

### CREW INDICATIONS

- MASTER ALARM
  - Light/Tone – on
- C/W FREON LOOP lt – on
- C/W FC PUMP lt – on
- C/W FC VOLT lt – on
- C/W H2O LOOP lt – on
- SM ALERT Light/Tone – on
- HYD/ APU
  - HYD QTY 3 ind – 0%
  - APU H2O QTY ind – 0%
- STAR TRKR DR POS -Z – OP/CL time incr from 8 to 16 sec

### NOTES

1. TIME CRITICAL
   - FC3 must be shut down within 9 min to avoid potentially hazardous condition
   - Vlv holds position
   - Av Bay 1 Fan ΔP, Air Out Temp snsrs lost
   - S86 WSB T 2 if in BLR/CNTRL 2A. S86 WSB T 3 if in BLR/CNTRL 3B
   - Brake/Skid Cntl Box A,B enabled before WOW
   - Freon Loop 1 P/L Hx Flow Rate, Freon Loop 2 ICH Flow Rate, and Accum Qty snsrs lost
   - Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snsrs lost
   - Indicates DN when NLG down
   - Will not indicate DN when RMG down
   - APU H2O QTY 2 if in BLR/CNTRL 2A. APU H2O QTY 3 if in BLR/CNTRL 3B
   - Inhibits H2O Loop 1 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, respectively
   - Inhibits Primary C/W for FC3 Stack Temp and Pump ΔP, H2O Loop 1,2 Pump P

   Refer to OMS/ RCS Slide Rule for vlv loss info (use FPC3 Slide for Aft RCS, and FMC3 for Fwd RCS)
## ACTIONS

**ONLY ON MCC CALL, PERFORM**

(MA73C:C)  
- cb MCA LOGIC MCA PWR
  - AC3 3φ FWD 3 – op
  - AC3 3φ MID 2 – op

(MA73C:D)  
- cb MCA LOGIC MCA PWR
  - AC3 3φ AFT 3 – op
  - MID 4 – op

(MA73C:E)  
- cb AC3 PAYLOAD 3φ – op

(MA73C:G)  
- cb AC3 GALLEY FAN (three) – op

(MA73C:H)  
- cb AC3 FWD RCS VLV (three) – op
- cb AC3 AFT POD VLV GP 3 (three) – op

(L4:A)  
- cb UTIL PWR A15/MO13Q (A15/MO13Q)

(L4:C-E)  
- cb AC3
  - FC3 PUMPS (three) – op
  - R ENG (three) – op
  - L ENG (three) – op

(L4:F-H)  
- cb AC3
  - H2O LOOP PUMP 2 (three) – op
  - AV BAY 3 FAN A (three) – op
  - AV BAY 2 FAN B (three) – op

(L4:I,J)  
- cb AC3
  - IMU FAN C (three) – op
  - φA SIG/CONDR HUM SEP – op
  - φB SIG/CONDR IMU FAN – op

(Continued)

## EQUIP/FUNCTION LOST

13. KU ANT Sto/Dpy Mtr 1  
   AC3 FMVC3 Bus pwr  
   R ADP Dpy Mtr 1  
   R ADP Dpy Mtr 1

14. Z Star Trkr Dr Sys 2 OP/CL capability  
   LH Vents 1.2 Mtr 1  
   AC3 MMC2 Bus pwr  
   PLBD C/L Lat 1-4 Mtr 2  
   5-8 Mtr 2  
   Port Aft Bilkhd Mtr 2  
   Stbd Rad Lat 7-12 Mtr 2  
   Dpy/Sto Mtr 2  
   LH Vent 6 Mtr 2  
   3 Mtr 1  
   AC3 AMC3 Bus pwr  
   RH Vents 8.9 Mtr 1  
   AC3 MMC4 Bus pwr  
   PLBD C/L Lat 9-12 Mtr 2  
   13-16 Mtr 1  
   Stbd Aft Bilkhd Mtr 1  
   Port Door Mtr 1  
   Port Rad Lat 7-12 Mtr 2  
   Dpy/Sto Mtr 2  
   RH Vents 3.5 Mtr 2

(Continued)

## CREW INDICATIONS

- R ADP deploy time incr from 15 to 30 sec
- SM (BFS SM 63) PL BAY DOORS
- During PLBD OP/CL, single mtr run time noted on actuators listed at left
- During Rad Dpy/Sto ops: (R13L) RAD CNTL tbs (four) indicate single mtr ops

## NOTES

13. *MCC for Ku Ant stow reqmts*  
14. Redundant mtrs remain  
15. Hum Sep A,B Speed Norm Snrs lost  
16. IMU Fan A,B,C Speed Norm Snrs lost
### EPS SSR-130 (Cont)

#### BUS LOSS: AC3

**Actions**

<table>
<thead>
<tr>
<th>(L4,K,L) cb AC3</th>
<th>EQUIP/FUNCTION LOST</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABIN FAN A (three) – op</td>
<td>Freon Loop 2 Flow Prop Vlv</td>
</tr>
<tr>
<td>ΦA FREON FLOW PROP 2 – op</td>
<td>Freon Loop 1,2 Rad Isol Motor B</td>
</tr>
<tr>
<td>ΦB FREON SIG/CONDRT – op</td>
<td>Hyd Rsvr Qty Snsr</td>
</tr>
<tr>
<td>(L4,M,N) cb AC3</td>
<td>Freon Loop 2 Cntlr A Rad Byp Viv Mtr</td>
</tr>
<tr>
<td>FREON LOOP 2 PUMP A (three) – op</td>
<td>Sta 1,2 COAS Itg pwr</td>
</tr>
<tr>
<td>ΦA FREON FLOW PROP 2 – op</td>
<td>MS pnl lts (pnlrs R10,R12)</td>
</tr>
<tr>
<td>ΦB FREON SIG/CONDRT – op</td>
<td>OS pnl lts (pnlrs A1,A2,A6, A7,A8,A13,L9)</td>
</tr>
<tr>
<td>(L4,N) cb AC3</td>
<td>L/Ctr Inst lts (pnlrs C2,F6,F7)</td>
</tr>
<tr>
<td>ΦC RAD ISOL B – op</td>
<td>ET Door Mtrs:</td>
</tr>
<tr>
<td>(L4,O) cb AC3</td>
<td>C/L Lat Actr 2 Mtr 2</td>
</tr>
<tr>
<td>ΦA BLR HYD BYP 2A – op</td>
<td>L Dr Closure Mtr 2</td>
</tr>
<tr>
<td>ΦB HYD QTY 3 – op</td>
<td>R Dr Closure Mtr 1</td>
</tr>
<tr>
<td>ΦC BLR HYD BYP 3B – op</td>
<td>Uplock Lat Mtr 1</td>
</tr>
<tr>
<td>(L4,P) cb AC3</td>
<td>RMS:</td>
</tr>
<tr>
<td>ΦA LG SNSR 1 – op</td>
<td>Port PNL Mtr 1</td>
</tr>
<tr>
<td>ΦB RAD CNTLR 2A – op</td>
<td>Port PNL Mtr 2</td>
</tr>
<tr>
<td>(L4,Q) cb AC3</td>
<td>Port Aft MRL Mtr 1</td>
</tr>
<tr>
<td>ΦA LTG COAS – op</td>
<td>Port Mid MRL Mtr 2</td>
</tr>
<tr>
<td>ΦB LTG PNL MS – op</td>
<td>Port Fwd MRL Mtr 2</td>
</tr>
<tr>
<td>ΦC LTG PNL OS – op</td>
<td></td>
</tr>
<tr>
<td>(L4,R) cb AC3</td>
<td>Stbd Mid MRL Mtr 1</td>
</tr>
<tr>
<td>ΦB INST L/CTR – op</td>
<td>Stbd Fwd MRL Mtr 1</td>
</tr>
</tbody>
</table>

**Crew Indications**

| 2 Vlv holds position |
| 14 Redundant mtrs remain |
| 17 Motor A remains |
| 18 Bypass vlv holds position and Cntlr B Rad Byp Viv Mtr remains |
| 19 Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison |
| 20 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists |
| 21 Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists |

**Notes**

- 2 Vlv holds position
- 14 Redundant mtrs remain
- 17 Motor A remains
- 18 Bypass vlv holds position and Cntlr B Rad Byp Viv Mtr remains
- 19 Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison
- 20 Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists
- 21 Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
# EPS SSR-131

## BUS LOSS: AC3 φA

### ACTIONS

- (L1)
  - ✗ IMU FAN B – ON
  - ✗ C – OFF
  - H2O PUMP LOOP 1 
    (two) – ON, B
  - Perform (H2O Loop 2 only), H2O PUMP OPS via GPC, ECLS SSR-10

- FREON PUMP LOOP 2 – B
  - ✗ AV BAY 2 FAN A – ON
  - ✗ B – OFF
  - ✗ 3 FAN A – OFF
  - ✗ B – ON

- Verify Cabin Fan A operation. If running, then:
  - (L1)
    - Install sw guard (stowed in IFM tool kit) over Cab Fan A
      sw in the ON position

- (L4-P)
  - cb AC2 φA LG SNSR 2 – cl

- (SM 60 SM TABLE MAINT)
  - Inhibit 0612605, 0612600, 0612640, 0612610
  - Reset upper limit of 0450314 (FC3 H2 PUMP STATUS) to current value +0.3 volts

- (R2)
  - C/W PARAM SEL tw (three) – > 105, 053
  - C/W PARAM – INH
  - C/W MEM – CLEAR
  - C/W PARAM SEL tw (three) – > 119

- (R1)
  - AC3 BUS SNSR – OFF
    (1 sec)
  - AC3 BUS SNSR – AUTO TRIP

### EQUIP/FUNCTION LOST

1. ✗ of IMU Fan C

2. ✗ of H2O Loop 2 Pump man ON

3. ✗ of Freon Loop 2 Pump A

4. ✗ of AV Bay 2 Fan B

5. ✗ of AV Bay 3 Fan A

### CREW INDICATIONS

- MASTER ALARM
  - Light/Tone – on
- C/W AC VOLT lt – on
- C/W H2O LOOP lt – on

- H2O PUMP OUT PRESS
  - LOOP 1 meter ind – 0 psia

- APY/Hyd Blr Cntrl/Htr 2A

- HYD/APU
  - APU H2O QTY 2 ind – 0%

- If H2O PUMP LOOP 2 active:
  - ‘S88 H2O PUMP P 2’
  - H2O PUMP OUT PRESS LOOP 2 ind – 40-45 psia

- If APUs active and using BLR CNTLR/HTR 2A:
  - C/W APU TEMP lt – on
  - after ~2 min

- If IMU FAN C ON:
  - S87 IMU FAN DP
  - S66 IMU FAN SPD C

### NOTES

1. If H2O Loop 2 Pump active, Loop 2 Pump Out Press must drop below 45 psia to trigger C/W

2. H2O Loop 1 Pump Out Press, Pump ΔP, Accum Qty, Pump Out Temp snrs lost

3. Indicates DN when NLG down

4. Will not indicate DN when RMG down

5. Switch guard installed to prevent Cab Fan A from being turned off during LiOH can changeout and cabin fan filter cleaning

6. Brake/Skid Cntl Box A,B enabled before WOW

7. Inhibits H2O Loop 1 Pump ΔP, Pump Out Press, Pump Out Temp, Accum Qty, respectively

8. Inhibits Primary C/W for H2O Loop 1 Pump P and AC3 voltage


10. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short. After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unprwing sub-buses: SSR-134, SSR-135, SSR-136, SSR-137


12. MCC will provide equipment reconfig info if reqd

(Continued)
**EPS SSR-131 (Cont)**

**BUS LOSS: AC3 φA**

### BUS ISOLATION

If bus not shorted, perform

- (L4:L)
  - cb AC3 φA H2O CNTLR 1 – op
- (L4:N)
  - cb AC3 φA FREON FLOW PROP 2 – op
  - cb AC3 φA BLR HYD BYP 2A – op
- (L4:P)
  - cb AC3 φA LG SNSR 1 – op
- (L4:Q)
  - cb AC3 φA LTG COAS – op

### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4:J)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC3 φA SIG CONDR HUM SEP – op</td>
<td>14</td>
<td>Hum Sep Sig Condr (ECLS SC 5)</td>
</tr>
<tr>
<td>(L4:L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC3 φA H2O CNTLR 1 – op</td>
<td>14</td>
<td>Hum Sep A,B Speed Norm snsrs lost</td>
</tr>
<tr>
<td>(L4:N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC3 φA FREON FLOW PROP 2 – op</td>
<td>15</td>
<td>Freon Loop 2 Flow Prop Vlv holds position</td>
</tr>
<tr>
<td>(L4:O)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC3 φA BLR HYD BYP 2A – op</td>
<td>15</td>
<td>Freon Loop 2 Flow Prop Vlv holds position</td>
</tr>
<tr>
<td>(L4:P)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC3 φA LG SNSR 1 – op</td>
<td>15</td>
<td>Freon Loop 2 Flow Prop Vlv holds position</td>
</tr>
<tr>
<td>(L4:Q)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC3 φA LTG COAS – op</td>
<td>15</td>
<td>Freon Loop 2 Flow Prop Vlv holds position</td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

- Sta 1,2 COAS pwr
- NLG, RMG Backup Rel 1 Fire 2, Arm FC 3 pH Snsr
- RMS:
  - 1φ of Port MPM Mtr 1
  - Stbd MPM Mtr 2
  - Port Fwd MRL Mtr 2
  - Port Aft MRL Mtr 1
  - Stbd Fwd MRL Mtr 1
  - Stbd Mid MRL Mtr 2
- 1φ of AC3 payload
- 3φ Bus pwr (pwr MS, PS Patch pnl)

**09/26/08**

**7-279**

**MAL/ALL/GEN J**
## EPS SSR-132
### BUS LOSS: AC3 φB

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4:F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</td>
<td>1 φ of IMU Fan C</td>
<td>MASTER ALARM</td>
<td>1 If H2O Loop 2 Pump active, Loop 2 Pump Out Press must drop below 45 psia to trigger C/W</td>
</tr>
<tr>
<td>(L1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• √IMU FAN B – ON</td>
<td>1 φ of H2O Loop 2 Pump man ON capability</td>
<td>(F7)</td>
<td>2 Av Bay 1 Fan ΔP, Air Out Temp snsrs lost</td>
</tr>
<tr>
<td>• √C – OFF</td>
<td></td>
<td>(C/W AC VOLT lt)</td>
<td></td>
</tr>
<tr>
<td>• H2O PUMP LOOP 1 (two) – ON,B</td>
<td>2 Av Bay 1 Sig Condr, Xdcrs (ECLS SC2)</td>
<td>(C/W FREON LOOP lt)</td>
<td></td>
</tr>
<tr>
<td>• H2O PUMP LOOP 2 – GPC</td>
<td>1 φ of Freon Loop 2 Pump A (O1)</td>
<td>SM ALERT lt</td>
<td></td>
</tr>
<tr>
<td>• H2O PUMP LOOP 1 BYP MODE – AUTO</td>
<td>1 φ of AV Bay 2 Fan B</td>
<td>(C/W H2O PUMP lt)</td>
<td></td>
</tr>
<tr>
<td>• H2O PUMP LOOP 2 BYP MODE – MAN</td>
<td>1 φ of AV Bay 3 Fan A</td>
<td>(F9)</td>
<td>3 Switch guard installed to prevent Cab Fan A from being turned off during LiOH can changeout and cabin fan filter cleaning</td>
</tr>
<tr>
<td>• AV BAY 1 FAN (two) – ON</td>
<td>4 Freon Sig Condr A AC3 pwr (ECLS SC1A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FREON PUMP LOOP 2 – B</td>
<td>5 Freon Sig Condr B AC3 pwr (ECLS SC1B)</td>
<td>(HYD/PU)</td>
<td>4 Freon Loop 2 P/L Hx Flow Rate, Freon Loop 1 ICH Flow Rate, and Accum Qty snsrs lost</td>
</tr>
<tr>
<td>• √AV BAY 2 FAN A – ON</td>
<td>1 φ of Cabinet Fan A</td>
<td>(HYD QTY 3 – 0%)</td>
<td></td>
</tr>
<tr>
<td>• √B – OFF</td>
<td></td>
<td>(LIGHTS LOST)</td>
<td></td>
</tr>
<tr>
<td>• √3 FAN A – OFF</td>
<td></td>
<td>L/Ctr Instr lts (pnls C2,F6,F7)</td>
<td></td>
</tr>
<tr>
<td>• √3 FAN A – ON</td>
<td></td>
<td>MS pnl lts (pnls R10,R12)</td>
<td></td>
</tr>
<tr>
<td>3 Verify Cabin Fan A operation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If running, then</td>
<td></td>
<td>(B)</td>
<td></td>
</tr>
<tr>
<td>(L1)</td>
<td>Install sw guard (stowed in IFM tool kit) over Cab Fan A sw in the ON position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(O17:C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SIG CONDR FREON A – AC2</td>
<td>4 Freon Sig Condr A AC3 pwr (ECLS SC1A)</td>
<td>(O1)</td>
<td></td>
</tr>
<tr>
<td>• SIG CONDR FREON B – AC2</td>
<td>5 Freon Sig Condr B AC3 pwr (ECLS SC1B)</td>
<td>H2O PUMP OUT PRESS</td>
<td></td>
</tr>
<tr>
<td>(R13U)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>C/W PARAM SEL tw (three) – 053</td>
<td>1 φ of FC3 H2 Pump</td>
<td>5 Freon Loop 2 P/L Hx Flow Rate Freon Loop 1 ICH Flow Rate, and Accum Qty snsrs lost</td>
</tr>
<tr>
<td>7</td>
<td>C/W PARAM – INH</td>
<td>1 φ of FC3 Coolant Pump</td>
<td>6 Inhibits Primary C/W for AC3 Voltage</td>
</tr>
<tr>
<td>7</td>
<td>Change PRI C/W PARAM 105 low limit to 1.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Change PRI C/W PARAM 115 low limit to 0.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>C/W MEM – CLEAR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>C/W PARAM SEL tw (three) – &gt; 119</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(R1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AC3 BUS SNSR – OFF (1 sec)</td>
<td>1 φ of FC3 H2 Pump</td>
<td>7 Sets H2O Loop 1 Pump P low limit to 45 psia and H2O Loop 2 Pump P low limit to 19.5 psia</td>
<td></td>
</tr>
<tr>
<td>• AC3 BUS SNSR – AUTO TRIP</td>
<td>1 φ of FC3 Coolant Pump</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SM 60 SM TABLE MAINT**

- Reset upper limit of 0450314 (FC3 H2 PUMP STATUS) to current value + 0.3 volts

7 Reconfig B/U C/W
- ITEM 1 +0 6 1 2 6 0 0 EXEC
- ITEM 11 +1 4 5 EXEC
- ITEM 1 +0 8 1 2 7 0 0 EXEC
- ITEM 11 +1 9 5 EXEC

(Continued)
### Actions

8 If bus shorted:
- Open all AC3 φB cbs that pwr 3φ loads on pns L4: C-I,K,M (9 cbs), MA73C: G-I (3 cbs)
- Open all AC3 3φ ganged cbs on pns L4:B (1 cb), MA73C: C-G (7 cbs)

9 If bus shorted:
- AC3 payload 3φ Bus pwr (pwr MS, PS Patch panel)
- AC3 FMC3 Bus pwr
- MMC2 Bus pwr
- MMC4 Bus pwr
- AMC3 Bus pwr

10 1φ of AC Utility Power Outlets at A15 and MO13Q

### Crew Indications

11 For unshorted bus, perform single φ isolation steps to prevent pwrng single phase loads with coupled energy from remaining two phases

12 IMU Fan Sig Condr (ECLS SC7)

13 Freon Loop 2 Cntrl A Rad Byp Vlv Mtr

### Notes

8 Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into short. After opening cbs, refer to the following SSRs for functions lost and crew indications caused by unpwring sub-buses: SSR-134, SSR-135, SSR-136, SSR-137

9 Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into shorts

10 MCC will provide equipment reconfig info if reqd

11 For unshorted bus, perform single φ isolation steps to prevent pwrng single phase loads with coupled energy from remaining two phases

12 IMU Fan A,B,C Speed Norm snsr lost

13 Bypass vlv holds position and Cntrl B Rad Byp Vlv Mtr remains
### EPS SSR-133

#### BUS LOSS: AC3 φC

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4:F)</td>
<td>• cb AC1 H2O LOOP PUMP 1A/2 (three) – cl</td>
<td>1Φ of IMU Fan C 1Φ of H2O Loop 2 Pump man ON capability</td>
<td>1. H2O Loop 2 Pump Out Press must drop below 45 psia to trigger C/W</td>
</tr>
</tbody>
</table>
| (L1)    | • √ IMU FAN B – ON  
• √ C – OFF  
• H2O PUMP LOOP 1 (two) – ON,B  
• H2O PUMP LOOP 2 – GPC  
• H2O PUMP LOOP 1 BYP MODE – AUTO  
• H2O PUMP LOOP 2 BYP MODE – MAN  
• √ FREON PUMP LOOP 2 – B  
• √ AV BAY 2 FAN A – ON  
• √ B – OFF  
• √ C FAN A – OFF  
| | | | 2 Switch guard installed to prevent Cab Fan A from being turned off during LOH can changeout and cabin fan filter cleaning |
| 2 Verify Cabin Fan A operation. | 1Φ of Freon Loop 2 Pump A 1Φ of AV Bay 2 Fan B 1Φ of AV Bay 3 Fan A | 3. Inhibits Primary C/W for AC3 Voltage |
| (R2)    | • BLR CNTLR/HTR 3 – A | 1Φ of Cabin Fan A | 4. Sets H2O Loop 1 Pump P low limit to 45 psia, and H2O Loop 2 Pump P low limit to 19.5 psia |
| (R1U)   | • C/W PARAM SEL tw (three) – 053  
• C/W PARAM – INH  
• Change PRI C/W PARAM 105 low limit to 1.50  
• Change PRI C/W PARAM 115 low limit to 0.65  
• C/W MEM – CLEAR  
• C/W PARAM SEL tw (three) – > 119 | | 5. Ganged cb. Isolation of shorted phase reqd to prevent coupling of energy from remaining two phases into shorts |
| (R1)    | • AC3 BUS SNSR – OFF (1 sec)  
• AC3 BUS SNSR – AUTO TRIP | | |
| (SM 60 SM TABLE MAINT) | • Reset upper limit of 0450314 (FC3 H2 PUMP STATUS) to current value + 0.3 volts | | |
| 4       | • Reconfg B/U C/W  
- ITEM 1 +0 6 1 2 6 0 0 EXEC  
- ITEM 11 +4 5 EXEC  
- ITEM 1 +0 8 1 2 7 0 0 EXEC  
- ITEM 11 +1 9 5 EXEC | | |
| If bus shorted: | 1Φ of FC3 H2 Pump 1Φ of FC3 Coolant Pump | | |
| 6       | • Open all AC3 φC cbs that pwr 3Φ loads on pnl L4: C-I,K,M (9 cbs), MA73C: G-I (3 cbs)  
• Open all AC3 3Φ ganged cbs on pnl L4:B (1 cb), MA73C: C-G (7 cbs) | | |

(Continued)

(Continued)
## EPS SSR-133 (Cont)

### BUS LOSS: AC3 φC

#### BUS ISOLATION

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>IF BUS NOT SHORTED, PERFORM</td>
</tr>
<tr>
<td></td>
<td>(L4:N)</td>
</tr>
<tr>
<td></td>
<td>• cb AC3 φC RAD ISOL B – op</td>
</tr>
<tr>
<td></td>
<td>(L4:O)</td>
</tr>
<tr>
<td></td>
<td>• cb AC3 φC BLR HYD BYP 3B – op</td>
</tr>
<tr>
<td></td>
<td>(L4:P)</td>
</tr>
<tr>
<td></td>
<td>• cb AC3 φC LTG PNL OS – op</td>
</tr>
</tbody>
</table>

#### EQUIP/FUNCTION LOST

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>1φ of AC Utility Power Outlets at A15 and MO13Q</td>
</tr>
<tr>
<td>9</td>
<td>Freon Loop 1,2 Rad Isol Motor B</td>
</tr>
<tr>
<td></td>
<td>OS pnl lts (pnlrs A1,A2,A6, A7,A8,A13,L9)</td>
</tr>
<tr>
<td></td>
<td>RMS:</td>
</tr>
<tr>
<td></td>
<td>• 1φ of Port MPM Mtr 1</td>
</tr>
<tr>
<td></td>
<td>• Stbd MPM Mtr 2</td>
</tr>
<tr>
<td></td>
<td>• Port Fwd MRL Mtr 2</td>
</tr>
<tr>
<td></td>
<td>• Port Aft MRL Mtr 1</td>
</tr>
<tr>
<td></td>
<td>• Stbd Fwd MRL Mtr 1</td>
</tr>
<tr>
<td></td>
<td>• Stbd Mid MRL Mtr 2</td>
</tr>
<tr>
<td></td>
<td>1φ of AC3 payload</td>
</tr>
<tr>
<td></td>
<td>3φ Bus pwr (pwrs MS, PS Patch pnl)</td>
</tr>
</tbody>
</table>

#### CREW INDICATIONS

7 For unshorted bus, perform single φ isolation steps to prevent pwring single phase loads with coupled energy from remaining two phases

8 MCC will provide equipment reconfig info if reqd

9 Motor A remains

#### NOTES
### EPS SSR-134
**BUS LOSS: AC3 FMC3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>AC3 FMC3 Bus pwr</td>
<td>-Z Star Trkr Dr OP/CL time incr from 8 to 16 sec</td>
<td>① Redundant mtr remains</td>
</tr>
<tr>
<td></td>
<td>LH Vent 1,2 Mtr 1</td>
<td>R ADP Dpy Mtr 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R -Z Star Trkr Dr Sys 2 OP/CL capability</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

- ONLY ON MCC CALL, PERFORM
- (MA73C.C)
  - cb MCA LOGIC MCA PWR
  - AC3 3Φ FWD 3 – op

### EPS SSR-135
**BUS LOSS: AC3 MMC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>AC3 MMC2 Bus pwr</td>
<td>SM (BFS SM 63) PL BAY DOORS</td>
<td>① Single mtr time. One failure away from loss of two out of three MRLs. EVA or RMS jettison capability exists</td>
</tr>
<tr>
<td></td>
<td>PLBD C/L Lat 1-4 Mtr 2</td>
<td>During PLBD OP/CL, single mtr run time noted on actuators listed at left</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-8 Mtr 2</td>
<td>(R13L) During Rad Dpy/Sto ops, RAD CNTL STBD tb (two) indicates single mtr ops</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Port Aft Bkhd Mtr 2</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Stbd Rad Lat 7-12 Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dpy/Sto Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LH Vent 6 Mtr 2</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>3 Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RMS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Port Aft MRL Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Stbd Mid MRL Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 KU ANT Dpy/Sto Mtr 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CREW INDICATIONS**

- ① Redundant mtr remains
- ② Single mtr time. One failure away from loss of MRL latching capability. EVA or OBSS jettison capability exists
- ③ MCC for Ku Ant stow reqmts
### EPS SSR-136
**BUS LOSS: AC3 MMC4**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>RMS: Port MPM Mtr 1</td>
<td>SM (BFS SM 63) PL BAY DOORS</td>
<td>① Single mtr time. One failure away from EVA to stow MPM or from RMS/OBSS jettison</td>
</tr>
<tr>
<td></td>
<td>RMS: Stbd MPM Mtr 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RMS: Port Fwd MRL Mtr 2</td>
<td>During PLBD OP/CL, single mtr run time noted on actuators listed at left</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RMS: Stbd Fwd MRL Mtr 1</td>
<td>(R13L) During Rad Dpy/Sto ops, RAD CNTL PORT tb (two) indicates single mtr ops</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BUS ISOLATION ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(MA73C:D) cb MCA LOGIC MCA PWR AC3 3φ MID 4 – op</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EPS SSR-137
**BUS LOSS: AC3 AMC3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td></td>
<td></td>
<td>① Redundant mtrs remain</td>
</tr>
<tr>
<td>BUS ISOLATION ONLY ON MCC CALL, PERFORM</td>
<td>AC3 AMC3 Bus pwr RH Vents 8.9 Mtr 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:D)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* cb MCA LOGIC MCA PWR AC3 3φ AFT 3 – op</td>
<td>1 ET Door Mtrs: C/L Lat Actr 2 Mtr 2 L Dr Closure Mtr 2 R Dr Closure Mtr 2 Unlock Lat Mtr 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### EPS SSR-140
**BUS LOSS: AC1 RCS/FMC1**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info (Use FMC1 Slide for Fwd RCS)</td>
<td></td>
<td>1 The following tb indications do not change position in response to cmds: (O8) FWD RCS TK ISOL 3/4/5 MANF ISOL 1</td>
<td>1 Vlv remains in tb indicated position</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
</tr>
<tr>
<td>(MA73C:H) • cb AC1 FWD RCS VLV (three) – op</td>
</tr>
</tbody>
</table>

### EPS SSR-141
**BUS LOSS: AC2 RCS/FMC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info (Use FMC2 Slide for Fwd RCS)</td>
<td></td>
<td>1 The following tb indication does not change position in response to cmds: (O8) FWD RCS MANF ISOL 2</td>
<td>1 Vlv remains in tb indicated position</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
</tr>
<tr>
<td>(MA73C:H) • cb AC2 FWD RCS VLV (three) – op</td>
</tr>
</tbody>
</table>

### EPS SSR-142
**BUS LOSS: AC3 RCS/FMC3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to OMS/RCS Slide Rule for vlv loss info (Use FMC3 Slide for Fwd RCS)</td>
<td></td>
<td>1 The following tb indications do not change position in response to cmds: (O8) FWD RCS TK ISOL 1/2 MANF ISOL 3</td>
<td>1 Vlv remains in tb indicated position</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BUS ISOLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
</tr>
<tr>
<td>(MA73C:H) • cb AC3 FWD RCS VLV (three) – op</td>
</tr>
</tbody>
</table>
### EPS SSR-143
**BUS LOSS: AC1 POD/AMC1**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC1 Slide for Aft RCS)</td>
<td></td>
<td></td>
<td>① Vlv remains in tb indicated position</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**
ONLY ON MCC CALL, PERFORM
(MA73C:1) • cb AC 1 AFT POD VLV GP 1 (three) – op

### EPS SSR-144
**BUS LOSS: AC2 POD/AMC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC2 Slide for Aft RCS)</td>
<td></td>
<td></td>
<td>① Vlv remains in tb indicated position</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**
ONLY ON MCC CALL, PERFORM
(MA73C:1) • cb AC 2 AFT POD VLV GP 2 (three) – op
### EPS SSR-145
**BUS LOSS: AC3 POD/AMC3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC3 Slide for Aft RCS)</td>
<td></td>
<td></td>
<td>① vlv remains in tb indicated position</td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C:l)
- cb AC3 AFT POD VLV GP 3 (three) – op

### EPS SSR-146
**BUS LOSS: MNA/B POD/AMC1**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC1 Slide for Aft RCS)</td>
<td></td>
<td>① vlv remains in last commanded position</td>
<td></td>
</tr>
</tbody>
</table>

**BUS ISOLATION**

ONLY ON MCC CALL, PERFORM

(MA73C:l)
- AFT POD VLV LOGIC GP 1/3, 1/2 (two) – OFF

② MCC for impacts to OMS Gauging

<table>
<thead>
<tr>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMS Qty Gauging Degraded</td>
<td>(FSMs)</td>
</tr>
<tr>
<td>RCS PWR FAIL</td>
<td></td>
</tr>
</tbody>
</table>

① vlv remains in last commanded position

② MCC for impacts to OMS Gauging
### EPS SSR-147
**BUS LOSS: MNB/C POD/AMC2**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC2 Slide for Aft RCS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BUS ISOLATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AFT POD VLV LOGIC GP 1/2, 2/3 (two) – OFF</td>
<td>2 OMS Qty Gauging Degraded</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EPS SSR-148
**BUS LOSS: MNC/A POD/AMC3**

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>EQUIP/FUNCTION LOST</th>
<th>CREW INDICATIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Refer to OMS/RCS Slide Rule for vlv loss info (use FPC3 Slide for Aft RCS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BUS ISOLATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONLY ON MCC CALL, PERFORM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• AFT POD VLV LOGIC GP 1/3, 2/3 (two) – OFF</td>
<td>2 OMS Qty Gauging Degraded</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CREW INDICATIONS

- **O8**
  - L,R OMS XFEED B tb – bp
  - R OMS XFEED A tb – bp

- **O7**
  - AFT L,R RCS
  - TK ISOL 3/4/5 B tb – bp
  - MANF ISOL 1 tb – bp
  - (FSMs)
  - RCS PWR FAIL

### NOTES

1. Vlv remains in last commanded position
2. MCC for impacts to OMS Gauging
EPS SSR-150
ALTERNATE PRIMARY PAYLOAD PWR

1.1

Attempt MNC/PRIPL connection again:

O13:E 1. \text{\textbackslash vcb ESS 3AB MNC CONTR – cl}
O14:B 2. \text{\textbackslash vcb MNA MNC CONTR – cl}
R1 3. PL PRI MNC – OFF, ON (tb-ON)

If MNC/PRIPL connection failed, attempt FC3/PRIPL connection:
R1 4. PL PRI MNC – OFF (tb-OFF)
5. FC3 – ON (tb-ON)

If FC3/PRIPL connection failed, attempt MNB/PRIPL connection:

O13:C 6. \text{\textbackslash vcb ESS 2CA MNB CONTR – cl}
O16:B 7. \text{\textbackslash vcb MNC MNB CONTR – cl}
R1 8. PL PRI FC3 – OFF (tb-OFF)
9. MNB – ON (tb-ON)
This procedure is designed to be a standalone procedure with all necessary Bus Loss Actions included. The procedure also may be entered from the MN bus or FPC Bus Loss Actions (MAL or ENT PKT).

**NOTE**

FC must be shut down within 9 min to avoid potentially hazardous condition.

### Step 1: Which AC Bus is affected?

<table>
<thead>
<tr>
<th>AC1</th>
<th>AC2</th>
<th>AC3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Time Critical**

### Step 2: Isolate AC1

1. Perform FC1 SHUTDN (FC SHUTDN Cue Card), pwrdn not needed
2. BLR CNTLR/HTR 1 – A
3. √3 – B

**NOTE**

- If Arlk/Tnl Fan Active:
  - ARLK FAN A – OFF
  - B – ON
- ARLK FAN B – OFF
- CABIN FAN A – OFF
- CABIN FAN B – OFF

### Step 3: Isolate AC2

1. Perform FC2 SHUTDN (FC SHUTDN Cue Card), pwrdn not needed
2. BLR CNTLR/HTR 1 – B
3. 2 – A

**NOTE**

- If CAB TEMP CNTLR 2 active:
  - If Arlk/Tnl Fan Active:
    - ARLK FAN A – OFF
    - A – ON
- ARLK FAN B – OFF
- CABIN FAN A – OFF
- CABIN FAN B – OFF

### Step 4: Isolate AC3

1. Perform FC3 SHUTDN (FC SHUTDN Cue Card), pwrdn not needed
2. BLR CNTLR/HTR 2 – B
3. 3 – A

**NOTE**

- If CAB TEMP CNTLR 1 active:
  - If Arlk/Tnl Fan Active:
    - ARLK FAN A – OFF
    - B – ON
- ARLK FAN B – OFF
- CABIN FAN A – OFF
- CABIN FAN B – OFF

### Step 5: Isolate AC1

- HUM SEP A – OFF
- B – ON
- IMU FAN A – OFF
- √B(C) – ON
- H2O PUMP LOOP 1 (two) – GPC,B
- H2O PUMP LOOP 2 – ON
- AV BAY 1 FAN A – OFF
- √B – ON
- AV BAY 2 FAN A – ON
- √A(C) – ON
- HUM SEP B – OFF
- IMU FAN B – OFF
- HUM SEP A – ON
- HUM SEP B – OFF
- HUM SEP C – OFF
- CABIN FAN A(C) – ON
- H2O PUMP LOOP 1 (two) – GPC,A
- H2O PUMP LOOP 2 – ON
- AV BAY 1 FAN B – OFF
- A – ON
- AV BAY 2 FAN A – OFF
- B – ON
- AV BAY 3 FAN A – OFF
- B – OFF
- AV BAY 3 FAN B – OFF
- IMU FAN B – OFF
- IMU FAN A(C) – ON
- H2O PUMP LOOP 1 (two) – GPC,A
- H2O PUMP LOOP 2 – ON
- AV BAY 1 FAN A – OFF
- √B – ON
- AV BAY 2 FAN A – OFF
- B – ON
- AV BAY 3 FAN A – OFF
- B – OFF
- AV BAY 3 FAN B – OFF
- HUM SEP A – OFF
- HUM SEP B – OFF
- HUM SEP C – OFF
- ARLK FAN A – OFF
- ARLK FAN B – ON
- CABIN FAN A – OFF
- CABIN FAN B – OFF
- HUM SEP A – ON
- HUM SEP B – OFF
- HUM SEP C – OFF
- CABIN FAN A – OFF
- CABIN FAN B – OFF

### Step 6: Isolate AC2

1. HUM SEP B – OFF
2. A – ON
3. CABIN FAN B – OFF
4. A(C) – ON
5. H2O PUMP LOOP 1 (two) – GPC,A
6. H2O PUMP LOOP 2 – ON
7. AV BAY 1 FAN B – OFF
8. A – ON
9. AV BAY 2 FAN A – OFF
10. B – ON
11. AV BAY 3 FAN A – OFF
12. B – OFF
13. AV BAY 3 FAN B – OFF
14. HUM SEP A – OFF
15. HUM SEP B – OFF
16. IMU FAN A(C) – ON
17. H2O PUMP LOOP 1 (two) – GPC,A
18. H2O PUMP LOOP 2 – ON
19. AV BAY 1 FAN B – OFF
20. A – ON
21. AV BAY 2 FAN A – OFF
22. B – ON
23. AV BAY 3 FAN A – OFF
24. B – OFF
25. AV BAY 3 FAN B – OFF
26. HUM SEP A – OFF
27. HUM SEP B – OFF
28. HUM SEP C – OFF
29. ARLK FAN B – OFF
30. ARLK FAN A – ON
31. CABIN FAN A – OFF
32. CABIN FAN B – OFF
33. HUM SEP A – ON
34. HUM SEP B – OFF
35. HUM SEP C – OFF
36. CABIN FAN A – OFF
37. CABIN FAN B – OFF

### Step 7: Isolate AC3

1. CABINET FAN A – OFF
2. CABINET FAN B – ON
3. H2O PUMP LOOP 2 – ON
4. AV BAY 1 FAN B – OFF
5. A – ON
6. AV BAY 2 FAN A – OFF
7. B – ON
8. AV BAY 3 FAN A – OFF
9. B – OFF
10. AV BAY 3 FAN B – OFF
11. HUM SEP A – OFF
12. HUM SEP B – OFF
13. IMU FAN A(C) – ON
14. H2O PUMP LOOP 1 (two) – GPC,A
15. H2O PUMP LOOP 2 – ON
16. AV BAY 1 FAN B – OFF
17. A – ON
18. AV BAY 2 FAN A – OFF
19. B – ON
20. AV BAY 3 FAN A – OFF
21. B – OFF
22. AV BAY 3 FAN B – OFF
23. HUM SEP A – OFF
24. HUM SEP B – OFF
25. IMU FAN A(C) – ON
26. H2O PUMP LOOP 1 (two) – GPC,A
27. H2O PUMP LOOP 2 – ON
28. AV BAY 1 FAN B – OFF
29. A – ON
30. AV BAY 2 FAN A – OFF
31. B – ON
32. AV BAY 3 FAN A – OFF
33. B – OFF
34. AV BAY 3 FAN B – OFF
35. HUM SEP A – OFF
36. HUM SEP B – OFF
37. IMU FAN A(C) – ON
38. H2O PUMP LOOP 1 (two) – GPC,A
39. H2O PUMP LOOP 2 – ON
40. AV BAY 1 FAN B – OFF
41. A – ON
42. AV BAY 2 FAN A – OFF
43. B – ON
44. AV BAY 3 FAN A – OFF
45. B – OFF
46. AV BAY 3 FAN B – OFF
47. HUM SEP A – OFF
48. HUM SEP B – OFF
49. IMU FAN A(C) – ON
50. H2O PUMP LOOP 1 (two) – GPC,A
51. H2O PUMP LOOP 2 – ON
52. AV BAY 1 FAN B – OFF
53. A – ON
54. AV BAY 2 FAN A – OFF
55. B – ON
56. AV BAY 3 FAN A – OFF
57. B – OFF
58. AV BAY 3 FAN B – OFF
59. HUM SEP A – OFF
60. HUM SEP B – OFF
61. IMU FAN A(C) – ON
If Cabin Fan or upgraded AV Bay 3 Fan to be powered via the AC XFER cable (because redundant fan is unavailable), other loads on the xfer cable will need to be unpowered. This is due to the current limitations on the AC XFER Cable (3 amp cb at AC UTIL OUTLET).

Disconnect, unpower AC1 inverters
(R1)
- AC BUS SNSR 1 – OFF
- cb AC CONTR AC1 ΦA,ΦB,ΦC (three) – cl
- INV/AC BUS 1 – OFF (tb-OFF)
- INV PWR 1 – OFF (tb-OFF)
- cb AC CONTR AC1 ΦA,ΦB,ΦC (three) – op

Connect AC1 to AC3
(R1)
- AC BUS SNSR 2 – OFF
- cb AC CONTR AC2 ΦA,ΦB,ΦC (three) – cl
- INV/AC BUS 2 – OFF (tb-OFF)
- INV PWR 2 – OFF (tb-OFF)
- cb AC CONTR AC2 ΦA,ΦB,ΦC (three) – op

Disconnect, unpower AC2 inverters
(R1)
- AC BUS SNSR 3 – OFF
- cb AC CONTR AC3 ΦA,ΦB,ΦC (three) – cl
- INV/AC BUS 3 – OFF (tb-OFF)
- INV PWR 3 – OFF (tb-OFF)
- cb AC CONTR AC3 ΦA,ΦB,ΦC (three) – op
EPS SSR-200 (Cont)

12  (MA73C:C)
- cb AC1 3φ MCA PWR MID 1 – op
- cb AC1 3φ MCA PWR AFT 1 – op
- cb AC1 3φ MCA PWR MID 3 – op
(L1)
- cb AC1 AV BAY 3 FAN B φA, φB, φC (three) – cl

11

13  Connect AC2 to AC3 or AC1
- Perform AC POWER TRANSFER CABLE INSTALLATION (IFM)
(R1)
- AC BUS SNSR 2 – MON
Is Cabin Fan B reqd?

14  Connect AC3 to AC1
- Perform AC POWER TRANSFER CABLE INSTALLATION (IFM)
(R1)
- AC BUS SNSR 3 – MON
Is Cabin Fan A reqd or AV BAY 3 Fan A reqd? (Redundant fan unavailable)

15  (MA73C:C)
- cb AC2 3φ MCA PWR MID 1 – op
- cb AC2 3φ MCA PWR MID 2 – op
(MA73C:D)
- cb AC2 3φ MCA PWR AFT 2 – op
- cb AC2 3φ MCA PWR MID 3 – op
- cb AC2 3φ MCA PWR MID 4 – op
(L4:H)
- cb AC2 CAB FAN B φA, φB, φC (three) – cl
(L1)
- CAB FAN A – OFF
- B – ON

16  (MA73C:C)
- cb AC3 3φ MCA PWR MID 2 – op
(MA73C:D)
- cb AC3 3φ MCA PWR AFT 3 – op
- cb AC3 3φ MCA PWR MID 4 – op
(L4:K)
- cb AC3 CAB FAN A φA, φB, φC (three) – cl
(L1)
- CAB FAN A – ON
- B – OFF
If Cabin Fan A reqd:
(L4:K)
- cb AC3 CAB FAN A φA, φB, φC (three) – cl
(L1)
- CAB FAN A – ON
- B – OFF
If AV BAY 3 FAN A reqd:
(L4:G)
- cb AC3 AV BAY 3 FAN A φA, φB, φC (three) – cl
(L1)
- AV BAY 3 FAN A – ON
- B – OFF

17  MNA shorted?

18  Repower Fuel Cell 1
- Perform FC POWERUP, EPS SSR-6

19  MNB shorted?

20  Repower Fuel Cell 2
- Perform FC POWERUP, EPS SSR-6

21  Repower Fuel Cell 3
- Perform FC POWERUP, EPS SSR-6

22

23

24
### CONTINUOUS EQUIPMENT

After cable installation, the following equipment will be powered CONTINUOUSLY:

<table>
<thead>
<tr>
<th>Equipment Description</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC CURRENT AFTER CABLE INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R1) FUEL CELL 1 PUMPS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:K) AC1 ΦA H2O CNTLR 2 (S/C)</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td>ΦB CAB AIR S/C</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>(L4:L) ΦB AV BAY 2 S/C</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>(L4:O) ΦB HYD QTY 1</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>ΦA BLR HYD BYP SENSOR 1B</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>ΦC BLR HYD BYP SENSOR 3A</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>(L4:L) ΦA CABIN TEMP CNTLR 2 (EL)</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>(MA73C:F) ΦC OPS HYD ACTR INST</td>
<td>.06</td>
<td></td>
</tr>
</tbody>
</table>

**SUBTOTAL AMPS/PFASE**: .98 .89 .94

### INTERMITTENT EQUIPMENT

After cable installation, the following equipment will be available for INTERMITTENT operation:

<table>
<thead>
<tr>
<th>Equipment Description</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4:K) AC1 ΦA H2O CNTLR 2 (BYP VLV)</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>(L4:O) ΦA BLR HYD BYP VLV 1B</td>
<td>.21</td>
<td></td>
</tr>
<tr>
<td>(L4:P) ΦC BLR HYD BYP VLV 3A</td>
<td>.21</td>
<td></td>
</tr>
<tr>
<td>(MA73C:F) AC1 3Φ FWD 1 RH VENTS 1/2 MTR 1</td>
<td>OP – .28 CL – .21</td>
<td></td>
</tr>
<tr>
<td>(MA73C:F) AC1 3Φ MID 1 RH VENT 3 MTR 1</td>
<td>OP – .59 CL – .29</td>
<td></td>
</tr>
<tr>
<td>L ADP DPY MTR 1</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>AC1 3Φ MID 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 MTR 1</td>
<td>OP – .59 CL – .29</td>
<td></td>
</tr>
<tr>
<td>6 MTR 1</td>
<td>OP – .57 CL – .27</td>
<td></td>
</tr>
<tr>
<td>PL RETEN LAT MTR 1</td>
<td>.41</td>
<td></td>
</tr>
<tr>
<td>PORT RAD LAT 1-6, 7-12 MTRS 1 (2 ea)</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>PORT RAD DPY/STO MTR 1</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>PLBD C/L LAT 9-12 MTR 1</td>
<td>.72</td>
<td></td>
</tr>
<tr>
<td>PORT, STBD FWD BLKHD MTRS 1</td>
<td>.87</td>
<td></td>
</tr>
<tr>
<td>PLBD STBD DOOR MTR 1</td>
<td>1.64</td>
<td></td>
</tr>
<tr>
<td>PORT RMS MID RETN LAT MTR 1</td>
<td>.25</td>
<td></td>
</tr>
</tbody>
</table>

**If MNA shorted, FC pumps will not be restarted**

**Includes RUD/SPDBRK and ELVN SW VLV Xdcrs**

**AC Utility Outlet cb can handle up to 6 amps for up to 5 sec. AC current for vent door ops peaks at ~4.5 amps/phase for 1 sec for dual mtr ops, peaks for 6 sec for single mtr ops. The cb should not trip if steady-state loads less than 3 amps/phase for dual mtr ops or less than 1 amp/phase for single mtr ops on all associated vent doors**

**Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase**

**If MNA DA1 is not regained, these mtrs (auto and man cntl) will not be operational**

Total current for each phase of AC bus must not exceed 3 amps continuous. Table should be used to calculate total phase current. CONTINUOUS EQUIPMENT will be powered continuously. INTERMITTENT EQUIPMENT will be available for intermittent ops. CONTINGENCY EQUIPMENT will be available for contingency use only.
**EPS SSR-200 (Cont)**

**AC1 LOAD REFERENCE TABLE (Cont)**

<table>
<thead>
<tr>
<th>INTERMITTENT EQUIPMENT (Cont)</th>
<th>AC CURRENT (amps/phase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:D) AC1 3Φ MID 3 PLBD LAT 1-4, 5-8 MTR 1 (2 ea)</td>
<td>0.72</td>
</tr>
<tr>
<td>L AFT BLKHD MTR 1</td>
<td>0.87</td>
</tr>
<tr>
<td>LH VENTS 5 MTR 1</td>
<td>OP – 0.59 CL – 0.27</td>
</tr>
<tr>
<td>6 MTR 1</td>
<td>OP – 0.57 CL – 0.27</td>
</tr>
<tr>
<td>STBD RAT LAT 1-6, 7-12 MTRS 1 (2 ea)</td>
<td>0.26</td>
</tr>
<tr>
<td>STBD RAD DPY/STO MTR 1</td>
<td>0.26</td>
</tr>
<tr>
<td>PORT RMS AFT RETN LAT MTR 2</td>
<td>0.25</td>
</tr>
<tr>
<td>AC1 3Φ AFT 1 LH VENT 8/9 MTR 1</td>
<td>OP – 0.67 CL – 0.39</td>
</tr>
<tr>
<td>ET DOORS L DRIVE MTR 1</td>
<td>1.06</td>
</tr>
<tr>
<td>L LAT MTR 1</td>
<td>1.28</td>
</tr>
<tr>
<td>C/L LAT 1 MTR 1</td>
<td>0.41</td>
</tr>
<tr>
<td>C/L LAT 2 MTR 1</td>
<td>0.41</td>
</tr>
<tr>
<td>(MA73C:F) ΦA RMS PRIMARY</td>
<td>0.93</td>
</tr>
<tr>
<td>(MA73C:H) FWD RCS VLV (3 ea)</td>
<td>0.42</td>
</tr>
<tr>
<td>(MA73C:I) AFT POD VLV GP 1 AFT RCS ISOL L MANF 2 FU VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>L MANF 2 OX VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>R MANF 2 FU VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>R MANF 2 OX VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>L TK 3/4/5A FU VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>L TK 3/4/5A OX VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>R TK 3/4/5A FU VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>R TK 3/4/5A OX VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>RCS XFEED R MANF 3/4/5 FU VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>R MANF 3/4/5 OX VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>L MANF 3/4/5 FU VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>L MANF 3/4/5 OX VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>L OMS XFEED 3/4/5 FU VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>3/4/5 OX VLV</td>
<td>0.42</td>
</tr>
<tr>
<td>OMS ISOL L FU VLV A</td>
<td>0.42</td>
</tr>
<tr>
<td>L OX VLV A</td>
<td>0.42</td>
</tr>
<tr>
<td>R FU VLV A</td>
<td>0.42</td>
</tr>
<tr>
<td>R OX VLV A</td>
<td>0.42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AC1 CURRENT AFTER CABLE INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΦA</td>
</tr>
</tbody>
</table>

*Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase*
Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase.

H2O LOOP 2 PUMP GPC position pwrd by AC1.

cb opened to prevent powering lights inadvertently.

<table>
<thead>
<tr>
<th>CONTINGENCY EQUIPMENT</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC1 CURRENT AFTER CABLE INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΦA</td>
<td>ΦB</td>
</tr>
<tr>
<td>(L4:J) HUM SEP A</td>
<td>9</td>
<td>.28</td>
</tr>
<tr>
<td>(L4:I) IMU FAN A</td>
<td>9</td>
<td>.17</td>
</tr>
<tr>
<td>(L4:F) H2O LOOP PUMP 1A</td>
<td>9</td>
<td>1.01</td>
</tr>
<tr>
<td>(L4:F) H2O LOOP PUMP 2</td>
<td>9</td>
<td>1.03</td>
</tr>
<tr>
<td>(L4:G) AV BAY 1 FAN A</td>
<td>9</td>
<td>.69</td>
</tr>
<tr>
<td>(L4:H) AV BAY 3 FAN B (upgraded)</td>
<td>9</td>
<td>1.66</td>
</tr>
<tr>
<td>(L4:H) AV BAY 3 FAN B</td>
<td>9</td>
<td>.73</td>
</tr>
<tr>
<td>(L4:M) FREON LOOP 1 PUMP A</td>
<td>9</td>
<td>1.68</td>
</tr>
<tr>
<td>(L4:N) FREON LOOP 2 PUMP B</td>
<td>9</td>
<td>1.68</td>
</tr>
<tr>
<td>(L4:L) AC1 ΦA CABIN TEMP CNTLR 2</td>
<td>9</td>
<td>.15</td>
</tr>
<tr>
<td>(L4:Q) AC1 ΦA LTG PNL L/CTR</td>
<td>12</td>
<td>2.85</td>
</tr>
<tr>
<td></td>
<td>ΦB LTG PNL L/OVHD</td>
<td>12</td>
</tr>
<tr>
<td>(L4:R) ΦA LTG R INST</td>
<td>9</td>
<td>.31</td>
</tr>
<tr>
<td></td>
<td>ΦB LTG NUMERIC</td>
<td></td>
</tr>
<tr>
<td>(L4:Q) ΦC OS LTG INST</td>
<td></td>
<td>.13</td>
</tr>
<tr>
<td>(MA73C:E) WCS FAN SEP 1</td>
<td></td>
<td>.86</td>
</tr>
<tr>
<td>(MA73C:G) AIRLOCK TUNNEL FAN A</td>
<td>9</td>
<td>.80</td>
</tr>
<tr>
<td>(F1/MO5J) AC1 UTILITY POWER</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VACUUM CLEANER</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL AMPS/PHASE
Total current for each phase of AC bus must not exceed 3 amps continuous. Table should be used to calculate total phase current.

**CONTINUOUS EQUIPMENT** will be powered continuously.

**INTERMITTENT EQUIPMENT** will be available for intermittent ops.

**CONTINGENCY EQUIPMENT** will be available for contingency use only.

Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

If MNB lost, FC2 pumps will not be restarted

Includes E1VN PS2 and ME TVC SW VLV Xdcrs

AC Utility Outlet cb can handle up to 6 amps for up to 5 sec. AC current for vent door ops peaks at ~5.1 amps/phase for 1 sec for dual mtr ops, peaks for 6 sec for single mtr ops. The cb should not trip if steady-state loads less than 3 amps/phase for dual mtr ops or less than 1 amp/phase for single mtr ops on all associated vent doors

If MNB DA2 is not regained, this mtr (auto cntl) will not be operational

### AC2 LOAD REFERENCE TABLE

<table>
<thead>
<tr>
<th>Phase</th>
<th>Load Description</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC CURRENT AFTER CABLE INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΦA</td>
<td></td>
<td></td>
<td>ΦA</td>
</tr>
<tr>
<td>ΦB</td>
<td></td>
<td></td>
<td>.81</td>
</tr>
<tr>
<td>ΦC</td>
<td></td>
<td></td>
<td>.81</td>
</tr>
</tbody>
</table>

#### CONTINUOUS EQUIPMENT

After cable installation, the following equipment will be powered CONTINUOUSLY:

- (R1) FUEL CELL 2 PUMPS
- (L4:L) AC2 ΦB AV BAY 3 S/C
- (L4:O) ΦB HYD QTY 2
- (L4:L) ΦA CABIN TEMP CNTLR 1 (EL)
- (L4:O) ΦA BLR HYD CNTL SENSOR 1A
- (L4:O) ΦC BLR HYD CNTL SENSOR 2B
- (L4:P) ΦA LG PROX SNR 2
- (MA73C:F) ΦC OPS INST HYD ACTR

#### INTERMITTENT EQUIPMENT

After cable installation, the following equipment will be available for INTERMITTENT operation:

- (L4:O) AC2 ΦA BLR HYD BYPASS VLV 1A
- ΦC BLR HYD BYPASS VLV 2B
- (L4:P) ΦB RAD CNTLR 1A (FREON LOOP 1 CNTLR A RAD BYP VLV MTR)
- (L4:N) ΦA FREON FLOW PROP 1 (VLV)
- (MA73C:C) Φ FWD 2
- AC2 3 Φ MIG 1
- AC2 3 Φ MIG 2
- AC2 3 Φ MIG 3
- PLBD PORT DOOR MTR 2
- STBD AFT BLKHD LAT MTR 2
- C/L LATCH 13-16 MTR 2
- KU BAND ANT DPLY MTR 2
- STBD RAD LAT 1-6 MTR 2
- PORT RMS DPLY MTR 2
- PORT RMS FWD RETN LAT MTR 1
Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase

<table>
<thead>
<tr>
<th>INTERMITTENT EQUIPMENT</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC2 CURRENT</th>
<th>AC CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:C) (Cont)</td>
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<td></td>
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</tr>
<tr>
<td>AC2 3 Φ AFT 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RH VENTS 8/9 MTR 2</td>
<td>OP – .73 CL – .35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LH VENTS 8/9 MTR 2</td>
<td>OP – .67 CL – .38</td>
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<tr>
<td>ET DOORS L LAT MTR 2</td>
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<tr>
<td>C/L LAT 1 MTR 2</td>
<td>.41</td>
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<td></td>
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<tr>
<td>ET DOORS R DRIVE MTR 2</td>
<td>1.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R LAT MTR 2</td>
<td>1.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC2 3 Φ MID 3</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>PL RET LAT MTR 2</td>
<td>.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC2 3 Φ MID 4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>RH VENT 6 MTR 2</td>
<td>OP – .59 CL – .29</td>
<td></td>
<td></td>
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<tr>
<td>PLBD STBD DOOR MTR 2</td>
<td>1.64</td>
<td></td>
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<tr>
<td>PORT FWD BLKHD LAT MTR 2</td>
<td>.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STBD FWD BLKHD LAT MTR 2</td>
<td>.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PORT RAD LAT 1-6 MTR 2</td>
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<td></td>
</tr>
<tr>
<td>DPLY MTR 2</td>
<td>.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PORT RMS MID RETN LAT MTR 2</td>
<td>.25</td>
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<tr>
<td>(MA73C:F) PAYLOAD</td>
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<tr>
<td>AC2 3 Φ RMS BACKUP</td>
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<td>LEFT SEAT</td>
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<tr>
<td>AC2 3 Φ PORT RMS SHLD BRACE ACTR</td>
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<tr>
<td>(MA73C:G) OMS KIT VLV</td>
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</tr>
<tr>
<td>(MA73C:H) FWD RCS VLV (3 ea)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:E) AFT POD VLV GP 2</td>
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<td></td>
</tr>
<tr>
<td>AFT RCS ISOL L MANF 1 FU VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L MANF 1 OX VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R MANF 1 FU VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R MANF 1 OX VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L TK 3/4/5B FU VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L TK 3/4/5B OX VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R TK 3/4/5B FU VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R TK 3/4/5B OX VLV</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OMS XFEED L FU VLV B</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L OX VLV B</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R FU VLV B</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R OX VLV B</td>
<td>.42</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase.

cb opened to prevent powering lights inadvertently.

### AC2 LOAD REFERENCE TABLE (Cont)

<table>
<thead>
<tr>
<th>CONTINGENCY EQUIPMENT</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC2 CURRENT AFTER CABLE INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>φA</td>
<td>φB</td>
</tr>
<tr>
<td>After cable installation, the following AC2 continuous equipment will be powered off but available for CONTINGENCY use only. Minimize loading to prevent exceeding 3 amps/phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(L4:F) H2O LOOP PUMP 1B</td>
<td>9</td>
<td>1.02</td>
</tr>
<tr>
<td>(L4:G) AV BAY 1 FAN B</td>
<td>9</td>
<td>0.69</td>
</tr>
<tr>
<td>(L4:H) AV BAY 2 FAN A</td>
<td>9</td>
<td>0.70</td>
</tr>
<tr>
<td>(L4:I) IMU FAN B</td>
<td>9</td>
<td>0.18</td>
</tr>
<tr>
<td>(L4:J) HUM SEP B</td>
<td>9</td>
<td>0.28</td>
</tr>
<tr>
<td>(L4:K) CABIN FAN B</td>
<td>9</td>
<td>1.67</td>
</tr>
<tr>
<td>(L4:M) FREON LOOP 1 PUMP B</td>
<td>9</td>
<td>1.68</td>
</tr>
<tr>
<td>(L4:L) AC2 φA CABIN TEMP CNTLR 1</td>
<td>9</td>
<td>0.15</td>
</tr>
<tr>
<td>(L4:R) AC2 φB LTG INST OVHD</td>
<td>9</td>
<td>0.26</td>
</tr>
<tr>
<td>(L4:Q) AC2 φB OS LTG NUMERIC</td>
<td>9</td>
<td>0.20</td>
</tr>
<tr>
<td>(L4:Q) AC2 φA LTG PNL R OVHD</td>
<td>12</td>
<td>1.34</td>
</tr>
<tr>
<td>AC2 φB LTG PNL R</td>
<td>12</td>
<td>1.51</td>
</tr>
<tr>
<td>(L4:N) AC2 φB FREON SIG CONDR</td>
<td>9</td>
<td>0.05</td>
</tr>
<tr>
<td>(MA73C:E) WCS FAN SEP 2</td>
<td>9</td>
<td>0.86</td>
</tr>
<tr>
<td>(MA73C:G) AIRLOCK TUNNEL FAN B</td>
<td>9</td>
<td>0.80</td>
</tr>
</tbody>
</table>

TOTAL AMPS/PHASE
Total current for each phase of AC bus must not exceed 3 amps continuous. Table should be used to calculate total phase current. CONTINUOUS EQUIPMENT will be powered continuously. INTERMITTENT EQUIPMENT will be available for intermittent ops. CONTINGENCY EQUIPMENT will be available for contingency use only. 

### CONTINUOUS EQUIPMENT

After cable installation, the following AC3 equipment will be powered CONTINUOUSLY:

<table>
<thead>
<tr>
<th>Equipment Description</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC3 CURRENT AFTER CABLE INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R1) FUEL CELL 3 PUMPS</td>
<td>.81</td>
<td>.81 .81 .81</td>
</tr>
<tr>
<td>(L4,J) AC3 φA HUM SEP S/C</td>
<td>.02</td>
<td>.02</td>
</tr>
<tr>
<td>(L4,J) AC3 φB IMU FAN S/C</td>
<td>.02</td>
<td>.02</td>
</tr>
<tr>
<td>(L4,L) AC3 φA H2O CNTLR 1 (S/C)</td>
<td>.06</td>
<td>.06</td>
</tr>
<tr>
<td>AC3 φB AV BAY 1 S/C</td>
<td>.02</td>
<td>.02</td>
</tr>
<tr>
<td>(L4,O) AC3 φB HYD QTY 3</td>
<td>.02</td>
<td>.02</td>
</tr>
<tr>
<td>AC3 φA BLR HYD BYP SENSOR 2A</td>
<td>.07</td>
<td>.07</td>
</tr>
<tr>
<td>AC3 φC BLR HYD BYP SENSOR 3B</td>
<td>.07</td>
<td>.07</td>
</tr>
<tr>
<td>(L4,P) AC3 φA LG PROX SNSR 1</td>
<td>.07</td>
<td>.07</td>
</tr>
<tr>
<td><strong>SUBTOTAL AMPS/PHASE</strong></td>
<td><strong>1.03</strong></td>
<td><strong>.87 .87</strong></td>
</tr>
</tbody>
</table>

### INTERMITTENT EQUIPMENT

After cable installation, the following AC3 equipment will be available for INTERMITTENT operation:

<table>
<thead>
<tr>
<th>Equipment Description</th>
<th>AC CURRENT (amps/phase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4,L) AC3 φA H2O CNTLR 1 (BYP VLV)</td>
<td>.14</td>
</tr>
<tr>
<td>(L4,N) AC3 φA FREON FLOW PROP 2 (VLV)</td>
<td>.30</td>
</tr>
<tr>
<td>(L4,O) AC3 φA BLR HYD BYP VLV 2A</td>
<td>.21</td>
</tr>
<tr>
<td>AC3 φC BLR HYD BYP VLV 3B</td>
<td>.21</td>
</tr>
<tr>
<td>(L4,P) AC3 φB RAD CNTLR 2A (FREON LOOP 2 CNTLR A RAD BYP VLV MTR)</td>
<td>.17</td>
</tr>
<tr>
<td>(MA73C:C) AC3 3φ FWD 3 FWD RCS ISOL TK 1/2 FU VLV</td>
<td>.42</td>
</tr>
<tr>
<td>TK 1/2 OX VLV</td>
<td>.42</td>
</tr>
<tr>
<td>MANF 3 FU VLV</td>
<td>.42</td>
</tr>
<tr>
<td>OX VLV</td>
<td>.42</td>
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<td>4 FU VLV</td>
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<tr>
<td>OX VLV</td>
<td>.42</td>
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<tr>
<td>LH VENTS 1/2 MTR 1</td>
<td>OP – .29 CL – .21</td>
</tr>
<tr>
<td>R ADP MTR 1, 18</td>
<td>.14</td>
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<tr>
<td>-Z STAR TRKR SYS 2 MTR CNTRL</td>
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<tr>
<td>AC3 3φ MID 2 LH VENT 3 MTR 1</td>
<td>OP – .59 CL – .29</td>
</tr>
<tr>
<td>LH VENT 6 MTR 2</td>
<td>OP – .59 CL – .29</td>
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<tr>
<td>PLBD PORT AFT BLKHD LAT MTR 2</td>
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<tr>
<td>INTERMITTENT EQUIPMENT (Cont)</td>
<td>AC CURRENT (amps/phase)</td>
</tr>
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<td>-------------------------------</td>
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<tr>
<td>(MA73C:C) (Cont)</td>
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<tr>
<td>AC3 3Φ PLBD C/L 1-4 LAT MTR 2</td>
<td>.72</td>
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<tr>
<td>C/L 5-8 LAT MTR 2</td>
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<tr>
<td>KU BAND ANT DPLY MTR 1</td>
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<tr>
<td>STBD RAD DPY/STD MTR 2</td>
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<tr>
<td>LAT 7-12 MTR 2</td>
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<td>AC3 3Φ MID 2</td>
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<td>PORT RMS AFT SYS RETN LCH MTR 1</td>
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<td>(MA73C:D)</td>
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<tr>
<td>AC3 3Φ AFT 3</td>
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<tr>
<td>RH VENTS 8/9 MTR 1</td>
<td>OP – .68 CL – .34</td>
</tr>
<tr>
<td>ET DOORS L DRIVE MTR 2</td>
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<tr>
<td>C/L LAT 2 MTR 2</td>
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<td>R DRIVE MTR 1</td>
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<td>R LAT MTR 1</td>
<td>1.28</td>
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<td>AC3 3Φ MID 4</td>
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<tr>
<td>RH VENT 3 MTR 2</td>
<td>OP – .65 CL – .32</td>
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<tr>
<td>5 MTR 2</td>
<td>OP – .65 CL – .32</td>
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<td>PLBD PORT DOOR MTR 1</td>
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<td>STBD AFT BLKHD LAT MTR 1</td>
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<td>C/L 9-12 LAT MTR 2</td>
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<td>C/L 13-16 LAT MTR 1</td>
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<td>PORT RAD DPY MTR 2</td>
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<tr>
<td>7-12 LAT MTR 2</td>
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<tr>
<td>PORT RMS DPY MTR 1</td>
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<td>FWD RETN LAT MTR 2</td>
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<td>(MA73C:E) PAYLOAD</td>
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<td>(MA73C:G) GALLEY FAN</td>
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<td>RIGHT SEAT</td>
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</tr>
<tr>
<td>(MA73C:H) FWD RCS VLV (3 ea)</td>
<td>9</td>
</tr>
<tr>
<td>(MA73C:I) AFT POD VLV GP 3</td>
<td>9</td>
</tr>
<tr>
<td>AFT RCS ISOL L TK 1/2 FU VLV</td>
<td></td>
</tr>
<tr>
<td>L TK 1/2 OX VLV</td>
<td>.42</td>
</tr>
<tr>
<td>R TK 1/2 FU VLV</td>
<td>.42</td>
</tr>
<tr>
<td>R TK 1/2 OX VLV</td>
<td>.42</td>
</tr>
<tr>
<td>L MANF 3 FU VLV</td>
<td>.42</td>
</tr>
<tr>
<td>L MANF 3 OX VLV</td>
<td>.42</td>
</tr>
</tbody>
</table>

Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase.
Normal individual load operation should not trip AC Utility Outlet cb if steady-state loads less than 3 amps/phase.

H2O LOOP 2 PUMP Man ON pwr'd by AC3.

### AC3 LOAD REFERENCE TABLE (Cont)

<table>
<thead>
<tr>
<th>INTERMITTENT EQUIPMENT (Cont)</th>
<th>AC CURRENT (amps/phase)</th>
<th>AC3 CURRENT AFTER CABLE INSTALLED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΦA ΦB ΦC</td>
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<tr>
<td>(MA73C:J) (Cont)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AFT RCS ISOL R MANF 3 FU VLV</td>
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</tr>
<tr>
<td>R MANF 3 OX VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>L MANF 4 FU VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>L MANF 4 OX VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MA73C:J)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AFT POD VLV GP 3</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>R MANF 4 FU VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>R MANF 4 OX VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>AFT RCS XFEED L MANF 1/2 FU VLV</td>
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<td></td>
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<tr>
<td>L MANF 1/2 OX VLV</td>
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<td></td>
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<tr>
<td>R MANF 1/2 FU VLV</td>
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<td></td>
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<tr>
<td>R MANF 1/2 OX VLV</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>OMS XFEED R FU VLV A</td>
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</tr>
<tr>
<td>R OX VLV A</td>
<td>.42</td>
<td></td>
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<tr>
<td>OMS ISOL L FU VLV B</td>
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<td></td>
</tr>
<tr>
<td>L OX VLV B</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>R FU VLV B</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>R OX VLV B</td>
<td>.42</td>
<td></td>
</tr>
</tbody>
</table>

### CONTINGENCY EQUIPMENT

After cable installation, the following AC3 continuous equipment will be switched off but available for CONTINGENCY use only. Minimize loading to prevent exceeding 3 amps/phase.

<table>
<thead>
<tr>
<th>Equipment Description</th>
<th>AC CURRENT (amps/phase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L4:F) H2O LOOP PUMP 2</td>
<td>1.03</td>
</tr>
<tr>
<td>(L4:G) AV BAY 3 FAN A (upgraded)</td>
<td>1.66</td>
</tr>
<tr>
<td>(L4:G) AV BAY 3 FAN A</td>
<td>.75</td>
</tr>
<tr>
<td>(L4:H) AV BAY 2 FAN B</td>
<td>.75</td>
</tr>
<tr>
<td>(L4:I) IMU FAN C</td>
<td>.18</td>
</tr>
<tr>
<td>(L4:K) CABIN FAN A</td>
<td>1.66</td>
</tr>
<tr>
<td>(L4:M) FREON LOOP 2 PUMP A</td>
<td>1.68</td>
</tr>
<tr>
<td>(L4:R) AC3 ΦB LTG INST LCTR</td>
<td>.31</td>
</tr>
<tr>
<td>(L4:N) AC3 ΦB FREON SIG CONDR</td>
<td>.05</td>
</tr>
<tr>
<td>(L4:Q) AC3 ΦA LIGHTING COAS</td>
<td>.11</td>
</tr>
<tr>
<td>(R10) AC3 ΦB MS LTG PNL</td>
<td>.31</td>
</tr>
<tr>
<td>AC3 ΦC LIGHTING PANEL OS</td>
<td>2.66</td>
</tr>
<tr>
<td>(A15,MO13Q) AC3 UTILITY POWER</td>
<td>1.44</td>
</tr>
</tbody>
</table>

TOTAL AMPS/PHASE
1. Config limits

Config SM ALERT limits for affected tank which requires manual htr ops via SM SPEC 60. Do not use B/U C/W limits unless necessary (e.g., Tank P XDCR failure). Do not alter hardware C/W limits. Use appropriate ID listed below to modify SM ALERT, limit set #1.

<table>
<thead>
<tr>
<th>TANK #</th>
<th>SM ALERT (TANK P)</th>
<th>B/U C/W (CNTLR P)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O2</td>
<td>H2</td>
</tr>
<tr>
<td>1</td>
<td>0451100</td>
<td>0452100</td>
</tr>
<tr>
<td>2</td>
<td>0451200</td>
<td>0452200</td>
</tr>
<tr>
<td>3</td>
<td>0451300</td>
<td>0452300</td>
</tr>
<tr>
<td>4</td>
<td>0451400</td>
<td>0452400</td>
</tr>
<tr>
<td>5</td>
<td>0451500</td>
<td>0452500</td>
</tr>
</tbody>
</table>

2. Define alert limits

Define upper and lower limits to be used for tank which requires manual heater operations.

<table>
<thead>
<tr>
<th>CRYOGENIC</th>
<th>LOWER LIMIT</th>
<th>UPPER LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>O2</td>
<td>780</td>
<td>920</td>
</tr>
<tr>
<td>H2</td>
<td>200</td>
<td>260</td>
</tr>
</tbody>
</table>

3. This procedure assumes that both manifold vlvs are open.
3 Activate htrs
Determine appropriate switch(es) that control htr(s) to be operated from EPS, 7.6 CRYO Table A.
Config:
• Aff TK HTR A (one) – ON
• All other TK HTRS – OFF

4 Wait for alarm
• Wait for ‘S68 CRYO O2(H2)’ or if using B/U C/W: ‘S68 CRYO O2(H2) PRES’

Pressure OK
Pressure ↑
Pressure ↓

7 Dual htrs must be used
• Aff TK HTR B – ON
• Cycle A and B HTRS in subsequent blocks

5 Troubleshoot alarm per appropriate Mal procedure

6 • Aff TK HTR A – OFF. Half heaters are sufficient
• Cycle HTR A only during subsequent blocks

8 Wait for alarm
• Wait for ‘S68 CRYO O2(H2)’ or if using B/U C/W: ‘S68 CRYO O2(H2) PRES’

Pressure OK
Pressure ↑
Pressure ↓

9 • Aff TK HTR(s) – OFF

10 • Aff TK HTR(s) – ON

8
EPS SSR-202
PREFLIGHT TEST BUS USE

NOTE
Powering Preflight Test Bus enables single string circuits that use launch MDMs and data bus normally used to operate many orbiter systems during ground turnaround. Due to design, a single driver failure could cause equipment to be inadvertently commanded whenever Preflight Test Bus is powered. See Table 1 for reference to possible commands available through Preflight MDM/data bus. For any problems experienced that could be attributed to Preflight Bus, remove pwr to Preflight Bus, recover lost systems, and shut down affected FC within 9 min if reqd.

1. FC recovery reqd?
   YES ➔ 35
   NO

2. First FC failure
   Second FC failure

3. Which FC will be recovered:
   FC1
   FC2
   FC3

4. Bus tie config (FC3)
   (R1)
   MN BUS TIE
   • C – ON (tb-ON)
   • A – ON (tb-ON)
   • B – OFF (tb-OFF)

5. Has this SSR already been performed for first FC failure?
   YES ➔ 6
   NO ➔ 7

6. MCC about second FC recovery

7. LOSS OF 2ND FC PWRDN completed
   (R1)
   • MN BUS TIE (three) – ON (tb-ON)

   FC2 being recovered while FC1 failed
   NO ➔ 11
   YES ➔ 8

8. Bus tie config (FC1)
   (R1)
   MN BUS TIE
   • A – ON (tb-ON)
   • B – ON (tb-ON)
   • C – OFF (tb-OFF)

9. Bus tie config (FC2)
   (R1)
   MN BUS TIE
   • B – ON (tb-ON)
   • C – ON (tb-ON)
   • A – OFF (tb-OFF)

10. (R1)
     • PRI PL MNC – ON (tb-ON)
     • PRI PL FC3 – ON (tb-ON)
     ➔ 12

11. ➔ 12

12. ➔ 12

09/26/08  7-305  MAL/ALL/GEN J
11 If FC2 being recovered
   (R1)
   • PRI PL MNC – ON (tb-ON)
   • PRI PL FC3 – ON (tb-ON)

During next steps, Preflight Test Bus will be pwrd. Single driver failures can alter vehicle config. If Preflight Bus is thought to cause problems:
• Unpw DC UTIL OUTLET
• Use normal FDF procedures to recover lost system and shutdn off FC

12 Perform PREFLIGHT TEST BUS SETUP (IFM)

13 FC3 being recovered while FC1 failed?
   NO 15
   YES

14 Preflight Bus pwup/FC3 recovery
   (R1)
   • FC3 REAC – OP (tb-OP)
   • Note AC3 AMPS
   • DC UTIL PWR MNA – ON
   • AUX – ON (Preflight Bus is now pwrd)
   • PWR B – ON
   • √22 lt – ON
   • FC3/MN BUS C – ON (tb-ON)
   • SM 67 ELECTRIC
   (MO52J)

15 FC3 being recovered while FC1 failed?
   YES

16 

21
25
- Wait 30 min
Aff FC STACK TEMP < 185 degF
or
Aff FC EXIT TEMP < 130 degF or > 160 degF
or
Difference between FC STACK TEMP and EXIT TEMP < 30 degF or > 70 degF ?

26
- Perform FC SHUTDN (FC SHUTDN Cue Card)

27
- Return to PREFLIGHT TEST BUS SETUP (IFM) to remove and stow cables, etc

28
Which FC config is present:
- FC1 recovered, FC2(3) failed
- FC2 recovered, FC1 failed
- FC2 recovered, FC3 failed
- FC3 recovered, FC1(2), failed
- FC1 or FC2 recovered, other FCs operating normally
- FC3 recovered, FC1 and FC2 operating normally

29
(R1)
- MN BUS TIE B – ON (tb-ON)
- C – ON (tb-ON)
- A – OFF (tb-OFF)

30
(R1)
- MN BUS TIE C – ON (tb-ON)
- A – ON (tb-ON)
- B – OFF (tb-OFF)
- PRI PL MNC – ON (tb-ON)
- FC3 – ON (tb-ON)

31
(R1)
- MN BUS TIE C – ON (tb-ON)
- A – ON (tb-ON)
- B – OFF (tb-OFF)

32
(R1)
- MN BUS TIE A – ON (tb-ON)
- C(B) – ON (tb-ON)
- MN BUS TIE B(C) – OFF (tb-OFF)
- PRI PL MNC – ON (tb-ON)
- FC3 – ON (tb-ON)

33
(R1)
- PRI PL MNC – ON (tb-ON)
- FC3 – ON (tb-ON)
- MN BUS TIE B – ON (tb-ON)
- A – OFF (tb-OFF)

36
(R1)
- Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc
1 Crewmember must be able to reach DC UTIL PWR switch while secured in seat.

35 Which Preflight Test Bus reqd:
   1
   2

36 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc for on-orbit use
   - On MCC call, prior to D/O Prep, If FC3 recovered:
      - PRI PL FC3 – OFF (tb-OFF)
      - PRI PL MNC – OFF (tb-OFF), if reqd
      - Perform FC SHUTDN (FC SHUTDN Cue Card)
   - DC UTIL PWR MNC(MNA) – OFF

37 (R1)
   MN BUS TIE
   - A – ON (tb-ON)
   - B – ON (tb-ON)
   - C – OFF (tb-OFF)

38 (R1)
   MN BUS TIE
   - A – ON (tb-ON)
   - B – ON (tb-ON)
   - C – OFF (tb-OFF)

39 Perform PREFLIGHT TEST BUS SETUP (IFM)

40 If second FC fails during entry, restart IFM recoverable FC:
   - DC UTIL PWR MNC(MNA) – ON

41 Preflight Bus reqd:
   Momentarily
   Continuously

CAUTION
During next steps, Preflight Test Bus will be pwrd. Single driver failures can alter vehicle config.
If Preflight Bus is thought to cause problems:
- Unpwrcr DC UTIL OUTLET
- Use normal FDF procedures to recover lost system

42

43
42 Which Preflight Bus being used:

1

2

43 Which Preflight Bus being used:

1

2

46 (MO52J)
- DC UTIL PWR MNA – ON

IFM Breakout Box:
- AUX – ON
  (Preflight Bus now pwrd)
- PWR B – ON
- 22 lt – on
- \(\sqrt{\text{Status of recovered system/function}}\)

System/function recovered?

44 (MO30F)
- DC UTIL PWR MNC – ON

IFM Breakout Box:
- PWR B – ON
  (22 lt on)
  (Preflight Bus now pwrd)
- PWR A – ON
  (22 lt on)
- \(\sqrt{\text{Status of recovered system/function}}\)

49 (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- \(\sqrt{\text{MCC}}\)

54

51

53 Leave IFM installed through T/D

52 On MCC call or prior to D/O PREP:
- (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- Config for loss of recovered system/function per normal FDF procedures

50 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

Recovery system/function reqd for remainder of flight?

41

45 (MO30F)
- DC UTIL PWR MNC – ON

IFM Breakout Box:
- PWR B – ON
  (22 lt on)
  (Preflight Bus now pwrd)
- PWR A – ON
  (22 lt on)

48

54

51

52 On MCC call or prior to D/O PREP:
- (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- Config for loss of recovered system/function per normal FDF procedures

50 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

Recovery system/function reqd for remainder of flight?

41

45 (MO30F)
- DC UTIL PWR MNC – ON

IFM Breakout Box:
- PWR B – ON
  (22 lt on)
  (Preflight Bus now pwrd)
- PWR A – ON
  (22 lt on)

48

54

51

52 On MCC call or prior to D/O PREP:
- (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- Config for loss of recovered system/function per normal FDF procedures

50 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

Recovery system/function reqd for remainder of flight?

41

45 (MO30F)
- DC UTIL PWR MNC – ON

IFM Breakout Box:
- PWR B – ON
  (22 lt on)
  (Preflight Bus now pwrd)
- PWR A – ON
  (22 lt on)

48

54

51

52 On MCC call or prior to D/O PREP:
- (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- Config for loss of recovered system/function per normal FDF procedures

50 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

Recovery system/function reqd for remainder of flight?

41

45 (MO30F)
- DC UTIL PWR MNC – ON

IFM Breakout Box:
- PWR B – ON
  (22 lt on)
  (Preflight Bus now pwrd)
- PWR A – ON
  (22 lt on)

48

54

51

52 On MCC call or prior to D/O PREP:
- (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- Config for loss of recovered system/function per normal FDF procedures

50 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

Recovery system/function reqd for remainder of flight?

41

45 (MO30F)
- DC UTIL PWR MNC – ON

IFM Breakout Box:
- PWR B – ON
  (22 lt on)
  (Preflight Bus now pwrd)
- PWR A – ON
  (22 lt on)

48

54

51

52 On MCC call or prior to D/O PREP:
- (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- Config for loss of recovered system/function per normal FDF procedures

50 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

Recovery system/function reqd for remainder of flight?

41

45 (MO30F)
- DC UTIL PWR MNC – ON

IFM Breakout Box:
- PWR B – ON
  (22 lt on)
  (Preflight Bus now pwrd)
- PWR A – ON
  (22 lt on)

48

54

51

52 On MCC call or prior to D/O PREP:
- (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- Config for loss of recovered system/function per normal FDF procedures

50 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

Recovery system/function reqd for remainder of flight?

41

45 (MO30F)
- DC UTIL PWR MNC – ON

IFM Breakout Box:
- PWR B – ON
  (22 lt on)
  (Preflight Bus now pwrd)
- PWR A – ON
  (22 lt on)

48

54

51

52 On MCC call or prior to D/O PREP:
- (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- Config for loss of recovered system/function per normal FDF procedures

50 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

Recovery system/function reqd for remainder of flight?

41

45 (MO30F)
- DC UTIL PWR MNC – ON

IFM Breakout Box:
- PWR B – ON
  (22 lt on)
  (Preflight Bus now pwrd)
- PWR A – ON
  (22 lt on)

48

54

51

52 On MCC call or prior to D/O PREP:
- (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- Config for loss of recovered system/function per normal FDF procedures

50 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

Recovery system/function reqd for remainder of flight?

41

45 (MO30F)
- DC UTIL PWR MNC – ON

IFM Breakout Box:
- PWR B – ON
  (22 lt on)
  (Preflight Bus now pwrd)
- PWR A – ON
  (22 lt on)

48

54

51

52 On MCC call or prior to D/O PREP:
- (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- Config for loss of recovered system/function per normal FDF procedures

50 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

Recovery system/function reqd for remainder of flight?

41

45 (MO30F)
- DC UTIL PWR MNC – ON

IFM Breakout Box:
- PWR B – ON
  (22 lt on)
  (Preflight Bus now pwrd)
- PWR A – ON
  (22 lt on)

48

54

51

52 On MCC call or prior to D/O PREP:
- (MO30F/MO52J)
- DC UTIL PWR MNC(MNA) – OFF
- Config for loss of recovered system/function per normal FDF procedures

50 Return to PREFLIGHT TEST BUS SETUP (IFM) to secure cables, etc

Recovery system/function reqd for remainder of flight?
### EPS SSR-202 (Cont)

<table>
<thead>
<tr>
<th>54</th>
<th>IFM reqd to maintain entry single fault tolerance in critical system?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td><strong>55</strong> Return to PREFLIGHT TEST BUS SETUP (IFM) to remove and stow cables, etc</td>
</tr>
</tbody>
</table>

- **56** Leave IFM installed through T/D

<table>
<thead>
<tr>
<th>57</th>
<th>If IFM recoverable system/function reqd during entry:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(R1)</td>
<td>If Preflight 1 used:</td>
</tr>
<tr>
<td>· MN BUS TIE B – ON (tb-ON)</td>
<td></td>
</tr>
<tr>
<td>· MN BUS TIE A – ON (tb-ON)</td>
<td></td>
</tr>
<tr>
<td>If Preflight 2 used:</td>
<td></td>
</tr>
<tr>
<td>· MN BUS TIE C – ON (tb-ON)</td>
<td></td>
</tr>
<tr>
<td>· PRI PL MNC – ON (tb-ON)</td>
<td></td>
</tr>
<tr>
<td>· FC3 – ON (tb-ON)</td>
<td></td>
</tr>
<tr>
<td>(MO30F/MO52J)</td>
<td>DC UTIL PWR MNC(MNA) – ON</td>
</tr>
</tbody>
</table>

If momentary use reqd:
- Wait 5 sec
- DC UTIL PWR MNC(MNA) – OFF
- Status of system/function
### TABLE 1
POSSIBLE PREFLIGHT TEST AND DATA BUSES COMMANDS

**NOTE**
This table identifies the major Preflight Test Bus single-driver failures that impact critical orbiter systems. After the Preflight Test Bus has been powered, if a driver failure is suspected, the Preflight Test Bus must be unpowered before the affected system can be recovered by standard FDF procedures.

<table>
<thead>
<tr>
<th>Preflight Test Bus 1</th>
<th>Preflight Test Bus 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC1 PUMP POWER</td>
<td>FC2(3) PUMP POWER</td>
</tr>
<tr>
<td>AV BAY 3 FIRE SUPP INH</td>
<td>AV BAY 1(2) FIRE SUPP INH</td>
</tr>
<tr>
<td>FC1 TO MNA ON/OFF</td>
<td>FC2(3) TO MNB(C) ON/OFF</td>
</tr>
<tr>
<td>MNA BUS TIE ON/OFF</td>
<td>MNB(C) BUS TIE ON/OFF</td>
</tr>
<tr>
<td>AC1 INV PWR ON/OFF</td>
<td>AC2(3) INV PWR ON/OFF</td>
</tr>
<tr>
<td>AC1 INV TO BUS ON/OFF</td>
<td>AC2(3) INV TO BUS ON/OFF</td>
</tr>
<tr>
<td>APU 1 FU VLV 1 OP (NC)</td>
<td>APU 2(3) FU VLV 1 OP (NC)</td>
</tr>
<tr>
<td>APU 1 FU VLV 2 CL (NO)</td>
<td>APU 2(3) FU VLV 2 CL (NO)</td>
</tr>
<tr>
<td>FCL PUMP 1A ON</td>
<td>FCL PUMP 2A ON</td>
</tr>
<tr>
<td>SMOKE DETN H/W ALERT INH</td>
<td>CAB FAN A(B) ON</td>
</tr>
<tr>
<td></td>
<td>IMU FAN A(B,C) ON</td>
</tr>
</tbody>
</table>
1. If APCUs are connected in parallel and the output APCU power requirement is < 1800 watts, then alternate APCU can be used to power the equipment.

2. Loss of power to equipment powered from APCU

3. Check aff APCU trip status

4. Cycle aff APCU converter (Not in Parallel Config)

5. APCU RECOVERED

6. Config swap (Power equipment from alternate APCU)

7. Reapply power to aff APCU equipment

8. Check aff APCU trip status

9. APCU RECOVERED

10. APCU CONVERTER UNRECOVERABLE

11. Reapply power to aff APCU equipment

12.
EPS SSR-204
OPCU FAULT ISOLATOR
TRIP RECOVERY

1. **Isolate OPCU**
   - (A15)
   - OPCU 1(2) CONV – OFF
   - \( cb\) CNTL PWR PTU 1(2) – cl
   - PTU/MAIN BUS A/B – ON
   - OPCU 1,2 CONV (two) – ON

2. **Stand by while MCC commands affected ISS RPC(s)**
   - OFF (10 sec) then ON

3. **Activate OPCU converter**
   - On MCC GO:
   - (A15)
   - OPCU 1(2) CONV – ON

4. **OPCU Volts**
   - SM 179 POWER TRANSFER
   - Aff PTU OPCU A(B) OUT VOLTS > 30?

   - YES
     - Reconnect PTU to MN Bus
     - (A15)
     - Aff PTU/MAIN BUS A(B) – ON (tb-ON)

   - NO
     - Is other OPCU converter in aff PTU activated?

     - YES
       - Deactivate OPCU
       - (A15)
       - OPCU 1(2) CONV – OFF

     - NO
       - If required, APCU ops, reconnect PTU to MN Bus:
         - Aff PTU/MAIN BUS A/B – ON (tb-ON)

5. **FALSE TRIP, OPCU CONVERTER RECOVERED**

6. **Reconnect PTU to MN Bus**
   - (A15)
   - Aff PTU/MAIN BUS A(B) – ON (tb-ON)

7. **OPCU CONVERTER UNRECOVERABLE**

8. **Is other OPCU converter in aff PTU activated?**
   - YES
     - Deactivate OPCU
     - (A15)
     - OPCU 1(2) CONV – OFF

   - NO
     - If required, APCU ops, reconnect PTU to MN Bus:
       - Aff PTU/MAIN BUS A/B – ON (tb-ON)

9. **Reconnect PTU to MN Bus**
   - (A15)
   - Aff PTU/MAIN BUS A(B) – ON (tb-ON)

10. **OPCU**

**NOTE**
This procedure can be used to attempt a recovery of an inadvertent Fault Isolator (FI) trip. If an FI trips the OPCU converter TLM will be OSL for the affected channel, due to the isolation of input power; ISS RPC will still indicate ON.

1. Associated APCU should be deactivated before procedure is started
2. If required, APCU can be reactivated
3. Voltage will need to be adjusted on aff OPCU converter to desired setpoint
4. ISS will command off affected RPC. Other OPCU converter in affected PTU may be available
## GNC

### GNC FRP

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRP-1</td>
<td>IMU REFERENCE RECOVERY AFTER GNC GPCs IPL'D</td>
<td>8-4</td>
</tr>
<tr>
<td>FRP-2</td>
<td>RECOVERY</td>
<td>8-6</td>
</tr>
<tr>
<td>FRP-3</td>
<td>IMU RECOVERY WITH AT LEAST ONE IMU AS GOOD REFERENCE</td>
<td>8-7</td>
</tr>
</tbody>
</table>

### GNC SSR

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSR-1</td>
<td>ACTIVATE IMU(s)</td>
<td>8-10</td>
</tr>
<tr>
<td>SSR-2</td>
<td>MATRIX (TORQUE) ALIGN USING HUD STAR DATA</td>
<td>8-10</td>
</tr>
<tr>
<td>SSR-3</td>
<td>ALIGN USING STR TRKR STAR DATA</td>
<td>8-12</td>
</tr>
<tr>
<td>SSR-4</td>
<td>IMU DATA</td>
<td>8-12</td>
</tr>
<tr>
<td>SSR-5</td>
<td>RESERVED</td>
<td>not used</td>
</tr>
<tr>
<td>SSR-6</td>
<td>RESERVED</td>
<td>not used</td>
</tr>
<tr>
<td>SSR-7</td>
<td>RESERVED</td>
<td>not used</td>
</tr>
<tr>
<td>SSR-8</td>
<td>POSITION OMS THROUGH CG</td>
<td>8-13</td>
</tr>
<tr>
<td>SSR-9</td>
<td>RM DESELECTION OF FAILED OPEN THC CONTACT</td>
<td>8-14</td>
</tr>
</tbody>
</table>

The following Fault Msgs have no corresponding MAL procedures in this book:

- AERO DRIVE
- DAP DNMODE
- DISPLAY SW A(L,R)
- L(R) OMS GMBL
- NAV EDIT
- SEL AUTO
- SENSE SW
- IMU BITE/T
- RM FAIL IMU
- RM DLMA IMU
- RHC L(R,A)
- SBTC/THC L(R,A)
GNC FRP-1
IMU REFERENCE RECOVERY AFTER GNC GPCs IPL’D

NOTE
Preferable to accomplish this procedure in GNC OPS 2; however, procedure is also valid for MM301. If all IMUs have been caged, perform steps 1-7. Step 8 of the procedure assumes recovery of "operational" IMUs only. Operational IMUs are IMUs in OPER and not previously caged

O6 1. Configure DAP
   √DAP: INRTL
   √DAP ROT: DISC/DISC/DISC

2. Ensure pwr ON to both STAR TRKRs and doors open
   √S TRK PWR (two) – ON
   √DR POS tb (two) – OP

   NOTE
   'IMU BITE/T' may be annunciated until READ/WRITE is performed to restore IMU gyro delta bias terms. Previous IMU Bias and Scale Factor READ/WRITEs of uplinks will have to be performed again

3. Mass Memory Read of IMU calibration data (gyro and accel biases, scale factors, etc.) computed in preflight cal
   GNC 21 IMU ALIGN
   Select all IMUs for MASS MEMORY READ
   IMU 1,2,3 – ITEM 10,11,12 EXEC (*)
   MM READ – ITEM 19 EXEC (*)
   √MM READ – ITEM 19 (no *)

O6 4. Configure DAP
   √DAP: INRTL
   DAP ROT: PULSE/PULSE/PULSE

5. Deselect IMU(s) leaving one IMU selected

   NOTE
   RM may fail IMU(s) during deselection process
   a. GNC 21 IMU ALIGN
      IMU DES 1(2,3) – ITEM 7(8,9) (*)
   b. Verify one operational IMU remains selected (no *)

6. Configure DAP
   √DAP: INRTL
   DAP ROT: DISC/DISC/DISC

7. If extended loss of comm (ZOE not included) or no uplink CMD capability:
   a. Perform Matrix Align of IMUs 1,2,3 in MATRIX (TORQUE) ALIGN USING HUD STAR DATA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . GNC SSR-2
   b. Reselect all deselected IMUs

      GNC 21 IMU ALIGN
      IMU DES – ITEM 7(8,9) EXEC (no *)

   NOTE
   Once comm reestablished, verify with MCC uplink of REFSMMATs complete and then proceed to IMU ALIGN – S TRK (ORB OPS, GNC)

8. If comm and uplink CMD capability exists:
   a. Confirm with MCC uplink of REFSMMATs has been performed. Do not proceed without confirmation
b. Recover IMU attitude reference of a deseleced operational IMU, utilizing Matrix Alignment, aligning the IMU to itself

```
GNC 21 IMU ALIGN
Utilize as reference one of the IMUs currently deseleced
REF IMU – ITEM 14 + EXEC
TYPE – ITEM 15 EXEC (MATRIX)
```

Align Reference IMU to itself
ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
EXEC – ITEM 16 EXEC (*)
√MCC to repeat step 8b with other deseleced operational IMU

c. Configure DAP
\√DAP: INRTL
DAP ROT: PULSE/PULSE/PULSE

d. Deselect currently selected IMU (no selected IMUs)

```
GNC 21 IMU ALIGN
IMU DES – ITEM 7(8,9) EXEC (*)
```

e. Reselect IMU(s) aligned in step 8b

```
GNC 21 IMU ALIGN
IMU DES – ITEM 7(8,9) EXEC (no *)
```

f. \√DAP: INRTL
DAP ROT: DISC/DISC/DISC

g. \√MCC to repeat step 8b with remaining IMU

h. When Matrix Alignment(s) Using IMU Data complete, reselect all recovered IMUs:

```
GNC 21 IMU ALIGN
IMU DES – ITEM 7(8,9) EXEC (no *)
```

i. DAP: as reqd

j. Go to IMU ALIGN – S TRK (ORB OPS, GNC)
GNC FRP-2
IMU REFERENCE RECOVERY

NOTE
If GNC GPCs IPL'd, use GNC FRP-1 for Reference Recovery. Preferable to accomplish this procedure in OPS 2; however, it is also valid for MM301.

O6 1. Apply pwr to both STAR TRKRs
   \STAR TRKR PWR -Y,-Z – ON

O14:A 2. Ensure pwr applied to all IMUs
   IMU 1,2,3 – ON
   If not, ACTIVATE IMU(s) . . . . . . . GNC SSR-1

O15:A 3. Ensure all IMUs in OPERATE mode
   GNC 21 IMU ALIGN
   IMUs: OPER – ITEM 4,5,6 EXEC (*)

NOTE
If ITEMS 4,5, or 6 executed, wait for asterisks to appear (~90 sec)

O16:A 4. Enable serial data link
   GNC I/O RESET

5. Select one IMU for attitude reference
   GNC 21 IMU ALIGN
   IMU 1,2, or 3: DES – ITEM 7,8, or 9 EXEC (no *)
   Deselect remaining two IMUs
   IMUs: DES – ITEM 7(8,9) EXEC (*)

6. Perform MATRIX ALIGN IMUs 1,2,3 USING HUD STAR DATA . . . . . . . GNC SSR-2

7. Reselect all deselected IMUs
   GNC 21 IMU ALIGN
   IMUs: DES – ITEM 7(8,9) EXEC (no *)

8. Reestablish skew between IMUs with IMU TO IMU ALIGN
   Perform IMU/IMU ALIGNMENT – IMUs 1,2,3 using best IMU as reference (ORB OPS, GNC)

9. Go to IMU ALIGN – S TRK (ORB OPS, GNC)
GNC FRP-3
IMU RECOVERY WITH AT LEAST ONE IMU AS GOOD REFERENCE

NOTE
Procedure must be accomplished in GNC OPS 2 or GNC OPS 3

1. Deselect IMUs being recovered

   \[\text{GNC 21 IMU ALIGN}\]

   \(\forall\text{IMUs: DES – ITEM 7(8,9) EXEC (*)}\)

2. Ensure pwr applied to all IMUs

   \(\text{O14:A, O15:A, O16:A}\)

   If not, ACTIVATE IMU(s) . . . . . . . GNC SSR-1

   NOTE
   If ITEMS 4, 5, or 6 executed, wait for asterisks to appear (~90 sec)

3. Ensure all IMUs in OPERATE mode

   \[\text{GNC 21 IMU ALIGN}\]

   \(\forall\text{IMUs: OPER – ITEM 4,5,6 EXEC (*)}\)

   NOTE
   Possible erroneous IMU BITE/T 1(2,3) msg after GNC I/O RESET. Ignore msg unless MCC advises otherwise, or if no comm

4. Enable serial data link

   \[\text{GNC I/O RESET}\]

   NOTE
   Both nonreference IMUs should be aligned to preclude possibility of IMU RM FAIL (RM threshold reset following any align)

5. Reestablish skew between IMUs. Choose IMU with good reference and align other two IMUs with IMU to IMU ALIGN. Use good IMU as reference for align – IMU to IMU ALIGNMENT (ORB OPS, GNC)

6. Reselect IMUs previously deselected

   \[\text{GNC 21 IMU ALIGN}\]

   DES – ITEM 7(8,9) EXEC (no *)
**GNC SSR-1**

**ACTIVATE IMU(s)**

- O6: MDM FF 1,2(3) – ON
- O14:A, O15:A, O16:A: IMU 1(2,3) – ON
- L1: IMU FAN A(B,C) – ON (if avail)

**NOTE**

IMU 1(2,3) TEMP – LO indication may be displayed. Proceed

**CRT**

- IMU 1(2,3): DES – ITEM 7(8,9) EXEC (*)
- OPER – ITEM 4(5,6) EXEC (*)

**NOTE**

If ITEMS 4, 5, or 6 executed, wait for asterisks to appear (~90 sec)

**GNC I/O RESET**

**GNC SSR-2**

**MATRIX (TORQUE) ALIGN USING HUD STAR DATA**

**CAUTION**

If RMS/payload unberthed, either enable Aft PRCS only or berth payload before proceeding

**NOTE**

In OPS 201, if Verniers not available, use FREE mode

Remove L(R) HUD Cover

- F3: L(R) HUD PWR – ON
- F6U(F8U): MODE – TEST
- Wait ~15 sec for final symbology of test mode
- L(R) HUD BRT – MAN NIGHT
- MAN BRT – as reqd

- O14:E, O15:E, O16:E: cb DDU L(R) (two) – cl
- F7(F8): FLT CNTLR PWR – ON

If OPS 2:
- Change DAP A,B to A1,B5
- DAP: INRTL/VERN(FREE/PRI)

If OPS 3:

**GNC 23 RCS**

**CRT**

- RCS FWD – ITEM 1 EXEC (*)
- MANF VLV OVRD 1 – ITEM 40 EXEC (CL)
- 2 – ITEM 41 EXEC (CL)
- 3 – ITEM 42 EXEC (CL)
- 4 – ITEM 43 EXEC (CL)
- 5 – ITEM 44 EXEC (CL)

**NOTE**

Position ADI ATT sw on pnl F6(F8) to REF and depress ATT REF pb prior to enabling COAS SIGHT mode

**GNC 22 S TRK/COAS CNTL**
GNC SSR-2 (Cont)

\l $S$ TABLE CLR – ITEM 20 EXEC
COAS REQD ID – ITEM 21 + ___ ___ EXEC

POS +X – ITEM 26 EXEC
SIGHT mode – ITEM 22 EXEC (*)
DAP: as reqd for precise manual mnvr
Mnvr to center star in HUD boresight (‘P’ in ‘COMPLETE’):

F6(F8) ATT REF pb – push
(Repeat mark if desired)
CRT COAS ACCEPT – ITEM 23 EXEC
\l $S$ TABLE TRK ID 2: (reqd ID)

CAUTION
Do not deselect COAS SIGHT mode between sightings

DAP: as reqd for large manual mnvr
Mnvr to second HUD star att

NOTE
Second star should be > 35° and < 145° from the first

CRT COAS REQD ID – ITEM 21 + ___ ___ EXEC
DAP: as reqd for precise manual mnvr
Mnvr to center star in HUD boresight:
F6(F8) ATT REF pb – push
(Repeat mark if desired)
CRT COAS ACCEPT – ITEM 23 EXEC
\l $S$ TABLE TRK ID 1: (reqd ID)
ANG DIF 1 ≥ 35 deg, ≤ 145 deg
ERR 1 ≤ .2
\l $S$ SELECT – ITEM 17,18 (*)
COAS: DES – ITEM 25 EXEC (*)

F7(F8) FLT CNTLR PWR – OFF
O14:E, cb DDU L(R) (two) – as reqd
O15:E, O16:E

GNC 21 IMU ALIGN

\l $IMU$ 1(2,3) STAT – (blank)
ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
If Matrix Align
\l $REF$ STAR, ITEM 13 – (*)
TYPE, ITEM 15 EXEC (MATRIX)
DAP: INRTL
DAP ROT: PULSE/PULSE/PULSE

CRT EXEC – ITEM 16 EXEC (*), Rcd MET ___ : ___ : ___
\l $EXEC$ – ITEM 16 (no *)
DAP: as reqd
If Torque Align
\l $REF$ STAR, ITEM 13 – (*)
\l $TYPE$, ITEM 15 – TORQUE
\l $ANG$ 1,2,3 ΔX,ΔY,ΔZ: ≤ .80
Rcd ANG 1 2 3
ΔX ( ) ___ . ___ ( ) ___ . ___ ( ) ___ . ___
ΔY ( ) ___ . ___ ( ) ___ . ___ ( ) ___ . ___
ΔZ ( ) ___ . ___ ( ) ___ . ___ ( ) ___ . ___

CAUTION
If ANG ΔX,ΔY,ΔZ > .80 for two or more IMUs:
DO NOT TORQUE PLATFORMS EXCEPT UNDER MCC INSTRUCTIONS

CRT EXEC – ITEM 16 EXEC (*), Rcd MET ___ : ___ : ___
\l $EXEC$ – ITEM 16 (no *)
GNC SSR-2 (Cont)

F6U(F8U) HUD MODE – NORM
PWR – OFF
Install L(R) HUD Cover
If OPS 3:

GNC 23 RCS

RCS FWD – ITEM 1 EXEC (*)
MANF VLVS OVRD 1 – ITEM 40 EXEC (OP)
2 – ITEM 41 EXEC (OP)
3 – ITEM 42 EXEC (OP)
4 – ITEM 43 EXEC (OP)
5 – ITEM 44 EXEC (OP)
DAP: as reqd

GNC SSR-3
MATRIX ALIGN USING STR TRKR STAR DATA

NOTE
Procedure assumes S TRKs on at least 15 min and vehicle at S TRK star attitude. DAP as reqd for star trk ops

GNC 22 S TRKR/COAS CNTRL

√S TRK -Y,-Z REQD ID, ITEM 11,12 0
STATUS – (no BITE)
SHUTTER – OP
√S TABLE CLR – ITEM 20 EXEC (*)
STAR TRK -Y,-Z – ITEM 3,4 EXEC (*)
√S TABLE TRK ID 1,2 (reqd ID)
ANG ERR: < .09, Rcd __ . __ __
SEL – ITEM 17,18 (*)

GNC 21 IMU ALIGN

√IMU 1(2,3) STAT – (blank)
√REF STAR, ITEM 14 + (REF IMU) EXEC
TYPE – ITEM 15 EXEC (MATRIX)
ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
EXEC – ITEM 16 EXEC (*), Rcd MET __ __ : __ __ : __ __
EXEC – ITEM 16 (no *)

GNC SSR-4
MATRIX ALIGN USING IMU DATA

NOTE
Procedure assumes ground knowledge of platform orientation of at least a single IMU

GNC 21 IMU ALIGN

√IMU 1(2,3) STAT – (blank)
REF IMU – ITEM 14 + (REF IMU) EXEC
TYPE – ITEM 15 EXEC (MATRIX)
ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
EXEC – ITEM 16 EXEC (*), Rcd MET __ __ : __ __ : __ __
EXEC – ITEM 16 (no *)
GNC SSR-8
POSITION OMS THROUGH CG

NOTE
This procedure sets up a dummy single engine L(R) OMS burn to position L(R) OMS Thrust Vector through CG. Actual burn will not be executed. When procedure completed, L(R) OMS will be protected from loss due to PRI(SEC) GMBL pwr or data path failures.

GNC, OPS 202(302) PRO

GNC XXXXX MNVR YYYYY
If L OMS to be positioned:
| L OMS PRI(SEC) SEL – ITEM 28(30) EXEC
If R OMS to be positioned:
| R OMS PRI(SEC) – ITEM 29(31) EXEC

C3
\√OMS ENG (two) – OFF
CRT
SEL OMS L(R) – ITEM 2(3) EXEC

TRIM LOAD P ITEM 6 ±X.X EXEC
| LY ITEM 7 +X.X EXEC
| RY ITEM 8 -X.X EXEC

NOTE
Actual values dependent on CG.
If reqd, generic CG trims are:
| P = +.0.0
| LY = +5.2
| RY = -5.2

TGT PEG 7
ITEM 19 +1.0 +0 +0 EXEC
TIG – ITEM 10 + (current MET + 2 min) EXEC
LOAD – ITEM 22 EXEC

NOTE
Do NOT MNVR to burn attitude; ignore flashing EXECEXEC

After T-15 sec:
\√GMBL position: P = ±X.X
| LY = +X.X
| RY = -X.X
L(R) GMBL OFF – ITEM 32(33) EXEC

If in OPS 202:
| GNC, OPS 201 PRO
If in OPS 3, and at burn attitude:
| Reload Burn Pad

NOTE
Displayed GMBL position is not updated when GMBL OFF.
If in OPS 2, on transition to OPS 3 (prior to deorbit) P/Y positions will read 1.0 deg and GMBL fail will be annunciated.
GNC SSR-9
RM DESELECTION OF FAILED OPEN THC CONTACT

NOTE
This procedure will allow RM to deselect failed open THC contact in OPS 2. Use this SSR only under direction from MCC. Procedure will cause primary RCS jet firings which must be coordinated with MCC. Assumes two good channels exist in axis/direction with failed open contact

1. CONFIG DAP FOR MINIMUM TRANS PULSE
   GNC 20 DAP CONFIG
   DAP A(B) TRANS PLS – ITEM 17(37) +0.0 1 EXEC
   DAP TRANS: PULSE/PULSE/PULSE/LOW Z

2. RESELECT FAILED OPEN CONTACT
   GNC 25 RM ORBIT
   SEL FAILED CONTACT – ITEM X EXEC
   Verify no ↓‘s on affected row
   ↓‘SW RM INH – ITEM 16 (no *)

3. DEFLECT THC
   O14:E, O15:E, O16:E
   cb DDU L(A) (two) – cl
   F7(A6U) L(A) FLT CNTLR PWR – ON
   L(A) THC – deflect in aff axis for 1 sec
   NOTE
   This step will cause PRCS jets to fire for 80-320 msec.
   Expect SBTC/THC Fault Summary msg
   Verify ↓‘ for failed contact

4. RECONFIG DAP
   GNC 20 DAP CONFIG
   Reload DAP A(B) as reqd
   DAP TRANS: as reqd
   F7(A6U) L(A) FLT CNTLR PWR – OFF
   O14:E, O15:E, O18:E
   cb DDU L(A) (two) – as reqd
MECH

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<th>MicroSw Power</th>
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<th>MCA Logic</th>
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## PLBD POWER/MDM CONFIGURATION

Ref: MA73C: C&D for MCA (cb)

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<th>PLBD DISPLAY PL MDM</th>
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<td>5-8</td>
<td>1/MID3</td>
<td>AB3/AB2</td>
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<td>1/MID1</td>
<td>AB3/AB1</td>
</tr>
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<td>1-4</td>
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<td>AB3/AB2</td>
</tr>
<tr>
<td>13-16</td>
<td>3/MID4</td>
<td>CA3/CA2</td>
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<td>S FWD</td>
<td>1/MID1</td>
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<td>S AFT</td>
<td>3/MID4</td>
<td>CA3/CA2</td>
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<tr>
<td>S DOOR</td>
<td>1/MID1</td>
<td>AB3/AB1</td>
</tr>
</tbody>
</table>

- PLBD DOORS
- 9.1

- 9-3 MAL/ALL/GEN J
MECH

9.1a NO MOTION/OP/CL' NOT BLANK/'O' OR 'C'/R' MICROSW = 1 AFTER DRIVE INITIATION

1 No Motion after Drive Initiation
   ~10 sec

2 'OP/CL' Status Not Blank after Drive Initiation
   ~10 sec

3 All 'O' or 'C/R' MICRO-SW STAT = 1 after Drive Initiation
   ~10 sec

Nominal Config:
(R13L)
PL BAY DR
SYS 1,2 (two) – ENA (MA73C)
MCA LOGIC
MNA MID 1,3 (two) – ON
MNB MID 2,4 (two) – ON
MNC MID 2,4 (two) – ON
cb MCA PWR
AC1 3φ MID 1,3 (two) – cl
AC2 3φ MID 2.4 (two) – cl
AC3 3φ MID 2.4 (two) – cl
(CRT)
AC POWER ON, ITEM 1 – *

1 Ops Times
CENTER LATCHES
2 mtrs ~20 sec
1 mtr ~40 sec
FWD,AFT LATCHES
2 mtrs ~30 sec
1 mtr ~60 sec
DOOR
2 mtrs ~63 sec
1 mtr ~126 sec
MECH 9.1a (Cont)

11 Type of failure:
(CRT) CENTER LATCHES, STBD FWD, AFT LATCHES, or STBD DOOR failed 'CL' (while opening)
PORT FWD, AFT LATCHES OR PORT DOOR failed 'CL'
Any one latch gang failed 'OP'
STBD DOOR failed 'OP'
PORT DOOR failed 'OP'

12 Prepare for Deorbit Next PLS

13 MCC for mission duration based on cooling requirements

14 Nominal EOM

15 Reopen Port Door
(CRT, R13L)
• Deselect all 'MAN SEL' items
• Select PORT FWD, AFT LATCHES
• PL BAY DR – OP
• PORT FWD, AFT LATCHES – blank, OP (~30 sec)
• PL BAY DR – STOP
• Deselect PORT FWD, AFT LATCHES
• Select PORT DOOR
• PL BAY DR – OP
• PORT DOOR – blank, OP (~63 sec)
• PL BAY DR – STOP

16 (CRT, R13L)
• Deselect all 'MAN SEL' items
• PL BAY DR SYS 1.2 (two) – DSBL
• AC POWER OFF – ITEM 2 EXEC (*)
• MCC, EVA may be reqd
9.1b ‘?’ DISPLAYED IN ‘OP/CL’ COLUMN

1. ‘?’ is displayed for the following:
   - **LATCH:**
     At least one ‘1’ displayed for both ‘O’ and ‘C’ microsws
   - **DOOR:**
     - ‘1’ displayed in:
       - two ‘C’ and two ‘O’ microsws
       - two ‘C’ and not (two of three) FWD and AFT ‘R’ microsws
   - **FWD and AFT ‘R’ microsws**
     - two ‘O’ and (two of three) FWD or AFT ‘R’ microsws

2. Failed-on door CL microsw can be bypassed to regain mtr function (refer to MECH SSR-6)

3. In most cases, AUTO mode will not work with ‘?’ indicated

4. One microsw attained in commanded direction within single mtr time is sufficient verification of position if visual cues not available

Nominal Config:
(R13L)
PL BAY DR
SYS 1,2 (two) – ENA
(MA73C)
MCA LOGIC
MNA MID 1,3
(two) – ON
MNB MID 2,4
(two) – ON
MNC MID 2,4
(two) – ON
cb MCA PWR
AC1 3Φ MID
1,3 (two) – cl
AC2 3Φ MID
2,4 (two) – cl
AC3 3Φ MID
2,4 (two) – cl
(CRT)
AC POWER ON,
ITEM 1 – *
Although PBD SEQ FAIL will terminate AUTO MODE, ITEM 3 (AUTO MODE SEL) remains selected (*). To reselect AUTO MODE, ITEM 3 must be deselected (no *), then reselected (*).
Latch Gang Does Not Indicate ‘OP’ in Single Mtr Drive Time

Nominal Config:
(R13L)
PL BAY DR
SYS 1,2 (two) – ENA (MA73C)
MCA LOGIC
MNA MID 1,3
(two) – ON
MNB MID 2,4
(two) – ON
MNC MID 2,4
(two) – ON
cb MCA PWR
AC1 3φ MID
1,3 (two) – cl
AC2 3φ MID
2,4 (two) – cl
AC3 3φ MID
2,4 (two) – cl
(CRT)
AC POWER ON,
ITEM 1 – *

1 Ops Times
CENTER LATCHES
2 mtrs ~20 sec
1 mtr ~40 sec
FWD,AFT
LATCHES
2 mtrs ~30 sec
1 mtr ~60 sec
DOORS
2 mtrs ~63 sec
1 mtr ~126 sec

1. Latch Gang Not ‘OP’ in Single Mtr Drive Time

2. (CRT)
   • "MICRO-SW STAT"
   At least one ‘O’ microsw = ‘1’ ?
   YES
   NO

3. MICROSW FAILURE

4. LATCH OBSTRUCTION IN OPEN DIRECTION

5. Refer to SYS DATA dwg 14.1-2
   Latch gang visually verified clear of rollers ?
   YES
   NO

6. Do not close latch gang until EOM door closure

7. Continue ops in MANUAL mode

8. (CRT)
   • Deselect all ‘MAN SEL’ items
   • Select aff latch gang
   Attempt to close latch gang
   (R13L)
   • PL BAY DR – CL (1 mtr time)
   • PL BAY DR – STOP
   (CRT)
   • "MICRO-SW STAT"
   At least one ‘C’ microsw = ‘1’ ?
   YES
   NO

9. TWO-WAY JAM

10

11

12

13

MECH  9.1d (Cont)

10 Attempt to reopen latch
(R13L)
- PL BAY DR – OP (1 mtr time)
- PL BAY DR – STOP

(CRT)
- 'MICRO-SW STAT'

At least one 'O' = '1'?

YES

11 Continue ops in MANUAL mode

NO

12 JAM IN OPEN DIRECTION

9

13 Aff latch gang is:
- Port Bldhd
- Stbd Bldhd or Center

14 Do not attempt to open PORT DOOR
- Close remaining PORT LATCHES
- MCC for pwrdn/mission duration

15 Do not attempt to open STBD DOOR
- Close remaining latches
- Prepare to deorbit next opportunity

1 Ops Times
CENTER LATCHES
2 mtrs ~20 sec
1 mtr ~40 sec
FWD, AFT LATCHES
2 mtrs ~30 sec
1 mtr ~60 sec
DOORS
2 mtrs ~63 sec
1 mtr ~126 sec
LATCH GANG NOT ‘CL’ IN SINGLE MTR TIME

Nominal Config:
(R13L)
PL BAY DR
SYS 1,2 (two) – ENA
(MA73C)
MCA LOGIC
MNA MID 1,3
(two) – ON
MNB MID 2,4
(two) – ON
MNC MID 2,4
(two) – ON
cb MCA PWR
AC1 3φ MID
1,3 (two) – cl
AC2 3φ MID
2,4 (two) – cl
AC3 3φ MID
2,4 (two) – cl
(CRT)
AC POWER ON,
ITEM 1 – *

1. Latch Gang Does Not Indicate 'CL' in Single Mtr Drive Time

2. (CRT)
   • Micro-SW Stat’
   At least one 'C' microsw = '1' ?
   YES → 3 MICROSW FAILURE
   NO → 4 LATCH OBSTRUCTION IN CLOSE DIRECTION

3. Aff latch gang is:
   C/L
   BLKHD

5. Refer to SYS DATA dwg 14.1-2
   Latch gang visually verified latched ?
   YES → 7 Continue ops in MANUAL mode
   NO → 6

6. Door visually
   Door deformed ?
   YES → 9 DOOR HUNG ON BLKHD OR JAMMED BY DEBRIS
   NO → 8

7. Door visually
   Door deformed ?
   YES → 9 DOOR HUNG ON BLKHD OR JAMMED BY DEBRIS
   NO → 10

8. Door visually
   Door deformed ?
   YES → 9 DOOR HUNG ON BLKHD OR JAMMED BY DEBRIS
   NO → 10

9. Door visually
   Door deformed ?
   YES → 9 DOOR HUNG ON BLKHD OR JAMMED BY DEBRIS
   NO → 10

10. Door visually
    Door deformed ?
    YES → 9 DOOR HUNG ON BLKHD OR JAMMED BY DEBRIS
    NO → 10

11. Door visually
    Door deformed ?
    YES → 9 DOOR HUNG ON BLKHD OR JAMMED BY DEBRIS
    NO → 10

1. Ops Times
   CENTER LATCHES
   2 mtrs ~20 sec
   1 mtr ~40 sec
   FWD, AFT LATCHES
   2 mtrs ~30 sec
   1 mtr ~60 sec
   DOOR
   2 mtrs ~63 sec
   1 mtr ~126 sec
10. (CRT)
   - Deselect all 'MAN SEL' items
   - Select aff latch gang

   Attempt to open latch gang

   (R13L)
   - PL BAY DR – OP (1 mtr time)
   - PL BAY DR – STOP

   (CRT)
   - √'MICRO-SW STAT'

   At least one 'O' = '1'?

   NO
   → 11. Go to CONTINGENCY PLBD CLOSURE, MECH SSR-2

   YES
   → 12. TWO-WAY JAM

   (R13L)
   - PL BAY DR – CL (1 mtr time)
   - PL BAY DR – STOP

   (CRT)
   - √'MICRO-SW STAT'

   At least one 'C' = '1'?

   NO
   → 14. MCC for entry loads minimization procedures

   YES
   → 15. INTERMITTENT JAM OR OBSTRUCTION CLEARED

   16. Continue ops in MANUAL mode
Door Does Not Indicate ‘OP’ in Single Mtr Time

Nominal Config:
(R13L)
PL BAY DR  
SYS 1,2 (two) – ENA  
(MA73C)  
MCA LOGIC  
MNA MID 1,3  
(two) – ON  
MNB MID 2,4  
(two) – ON  
MNC MID 2,4  
(two) – ON  
CB MCA PWR  
AC1 3Ø MID  
1,3 (two) – cl  
AC2 3Ø MID  
2,4 (two) – cl  
AC3 3Ø MID  
2,4 (two) – cl  
(CRT)  
AC POWER – ON  
(ITEM 1 – *)

Drive Times  
CENTER LATCHES  
2 mtrs ~20 sec  
1 mtr ~40 sec  
FWD,AFT LATCHES  
2 mtrs ~30 sec  
1 mtr ~60 sec  
DOORS  
2 mtrs ~63 sec  
1 mtr ~126 sec

1. Drive Times  
2. Drive Times  
3. Display S/W Failure  
4. Select all S/W: BFS (PASS)  
5. Continue PLBD ops  
6. One DOOR ‘O’ (open) microsw = ‘1’ ?  
7. Door OP Microsw Failure  
8. Continuation of PLBD ops in MANUAL mode
MECH 9.1f (Cont)

1. Un latch/open PORT DOOR in MANUAL mode

2. Door may interfere with payload deploy

3. Cmd door to close to see if EVA necessary to CL

4. For rotary actuator jam, EVA reqd to cut door drive linkage(s) closest to point of deformation

5. For door drive PDU gearbox jam, EVA reqd to disconnect PDU

6. For door drive torque tube jam, EVA reqd to remove obstruction or cut door drive linkage(s)

7. If door reopen were attempted, two-way jam could occur causing day-1 EVA

8. Aff door is:
   - PORT
   - STBD and > 2 stripes are visible
   - STBD and < 2 stripes are visible

9. Close door in MANUAL mode
   - (CRT) Select door (if not selected)
   - ITEM 13(10) EXEC (*)
   - (R13L) PL BAY DR – CL
   - (CRT) DOOR – CL or stopped
   - (R13L) PL BAY DR – STOP
   - (CRT) OP/CL column
   - DOOR ‘RDY’ or ‘CL’?

10. Yes
    - Item 13(10) EXEC (*)
    - (R13L) PL BAY DR – CL
    - (CRT) OP/CL column
    - ‘OP/CL’ column
    - PORT ‘RDY’ or ‘CL’?

11. No
    - Item 13(10) EXEC (*)
    - (R13L) PL BAY DR – STOP
    - (CRT) PORT ‘RDY’ or ‘CL’?

12. Report to MCC the number of stripes visible
    - MCC for payload clearance

13. Is payload clearance sufficient for deploy?

14. YES
    - MCC for possible payload deploy prior to performing subsequent steps
    - CAUTION
    - If STBD door, do not close to < 2 stripes visible to protect PORT door OP/CL capability

15. NO
    - Attempt to close door for 5 sec
    - (CRT) Select door (if not selected)
    - ITEM 13(10) EXEC (*)
    - (R13L) PL BAY DR – CL (5 sec)
    - (R13L) PL BAY DR – STOP
    - Does entire door move?

16. Close/latch doors in MANUAL mode
    - PL BAY DR – OP (as reqd)
    - PL BAY DR – STOP

17. JAM IN OPEN DIRECTION

18. YES
    - MCC for pwrdn
    - Prepare for EVA

19. TWO-WAY JAM

20. If door deformed, open door until deformation relieved
    - (R13L) PL BAY DR – OP (as reqd)
    - PL BAY DR – STOP

21. Close/latch doors in MANUAL mode

22. MCC for pwrdn
    - Prepare for EVA

23. Does entire door move?

24. NO
    - YES
For rotary actuator jam, EVA reqd to cut door drive linkage(s) closest to point of deformation.

For door drive PDU gearbox jam, EVA reqd to disconnect PDU.

For door drive torque tube jam, EVA reqd to remove obstruction or cut door drive linkage(s).

No EVA reqd to close door.
9.1g  DOOR NOT ‘CL’ IN SINGLE MTR TIME

1. Drive Times
   CENTER LATCHES
   2 mtrs ~ 20 sec
   1 mtr ~ 40 sec
   FWD, AFT
   LATCHES
   2 mtrs ~ 30 sec
   1 mtr ~ 60 sec
   DOORS
   2 mtrs ~ 63 sec
   1 mtr ~ 126 sec

2. EVA reqd to cut PLB door drive
   linkage for at least
   one rotary actuator
   (i.e., one nearest
   point of deformation)

Nominal Config:
(R13L)
PL BAY DR
SYS 1,2 (two) – ENA
(MA73C)
MCA LOGIC
MNA MID 1,3
(two) – ON
MNB MID 2,4
(two) – ON
MNC MID 2,4
(two) – ON
cb MCA PWR
AC1 3b MID
1,3 (two) – cl
AC2 3b MID
2,4 (two) – cl
AC3 3b MID
2,4 (two) – cl
(CRT)
AC POWER ON,
ITEM 1 – *

1 Is door deformed (indicated by centerline edge
warpage and/or different number of
stripes visible on
door drive
pushrods)?

2 Is deformation at extreme fwd or aft
end of door?

3 ROTARY
ACTUATOR JAM
AT POINT OF
DEFORMATION

4 BLKHD JAM
CAUSED BY
THERMAL
WARPAGE OR
OBSTRUCTION

5 Note point of
deformation

6 DISPLAY S/W
FAILURE

7 If s/w failure in
PASS(BFS), use
BFS SM 63
(PASS SM, OPS
202)

8 Continue PLBD
ops

9 Continue PLBD
ops in MANUAL
mode

10 Door position is
GO on PORT AFT
BULKHEAD LATCH
GO/NO-GO
DIAGRAM, MECH
SSR-2, fig. 9-1

11 Visual verification
reqd for latch
capture

12 Other
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
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<tbody>
<tr>
<td>1.</td>
<td>Drive Times</td>
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<td>CENTER LATCHES</td>
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<td>2 mtrs ~20 sec</td>
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<td>1 mtr ~40 sec</td>
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<td>FWD, AFT</td>
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<td></td>
<td>LATCHES</td>
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<td></td>
<td>2 mtrs ~30 sec</td>
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<td>1 mtr ~60 sec</td>
</tr>
<tr>
<td></td>
<td>DOORS</td>
</tr>
<tr>
<td></td>
<td>2 mtrs ~63 sec</td>
</tr>
<tr>
<td></td>
<td>1 mtr ~126 sec</td>
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<tr>
<td>2.</td>
<td>EVA reqd to</td>
</tr>
<tr>
<td></td>
<td>disconnect PDU</td>
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</table>

**3.** Attempt to open door:
- (CRT)
  - Select door
    - ITEM 13(10) EXEC (*)
- (R13L)
  - PL BAY DR – OP (~126 sec)
  - PL BAY DR – STOP
- (CRT)
  - ‘OP/CL’ column

**4.** Is DOOR ‘OP’?
- YES
  - **CAUTION**
  - Do not open PORT door if < 2 stripes visible on STBD door to prevent door contact
- NO

**5.** Attempt to close door:
- (R13L)
  - PL BAY DR – CL (~126 sec)
  - PL BAY DR – STOP
- (CRT)
  - ‘OP/CL’ column

**6.** Is door ‘RDY’ or ‘CL’?
- YES
  - Continue PL BD ops
- NO

**7.** Attempt to open (close) door to relieve deformation (if reqd):
- (R13L)
  - PL BAY DR – OP (CL) (as reqd)
  - PL BAY DR – STOP

**8.** Reopen door:
- (R13L)
  - PL BAY DR – OP (~126 sec)
  - PL BAY DR – STOP

**9.** MCC for pwrdn
- Prepare for EVA
When PBD CONFIG message annunciated, AC POWER ON, ITEM 1 – (no *) will automatically be deselected and any active commands are disabled

2 MCC to recommend removal of pwr and/or repositioning affected mechanism

3 Use manual mode for all subsequent PLBD ops

如果机制在途中或微开关未按当前命令位置时，自动模式命令被禁止，任何正在进行的命令都被禁用

使用手动模式进行所有后续PLBD操作

1. 机制在潜在的移动或微开关未在预期位置时，可能由于相间短路或提前关闭（打开）而发生危险。如果在AC电源应用时命令相反方向时可能发生，应避免这种情况发生。

2. BFS SM 63 门道
   - 自动模式选择 - 项3 执行（不*）

3. AC POWER ON, ITEM 1 – *
   - 持续使用MANUAL模式

4. 机制受影响：
   - 门
   - 挂锁

5. 机制受影响：
   - 门
   - 挂锁

6. 警告
   - MCC注意
   - “MICRO-SW STAT”所有未按命令位置的微开关
   - 机制视觉上似乎已经移动或两个微开关不在预期位置？
     - 是
     - 否

7. 显示软件或微开关故障

8. 自动序列软件故障

9. 机制在潜在的移动或微开关未在预期位置时，可能由于相间短路或提前关闭（打开）而发生危险。如果在AC电源应用时命令相反方向时可能发生，应避免这种情况发生。

10. BFS SM 63 门道
    - 自动模式选择 - 项3 执行（不*）

11. 警告
    - MCC注意
    - “MICRO-SW STAT”所有未按命令位置的微开关
    - 机制视觉上似乎已经移动或两个微开关不在预期位置？
      - 是
      - 否

12. 继续使用MANUAL模式

如果机制在途中或微开关未按当前命令位置时，自动模式命令被禁止，任何正在进行的命令都被禁用。
MECH

RAD LAT CNTL PORT(STBD) tb NOT LAT IN 60 SEC OR REL IN 30 SEC

Nominal Config:
(MA73C)
MCA LOGIC
• MNA MID 1 – ON
• MNB MID 2 – ON
• MNC MID 2 – ON
cb MCA PWR
AC1 3Φ MID 1,3 (two) – cl
AC2 3Φ MID 2,4 (two) – cl
AC3 3Φ MID 2,4 (two) – cl
(R13L)
PL BAY MECH PWR SYS 1.2 (two) – ON
RAD LAT CNTL SYS (two) – OFF
RAD CNTL SYS (two) – OFF
If RMS uncradled:
(MA73C)
cb MCA PWR
AC2 3Φ MID 2 – op
AC3 3Φ MID 4 – op

1 Opened MCA cb’s (for RMS uncradled) prevent verification of dual motor ops during RAD troubleshooting
2 PDU Actuator Times
NORMAL
Lat – 30 sec
Rad – 50 sec
SINGLE MTR
Lat – 60 sec
Rad – 100 sec
3 Need MCC verification of microsw status for failed tb

1 (R13L)
RAD LAT CNTL PORT(STBD) tb – bp ?

YES
5

2 Disable MCA logic to verify tb indication

<table>
<thead>
<tr>
<th>Port</th>
<th>Stbd</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:A,B) MCA LOGIC</td>
<td>(MA73C:A,B) MCA LOGIC</td>
</tr>
</tbody>
</table>
• MNA MID 1 – OFF
• MNB MID 4 – OFF
• MNC MID 4 – OFF

NO

YES

3 Port

<table>
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<th>Stbd</th>
</tr>
</thead>
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</tr>
</tbody>
</table>
• MNA MID 1 – ON
• MNB MID 4 – ON
• MNC MID 4 – ON

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<td>(MA73C:A,B) MCA LOGIC</td>
</tr>
</tbody>
</table>
• MNA MID 3 – OFF
• MNB MID 2 – OFF
• MNC MID 2 – OFF

RMS uncradled ?

NO

10

YES

1

6 MCC for next action

7 tb FAILURE

8 Port

<table>
<thead>
<tr>
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<th>Stbd</th>
</tr>
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<td>(MA73C:A,B) MCA LOGIC</td>
</tr>
</tbody>
</table>
• MNA MID 1 – ON
• MNB MID 4 – ON
• MNC MID 4 – ON

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<td>(MA73C:A,B) MCA LOGIC</td>
</tr>
</tbody>
</table>
• MNA MID 3 – ON
• MNB MID 2 – ON
• MNC MID 2 – ON

YES

4

• Discontinue ops

9

16

NO

11

1

2

3
10 What was attempted drive ops at time of the failure:
   LAT
   REL

11 Cycle Lat Sys
   (R13L)
   • RAD LAT CNTL SYS A,B (two) – REL (60 sec) or tb – REL
   • RAD LAT CNTL SYS A,B (two) – OFF

12 Is RAD Deploy reqd?
   NO

13 (R13L)
   • RAD LAT CNTL SYS A,B (two) – LAT (60 sec) or tb – LAT
   • RAD LAT CNTL SYS A,B (two) – OFF

14 • √MCC for next action

15 INTERMITTENT OPS

16 MECHANICAL JAM

17 Enable good Port/Stbd Lat Sys
   (MA73C:C,D)
   cb MCA PWR
   • AC1 3Φ MID 1 – cl
   • AC2 3Φ MID 4 – cl
   • AC3 3Φ MID 4 – cl
   (MA73C:C,D)
   cb MCA PWR
   • AC1 3Φ MID 3 – cl
   • AC2 3Φ MID 2 – cl
   • AC3 3Φ MID 2 – cl

18 • If deploying: Deploy good Rad pnl. Go to MECH SSR-1
9.2b RAD CNTL PORT(STBD) tb NOT DPY OR STO WITHIN 50 SEC AND NO MOTION

1. Compare PORT (STBD) RAD pnl with fixed RAD pnls or deployed STBD(PORT) RAD pnl
2. If dual microsw failure, microsws can be bypassed to regain mtrs function (refer to MECH SSR-8)
3. Both redundant deploy mtrs must be operational to be GO for deploy
4. Opened MCA cbs (if RMS uncradled) conflict with Rad troubleshooting
5. Resume in block 12 if RAD STOW/DPY OPS unsuccessful, and affected RAD pnl failed in transit
6. EVA reqd to stow jammed Rad pnl
7. If RMS uncradled, expect single mtr drive time for PORT RAD
8. MCC to determine if pwrdn is reqd

Nominal Config:
(MA73C)
MCA LOGIC
MNA MID 1,3
(two) – ON
MNB MID 2,4
(two) – ON
cb MCA PWR
AC1 3Φ MID 1,3
(two) – cl
AC2 3Φ MID 2,4
(two) – cl
AC3 3Φ MID 2,4
(two) – cl
R13L
PL BAY MECH PWR
SYS 1,2 (two) – ON
RAD LAT CNTL SYS
(two) – OFF
RAD CNTL SYS
(two) – OFF
If RMS uncradled:
(MA73C)
cb MCA PWR
AC2 3Φ MID 2 – op
AC3 3Φ MID 4 – op

What was attempted drive ops at time of failure?
STOW
DPY
Did jammed RAD pnl move?

9.3

MECH 9.3

15

• Attempt to stow jammed RAD pnl

(R13L)

• PL BAY MECH PWR SYS (two) – ON

On MCC GO:

• RAD CNTL SYS (two) – DPY

• RAD CNTL SYS (two) – OFF (if no motion, or after 10 sec max)

Did jammed RAD pnl move?

8

• MCC to determine if pwrdn is reqd

9 PDU Actuator Times

Dual Mtr

Lat – 30 sec

Rad – 50 sec

Single Mtr

Lat – 60 sec

Rad – 100 sec

14

• Attempt to DPY jammed RAD pnl

(R13L)

• PL BAY MECH PWR SYS (two) – ON

On MCC GO:

• RAD CNTL SYS (two) – DPY

• RAD CNTL SYS (two) – OFF (if no motion, or after tb-STO)

17

What was attempted ops at time of initial jam?

DEPLOY

STOW

18

TWO-WAY MECHANICAL JAM

18

Is affected RAD Cntl Sys tb – STO?

YES

19

INTERMITTENT MECHANICAL JAM OR INTERMITTENT MTR FAILURE

21

• Latch STBD (PORT) RAD Latches

(R13L)

• RAD LAT CNTL SYS (two) – LAT (\ltb-bp)

• RAD LAT CNTL SYS (two) – OFF (\ltb-LAT)

• PL BAY MECH PWR SYS (two) – OFF

22

• Attempt to fully deploy jammed RAD pnl for EVA access

(R13L)

• PL BAY MECH PWR SYS (two) – ON

• RAD CNTL SYS (two) – DPY

• RAD CNTL SYS (two) – OFF (if no motion, or after tb-DPY)

23

24

• Enable nominal PORT(STBD) RAD Latch and RAD Cntl sys

(MA73C:C,D)

• PORT Sys Enable cb MCA PWR

• AC1 3Φ MID 1 – op

• AC2 3Φ MID 4 – op

• AC3 3Φ MID 4 – op

(MA73C:C,D)

• STBD Sys Enable cb MCA PWR

• AC1 3Φ MID 3 – op

• AC2 3Φ MID 2 – op

• AC3 3Φ MID 2 – op

25

• Continue RAD OPS for nominal RAD pnl (if reqd) using MECH SSR-1

(MA73C:C,D)

• PORT Sys Disable cb MCA PWR

• AC1 3Φ MID 1 – cl

• AC2 3Φ MID 4 – cl

• AC3 3Φ MID 4 – cl

(MA73C:C,D)

• STBD Sys Disable cb MCA PWR

• AC1 3Φ MID 3 – cl

• AC2 3Φ MID 2 – cl

• AC3 3Φ MID 2 – cl

16

Config for SINGLE RADIATOR ops

• Disable nominal PORT(STBD) RAD Latch sys

(MA73C:C,D)

• PORT Sys Disable cb MCA PWR

• AC1 3Φ MID 1 – op

• AC2 3Φ MID 4 – op

• AC3 3Φ MID 4 – op

20

MECHANICAL JAM
MECH 9.3a KU ANT tb NOT DPY IN 46 SEC

1. Drive Time
   - Single mtr – 46 sec
   - Dual mtr – 23 sec
2. KU-BD CCTV overlay located in Middeck Transparency Kit
3. KU-BAND ANTENNA CONTINGENCY DEPLOY/STOW FAILED DEPLOY
   STOW SWITCH (IFM) may be reqd
4. Possible Ant jettison reqd
5. If limit sw mechanism failed in stow position, MECH SSR-7 reqd for stow ops
6. If limit sw mechanism failed to transfer deploy signal, failure results in loss of Ku-Bd comm and radar ops

Nominal Config:
- (MA73C:A) MCA LOGIC
- MNC MID 2 – ON (MA73C:B)
- MCA LOGIC
- MNB MID 4 – ON (MA73C:C)
- cb MCA PWR AC3
- cb MCA PWR AC2
- (R13L) PL BAY MECH PWR SYS (two) – ON
- KU ANT – GND
- (A1U) KU PWR – OFF
- (A2) DIGI-DIS SEL – EL/AZ
- (R14:C) cb MNB KU ELEC – op

1. KU ANT tb Not DPY in 46 Sec
   1. (R13L)
      - KU ANT – GND
      - KU ANT tb position
   2. Ant position via visual aids
      - tb – STO
      - tb – bp
   3. KU ANT DPY/STO sw FAILURE OR JAMMED MECHANISM
   4. Perform CONTINGENCY KU-BD ANT DIRECT STOW, MECH SSR-5
   5. tb FAILURE
      - Stowed
      - Not stowed
   6. Ant position (visual)
      - Ant appears fully deployed ?
      - No
      - Perform CONTINGENCY KU-BD ANT DIRECT STOW, MECH SSR-5
      - Yes
      - Discontinue ops
      - tb position
      - tb – bp
      - tb – STO
   7. MECHANICAL FAILURE OR JAMMED MECHANISM
   8. (R14:C)
      - cb MNB KU ELEC – cl
      - KU BD PWR – ON
      - Wait 60 sec
      - (A1U)
      - Ant initialization to -Z orientation
      - RANGE/ELEVATION – 0.000, RANGE RATE/AZM 0.000 ?
      - No
      - Yes
      - STOW LIMIT SWITCH MECH FAILED OR tb FAILURE
      - Go to CONTINGENCY KU-BD ANT DIRECT STOW, MECH SSR-5
   9. (A2)
      - Ant initialization to -Z orientation
      - STOW LIMIT SWITCH MECH FAILED OR JAMMED MECHANISM
      - Range/Elevation 0.000, Range Rate/Azm 0.000 ?
      - No
      - Yes
      - Go to CONTINGENCY KU-BD ANT DIRECT STOW, MECH SSR-5
   10. INTERMITTENT OPS OR JAM IN DPY DIRECTION
   11. STOW LIMIT SWITCH MECHANISM FAILED OR tb FAILURE
   12. Continue ops
   13. Discontinue ops
   14. IMC
   15. IMC
   16. IMC
   17. IMC
MECH 9.3b KU ANT tb NOT STO IN 46 SEC

Nominal Config:
(MA73C:A)
MCA LOGIC
MNC MID 2 – ON
(MA73C:B)
MCA LOGIC
MNB MID 4 – ON
(MA73C:C)
cb MCA PWR
AC3 3φ MID 2 – cl
(MA73C:D)
cb MCA PWR
AC2 3φ MID 4 – cl
(R13L)
PL BAY MECH PWR
SYS (two) – ON
KU ANT – STO
(A1U)
KU BD PWR – ON
(R14:C)
cb MNB KU
ELEC – cl

1. Drive Time
Single mtr – 46 sec
Dual mtr – 23 sec

2. KU-BAND CCTV overlay
located in Middeck
Transparency Kit

3. If limit sw
mechanism failed in
deploy position,
MECH SSR-7 reqd
for subsequent
deploy ops

4. If Boom Stow
Enable signal failure,
MECH SSR-5 reqd
for stow ops

5. Antenna jettison
may be reqd; KU-BD
ANT JETTISON
(ORB OPS)

6. KU-BAND
ANTENNA
CONTINGENCY
DEPLOY/STOW -
FAILED
DEPLOY/STOW SW
(IFM) may be reqd

7. KU BD PWR
must be turned off
prior to taking KU
ANT – GND to
prevent gimbal
locking pins from
retracting

8. Perform KU-BD
ANT DEPLOY
(ORB OPS)

9. INTERMITTENT
OPS, OR BOOM
STOW ENABLE I
OR II SIGNAL
FAILED

10. MECHANICAL
FAILURE OR
JAMMED
MECHANISM

11. Discontinue ops

12. •√
MCC
MECH 9.3c  KU ANT GIMBAL ANGLES INCORRECT AFTER 50 SEC

Nominal Config:
(MA73C-A)
- MCA LOGIC
  - MNC MID 2 – ON
(MA73C-B)
- MCA LOGIC
  - MNB MID 4 – ON
(MA73C:C)
  - cb MCA PWR
    - AC3 3φ MID 2 – cl
(MA73C:D)
  - cb MCA PWR
    - AC2 3φ MID 4 – cl
(R13L)
  - PL BAY MECH PWR SYS (two) – OFF
  - KA ANT – STO
(A1U)
- KU PWR – ON
(R14:C)
  - cb MNB KU ELEC – cl

1. KU-BAND ANTENNA CONTINGENCY DEPLOY/STOW – FAILED
   DEPLOY/STOW SWITCH (IFM) may be reqd

2. If α/β GIMBAL FAILURE, KU-BAND ANTENNA CONTINGENCY STOW W/EVA ANTENNA GIMBAL ALIGNMENT (IFM) may be reqd

3. If EA-1 FAILURE, KU-BAND ANTENNA: CONTINGENCY STOW – EA1 ALTERNATE PWR (IFM) may be reqd

4. Selecting GND will allow ant to assume safe config

1. (R13L)
   - KU ANT – STO
   - PL BAY MECH PWR SYS 1,2 (two) – OFF

2. (R13L)
   - KU ANT – GND
   - MCC

3. (R13L)
   - KU ANT – STO
   - MCC

4. (R13L)
   - KU ANT – STO
   - MCC

5. (R13L)
   - KU ANT – STO
   - MCC
ROEU DEMATE – tb NOT REL, MICROSW IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

1. MCC can determine which condition exists
2. Expect single mtr mate/demate/relax for mtr failure
3. If PL SEL X LATCH 2 REL A(B) – 1 ind received in single mtr time, microsw misrigged
4. One mtr will continue to drive while demating until PL RETEN LAT 2 sw turned OFF
5. If SYS A Microsw failed, tb will be inaccurate
6. Expect single mtr drive time for mate

**Nominal Config:**
(R13L)
PL BAY MECH PWR (two) – ON
(A6U) PL RETEN
LOGIC PWR (two) – ON
PL SEL 3(1,2) (MA73C:C)
cb MCA PWR AC1 3Φ MID 1 – cl
(MA73C:D)
cb MCA PWR AC2 3Φ MID 3 – cl
ROEU released

1. (A6U) PL RETEN LAT 2 – OFF
2. (A6U) PL RETEN LAT 2 – REL?
3. tb FAILURE
4. Continue nominal ops using SM 97
5. MTR OR RELAY FAILURE
6. Continue nominal ops (expect single mtr demate)
7. PL SEL X LATCH 2 REL A(B) – 1 ind received in single mtr time (> 18 sec)?
8. DEMATE A(B) MICROSW FAILED OPEN
9. MATE A(B) MICROSW FAILED CLOSED
10. Continue nominal ops using SM 97 for nom sys
One mtr Φ lost. Good mtr will backdrive failed mtr. Subsequent mate, relax, and demate ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system.

EVA capability exists to perform ROEU demate.

MCC can determine if switch is failed.
1. If PL SEL X LATCH 2 LAT A(B) – 1 ind received in single mtr time, microsw misrigged
2. MCC can determine which condition exists
3. One mtr will continue to drive while mating until PL RETEN LAT 2 sw turned OFF
4. If SYS A microsw failed, tb will be inaccurate
5. Expect single mtr drive time for demate
6 One mtr \( \Phi \) lost. Good mtr will backdrive failed mtr. Subsequent mate, relax, and demate ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system.

7 EVA capability exists to perform ROEU demate.

8 MCC can determine if switch is failed.
Release tb Not Rel or SM 97 PL RETENTION Microsw LAT/REL Ind Not Nominal or Single Mtr Drive Time > 20 sec

Nominal Config:
(R13L)
PL BAY MECH PWR (two) – ON (A6U)
PL RETEN LOGIC PWR (two) – ON
PL SEL 3(1,2) (MA73C:C)
cb MCA PWR AC1 3Φ MID 1 – cl
(MA73C:D)
cb MCA PWR AC2 3Φ MID 3 – cl

1 MCC can determine which condition exists
2 Expect single mtr latch/release for mtr failure
3 If PL SEL X LATCH 3 REL A(B) – 1 ind received in single mtr time, microsw misrigged
4 One mtr will continue to drive while releasing until PL RETEN LAT 3 sw turned OFF
5 If SYS A Microsw failed, tb will be inaccurate
6 Expect single mtr drive time for latch
One mtr Φ lost. Good mtr will backdrive failed mtr. Subsequent release and latch ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system.

EVA capability exists to perform ROEU release.

MCC can determine if switch is failed.

11 Disable Mtr 2
   (R13L)
   • PL BAY MECH PWR SYS 2 – OFF
   (A6U)
   • PL RETEN LAT 3 – REL (40 sec max)
   • PL RETEN LAT 3 – OFF
   (CRT)
   PL SEL X LATCH 3 REL A – 1 ?

12 Disable Mtr 1
   (R13L)
   PL BAY MECH
   • PWR SYS 2 – ON
   • PWR SYS 1 – OFF
   (A6U)
   • PL RETEN LAT 3 – REL (40 sec max)
   • PL RETEN LAT 3 – OFF
   (CRT)
   PL SEL X LATCH 3 REL B – 1 ?

13 RELEASE MTR 2 FUNCTION LOST

14 (R13L)
   • PL BAY MECH PWR SYS 2 – ON
   • Continue nominal ops

15 MICROSW MISRIGGING, MECHANICAL JAM, OR PL RETEN LAT 3 SW FAILURE

16 RELEASE MTR 1 FUNCTION LOST

17 •√ MCC

18 (R13L)
   • PL BAY MECH PWR SYS 1 – ON
   • Continue nominal ops
MECH 9.4d ROEU LATCH – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

1. MCC can determine which condition exists
2. Expect single mtr latch/release for mtr failure
3. If PL SEL X LATCH 3 LAT A(B) – 1 ind received in single mtr time, microsw misrigged
4. One mtr will continue to drive while latching until PL RETEN LAT 3 sw turned OFF
5. If SYS A Microsw failed, tb will be inaccurate
6. Expect single mtr drive time for release/latch

Nominal Config:
(R13L) PL BAY MECH PWR (two) – ON (A6U) PL RETEN LOGIC PWR (two) – ON PL SEL – 3 (1,2) (MA73C:C) cb MCA PWR AC1 3Φ MID 1 – cl (MA73C:D) cb MCA PWR AC2 3Φ MID 3 – cl

Latch tb Not Lat or SM 97 PL RETENTION Microsw LAT/REL Ind Not Nominal or Single Mtr Drive Time > 20 sec

1. (A6U) PL RETEN LAT 3 – OFF

SM 97 PL RETENTION

LAT 3
PL SEL X

A B

LAT 1 1
REL 0 0

NO 3. tb FAILURE

YES 4. Continue nominal ops using SM 97

7. PL SEL X LATCH 3 LAT A(B) – 1 ind received in single mtr time (> 20 sec) ?

LAT 1 0
REL 0 0

OR

LAT 0 0
REL 0 0

11

4.5

5. Continue nominal ops (expect single mtr latch)

8. LATCH A(B) MICROSW FAILED OPEN

LATCH A(B) MICROSW FAILED CLOSE

9. RELEASE A(B) MICROSW FAILED CLOSE

10. Continue nominal ops using SM 97 for nom sys

1. YES 2. PL RETEN LAT 3 tb – LAT ?

LAT 1 1
REL 0 0

5. MTR OR RELAY FAILURE

6. Continue nominal ops using SM 97

9. YES 10. NO
One mtr Φ lost. Good mtr will backdrive failed mtr. Subsequent release and latch ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system.

EVA capability exists to perform ROEU latch.

MCC can determine if switch is failed.
MECH 9.4e ROEU RELAX – tb NOT NOMINAL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

1 Expect single mtr drive time for relax
2 If SYS A Microsw failed, tb will be inaccurate
3 One mtr will continue to drive while relaxing until PL RETEN LAT 1 sw turned OFF
4 MCC can determine which condition exists. If mtr failure, demate, mate and relax will be single mtr time

Nominal Config:
(R13L) PL PAY MECH PWR (two) – ON (A6U) PL RETEN LOGIC PWR (two) – ON PL SEL – 3(1,2) (MA73C:C) cb MCA PWR AC1 3Φ MID 1 – cl (MA73C:D) cb MCA PWR AC2 3Φ MID 3 – cl

1 Expect single mtr drive time for relax
2 If SYS A Microsw failed, tb will be inaccurate
3 One mtr will continue to drive while relaxing until PL RETEN LAT 1 sw turned OFF
4 MCC can determine which condition exists. If mtr failure, demate, mate and relax will be single mtr time
If SYS A Microsw failed, tb will be inaccurate

One mtr will continue to drive while relaxing until PL RETEN LAT 1 sw turned OFF

MCC can determine which condition exists. If MTR failure, demate, mate and relax will be single mtr time

If PL SEL LATCH 1 REL – 1 ind received in single mtr time, microsw misrigged

EVA capability exists to perform ROEU relax

PL RETEN LAT 2 sw to demate may be used to relax ROEU. MCC will explain implementation

Subsequent mate, relax, and demate ops will be performed on single mtr. Good mtr will be isolated by turning PL BAY MECH PWR OFF for failed system

MCC can determine if switch is failed
If SYS A Microsw failed, tb will be inaccurate.

Nominal Config:
(R13L)
PL BAY MECH PWR (two) – ON (A6U)
PL RETEN LOGIC PWR (two) – ON
PL SEL – 3(1,2)
(MA73C:C)
cb MCA PWR AC1
3Φ MID 1 – cl
(MA73C:D)
cb MCA PWR AC2
3Φ MID 3 – cl

If LATCHED (A6U)
PL RETEN RDY 1 tb – gray
SM 97 PL RETENTION
PL SEL X LATCH 3 RDY A,B – 1

If UNLATCHED (A6U)
PL RETEN RDY 1 tb – bp
SM 97 PL RETENTION
PL SEL X LATCH 3 RDY A,B – 0

1 If SYS A Microsw failed, tb will be inaccurate.

2 tb FAILED bp
3 Continue nominal ops using SM 97

4 ELECTRICAL CONTINUITY A(B) CIRCUIT/IND FAILED OPEN
5 ELECTRICAL CONTINUITY A(B) CIRCUIT/IND FAILED CLOSED
6 Continue nominal ops using SM 97 for nom sys

7 tb FAILED
8 Continue nominal ops using SM 97
MECH SSR-1
PORT(STBD) RAD OPS

WARNING
To preclude failures causing inadvertent MPM cycling, RMS must be cradled. This procedure assumes that the RMS (if flown) is cradled.

1 Disable STBD(PORT) RAD sys
   STBD Panel Disable (MA73C:D,C) cb MCA PWR
   • AC1 3Φ MID 3 – op
   • AC2 3Φ MID 2 – op
   • AC3 3Φ MID 2 – op
   PORT Panel Disable (MA73C:C,D) cb MCA PWR
   • AC1 3Φ MID 1 – op
   • AC2 3Φ MID 4 – op
   • AC3 3Φ MID 4 – op

2 PORT(STBD) ops reqd:
   STO
   DPY

3 Stow,latch PORT(STBD)
   (R13L)
   • PL BAY MECH PWR SYS 1,2 – ON
   • RAD LAT CNTL SYS A,B – STO
   • PORT(STBD) tb – STO
   • SYS A,B – OFF
   • LAT CNTL SYS A,B – LAT
   • RAD LAT CNTL PORT(STBD) tb – LAT
   • RAD LAT CNTL SYS A,B – OFF
   • PL BAY MECH PWR SYS 1,2 – OFF

4 Release,deploy PORT(STBD) RAD
   (R13L)
   • PL BAY MECH PWR SYS 1,2 – ON
   • RAD LAT CNTL SYS A,B – REL
   • RAD LAT CNTL PORT(STBD) tb – REL
   • RAD LAT CNTL SYS A,B – OFF
   • RAD CNTL SYS A,B – DPY
   • RAD CNTL PORT(STBD) tb – DPY
   • RAD CNTL SYS A,B – OFF
   • PL BAY MECH PWR SYS 1,2 – OFF

5 Enable STBD(PORT) RAD sys
   STBD (MA73C:D,C) cb MCA PWR
   • AC1 3Φ MID 3 – cl
   • AC2 3Φ MID 2 – cl
   • AC3 3Φ MID 2 – cl
   PORT (MA73C:C,D) cb MCA PWR
   • AC1 3Φ MID 1 – cl
   • AC2 3Φ MID 4 – cl
   • AC3 3Φ MID 4 – cl

1 PDU Actuator Times Normal (2 mtr)
   Lat – 30 sec
   Rad – 50 sec
   Single Mtr
   Lat – 60 sec
   Rad – 100 sec

WARNING
MECH SSR-2
CONTINGENCY PLBD CLOSURE

NOTE
This procedure assumes that the door has jammed from orbiter thermal warpage or debris.

1 Configuration check

SM (BFS SM 63) PL BAY DOORS
• Deselect all 'MAN SEL' items
• 'OP/CL' column

Are PORT(STBD) FWD, AFT LATCHES (two) – 'OP'? NO  YES

2 Open bulkhead latch gangs

(CRT) Select PORT(STBD) FWD, AFT LATCHES
• ITEM 11(8) EXEC (*)
• ITEM 12(9) EXEC (*)

(R13L)
• PL BAY DR – OP (10 sec)
• – STOP
• Visually check area for obstruction. If cause of jam found, \MCC before proceeding
• PL BAY DR – CL ('RDY' + 6 sec)
• – STOP

3 Check for debris

(CRT, R13L)
Select PORT(STBD) DOOR
• ITEM 13(10) EXEC (*)

(R13L)
• PL BAY DR – OP (10 sec)
• – STOP
• Visually check area for obstruction. If cause of jam found, \MCC before proceeding
• PL BAY DR – CL ('RDY' + 6 sec)
• – STOP

4 Recheck for jam condition

(CRT)
• 'OP/CL' column and visually inspect door

Is PORT(STBD) DOOR 'RDY' or 'CL' and door is not deformed? NO  YES

6 \MCC

Does time permit one full day side pass TOP SUN SOLAR INERTIAL attitude? NO  YES

8 Partially close bulkhead latch gangs and door

(CRT)
Select PORT(STBD) FWD, AFT LATCHES
• ITEM 11(8) EXEC (*)
• ITEM 12(9) EXEC (*)

(R13L)
• PL BAY DR – CL (15 sec)
• – STOP

9 Recheck for jam condition

(CRT)
• 'OP/CL' column and visually inspect door

Is PORT(STBD) DOOR 'RDY' or 'CL' and door is not deformed? NO  YES

7 Open door, complete one day side pass TOP SUN SOLAR INERTIAL attitude, and close door

(R13L)
• PL BAY DR – OP (~63 sec)
• – STOP
• Complete TOP SUN SOLAR INERTIAL pass, then at sunset:
• PL BAY DR – CL (~63 sec)
• – STOP

10

11

1

2

1

2

---

1. Aft bulkhead target line can be used to verify port aft door configuration (See Fig. 9-1, PORT AFT BULKHEAD LATCH GO/NO-GO DIAGRAM)
2. Observe aft centerline for deflection (See Fig. 9-2, PORT AFT CENTERLINE VIEWED BY CAMERA C)
### MECH SSR-2 (Cont)

**1.** Aft bulkhead target line can be used to verify port aft door configuration (See Fig. 9-1, PORT AFT BULKHEAD LATCH GO/NO-GO DIAGRAM)

**2.** Observe aft centerline for deflection (See Fig. 9-2, PORT AFT CENTERLINE VIEWED BY CAMERA C)

**10.** Recheck for jam condition

<table>
<thead>
<tr>
<th>Is PORT(STBD) DOOR ‘RDY’ or ‘CL’ and door is not deformed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
</tr>
</tbody>
</table>

**11.** Close, latch door

<table>
<thead>
<tr>
<th>Close, latch door</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CRT, R13L)</td>
</tr>
<tr>
<td>• PORT FWD, AFT LATCHES ‘CL’ (~15-30 sec)</td>
</tr>
<tr>
<td>• PL BAY DR – STOP</td>
</tr>
</tbody>
</table>

**12.** Open bulkhead latch gangs

<table>
<thead>
<tr>
<th>Deselect PORT(STBD) FWD, AFT LATCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ITEM 11(8) EXEC (no *)</td>
</tr>
<tr>
<td>• ITEM 12(9) EXEC (no *)</td>
</tr>
</tbody>
</table>

**13.** Continue PLBD ops in MANUAL mode

**14.** Unlatch, open port door

<table>
<thead>
<tr>
<th>Select PORT FWD, AFT LATCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ITEM 11 EXEC (*)</td>
</tr>
<tr>
<td>• ITEM 12 EXEC (*)</td>
</tr>
</tbody>
</table>

**15.** MCC for wave-off capability

<table>
<thead>
<tr>
<th>GO for wave-off?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
</tr>
</tbody>
</table>

**16.** Open PLBD

<table>
<thead>
<tr>
<th>Select PORT(STBD) DOOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ITEM 13(10) EXEC (*)</td>
</tr>
</tbody>
</table>

**17.** Disable PLBDs

<table>
<thead>
<tr>
<th>PL BAY DR SYS 1, 2 (two) – DSBL</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC POWER OFF – ITEM 2 EXEC (*)</td>
</tr>
<tr>
<td>IF PASS SM, SM OPS 201 PRO</td>
</tr>
</tbody>
</table>

**18.** Waveoff for 24 hr; remain TOP SUN SOLAR INERTIAL

<table>
<thead>
<tr>
<th>Prepare for EVA to close doors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attempt MANUAL PLBD close prior to EVA</td>
</tr>
</tbody>
</table>

**19.** Port door just opened?

| YES | NO |

---

### Instructions

- **CRT**
- **PL BAY DR**
- **PL BAY DR – STOP**
- **PL BAY DR – OP**
- **PORT(STBD) FWD, AFT LATCHES – ‘CL’ (~15-30 sec)**
- **PORT(STBD) FWD, AFT LATCHES – ‘OP’ (~30 sec)**
- **PORT DOOR – ‘OP’ (~63 sec)**
- **PORT DOOR – ‘RDY’ or ‘CL’**

---

**09/24/08 9-40 MAL/ALL/GEN J**
CAUTION

The following steps risk damaging PLBD structure as maximum latching force is used to close doors.

15

19

Problem appears to be at:

- Forward bulkhead
- Aft bulkhead

20

Close forward bulkhead latch gang and door

(CRT, R13L)
Select PORT(STBD) FWD LATCHES, PORT(STBD) DOOR
- ITEM 11(8) EXEC (*)
- ITEM 13(10) EXEC (*)
- PL BAY DR – CL
- PORT(STBD) FWD LATCHES – blank, ‘CL’ (~30 sec)
- PL BAY DR – STOP

21

Close aft bulkhead latch gang and door

(CRT, R13L)
Select PORT(STBD) AFT LATCHES, PORT(STBD) DOOR
- ITEM 12(9) EXEC (*)
- ITEM 13(10) EXEC (*)
- PL BAY DR – CL
- PORT(STBD) AFT LATCHES – blank, ‘CL’ (~30 sec)
- PL BAY DR – STOP

22

Recheck for jam condition

(CRT)
- ‘OP/CL’ column and visually inspect door

Is PORT(STBD) DOOR ‘RDY’ or ‘CL’ and door is not deformed?

23

Recheck for jam condition

(CRT)
- ‘OP/CL’ column and visually inspect door

Is PORT(STBD) DOOR ‘RDY’ or ‘CL’ and door is not deformed?

24

Close aft bulkhead latch gang and door

(CRT)
Deselect PORT(STBD) FWD LATCHES, select PORT(STBD) AFT LATCHES
- ITEM 11(8) EXEC (no *)
- ITEM 12(9) EXEC (*)

(CRT, R13L)
Close PORT(STBD) AFT LATCHES, PORT(STBD) DOOR
- PL BAY DR – CL
- PORT(STBD) AFT LATCHES – blank, ‘CL’ (~30 sec)
- PL BAY DR – STOP

(CRT)
Deselect PORT(STBD) FWD LATCHES, PORT(STBD) DOOR
- ITEM 11(8) EXEC (no *)
- ITEM 13(10) EXEC (no *)

25

Close forward bulkhead latch gang and door

(CRT)
Deselect PORT(STBD) AFT LATCHES, select PORT(STBD) FWD LATCHES
- ITEM 12(9) EXEC (no *)
- ITEM 11(8) EXEC (*)

(CRT, R13L)
Close PORT(STBD) FWD LATCHES, PORT(STBD) DOOR
- PL BAY DR – CL
- PORT(STBD) FWD LATCHES – blank, ‘CL’ (~30 sec)
- PL BAY DR – STOP

(CRT)
Deselect PORT(STBD) FWD LATCHES, PORT(STBD) DOOR
- ITEM 12(9) EXEC (no *)
- ITEM 13(10) EXEC (no *)

26

- Continue PLBD ops in MANUAL mode
27 Open aft bulkhead latch gang, close forward bulkhead latch gang and door

(CRT, R13L)
Deselct PORT(STBD) DOOR, open PORT(STBD) AFT LATCHES
• ITEM 13(10) EXEC (no *)
• PL BAY DR – OP
• PORT(STBD) AFT LATCHES – blank, ‘OP’ (~30 sec)
• PL BAY DR – STOP

28 Open forward bulkhead latch gang, close aft bulkhead latch gang and door

(CRT, R13L)
Deselct PORT(STBD) DOOR, open PORT(STBD) FWD LATCHES
• ITEM 13(10) EXEC (no *)
• PL BAY DR – OP
• PORT(STBD) FWD LATCHES – blank, ‘OP’ (~30 sec)
• PL BAY DR – STOP

29 Is STBD door open?

YES

30 Is STBD door open?

NO

31 Close STBD door and STBD forward bulkhead latch gang

(CRT)
Select STBD DOOR
• ITEM 10 EXEC (*)

32 Close STBD door and STBD aft bulkhead latch gang

(CRT)
Select STBD DOOR
• ITEM 10 EXEC (*)

33

34
33 Close centerline latch gangs forward to aft and both doors

(CRT)
Select PORT, STBD DOOR, CENTER LATCHES 1-4
- ITEM 13 EXEC (*)
- ITEM 10 EXEC (*)
- ITEM 6 EXEC (*)

(CRT, R13L)
- PL BAY DR – CL
- CENTER LATCHES 1-4 – blank, ‘CL’ (~20 sec)
- PL BAY DR – STOP

(CRT)
Deselect CENTER LATCHES 1-4
- ITEM 6 EXEC (no *)
- Repeat closure for CENTER LATCHES 5-8, 9-12, 13-16 in order

34 Close centerline latch gangs aft to forward and both doors

(CRT, R13L)
Select PORT, STBD DOOR, CENTER LATCHES 13-16
- ITEM 13 EXEC (*)
- ITEM 10 EXEC (*)
- ITEM 7 EXEC (*)

(CRT, R13L)
- PL BAY DR – CL
- CENTER LATCHES 13-16 – blank, ‘CL’ (~20 sec)
- PL BAY DR – STOP

(CRT)
Deselect CENTER LATCHES 13-16
- ITEM 7 EXEC (no *)
- Repeat closure for CENTER LATCHES 9-12, 5-8, 1-4 in order

35 Close aft bulkhead latch gangs and doors

(CRT)
Select PORT, STBD AFT LATCHES
- ITEM 12 EXEC (*)
- ITEM 9 EXEC (*)

(CRT, R13L)
- PL BAY DR – CL
- PORT, STBD AFT LATCHES – blank, ‘CL’ (~30 sec)
- PL BAY DR – STOP

(CRT)
Deselect PORT, STBD AFT LATCHES, PORT, STBD DOOR
- ITEM 12 EXEC (no *)
- ITEM 9 EXEC (no *)
- ITEM 13 EXEC (no *)
- ITEM 10 EXEC (no *)

36 Close forward bulkhead latch gangs and doors

(CRT)
Select PORT, STBD FWD LATCHES
- ITEM 11 EXEC (*)
- ITEM 8 EXEC (*)

(CRT, R13L)
- PL BAY DR – CL
- PORT, STBD FWD LATCHES – blank, ‘CL’ (~30 sec)
- PL BAY DR – STOP

(CRT)
Deselect PORT, STBD FWD LATCHES, PORT, STBD DOOR
- ITEM 11 EXEC (no *)
- ITEM 8 EXEC (no *)
- ITEM 13(10) EXEC (no *)
- ITEM 10 EXEC (no *)
37 Close centerline latch gangs forward to aft and door

(CRT)
Select STBD DOOR, CENTER LATCHES 1-4
- ITEM 10 EXEC (*)
- ITEM 6 EXEC (*)

(CRT, R13L)
- PL BAY DR – CL
- CENTER LATCHES 1-4 – blank, ‘CL’ (~20 sec)
- PL BAY DR – STOP

(CRT)
Deselect CENTER LATCHES 1-4
- ITEM 6 EXEC (no *)
- Repeat closure for CENTER LATCHES 5-8, 9-12, 13-16 in order

38 Close centerline latch gangs aft to forward and door

(CRT)
Select STBD DOOR, CENTER LATCHES 13-16
- ITEM 10 EXEC (*)
- ITEM 7 EXEC (*)

(CRT, R13L)
- PL BAY DR – CL
- CENTER LATCHES 13-16 – blank, ‘CL’ (~20 sec)
- PL BAY DR – STOP

(CRT)
Deselect CENTER LATCHES 13-16
- ITEM 7 EXEC (no *)
- Repeat closure for CENTER LATCHES 9-12, 5-8, 1-4 in order

39 Close aft bulkhead latch gang and door

(CRT)
Select STBD AFT LATCHES
- ITEM 9 EXEC (*)

(CRT, R13L)
- PL BAY DR – CL
- STBD AFT LATCHES – blank, ‘CL’ (~30 sec)
- PL BAY DR – STOP

(CRT)
Deselect STBD AFT LATCHES, STBD DOOR
- ITEM 9 EXEC (no *)
- ITEM 10 EXEC (no *)

40 Close forward bulkhead latch gang and door

(CRT)
Select STBD FWD LATCHES
- ITEM 8 EXEC (*)

(CRT, R13L)
- PL BAY DR – CL
- STBD FWD LATCHES – blank, ‘CL’ (~30 sec)
- PL BAY DR – STOP

(CRT)
Deselect STBD FWD LATCHES, STBD DOOR
- ITEM 8 EXEC (no *)
- ITEM 10 EXEC (no *)

35 36

41 Disable PLBDs

(CRT, R13L)
- PL BAY DR SYS 1.2 (two) – DSBL
- AC POWER OFF – ITEM 2 EXEC (*)
- If PASS SM, SM OPS 201 PRO

(A7U)
- PL BAY FLOOD (all) – OFF
Figure 9-1.- Port aft bulkhead latch GO/NO-GO diagram.
Shows worst case upwards deflection of PLBD seen on STS-4

Figure 9-2.- Port aft centerline viewed by camera C.
1. Depending on the position of the port door, STBD DOOR may show 'RDY' instead of blank.
2. Allows LATCHES to unlatch partially while remaining captured.

---

**Excessive C/L Overlap**
- Noted with PORT DOOR
- Closed and Latched Entry
- Req'd Next Opportunity

**STBD DOOR extended guide roller trajectory**
- above point D on Fig. 9-3

---

**MECH SSR-3 SIMULTANEOUS PLBD CL**

1. Disable one mtr in each actuator
   - (R13L)
   - PL BAY DR SYS
   - 1 – DSBL

2. Close STBD DOOR until just before contact with PORT DOOR
   - (CRT)
   - Select STBD DOOR
   - ITEM 10 EXEC (*)

3. Open PORT BLKHDs to 'OP'
   - (CRT)
   - Select PORT FWD, AFT LATCHES
   - ITEM 11 EXEC (*)

4. Open STBD DOOR 2-3 stripes
   - (CRT)
   - 'STBD FWD, AFT LATCHES' (two) – 'OP'

5. Select STBD DOOR
   - ITEM 10 EXEC (*)
   - (CRT, R13L)
   - PL BAY DR – CL
   - 'STBD DOOR – blank, 'RDY' – PL BAY DR – STOP

6. Deselect STBD DOOR
   - ITEM 10 EXEC (no *)

7. Close STBD DOOR until just before contact with PORT DOOR
   - (CRT)
   - Select STBD DOOR
   - ITEM 10 EXEC (*)

8. Open STBD DOOR 2-3 stripes
   - (CRT)
   - 'C/L LATCH EXTENDED GUIDE ROLLER TRAJECTORY NO-GO DIAGRAM, fig. 9-3'

9. Partially Open PORT BLKHDs
   - (CRT)
   - Select PORT FWD, AFT LATCHES
   - ITEM 11 EXEC (*)

10. Open STBD DOOR 2-3 stripes
    - (CRT)
    - Select STBD DOOR
    - ITEM 10 EXEC (*)

11. No-Go for PLBD closing?
    - (CRT)
    - PL BAY DR – STOP

12. Deselect PORT FWD, AFT LATCHES
    - (CRT)
    - PL BAY DR – STOP

---

**NO-GO for PLBD closing?**

- YES
- NO
MECH SSR-3 (Cont)

1. Depending on the position of the port door, STBD DOOR may show 'RDY' instead of blank.
2. Allows LATCHES to latch partially.
3. The latch hangers on CENTER LATCHES 3, 5, 7, 9, and 12 are the only ones that have stripes. The stripes on 9 may not be visible due to obstruction by the passive shear roller.

- **Open STBD DOOR 2-3 stripes**
  - (CRT) Select STBD DOOR
  - ITEM 10 EXEC (*)

- **Close STBD DOOR until just before contact is made with PORT DOOR**
  - (CRT, R13L)
  - PL BAY DR – OP (~25 sec)
  - STBD DOOR – blank
  - PL BAY DR – STOP
  - (CRT) Deselect STBD DOOR
  - ITEM 10 EXEC (no *)

- **Open STBD DOOR 2-3 stripes (CRT)**
  - Select STBD DOOR
  - ITEM 10 EXEC (*)

- **Partially close PORT LATCHES**
  - If not already 'CL' select PORT DOOR
  - ITEM 13 EXEC (*)
  - Select PORT FWD, AFT LATCHES
  - ITEM 11 EXEC (*)
  - ITEM 12 EXEC (*)

**CAUTION**

- Do not close FWD, AFT LATCHES if PORT(STBD) DOOR not 'RDY' to prevent DOOR closing onto the latches

- **Repeat blocks 10, 14, 11 as reqd to eliminate overlap**

- **Open PORT DOOR slightly to eliminate overlap. Do not move past 'RDY' position**
  - (CRT) Select PORT DOOR
  - ITEM 13 EXEC (*)
  - (CRT, R13L)
  - PL BAY DR – OP (~25 sec)
  - PORT DOOR – 'RDY'
  - PL BAY DR – STOP
  - (CRT) Deselect PORT DOOR
  - ITEM 13 EXEC (no *)

- **Repeat blocks 10, 14, 11 as reqd to eliminate overlap**

- **Close CENTER LATCHES visually for LATCH capture using C/L LATCH EXTENDED GUIDE ROLLER TRAJECTORY NO-GO DIAGRAM, fig. 9-3**
  - Extended guide rollers for CENTER LATCHES 3, 5, 7, 12 are below point B
  - CENTER LATCHES for excessive gap. LATCH Guide Roller must be above Passive Stop
  - Partially close individual LATCH Gangs that pass checks
  - Select single CENTER LATCH Gang (as reqd)

- **Repeat for all CENTER LATCH Gangs that pass checks**
  - (CRT)
  - Select single CENTER LATCH Gang (as reqd)
  - Repeat for all CENTER LATCH Gangs that pass checks

- **Do not close FWD, AFT LATCHES if PORT(STBD) DOOR not 'RDY' to prevent DOOR closing onto the latches**
3. Allows LATCHES to latch partially.

4. The latch hangers on CENTER LATCHES 3, 5, 7, 9, and 12 are the only ones that have stripes. The stripes on 9 may not be visible due to obstruction by the passive shear roller.

16. Partially Close STBD LATCHES, DOOR
   (CRT)
   If not already 'CL'
   select STBD DOOR
   • ITEM 10 EXEC (*)
   Select STBD FWD, AFT LATCHES
   • ITEM 8 EXEC (*)
   • ITEM 9 EXEC (*)
   (CRT)
   • PL BAY DR – CL (31 sec)
   • STBD DOOR – 'CL'
   • STBD FWD, AFT LATCHES – blank
   • PL BAY DR – STOP

17. CENTER LATCHES visually for LATCH capture using C/L LATCH EXTENDED GUIDE ROLLER
   TRAJECTORY
   NO-GO DIAGRAM, fig. 9-3
   • Extended guide rollers for CENTER LATCHES 3, 5, 7, 12 are below point B
   • CENTER LATCHES for excessive gap.
   LATCH Guide Roller must be above Passive Stop

18. Complete closure of PORT FWD, AFT LATCHES, DOOR
   (CRT)
   If not already 'CL'
   select PORT DOOR
   • ITEM 13 EXEC (*)
   Select PORT FWD, AFT LATCHES
   • ITEM 11 EXEC (*)
   • ITEM 12 EXEC (*)
   (CRT, R13L)
   • PL BAY DR – CL (~29 sec)
   • PORT DOOR – 'CL'
   • PORT FWD, AFT LATCHES – 'CL'
   • PL BAY DR – STOP

19. Complete closure of STBD FWD, AFT LATCHES, DOOR
   (CRT)
   If not already 'CL'
   select STBD DOOR
   • ITEM 10 EXEC (*)
   Select STBD FWD, AFT LATCHES
   • ITEM 8 EXEC (*)
   • ITEM 9 EXEC (*)
   (CRT, R13L)
   • PL BAY DR – CL (~29 sec)
   • STBD DOOR – 'CL'
   • STBD FWD, AFT LATCHES – 'CL'
   • PL BAY DR – STOP

20. Partially close individual LATCH Gangs, not previously closed, that pass checks:
   (CRT)
   • Select single CENTER LATCH Gang (as reqd)
   (CRT, R13L)
   • PL BAY DR – CL (25 sec)
   • CENTER LATCHES – blank
   • PL BAY DR – STOP

21. Repeat for all CENTER LATCH Gangs that pass checks:
   (CRT)
   • Deselect single CENTER LATCH Gang (as reqd)
   • Repeat for all CENTER LATCH Gangs that pass checks
20 Complete CENTER LATCH closure in the following order:
1-4 (ITEM 6)
13-16 (ITEM 7)
5-8 (ITEM 4)
9-12 (ITEM 5)

(CRT)
• Select single CENTER LATCH Gang

(R13L)
• PL BAY DR – CL (~15 sec for partially closed, ~40 sec for open LATCH)
• PL BAY DR – STOP

(CRT)
• Deselect single CENTER LATCH Gang
• Repeat for all remaining CENTER LATCH Gangs

21
(CRT)
• AC POWER OFF – ITEM 2 EXEC (*)
(R13L)
• PL BAY DR SYS 2 – DSBL
Figure 9-3.– C/L Latch Extended Guide Roller Trajectory NO-GO Diagram
MECH SSR-4
PLBD CHECKOUT AFTER MDM CHANGEOUT

R13L 1. √ PL BAY DR – STOP
    √ PL BAY DR SYS (two) – DSBL

CRT4 2. SM, OPS 202 PRO or BFS, SM 63 PL BAY DOORS
    4: SM PL BAY DOORS
    √ AC POWER OFF, ITEM 2 EXEC (*)
    √ MAN SEL (ten) – (no *)
    √ PBD SW BYPASS, ITEM 14 EXEC (no *)
    √ OP/CL STATUS (ten) – OP

NOTE
Perform remaining steps during AOS only

3. Select CENTER LATCHES 5-8, 9-12, 1-4, 13-16 – ITEM 4, 5, 6, 7 EXEC (*)

R13L 4. PL BAY DR – CL
    On MCC GO:
    PL BAY DR – STOP

CRT4 5. Deselect CENTER LATCHES 5-8, 9-12, 1-4, 13-16 – ITEM 4, 5, 6, 7 EXEC (no *)

R13L 6. Select STBD FWD, AFT LATCHES & DOOR – ITEM 8, 9, 10 EXEC (*)

R13L 7. PL BAY DR – CL
    On MCC GO:
    PL BAY DR – STOP

CRT4 8. Deselect STBD FWD, AFT LATCHES & DOOR – ITEM 8, 9, 10 EXEC (no *)

CRT4 9. Select PORT FWD, AFT LATCHES & DOOR – ITEM 11, 12, 13 EXEC (*)

R13L 10. PL BAY DR – CL
    On MCC GO:
    PL BAY DR – STOP

CRT4 11. Deselect PORT FWD, AFT LATCHES & DOOR – ITEM 11, 12, 13 EXEC (no *)

CAUTION
Driving PLBD mechanisms out of sequence may create a condition that could prevent PLBD closure

* If any OP/CL STATUS changes or any PLBD *
* mechanism is observed to be moving: *

R13L 12. PL BAY DR SYS (two) – DSBL

CRT4 13. AC POWER ON – ITEM 1 EXEC (*)

R13L 13. PL BAY DR SYS (two) – ENA
    On MCC GO:
    PL BAY DR SYS (two) – DSBL

CRT4 14. AC POWER OFF – ITEM 2 EXEC (*)
CAUTION
MCC to verify Gimbals are locked before applying this procedure

Config CCTVs to monitor KU Ant motion
Point CCTV as reqd
Record all motion on VTR

R13L
\PL BAY MECH PWR SYS (two) – OFF

A1U
KU BD PWR – OFF
CNTL – PNL

R13L
ANT – GND

CAUTION
Ku Ant switch must be in GND position prior to use of Direct Stow sw to prevent phase-to-phase short of STO/DPY mtrs

KU ANT DIRECT STO – ON
PL BAY MECH PWR SYS (two) – ON
\KU ANT tb – bp

When KU ANT tb – STO (~23-46 sec),
KU ANT DIRECT STO – OFF
PL BAY MECH PWR SYS (two) – OFF
\KU-BD is within STO envelope

NOTE
KU-BD CCTV overlay is located in Middeck Transparency Kit
MECH SSR-6
PLBD CL MICROSW FAILURE WORKAROUND

NOTE
This procedure regains door close capability for door-closed microsw failed-on (closed) (Mtr 1 or Mtr 2 inhibited from running). Procedure will not work for opening or closing latches, or opening doors.

1. Check config

SM (BFS SM 63) PL BAY DOORS
• VAC POWER ON – (*)
• AUTO MODE SEL – (no *)
• MAN SEL (ten) – (no *)

(R13L)
• PL BAY DR SYS (two) – ENA
  • DR – STOP

2. Aff DOOR:

STBD
PORT

3. Close, latch
PORT DOOR in
MANUAL mode

4. Disable pwr to microsw failed in closed
state
TO ENABLE:

MTR 1
(FWD 'C' MICRO-SW
STAT – '1')
(MA73C:B)
• MCA LOGIC MNB
MID 4 – OFF
(CRT)
• PORT DOOR FWD
'C' MICRO-SW
STAT – ‘0’

MTR 2
(AFT 'C' MICRO-SW
STAT – ‘1’)
(MA73C:A)
• MCA LOGIC MNA
MID 2 – OFF
(CRT)
• PORT DOOR AFT
'C' MICRO-SW
STAT – ‘0’

5. Disable pwr to microsw failed in closed
state
TO ENABLE:

MTR 1
(FWD 'C' MICRO-SW
STAT – ‘1’)
(MA73C:B)
• MCA LOGIC MNB
MID 4 – OFF
(CRT)
• STBD DOOR FWD
'C' MICRO-SW
STAT – ‘0’

MTR 2
(AFT 'C' MICRO-SW
STAT – ‘1’)
(MA73C:A)
• MCA LOGIC MNA
MID 4 – OFF
(CRT)
• STBD DOOR AFT
'C' MICRO-SW
STAT – ‘0’

6. Close PORT DOOR

(CRT)
Select PORT DOOR
• ITEM 13 EXEC (*)

(R13L)
• PL BAY DR – CL

(CRT)
• ‘OP/CL’, ‘MICRO-SW STAT’ columns
After PORT DOOR ‘RDY’ and one DOOR ‘C’ = ‘1’, or ~126 sec:
(R13L)
• PL BAY DR – STOP

(CRT)
Deselect PORT DOOR
• ITEM 13 EXEC (no *)

7. PLBD fit check

(CRT)
Select STBD DOOR
• ITEM 10 EXEC (*)

(R13L)
• PL BAY DR – CL

When STBD DOOR as close as possible to
PORT DOOR before contact:
(R13L)
• PL BAY DR – STOP
• Determine C/L Latch Clearance on C/L
LATCH EXTENDED GUIDE ROLLER
TRAJECTORY NO-GO DIAGRAM, MECH
SSR-3, fig. 9-3:

GO
NO-GO

8. Reenable MCA LOGIC pwr

MTR 1
(MA73C:B)
• MCA LOGIC MNB
MID 4 – ON
MTR 2
(MA73C:A)
• MCA LOGIC MNA
MID 1 – ON

9
12

To enable mtr
1, this step also
disables pwr to:
PORT FWD BLKHD
MTR 2
STBD DOOR
MTR 2
STBD FWD BLKHD
MTR 2

To enable mtr
2, this step also
disables pwr to:
PORT FWD BLKHD
MTR 1
STBD DOOR
MTR 1
STBD FWD BLKHD
MTR 1
C/L 9-12 MTR 1

To enable mtr
1, this step also
disables pwr to:
PORT DOOR
MTR 2
STBD AFT BLKHD
MTR 2
C/L 13-16 MTR 2

To enable mtr
2, this step also
disables pwr to:
PORT DOOR
MTR 1
STBD AFT BLKHD
MTR 1
C/L 9-12 MTR 2
C/L 13-16 MTR 1
MECH SSR-6 (Cont)

9 Close STBD DOOR

- PL BAY DR – CL

(CRT)
- ‘OP/CL’, ‘MICRO-SW STAT’ columns
  After STBD DOOR ‘RDY’ and one DOOR ‘C’ = ‘1’, or ~6 sec:
  - PL BAY DR – STOP

(CRT)
Deselect STBD DOOR
- ITEM 10 EXEC (no *)

10 Reenable MCA LOGIC pwr

MTR 1 (MA73C:A)
- MCA LOGIC MNB MID 2 – ON

MTR 2 (MA73C:B)
- MCA LOGIC MNC MID 4 – ON

11 Continue normal PLBD ops

12 Does wave-off capability exist?

- NO

13 Simultaneous door closure
  - Perform SIMULTANEOUS PLBD CL, MECH SSR-3

- YES

14 MCC

15 Reenable MCA LOGIC pwr

MTR 1 (MA73C:A)
- MCA LOGIC MNB MID 2 – ON

MTR 2 (MA73C:B)
- MCA LOGIC MNC MID 4 – ON

16 Continue normal PLBD ops
MECH SSR-7
KU-BAND ANTENNA DPY/STO MICROSW FAILURE

**NOTE**
This procedure regains capability to deploy or stow antenna if (DPY/STO) microsw(s) is (are) failed on, inhibiting deploy/stow mtr ops

1. Disable pwr to microsw(s) inhibiting DPY/STO mtr(s) drive capability
   - Mtr 1 Microsw Disable (MA73C:A)
     - MCA LOGIC MNC MID 2 – OFF
   - Mtr 2 Microsw Disable (MA73C:B)
     - MCA LOGIC MNB MID 4 – OFF

2. Deploy/Stow requirement:
   - Deploy
   - Stow

3. Perform KU-BD ANT DEPLOY (ORB OPS, COMM/INST)

4. Disable requirement:
   - Mtr 1 or 2 Microsw Disable
   - Mtr 1 and 2 Microsw Disable

5. Perform KU-BD ANT STOW (ORB OPS, COMM/INST)

6. Config for stow (R13L)
   - PL BAY MECH PWR SYS (two) – OFF
   - KU BD PWR – ON
     - MODE – RDR PASSIVE

7. Reenable pwr
   - For Mtr 1 Microsw Enable (MA73C:A)
     - MCA LOGIC MNC MID 2 – ON
   - For Mtr 2 Microsw Enable (MA73C:B)
     - MCA LOGIC MNB MID 4 – ON

8. **NOTE**
   Logic pwr does not inhibit mtr drive capability if pwr off
   Inhibiting logic pwr to both mtr microswitches inhibits pwr for Boom Stow Enable II signals. KU ANT DIRECT STOW sw must be used to stow deployed assy
Inhibiting logic pwr to both mtr microswitches inhibits pwr for Boom Stow Enable II signals. KU ANT DIRECT STOW sw must be used to stow deployed assy.

KU-BD CCTV overlay is located in Middeck Transparency Kit.

MECH SSR-7 (Cont)

8 Lock Gimbals
- DAP: VERN(FREE)
  (A1U)
  - SLEW RATE – as reqd
  - ELEV – as reqd
  (A2)
  - R/EL ind: -27.0 (± 1°)
  (A1U)
  - SLEW AZM – as reqd
  (A2)
  - R/AZM ind: -123.0 (± 1°)
  (R13L)
  - KU ANT – STOW

CAUTION

KU ANT sw must remain in STOW until after KU BD PWR sw is in OFF

9 After 50 sec:
(A2)
- √ R/EL ind: -29.0 (± 1°)
- √ R/AZM ind: -125.0 (± 1°)
(A1U)
- KU BD PWR – OFF
- CNTL – PNL
(R14C)
- cb MNB KU ELEC – op
- MNC KU SIG PROC – op
(R13L)
- KU ANT – GND
- DAP: as reqd

10 Stow deployed assy
(R13L)
- KU ANT DIRECT STO – ON
- PL BAY MECH PWR SYS (two) – ON
  After 23 sec max:
  - PL BAY MECH PWR SYS (two) – OFF
  - KU ANT DIRECT STO – OFF
  - KU-BD deployed assy is within GO FOR PLBD CLOSURE envelope

11 Reenable pwr
For Mtr 1 Microsw Enable
(MA73C:A)
- MCA LOGIC MNC MID 2 – ON
For Mtr 2 Microsw Enable
(MA73C:B)
- MCA LOGIC MNB MID 4 – ON
MECH SSR-8
RAD DPY/STO MICROSW FAILURE WORKAROUND

NOTE
This procedure regains radiator panel deploy or stow capability if DPY/STO microsw(s) is (are) failed on, inhibiting deploy/stow motor ops. This procedure accommodates PORT(STBD) and/or dual panel ops.

WARNING
To preclude failures causing inadvertent MPM cycling, the RMS (if flown) must be cradled if PORT RAD deploy ops are required. This procedure assumes that the RMS is cradled.

1. Drive Times
   (Dual Motor)
   Lat – 30 sec
   Panel – 50 sec
   (Single Motor)
   Lat – 60 sec
   Panel – 100 sec

2. For either a dual microsw or microsw/motor failure, failed panel will be inhibited from driving.

Dual or PORT(STBD) RAD panel ops reqd ?

- PORT(STBD) Dual Panel

- Disable STBD(PORT) RAD latches and panel

- Disable STBD
  (MA73C:C,D) cb MCA PWR
  • AC1 3Φ MID 3 – op
  • AC2 3Φ MID 2 – op
  • AC3 3Φ MID 2 – op

- Disable PORT
  (MA73C:C,D) cb MCA PWR
  • AC1 3Φ MID 1 – op
  • AC2 3Φ MID 4 – op
  • AC3 3Φ MID 4 – op

- Drive operation reqd
  STOW
  DPY

- Release RAD latches
  (R13L)
  • \RAD LAT CNTL SYS (two) – OFF
  • \CNTL SYS (two) – OFF
  • PL BAY MECH PWR SYS (two) – ON
  • RAD LAT CNTL SYS (two) – REL (~30 sec REL)
  • RAD LAT CNTL SYS (two) – OFF

- Are deploy ops reqd for nominal RAD panel ?
  NO
  YES

- Deploy nominal RAD panel
  (R13L)
  • RAD CNTL SYS (two) – DPY (~50 sec DPY)
  • RAD CNTL SYS (two) – OFF
### MECH SSR-8 (Cont)

#### 6 Disable pwr to failed-on microsw(s)

<table>
<thead>
<tr>
<th>PORT</th>
<th>STBD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:A) Motor 1 Microsw Disable</td>
<td>(MA73C:B) Motor 1 Microsw Disable</td>
</tr>
<tr>
<td>• MCA LOGIC MNC MID 2 – OFF</td>
<td>• MCA LOGIC MNC MID 4 – OFF</td>
</tr>
<tr>
<td>(MA73C:B) Motor 2 Microsw Disable</td>
<td>(MA73C:B) Motor 2 Microsw Disable</td>
</tr>
<tr>
<td>• MCA LOGIC MNA MID 3 – OFF</td>
<td>• MCA LOGIC MNA MID 1 – OFF</td>
</tr>
</tbody>
</table>

#### 7 DPY RAD panel with failed-on microsw(s)

(R13L)

On MCC GO:
- RAD CNTL SYS (two) – DPY
- RAD CNTL SYS (two) – OFF (after 50 sec max)
- Visually verify RAD panel is deployed
- MCC to confirm RAD panel is deployed
- PL BAY MECH PWR SYS (two) – OFF

#### 8 Enable pwr to failed-on microsw(s)

<table>
<thead>
<tr>
<th>PORT</th>
<th>STBD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:A) Motor 1 Microsw Enable</td>
<td>(MA73C:B) Motor 1 Microsw Enable</td>
</tr>
<tr>
<td>• MCA LOGIC MNC MID 2 – ON</td>
<td>• MCA LOGIC MNC MID 4 – ON</td>
</tr>
<tr>
<td>(MA73C:B) Motor 2 Microsw Enable</td>
<td>(MA73C:B) Motor 2 Microsw Enable</td>
</tr>
<tr>
<td>• MCA LOGIC MNA MID 3 – ON</td>
<td>• MCA LOGIC MNA MID 1 – ON</td>
</tr>
</tbody>
</table>

#### 9 Enable STBD(PORT) RAD sys (if reqd)

<table>
<thead>
<tr>
<th>Enable STBD</th>
<th>Enable PORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>(MA73C:C,D) cb MCA PWR</td>
<td>(MA73C:C,D) cb MCA PWR</td>
</tr>
<tr>
<td>• AC1 3Φ MID 3 – cl</td>
<td>• AC1 3Φ MID 1 – cl</td>
</tr>
<tr>
<td>• AC2 3Φ MID 2 – cl</td>
<td>• AC2 3Φ MID 4 – cl</td>
</tr>
<tr>
<td>• AC3 3Φ MID 2 – cl</td>
<td>• AC3 3Φ MID 4 – cl</td>
</tr>
</tbody>
</table>

### Drive Times
- **Dual Motor**
  - Lat – 30 sec
  - Panel – 50 sec
- **Single Motor**
  - Lat – 60 sec
  - Panel – 100 sec

### Notes
- Only nominal RAD panel tb will be operational. MCC verification of AC bus slip currents will verify mechanism end-of-travel.
- For dual microsw failure expect dual motor drive time. For microsw and motor failure expect single motor drive time (drive for 100 sec).
MECH SSR-8 (Cont)

10 Is nominal RAD panel required to be stowed?

11 Stow nominal RAD panel

- RAD LAT CNTL SYS (two) – OFF
- CNTL SYS (two) – OFF
- PL BAY MECH PWR SYS (two) – ON

On MCC GO:
- RAD CNTL SYS (two) – STO (~10 sec)
- RAD CNTL SYS (two) – OFF

12 Disable pwr to failed-on microsw(s)

PORT STBD

(MA73C:A) Motor 1 Microsw
- MCA LOGIC MNC MID 2 – OFF

(MA73C:B) Motor 1 Microsw
- MCA LOGIC MNC MID 4 – OFF

(MA73C:B) Motor 2 Microsw
- MCA LOGIC MNA MID 3 – OFF

(MA73C:B) Motor 2 Microsw
- MCA LOGIC MNA MID 1 – OFF

13 Stow RAD panel with failed-on microsw(s)

(R13L)
- RAD LAT CNTL SYS (two) – OFF
- CNTL SYS (two) – OFF
- PL BAY MECH PWR SYS (two) – ON

On MCC GO:
- RAD CNTL SYS (two) – STO (after 50 sec max)
- Visually verify panel is stowed (compare to fixed panel)
- MCC to confirm panel is stowed

14 Enable pwr to failed-on microsw(s)

PORT STBD

(MA73C:A) Motor 1 Microsw
- MCA LOGIC MNC MID 2 – ON

(MA73C:B) Motor 1 Microsw
- MCA LOGIC MNC MID 4 – ON

(MA73C:B) Motor 2 Microsw
- MCA LOGIC MNA MID 3 – ON

(MA73C:B) Motor 2 Microsw
- MCA LOGIC MNA MID 1 – ON

15 Latch RAD latches

(R13L)
- RAD LAT CNTL SYS (two) – LAT (~30 sec LAT)
- RAD LAT CNTL SYS (two) – OFF
- PL BAY MECH PWR SYS (two) – OFF

16 Enable STBD(PORT) RAD sys (reqd only if PORT(STBD) ops performed)

Enable STBD Enable PORT

(MA73C:C,D) cb MCA PWR
- AC1 3Φ MID 3 – cl
- AC2 3Φ MID 2 – cl
- AC3 3Φ MID 2 – cl

(MA73C:C,D) cb MCA PWR
- AC1 3Φ MID 1 – cl
- AC2 3Φ MID 4 – cl
- AC3 3Φ MID 4 – cl

1 Drive Times
(Dual Motor)
Lat – 30 sec
Panel – 50 sec

2 For either a dual microsw or microsw/motor failure, failed panel will be inhibited from driving

4 For dual microsw failure, expect dual motor drive time. For microsw and motor failure, expect single motor drive time (drive for 100 sec)

5 RAD panel tb is not operational. MCC verification of AC bus slip currents will verify mechanism end-of-travel
RCS

RCS SCHEMATIC ........................................................................................................... 10-3

10.1 RCS JET/DLMA/PWR
10.1b ‘RM DLMA MANF’ .................................................................................................. 10-10
10.1c ‘RCS PWR FAIL’ ..................................................................................................... 10-11

10.2 RCS VLV MISCOMP
10.2a RCS VLV tb – bp ..................................................................................................... 10-12
10.2b tb AND sw POSITION DISAGREE ........................................................................ 10-15

10.3 RCS PRPLT THERM/SYS
10.3a ‘S89 PRPLT THRM RCS’ ..................................................................................... 10-16
10.3b ‘G23 RCS SYSTEM F(L,R)’ .................................................................................. 10-17

RCS SSR
RCS SSR-1 RCS MIXED XFEED MEM READ/WRITE ............................................... 10-20
SSR-2 HOT FIRE RCS ................................................................................................. 10-22
SSR-3 AFT RCS MANF/LEG PRESS, READ/WRITE ............................................. 10-25
SSR-4 STAGED, MANF REPRESS ............................................................................. 10-27
SSR-5 LEAKING RCS PRPLT/He BURN ................................................................. 10-28

The following Fault Msgs have no corresponding MAL procedures in this book:
ET SEP AUTO (INH, MAN)
F(L,R) RCS PVT
F(L,R) RCS He P
G23 OMS/RCS QTY
RCS XFEED L(R)
To determine if multiple fail-off jets occurred, √ both Aft pods

If L5L or R5R failed, vernier control available except during certain loaded PDRS ops

MCC for other params possibly lost
If L5L or R5R failed, vernier control available except during certain loaded PDRS ops

\[ O_{\text{MCC}} \] for other params possibly lost

Fail-on protection lost for affected jet

MCC call based on jet injector temps

From ORB PKT, RCS JET FAIL (ON)

13 Manf 5 ?

\[ \text{YES} \]

14 MDM INPUT PARAM FAIL HIGH OR JET DRIVER FAILED-ON ELECTRICALLY

\[ \text{YES} \]

15 If VERN ops, go to LOSS OF VERNIERS (ORB OPS, RCS)

\[ \text{NO} \]

16 (CRT) RCS OXID and FU MANF Ps > 130 ?

\[ \text{YES} \]

17 MDM INPUT PARAM FAIL HIGH

\[ \text{YES} \]

18 Open aff Manf (O7, O8)

\[ \text{YES} \]

19 Overwrite to CL status aff Manf and all other Manfs which share same RJD

\[ \text{NO} \]

20 JET DRIVER FAILED-ON ELECTRICALLY

\[ \text{YES} \]

21 Qtys diverge ?

\[ \text{YES} \]

22 JET LEAK FAILURE

\[ \text{NO} \]

CAUTION

23 If Manf 5, go to LOSS OF VERNIERS (ORB OPS, RCS)

\[ \text{YES} \]

24 Deselect aff jets if not auto deselected or if Manf status not overridden to CL

\[ \text{NO} \]

25 GNC 23 RCS

\[ \text{YES} \]

26 GNC 23 RCS

\[ \text{NO} \]

\[ \text{YES} \]

27 Multiple fail leaks present ?

\[ \text{NO} \]

28 JET LEAK OR JET HTR FAILED OR INJECTOR TEMP PARAM LOST

\[ \text{YES} \]

29 Reprioritize, reset POD counter

\[ \text{NO} \]

30 L5L or RSR

\[ \text{YES} \]

31 Deselect Jet

32 Continue nominal ops

\[ \text{NO} \]

33 Go to LOSS OF VERNIERS (ORB OPS, RCS)

From ORB PKT, RCS JET FAIL (LEAK)

21 Qtys diverge ?

\[ \text{YES} \]

22 JET LEAK FAILURE

\[ \text{NO} \]

CAUTION

23 If Manf 5, go to LOSS OF VERNIERS (ORB OPS, RCS)

\[ \text{YES} \]

24 Deselect aff jets if not auto deselected or if Manf status not overridden to CL

\[ \text{NO} \]

25 GNC 23 RCS

\[ \text{YES} \]

26 GNC 23 RCS

\[ \text{NO} \]

\[ \text{YES} \]

27 Multiple fail leaks present ?

\[ \text{NO} \]

28 JET LEAK OR JET HTR FAILED OR INJECTOR TEMP PARAM LOST

\[ \text{YES} \]

29 Reprioritize, reset POD counter

\[ \text{NO} \]

30 L5L or RSR

\[ \text{YES} \]

31 Deselect Jet

32 Continue nominal ops

\[ \text{NO} \]

33 Go to LOSS OF VERNIERS (ORB OPS, RCS)
3 MCC for other params possibly lost

6 Evacuated Manfs need to be repressed. √MCC for config and repress procedure

7 Both F4,F5 commanded by FF3 and return telemetry by DSC OF2

34 (O7,O8) Vlv configured properly and no tb – bp ?

35 Alt RCS ?

36 PRCS selected ?

37 Reconfig DAP

39 Did failures occur in the following Manf groups:

L1, R1, L5 or
L2, R2 or
L3, R3, R5 or
L4, R4 ?

42 Reconfig DAP

41 PRCS selected ?

40 Any sw position and tb disagree ?

43 All fail-offs on same Manf ?

44 All fail-offs on Manf F4 and F5 ?

45 HELIUM INGESTION

52

46

GNC 23 RCS

Is ICNCT and XFD Line P (OX or FU) < 130 psia ?

50

If 3/4/5 Leg aff, establish Vernier Cntl

Aff MANF 5 – OP

Reselect Vern if deselected

√MCC for manf/xfeed repress actions

If manf and/or xfeed reqd for crew safety, repress one line at a time

53

09/24/08 MAL/ALL/GEN J


51. MDM INPUT (OUTPUT) PARAMS FAILED, OR RJD P; DISCRETE LOST, OR RJD ELECTRICAL FAIL-OFF, OR RJD PWR FAIL, OR BUS FAIL

52. Override to CL status all Manf in aff POD(s)

- If both AFT PODs affected, DAP: free drift
- RCS F(L,R) – ITEM 1(2,3) EXEC
- MANF VLVS OVRD – ITEM 40,41,42,43,44 EXEC
- If one AFT POD affected, perform I’CNCT: L(R) OMS TO GOOD RCS POD (ORB PKT, RCS) (Leave aff RCS XFEEDs closed)
- Reconfig DAP for NOSE/TAIL OR TAIL ONLY CONTROL as appropriate

53. Override affected Manifold status to CL

- GNC 23 RCS
  - RCS FWD(L,R) ITEM 1(2,3) EXEC
  - MANF VLVS OVRD ITEM 40 (41,42,43,44) EXEC
  
- (O14,O15,O16)
- Aff RJD DRIVER – OFF

54. √MCC for Helium clearing

55. From ORB PKT, RCS TK P HIGH

56. RCS DUAL REG A(B) FAIL OPEN

57. FU TK P – OX TK P > 20 psi ?

58. DAP: config for NORM jets

59. O8(O7)
- FWD(AFT L,R) RCS He PRESS B(A) – OP (tb-OP)
- When aff RCS TK P < 300, He PRESS B(A) – GPC (tb-OP)

60. GNC 23 RCS and SYS SUMM 2 TK Ps agree ?

61. MDM INPUT OR SIGNAL CONDITIONER FAIL

- YES: NO

62. TK XDCR OR SIGNAL CONDITIONER FAILURE

- YES: NO

63. O8(O7)
- FWD(AFT L,R) RCS He PRESS A(B) – OP (tb-OP)

8. Vern jets can be used when FU TK P – OX TK P ≤ 20 psi

9. H/W C&W remains

10. TK P can be monitored using SYS SUMM or (O3) Meter

11. Aff POD FU(OX) can be used for qty

12. TK P can only be monitored in SYS SUMM

3. √MCC for other params possibly lost
3. MCC for other params possibly lost

9. H/W C&W remains

13. Use SYS SUMM 2 or (O3) meter TK P only (O3) Meter

14. RCS PVT for aff OX(FU) may be in error. Use aff pod FU(OX) for qty

15. Prior to deorbit burn, reselect FWD RCS. Secure FWD RCS when TK P < 190

16. Xfeed from good RCS prior to deorbit. Propellant with He blockage available until TK P < 190 psi if reqd

64. Aff RCS GNC 23 RCS TK P agree with GNC SYS SUMM 2 TK P ?

65. GNC 23 RCS and (O3) Meter TK P agree ?

66. MDM INPUT OR SIGNAL CONDITIONER FAIL

67. TK XDCR OR SIGNAL CONDITIONER FAILURE

68. Aff RCS (CRT) OXID(FU) TK P increasing or back to normal ?

69. He REG A(B) FAILED CLOSED

70. He SYS BLOCKAGE

71. FWD RCS ?

72. Override to CL status all FWD Manfs

73. Go to I’CNCT L(R) OMS TO RCS (ORB PKT, RCS)

74. Go to LOSS OF VERNIERS (ORB OPS, RCS)
From ORB PKT, RCS LEAK ISOL

75 Config for Manf 5 check
- Config free drift
- RCS SECURE (ORB PKT, RCS) complete

If normal config when leak occurred
If feeding XFEED when leak occurred
If OMS/RCS I'CNCT when leak occurred

76 FWD(AFT) RCS ISOL 3/4/5 – CL (tb-CL)
- F(L,R) RCS MANF ISOL 5 – OP (tb-OP)

77 L,R RCS
- TK ISOL 3/4/5
- A,B (two) – CL (tb-CL)
- XFEED 3/4/5
- (two) – CL (tb-CL)
- MANF ISOL 5
- (two) – OP (tb-OP)

78 L,R RCS
- TK ISOL (six) – CL (tb-CL)
- MANF ISOL (ten) – CL (tb-CL)
- XFEED 3/4/5 (two) – CL (tb-CL)
- MANF ISOL 5 (two) – OP (tb-OP)

79 GNC 23 RCS
- Manf 3 or 4 press decr ?

80 Leak source not located
- Remain on PRCS
- DAP: as reqd
- MCC

81 MANF IS LEAK SOURCE, VERNLS LOST

82 Isolate Manf 5 (O7,O8)
- F(L,R) RCS MANF ISOL 5 – CL (tb-CL)

83 Repress PRCS Manifolds (O7,O8)
- F(L,R) RCS
- XFEED 3/4/5 – CL (tb-CL)
- TK ISOL 3/4/5
- A,B (two) – OP (tb-OP)
- MANF ISOL 3 – OP (tb-OP), GPC
- Wait 2 sec
- MANF ISOL 4 – OP (tb-OP), GPC
- Complete return to desired PRCS config
- MCC for DAP config

84 Repressing more than one manifold at a time when the manifolds are at low pressure may damage RCS propellant tank

WARNING

90 MCC for DAP config
1 If position discretes are intermediate, MANF ISOL STAT will be evaluated at each change of state. It may be necessary to repeat RCS MANF VLVS OVRD later.

2 Prevent continuous pwr if microsw fails again

**Nominal Config:**
(MA73C:A)
MCA LOGIC
MNA FWD 1 – ON
MNB FWD 2 – ON
MNC FWD 3 – ON
(MA73C:I)
AFT POD VLV LOGIC GP 1/3 – ON
AFT POD VLV LOGIC GP 1/2 – ON
AFT POD VLV LOGIC GP 2/3 – ON

If OX and/or FU vlv miscompare, propellant flow path cannot be verified open.

---

**Flowchart:**

1. Was vlv in transition?
   - NO
   - YES → (O8, O7) More than one tb – bp or FRCS MANF 2 tb – bp?

2. (O8, O7)
   - YES → 10.2a
   - NO → 3 MICROSW FAILURE

3. MICROSW FAILURE

4. If previous vlv position was OP:
   - YES →
   - NO → 6 TRANSIENT MICROSW FAILURE OR STICKY VLV

5. (O7, O8)
   - Cycle aff vlv several times in desired position
   - YES →
   - NO → 8 MICROSW FAILURE OR VLV FAILED INTERMEDIATE

6. GNC 23 RCS Did failure clear?
   - YES →
   - NO →

7. (O7, O8)
   - Aff RCS MANF VLVS STAT agrees with vlv position
   - YES →
   - NO →

8.微型开关故障或活塞卡滞

9. (O7, O8)
   - Aff RCS MANF ISOL – GPC
   - YES →
   - NO →

10. If Manf 5:
    - YES →
    - NO →

11. MCC for further troubleshooting
10.1c ‘RCS PWR FAIL’

If subsequent leak on affected manf:
GNC 23 RCS

ITEM 2(3) EXEC (as reqd)

√ Manf status:
If OP, override to CL with ITEM 40-43. To isolate leak, close TK ISOL vlv. Affected RCS MANF ISOL vlv cannot be moved from current status

Failure possibly caused by dual CNTL or dual APC bus failures or CNTL and APC bus failure

Failure possibly caused by loss of MNC APC6 or MNC DA3

Nominal Config:
(MA73C:A) MCA LOGIC
MNC FWD 3 – ON

(MA73C:I) AFT POD VLV
LOGIC GP 1/3 – ON
LOGIC GP 1/2 – ON
LOGIC GP 2/3 – ON

EPS SSR-147
BUS LOSS MNB/C POD/AMC2

EPS SSR-146
BUS LOSS MNA/B POD/AMC1

EPS SSR-148
BUS LOSS MNC/A POD/AMC3

- Go to MNC ALC3 (ORB PKT, EPS)
RCS VLV tb – bp

If tb – bp:
O8(O7)
FWD(AFT L,R)
RCS
He PRESS A(B)
TK ISOL 1/2
TK ISOL 3/4/5 A(B)
MANF ISOL
1(2,3,4,5)
AFT L,R RCS
XFEED
1/2(3/4/5)

Nominal Config:
(MA73C:A)
MCA LOGIC
MNA FWD 1 – ON
MNB FWD 2 – ON
MNC FWD 3 – ON
(MA73C:I)
AFT POD VLV
LOGIC GP
1/3 – ON
1/2 – ON
2/3 – ON
(MA73C:H)
cb AC1,AC2,AC3
FWD RCS VLV
ΦA,ΦB,ΦC
(nine) – cl
(MA73C:I)
cb AC1,AC2,AC3
AFT POD VLV GP
1,2,3 ΦA,ΦB,ΦC
(nine) – cl
(R14:C)
cb MNC MANF ISOL
L5,R5,F5 ENA
(three) – cl

10.2a RCS VLV tb – bp

10.1a

10.1b

10.2b

More than one tb – bp or
FRCS MANF 2 tb – bp?

1

(O8,O7)

Yes

13

No

2

Was vlv reconfig in
progress?

10.2b

5

Yes

4

• RCS He P B(A) vlv GPC (tb-OP)

5

• FWD RCS MANF ISOL 1,2 (two) – CL
(tb-CL)

6

• FWD RCS MANF ISOL 3,4 (two) – CL
(tb-CL)
• FWD RCS MANF ISOL 5 – CL (tb-CL)
• Perform LOSS OF VERNIERS
(ORB OPS, RCS)

7

• Go to desired propellant feed config
except:
GNC 23 RCS
• OVERRIDE AFF POD MANF VLVS
STATUS 1,2 – CL
• Aff POD RCS XFD 1/2 – CL (tb-CL)

8

• Return to RCS STRAIGHT FEED
• Aff POD RCS TK ISOL 3,4,5 B(A) –
OP (tb-OP)

9

GNC 23 RCS
• Aff MANF VLVS STATUS – CL
• If MANF 5, perform LOSS OF VERNIERS
(ORB OPS, RCS)

10

(C3)
• DAP: FREE

11

Remove vlv pwr

12 POTENTIAL MICROSW FAILURE.
√MCC FOR FAILURE DETERMINATION

09/24/08

10-12 MAL/ALL/GEN J
Refer to BUS LOSS ID Table (ORB PKT, EPS) for bus loss verification. Proceed to BUS LOSS SSR if bus loss confirmed. For OMS/RCS function loss, refer to OMS/RCS operational Slide Rule for appropriate bus failure.

1. Refer to BUS LOSS ID Table (ORB PKT, EPS) for bus loss verification. Proceed to BUS LOSS SSR if bus loss confirmed. For OMS/RCS function loss, refer to OMS/RCS operational Slide Rule for appropriate bus failure.

13. Which combination of OMS and RCS vlv's is lb - bp:
   - (O7) AFT L, R RCS MANF ISOL 5 AFT L RCS He PRESS B
   - (O7) AFT L, R RCS MANF ISOL 5 AFT L RCS He PRESS A
   - (O8) FWD RCS TK ISOL 3/4/5 MANF ISOL 1 He PRESS A
   - (O8) FWD RCS TK ISOL 3/4/5 MANF ISOL 1 He PRESS A
   - (O7) AFT L, R RCS He PRESS A

If none of the above combinations exists, continue to next block:

23. SM 67 ELECTRIC
   - DC VOLT PCA AFT 1 = 0 AND DC AMP S AFT 1 = 0
   - DC VOLT PCA AFT 1 = 0 ONLY
   - Is CNTL AB3 VOLTS < 20 ?

28. SM 67 ELECTRIC
   - DC VOLT PCA AFT 1 = 0 AND DC AMP S AFT 1 = 0
   - DC VOLT PCA AFT 1 = 0 ONLY

29. MNA APC4 BUS FAILURE
   - Go to MNA APC4 (ORB PKT, EPS)

30. MNA ALC1 BUS FAILURE
   - Go to MNA ALC1 (ORB PKT, EPS)

32. MNA ALC1 BUS FAILURE
   - Go to MNA ALC1 (ORB PKT, EPS)
Refer to BUS LOSS ID Table (ORB PKT, EPS) for bus loss verification. Proceed to BUS LOSS SSR if bus loss confirmed. For OMS/RCS function loss, refer to OMS/RCS operational Slide Rule for appropriate bus failure.

Which combination of OMS and RCS vlv is tb – bp:

(O7) AFT R RCS He PRESS B
(O8) FWD RCS He PRESS B MANF ISOL 2

(O8) FWD RCS He PRESS B MANF ISOL 2

(O8) FWD RCS TK ISOL 1/2 MANF ISOL 3 MANF ISOL 4 MANF ISOL 5

(O8) FWD RCS TK ISOL 1/2 MANF ISOL 4 MANF ISOL 5

(O7) AFT L RCS He PRESS B AFT LR RCS MANF ISOL 5

(O8) FWD RCS TK ISOL 1/2 MANF ISOL 4 MANF ISOL 5

(O7) AFT LR RCS TK ISOL 3/4/5 A XFEED 3/4/5 MANF ISOL 2

(O8) LR OMS TK ISOL A L OMS XFEED A

(O7) AFT LR RCS MANF ISOL 1 TK ISOL 3/4/5 B

(O8) L OMS XFEED B

(O7) AFT LR RCS TK ISOL 1/2 XFEED 1/2 MANF ISOL 3 MANF ISOL 4

(O8) R OMS XFEED A L R OMS TK ISOL B

If none of the preceding combinations exists, troubleshoot affected vlv separately.

13

34 MNB DA2 BUS FAILURE

35 Go to MNB DA2 (ORB PKT, EPS)

36 MNB FPC2 BUS FAILURE

37 Go to MNB FPC2 (ORB PKT, EPS)

38 SM 67 ELECTRIC

39 CNTL BC3 FAILURE

40 Go to CNTL BC3 (ORB PKT, EPS)

41 MICROSW FAILURE OR MNB FMC2 FAILURE

42 MNC DA3 BUS FAILURE

43 Go to MNC DA3 (ORB PKT, EPS)

44 MNC FPC3 BUS FAILURE

45 Go to MNC FPC3 (ORB PKT, EPS)

47 SM 67 ELECTRIC

48 CNTL CA3 BUS FAILURE

49 Go to CNTL CA3 (ORB PKT, EPS)

50 MNC FMC3 BUS FAILURE

51 MNA/B POD/AMC 1 BUS FAILURE

52 MNB/C POD/AMC 2 BUS FAILURE

53 MNC/A POD/AMC 3 BUS FAILURE

54 YES

55 EPS SSR-146

56 EPS SSR-147

57 EPS SSR-148

58 YES

59 MCC for failure determination

60 NO

61 NO
### Nominal Config:

- **(MA73C:H)**
  - cb AC1, AC2, AC3
  - FWD RCS VLV \( \Phi_A, \Phi_B, \Phi_C \) (nine) – cl

- **(MA73C:I)**
  - cb AC1, AC2, AC3
  - AFT POD VLV GP 1, 2, 3 \( \Phi_A, \Phi_B, \Phi_C \) (nine) – cl

- **(R14:C)**
  - cb MNC MANF
  - ISOL L5, R5, F5
  - ENA (three) – cl

---

**10.2b RCS VLV tb AND sw POSITION DISAGREE**

1. **Ignore tb. Vlv in commanded position**

2. **Aff vlv tb – bp?**
   - YES \( \rightarrow 10.2a \) 1
   - NO

3. **Vlv reconfig in progress?**
   - NO \( \rightarrow 4 \) tb FAILURE
   - YES

4. **SWITCH OR tb FAILURE**
   - \( \rightarrow 10.2a \) 3
RCS 10.3a ‘S89 PRPLT THRM RCS’

1. **SM ALERT**

   If:
   - FWD RCS FU(OX) < 46 or > 105
   - Any AFT RCS MANF 1 OX < 50 or > 140
   - DRN PNL < 49 or > 125
   - VERN PNL < 45 or > 140

   **Nominal Config:**
   - (A14) RCS/OMS HTR FWD RCS – A AUTO (B AUTO)

2. **SM 89 PRPLT THERMAL**
   - Which temps are out-of-limits:
     - AFT
     - FWD
     - NEITHER

3. **10.3b**

4. **4 TRANSIENT CONDITION**

5. **5 Switch to other htrs**
   - (A14)
   - RCS/OMS HTR FWD RCS – B AUTO (A AUTO)

6. **6 Temps return to normal control range?**

7. **7 THERMAL/ATTITUDE PROBLEM**

8. **8 HTRS A(B) FAILURE**

   **1** Msg available in SM OPS 2 or 4 only
   **2** Since FU and OX Htrs controlled by separate thermostats, both T1 and T2 FU temps normally incr or decr together. Both T1 and T2 OX temps normally incr or decr together
   **3** √MCC for other params possibly lost in same MDM or DSC Card
   **4** Htrs cycling high/low or intermittent xdcr failure. √MCC
   **5** √MCC for additional thermal analysis, possible vehicle attitude change, or htr reconfig. Fwd RCS control can be resumed when temps return to normal
RCS

10.3b ‘G23 RCS SYSTEM F(L,R)’

1. MCC can determine other params possibly lost in same MDM or DSC Card

2. RCS PVT for affected OXID(FU) may be in error for failed or biased temp or press Xdcr

Nominal Config:
- O8(O7)
- FWD(AFT L, AFT R)
- RCS He PRESS
- A(B) – GPC (lb-OP)
- B(A) – CL (tb-CL)
- (A14)
- RCS/OMS HTR
- FWD RCS – A AUTO (B AUTO)
- L(R) RCS
- (A14)
- RCS/OMS HTR
- POD (two) – A AUTO (B AUTO)
- B OFF (A OFF)
- RCS/OMS HTR
- (two) – A AUTO (B AUTO)
- B OFF (A OFF)

If:
- FWD RCS OXID(FU) PRPLT TK T
  - < 50 degF
  - > 90 degF
- or L(R) RCS OXID(FU) PRPLT TK T
  - < 50 degF
  - > 100 degF
- or GNC SYS SUMM 2
- FWD(L,R) OXID (FU) TK P
  - < 220 psi
  - > 300 psi

1. GNC 23 RCS
   - ITEM 1(2,3) EXEC (*)
   - OXID(FU) ‘PRPLT TK T’ out-of-limits ?

2. ‘S89 PRPLT THRM’ msg present for:
   - POD
   - RCS
   - NEITHER

3. OXID (FU) PRPLT TK T
   - off-scale high or low ?

4. OXID(FU) PRPLT TK T
   - XDCR FAILURE; MDM OR DSC INPUT PARAM LOSS

5. Switch to other htr/thermostat ckt
   - Which Pod failed:
     - FWD RCS
     - L(R) RCS

6. OXID(FU) PRPLT TK T
   - XDCR BIAS; OR BIAS FROM MDM OR DSC INPUT PARAM

7. Temp returns to normal ?

8. HTR/ THERMOSTAT CKT A(B) FAILURE

9. HTR/ THERMOSTAT CKT A(B) FAILURE
1. MCC can determine other params possibly lost in same MDM or DSC Card
2. RCS PVT for affected OXID(FU) may be in error for failed or biased temp or press Xdcr
3. OXID (FU) PRPLT TK P can be monitored on GNC 23 RCS display or RCS/OMS Press meter (pnl O3)
4. Overpress protection lost
5. Transient Xdcr bias or pressure surge
6. Vern jets can be used when FU TK P-OX TK P < 20 psi

GNC 23 RCS and GNC SYS SUMM 2 TK Ps agree?

FWD(L,R) OXID(FU) TK P out-of-limits param:
- LOW
- HIGH
- NEITHER

FWD(L,R) DUAL REG A(B) CREEP HIGH OR FAILED OP

FU TK P-OX TK P > 20 psi?

DAP: config for PRI jets

Use alternate Reg
- O8(O7) FWD(AFT L, AFT R) RCS He PRESS A(B) – CL (tb-CL)
- FWD(AFT L, AFT R) RCS He PRESS B(A) – OP (tb-OP)

When FWD(L,R) OXID(FU) TK P < 300
- FWD(AFT L, AFT R) RCS He PRESS B(A) – GPC (tb-OP)

Use alternate Reg
- O8(O7) FWD(AFT L, AFT R) RCS He PRESS A(B) – CL (tb-CL)
- FWD(AFT L, AFT R) RCS He PRESS B(A) – OP (tb-OP) then, GPC (tb-OP)
This Page Intentionally Blank
RCS SSR-1
RCS MIXED XFEED MEM READ/WRITE

NOTE
This procedure must be performed in OPS 3. OMS/RCS interconnect is assumed to be the initial configuration. A backout procedure is provided in the event of a deorbit waveoff, which would require a return from Mixed RCS Crossfeed to OMS-RCS Interconnect. Address locations are S/W release dependent and will be supplied by MCC. This procedure requires realtime ground verification (24 hr) prior to use.

1. Check config:
   O7
   √XFT L,R RCS TK ISOL (six) – CL (tb-CL)
   √XFEED (four) – OP (tb-OP)
   O8
   √L,R OMS XFEED A (two) – CL (tb-CL)
   √L(R) OMS XFEED B – OP (tb-OP)
   √R(L) OMS XFEED B – CL (tb-CL)

2. MSTR RCS XFEED – FEED FROM L

   NOTE
   ADD IDs, TABLEs A, B, C, and D will be supplied by MCC

3. Zero (0) the appropriate RCS TK ISOL reset command:
   GNC 0 GPC MEMORY
   √HEX – ITEM 27 (*)
   BIT RST – ITEM 23 EXEC (*)
   Enter ADD IDs and DESIRED values
   ADD ID  DESIRED  TABLE A  TABLE B
   28 1000
   30 0400
   32 1000
   34 0400
   36 1000
   38 0400
   √Data values in ACTUAL column agree with TABLE A
   WRITE – ITEM 25 EXEC
   √Data values in ACTUAL column agree with TABLE B

4. Set to one (1) the appropriate RCS TK ISOL set command
   BIT SET – ITEM 22 EXEC (*)
   Enter ADD IDs and DESIRED values
   ADD ID  DESIRED  TABLE C  TABLE D
   28 1000
   30 0400
   32 1000
   34 0400
   36 1000
   38 0400
   √Data values in ACTUAL column agree with TABLE C
   WRITE – ITEM 25 EXEC
   √Data values in ACTUAL column agree with TABLE D
RCS SSR-1 (Cont)

5. During AOS, perform ARCS reconfig
   DAP: INRTL
   DAP ROT: PULSE/PULSE/PULSE
   O8 L,R OMS XFEED (four) – CL (tb-CL)
   O7 AFT L,R RCS XFEED (four) – CL (tb-CL)
   TK ISOL (six) – GPC (tb-bp)

   **CAUTION**
   Wait for MCC verification of correct config

   AFT L,R RCS XFEED (four) – OP (tb-OP)

6. Resume attitude control:
   DAP: as reqd

RCS MIXED XFEED TERMINATE (PERFORM IN OPS 3)

Establish L(R) OMS interconnect config:

   F7 1. \(\sqrt{}\)FLT CNTLR PWR – OFF
      DAP: INRTL
      DAP ROT: PULSE/PULSE/PULSE
   C3

   O7 2. L,R RCS TK ISOL (six) – CL (tb-CL)
      \(\sqrt{}\)XFEED (four) – OP (tb-OP)

   3. If RCS MANF P (OX and FU) > 130, continue
      Otherwise, MCC >>

   O8 4. \(\sqrt{}\)L(R) OMS He PRESS/VAP ISOL (two) – CL
      TK ISOL (two) – OP (tb-OP)
      \(\sqrt{}\)R(L) OMS XFEED (two) – CL (tb-CL)
      L(R) OMS XFEED A – CL (tb-CL)
         B – OP (tb-OP)
   O7

   5. MSTR RCS XFEED – OFF
   C3 6. DAP: as reqd

   **NOTE**
   Gauging not avail in OPS 3

7. After OPS 2 transition:

   **GNC 23 RCS**

   OMS PRESS ENA L(R) OMS – ITEM 5(6) EXEC
RCS SSR-2
HOT FIRE RCS

O7(O8)  √Prop feed vlvs – OP
O14(O15,O16)  √Appropriate RJD LOGIC, DRIVER – ON

Perform Hot Fire during AOS

CONFIG DAP FREE DRIFT FOR HOT FIRE
1. If OPS 2:

   [GNC 20 DAP CONFIG]
   If PRI:
   - ITEM 13 +0.3 EXEC
   - ITEM 17 +0.1 EXEC
   √P(Y) OPTION – ITEM 15(16) ALL
   If VERN:
   - ITEM 26 +0.9 3 EXEC

   DAP: A/FREE/PRI(VERN)
   DAP TRANS: PULSE/PULSE/PULSE

   If OPS 3:
   - DAP: INRTL
   - DAP ROT: PULSE/PULSE/PULSE

SET UP FOR HOT FIRE
2. [GNC 23 RCS]

   Deselect jets per table

3. If jet to be selected is fail-off, reselect affected jet (Do not toggle RM)

O14,O15,O16  √cb L(R) DDU (two) – cl

F7/F8  FLT CNTLR PWR L(R) – ON

HOT FIRE (Perform during AOS)
5. If OPS 2:
   Command maneuver per table with RHC(THC) and release
   If RHC, do not command past soft stop (no ACCEL mode)
   If OPS 3:
   Command maneuver per table with RHC(THC)
   If THC, command for approximately 1 sec and release
   If RHC, command past soft stop (ACCEL mode) for approximately 1 sec and release
6. **GNC 23 RCS**

   If primary jet:
   - If correct response (Failure indication was false. Have lost fail-off protection). Perform following steps to place jet in last priority and to regain fail LK auto deselect protection:
     1. DES INH twice (re prioritze, reset RM)
     2. Repeat maneuver (expect jet fail-off)
     3. Reselect jet (in order to reset auto deselect counter)

   **NOTE**
   - If > 1 jet/pod/dir lost fail-off RM, after OPS 301 transition, reselect jets

   If no response:
   - Deselect jet

   **NOTE**
   - During entry, reselect jet if reqd to maintain 1 pitch or 2 yaw Aft RCS jets

   If vernier jet:
   - If jet fired (√MCC):
     1. Continue vernier control (Failure indication was false. Have lost fail-off protection)
   - If jet did not fire (√MCC):
     1. If L5L or R5R:
        1. Deselect jet
        2. Continue vernier control
     2. If F5L, F5R, L5D, or R5D:
        1. Deselect jet
        2. Perform LOSS OF VERN (ORB OPS, RCS)

   **CLEAN UP AFTER HOT FIRE**

7. **GNC 23 RCS**

   Reselect jets deselected in step 2

   C3  8. Config DAP: as reqd

   F7(F8) 9. FLT CNTLR PWR L(R) – OFF

   O14, O15, O16 10. Config cb L,R DDU (four) – as reqd
## HOT FIRE TABLE

<table>
<thead>
<tr>
<th>SUBJECT JET</th>
<th>DESELECT JETS</th>
<th>MANEUVER REQD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F1F</strong></td>
<td>F2F, F3F</td>
<td>(-) X TRANSLATION</td>
</tr>
<tr>
<td><strong>F2F</strong></td>
<td>F1F, F3F</td>
<td></td>
</tr>
<tr>
<td><strong>F3F</strong></td>
<td>F1F, F2F</td>
<td></td>
</tr>
<tr>
<td><strong>F1L</strong></td>
<td>F3L, R1R, R2R, R3R, R4R</td>
<td>(+) YAW</td>
</tr>
<tr>
<td><strong>F3L</strong></td>
<td>F1L, R1R, R2R, R3R, R4R</td>
<td></td>
</tr>
<tr>
<td><strong>F5L</strong></td>
<td>R5R</td>
<td></td>
</tr>
<tr>
<td><strong>F2R</strong></td>
<td>F4R, L1L, L2L, L3L, L4L</td>
<td>(-) YAW</td>
</tr>
<tr>
<td><strong>F4R</strong></td>
<td>F2R, L1L, L2L, L3L, L4L</td>
<td></td>
</tr>
<tr>
<td><strong>F5R</strong></td>
<td>L5L</td>
<td></td>
</tr>
<tr>
<td><strong>F1U</strong></td>
<td>F2U, F3U, L2D, L3D, L4D, R2D, R3D, R4D</td>
<td>(-) PITCH</td>
</tr>
<tr>
<td><strong>F2U</strong></td>
<td>F1U, F3U, L2D, L3D, L4D, R2D, R3D, R4D</td>
<td></td>
</tr>
<tr>
<td><strong>F3U</strong></td>
<td>F1U, F2U, L2D, L3D, L4D, R2D, R3D, R4D</td>
<td></td>
</tr>
<tr>
<td><strong>F1D</strong></td>
<td>F2D, F3D, F4D, L1U, L2U, L4U, R1U, R2U, R4U</td>
<td>(+) PITCH</td>
</tr>
<tr>
<td><strong>F2D</strong></td>
<td>F1D, F3D, F4D, L1U, L2U, L4U, R1U, R2U, R4U</td>
<td></td>
</tr>
<tr>
<td><strong>F3D</strong></td>
<td>F1D, F2D, F4D, L1U, L2U, L4U, R1U, R2U, R4U</td>
<td></td>
</tr>
<tr>
<td><strong>F4D</strong></td>
<td>F1D, F2D, F3D, L1U, L2U, L4U, R1U, R2U, R4U</td>
<td></td>
</tr>
<tr>
<td><strong>L1L</strong></td>
<td>L2L, L3L, L4L, F2R, F4R</td>
<td>(-) YAW</td>
</tr>
<tr>
<td><strong>L2L</strong></td>
<td>L1L, L3L, L4L, F2R, F4R</td>
<td></td>
</tr>
<tr>
<td><strong>L3L</strong></td>
<td>L1L, L2L, L4L, F2R, F4R</td>
<td></td>
</tr>
<tr>
<td><strong>L4L</strong></td>
<td>L1L, L2L, L3L, F2R, F4R</td>
<td></td>
</tr>
<tr>
<td><strong>L5L</strong></td>
<td>F5R</td>
<td></td>
</tr>
<tr>
<td><strong>L1A</strong></td>
<td>L3A, R1A, R3A</td>
<td>(+) X TRANSLATION</td>
</tr>
<tr>
<td><strong>L3A</strong></td>
<td>L1A, R1A, R3A</td>
<td></td>
</tr>
<tr>
<td><strong>L1U</strong></td>
<td>L2U, L4U, R1U, R2U, R4U, F1D, F2D, F3D, F4D</td>
<td>(+) PITCH</td>
</tr>
<tr>
<td><strong>L2U</strong></td>
<td>L1U, L4U, R1U, R2U, R4U, F1D, F2D, F3D, F4D</td>
<td></td>
</tr>
<tr>
<td><strong>L4U</strong></td>
<td>L1U, L2U, R1U, R2U, R4U, F1D, F2D, F3D, F4D</td>
<td></td>
</tr>
<tr>
<td><strong>L2D</strong></td>
<td>L3D, L4D, R2D, R3D, R4D, F1U, F2U, F3U</td>
<td>(-) PITCH</td>
</tr>
<tr>
<td><strong>L3D</strong></td>
<td>L2D, L4D, R2D, R3D, R4D, F1U, F2U, F3U</td>
<td></td>
</tr>
<tr>
<td><strong>L4D</strong></td>
<td>L2D, L3D, R2D, R3D, R4D, F1U, F2U, F3U</td>
<td></td>
</tr>
<tr>
<td><strong>L5D</strong></td>
<td>R5D</td>
<td></td>
</tr>
<tr>
<td><strong>R1R</strong></td>
<td>R2R, R3R, R4R, F1L, F3L</td>
<td>(+) YAW</td>
</tr>
<tr>
<td><strong>R2R</strong></td>
<td>R1R, R3R, R4R, F1L, F3L</td>
<td></td>
</tr>
<tr>
<td><strong>R3R</strong></td>
<td>R1R, R2R, R4R, F1L, F3L</td>
<td></td>
</tr>
<tr>
<td><strong>R4R</strong></td>
<td>R1R, R2R, R3R, F1L, F3L</td>
<td></td>
</tr>
<tr>
<td><strong>R5R</strong></td>
<td>F5L</td>
<td></td>
</tr>
<tr>
<td><strong>R1A</strong></td>
<td>R3A, L1A, L3A</td>
<td>(+) X TRANSLATION</td>
</tr>
<tr>
<td><strong>R3A</strong></td>
<td>R1A, L1A, L3A</td>
<td></td>
</tr>
<tr>
<td><strong>R1U</strong></td>
<td>R2U, R4U, L1U, L2U, L4U, F1D, F2D, F3D, F4D</td>
<td>(+) PITCH</td>
</tr>
<tr>
<td><strong>R2U</strong></td>
<td>R1U, R4U, L1U, L2U, L4U, F1D, F2D, F3D, F4D</td>
<td></td>
</tr>
<tr>
<td><strong>R4U</strong></td>
<td>R1U, R2U, L1U, L2U, L4U, F1D, F2D, F3D, F4D</td>
<td></td>
</tr>
<tr>
<td><strong>R2D</strong></td>
<td>R3D, R4D, L2D, L3D, L4D, F1U, F2U, F3U</td>
<td>(-) PITCH</td>
</tr>
<tr>
<td><strong>R3D</strong></td>
<td>R2D, R4D, L2D, L3D, L4D, F1U, F2U, F3U</td>
<td></td>
</tr>
<tr>
<td><strong>R4D</strong></td>
<td>R2D, R3D, L2D, L3D, L4D, F1U, F2U, F3U</td>
<td></td>
</tr>
<tr>
<td><strong>R5D</strong></td>
<td>L5D</td>
<td></td>
</tr>
</tbody>
</table>
This procedure is used when affected RCS propellant lines, both oxidizer and fuel (manifold or leg) pressure, is less than or equal to propellant vapor pressure plus instrumentation error (OX P < 49 psia, FU P < 35 psia).

Starting condition for this procedure is straight RCS feed with appropriate MANF or TK ISOL vlv upstream of evacuated section closed.

Manually repressing evacuated aft RCS propellant line (manifold or leg) can result in jet thruster vlv bounce and/or seal leakage. This can result in ‘zot’ firings which can damage respective thruster(s). Zot firings can be avoided by staggering opening of upstream OX and FU vlv’s. However, since both vlv’s are gang-commanded by manual switch settings, one of the vlv’s must be individually commanded by using GMEM R/W. This procedure uses GMEM R/W to repress evacuated line, from same pod OMS propellant tanks, by setting appropriate GPC open command bit for RCS XFEED OX vlv, then manually opening appropriate FU vlv. Once line repress has been completed, nominal RCS propellant feed is resumed.

Reqd GPC address locations for TABLES 1 and 2 are software release dependent and will be supplied by MCC

1. DAP: FREE

2. Config RCS for repress:
   
   O7
   - Aff RCS TK ISOL 1/2(3/4/5 A,B) – CL (tb-CL)
   - XFEED 1/2(3/4/5) – CL (tb-CL)
   - MANF ISOL 1,2(3,4,5) – OP (tb-OP)

3. Config SAME side OMS vlv:
   
   O8
   - L(R) OMS TK ISOL A,B – OP (tb-OP)
   - XFEED A – CL (tb-CL)
   - XFEED B – OP (tb-OP)

4. Zero (0) appropriate RCS XFEED VLV reset command:
   
   GNC 0 GPC MEMORY
   - HEX 27
   - BIT RST – ITEM 23 EXEC
   Obtain and enter ADD IDs and DESIRED values from TABLE 1
   
<table>
<thead>
<tr>
<th>ADD ID</th>
<th>DESIRED</th>
<th>Value A</th>
<th>Value B</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td></td>
<td>__ __ __</td>
<td>__ __ __</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td>__ __ __</td>
<td>__ __ __</td>
</tr>
</tbody>
</table>

   - Data values in ACTUAL column agree with Value A (MCC supplied)
   - WRITE – ITEM 25 EXEC
   - Data values in ACTUAL column agree with Value B (MCC supplied)

5. Set to One (1) the appropriate RCS XFEED VLV set command:
   
   BIT SET – ITEM 22 EXEC
   Obtain and enter ADD IDs and DESIRED values from TABLE 2
   
<table>
<thead>
<tr>
<th>ADD ID</th>
<th>DESIRED</th>
<th>Value C</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td></td>
<td>__ __ __</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td>__ __ __</td>
</tr>
</tbody>
</table>

   - Data values in ACTUAL column agree with Value C (MCC supplied)
   - WRITE – ITEM 25 EXEC
   - Data values in ACTUAL column agree with DESIRED

6. During AOS, perform OX line repress from OMS
   
   O7
   - L(R) RCS XFEED 1/2(3/4/5) – GPC (tb-bp)
   - Wait 10 sec
   
   GNC 23 RCS
   - OX MANF P > 130 psia
RCS SSR-3 (Cont)

7. Perform FU line repress from OMS

   O7 L(R) OMS XFEED A,B – CL (tb-CL)
   Wait 10 sec
crt

   O8 L(R) RCS XFEED 1/2(3/4/5) – OP (tb-OP)
   \%FU MANF P > 130 psia

   If MANF P < 130 psia:
   O7 RCS XFEED 1/2(3/4/5) – CL (tb-CL)
   Set aff MANF VLVS STAT to CL
   * GNC 23 RCS
   * ITEM 2(3) EXEC
   * ITEM 40,41(42,43,44) EXEC
   * DAP: as reqd
   * \%MCC >>

8. Cleanup and reconfig:

   O8 L(R) OMS XFEED A,B – CL (tb-CL)
   O7 RCS XFEED 1/2(3/4/5) – CL (tb-CL)
   RCS XFEED ISOL 1/2(3/4/5 A,B) – OP (tb-OP)
   L(R) MANF ISOL 1,2(3,4,5) – OP (tb-OP), GPC

9. Reselect jets as reqd

10. DAP: as reqd

11. Zero (0) the appropriate RCS XFEED VLV set command:

    GNC 0 GPC MEMORY

    \%HEX 27*
    BIT RST – ITEM 23 EXEC
    Obtain and enter ADD IDs and DESIRED values from TABLE 2

    | ADD ID | DESIRED | Value D | Value E |
    |--------|---------|---------|---------|
    | 28     | _______ | _______ | _______ |
    | 29     | _______ | _______ | _______ |

    \%Data values in ACTUAL column agree with Value D (MCC supplied)
    WRITE – ITEM 25 EXEC
    \%Data values in ACTUAL column agree with Value E (MCC supplied)

12. Set to One (1) the appropriate RCS XFEED VLV reset command:

    BIT SET – ITEM 22 EXEC
    Obtain and enter ADD IDs and DESIRED values from TABLE 1

    | ADD ID | DESIRED | Value F | Value G |
    |--------|---------|---------|---------|
    | 28     | _______ | _______ | _______ |
    | 29     | _______ | _______ | _______ |

    \%Data values in ACTUAL column agree with Value F (MCC supplied)
    WRITE – ITEM 25 EXEC
    \%Data values in ACTUAL column agree with Value G (MCC supplied)
RCS SSR-3 (Cont)

<table>
<thead>
<tr>
<th>X-REF</th>
<th>ADD ID BIT RESET ADDRESS</th>
<th>COMMANDS</th>
<th>DESIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>__ __ __ __ __</td>
<td>L RCS OX 1/2 XFEED</td>
<td>4 0 0 0</td>
</tr>
<tr>
<td>(2)</td>
<td>__ __ __ __ __</td>
<td>L RCS OX 3/4/5 XFEED</td>
<td>0 0 4 0</td>
</tr>
<tr>
<td>(3)</td>
<td>__ __ __ __ __</td>
<td>R RCS OX 1/2 XFEED</td>
<td>4 0 0 0</td>
</tr>
<tr>
<td>(4)</td>
<td>__ __ __ __ __</td>
<td>R RCS OX 3/4/5 XFEED</td>
<td>0 0 1 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>X-REF</th>
<th>ADD ID BIT SET ADDRESS</th>
<th>COMMANDS</th>
<th>DESIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>__ __ __ __ __</td>
<td>L RCS OX 1/2 XFEED</td>
<td>4 0 0 0</td>
</tr>
<tr>
<td>(2)</td>
<td>__ __ __ __ __</td>
<td>L RCS OX 3/4/5 XFEED</td>
<td>0 0 4 0</td>
</tr>
<tr>
<td>(3)</td>
<td>__ __ __ __ __</td>
<td>R RCS OX 1/2 XFEED</td>
<td>4 0 0 0</td>
</tr>
<tr>
<td>(4)</td>
<td>__ __ __ __ __</td>
<td>R RCS OX 3/4/5 XFEED</td>
<td>0 0 1 0</td>
</tr>
</tbody>
</table>

RCS SSR-4
STAGED, MANF REPRESS

NOTE
1. This procedure attempts to pressurize non-leaking Manf P (OX or FU) to greater than 130 psia, so manifold can then be repressed directly from tank
2. Do not use this procedure if OX MANF P < 49 psia and FU MANF P < 35 psia
3. All manifolds on same tank leg will be affected

WARNING
Repressing more than one manifold at a time may damage RCS propellant tanks when manifolds are below vapor pressure (See Note 2.)

GNC 23 RCS
1. DAP: FREE
O7(O8) 2. Aff RCS XFEED(s) – CL (tb-CL)
       TK ISOL(s) – CL (tb-CL)
       MANF ISOL(s) – OP (tb-OP)
3. If aff MANF P(s) < 130 (OX and FU):
   Aff RCS MANF ISOL(s) – CL (tb-CL)
   TK ISOL(s) – OP (tb-OP)
   Repeat step 2
4. If aff MANF P(s) > 130 (OX or FU):
   Aff RCS MANF ISOL(s) – CL (tb-CL)
   TK ISOL(s) – OP (tb-OP)
   MANF ISOL(s) – OP (tb-OP), GPC one at a time
5. DAP: as reqd
RCS SSR-5
LEAKING RCS PRPLT/He BURN

If FWD RCS LEAK, perform either -X TRANSLATION (uses OPS 2, part A) or FRCS DUMP (uses OPS 3, part B)
(If no MCC, perform -X TRANSLATION)
If AFT RCS LEAK, perform +X TRANSLATION (uses OPS 2, part C)

A. IF FRCS -X TRANSLATION:

1. RCS BURN PREP
   O14:F, √Pri RJD LOGIC, DRIVER (sixteen) – ON
   O15:F, O16:F
   O14:E, √cb DDU (six) – cl
   O15:E, O16:E
   O8 FWD He PRESS A(B) – OP (tb-OP)
   B(A) – CL (tb-CL)
   TK ISOL (two) – OP (tb-OP)
   MANF ISOL 1,2,3,4 (four) – OP (tb-OP), GPC
   GNC 55 GPS STATUS
   √GPS TO NAV – INH (*)

2. MNVR TO BURN ATTITUDE
   DAP: B1/AUTO/PRI
   GNC UNIV PTG
   TGT ID: 2
   MCC for preferred burn
   If no COMM, maneuver to closest out-of-plane attitude and execute burn ASAP

   If out-of-plane burn:
   BODY VECTOR: 3
   OM: 90 (270 for nose south)
   Start TRK – ITEM 19 EXEC (CUR - *)

   If retro burn (heads down):
   BODY VECTOR: 5
   P: 88
   Y: 0
   OM: 180
   Start TRK – ITEM 19 EXEC (CUR - *)
   GNC, OPS 202 PRO
   GNC ORBIT MNVR EXEC
   RCS SEL – ITEM 4 EXEC
   TIG – ITEM 10 +(consult MCC) EXEC
   ∆VX – ITEM 19 -1 0 0 EXEC
   ∆VY – ITEM 20 +0 EXEC
   ∆VZ – ITEM 21 +0 EXEC
   LOAD – ITEM 22 EXEC
   TIMER – ITEM 23 EXEC
   Do not maneuver (no ITEM 27), ignore computed ATT, perform burn in final ATT
   Go to step A3

   If posi burn (heads down):
   BODY VECTOR: 5
   P: 92
   Y: 0
   OM: 0
   Start TRK – ITEM 19 EXEC (CUR - *)
   GNC, OPS 202 PRO
   GNC ORBIT MNVR EXEC
   RCS SEL – ITEM 4 EXEC
   TIG – ITEM 10 +(consult MCC) EXEC
   ∆VX – ITEM 19 -1 0 0 EXEC
   ∆VY – ITEM 20 +0 EXEC
   ∆VZ – ITEM 21 +0 EXEC
   LOAD – ITEM 22 EXEC
   TIMER – ITEM 23 EXEC
   Do not maneuver (no ITEM 27), ignore computed ATT, perform burn in final ATT
   Go to step A3
3. **TERMINATE CONDITIONS**

Terminate RCS burn when any one of the following conditions exists:

- **If He LEAK:**
  - Aff He P < 456 psia, or
  - CUR HP = 95 nmi, or
  - Burn Time from below table expired

- **RCS PRPLT TO BE BURNED TO ACHIEVE MAX BLOWDN**

<table>
<thead>
<tr>
<th>CURRENT NON-LEAKING (OX OR FU)%</th>
<th>24</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
<th>75</th>
<th>80</th>
<th>85</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRCS -X (2 JETS)</td>
<td>0:00</td>
<td>0:03</td>
<td>0:19</td>
<td>0:34</td>
<td>0:49</td>
<td>1:05</td>
<td>1:20</td>
<td>1:36</td>
<td>1:51</td>
<td>2:07</td>
<td>2:22</td>
<td>2:36</td>
<td>2:53</td>
<td>3:08</td>
<td>3:24</td>
</tr>
<tr>
<td>TIME FROM BURN INITIATION (M:S)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **If PRPLT LEAK:**
  - First RCS jet FAIL OFF or
  - CUR HP = 95 nmi

4. **BURN EXEC**

- **F6(F8) ADI ERROR – MED**
  - RATE – HI

- **If burning out-of-plane:**
  - Verify burn attitude, execute burn ASAP, and ignore TIG references

- **If retro burn:**
  - ADI ATT – LVLH
  - \[\checkmark\] ATT
  - Retro
  - Heads Down
  - R: 180
  - P: 358
  - Y: 000

- **If posi burn:**
  - ADI ATT – LVLH
  - \[\checkmark\] ATT
  - Posi
  - Heads Down
  - R: 000
  - P: 178
  - Y: 000

**GNC 20 DAP CONFIG**

- P,Y OPTION – ITEM 35,36 EXEC (NOSE)
- FLT CNTLR PWR – ON
  - DAP TRANS: NORM/PULSE/PULSE

- TIG-0:30> DAP: B/INRTL/PRI
  - ADI ATT – REF
  - ATT REF pb – push

- **F5**
  - At TIG: THC – X (pull)
  - When terminate conditions are met:
    - THC – release
  - If burn is terminated at CUR Hp = 95, finish burn out-of-plane (step A2)

5. **POST BURN RECONFIG**

- **F7**
  - FLT CNTLR PWR – OFF
  - \[\checkmark\] cb DDU (six) – as reqd

- **C2**
  - If retro or posi burn: GNC, OPS 201 PRO
  - DAP TRANS: PULSE/PULSE/PULSE

**GNC 20 DAP CONFIG**

- P,Y OPTION – ITEM 15,16 EXEC (twice) (TAIL)
  - ITEM 35,36 EXEC (TAIL)

- **O8**
  - If He leak:
    - FWD He PRESS A(B) – CL (tb-CL)
    - MANF ISOL 5 – OP (tb-OP), GPC
  - If Prplt leak:
    - Perform RCS SECURE (FWD,AFT) (ORB PKT, RCS)

- **O16**
  - RJD LS/FS/RS DRIVER – OFF
  - DAP: as reqd >>
RCS SSR-5 (Cont)

B. If FRCS DUMP:

1. RCS DUMP PREP
   O14:F, \sqrt{Pri RJD \text{ LOGIC, DRIVER} (sixteen)} \text{ – ON}
   O15:F,
   O16:F
   O8
   FWD He PRESS A(B) – OP (tb-OP)
   B(A) – CL (tb-CL)
   TK ISOL (two) – OP (tb-OP)
   MANF ISOL 1,2,3,4 (four) – OP (tb-OP), GPC
   Perform G2/G8 to G3 TRANS (ENT PKT, DPS)

2. TERMINATE CONDITIONS
   Terminate RCS dump when any one of the following conditions exists:
   If He LEAK:
   Aff He P < 456 psia, or
   Dump Time from below table expired
   RCS PRPLT TO BE DUMPED TO ACHIEVE MAX BLOWDN
   CURRENT NON-LEAKING (OX OR FU)%

<table>
<thead>
<tr>
<th>Time from Dump Initiation (M:S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
</tr>
<tr>
<td>0.00</td>
</tr>
</tbody>
</table>
   OPS 3 FRCS DUMP (4 JETS)

   If PRPLT LEAK:
   First RCS jet FAIL OFF

3. PERFORM FWD RCS DUMP
   \text{GNC DEORB MNVR COAST}
   FWD RCS ARM – ITEM 36 EXEC
   DUMP – ITEM 37 EXEC
   When terminate conditions met:
   FWD RCS OFF – ITEM 38 EXEC

4. POST DUMP RECONFIG
   Perform G3 to G2/G8 TRANS (ENT PKT, DPS)
   Reconfig NBAT to pre-dump config
   \text{GNC 20 DAP CONFIG}
   P,Y OPTION – ITEM 15,16 EXEC (twice) (TAIL)
   – ITEM 35,36 EXEC (twice) (TAIL)

   O8
   If He leak:
   FWD He PRESS A(B) – CL (tb-CL)
   MANF ISOL 5 – OP (tb-OP), GPC
   If Prplt leak: Perform RCS SECURE (FWD,AFT) (ORB PKT, RCS)

   O16
   RJD L5/F5/R5 DRIVER – OFF

   \text{DAP: as reqd} >>

C. If AFT RCS LEAK, perform \text{+X TRANSLATION}:

1. XFEED FROM LEAKING RCS 1/2 LEG TO GOOD RCS 1/2 LEG
   \sqrt{Pri RJD \text{ LOGIC, DRIVER} (sixteen)} \text{ – ON}
   O14:F,
   O15:F,
   O16:F
   O14:E, \sqrt{cb DDU (six)} – cl
   O15:E,
   O16:E
   \sqrt{DAP: FREE}
   O8 \\sqrt{L,R OMS XFEED (four)} – CL (tb-CL)
   O7
   AFT L,R RCS TK ISOL 3/4/5 (four) – CL (tb-CL)
   Good AFT RCS TK ISOL 1/2 – CL (tb-CL)
   Leaking AFT RCS TK ISOL 1/2 – OP (tb-OP)
   He PRESS A(B) – OP (tb-OP)
   B(A) – CL (tb-CL)
   AFT L,R RCS MANF ISOL 1 (two) – OP (tb-OP), GPC
   2,3,4 (six) – CL (tb-CL)
   5 (two) – CL (tb-CL), GPC
   XFEED 1/2 (two) – OP (tb-OP)
   3/4/5 (two) – CL (tb-CL)
RCS SSR-5 (Cont)

If prior config was interconnect:

- **GNC 23 RCS**
- **OMS PRESS ENA OFF – ITEM 7 EXEC** (*
- **GNC UNIV PTS**
- **CNCL – ITEM 21 EXEC**

2. **MNVR TO BURN ATTITUDE**

**DAP**: B1/AUTO/PRI

- **GNC 55 GPS STATUS**
- **√GPS TO NAV – INH** (*

**C2**

- **GNC, OPS 202 PRO**
- **GNC ORBIT MNVR EXEC**

- **RCS SEL – ITEM 4 EXEC**
- **TV ROLL – ITEM 5 +1 8 0 EXEC**

**√MCC for preferred burn**

If no COMM, maneuver to closest out-of-plane attitude and execute burn ASAP

If out-of-plane burn:

- **TIG – ITEM 10 +(current MET + 10 min) EXEC**
- **ΔVX – ITEM 19 +0 EXEC**
- **ΔVY – ITEM 20 -1 0 0 EXEC (+1 0 0 for nose south) EXEC**
- **ΔVZ – ITEM 21 +0 EXEC**
- **LOAD – ITEM 22 EXEC**
- **TIMER – ITEM 23 EXEC**
- **MNVR – ITEM 27 EXEC** (*

Go to step C3

If retro burn:

- **TIG – ITEM 10 +(consult MCC) EXEC**
- **ΔVX – ITEM 19 -1 0 0 EXEC**
- **ΔVY – ITEM 20 +0 EXEC**
- **ΔVZ – ITEM 21 +0 EXEC**
- **LOAD – ITEM 22 EXEC**
- **TIMER – ITEM 23 EXEC**
- **MNVR – ITEM 27 EXEC** (*

Go to step C3

If posi burn:

- **TIG – ITEM 10 +(consult MCC) EXEC**
- **ΔVX – ITEM 19 +1 0 0 EXEC**
- **ΔVY – ITEM 20 +0 EXEC**
- **ΔVZ – ITEM 21 +0 EXEC**
- **LOAD – ITEM 22 EXEC**
- **TIMER – ITEM 23 EXEC**
- **MNVR – ITEM 27 EXEC** (*

Go to step C3

3. **TERMINATE CONDITIONS**

Terminates RCS burn when any one of the following conditions exists:

If He LEAK:

- Aff He P < 456 psia, or
- **CUR HP = 95 nmi**, or
- Burn Time from below table expired

RCS PRPLT TO BE BURNED TO ACHIEVE MAX BLOWDN
CURRENT NON-LEAKING (OX OR FU)%

<table>
<thead>
<tr>
<th></th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
<th>75</th>
<th>80</th>
<th>85</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFT +X DUMP (2 JETS)</td>
<td>0:00</td>
<td>0:15</td>
<td>0:31</td>
<td>0:46</td>
<td>1:02</td>
<td>1:17</td>
<td>1:32</td>
<td>1:48</td>
<td>2:02</td>
<td>2:19</td>
<td>2:34</td>
<td>2:50</td>
</tr>
</tbody>
</table>

TIME FROM BURN INITIATION (M:S)

If PRPLT LEAK:

- First RCS jet FAIL OFF or
- **CUR HP = 95 nmi**
RCS SSR-5 (Cont)

4. **BURN EXEC**

- **F6(F8)**
  - ADI ERROR – MED
  - RATE – HI
  - ATT – INRTL
  - √ADI ATT
  - ADI ATT – REF
  - ATT REF pb – push
  - If burning out-of-plane, execute burn ASAP and ignore TIG references

- **GNC 20 DAP CONFIG**
  - DAP: P, Y OPTION – ITEM 35, 36 EXEC (twice) (TAIL)
  - FLT CNTLR PWR – ON
  - DAP TRANS: NORM/PULSE/PULSE

- **TIG-0:30**
  - DAP: B/INRTL/PRI
  - AI TIG: THC +X
  - When terminate conditions are met:
    - THC – release
  - If burn was terminated at CUR Hp = 95, finish burn out-of-plane (step C2)
  - DAP: FREE

- **O7**
  - Leaking RCS He PRESS A(B) – CL (tb-CL)

- **C2**
  - GNC, OPS 201 PRO
  - If He leak, go to step C11

5. **SETUP TO CLEAR He**

- **O7**
  - Leaking RCS TK ISOL 1/2 – CL (tb-CL)

- **O8**
  - √LOMS TK ISOL (two) – OP (tb-OP)
    - XFEED B(A) – OP (tb-OP)

- **GNC 23 RCS**
  - L OMS TO AFT – ITEM 5 EXEC (*)
  - Reselect failed-off jets
  - Set L, R pod fail limit to 0:
    - RCS L – ITEM 2 EXEC
    - FAIL LIM – ITEM 4 +0 EXEC
    - RCS R – ITEM 3 EXEC
    - FAIL LIM – ITEM 4 +0 EXEC

6. **SET UP DAP**

- **GNC 20 DAP CONFIG**
  - Change DAP A to A1

7. **CLEAR He FROM LEFT RCS +X**

- **DAP**: A/INRTL/PRI
  - TRANS: NORM/NORM/NORM
  - If Hp ≤ 98, maneuver out-of-plane

- **F5**
  - THC +X
  - After 7 sec,
    - THC – release

8. **CLEAR He FROM XFEED LINE AND RIGHT RCS +X**

- **GNC 23 RCS**
  - Deselect L1A:
    - RCS L – ITEM 2 EXEC
    - JET DES – ITEM 33 EXEC

- **F5**
  - THC +X
  - After 16 sec,
    - THC – release

9. **CLEAR He FROM RCS MANF 1 PITCH AND YAW**

- **DAP**: B/FREE/PRI
  - TRANS: NORM/NORM/NORM
  - RHC -yaw past soft stop (ACCEL mode) for 2 sec
  - RHC -yaw past soft stop (ACCEL mode) for 2 sec
  - RHC +pitch past soft stop (ACCEL mode) for 2 sec

- **DAP**: A/INRTL/PRI
  - TRANS: PULSE/PULSE/PULSE
RCS SSR-5 (Cont)

10. POST He CLEAR CLEANUP

F7
FLT CNTLR PWR – OFF
O14:E, cb DDU (six) – as reqd
O15:E,
O16:E

GNC 23 RCS

Reselect L1A:
JET DES – ITEM 33 EXEC

Reset L,R Pod Fail Limit to 2:
FAIL LIM – ITEM 4 +2 EXEC
RCS R – ITEM 3 EXEC
FAIL LIM – ITEM 4 +2 EXEC

Reset RCS RM fail counters on all jets:
JET RESET – ITEM 45 EXEC

DAP: FREE
AFT L,R RCS XFEED 3/4/5 (two) – OP (tb-OP)
MANF ISOL 2,3,4 (six) – OP (tb-OP), GPC
5 (two) – OP (tb-OP), GPC

If Group B(C) Powerdown:
O14:F,
Pri RJD LOGIC,DRIVER (sixteen) – OFF
O15:F,
RJD A 1A L2/R2 MANF DRIVER – ON
O16:F

DAP: A,B as reqd >>

11. SYSTEMS CLEANUP FOR He LEAKS

F7
FLT CNTLR PWR – OFF
O14:E, cb DDU (six) – as reqd
O15:E,
O16:E

DAP: FREE
Leaking RCS TK ISOL 1/2 – CL (tb-CL)
AFT L,R RCS XFEED 3/4/5 (two) – OP (tb-OP)
MANF ISOL 2,3,4 (six) – OP (tb-OP), GPC
5 (two) – OP (tb-OP), GPC

√
L OMS TK ISOL (two) – OP (tb-OP)
XFEED B(A) – OP (tb-OP)

GNC 23 RCS

Initiate interconnect usage counter:
L OMS TO AFT – ITEM 5 EXEC (*)

If Group B(C) Powerdown:
O14:F,
Pri RJD LOGIC,DRIVER (sixteen) – OFF
O15:F,
RJD A 1A L2/R2 MANF DRIVER – ON
O16:F

DAP TRANS: as reqd
DAP: A,B as reqd
The following Fault Msgs have no corresponding MAL procedures in this book:
S89 L(R) OMS TEMP
G23 OMS/RCS QTY
L(R) OMS GMBL
L(R) OMS VLV
L(R) OMS QTY
L(R) OMS PC

NOTE A
The identified MAL represents a support procedure that is entered from other procedures or on MCC call
OMS PRPLT THERMAL

11.3 OMS PRPLT THERMAL
11.3b ‘SM 0 THRM PRPLT’ – THRM PRPLT ...................................................... 11-15
OMS

11.1a ‘L(R) OMS TK P’

1. SM ALERT msg ‘L(R) OMS TK P’ occur?
   NO → 2
   YES → 1

2. SPEC XDCR FAILURE OR MDM OR DSC ANALOG INPUT PARAM LOST

3. OMS/MPS XDCR FAILURE OR MDM OR ADC OR DSC ANALOG INPUT PARAM LOST

4. N2 TK P decreasing?
   NO → 5
   YES → 4

5. N2 TK LEAK
   6. When TK P < 470 psia
      • P&I DEORBIT OMS BURN
      • Cue Card: ‘TIG -2 Aff OMS ENG L(R) – ARM’

6. N2 REG P decreasing?
   NO → 8
   YES → 6

7. N2 REG P decreasing?
   NO → 8
   YES → 7

8. N2 LEAK DOWNSTREAM OF CHECK VLV

9. N2 LEAK BETWEEN OMS P VLV AND CK VLV OR N2 RELIEF VLV FAILED OPEN

1. MCC for other params possibly lost in same MDM or ADC or DSC card
2. N2 P available on OMS/MPS
3. N2 P available on GNC SYS SUMM
4. Do not use engine for additional on-orbit burns
5. MCC to determine if engine is usable for deorbit
6. If after manual repress, N2 REG P < 299 psia, OMS engine inop
7. N2 TK P > 564 psia
   Attempt repress of N2 sys prior to each burn. Monitor N2 REG P
8. N2 TK P < 564 psia
   Save for Deorbit Burn. Capability exists to allow one additional actuation of bipropellant vlv from N2 REG. Ignore ‘L(R) OMS TK P’ msg caused by low N2 REG P (P < 299 psia)
OMS 11.1a (Cont)

From ORB PKT, OMS N2 REG PRESS LOW

10
- Compare N2 TK P on GNC SYS SUMM 2 display with OMS/MPS

Both agree?

YES

11 MDM ANALOG INPUT PARAM LOSS

4 NO

12 (CRT,C3) N2 REG P decr with sw now in OFF?

YES

13 N2 LEAK DOWNSTREAM OF CHECK VLV

5 NO

14 ENG P VLV position

GNC SYS SUMM 2
- OMS N2 P VLV status and N2 TK P and N2 REG P during and after (C3) OMS ENG sw in ARM/PRESS

(C3)
Aff OMS:
- OMS ENG – ARM/PRESS
- Wait 15 sec
- OMS ENG – OFF

(CRT,C3) L(R) OMS N2 P VLV indicate OP when sw in ARM/PRESS?

15 Additional cycling of L(R) OMS ENG P VLV may free stuck vlv

16 L(R) OMS N2 P VLV indicate OP when sw in ARM PRESS?

17 L(R) OMS N2 P VLV FAILED CLOSED

18 (CRT,C3) Did N2 TK P decr when sw in ARM/PRESS?

19 INTERMITTENT STUCK P VLV, OR THERMAL COOLING EFFECT

20 N2 REG XDCR FAILURE OR DSC ANALOG INPUT PARAM LOSS OR N2 REG FAILED CLOSED OR TOTAL LINE BLOCKAGE BETWEEN P VLV AND CK VLV

1 MCC for other params possibly lost in same MDM or DSC card

4 Do not use engine for additional on-orbit burns

5 MCC to determine if engine is usable for deorbit

7 N2 REG xdcr and N2 TK P xdcr on CRT have common MDM card. This check detects MDM card failure

8 MCC for further engine use
17 Perform subsequent burns in blowdown in affected pod to prevent mixture ratio variations.

18 MCC on action to be taken to minimize failure effects and config for subsequent burns.
OMS 11.1a (Cont)

From ORB PKT, OMS TK P LOW, step 32

47 Aff OMS

(O8)
- L(R) OMS He PRESS/VAP ISOL A(B) – OP
- Wait 10 sec
- L(R) OMS He PRESS/VAP ISOL A(B) – CL

48 (CRT) L(R) OMS FU (OXID) TK P incr ?

YES

49 Aff OMS feeding OMS Xfeed at time of failure ?

YES

50 GNC 23 RCS
- RCS L – ITEM 2 EXEC

51 Aff OMS

(O8)
- L(R) OMS He PRESS/VAP ISOL B(A) – OP
- Wait 10 sec
- L(R) OMS He PRESS/VAP ISOL B(A) – CL

(CRT) L(R) OMS FU (OXID) P incr ?

NO

52 FROZEN LEAK SOURCE OR PARTIAL He LINE BLOCKAGE TO AFFECTED TANK

53 (CRT) XFEED P DECR or zero ?

NO

54 FU/OXID LEAK IN OMS XFEED LINES

YES

55 L(R) OMS He PRESS A(B) VLV REG FAILED CL

56 FROZEN LEAK SOURCE OR PARTIAL He LINE BLOCKAGE TO AFFECTED TANK

57 (O8)
- L,R OMS TK ISOL (four) – OP (tb-OP)

58 (CRT) Both L(R) OMS FU and OXID TK P agree in aff pod ?

NO

59 L(R) OMS He LINE BLOCKAGE BETWEEN He TK AND He PRESS VLV (A,B)

58 Reconfig OMS

(O8)
- L,R OMS TK ISOL (four) – OP (tb-OP)

59

60 L(R) OMS He LINE BLOCKAGE TO AFFECTED TANK

61
- P&I all OMS BURN Cue Cards:
  - "L(R) OMS He PRESS/VAP ISOL (two) – CL"
OMS 11.1a (Cont)

From ORB PKT, OMS He TK P LOW, step 2

63. SM ALERT msg 'L(R) OMS TK P' occur ?
   YES → 1. MCC for other params possibly lost in same MDM or DSC card
   NO → 2. N2 P available on OMS/MPS

64. SPEC XDCR FAILURE OR MDM OR DSC ANALOG INPUT PARAM LOSS

65. OMS/MPS XDCR FAILURE, OR ADC OR DSC ANALOG INPUT PARAM LOSS

20. He P available on GNC SYS SUMM 2 display
OMS SW/VLV MISCOMP

OMS 11.2a OMS VLV tb – bp

1. (O8) More than one tb – bp?
   NO
   YES
   2. Which OMS vlv tb – bp:
      (O8) L OMS TK ISOL A and R OMS TK ISOL A
           and L OMS XFEED A
           L OMS XFEED B and R OMS XFEED B
           L OMS TK ISOL B and R OMS TK ISOL B
           and R OMS XFEED A
           Neither
      3. POD/AMC1 BUS FAILURE
         EPS SSR-143
      4. POD/AMC2 BUS FAILURE
         EPS SSR-144
      5. SEPARATE FAILURES. TROUBLESHOOT VLVS INDIVIDUALLY
      6. POD/AMC3 BUS FAILURE
         EPS SSR-145
      7. During reconfig, tb – bp occurred?
         NO
         YES
         8. VLV FAILURE OR tb FAILURE OR MICROSW FAILURE
            17
      9. √ AC motor thermal overload
         • Aff OMS sw – GPC
         • Wait 3 min, then reposition sw to mode in which tb – bp occurred
         tb – bp ?
         NO
         YES
         10. VLV CONTINUOUS PWR PROBLEM. THERMAL OVERLOAD
             RESET. VLV OPERATIONAL
                1
                11. • Aff OMS sw – GPC

Nominal Config: (MA73C:I)
  cb AC1 AFT POD VLV GP 1
  φA(φB,φC) – cl
cb AC2 AFT POD VLV GP 2
  φA(φB,φC) – cl
cb AC3 AFT POD VLV GP 3
  φA(φB,φC) – cl
AFT POD VLV LOGIC GP
  1/3 – ON
  1/2 – ON
  2/3 – ON

For subsequent reconfig, ignore tb – bp. After vlv commanded, wait 3 sec; then position appropriate sw to GPC.
Position of aff sw:

- CL
- OP

Aff OMS vlv –

- OP

tb – bp ?

- CL

Position sw to

- mode in which

- aff occurred

- tb – bp

- Perform ICNCT

- RETURN (OPS

- 2,3) (ORB PKT,

- RCS)

- Aff OMS sw –

- GPC

- √MCC

STICKY LIMIT

- sw OR VLV. VLV

- OPERATIONAL
11.2b OMS VLV tb AND sw POSITION DISAGREE

Nominal Config:
(MA73C:I)
- cb AC1 AFT POD VLV GP 1
- $\Phi A(\Phi B,\Phi C)$ – cl
- cb AC2 AFT POD VLV GP 2
- $\Phi A(\Phi B,\Phi C)$ – cl
- cb AC3 AFT POD VLV GP 3
- $\Phi A(\Phi B,\Phi C)$ – cl
- AFT POD VLV LOGIC GP
  - 1/3 – ON
  - 1/2 – ON
  - 2/3 – ON

If:
- OMS vlv tb – OP
  - but sw closed
- OMS vlv tb – CL
  - but sw open

1. Vlv reconfig in progress?
  - NO
    - 2. tb OR sw FAILURE
  - YES
    - 3. tb FAILURE

10.1a

4.
- Perform I’CNCT RETURN (OPS 2,3) (ORB PKT, RCS)
- Aff OMS sw – GPC
- MCC

YES

NO
OMS 11.3a PRPLT THRM OMS

If any param on OMS Thermal Limit Table is out-of-limits:

1. MSG available with SM in RUN mode only.
2. Htrs cycling high/low or intermittent xdcr failure. \(\sqrt{MCC}\)
3. Because of insufficient onboard data and complexity of interacting htr/thermostat groups, crew cannot identify specific failure or determine instrument faults.
4. \(\sqrt{MCC}\) for further analysis, possible reconfig, and/or attitude change.
5. When no onboard thermal visibility into crossfeed lines (no SM and no BFS) exists, both A,B Htr sets will be turned to AUTO.
6. OMS CRSFD L GMBL LN and OMS CRSFD C XFD OX upper limit is 100 degF.
7. OMS CRSFD R DRN OX upper limit is 110 degF.

Nominal Config:

(A14) RCS/OMS HTR
OMS CRSFD LINES (two) – A AUTO(B AUTO), B OFF(A OFF)

OMS THERMAL LIMIT TABLE

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>FDA LIMIT</th>
<th>LOW</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMS CRSFD L R C XFD OX XXXS XXXS XXXS</td>
<td>50</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>GMBL LN XXXS XXXS</td>
<td>50</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>DRN OX XXXS XXXS</td>
<td>50</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>FU OX</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
OMS

11.3b THRM PRPLT

If:
Any up or down arrows displayed on PRPLT POD or PRPLT OMS CRSFD lines of BFS SM 0 THERMAL display

Nominal Config:
(A14)
RCS/OMS HTR L POD (two) – A AUTO (B AUTO), B OFF (A OFF)
R POD (two) – A AUTO (B AUTO), B OFF (A OFF)
CRSFD LINES (two) – A AUTO (B AUTO), B OFF (A OFF)

1 BFS msg available in MM 104, 105, 106, 301, 302, 303, and when BFS in OPS 0
2 If SM 89 PRPLT THERMAL is available, display may be used to provide insight into problem, with MCC consultation
3 THERMAL display available only from BFS. No values displayed, only ↑, ↓, M, H, or L
4 Because of insufficient onboard data and complexity of interfacing htr/thermostat groups, crew cannot identify specific failure or determine instrument faults
5 Htrs cycling high/low or intermittent xdcr failure.
6 MCC for further analysis, possible reconfig, and/or attitude change
7 When no onboard thermal visibility into CRSFD LINES (no SM and no BFS) exists, both A, B Htr sets will be turned to AUTO

1 BFS SM 0 THERMAL
2 PRPLT POD OMS CRSFD:
↑
↓
Neither
3 TRANSIENT CONDITION
4 HTR/THERMOSTAT CKT FAILED OFF OR HEATING FROM CONTROLLING CKT INADEQUATE OR INST FAILURE OR BIAS
5 Arrow in which area:
OMS CRSFD POD
CAUTION
Simultaneous operation of both A, B Htr circuits in pods will result in htr burnout
6 Switch to other htr/thermostat ckt
(A14)
RCS/OMS HTR OMS CRSFD LINES –
• A OFF (B OFF)
• B AUTO (A AUTO)
7 Switch to other htr/thermostat ckt
Which area failed:
Right Pod
Left Pod
8 (A14)
RCS/OMS HTR R POD (two) –
• A OFF (B OFF)
• B AUTO (A AUTO)
9 (A14)
RCS/OMS HTR L POD (two) –
• A OFF (B OFF)
• B AUTO (A AUTO)
OMS 11.3c PRPLT THRM POD

1. SM ALERT

S89 PRPLT THRM POD

If:
- Any param on Pod Thermal Limit Table except ENG I/F FU INJ temp out-of-limits

Nominal Config:
- (A14) RCS/OMS HTR L POD (two) – A AUTO (B AUTO), B OFF (A OFF)
- R POD (two) – A AUTO (B AUTO), B OFF (A OFF)

10.3a 1
10.3b 2

1. SM 89 PRPLT THERMAL

Param(s) out-of-limits?
- WEB KEEL
- OX DRN PNL
- RCS DRN PNL
- RCS VERN PNL

YES 2 Both params 1,2 out-of-limits?

NO 3 INST FAILURE

3. INST FAILURE

Param(s) out-of-limits high or low:

↑
↓
Neither

4. HTR/THERMOSTAT CKT FAILED ON OR EXTREMELY HOT ENVIRONMENT OR INST FAILURE OR BIAS

6. HTR/THERMOSTAT CKT FAILED OFF OR HEATING FROM CONTROLLING CKT INADEQUATE OR INST FAILURE OR BIAS

Simultaneous ops of both A,B HTR ckt's in pods will result in burnout of htrs

8. Switch to other htr/thermostat ckt

Which area failed:
- Right Pod
- Left Pod

9. (A14) RCS/OMS HTR R POD (two) –
- A OFF (B OFF)
- B AUTO (A AUTO)

10. (A14) RCS/OMS HTR L POD (two) –
- A OFF (B OFF)
- B AUTO (A AUTO)

1. Msg available with SM in RUN mode only
2. √MCC for verification
3. Because of insufficient onboard data and complexity of interacting htr/thermostat groups, crew cannot identify specific failure or determine instrument faults
4. Htrs cycling high/low or intermittent xdcr failure. √MCC
5. √MCC for further analysis, possible reconfig, and/or attitude change

11-16 MAL/ALL/GEN J
### POD THERMAL LIMIT TABLE

<table>
<thead>
<tr>
<th>PARAM</th>
<th>FDA LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOW</td>
</tr>
<tr>
<td>POD</td>
<td></td>
</tr>
<tr>
<td>OMS TK</td>
<td>45</td>
</tr>
<tr>
<td>F U</td>
<td>45</td>
</tr>
<tr>
<td>ENG I/F</td>
<td>45</td>
</tr>
<tr>
<td>F U</td>
<td>45</td>
</tr>
<tr>
<td>O X V L</td>
<td>40</td>
</tr>
<tr>
<td>F U I N J</td>
<td>36</td>
</tr>
<tr>
<td>WEB K E E L</td>
<td>45</td>
</tr>
<tr>
<td>1</td>
<td>45</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
</tr>
<tr>
<td>Y O B</td>
<td>45</td>
</tr>
<tr>
<td>UP</td>
<td>45</td>
</tr>
<tr>
<td>O X D R N P N L</td>
<td>45</td>
</tr>
<tr>
<td>1</td>
<td>45</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
</tr>
<tr>
<td>ENG C O V E R</td>
<td>45</td>
</tr>
<tr>
<td>S E R V P N L</td>
<td>45</td>
</tr>
<tr>
<td>G S E S E R V P N L</td>
<td>45</td>
</tr>
<tr>
<td>T E S T H E /O X</td>
<td>35</td>
</tr>
<tr>
<td>1</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>35</td>
</tr>
</tbody>
</table>
**OMS SSR-1**

**MIXED XFD: OMS PRPLT FAILURE**

**NOTE**

Procedure uses MEMORY READ/WRITE to set appropriate OMS TK ISOL vlv and OMS XFEED vlv commands in order to connect usable OMS tk to opposite side. For single tank or single inlet failures, select engine in good pod. Unstow ASC PKT and reference DEORBIT MIXED XFD BURN PREP procedure on 7-6 for reqd address IDs. Desired values are given in Tables 1 thru 8.

1. L,R OMS TK ISOL (four) – CL (tb-CL)  
   L,R OMS XFEED (four) – CL (tb-CL)

2. AFT L,R RCS XFEED (four) – CL (tb-CL)  
   MSTR RCS XFEED – OFF

**WARNING**

Do not use MSTR RCS XFEED until post burn or loss of Deorbit capability may occur.

3. Select failure case table

<table>
<thead>
<tr>
<th>Single Failures</th>
<th>Use Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>L OMS OX TK</td>
<td>4</td>
</tr>
<tr>
<td>L OMS OX INLET</td>
<td>4</td>
</tr>
<tr>
<td>L OMS FU TK</td>
<td>6</td>
</tr>
<tr>
<td>L OMS FU INLET</td>
<td>6</td>
</tr>
<tr>
<td>R OMS OX TK</td>
<td>3</td>
</tr>
<tr>
<td>R OMS OX INLET</td>
<td>3</td>
</tr>
<tr>
<td>R OMS FU TK</td>
<td>5</td>
</tr>
<tr>
<td>R OMS FU INLET</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dual Failures</th>
<th>Use Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>L OMS FU TK AND R OMS OX TK</td>
<td>1</td>
</tr>
<tr>
<td>L OMS TK AND R OMS FU TK</td>
<td>2</td>
</tr>
<tr>
<td>L OMS TK AND R OMS OX INLET</td>
<td>3</td>
</tr>
<tr>
<td>L OMS OX INLET AND R OMS FU TK</td>
<td>4</td>
</tr>
<tr>
<td>L OMS OX TK AND R OMS FU INLET</td>
<td>5</td>
</tr>
<tr>
<td>L OMS FU TK AND R OMS OX TK</td>
<td>6</td>
</tr>
<tr>
<td>L OMS OX INLET AND R OMS FU INLET</td>
<td>7</td>
</tr>
<tr>
<td>L OMS OX INLET AND R OMS OX INLET</td>
<td>8</td>
</tr>
</tbody>
</table>

4. Set up GPC vlvs

**GNC 0 GPC MEMORY**

\HEX 27*  
BIT RST – ITEM 23 EXEC (*)  
Obtain and enter ADD ID from ASC PKT, 7-6, DEORBIT MIXED XFD BURN PREP, step 3.  
Obtain and enter DESIRED values from Tables 1 thru 8.

<table>
<thead>
<tr>
<th>ADD ID</th>
<th>DESIRED</th>
<th>Table A</th>
<th>Table B</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>30</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>32</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>34</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

\Data values in ACTUAL column agree with Table A (MCC supplied)  
WRITE – ITEM 25 EXEC  
\Data values in ACTUAL column agree with Table B (MCC supplied)

5. BIT SET – ITEM 22 EXEC (*)  
Obtain and enter ADD ID from ASC PKT, 7-6, DEORBIT MIXED XFD BURN PREP, step 4.  
Obtain and enter DESIRED values from Tables 1 thru 8.

<table>
<thead>
<tr>
<th>ADD ID</th>
<th>DESIRED</th>
<th>Table C</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>_______</td>
<td>0 0 0 0</td>
</tr>
<tr>
<td>30</td>
<td>_______</td>
<td>0 0 0 0</td>
</tr>
<tr>
<td>32</td>
<td>_______</td>
<td>0 0 0 0</td>
</tr>
<tr>
<td>34</td>
<td>_______</td>
<td>0 0 0 0</td>
</tr>
</tbody>
</table>

\Data values in ACTUAL column agree with Table C  
WRITE – ITEM 25 EXEC  
\Data values in ACTUAL column agree with DESIRED

6. During AOS, perform reconfig:

O8 L,R OMS TK ISOL (four) – GPC  
   XFEED (four) – GPC  
\Vlv config with MCC

7. Go to DEORBIT BURN (MIXED XFEED) (Cue Card) to perform deorbit burn  
\Burn engine in Tables 1 thru 8)
### TABLE 1

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>554</td>
</tr>
<tr>
<td>31</td>
<td>554</td>
</tr>
<tr>
<td>33</td>
<td>1000</td>
</tr>
<tr>
<td>35</td>
<td>1000</td>
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</table>

**TABLE 2**

<table>
<thead>
<tr>
<th>ITEM</th>
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</tr>
</thead>
<tbody>
<tr>
<td>29</td>
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</tr>
<tr>
<td>31</td>
<td>1154</td>
</tr>
<tr>
<td>33</td>
<td>400</td>
</tr>
<tr>
<td>35</td>
<td>400</td>
</tr>
</tbody>
</table>

**Diagram**

The diagrams illustrate the flow of helium (He), fuel (FU), oxidizer (OX), and other components through the system, with various controls and burn engine either options indicated.
TABLE 3

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESIRED</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>31</td>
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<tr>
<td>33</td>
<td>1000</td>
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<tr>
<td>35</td>
<td>1000</td>
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</tbody>
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TABLE 4

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESIRED</th>
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</thead>
<tbody>
<tr>
<td>29</td>
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<tr>
<td>31</td>
<td>1144</td>
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<tr>
<td>33</td>
<td>400</td>
</tr>
<tr>
<td>35</td>
<td>400</td>
</tr>
</tbody>
</table>
TABLE 7

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>1104</td>
</tr>
<tr>
<td>31</td>
<td>1104</td>
</tr>
<tr>
<td>33</td>
<td>400</td>
</tr>
<tr>
<td>35</td>
<td>400</td>
</tr>
</tbody>
</table>

TALKBACKS
bp
bp

BUCK ENGINE
THC + X
OMS % VS RCS
BURN TIME

TALKBACKS
bp
bp

RCS

TABLE 8

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>450</td>
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<tr>
<td>31</td>
<td>450</td>
</tr>
<tr>
<td>33</td>
<td>1000</td>
</tr>
<tr>
<td>35</td>
<td>1000</td>
</tr>
</tbody>
</table>

TALKBACKS
bp
bp

BUCK ENGINE
THC + X
OMS % VS RCS
BURN TIME

TALKBACKS
bp
bp

RCS
## PDRS

### 12.1 RMS C/W

<table>
<thead>
<tr>
<th>12.1a</th>
<th>C/W LT(S) ON, BUT RMS MSTR ALARM LT/TONE OFF</th>
<th>12-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1b</td>
<td>MULTIPLE C/W LTS AND PDRS MSGS</td>
<td>12-5</td>
</tr>
<tr>
<td>12.1c</td>
<td>C/W MCIU LT</td>
<td>12-6</td>
</tr>
<tr>
<td>12.1d</td>
<td>ABE LT – S96 PDRS ABE COMM(SY, SP, EP, WP, WY, WR)</td>
<td>12-8</td>
</tr>
<tr>
<td>12.1e</td>
<td>CONTR ERR LT – S96 PDRS CNTL SY(SP, EP, WP, WY, WR) OR PDRS CNTL POR</td>
<td>12-19</td>
</tr>
<tr>
<td>12.1f</td>
<td>GPC DATA LT OR BCE BYP MCIU</td>
<td>12-22</td>
</tr>
<tr>
<td>12.1g</td>
<td>CHECK CRT LT</td>
<td>12-24</td>
</tr>
<tr>
<td>12.1h</td>
<td>– S96 PDRS CKCRT D</td>
<td>12-26</td>
</tr>
<tr>
<td>12.1i</td>
<td>– S96 PDRS TEST SPA</td>
<td>12-27</td>
</tr>
<tr>
<td>12.1j</td>
<td>– S96 PDRS CKCRT SY(SP, EP, WP, WY, WR)</td>
<td>12-31</td>
</tr>
<tr>
<td>12.1k</td>
<td>– S96 PDRS CKCRT EE</td>
<td>12-33</td>
</tr>
<tr>
<td>12.1l</td>
<td>– S96 PDRS CKCRT T CK</td>
<td>12-36</td>
</tr>
<tr>
<td>12.1m</td>
<td>– S96 PDRS CKCRT HC</td>
<td>12-37</td>
</tr>
<tr>
<td>12.1n</td>
<td>– PDRS SLIP SY(SP, EP, WP, WY, WR, ALL)</td>
<td>12-38</td>
</tr>
<tr>
<td>12.1o</td>
<td>– S94 PDRS WR R</td>
<td>12-39</td>
</tr>
<tr>
<td>12.1p</td>
<td>– PDRS TEST BRK(C/W, NMI, FS, LOSS)</td>
<td>12-40</td>
</tr>
<tr>
<td>12.1q</td>
<td>– S96 PDRS CKCRT FS</td>
<td>12-42</td>
</tr>
<tr>
<td>12.1r</td>
<td>RELEASE LT – PDRS REL</td>
<td>12-43</td>
</tr>
<tr>
<td>12.1s</td>
<td>– PDRS REL (CUE CARD EXECUTED)</td>
<td>12-44</td>
</tr>
<tr>
<td>12.1t</td>
<td>DERIGIDIZE LT – PDRS DERIG</td>
<td>12-45</td>
</tr>
<tr>
<td>12.1u</td>
<td>– PDRS DERIG (CUE CARD EXECUTED)</td>
<td>12-46</td>
</tr>
<tr>
<td>12.1v</td>
<td>PORT TEMP LT – PDRS TEMP PORT</td>
<td>12-47</td>
</tr>
<tr>
<td>12.1w</td>
<td>STBD TEMP LT – PDRS TEMP STBD</td>
<td>12-49</td>
</tr>
</tbody>
</table>

### 12.2 RMS D&C

<table>
<thead>
<tr>
<th>12.2a</th>
<th>MSTR ALARM ON, BUT C/W LT(S) OFF</th>
<th>12-52</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.2b</td>
<td>BRAKES – ON, BUT BRAKES tb – OFF</td>
<td>12-53</td>
</tr>
<tr>
<td>12.2c</td>
<td>– OFF, BUT BRAKES tb – ON</td>
<td>12-54</td>
</tr>
<tr>
<td>12.2d</td>
<td>SAFING – AUTO, BUT SAFING tb – bp</td>
<td>12-55</td>
</tr>
<tr>
<td>12.2e</td>
<td>RESERVED</td>
<td>not used</td>
</tr>
<tr>
<td>12.2f</td>
<td>RESERVED</td>
<td>not used</td>
</tr>
<tr>
<td>12.2g</td>
<td>SELECTED MODE ANNUN – OFF OR ALL A8 LTS – OFF</td>
<td>12-57</td>
</tr>
<tr>
<td>12.2h</td>
<td>SHLDR BRACE REL tb – bp AFTER CMD</td>
<td>12-59</td>
</tr>
</tbody>
</table>

### 12.3 END EFFECTOR

<table>
<thead>
<tr>
<th>12.3a</th>
<th>EE FAILS TO GRAPPLE CONSTRAINED PL IN EE MODE – AUTO</th>
<th>12-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.3b</td>
<td>EE FAILS TO RELEASE/DERIGIDIZE CONSTRAINED PL IN EE MODE – AUTO</td>
<td>12-62</td>
</tr>
<tr>
<td>12.3c</td>
<td>RESERVED</td>
<td>not used</td>
</tr>
<tr>
<td>12.3d</td>
<td>RESERVED</td>
<td>not used</td>
</tr>
<tr>
<td>12.3e</td>
<td>EE FAILS TO RELEASE IN EE MODE – MAN</td>
<td>12-67</td>
</tr>
<tr>
<td>12.3f</td>
<td>DERIGIDIZE/EXTEND IN MANUAL</td>
<td>12-69</td>
</tr>
<tr>
<td>12.3g</td>
<td>MULTIPLE EE tb ABNORMAL WHILE NO EE CMD</td>
<td>12-71</td>
</tr>
<tr>
<td>12.3h</td>
<td>EE tb ABNORMAL WHILE EE MODE OFF</td>
<td>12-73</td>
</tr>
<tr>
<td>12.3i</td>
<td>CAPTURE SEQ ABORTED (CUE CARD EXECUTED)</td>
<td>12-75</td>
</tr>
<tr>
<td>12.3j</td>
<td>NO AUTO RELEASE (CUE CARD EXECUTED)</td>
<td>12-76</td>
</tr>
<tr>
<td>12.3k</td>
<td>MANUAL RELEASE (CUE CARD EXECUTED)</td>
<td>12-78</td>
</tr>
<tr>
<td>12.3l</td>
<td>DERDIG (CUE CARD EXECUTED)</td>
<td>12-80</td>
</tr>
</tbody>
</table>
### 12.4 RMS OPS

- **12.4a** ARM RESPONSE ABNORMAL IN MANUAL MODES ............................................. 12-82
- **12.4b** AUTO MODES ............................................................................................... 12-84
- **12.4c** JOINT RESPONSE ABNORMAL IN SINGLE MODE ...................................... 12-86
- **12.4d** DIRECT MODE .............................................................................................. 12-89

### 12.5 MPM/MRL

- **12.5a** MPM DPY – tb NOT DPY, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME .................................................................................................................. 12-92
- **12.5b** MPM STO – tb NOT STO, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME .................................................................................................................. 12-94
- **12.5c** MRL REL – tb NOT REL, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME .................................................................................................................. 12-96
- **12.5d** MRL LAT – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME .................................................................................................................. 12-98
- **12.5e** PORT(STBD) RMS RETEN LATCHES R-F-L tb – bp WHEN CRADLED ................. 12-100
- **12.5f** PORT(STBD) RMS RETEN LATCHES R-F-L tb – gray WHEN UNCRADLED .................................................................................................................. 12-101

### PDRS SSR

- **PDRS SSR-1** MPM MTR INHIBIT DISABLE .................................................................. 12-102
- **SSR-2** RESERVED ................................................................................................... not used
- **SSR-3** BACKDRIVE TECHNIQUE – JOINT FREE ...................................................... 12-103
- **SSR-4** RMS IFM D&C KIT ....................................................................................... 12-111
12.1a C/W LT(S) ON, BUT RMS MSTR ALARM LT/TONE OFF

1. (A8U)
   - BRAKES – ON
   - PARAM sel – TEST (30 sec max)

2. MSTR ALARM lt and tone on ?
   NO
   YES

3. MSTR ALARM LT AND/OR TONE FAILED OFF OR MSTR ALARM CANCEL CONTACT SHORT
   • Use SM ALERT and other cues for failure annunciation
   • Go to appropriate MAL

4. FAULT
   Any RMS msg?
   NO
   YES

5. MCIU lt on ?
   NO
   YES

6. GPC DATA lt on ?
   NO
   YES

7. MSTR ALARM CKT FAILURE

8. SM 94 PDRS CONTROL
   I/O ON – ITEM 5 ‘*’ ?
   NO
   YES

9. CRT msg Fault Summ Page
   • Go to appropriate MAL for msg

10. C/W LT(S) FAILED ON
    • Continue normally. Failure will be annunciated by MSTR ALARM
**SM ALERT**

**MSTR ALARM**

**Multiple C/W Lts**

**Multiple PDRS msgs**

1. **(A8U)**
   - BRAKES – ON
   - Perform highest priority MAL (Lts listed in priority order)

1. **C/W MCIU lt**

1. **C/W ABE lt**

1. **C/W CONTR ERR lt**

1. **C/W GPC DATA lt**

1. **C/W CHECK CRT lt**

1. **C/W RELEASE lt**

1. **C/W DERIGID lt**

1. **C/W PORT TEMP lt**

1. **C/W STBD TEMP lt**

1. **C/W SINGULAR lt**

1. **C/W REACH LIM lt**

2. **No action reqd**

**12.1b MULTIPLE C/W LTS AND PDRS MSGS**
Ground can detect if failure was NON-MASKABLE INTERRUPT (NMI) before removing brakes.

Additional transients possible.

Taking brakes off will clear MCIU lt and related down arrows.

Full capability may be restored with RMS MCIU CHANGEOUT (IFM).

Display data may be unreliable. Additional fault msgs and C&W lights possible.

MCIU lt not available for subsequent MCIU failures, but MSTR ALARM still available.

Nominal Config:
- (A8L) RMS PWR – PRI

If: MADC, MCPC, ICF, Frame Sync, MCIU failure warning circuit failure
2 Additional transients possible

4 Full capability may be restored with RMS MCIU CHANGEOUT (IFM)

6 MCIU It not available for subsequent MCIU failures, but MSTR ALARM still available

15 TRANSIENT MCIU FAILURE

16 PERMANENT MCIU C/W CKT FAILURE

17 SM 94 PDRS CONTROL
  (ABU)
  • SAFING – CANCEL (tb-gray)
  • If WR RANGE different than recorded value, update WR RANGE on SM 94 (ITEM 26)
  • Continue ops

18 EE MAN and B/U RELEASE modes remain. EE AUTO may remain
  • If unloaded, √MCC for possible EE AUTO checkout
12.1d C/W ABE LT – S96 PDRS ABE COMM (SY, SP, EP, WP, WY, WR)

12.1b

1. BRAKES – ON

SM 96 PDRS FAULTS

ABE: COMM ↓ ?

YES

2. Reset ABE

(A8L)
- RMS SEL – OFF
- RMS SEL – PORT

Any ABE related annunciations ?

NO

3. TRANSIENT FAILURE

• Continue nominal ops

YES

4. SMA OR MCIU FAILURE

7. DIRECT and B/U drive modes remain

5. SM 96 PDRS FAULTS

ABE BITE: or CHECK CRT:
SPA BITE TEST:
Joint related ABE BITE or BITE TEST for one or more joints ?

NO

6. SPA OR MCIU FAILURE

YES

8. Identify failed joint

ABE BITE: or CHECK CRT:
SPA BITE TEST:
Choose first joint in sequence SY, SP, EP, WP, WY, WR which has ABE or BITE TEST annun

9. Attempt to drive joint

(A8U)
- JOINT – failed one
- MODE – DIRECT
- SINGLE/DIRECT
- DR – ‘+’ and ‘-’
   (√ for motion)
- MODE – not DIRECT

Joint drive properly ?

NO

10. SPA FAILURE

YES

11

12

1 Full capability may be regained by RMS MCIU CHANGEOUT (IFM)
1. Full capability will be regained by RMS MCIU CHANGEOUT (IFM).
2. If any wrist joint data is unreliable, EE Auto mode may be lost.
3. If annunciation for all six joints is identical, full capability may be regained by RMS MCIU CHANGEOUT (IFM). If annunciation is not for all six joints, then SPA failure.
4. Computer supported modes available but subsequent SPA failure for same joint may not be annunciated or protected by autobrakes. May receive spurious SPA or EEEU annunciations.
5. For BITE circuit failure, MCIU OVERRIDE: ABE OVRD A (ITEM 36) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain computer supported modes (on MCC GO). Subsequent tachometer failure for same joint will be annunciated by CONTR ERR and protected by autobrakes.
6. For tach failure, rate data is unreliable.

Diagram:
- Node 1: ABE BITE: MICROCOMPUTER '↓'?
  - YES: Node 17
  - NO: Node 18
- Node 17: SPA BITE TEST 'LOSS' for failed joint?
  - YES: Node 20
  - NO: Node 18
- Node 18: CHECK CRT: SPA BIT OR MCIU FAILURE?
  - YES: Node 19
  - NO: Node 22
- Node 19: Determine type of BITE
  - Multiple ABE BITE: down arrows for one joint only
  - Any single type of ABE annunciation for any joint(s): ABE BITE:
    - TOTAL COMPENSATOR '↓'
    - TACHOMETER '↓'
    - COMMUTATOR '↓'
    - MDA OVERCURRENT/MOTOR DRV FAULT '↓'
    - MDA DEMAND VOLTAGE '↓'
    - A/D CONVERTER '↓'
    - BRAKE '↓'
    - POS ENCODER '↓'
    - BACKUP RELAY '↓'
    - None
  - YES: Node 21
  - NO: Node 23
- Node 21: TACHOMETER ELECTRONICS OR BITE CIRCUIT FAILURE
  - YES: Node 24
  - NO: Node 25
- Node 22: DIRECT and B/U drive modes remain
- Node 23: DIRECT and B/U drive modes remain
- Node 24: DIRECT and B/U drive modes remain
- Node 25: DIRECT and B/U drive modes remain

Flowchart:
- Node 2: Full capability will be regained by RMS MCIU CHANGEOUT (IFM)
- Node 3: If any wrist joint data is unreliable, EE Auto mode may be lost.
- Node 4: If annunciation for all six joints is identical, full capability may be regained by RMS MCIU CHANGEOUT (IFM). If annunciation is not for all six joints, then SPA failure.
- Node 5: Computer supported modes available but subsequent SPA failure for same joint may not be annunciated or protected by autobrakes. May receive spurious SPA or EEEU annunciations.
- Node 6: For BITE circuit failure, MCIU OVERRIDE: ABE OVRD A (ITEM 36) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain computer supported modes (on MCC GO). Subsequent tachometer failure for same joint will be annunciated by CONTR ERR and protected by autobrakes.
- Node 7: For tach failure, rate data is unreliable.
Possible TOTAL COMPENSATOR BITE for failed joint while driving. Direct Drive joint test may determine failed joint.

For A/D Converter failure MCIU OVERRIDE ABE OVRD C (ITEM 38) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain computer supported modes (on MCC GO). Subsequent failures for same joint will be annunciated by CONTR ERR and protected by autobrakes.

MCIU OVERRIDE: ABE OVRD B (ITEM 37) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain computer supported modes (on MCC GO). Subsequent failure for same joint will not be annunciated or protected by autobrakes.

If brake failed off, brakes available for five good joints and dynamic braking for failed joint.

MCIU OVERRIDE: ABE OVRD B (ITEM 37) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain computer supported modes (on MCC GO). Possible brake overdrive for failed joint. Ground may determine if joint is sluggish.
PDRS 12.1d (Cont)

13 MCU
OVERRIDE: ABE
OVRD C (ITEM 38)
on SPEC 95, PDRS
OVERRIDE, can be
used to remove
autobrakes and
regain computer
supported modes
(on MCC GO).
Subsequent failures
for same joint will be
annunciated by
CONTR ERR and
protected by
autobrakes

14 Additional
annunciations may
be received after
ABE reset

15 May receive
CHECK CRT and
DIRECT DRIVE
BITE annunciation
when driving in
Direct mode. Cycle
Brake sw to clear
failure

19

40

Reset ABE
(A8L)
• RMS SEL –
OFF
• RMS SEL –
PORT
Did same failure
reannunciate for
same joint ?

YES

NO

41

Joint drive test
(A8U)
• MODE –
DIRECT
• JOINT – failed
one
• SINGLE/DIRECT
DR – ‘+’ and ‘-’
• MODE – not
DIRECT
Joint drive properly ?

YES

NO

42

MDA
FAILURE

43

B/U drive
mode remains.
DIRECT mode for
five good joints

44

ERRONEOUS
CURRENT
SENSOR DATA

45

DIRECT and
B/U drive modes
remain

46

Monitor SM 96
while cycling brakes

47

48

POSSIBLE
ERRONEOUS
CURRENT SENSOR,
COMMUTATOR,
OR TACH DATA

49

DIRECT and
B/U drive modes
remain

50

Attempt to
drive in SINGLE

(A8U)
• RATE – VERN
• BRAKES – OFF
• MODE –
SINGLE, ENTER
• JOINT – failed
one
• SINGLE/DIRECT
DR – ‘+’ and ‘-’
• BRAKES – ON
SM 96 PDRS
FAULTS

ABE BITE: TOTAL
COMPENSATOR
↓ when
BRAKES – OFF ?

YES

NO

51

MDA CLOCK
FAILURE RESULTING IN
CORRUPT REDUNDANT
TACHOMETER DATA AND LOSS
OF DIRECT DRIVE

52

MOTOR
VOLTAGE
SUPPRESSION
DIODE SHORT,
FURTHER JOINT
SPA DAMAGE
POSSIBLE

53

B/U drive
mode remains.
DIRECT mode for
five good joints

54

TRANSIENT
FAILURE

55

• Continue nominal
ops

56

DIRECT and
B/U mode for five
good joints

Driving failed joint in
B/U will cause loss of
B/U mode for all
joints

CAUTION
If any wrist joint data is unreliable, EE Auto mode may be lost

Additional annunciations may be received after ABE reset

One failure away from possible uncommanded motion, but protected by auto brakes and annunciated by CONTR ERR

When driving any joint in DIRECT, failure will reannunciate. Recycle arm select to regain computer supported modes

- Reset ABE
  - RMS SEL – OFF
  - RMS SEL – PORT

SM 96 PDRS FAULTS

ABE BITE: COMMUTATOR ‘↓’, ABE BITE: MICROCOMPUTER ‘↓’, or A/D CONVERTER ‘↓’?

YES

NO

58  SM 96 PDRS FAULTS

CHECK CRT: SPA BITE TEST ‘FS’?

YES

NO

59  Joint drive test

(A8U)
- MODE – DIRECT
- JOINT – failed one
- SINGLE/DIRECT DR – ‘+’ and ‘-’
- MODE – not DIRECT

SM 96 PDRS FAULTS

ABE BITE: MICROCOMPUTER ‘↓’ reannunciate?

YES

NO

63  BITE CIRCUIT FAILURE

NO

66  All drive modes available

67  SPA FAILURE

68  DIRECT and B/U drive modes remain

3  Direct and B/U drive modes remain. DIRECT mode for five good joints

69  • Continue nominal ops

61  Joint drive test

(A8U)
- MODE – DIRECT
- JOINT – failed one
- SINGLE/DIRECT DR – ‘+’ and ‘-’
- MODE – not DIRECT

SM 96 PDRS FAULTS

ABE BITE: MICROCOMPUTER ‘↓’ reannunciate?

YES

NO

63  BITE CIRCUIT FAILURE

NO

66  All drive modes available

67  SPA FAILURE

68  DIRECT and B/U drive modes remain

3  Direct and B/U drive modes remain. DIRECT mode for five good joints

69  • Continue nominal ops
18 Removing brakes may result in reannunciation of failure and autobrakes.

19 Subsequent MDA Demand Voltage BITE possible while driving failed joint. For commutator and MDA demand voltage failures, MCUI OVERRIDE: ABE OVRD B (ITEM 37) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain SINGLE drive mode (on MCC GO). Subsequent failure for same joint will not be annunciated or protected by autobrakes.

20 For MDA BITE circuit failure, MCUI OVERRIDE: ABE OVRD B (ITEM 37) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain computer supported modes, or SINGLE drive mode for sluggish joint (on MCC GO). Subsequent failures for same joint will be annunciated by CONTR ERR and protected by autobrakes.
21 For MDA continuously enabled or loss of dynamic braking, subsequent failure (runaway or failed free joint) will be annunciated but not stopped by autobrakes or dynamic braking, respectively.

22 Port RMS SEL will need to be cycled to regain computer supported modes.
PDRS 12.1d (Cont)

100 Joint drive test
(A8U)
- MODE – DIRECT
- JOINT – failed one
- SINGLE/DIRECT DR – '+' and '-'
- MODE – not DIRECT

Joint drive properly?

YES

101
- RMS SEL – OFF
- RMS PWR – B/U (expect SM ALERT and BCE BYP MCIU)
- RMS SEL – PORT

(A8U)
- B/U JOINT – failed joint
- B/U DRIVE ‘+’ or ‘-’

Did joint drive properly?

NO

102 FALSE COMMUTATOR BITE

YES

103 DIRECT and B/U drive modes remain

104 COMUTATOR DISC FAILURE

Did joint drive properly?

NO

105 PRIMARY COMMUTATOR DATA FAILURE

106 • √MCC

Possible backdrive technique for free joint (PDRS SSR-3) or EVA reqd

108 B/U drive mode remains. DIRECT mode for five good joints

107

107

Reconfig to PRI PWR; if required
(A8L)
- RMS SEL – OFF
- RMS PWR – PRI (expect MA)

SM 94 PDRS CONTROL
- I/O ON – ITEM 5 EXEC (*)

(A8L)
- RMS SEL – PORT

(A8U)
- SAFING – CANCEL (tb-gray)

MCIU OVERRIDE: ABE OVRD B (ITEM 37) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain single mode for five good joints, but the MDA is inhibited on the failed joint, and is therefore, electrically free. Brakes will stop joint motion. Override may be used with caution on MCC GO

MCIU OVERRIDE: ABE OVRD B (ITEM 37) on SPEC 95, PDRS OVERRIDE, required to regain computer supported modes for the backdrive technique
Subsequent MDA Demand Voltage BITE possible while driving failed joint

109 Monitor SM 96 while cycling brakes

SM 96 PDRS FAULTS
(A8U)
- BRAKES – OFF
- BRAKES – ON

ABE BITE: MDA OVERCURRENT/MOTOR DRV FAULT '↓' when BRAKES – OFF?

YES

Joint drive test

(A8U)
- BRAKES – ON
- MODE – DIRECT
- JOINT – failed one
- SINGLE/DIRECT DR – ‘+’ and ‘-’
- MODE – not DIRECT

Joint drive properly?

NO

111 TRANSIENT FAILURE

NO

YES

112 MDA FAILURE

113 B/U drive mode remains. DIRECT mode for five good joints

114 Continue nominal ops

115 MDA FAILURE RESULTING IN REDUCED MOTOR TORQUE FOR FAILED JOINT

116 B/U drive mode remains. SINGLE and DIRECT drive modes with possible degraded joint response for failed joint
26 Additional announcements of TOTAL COMPENSATOR or BACKUP RELAY is good indication that driving failed joint in B/U will cause loss of B/U for all joints
For tach failure, rate data is unreliable.

For encoder failure, MCIU OVERRIDE: ABE OVRD A (ITEM 36) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain SINGLE mode (on MCC GO). Position hold is not functional for failed joint. Subsequent TACH failure will be annunciated by CONTR ERR or TOTAL COMPENSATOR and protected by autobrakes.

For encoder failure, joint data is unreliable. REACH LIMIT and SOFT STOP annunciations not available for failed joint.

MCIU OVERRIDE: ABE OVRD A (ITEM 36) on SPEC 95 PDRS OVERRIDE required to regain computer supported modes for backdrive technique.
1. Joint biases
Arm S/N 201
SY: -2.5
SP: +2.0
EP: +0.5
WP: -0.4
WY: -1.0
WR: +0.1
Arm S/N 301
SY: -0.9
SP: +2.4
EP: -0.0
WP: -1.0
WY: -1.9
WR: +0.3
Arm S/N 303
SY: -2.4
SP: +4.0
EP: +3.6
WP: +0.9
WY: +0.1
WR: +2.8
Arm S/N 202
SY: +0.6
SP: +1.3
EP: -0.6
WP: -0.8
WY: +0.9
WR: +2.6

2. If alarms become a nuisance, use vernier rates, SINGLE, or on MCC call inhibit POHS CNTL

3. EE tb(s) inaccurate. All display data bad

4. Full capability may be restored with RMS MCIU CHANGEOUT (IFM)
13 • If motion of failed joint could result in collision, √MCC

14 • If motion of failed joint could result in collision, √MCC
  • MODE – DIRECT
  • JOINT = failed one
  • SINGLE/DIRECT
  • DR = ‘+’ or ‘-’
  • (2 sec max)
  • MODE – not DIRECT

Joint move (visual)?

CAUTION
Arm may have up to 2 ft of uncommanded motion if not captured to constrained payload

15 JOINT
  PWR-ON RESET
  FAILURE. ALL DATA FOR FAILED JOINT IS BAD

16 • BRAKES – OFF
  Joint move (visual)?

17 • BRAKES – ON

18 DIRECT and B/U drive modes remain for good joints, and B/U drive mode only for failed joint. All EE modes remain

19 • MODE – SINGLE, ENTER (lt-on)
  • SINGLE/DIRECT
  • DR = ‘+’ and ‘-’
  Joint drive (visual)?

20 (A8U)
  • JOINT = failed one
  • BRAKES – OFF

C/W CONTR ERR lt back on?

21 JOINT SYNC
  FAILURE

22 Joint moving (visual)?

23 JOINT
  ENCODER
  FAILURE

24 DIRECT and B/U drive modes remain. If wrist joint failed, AUTO EE mode lost. MAN EE modes remain

25 (A8U)
  • BRAKES – ON
  • MODE – DIRECT
  • JOINT = failed one
  • SINGLE/DIRECT
  • DR = ‘+’ and ‘-’
  • MODE – not DIRECT

Joint drive properly (visual)?

26 SINGLE, DIRECT, B/U drive modes remain. Joint position data unreliable for failed joint

27 JOINT
  RUNAWAY DUE TO TACH OR MDA FAILURE

28 DIRECT and B/U drive modes remain
  • POS ENC CK
  • INH – ITEM 12 EXEC

29 JOINT RUNAWAY DUE TO MDA FAILURE

30 DIRECT and B/U drive modes remain for good joints, and B/U drive mode only for failed joint

31 YES

CAUTION
Taking BRAKES OFF may result in unannounced motion of failed joint. Be ready to apply BRAKES if motion occurs

5 REACH LIMITs and SOFT STOPs annunciation not available for failed joint

6 Position hold function will not work for failed joint


5. REACH LIMITs and SOFT STOPs annunciation not available for failed joint

6. Position hold function will not work for failed joint

7. MCC can determine if fwd/backdrive flag failure is cause of false alarm

8. Whiplash technique or EVA may be reqd to cradle arm
Further transients are possible; and if they continue, full capability can be restored with SM GPC REASSIGNMENT and/or RMS MCIU CHANGEOUT (IFM)

Further transients are possible; and if they continue, full capability can be restored with RMS MCIU CHANGEOUT (IFM)
3. Mode It may not illuminate.
4. Full capability may be restored with MCIU CHANGEOUT (IFM).
5. RSAD may be capable of displaying joint data.
6. Primary pwr may be restored following IFM. Panel edge lighting may not be available.
Computer supported modes available but subsequent commutator failure for same joint will not be annunciated or protected by autobrakes.
One failure away from uncommanded joint drive in DIRECT

Joint drive properly?

- YES
  - 8 TRANSIENT FAILURE

- NO
  - 9 SINGLE/DD SW, JOINT SW, MODE SW, K2 RELAY, DIRECT DRIVE CIRCUIT, OR DIRECT DRIVE BITE CIRCUIT FAILURE

Computer supported and B/U drive modes remain. DIRECT drive for five good joints

Joint drive test

- YES
  - 10 Continue nominal ops

- NO
  - 11 Computer supported and B/U drive modes remain. DIRECT drive for five good joints

Joint drive properly?

- YES
  - 12 Joint drive test
    - (A8U)
    - BRAKES – OFF
    - JOINT – any
    - MODE – SINGLE, ENTER
    - SINGLE (DIRECT) DR – ‘+’ and ‘-’
    - BRAKES – ON
    - Use SM 95 PDRS OVERRIDE to regain SINGLE drive mode

- NO
  - 13 SINGLE/DIRECT DR SW 10V CONTACT OR POLE FAILURE OR MODE SW 10V POLE FAILURE IF SINGLE LT – OFF. SINGLE DRIVE MODE UNAVAILABLE
    - Use SM 95 PDRS OVERRIDE to regain SINGLE drive mode

All drive modes available

4

7
(A8U)
• BRAKES – ON
• JOINT – Failed ONE
• MODE – DIRECT
• SINGLE (DIRECT) DR – ‘+’ and ‘-’
• MODE – not DIRECT

Joint drive properly?

8

9
SINGLE/DD SW, JOINT SW, MODE SW, K2 RELAY, DIRECT DRIVE CIRCUIT, OR DIRECT DRIVE BITE CIRCUIT FAILURE
12.1h C/W CHECK CRT LT – S96 PDRS CKCRT D

Data may be unreliable on D&C pnl. ABE data on SM 169 still good
2 Full capability may be restored with RMS MCIU CHANGEOUT (IFM). If problem is in D&C pnl, MCIU changeout will not restore capability
3 Possible PDRS SLIP msgs if driving in DIRECT (once per joint). Possible PDRS DERIG and PDRS RELEASE msgs when performing EE release

Nominal Config:
(A8L)
RMS PWR – PRI (CRT)
SM 94 I/O ON – ITEM 5 "

If:
D&C – MCIU transmission parity error, Testword miscompare, or address check fail

Selecting EE Auto may result in uncommanded EE ops

DIRECT and B/U drive modes remain. EE MAN and B/U RELEASE remain, but limping not available
1 For loss of microcomputer BITE, computer supported modes available but subsequent failure for same joint may not be annunciated or protected by autobrakes

2 Computer supported modes available but subsequent SPA failure for same joint may not be annunciated or protected by autobrakes. May receive spurious SPA or EEEEU annunciations

3 May receive CHECK CRT 'II and DIRECT DRIVE BITE 'CPU' when driving in Direct Mode. Cycle BRAKES sw to clear failure

4 Computer supported modes available but subsequent commutator failure for same joint may not be annunciated or protected by autobrakes

5 DIRECT and B/U drive modes remain

6 CORRUPT BITE AND BITE VERIFICATION DATA

7 DIRECT and B/U drive modes remain

8 Joint drive test

9 MDA CLOCK FAILURE

10 B/U drive mode remains. DIRECT mode for five good joints

11 COMMUTATOR BITE OR BITE VERIFICATION CIRCUIT FAILURE

12 DIRECT and B/U drive modes remain
Computer supported modes available but subsequent SPA failure for same joint may not be annunciated or protected by autobrakes. May receive spurious SPA or EEEU annunciations.

For MDA BITE circuit failure, computer supported modes available but subsequent MDA failure for same joint will not be annunciated or protected by autobrakes.

IF TOTAL COMPENSATOR and MDA DEMAND VOLTAGE occur together, BRAKE and A/D CONVERTER will annunciate due to multiple failure combination.

For loss of microcomputer BITE, computer supported modes available but subsequent failure for same joint will not be annunciated or protected by autobrakes.
1. Monitor SM 96 while cycling brakes.

- **SM 96 PDRS FAULTS**
  - (A8U)
    - BRAKES – OFF
    - BRAKES – ON

2. **CHECK CRT:** SPA BITE TEST ‘D/D’ clears when BRAKES – OFF?
   - NO
   - YES

3. **ABE BITE: TOTAL COMPENSATOR ↓?**
   - NO
   - YES

4. **MDA CLOCK FAILURE RESULTING IN CORRUPT REDUNDANT TACHOMETER DATA AND LOSS OF DIRECT DRIVE**

   - **B/U drive mode remains. DIRECT mode for five good joints**

5. **DIRECT and B/U drive modes remain**

6. **CORRUPT BITE AND BITE VERIFICATION DATA**

7. **DIRECT DRIVE BITE OR BITE VERIFICATION CIRCUIT FAILURE**

8. **MCIU OVERRIDE: ABE OVRD C (ITEM 38) on SPEC 95, PDRS OVERRIDE, can be used to remove autobrakes and regain computer supported modes (on MCC GO). Subsequent failures for same joint will be annunciated by CONTR ERR and protected by autobrakes.**

9. **Computer supported modes available but subsequent SPA failure for same joint may not be annunciated or protected by autobrakes. May receive spurious SPA or EEEU annunciations.**

10. **DIRECT DRIVE BITE failure, DIRECT mode available but for subsequent failure joint could drive in wrong direction or drive two joints simultaneously.**
Computer supported modes available but subsequent SPA failure for same joint may not be annunciated or protected by autobrakes. May receive spurious SPA or EEEU annunciations.

For PLL BITE Failure Subsequent tachometer failure for same joint will be annunciated by ABE lt and ABE BITE: POS ENCODER ↓ and protected by autobrakes.

For clear current sensor circuit failure, subsequent loss of 12.8 MHz clock will result in joint driving at last commanded rate. Not annunciated or protected by autobrakes.

Computer supported modes available, but subsequent clock failure may not be annunciated or protected by autobrakes.
12.1j  C/W CHECK CRT LT – S96 PDRS
CKCRT SY(SP, EP, WP, WY, WR)

1Joint biases
DDE (201)
SY -2.5
SP +2.0
EP +0.5
WP -0.4
WY -1.0
WR +0.1
FOP1 (301)
SY -0.9
SP +2.4
EP -0.0
WP -1.0
WY -1.9
WR +0.3
FOP3 (303)
SY -2.4
SP +4.0
EP +3.6
WP +0.9
WY +0.1
WR +2.8

2EE tb(s)
inaccurate. All
display data bad

3Full capability
may be restored with
RMS MCIU
CHANGEOUT (IFM)

4REACH LIMITs
and SOFT STOPs
annunciation not
available for failed
joint

Nominal Config:
(A8L)
RMS PWR – PRI
SEL – PORT

If CKCKT-POS SY
(SP, EP, WP, WY, WR) ↓'

12.1g
12.1e

1. (A8U)
• BRAKES – ON
• PARAM sel – JOINT ANGLE

2. (A8U) Failed
joint angle readout
equal to joint bias ?

3. SM 96 PDRS
FAULTS
• Identify failed joint

4. SM 94 PDRS
CONTROL
• POS ENC CK
INH, ENA – ITEM 12.11
EXEC

5. S96 PDRS CKCRT
FS ?

6. LOSS OF
EXTERNAL
FRAME SYNC AT
ABE

7. S96 PDRS CKCRT
FAIL ?

8. Joint move
(visual) ?

9. JOINT
PWR-ON RESET
FAILURE. ALL DATA FOR FAILED
JOINT IS BAD

10. DIRECT and
B/U drive modes
remain. MAN and
B/U RELEASE EE
modes remain

11. BRAKES – OFF
Joint move
(visual) ?

12. YES

13. NO

14. YES

CAUTION

Taking BRAKES OFF may result in unannounced
motion of failed joint. Be ready to apply BRAKES if
motion occurs

• MODE – DIRECT
• JOINT – failed one
• SINGLE (DIRECT) DR – ‘+’ or ‘-’ (2 sec
max)
• MODE – not DIRECT

Joint move
(visual) ?

• YES

• NO
4 REACH LIMITs and SOFT STOPs annunciation not available for failed joint

5 Position hold function will not work for failed joint

12.1j (Cont)

12
- If loaded and motion of failed joint could result in collision, vMCC

CAUTION
Arm may have up to two ft of uncommanded motion if not captured to constrained payload

13
- MODE – SINGLE, ENTER (lt-on)
- SINGLE (DIRECT) DR – ‘+’ or ‘-’

Joint drive (visual)?

14
- BRAKES – ON

15 JOINT SYNC FAILURE

16 JOINT ENCODER FAILURE

17 DIRECT and B/U drive modes remain. If wrist joint failed, EE MODE AUTO lost

18 SINGLE, DIRECT, and B/U drive modes remain. Joint position data unreliable

19 (A8U)
- JOINT – failed one
- BRAKES – OFF

C/W CONTR ERR lt?

20 Joint moving (visual)?

21 (A8U)
- BRAKES – ON

22 TACH DATA FAILURE

23 DIRECT and B/U drive modes remain

SM 94 PDRS CONTROL
- POS ENC CK INH – ITEM 12 EXEC

12.1e

YES

NO

YES

NO

12.1e

31
1 For digital SPA failure, external flags can fail in pairs: CAP/EXTEND OPEN/RIG DERIG/CLOSE

2 Other CHECK CRT failures will be annunciated with MA and SM msg

3 Ground can determine which EE Auto functions remain

4 Full EE AUTO capability may be regained with an MCIU CHANGEOUT (IFM)

Nominal Config:
(A8L)
RMS PWR – PRI
RMS SEL – PORT

If: EE CMDS out of tolerance, EEEU BITE, or EE FLAG mismatch

12.1g

12.3a

12.3b

12.1k  C/W CHECK CRT LT – S96 PDRS
CKCRT EE

CHECK CRT

(A8U)

RMS MSTR ALARM

'S96 PDRS CKCRT EE'

CHECK CRT:
EE FLAG ↓
EEEU ↓
EE CMDS ↓

1 Performing grapple of a constrained PL?

2 Performing release of a constrained PL?

3 Performing
release of a constrained PL?

4 SM 96 PDRS FAULTS

CHECK CRT:
EE FLAG ↓
EE CMDS ↓
EEEU ↓

5 EE MICROSW CKT FAILURE OR DIGITAL SPA EXTERNAL FLAG CKT FAILURE

6 EE MAN and B/U RELEASE modes remain. Use following maximum drive times for failed indications:
CAPTURE – 3 sec
RIGID – 25 sec
DERIGID – 5 sec
RELEASE – 3 sec
EXTEND – 20 sec

7 EE CMD OUTPUT FAILED IN MCIU

8 EE MAN and B/U RELEASE modes remain. EE AUTO may remain

9
PDRS 12.1k (Cont)

9 All EE tb – bp except DERIGID tb – gray ?
    NO

10 Pwr cycle EEEU (A8L)
    YES
    • RMS SEL – OFF
    • RMS SEL – PORT

11 TRANSIENT FAILURE

12 PL captured to EE ?
    NO
    YES
    CAUTION
    Further captures may not be possible

13 EEEU PWR SHUTDN
    NO

14 EE B/U RELEASE remains
    • Use LOADED RATE (ITEM 14) on SPEC 95, PDRS OVERRIDE to set or reset loaded rate limit flag to achieve correct rate limiting in computer supported modes

15 Further EE captures planned ?
    NO

16 MCC. May require payload reberthing

17 When ready for P/L release, release in EE MODE – MAN. If reqd, use B/U EE RELEASE

18 Capture (A8U)
    YES
    • EE MODE – MAN
    • EE CAPTURE sw – depress (3 sec)
    • C/W CHECK CRT lt – on, while holding sw and EE CLOSE tb – gray
    • C/W CHECK CRT lt – on, while holding sw and EE CLOSE tb – bp
    • C/W CHECK CRT lt – off, while holding sw and EE CLOSE tb – bp
    • C/W CHECK CRT lt – off, while holding sw and EE CLOSE tb – gray

19 EEEU BITE CKT FAILURE OR WR DIGITAL SPA EXTERNAL FLAG CKT FAILURE

20 All EE modes remain (A8U)
    • EE MODE – OFF

21 EE MTR COMMUTATOR FAILURE, EE NOT OPERATIONAL

22 EEEU CAPTURE FAILURE OR EE ELECTRICAL FAILURE, EE NOT OPERATIONAL

23 (A8U)
    • EE MODE – OFF

5 WR roll range value. Deselecting and reselecting RMS may cause WR roll range value to be incorrect

6 Additional alarms possible

7 Subsequent uncommanded release or derigidization will not be annunciated

8 EEEU BITE checks will be masked. Other CHECK CRT failures will be annunciated with MA and SM msg
8 EEEU BITE checks will be masked. Other CHECK CRT failures will be annunciated with MA and SM msg.

EE EXTEND tb – bp ?

24 RIGIDIZE
(A8U) • EE MAN CONTR – RIGID (2 sec)

EE EXTEND tb – gray ?

27 RELEASE
(RMS RHC) • EE RELEASE – depress (hold 3 sec)

28 EEEU BITE
CKT FAILURE

32 EEEU BITE
FAILURE OR EE ELECTRICAL
FAILURE

33 DERIGIDIZE
(A8U) • EE MAN CONTR – DERIGID (2 sec) • EE MODE – OFF

34 All EE modes remain

25 EEEU RIGID
FAILURE OR EE ELECTRICAL
FAILURE. EE NOT OPERATIONAL

29 (A8U) • EE MODE – OFF

30 MCC for GO to maneuver EE into position to view the snare cables for B/U release

31 DERIGIDIZE
(A8U) • EE MAN CONTR – DERIGID (2 sec) • EE MODE – OFF

35 AUTO/MAN CAPTURE remains; However, only one capture available since DERIGIDIZE lost. Tipoff rates possible when releasing from RIGID carriage position

26 (A8U) • EE MODE – OFF

27 (A8U) EE OPEN tb – gray ?

28 EEEU RELEASE
FAILURE OR EE ELECTRICAL
FAILURE

30 MCC for GO to maneuver EE into position to view the snare cables for B/U release
MCC may TMBU temp limits to prevent nuisance alarms

1. If Thermistor circuit reference voltage fail

Nominal Config:
(A8L) PORT RMS HTR A(B) – AUTO

2. TEMP CKT FAILED IN MCIU

3. (A8L) PORT RMS HTR A,B (two) – AUTO

4. Continue ops. Temp data may be incorrect
Full capability may be restored with RMS MCIU CHANGEOUT (IFM)

Single HC axis failure workaround capability exists via SM 95 PDRS OVERRIDE. Each time item 33 or 34 is toggled will result in MA and SM alert being reannunciated
MCC can attempt to correlate jet activity with ‘PDRS SLIP’ msg or may recommend a joint drive test to ascertain brake health.

**Nominal Config:**
- (A8U)
- RMS SEL – PORT
- BRAKES – ON
- BRAKES tb – ON
- MODE – not DIRECT

**If:**
- BRAKES – ON
  - and MODE – not DIRECT
  - and joint angle motion
  - > I LOADED VALUE

**12.1n C/W CHECK CRT LT – PDRS SLIP SY(SP, EP, WP, WY, WR, ALL)**

1. **RMS MSTR ALARM**
2. **CHECK CRT** (A8U)
3. **PDRS SLIP SY(SP, EP, WP, WY, WR, ALL)**

If:
- BRAKES – ON
  - and MODE – not DIRECT
  - and joint angle motion
  - > I LOADED VALUE

**12.1g**

1. DAP: FREE
2. BRAKES – OFF
3. RMS unloaded?
4. LOW BRAKE TORQUE

- **NO**
  - 5 BRAKE SLIPPAGE OR LOW BRAKE TORQUE
  - WARNING
    - Auto Brakes will not stop failed joint
    - (A8U)
      - BRAKES – ON
      - Remove BRAKES only if attitude control reqd

- **YES**
  - 4 LOW BRAKE TORQUE
  - WARNING
    - Auto Brakes will not stop failed joint

- **1**
  - MCC
  - YES
  - NO
### 12.1o C/W CHECK CRT LT – S94 PDRS WR R

**Nominal Config:**
- RMS PWR – PRI
- RMS SEL – PORT

**RMS MSTR ALARM**
**CHECK CRT**
**S94 PDRS WR R**

If WR range does not agree with encoder quadrant

1. **CAUTION**
   - If loaded, damage to RMS and/or PL could result if WR joint driven into hard stop.

2. **SM 94 PDRS CONTROL**
   - ITEM 26 + correct value (2-5) EXEC

3. **Continue normal ops**

4. **SM 94 PDRS CONTROL**
   - ITEM 26 +1 EXEC
   - Expect MA, REACH LIMIT lt and S/W STOP tb – bp

5. **SINGLE/DIRECT DR – ‘-’ until motion stops (hard stop)**
   - SM 94 PDRS CONTROL
   - ITEM 26 +1 EXEC

6. **SINGLE/DIRECT DR – ‘+’ to desired WR angle**
   - Continue ops

#### WR WRR
- -360 to -450 1
- -180 to -360 2
- 0 to -180 3
- 0 to 180 4
- 180 to 360 5
- 360 to 450 6

#### Expect CKCRT lt and 'S96 PDRS CKCRT WR'. Clear with SM 94 PDRS CONTROL ITEM 12, 11
12.1p  C/W CHECK CRT LT – PDRS TEST BRK (C/W, NMI, FS, LOSS)

If MCIU BITE
Verification test circuit failure

1 MCIU failure warning/Master Alarm may not be available for subsequent failures. Autobrakes remain

2 Subsequent MCIU failure warning may be accompanied by additional msgs

3 NMI may be lost for subsequent H/W Watchdog Timer failure. Autobrakes remain

4 Autobrakes may not be available for a subsequent loss of Internal Frame Sync

5 Next failure may result in a six-joint runaway at last commanded rates. Annunciated

6 Brakes operate nominally, but tb will remain OFF
7. Driving failed joint in B/U will blow +28V BDA fuse for all joints. EVA may be reqd to cradle arm

8. Full capability may be restored with RMS MCIU CHANGEOUT (IFM)

9. RMS limping will not exist during EE ops. Use EE MAN RELEASE for single joint ops

10. RMS temperature monitor mode not available

13. **BRAKES – OFF**

14. All digitals lost except temp data and EE tbs (six) – bp?

15. **BRAKES – ON**
   - **MODE – DIRECT**
   - SINGLE (DIRECT) DR – ‘+’ or ‘-‘ each joint in turn
   - All joints drive?

16. PORT PWR FLAG FAILED OFF IN MCIU

17. **BRAKE SHORT**

18. DIRECT and B/U drive modes remain. MAN and B/U RELEASE EE modes remain. RMS in TEMP MONITOR mode. Only temp data displayed

19. **BRAKE DRIVER OR AUTO BRAKES CIRCUIT FAILURE. BRAKES FAILED ON**

20. DIRECT and B/U drive modes remain

21. **MODE – not DIRECT**

22. **BRAKES – ON**

23. **MANUAL BRAKE DRIVE CIRCUIT FAILURE. AUTOBRAKES OK**

24. **Continue ops**

25. **CHECK CRT lt on?**

26. **A8L**
   - **RMS SEL – OFF**
   - ABE lt and various other failure indications?

27. **AUTO BRAKES DRIVE CIRCUIT OR BITE VERIFICATION CIRCUIT FAILURE**

28. **Continue ops in DIRECT mode or √MCC**

29. STBD PWR FLAG FAILED ON IN MCIU

30. **RMS SEL – PORT (MA & SM ALERT)**
   - Continue ops
Full capability will be restored with RMS MCIU CHANGEOUT (IFM)

Auto brakes available for subsequent loss of External Frame Sync due to SPA detected loss of Frame Sync

1. If: MCIU External Frame Sync BITE or BITE Verification Test Circuit failure

1. (A8U)
2. BRAKES – OFF
3. BRAKES tb – OFF?

YES

2. BRAKES – ON

3. EXTERNAL FRAME SYNC BITE CIRCUIT FAILURE

4. EXTERNAL FRAME SYNC BITE VERIFICATION TEST CIRCUIT FAILURE

5. BRAKES – ON
6. Direct and B/U drive modes remain
7. Continue ops

8. NO

CHECK CRT lt

12.1g
12.1r C/W RELEASE LT – PDRS REL

1. Subsequent uncommanded release will not be annunciated.
2. RMS loaded rates can be set via SM 95 PDRS OVERRIDE.
3. For digital SPA failure, EXTEND flag may be failed OFF causing EE motor to continue to drive until EE MODE – OFF during AUTO RELEASE.
4. Rigidize brake is sufficient to hold EE drive train.

If: Uncommanded release warning.

1. 
   - BRAKES – ON
   - EE MODE – OFF

2. 
   - EE MODE – MAN
   - EE MAN CONTR – RIGID, until RIGID tb – gray (25 sec max)
   - EE CAPTURE sw – depress, until EE MODE – OFF
   - Perform PULL TEST.

3. 
   - EE MODE – MAN
   - EE RELEASE sw – depress, until EE CAPTURE sw – depress, until close tb – gray (3 sec max)
   - EE MODE – OFF
   - CLOSE tb – gray?

4. 
   - CAPTURE MSW CKT FAILURE OR DIGITAL SPA EXTERNAL FLAG CKT FAILURE.

5. 
   - EE MAN mode remains. EE AUTO release remains.

6. 
   - MECHANICAL FAILURE. EE NOT OPERATIONAL.

7. 
   - EE MODE – MAN
   - EE MAN CONTR – RIGID, until RIGID tb – gray or CLOSE tb – bp (25 sec max)
   - EE MODE – OFF
   - CLOSE tb – gray?

8. 
   - CAPTURE tb – gray?

9. 
   - EE MODE – MAN
   - EE CAPTURE sw – depress, until close tb – gray (3 sec max)
   - EE MAN CONTR – RIGID, until RIGID tb – gray or CLOSE tb – bp (25 sec max)
   - EE MODE – OFF

10. 
    - DEGRADED CAPTURE BRAKE.

11. When derigiding, uncommanded release alarm possible.

12. 
    - CAPTURE BRAKE FAILURE. EE NOT OPERATIONAL.
12.1s C/W RELEASE LT – PDRS REL (CUE CARD EXECUTED)

If: Uncommanded release warning

1. BRAKES – ON
   • EE MODE – OFF
   Was payload released?
   YES
   NO

2. MECHANICAL FAILURE OR DEGRADED CAPTURE BRAKE

3. EE not operational

4. CAPTURE MSW CKT FAILURE OR DIGITAL SPA EXTERNAL FLAG CKT FAILURE

5. MCC for possible EE checkout

6. EE MAN mode remains. EE AUTO release remains

1. Subsequent uncommanded release will not be annunciated
2. For subsequent capture, RMS loaded rates can be set via SM 95 PDRS OVERRIDE
3. For digital SPA failure, EXTEND flag may be failed off causing EE motor to continue to drive until EE MODE – OFF during AUTO RELEASE
1 Loss of Rigidize brake will cause motion of the snare drive mechanism

2 RIGID CMD will reset C/W DERIGIDIZE check and extinguish light

3 Ground can verify that stall current occurs at the expected time

4 Further uncommanded derigidizations will not be annunciated

5 RMS loaded rates can be set via SM 95 PDRS OVERRIDE after next payload capture

6 Microsw ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

Nominal Config:
PL is 6 DOF constrained

If Uncommanded derigidize warning

PDRS 12.1t C/W DERIGIDIZE LT – PDRS DERIG

12.1b

1. EE MODE – OFF

2. SM 169 PDRS STATUS
   EE CLOSE – 1 and EE DERIG – 0?
   NO
   YES

3. RIGIDIZE BRAKE OR DRIVE TRAIN FAILURE. EE NOT OPERATIONAL

4. Manual Derigidization
   (A8U)
   • EE MODE – MAN
   • EE MAN CONTR – DERIGID, until DERIGID tb – gray (5 sec max)
   • EE MODE – OFF
   DERIGID – 1?
   NO
   YES

5. RIGIDIZE DRIVE FAILED MECHANICALLY FREE. EE NOT OPERATIONAL

6. Manual Rigidization
   (A8U)
   • EE MODE – MAN
   • EE MAN CONTR – RIGID, until RIGID tb – gray (6 sec max)
   • EE MODE – OFF
   RIGID – 1?
   NO
   YES

7. EE RIGID MICROSW CKT FAILURE. FALSE C/W DERIGIDIZE ALARM

8. EE MAN mode remains. AUTO RELEASE remains for Microsw failure. AUTO CAPTURE remains but mtr will drive until EE MODE – OFF

9. EE/GF I/F
   (RMS RHC)
   • RATE – VERN
   (A8U)
   • BRAKES – OFF (tb-OFF)
   • MODE – END EFF, ENTER
   • Try to back EE off of GF
   • BRAKES – ON
   EE/GF interface separates or EE DERIG – 1?
   NO
   YES

10. RIGIDIZE DRIVE FAILED MECHANICALLY FREE. EE NOT OPERATIONAL

11. RIGIDIZE MICROSW RIGGING OR ORIG CARRIAGE POS AT EDGE OF MICROSW LIMIT

12. Continue Ops

13. Continue Ops
12.1u C/W DERIGIDIZE LT – PDRS DERIG
(CUE CARD EXECUTED)

1. Additional DERIGID alarms possible
2. Further uncommanded derigidizations will not be annunciated
3. RMS loaded rates can be set via SM 95 PDRS OVERRIDE after next payload capture
4. MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG Timing of each phase is critical to prevent motor burnout. EE Mode sw to OFF after spec time

9. (RMS RHC)
   - RATE – VERN
   - DAP: FREE, until PL released

If Uncommanded derigidize warning

10. EE MODE – MAN
    - EE MAN CONTR – RIGID (6 sec max)
    - EE MODE – OFF

11. EE MAN mode remains. AUTO RELEASE remains for MSW failure. AUTO CAPTURE remains but mtr will drive until EE MODE – OFF

12. EE RIGID MICROSW CKT FAILURE. FALSE C/W DERIGIDIZE ALARM

13. EE MAN mode remains.
12.1v C/W PORT TEMP LT – PDRS TEMP PORT

1. (A8U)
   - BRAKES – ON
   - PARAM SEL – PORT TEMP
   - JOINT – CRIT TEMP

   TEMP ≤ LOW temp alarm limits
   TEMP > HIGH temp alarm limits

   If Temp exceeds alarm limits

   Other

2. Other joint temps
   Any other joint temps within 10 degF of crit temp?

3. HOT THERMAL ENVIRONMENT

4. TRANSIENT FAILURE

5. Both Htrs A and B AUTO?

6. (A8L)
   - PORT HTR A – OFF

7. Joint temps are within limits.
   Continue ops. Further alarms possible

8. Select alternate htr
   (A8L)
   - PORT HTR A(B) – OFF
   - PORT HTR B(A) – AUTO

9. (A8U)
   - JOINT – CRIT TEMP
   Does joint temp decr after 5 min?

10. Loaded arm?

11. □
   - MCC.
   - Reposition of orbiter/arm to cooler attitude may be req’d

12. (A8L)
   - PORT HTR A – AUTO
   - PORT HTR B – OFF

13. Cradle arm ASAP
   - Go to RMS POWERDN (PDRS OPS)

14. YES

15. NO

16. YES

17. NO

18. YES

19. NO

20. YES

21. NO

22. YES

23. NO

24. YES

25. NO

26. YES

27. NO

28. YES

29. NO

30. YES

31. NO

32. YES

33. NO

34. YES

35. NO

36. YES

37. NO

38. YES

39. NO

40. YES

41. NO

42. YES

43. NO

44. YES

45. NO

46. YES

47. NO

48. YES

49. NO

50. YES

51. NO

52. YES

53. NO

54. YES

55. NO

56. YES

57. NO

58. YES

59. NO

60. YES

61. NO

62. YES

63. NO

64. YES

65. NO

66. YES

67. NO

68. YES

69. NO

70. YES

71. NO

72. YES

73. NO

74. YES

75. NO

76. YES

77. NO

78. YES

79. NO

80. YES

81. NO

82. YES

83. NO

84. YES

85. NO

86. YES

87. NO

88. YES

89. NO

90. YES

91. NO

92. YES

93. NO

94. YES

95. NO

96. YES

97. NO

98. YES

99. NO
**HIGH temp alarm limits:**
- LED = 172
- ABE (SPA) = 106
- ABE (EE) = 144

**LOW temp alarm limits:**
- LED = 0
- ABE (ALL) = 0

1. SP ABE and SY ABE represent single temp reading. WP ABE and WY ABE represent single temp reading

4. MCC may TMBU temp limits to prevent nuisance alarms

6. Arm qual temp high limits:
- LED = 202
- ABE (SPA) = 136
- ABE (EE) = 176

Arm qual temp low limits:
- LED = -10
- ABE = -10

---

**Other joint temps**

Any other joint temps < 15?

14

- NO

17 Both htrs A and B AUTO?

15 HTR SW FAILED OPEN AND COLD THERMAL ENVIRONMENT

16 Select both htrs
- PORT HTR A,B (two) – AUTO

Discontinue ops until (A8U)
- TEMP > LOW temp alarm limit for all joints

18 Select alternate htrs
- PORT HTR A(B) – OFF
- PORT HTR B(A) – AUTO

**HTR FAILED OFF AND COLD THERMAL ENVIRONMENT**

19 Does crit temp incr after 5 min?

20 Discontinue ops until:
- (A8U)
  - TEMP > LOW temp alarm limit for crit temp

21 Does crit temp decr after 5 min?

22 HTR FAILED ON

23 Discontinue ops until:
- (A8U)
  - TEMP < HIGH temp alarm limit for crit temp

24 Joint drive test will be reqd if qual limits exceeded. If qual limits exceeded, \MCC

25 THERMISTOR FAILURE

26 Continue ops
PDRS TEMP STBD

RMS MSTR ALARM

STBD TEMP

(A8U)

Nominal Config:
(A8L)
STBD RMS HTR A(B) – AUTO
or
STBD RMS HTR A,B (two) – AUTO

If:
Temp exceeds alarm limits while OBSS berthed in Starboard MPMs

12.1w C/W STBD TEMP LT - PDRS TEMP STBD

1 HIGH/LOW temp alarm limits (deg F):
LDRI: 156/39
ITVC: 138/8
PTU: 138/-10
LCS: 119/15
LDRI & LCS Avionics: 128/-10

2 Joint selection corresponds to temps (joint ID) as follows:
SY: LDRI (201)
SP: ITVC (202)
EP: PTU (203)
WP: LCS (204)
WR Ind 1: LDRI Avionics (206)
WR Ind 2: LCS Avionics (206)

3 MCC may TMBU temp limits to prevent nuisance alarms

1. If:
Temp exceeds alarm limits while OBSS berthed in Starboard MPMs

If:
Temp exceeds alarm limits while OBSS berthed in Starboard MPMs

2. Other temps

Any other temps within 10 degF of crit temp?

3. HOT THERMAL ENVIRONMENT

4. MCC.
Reposition of orbiter to cooler attitude may be reqd

5. TRANSIENT FAILURE

6. Temps are within limits. Further alarms possible

7. Both Htrs A and B AUTO?

8. STBD RMS HTR A – OFF

9. Select alternate htr

10. DO TEMP

11. Does crit temp decr after 5 min?

12. THERMISTOR FAILURE

13. HTR FAILED ON

14. Continue Ops

15. Do not perform OBSS ops until:
(A8U) TEMP < HIGH temp alarm limit for crit temp

16. OTHER TEMPS

Joint selection corresponds to temps (joint ID) as follows:
SY: LDRI (201)
SP: ITVC (202)
EP: PTU (203)
WP: LCS (204)
WR Ind 1: LDRI Avionics (206)
WR Ind 2: LCS Avionics (206)

MCC may TMBU temp limits to prevent nuisance alarms
HIGH/LOW temp alarm limits (deg F):
LDRI: 156/39
ITVC: 138/8
PTU: 138/-10
LCS: 119/15
LDRI & LCS Avionics: 128/-10

Joint selection corresponds to temps (joint ID) as follows:
SY: LDRI (201)
SP: ITVC (202)
EP: PTU (203)
WP: LCS (204)
WR Ind 1: LDRI Avionics (206)
WR Ind 2: LCS Avionics (206)
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12.2a MSTR ALARM ON, BUT C/W LT(S) OFF

1. (ABU)
   - BRAKES – ON
   - MSTR ALARM pb – off
   - MSTR ALARM lt and tone – off?

2. MSTR ALARM FAILED ON

3. Continue without any further MSTR ALARM cues
   - C/W TONE VOL – full ccw

4. (ABU)
   - PARAM sel – TEST (30 sec max)
   - All RMS C/W lts – on?

5. Only one C/W lt off?
   - YES
   - GO TO 9
   - NO
   - NO
   - GO TO 6

6. C/W ANNUN LT FAILURE

7. Select alternate lighting function
   - (ABU)
   - LTS ANNUN/NUM – BRT (VAR)
   - PARAM sel – TEST (30 sec max)
   - All RMS C/W lts – on?

8. GO TO 8

9. LIGHTING CKT OR AC PWR PNL FAILURE

10. BRT/VAR SW CKT FAILURE

11. FAULT
    - GO TO 11

12. FAULT
    - PDRS TEST BRK?

13. Any other RMS faults?
    - YES
    - GO TO 16
    - NO
    - NO
    - GO TO 12.1p

14. MSTR ALARM FAILED

15. MSTR ALARM no longer reliable
   - Continue without MSTR ALARM cues

16. C/W ANNUN CKT FAILURE

17. Go to appropriate MAL for msg

Nominal Config:
- (MA73C-F)
- cb AC1 RMS PRIMARY A – cl

C/W lt associated with fault msg will not illuminate
12.2b BRAKES – ON, BUT BRAKES tb – OFF

1. (A8L)
   • BRAKES – ON
   • MODE – SINGLE, ENTER
   SINGLE II – on?
   NO
   YES

2. BRAKES tb
   CKT FAILURE; BRAKES OK

3. Continue without BRAKES tb

4. BRAKES SW
   FAILURE. LOSS
   OF BRAKES AND
   DIRECT MODE.
   AUTO BRAKES
   FOR RUNAWAYS
   OK

5. To apply
   Brakes:
   SM 94 PDRS
   CONTROL
   • AUTO BRAKE
   CK – ITEM 27
   EXEC (*)
   • □ BRAKES tb –
     ON

   To remove Brakes:
   SM 94 PDRS
   CONTROL
   • I/O OFF –
     ITEM 6 EXEC (*)
   • I/O ON –
     ITEM 5 EXEC (*)
   • SAFING –
     CANCEL
     (tb-gray)
   • □ BRAKES tb –
     OFF

6. All computer
   supported modes
   and B/U available

---

Nominal Config:
(A8L)
RMS PWR – PRI
SEL – PORT

(A8U)
BRAKES – ON
SM 94 I/O ON
ITEM 5 (*)

---

1. RMS IFM D&C
   Kit available to
   regain DIRECT
   mode. Refer to
   RMS
   CONTINGENCY
   OPERATION
   (INSTALLATION
   AND REMOVAL OF
   RMS IFM D&C KIT)
   (IFM), AND PDRS
   SSR-4, RMS IFM
   D&C KIT

2. If there was a
   “GOOD” next to
   ITEM 25 prior to
   cycling I/O, the
   “GOOD” indication
   will remain, but it is a
   false indication. A
   new ITEM 25 EXEC
   will be required after
   cycling I/O
For RMS pwr sw failure, all ABE data lost. For all other failures, only arm temp data remains.

Ground can determine if RMS pwr sw is failed.

RMS IFM D&C KIT available to regain DIRECT mode and EE – MAN modes for ABE PWR FLAG fuse, but ABE data will be unavailable. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT.

For RMS pwr or RMS select sw, Contingency Powerup IFM is available to regain primary drive modes and end effector capability. Refer to CONTINGENCY POWERUP (IFM).

RMS limping will not exist during EE ops. Use EE MAN release for single joint ops.
1 SM 95 ITEM 35 SAFING CAN override is a toggle. If left in place it will override a D&C panel safing command

2 MCIU SAFING circuit still operational

Nominal Config:
(A8L)
RMS PWR – PRI
RMS SEL – PORT

SAFING – AUTO and SAFING tb – bp

All RMS C/W lts – Off

MASTER ALARM – Off

No CRT SM Msgs

No SM ALERT

SAFING CAN override is a toggle. If left in place it will override a D&C panel safing command

SAFING tb – gray while holding sw?

2 SAFING SW 28V CONTACT FAILED OPEN

3 Continue without SAFING tb

4 (A8U)
   • BRAKES – OFF
   BRAKES tb – OFF?

12.2c 3

5 (A8U)
   • MODE – SINGLE, ENTER
   SINGLE lt – on?

6
   • If captured to constrained payload or if captured payload near structure, √MCC

7 (A8U)
   • BRAKES – ON
   • MODE – DIRECT
   • SINGLE/DIRECT DR – ‘+’ or ‘-’
   • MODE – not DIRECT
   Does joint drive properly?

8 SM 95 PDRS OVERRIDE
   • SAFING CAN – ITEM 35 EXEC
   SAFING tb – gray?

9 SAFING SW FAILED TO SAFE

10 SAFING SW 10V POLE FAILED

11 (A8U)
   • BRAKES – ON
   Continue without SAFING tb and with override in place

12 • Continue ops with override in place

13 YES

16 NO
For K1 relay failure, EE MODE – MAN may be restored with RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT.
5 DIRECT mode can be regained with RMS IFM D&C KIT

6 For MODE sw pole failure, use SPEC 95 for computer supported modes

7 For BRAKES sw failure, auto brakes can be removed via SM 94 PDRS CONTROL, ITEM 6, ITEM 5, and SAFING – CANCEL

17 BROKEN MODE SW SHAFT

18 Use SM 95 PDRS OVERRIDE to regain lost computer supported modes

19 BRAKES – OFF SM 94 PDRS CONTROL
   • AUTO BRAKE CK – ITEM 27 EXEC (*)
   • BRAKES – ON
     • OFF
   AUTO BRAKE CK – ITEM 27 “*” ?

20 MODE SWITCH 10V CONTACT OR POLE, OR DIRECT MODE LIGHT DRIVER FAILED
   NO
   YES

21 BRAKES SWITCH 10V POLE FAILURE

22 Continue w/o DIRECT It
12.2h  SHLDR BRACE REL tb – bp AFTER CMD

Nominal Config:
(MA73C:F)
cb AC1 RMS
PRI ΦA – cl
(A8L)
RMS PWR – PRI
SEL – PORT
SM 94 PDRS
CONTROL
I/O ON – ITEM 5(*)

1
• PARAM sel – TEST
All A8 lts on ?

2
• Perform RMS POWERUP, steps 1-6 (PDRS OPS)

3
ORBITER
AC1 ΦA OR RMS
POWER SW CONTACT
FAILURE. SHLDR
BRACE WILL NOT
RELEASE

4
SHLDR BRACE REL tb
OR MICROSW
FAILURE

5
ACTUATOR
FAILURE OR
SHLDR BRACE
REL SW FAILED
TO OFF. SHLDR
BRACE WILL NOT
RELEASE

6
• Continue normal ops

7
• iMCC

8

1. RMS IFM D&C KIT available to recover loss of AC1 ΦA for SHLDR brace release sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM) and PDRS SSR-4, RMS IFM D&C KIT

2. If actuator failure, EVA possible to release shldr brace. If SW failure, RMS IFM D&C kit available to regain shldr brace
12.3a EE FAILS TO GRAPPLE CONstrained PL in EE MODE – AUTO

If EE Failed to Capture and/or Rigidize in AUTO

Nominal Config: DAP: VERN(FREE)

1. SM 169 PDRS STATUS
   END EFFECTOR CLOSE 1 ?
   NO

2. Manual capture
   (ABU)
   • BRAKES – OFF
   • MODE – END EFF, ENTER
   • EE MODE – MAN
   • EE CAPTURE sw – depress (until CLOSE tb-gray, 3 sec max)
   • EE MODE – OFF
   • BRAKES – ON

3. Manual rigidize
   While observing EE/GF interface
   (ABU)
   • BRAKES – OFF
   • MODE – END EFF, ENTER
   • EE MODE – MAN
   • EE MAN CONTR – RIGID until RIGID tb-gray (25 sec max, 5 sec if DERIG tb-bp)
   • EE MODE – OFF
   • BRAKES – ON

4. EE MODE SW CAP/REL POLE OPEN, EEEU, EE CAP/REL SW, K2 RELAY, OR MOTOR/DRIVETRAIN FAILURE. EE CAPTURE LOST. DIRECT DRIVE MAY BE LOST FOR K2 RELAY FAILURE

5. Manual rigidize
   (ABU)
   • BRAKES – OFF
   • MODE – END EFF, ENTER
   • EE MODE – MAN
   • EE MAN CONTR – RIGID until RIGID tb-gray (25 sec max)
   • EE MODE – OFF
   • BRAKES – ON

6. Backaway
   (ABU)
   • BRAKES – OFF
   • MODE – END EFF, ENTER
   • Maneuver RMS away from payload
   • BRAKES – ON

7. CLOSE MSW Ckt. EE MODE SW AUTO CAP/REL CONTACT OPEN, EE MODE SW 10V POLE CONTACT OPEN, EE CAP/REL SW 10V CONTACT POLE OPEN, OR MCIU AUTO LOGIC FAILURE

8. MCIU for possible IFM. Direct Drive test can isolate if failure is K2 relay

9. Msw verification
   SM 169 PDRS STATUS
   END EFFECTOR CAPTURE 0 and rigid command pulls arm onto grapple plate ?

10. EE MAN mode remains. Auto release may remain

11. CAPTURE MSW Ckt. FAILURE. LOSS OF AUTO RIGIDIZE

12. Set LRLF
   SM 95 PDRS OVERRIDE
   • LOADED RATE ITEM 14 – EXEC (*)

13. SNARE FAILURE. EE NOT OPERATIONAL

14. END EFFECTOR CAPTURE 0 ?

15. END EFFECTOR CAPTURE 1 ?

16. 1 RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE Mode sw, EE Cap/Rel sw, EE MAN Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT)(IFM), and PDRS SSR-4, RMS IFM D&C KIT

17. Gnd can detect EE Cap/Rel sw and sw may feel loose

18. Limping will not occur in EE Manual for EE MODE sw 10V contact/pole or EE Cap/Rel 10V contact/pole (snare close)

19. MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S96 PDRS CKCRT EE' and a down arrow by EE CMDS

20. Gnd can detect EE MODE sw 10V pole and EE Cap/Rel sw failures

21. For EE Cap/Rel 10V pole failure, manual PL release will be accompanied by Uncommanded Release Warning

22. MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs:
   CAP/EXTEND OPEN/RIG CLOSE/DERIG
   Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time
1 RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE Mode sw, EE Cap/Rel sw, EE MAN Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT)(IFM), and PDRS SSR-4, RMS IFM D&C KIT

4 MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S96 PDRS CKCRT EE' and a down arrow by EE CMDS

7 MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs:
CAP/EXTEND OPEN/RIG CLOSE/DERIG Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

8 SAFING tb – bp is a good indication that K1 relay is failed
12.3b EE FAILS TO RELEASE/DERIGIDIZE
CONSTRAINED PL IN EE MODE – AUTO

Nominal Config:
DAP: VERN(FREE)

If EE Failed to Release and/or Derigidize in AUTO

PDRS

1 Msw Status

1 MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S96 PDRS CKCRT EE' and a down arrow by EE CMDS

RMS IFM D&C Kit available to recover loss of K1 or K2 relay, EE Mode sw, EE Cap/Rel sw, EE Man Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT)(IFM), and PDRS SSR-4, RMS IFM D&C KIT

MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG

Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

10 Payload Status

Is payload to be recaptured?

11 Manual Rigidize

(A8U)
- EE MODE – MAN
- EE MAN CONTR – RIGID until RIGID tb – gray (5 sec max)
- EE MODE – OFF

12 Manual release

(A8U)
- EE MODE – MAN
- EE RELEASE sw – depress (until OPEN tb-gray, 3 sec max)
- EE MODE – OFF

2 Manual release

1 EE MODE SW CAP/REL POLE OPEN, EEEEU, K2 RELAY, OR SNARE DRIVETRAIN FAILURE. EE AUTO AND MAN RELEASE LOST. DIRECT DRIVE MAY BE LOST FOR K2 FAILURE. B/U RELEASE WILL BE LOST FOR SNARE DRIVETRAIN FAILURE

7 Loss of AUTO Extend. Future snare open should be terminated after 3 sec to prevent motor burnout

6 OPEN MSW Ckt FAILURE

5 EE AUTO cap/rel lost. EE MAN modes remain

2 END EFFECTOR OPEN 0 ?

4 Msw Verification

3 EE MODE SW AUTO CAP/REL CONTACT OPEN, OR MCIU AUTO LOGIC FAILURE

2 END EFFECTOR DERIGID 0 ?

2 END EFFECTOR OPEN 0 ?

2 END EFFECTOR EXTEND 0 ?

1 Msw Status

SM 169 PDRS STATUS

Which condition exists?

END EFFECTOR DERIGID 0 ?

END EFFECTOR OPEN 0 ?

END EFFECTOR EXTEND 0 ?

SM 169 PDRS STATUS

END EFFECTOR OPEN 1 ?

END EFFECTOR CAPTURE 0 ? and END EFFECTOR CLOSE 0 ?

EE MODE – OFF

EE MODE – MAN

EE RELEASE sw – depress (until OPEN tb-gray, 3 sec max)

EE MODE – OFF

SM 169 PDRS STATUS

Loss of AUTO Extend. Future snare open should be terminated after 3 sec to prevent motor burnout

EE MODE – OFF

EE MAN CONTR – RIGID until EXTEND tb – gray (20 sec max)

EE MODE – OFF

EE MODE – MAN

EE MAN CONTR – RIGID until RIGID tb – gray (5 sec max)

EE MODE – OFF

Manual extend

(A8U)
- BRACKES – OFF
- MODE – END EFF
- Maneuver RMS away from payload
- BRACKES – ON
- EE MODE – MAN
- EE MAN CONTR – DERIGID until EXTEND tb – gray (20 sec max)
- EE MODE – OFF

11 Manual Rigidize

12 Manual release

1 EE MODE SW CAP/REL POLE OPEN, EEEEU, K2 RELAY, OR SNARE DRIVETRAIN FAILURE. EE AUTO AND MAN RELEASE LOST. DIRECT DRIVE MAY BE LOST FOR K2 FAILURE. B/U RELEASE WILL BE LOST FOR SNARE DRIVETRAIN FAILURE

5 EE AUTO cap/rel lost. EE MAN modes remain

2 END EFFECTOR OPEN 0 ?

4 Msw Verification

3 EE MODE SW AUTO CAP/REL CONTACT OPEN, OR MCIU AUTO LOGIC FAILURE

2 END EFFECTOR DERIGID 0 ?

2 END EFFECTOR OPEN 0 ?

2 END EFFECTOR EXTEND 0 ?

1 Msw Status

SM 169 PDRS STATUS

Which condition exists?

END EFFECTOR DERIGID 0 ?

END EFFECTOR OPEN 0 ?

END EFFECTOR EXTEND 0 ?

SM 169 PDRS STATUS

END EFFECTOR OPEN 1 ?

END EFFECTOR CAPTURE 0 ? and END EFFECTOR CLOSE 0 ?

EE MODE – OFF

EE MODE – MAN

EE RELEASE sw – depress (until OPEN tb-gray, 3 sec max)

EE MODE – OFF

SM 169 PDRS STATUS

Loss of AUTO Extend. Future snare open should be terminated after 3 sec to prevent motor burnout

EE MODE – OFF

EE MAN CONTR – RIGID until EXTEND tb – gray (20 sec max)

EE MODE – OFF

Manual extend

(A8U)
- BRACKES – OFF
- MODE – END EFF
- Maneuver RMS away from payload
- BRACKES – ON
- EE MODE – MAN
- EE MAN CONTR – DERIGID until EXTEND tb – gray (20 sec max)
- EE MODE – OFF

Manual Rigidize

(A8U)
- EE MODE – MAN
- EE MAN CONTR – RIGID until RIGID tb – gray (5 sec max)
- EE MODE – OFF

Manual Rigidize

(A8U)
- EE MODE – MAN
- EE MAN CONTR – RIGID until RIGID tb – gray (5 sec max)
- EE MODE – OFF

Manual Rigidize

(A8U)
- EE MODE – MAN
- EE MAN CONTR – RIGID until RIGID tb – gray (5 sec max)
- EE MODE – OFF
# PDRS 12.3b (Cont)

1. **Manual Derigid**
   - EE MODE – MAN
   - EE MAN CONTR – DERIGID until DERIGID tb – gray (5 sec max)
   - EE MODE – OFF

## SM 169 PDRS STATUS

### END EFFECTOR DERIGID 1 ?

<table>
<thead>
<tr>
<th><strong>YES</strong></th>
<th><strong>NO</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>13</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>

#### **13** Manual Release

(8U)
- EE MODE – MAN
- EE RELEASE sw – depress (until OPEN tb-gray, 3 sec max)
- EE MODE – OFF

#### **19**

<table>
<thead>
<tr>
<th><strong>YES</strong></th>
<th><strong>NO</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>18</strong></td>
<td><strong>36</strong></td>
</tr>
</tbody>
</table>

#### **18** Manual Rigidize

(8U)
- EE MODE – MAN
- EE MAN CONTR – RIGID until RIGID tb – gray (5 sec max)
- EE MODE – OFF

### SM 169 PDRS STATUS

#### END EFFECTOR OPEN 1 ?

<table>
<thead>
<tr>
<th><strong>YES</strong></th>
<th><strong>NO</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>14</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>

#### **14** EE MODE SW AUTO RIG/DERIG CONTACT OPEN, EE MODE SW 10V POLE OR CONTACT OPEN, EE CAP/REL SW 10V REL CONTACT OR POLE OPEN, OR MCIU AUTO LOGIC FAILURE

#### **2**

<table>
<thead>
<tr>
<th><strong>YES</strong></th>
<th><strong>NO</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>15</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

#### **15** EE CAP/REL SW TOTAL FAILURE OR HANGUP. EE AUTO/MAN RELEASE LOST. EE CAPTURE MAY REMAIN. B/U RELEASE REMAINS

#### **17** Payload Status

<table>
<thead>
<tr>
<th><strong>YES</strong></th>
<th><strong>NO</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>16</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>

#### **16** EE MAN mode remains. Auto capture may remain

#### **19**

<table>
<thead>
<tr>
<th><strong>YES</strong></th>
<th><strong>NO</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>12</strong></td>
<td><strong>1</strong></td>
</tr>
</tbody>
</table>

#### **12** Manual Derigid

- EE MODE – MAN
- EE MAN CONTR – DERIGID until DERIGID tb – gray (5 sec max)
- EE MODE – OFF

---

1. MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S'96 PDRS CKCRT EE' and a down arrow by EE CMDS
2. RMS IFM D&C KIT available to recover loss of K1 or K2 relay, EE Mode sw, EE Cap/Rel sw, EE Man Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT
3. For EE Cap/Rel 10V pole failure, manual PL release is accompanied by Uncommanded Release Warning
4. Gnd can detect EE MODE sw 10V pole and EE Cap/Rel sw 10V failures
5. Limping will not occur in EE Manual for EE MODE sw 10V pole/contact failure, or during EE Manual capture for EE Cap/Rel sw pole
RMS IFM D&C KIT available to recover loss of K1 or K2 relay, EE Mode sw, EE Cap/Rel sw, EE Man Contr sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT)(IFM), and PDRS SSR-4, RMS IFM D&C KIT

Gnd can detect EE MODE sw 10V pole and EE Cap/Rel sw 10V failures

SAFING tb – bp is a good indication that K1 relay is failed
1. MCIU changeout available for MCIU auto logic failure and failure will be accompanied by 'S96 PDRS CK CRT EE' and a down arrow by EE CMDS
2. MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG
3. Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time
4. Gnd can detect EE MODE sw 10V pole and EE Cap/Rel sw 10V failures

 Manual extend

EE MODE – MAN
EE MAN CONTR – DERIGID until EXTEND tb – gray (20 sec max)
EE MODE – OFF

SM 169 PDRS
STATUS
END EFFECTOR
EXTEND 1 ?

EXTEND
MSW Ckt
FAILURE

EE MAN
modes remain

EE AUTO
release lost. EE
Manual modes remain. PDRS CK
CRT EE and CK
CRT lt when
EXTEND msw 1.
Use PL ID 0 for
unloaded rates

B/U Release

Record WR R

BRAKES – ON
RMS SEL – OFF
RMS PWR – B/U (Expect SM ALERT and BCE BYP MCIU)
RMS SEL – PORT

B/U PL REL – ON
Wait 10 sec
B/U PL REL – OFF

RMS SEL – OFF
RMS PWR – PRI (MA)

I/O ON – ITEM
5 EXEC (*)

RMS SEL – PORT

SAFING – CANCEL

If WR R different, ITEM 26 + (recorded value)
EXEC (expect SM ALERT, CK CRT lt)

Manual

EE MODE – MAN
EE MAN CONTR – DERIGID until EXTEND tb – gray (20 sec max)
EE MODE – OFF

BRAKES – OFF
MODE – END
EFF
Maneuver RMS away from payload
BRAKES – ON
MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs:
- CAP/EXTEND
- OPEN/RIG
- CLOSE/DERIG

Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time

May receive 'S96 PDRS CKCRT EE' and down arrow by EE FLAG
For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE tb.

For digital SPA failure, RIGID flag may be failed OFF causing loss of loaded rates and motor to continue to drive until EE MODE – OFF during AUTO capture. Loaded rates can be set via SM 95 PDRS OVERRIDE.

RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT.
RMS D&C Kit available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS D&C KIT) (IFM), and PDRS SSR-4, RMS D&C KIT

13 SM 94 PDRS CONTROL
   - Record WR R ________
   - RMS SEL – OFF
   - RMS PWR – B/U (Expect SM ALERT and BCE BYP MCIU)
   - RMS SEL – PORT

14 (A8L)
   - RMS SEL – OFF
   - RMS PWR – PRI (MA)

15 EE OPEN tb – gray ?
   - YES
   - NO

16 CAP/REL SW, EE MODE SW, EEEU, K2 CONTACT, OR PRIMARY SNAKE DRIVE MECH FAILURE. EE NOT OPERATIONAL

17 EEEU FAILURE. EE AUTO/MAN RELEASE LOST
   - YES
   - NO

18 EE AUTO/MAN modes for CAPTURE/ RIGID/DERIGID remain and EE B/U for RELEASE remains

19 MCC for possible IFM
EE Fails to Derigidize in Manual, DERIGID tb – bp, or EXTEND – bp

Nominal Config:
EE MODE – MAN
DAP: VERN(FREE) (A8U)
SAFING tb – gray

1. If reqd, mnvr RMS to view inside EE
2. Carriage extended (visually)?

3. EE MODE – MAN
   EE MAN CONTR – DERIGID (3 sec)
   EE MODE – OFF

4. Did carriage move (visually)?
   EE MODE – AUTO
   EE RELEASE sw – depress (mom)

5. SM 169 PDRS STATUS
   END EFFECTOR DERIG 1?

6. EE MODE SW, MTR, COMM SCANNER, EEEU, K1 CONTACT, OR MECHANICAL FAILURE. EE NOT OPERATIONAL

7. DERIGID MSW OR DIGITAL SPA EXTERNAL FLAGS FAILURE. EE AUTO RELEASE LOST

8. EE MODE – MAN
   EE MAN CONTR – RIGID, (until EXTEND tb-bp, 2 sec max)
   EE MODE – OFF

9. √ MCC for possible IFM

10. EE MAN mode remains. EE AUTO CAPTURE remains for MSW failure. PDRS CK CRT EE and CK CRT It when EE goes to EXTEND due to MSW miscompare

11. EE MAN CONTR SW OR D&C DIODE FAILURE. EE MAN DERIG LOST

12. EE MAN CONTR SW, EE MODE SW, D&C DIODE FAILURE, EE MANUAL MODE LOST

13. EE AUTO remains. MAN CAPTURE/RELEASE modes may remain

14. DERIG tb FAILURE

15. AUTO mode remains

16. Continue ops

For digital SPA failure, CLOSE flag may be failed ON
RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT
For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE tb
For future EE OPS, use SM 94 PDRS CONTROL or SM 169 PDRS STATUS to determine status of affected EE.

For digital SPA failure, CAPTURE flag may be failed OFF.

For digital SPA failure, CAPTURE flag may be failed OFF.
EE tb Abnormal While No EE Commands

Nominal Config:
DAP: VERN(FREE)

1. Assumes PL about to be released

1. Arm loaded?
   - NO → 4
   - YES → 2

2. EE MAN CONTR FAILURE. EE MAN MODE LOST

3. EE AUTO mode remains
   - EE MODE – AUTO
   - EE REL sw – depress (mom)
   - Wait 20 sec
   - EE MODE – OFF

4. YES → 1
RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT.

RMS limping will occur whenever EE MODE sw is not in OFF position and RMS is in computer supported mode.

Uncommanded Release Warning is disabled.

Check for uncommanded ops

OPEN tb – gray and CLOSE tb – bp

OPEN tb – bp and CLOSE tb – gray

EE MODE – MAN
EE REL sw – depress (3 sec max)
EE MODE – OFF

CLOSE tb – gray?

EE AUTO RELEASE CONTACT FAILURE. EE AUTO MODE LOST

EE AUTO RELEASE remains, using EE MODE sw to initiate sequence. EE MAN mode remains

EE AUTO CAPTURE FAILURE. EE AUTO REL LOST

EE AUTO CAPTURE remains, using EE mode sw to initiate. B/U RELEASE remains. One CAPTURE remains if carriage extended

MCC for possible IFM
12.3h EE tb ABNORMAL WHILE EE MODE OFF

1. Is arm loaded?
   - NO → 11
   - YES → 2

2. EE CLOSE tb – bp?
   - NO → 3
   - YES → 4

3. OPEN, CAP, RIGID, DERIG, OR EXTEND tb
   - FAILURE

4. (A8U)
   - EE MODE – MAN
   - EE CAP sw – depress (3 sec max)
   - EE MODE – OFF

5. SNARE BRAKE SLIP

6. SM 169 PDRS STATUS
   - END EFFECTOR CLOSE 1?
     - YES → 1
     - NO → 7

7. CLOSE tb
   - FAILURE

8. CLOSE MSW OR DIGITAL SPA EXTERNAL FLAGS FAILURE, EE AUTO CAPTURE LOST

9. Continue ops

10. AUTO RELEASE remains

Nominal Config:
DAP: VERN(FREE)

1. For future EE OPS, use SM 169 PDRS STATUS to determine status of affected EE tb
2. Subsequent slipping may occur
1 For future EE OPS, use SM 169 PDRS STATUS to determine status of affected EE tb

3 For digital SPA failure, RIGID flag may be failed OFF causing loss of loaded rates and motor to continue to drive until EE MODE – OFF during AUTO CAPTURE. Loaded rates can be sent via SM 95 PDRS OVERRIDE

4 For digital SPA failure, CAPTURE flag may be failed OFF
Nominal Config: SAFING tb – gray

1. SM 169 PDRS STATUS

Is payload snared (2 or 3 of Capture 1, Close 1, Open 0)?

YES

1. EE MODE SW CAP/REL POLE OPEN, EEEEU LOGIC CIRCUIT, EE CAP/REL SW, K2 RELAY, OR MOTOR/DRIVETRAIN FAILURE. EE CAPTURE LOST. DIRECT DRIVE MAY BE LOST FOR K2 RELAY FAILURE. EE MAY NOT BE OPERATIONAL

NO

2. EE MODE SW CAP/REL POLE OPEN, EEEEU LOGIC CIRCUIT, EE CAP/REL SW, K2 RELAY, OR MOTOR/DRIVETRAIN FAILURE. EE CAPTURE LOST. DIRECT DRIVE MAY BE LOST FOR K2 RELAY FAILURE. EE MAY NOT BE OPERATIONAL

3. \(\sqrt{MCC}\) for possible IFM or EVA retrieve

4. EE RIGID tb – gray?

YES

5. EE DERIGID tb – bp?

YES

6. RIGID MSW CKT, K1 CONTACT, EE MODE SW, MTR MODULE, EEEEU LOGIC CIRCUIT, MECHANICAL FAILURE

NO

7. K1 RELAY CONTACT, EE MODE SW, COMM SCANNER, EEEEU LOGIC CIRCUIT, MECHANICAL FAILURE

8. UNCOMMANDED DERIGID C/W lost and possible loss of EE functionality

9. EE rigidize drive lost

- Stay free drift
- \(\sqrt{MCC}\) for possible IFM

10. EE CAPTURE tb – gray?

YES

11. CAPTURE MSW CKT FAILED

NO

12. Loss of AUTO CAPTURE. UNCOMMANDED RELEASE C/W lost

13. EE CLOSE tb – gray?

NO

14. CLOSE MSW CKT FAILED

YES

15. Loss of AUTO CAPTURE. AUTO RELEASE remains for msw failure

NO

16. EE AUTO CAPTURE CONTACT OR EE MODE SW FAILURE

17. EE AUTO CAPTURE lost. EE AUTO RELEASE may remain

18. When release reqd, perform in MAN. After PL RELEASE, \(\sqrt{MCC}\) for AUTO RELEASE check

1. RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

2. Arm will move at unloaded rates. RMS loaded rates can be set via SM 95 PDRS OVERRIDE

3. MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time
PDRS 12.3j NO AUTO RELEASE
(CUE CARD EXECUTED)

Nominal Config: SAFING tb – gray

1. Is payload released?
   - YES: Go to 2
   - NO: Go to 4

2. RIGID tb – gray?
   - YES: Go to 5
   - NO: Go to 3

3. EEEU LOGIC CIRCUIT, MTR MODULE, K1 RELAY CONTACT, EE MODE SW, OR MECHANICAL FAILURE
   - DAP: FREE
   - EE MODE – MAN
   - EE MAN CONTR – RIGID to DERIGID until DERIGID tb – gray (5 sec max)
   - EE MODE – OFF
   - RIGID tb – gray?
     - YES: Go to 6
     - NO: Go to 8

4. Was payload released in B/U?
   - YES: Go to 2
   - NO: Go to 10

5. Loss of EE RIGIDIZE/DERIGIDIZE, CAPTURE/RELEASE may be lost
   - DAP: FREE
   - EE MODE – OFF
   - MSW CKT FAILURE
   - EXTEND tb – gray?
     - YES: Go to 12
     - NO: Go to 11

6. Stay free drift
   - MCC for possible IFM

7. EE AUTO RELEASE lost. EE AUTO CAPTURE remains unless CLOSE flag affected. PDRS CK CRT if when EE goes to EXTEND due to microsw miscompare
   - EE MODE – MAN
   - EE MAN CONTR – RIGID until RIGID tb – gray (25 sec max)
   - EE MODE – OFF
   - DAP: as reqd

8. DERIGID tb – gray?
   - YES: Go to 9
   - NO: Go to 18

9. EE MODE – MAN
   - EE MAN CONTR – RIGID to DERIGID until EXTEND tb – gray (25 sec max)
   - EE MODE – OFF
   - EXTEND tb – gray?
     - YES: Go to 12
     - NO: Go to 18

10. DERIGID MSW CKT FAILURE
    - EE AUTO RELEASE lost. EE AUTO CAPTURE remains unless CLOSE flag affected
    - EE MODE – MAN
    - EE MAN CONTR – RIGID until RIGID tb – gray (25 sec max)
    - EE MODE – OFF
    - DAP: as reqd

11. EE AUTO RELEASE lost. EE AUTO CAPTURE may remain
    - EE MODE – MAN
    - EE MAN CONTR – RIGID until RIGID tb – gray (25 sec max)
    - EE MODE – OFF
    - DAP: as reqd

12. EEEU LOGIC CIRCUIT, EE MODE SW, K1 RELAY CONTACT, OR MECHANICAL FAILURE. LOSS OF RIGIDIZE/DERIGIDIZE
    - DAP: FREE
    - EE MODE – OFF
    - DAP: as reqd

13. EE AUTO RELEASE lost. EE AUTO CAPTURE may remain
    - EE MODE – MAN
    - EE MAN CONTR – RIGID until RIGID tb – gray (25 sec max)
    - EE MODE – OFF
    - DAP: as reqd

14. DAP: as reqd
    - MCC for possible IFM

15. DERIGID tb – gray?
    - YES: Go to 16
    - NO: Go to 18

16. EE MODE SW OR EE CAP/REL SW AUTO RELEASE CONTACT FAILURE
    - EE AUTO RELEASE lost. EE AUTO CAPTURE may remain
    - EE MODE – MAN
    - EE MAN CONTR – RIGID until RIGID tb – gray (25 sec max)
    - EE MODE – OFF
    - DAP: as reqd
1 RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

- RMS SEL – OFF
- RMS PWR – PRI (MA)

SM 94 PDRS CONTROL
- I/O ON – ITEM 5 EXEC (*)

(A8L)
- RMS SEL – PORT

(A8U)
- SAFING – CANCEL

21 Reconfig EE

(A8L)
- RMS SEL – OFF
- RMS PWR – B/U (Expect SM ALERT and BCE BYP MCIU)

(A8U)
- B/U PL REL – ON
- Wait 10 sec
- B/U PL REL – OFF

SM 94 PDRS CONTROL
- I/O ON – ITEM 5 EXEC (*)

(A8L)
- RMS SEL – PORT

(A8U)
- SAFING – CANCEL

22 EE MODE – MAN
- EE MAN CONTR – RIGID until RIGID tb – gray (6 sec max)
- EE MODE – OFF
- DAP: as reqd

23 JOINT SEL – WR
- BRAKES – ON
- MODE – DIRECT
- SINGLE/DIRECT DR – ‘+’
- MODE – not DIRECT

Joint drive properly?

24 K2 CONTACT, EE CAP/REL SW, EEEU LOGIC CIRCUIT, EE MODE SW, OR MECHANICAL FAILURE

K2 RELAY FAILURE

25 EE MODE – MAN
- EE MAN CONTR – DERIGID until EXTEND tb – gray (25 sec max)
- EE MODE – OFF

EXTEND tb – gray?

YES

26

NO

27 EE AUTO RELEASE lost. MAN RELEASE may remain. AUTO and MAN CAPTURE may remain

MCC for possible IFM

28 EE MODE SW, EEEU LOGIC CIRCUIT, MTR MODULE, K2 RELAY OR CONTACT, MECHANICAL FAILURE OR EE CAP/REL SW TOTAL FAILURE

29 EE CAPTURE/RELEASE and DIRECT DRIVE lost

MCC for possible IFM

30 EE MODE – MAN
- EE CAPTURE sw – depress until CLOSE tb – gray (3 sec max)
- EE MODE – OFF

CLOSE tb – gray?

YES

31 MTR MODULE, EEEU LOGIC CIRCUIT, MECHANICAL, EE MODE SW, OR K1 CONTACT FAILURE

32 K2 RELAY OR CONTACT, EE CAP/REL SW, MECHANICAL, EEEU LOGIC CIRCUIT OR EE MODE SW FAILURE

33 EE CAPTURE/RELEASE lost

MCC for possible IFM

34 EE not operational

- DAP: as reqd
- MCC for possible IFM

35 EEEU LOGIC CIRCUIT FAILURE

36 EE AUTO/MAN RELEASE lost

21
RMS IFM D&C Kit available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

Nominal Config: SAFING tb – gray

1 Is payload released?

2 RIGID tb – gray?

3 • JOINT – WR
   • BRAKES – ON
   • MODE – DIRECT
   • SINGLE/DIRECT DR – ‘+’
   • MODE – not DIRECT

4 Stay free drift

5 EE MODE SW, MTR MODULE, OR MECHANICAL FAILURE

6 K2 RELAY FAILURE

7 AUTO and MAN modes lost. B/U may remain

8 • MCC for possible IFM

9 Was payload released in B/U?

10 (A8L) • RMS SEL – OFF
   • RMS PWR – PRI (MA)
   • I/O ON – ITEM 5 EXEC (*)

11 K2 RELAY CONTACT, EEEU LOGIC CIRCUIT, EE MODE SW, OR MECHANICAL FAILURE

12 EE MODE SW, D&C ZENER DIODE, OR EE CAP/REL SW MANUAL CONTACT FAILURE

13 • MCC for possible IFM

14 EE MAN MODE lost

15 • EE MODE – MAN
   • MAN CONTR – DERIGID until EXTEND tb – gray (25 sec max)
   • EE MODE – OFF

16 EE MODE SW, EEEU LOGIC CIRCUIT, MTR MODULE, OR MECHANICAL FAILURE

17 EXTEND tb – gray?

18 YES

19 NO

20

21
RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT.
1. RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

2. MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs:

- CAP/EXTEND OPEN/RIG
- CLOSE/DERIG

Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time.

Nominal Config:
SAFING tb – gray

EE fails to Derigidize in Manual, DERIGID tb – bp

1. Is payload released?
   - NO
   - YES

2. RIGID tb – gray?
   - NO
   - YES

3. DAP: FREE
   - EE MODE – MAN
   - EE MAN CONTR – DERIGID (2 sec)
   - EE MODE – OFF

4. EEEU LOGIC CIRCUIT, MODE SW, K1 RELAY CONTACT, MTR MODULE, OR MECHANICAL FAILURE

5. EE RIGIDIZE/DERIGIDIZE lost

6. GO for release?
   - YES
   - NO

7. EE MAN CONTR SW, EEEU LOGIC CIRCUIT, D&C ZENER DIODE, K1 RELAY CONTACT, EE MODE SW, COMM SCANNER, MTR, OR MECHANICAL FAILURE

8. Was payload released in B/U?
   - NO
   - YES

9. (ABL)
   - RMS SEL – OFF
   - RMS PWR – PRI (MA)

SM 94 PDRS CONTROL
   - I/O ON – ITEM 5 EXEC (*)

(A8L)
- RMS SEL – PORT

(A8U)
- SAFING – CANCEL

10. MCC for possible IFM

11. • EE MODE – AUTO
    • EE RELEASE sw – depress (mom) until EXTEND tb – gray (25 sec max)
    • EE MODE – OFF

12. EXTEND tb – gray?
   - NO
   - YES

13. EE MAN CONTR SW OR EE MODE SW FAILURE

14. DERIGID MSW Ckt FAILURE

15. EE AUTO RELEASE lost. EE AUTO CAPTURE remains unless CLOSE flag affected. PDRS CK CRT EE and CK CRT It when EE goes to EXTEND due to msw miscompare

16. EE MANUAL DERIG lost
RMS OPS

RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG. Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time.

1. RMS IFM D&C KIT available to recover loss of K1, K2 relay, EE MODE sw, EE Cap/Rel sw, EE MAN CONTR sw. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT.

2. MSW ckt failures include circuitry in the SPA, therefore microswitches can fail in pairs: CAP/EXTEND OPEN/RIG CLOSE/DERIG. Timing of each phase is critical to prevent motor burnout. EE Mode to OFF after spec time.

3. DERIGID MSW Ckt Failure

4. EE MODE – MAN

5. EE MAN CONTR – RIGID until RIGID tb – gray (5 sec max)

6. EE MODE – OFF

7. DAP: as reqd

17. DERIGID MSW Ckt Failure

18. EE MODE – AUTO

19. RELEASE sw – depress (mom)

20. When OPEN tb – gray (8 sec max), EE MODE – OFF

21. Mnvr RMS off PL

22. Release successful ?

23. EE AUTO RELEASE lost. EE AUTO CAPTURE remains unless CLOSE flag affected. PDRS CK CRT EE and CK CRT it when EE goes to EXTEND due to msd miscompare

24. EE MANUAL DERIGIDIZE lost. EE MANUAL RELEASE/RIGIDIZE may be lost

25. EE MODE – AUTO

26. EE RELEASE sw – depress (mom) until EXTEND tb – gray (25 sec max)

27. EE MODE – OFF

28. EXTEND tb – gray ?

29. EE MODE SW, MTR MODULE, OR MECHANICAL FAILURE

30. D&C ZENER DIODE, EE MODE SW, OR EE MAN CONTR SW FAILURE

31. D&C ZENER DIODE FAILURE

32. EE MANUAL RELEASE/RIGIDIZE lost

33. EE not operational

34. √MCC for possible IFM

35. √MCC for possible IFM
12.4a ARM RESPONSE ABNORMAL IN MANUAL MODES

Nominal Config:
(A8L)
RMS PWR – PRI
RMS SEL – PORT
(8A8)
SAFING – AUTO
SAFING tb – gray
S/W STOP – gray
EE MODE – OFF

1. (A8U)
   • BRAKES – ON

2. (A8U)
   • BRAKES – OFF
   Is any joint moving (visual)?
   YES → 12.4c 26
   NO

3. BRAKES tb – ON?
   NO → 12.2c 1
   YES

4. (A8U)
   • RATE – VERN
   MODE – selected one, ENTER
   MODE lt – on?
   NO
   YES

5. HAND CONTROLLER BIAS. MANUAL AND TEST DRIVE MODES UNAVAILABLE

6. (A8U)
   • BRAKES – ON

7. Cycle RATE – COARSE, then VERN
   Does RATE MIN tb respond properly?
   NO
   YES → 10

8. VERNIER/COARSE SELECTION FAILURE

9. Use SM 95 PDRS OVERRIDE to override failed switches
   • BRAKES – ON

10. YES → 12.4c 26

WARNING:
Taking Brakes OFF may result in uncommanded motion of arm. Be ready to apply Brakes if motion occurs.
Single HC axis failure workaround capability exists via SM 95 PDRS OVERRIDE

10

- HC Axes
- If RMS in S/W STOP region (SOFT STOP tb-bp) or arm/PL is within approximately 10 ft of structure, \*MCC
- If arm unloaded:
  - DAP: VERN (FREE)
- If arm loaded:
  - DAP: FREE
- MODE – TEST, ENTER

SM 169 PDRS STATUS (RHC/THC)
- Deflect each axis full scale ‘+’ and ‘-’ while monitoring CMD rates on CRT

Commanded rates respond correctly?

11 SLUGGISH OR DEAD RHC/THC AXIS(ES)

12 MAN modes usable without failed axis(es)
- BRAKES – ON
- DAP: as reqd

13 (THC/RHC)
While holding any command:
- RATE HOLD – depress (mom)
- Release cmd

Commanded rates remain on S169?

CAUTION
Do not execute if captured to constrained payload or if captured payload should not be moved in SINGLE mode

14 RATE HOLD SW FAILURE

15 Use MAN modes without RATE HOLD function
- BRAKES – ON
- DAP: as reqd

16 (ASU)
- MODE – SINGLE, ENTER
- Drive each joint in turn ‘+’ and ‘-’

Does joint drive properly?

17 TRANSIENT FAILURE

18
- Continue normal ops
- BRAKES – ON
- DAP: as reqd

12.4c 26
Arm Response Not Normal for Commands in Auto Modes

Nominal Config:
(A8L)
RMS PWR – PRI
SEL – PORT
(A8U)
SAFING tb – gray
SOFTWARE STOP
tb – gray
EE MODE – OFF

1
(A8U)
• BRAKES – ON

WARNING
Taking Brakes OFF may result in uncommanded motion of arm. Be ready to apply Brakes if motion occurs

2
(A8U)
• BRAKES – OFF
Is any joint moving (visual)?

YES
12.4c 26
NO

3
BRAKES tb – ON?

YES
12.2c 1
NO

4
(A8U)
• RATE – VERN
• MODE – selected one, ENTER

MODE lt – on?

NO
5
AUTO SEQ PROCEED/STOP SW FAILURE

NO

6
(A8U)
• BRAKES – ON
• Use SM 95 PDRS OVERRIDE to override failed switch

YES

7
7. BRAKES – ON
   • Cycle RATE – COARSE, then VERN
   Does RATE MIN tb respond properly?

8. VERNIER/COARSE SW FAILURE

9. If 12 inches in -Z (up) could result in collision, √MCC

10. Use SM 95 PDRS OVERRIDE to override failed switch

11. Ck OPR CMD
    12 inches from present position
    • Note position X, Y, Z and attitude P,Y,R

12. WARNING
    If trajectory is not correct, collision could occur. Be ready to stop auto seq

13. AUTO SEQ PROCEED/STOP
    SW PROCEED CONTACT FAILURE

14. AUTO SEQ – STOP
    READY lt – on and IN PROG lt – on?

15. AUTO SEQ – STOP
    READY lt – off and IN PROG lt – on?

16. AUTO SEQ PROCEED/STOP
    SW STOP CONTACT FAILURE

17. AUTO SEQ – STOP
    • BRAKES – ON
    • Use SM 95 PDRS OVERRIDE to override failed switch

18. AUTO SEQ – STOP
    • BRAKES – ON
    • MODE – SINGLE, ENTER
    • Drive each joint in turn ‘+’ and ‘-’
    Does joint drive properly?

19. TRANSIENT FAILURE

20. Continue normal ops
    • BRAKES – ON

Joint Response Not Normal for Commands in Single Mode

Nominal Config:
- (A8L) RMS PWR – PRI SEL – PORT
- (A8U) SAFING tb – gray EE MODE – OFF

1. (A8U) • BRAKES – ON

**WARNING**
Taking BRAKES OFF may result in uncommanded motion of arm. Be ready to apply BRAKES if motion occurs.

2. (A8U) • BRAKES – OFF
Any joint moving (visual)?

3. BRAKES tb – ON?

4. • RATE – VERN
• JOINT sel – WR
• MODE – SINGLE, ENTER
SINGLE lt – ON?

**WARNING**
Placing mode switch in DIRECT may cause joint motion for selected joint. If motion occurs be ready to take mode switch out of DIRECT.

5. (A8U) • BRAKES – ON
• MODE – DIRECT
Is joint moving?

6. SINGLE/DIRECT DR SW 10V SHORT

7. • MODE – not DIRECT

8. • MODE – not DIRECT
• Use SM 95 PDRS OVERRIDE to reassign SINGLE/DIRECT DR sw to AUTO SEQ PROCEED/STOP sw

9. YES

10. NO

11. YES

12. NO
1 DIRECT mode can be regained with RMS IFM D&C KIT. Refer to RMS CONTINGENCY OPERATION/INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM), and PDRS SSR-4 RMS IFM D&C KIT.

9 • Cycle RATE – COARSE, then VERN.

Does RATE MIN tb respond properly?

YES

9

10 VERNIER/COARSE SW FAILURE

11 • Use SM 95 PDRS OVERRIDE to override failed switch
• BRAKES – ON

12 SINGLE/DIRECT DR SW SHORT. SINGLE AND DIRECT DRIVE MODES UNAVAILABLE

13 • PARAM sel – JOINT ANGLE
• JOINT sel – each joint in turn

Any joint angle display(s) blank?

NO

13

14 JOINT SELECT SW FAILURE

15 • Use SM 95 PDRS OVERRIDE to override failed switch
• BRAKES – ON

16 • Use SM 95 PDRS OVERRIDE to reassign SINGLE/DIRECT DR switch to AUTO SEQ PROCEED/STOP sw to regain SINGLE drive mode

17 As JOINT sel sw is cycled, does joint angle display change for each sw position?

YES

CAUTION

If captured to constrained PL or if loaded and near structure, √MCC

NO

17

20 For each joint in turn

• SINGLE/DIRECT DR – ‘+’ and ‘-’

Did each joint drive properly?

YES

21 TRANSIENT FAILURE

22 • Continue normal ops
• BRAKES – ON

NO

23 Did only 1 joint fail to drive properly?

NO

26

24

25

26
1. DIRECT mode can be regained with RMS IFM D&C KIT. Refer to RMS CONTINGENCY OPERATION/INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM), and PDRS SSR-4 RMS IFM D&C KIT.

2. BACKDRIVE TECHNIQUE – JOINT FREE, PDRS SSR-3 or EVA reqd to cradle arm for failed free joint.

3. May receive CK CRT It and DIRECT DRIVE BITE ‘↓’ for undriven joints.

PDRS 12.4c (Cont)

1. DIRECT mode can be regained with RMS IFM D&C KIT. Refer to RMS CONTINGENCY OPERATION/INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM), and PDRS SSR-4 RMS IFM D&C KIT.

2. BACKDRIVE TECHNIQUE – JOINT FREE, PDRS SSR-3 or EVA reqd to cradle arm for failed free joint.

3. May receive CK CRT It and DIRECT DRIVE BITE ‘↓’ for undriven joints.
**Joint Response Not Normal for Commands in Direct Mode**

**Nominal Config:**
- (A8L)
- RMS PWR – PRI
- RMS SEL – PORT
- (A8U)
- BRAKES – ON
- BRAKES tb – ON
- SAFING tb – gray

**Direct Mode**

1. **(A8U)**
   - BRAKES – ON
   - MODE – not DIRECT
   - JOINT – WR

   **WARNING**
   
   Placing mode switch in DIRECT may cause joint motion for selected joint. If motion occurs, be ready to take mode switch out of DIRECT.

2. **(A8U)**
   - MODE – DIRECT

   Joint motion of selected joint?
   - YES
   - NO

   **WARNING**
   
   Driving in DIRECT may cause incorrect joint to drive or motion in incorrect direction. If captured to constrained PL or if loaded and near structure, √MCC

3. **(A8U)**
   - MODE – not DIRECT

   **SINGLE/DIRECT DRIVE MODES UNAVAILABLE**
   
   **1**

4. **SINGLE/DIRECT DR SW SHORT. SINGLE AND DIRECT DRIVE MODES UNAVAILABLE**

5. **Use SM 95 PDRS OVERRIDE to reassign SINGLE/DIRECT DR sw to AUTO SEQ PROCEED/STOP sw to regain SINGLE drive mode**

6. **(A8U)**
   - SINGLE/DIRECT DR – each joint in turn ‘+’ and ‘-’

   Two joints drive simultaneously?
   - YES
   - NO

7. **6V/12V JOINT SEL SW CONTACT SHORT. DIRECT DRIVE MODE UNAVAILABLE**

8. **Any joint drive in wrong direction?**
   - YES
   - NO

9. **ZENER DIODE FAILURE. DIRECT DRIVE MODE LOST**

10. **DIRECT mode can be regained with RMS IFM D&C Kit. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT**
1 DIRECT mode can be regained with RMS IFM D&C Kit. Refer to RMS CONTINGENCY OPERATION (INSTALLATION AND REMOVAL OF RMS IFM D&C KIT) (IFM), and PDRS SSR-4, RMS IFM D&C KIT

10 Did more than one joint fail to drive at all?

11 K2 RELAY, SINGLE/DIRECT DR SW, MODE SW, OR JOINT SW FAILURE. DIRECT DRIVE MODE UNAVAILABLE

12 For SINGLE/DIRECT DR SW or JOINT sw, use SM 95 PDRS OVERRIDE to regain SINGLE drive mode

13 Test SINGLE (ABU)
   - RATE sw – VERN
   - JOINT – failed one
   - BRAKES – OFF
   - MODE – SINGLE, ENTER
   - SINGLE/DIRECT DR – ‘+’ and ‘-’

14 DIRECT DRIVE CKT FAILURE. DIRECT DRIVE MODE UNAVAILABLE FOR FAILED JOINT

15 (ABU)
   - BRAKES – ON

16 (ABU)
   - BRAKES – ON

12.4c 31
PDRS

12.5a MPM DPY – tb NOT DPY, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

1 Refer to RMS – MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)

2 One mtr will continue to run while deploying until PORT(STBD) RMS sw – OFF

3 PDRS SSR-1 MPM MTR INHIBIT DISABLE available to regain motor drive in the failed direction

4 Unloaded stowed ops can be performed on MCC GO. Refer to SM 95 PDRS OVERRIDE ITEM 15

Nominal Config:
(MA73C:A)
MCA LOGIC
MNA MID 1 – ON
MNB MID 2 – ON
MNC MID 2 – ON

(MA73C:B)
MCA LOGIC
MNA MID 3 – ON
MNB MID 4 – ON
MNC MID 4 – ON

(MA73C:C)
cb MCA PWR AC2
3Φ MID 2 – cl

(MA73C:D)
cb MCA PWR AC3
3Φ MID 4 – cl
1 Refer to RMS – MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)

5 One mtr will continue to run while stowing until PORT(STBD) RMS sw – OFF

6 RMS should not be used unless shoulder linkage is overcenter locked

7 To trip port(stbd) tb, signals from all four (three) pedestals are required, i.e., all of SYS 1 or all of SYS 2. SM94 only shows the shoulder (fwd) indications

8 MCC can determine if switch is failed

14 Was deploy time single mtr time (> 34 sec) ?

15 MTR, PORT(STBD) RMS SW (ONE POLE), OR DPY RELAY FAILURE

16 STO MICROSW FAILED OPEN PRIOR TO DEPLOY

17 MCC for failure isolation. One failure away from loss of ability to operate MPM

18 • Continue ops (tb is accurate)

19 Are MPMs fully in DPY position (visual inspection) ?

20 FAILED MICROSW LEVER ARM OR MICROSW MISRIGGING

21 MCC

22 tb FAILURE, STRUCTURAL FAILURE, JAM, OR MISRIGGING OF PEDESTAL OTHER THAN SHOULDER (FWD)

23 FAILURE OF PORT(STBD) RMS SW, (BOTH POLES), OR MECHANICAL JAM

24 MCC to determine if tb failed

25 • MCC for possible sw IFM

10 4

5 1

2 6

8 2

7 2

2

2

2
Refer to RMS - MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)

1. One mtr will continue to run while stowing until PORT (STBD) RMS sw – OFF

2. PDRS SSR-1 MTR Inhibit
   Disable available to regain motor drive in the failed direction

Nominal Config:
(MA73C:A)
MCA Logic
MNA MID 1 – ON
MNB MID 2 – ON
MNC MID 2 – ON
(MA73C:B)
MCA Logic
MNA MID 3 – ON
MNB MID 4 – ON
MNC MID 4 – ON
(MA73C:C)
cb MCA PWR
AC2 3db MID 2 – cl
(MA73C:D)
cb MCA PWR
AC3 3db MID 4 – cl
1 Refer to RMS – MANIPULATOR POSITIONING MECHANISM (MPM) CONTINGENCY DEPLOY/STOW (IFM)

4 To trip port (stbd) tb, signals from all four (three) pedestals are required, i.e., all of SYS 1 or all of SYS 2. SM94 only shows the shoulder (fwd) indications

5 One mtr will continue to run while deploying until PORT (STBD) RMS sw – OFF

6 RMS should not be used unless shoulder linkage is overcenter locked

7 MCC can determine if switch is failed

14 Was stow time single mtr time (> 34 sec) ?

15 STOW RELAY, MTR, OR PORT (STBD) RMS SW FAILED (ONE POLE)

16 tb FAILURE, STRUCTURAL FAILURE, OR JAM OF PEDESTAL OTHER THAN SHOULDER (FWD)

17 DPY MICROSW FAILED OPEN PRIOR TO STOW

18 \( \sqrt{ } \) MCC prior to deploying MPM

19 • Continue ops (tb is accurate)

20 \( \sqrt{ } \) MCC to determine if tb failed

21 Are MPMs in fully stowed position (visual inspection) ?

22 FAILED MICROSW LEVER ARM OR MICROSW MISRIGGING

23 \( \sqrt{ } \) MCC

24 FAILURE OF PORT (STBD) RMS SW, (BOTH POLES), OR MECHANICAL JAM

25 \( \sqrt{ } \) MCC for possible sw IFM

26 Are MPMs in fully stowed position (visual inspection) ?

27 DPY MICROSW FAILED OPEN PRIOR TO STOW

28 • Continue ops (tb is accurate)

29 \( \sqrt{ } \) MCC prior to deploying MPM

30 \( \sqrt{ } \) MCC to determine if tb failed
Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL) CONTINGENCY RELEASE/LATCH (IFM)

One mtr will continue to drive when commanding release until PORT(STBD) RMS RETEN LAT – OFF

Failed-on microsw disables one mtr. The tb is inaccurate from 8-18 sec (latch halfway open at 8 sec)

Nominal Config:
(MA73C:A)
MCA LOGIC
MNA MID 1 – ON
MNB MID 2 – ON
MNC MID 2 – ON
(MA73C:B)
MCA LOGIC
MNA MID 3 – ON
MNB MID 4 – ON
MNC MID 4 – ON
(MA73C:C)
cb MCA PWR
AC1 3Φ MID 1 – cl
AC2 3Φ MID 2 – cl
AC3 3Φ MID 2 – cl
(MA73C:D)
cb MCA PWR
AC1 3Φ MID 3 – cl
AC2 3Φ MID 4 – cl
AC3 3Φ MID 4 – cl
1. Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL) CONTINGENCY RELEASE/LATCH (IFM)

2. One mtr will continue to drive when commanding release until PORT(STBD) RMS RETEN LAT – OFF

3. tb is activated by receiving all three microsw indications from SYS 1 only

4. Port(STBD) RMS RETEN LAT SW, (BOTH POLES)

14. FAILURE OF PORT(STBD) RMS RETEN LAT SW, (BOTH POLES)

15. SYS 1 REL MICROSW FAILED OPEN

16. PORT(STBD) RMS RETEN LAT SW FAILED, (BOTH POLES)

17. POTENTIAL MECHANICAL JAM, MRL FAILED IN TRANSIT

18. MCC for possible sw IFM

19. Continue ops using SM 94. tb inaccurate for release. Nominal drive time (8 sec) to LAT and REL

20. MCC for possible sw IFM

21. MCC

12-97 MAL/ALL/GEN J
### PDRS

**Nominal Config:**
- (MA73C:A)
  - MCA LOGIC
  - MNA MID 1 – ON
  - MNB MID 2 – ON
  - MNC MID 2 – ON
- (MA73C:B)
  - MCA LOGIC
  - MNA MID 3 – ON
  - MNB MID 4 – ON
  - MNC MID 4 – ON
- (MA73C:C)
  - cb MCA PWR
  - AC1 3Φ MID 1 – cl
  - AC2 3Φ MID 2 – cl
  - AC3 3Φ MID 2 – cl
- (MA73C:D)
  - cb MCA PWR
  - AC1 3Φ MID 3 – cl
  - AC2 3Φ MID 4 – cl
  - AC3 3Φ MID 4 – cl

---

### 12.5d MRL LAT – tb NOT LAT, IND NOT NOMINAL, OR SINGLE MTR DRIVE TIME

- **tb Not LAT or SM 94 PDRS CONTROL**
  - Microsw Rel/Lat Ind Not Nominal or Single Mtr Drive Time (> 8 sec)

#### 1
- (A8L)
  - Port(STBD) RMS Reten LAT – OFF
  - (R13L)
  - PL BAY MECH PWR 1.2 – OFF

#### 2
- Port(STBD) RMS Reten LAT tb – LAT ?
  - NO
  - SM 94 PDRS CONTROL
    - Determine:
      - PORT(STBD) LAT
        - AFT 11
        - MID 11
        - FWD 11
      - Any one pedestal LAT 0T
      - PORT(STBD) REL
        - AFT 11
        - MID 11
        - FWD 11
      - Any one pair of LAT ind = '0'
      - PORT LAT REL
        - (STBD)
        - AFT 00 00
        - MID 00 00
        - FWD 00 00
    - YES
      - SM 94 PDRS CONTROL
        - All LAT microsw ind '1' prior to commanding LAT
        - Any one pedestal LAT 10
        - Single LAT ind '1' prior to LAT command
        - Other

#### 3
- tb FAILURE

#### 4
- Continue ops using SM 94 display

#### 5
- SM 94 PDRS CONTROL
  - Any one pedestal LAT 10
  - Any single LAT ind '1' prior to LAT command
  - Other

#### 6
- PORT(STBD) RMS Reten LAT SW SHORT

#### 7
- MCC prior to MRL ops

#### 8
- LATCH Microsw FAILED OPEN

#### 9
- Nominal drive time to latch and release. tb is accurate
  - Continue ops

#### 10
- LATCH Microsw FAILED CLOSED

#### 11
- 18 sec max drive time to LATCH. tb is suspect for release if SYS 1 microsw failed. tb is accurate if SYS 2 microsw failed. Continue ops using SM 94 display

#### 12
- FAILURE OF PORT(STBD) RMS Reten LAT SW. (ONE POLE) OR RELAY OR MTR

#### 13
- MCC for possible failure isolation
  - Single mtr drive time (18 sec) for LATCH. IFM possible if switch failure. Potentially one failure away from ability to safely latch RMS(OBSS) for entry

---

1. Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL CONTINGENCY RELEASE LATCH) (IFM)
2. One mtr will continue to drive when commanding LATCH until PORT(STBD) RMS RETEN LAT – OFF
3. Failed-on microsw disables one mtr. The tb is inaccurate from 8-18 sec (latch halfway closed at 8 sec)
1 Refer to RMS – MANIPULATOR RETENTION LATCHES (MRL CONTINGENCY RELEASE/LATCH) (IFM)

2 One mtr will continue to drive when commanding LATCH until PORT(STBD) RMS RETEN LAT – OFF

4 tb is activated by receiving all three microsw indications from SYS 1 only

14 FAILURE OF PORT(STBD) RMS RETEN LAT SW, (BOTH POLES)

15 SYS 1 LAT MICROSW FAILED OPEN

16 PORT(STBD) RMS RETEN LAT SW FAILED, (BOTH POLES)

17 POTENTIAL MECHANICAL JAM. MRL FAILED IN TRANSIT

18 •\textbf{MCC} for possible sw IFM

19 • Continue ops using SM 94. For LAT, tb is inaccurate. Nominal drive time (8 sec) to LAT and REL

20 •\textbf{MCC} for possible sw IFM

21 •\textbf{MCC}
1. Inaccurate tb because tb is driven by SYS 1 only

Nominal Config:
(MA73C:A)
MCA LOGIC
MNA MID 1 – ON
MNB MID 2 – ON
MNC MID 2 – ON

(MA73C:B)
MCA LOGIC
MNA MID 3 – ON
MNB MID 4 – ON
MNC MID 4 – ON

1. Use SM 94 for pedestal with failed tb

2. Use R-F-L alignment guides on MPM (if visible) for failed pedestal and use SM 94 SYS 2 RDY indications
**Nominal Config:**
(MA73C:A)
MCA LOGIC
MNA MID 1 – ON
MNB MID 2 – ON
MNC MID 2 – ON
(MA73C:B)
MCA LOGIC
MNA MID 3 – ON
MNB MID 4 – ON
MNC MID 4 – ON

1. Inaccurate tb because tb is driven by SYS 1 only

2. When cradling, use R-F-L alignment guides on MPM (if visible) for failed pedestal and use SM 94 SYS 2 RDY indications

3. Use SM 94 for pedestal with failed tb

4. MICROSW

5. • When cradling, use R-F-L alignment guides on MPM (if visible) for failed pedestal and use SM 94 SYS 2 RDY indications
PDRS SSR-1
MPM MTR INHIBIT DISABLE

If PORT MPM STO/DPLY – 1 X 1 X (STBD MPM STO/DPLY – X 1 X 1):

1. INHIBIT MICROSWITCH
   MA73C:A
   CRT PORT MPM STO/DPLY – 0 X 0 X (STBD MPM STO/DPLY – X 0 X 0)

2. STOW(DEPLOY) MPM
   MA73C:D cb
   R13L
   CRT
   √ PORT MPM STO/DPLY – 0 X 0 X (STBD MPM STO/DPLY – X 0 X 0)

   WARNING
   If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result.

   A8L PORT(STBD) RMS – STO(DPY) as reqd (68 sec max)
   – OFF

   CRT
   √ PORT MPM STO/DPLY – X 0 X 0 (STBD MPM STO/DPLY – 0 X 0 X)

3. ENABLE BUS
   MA73C:A
   CRT PORT(STBD) RMS – STO(DPY) >>

   A8L PORT(STBD) RMS – STO(DPY) as reqd (68 sec max)
   – OFF

   CRT
   √ PORT MPM STO/DPLY – X 1 X 1 (STBD MPM STO/DPLY – 1 X 1 X)

   CAUTION
   If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result.

   A8L PORT(STBD) RMS – STO(DPY) as reqd (68 sec max)
   – OFF

   CRT
   √ PORT MPM STO/DPLY – X 0 X 0 (STBD MPM STO/DPLY – 0 X 0 X)

   If PORT MPM STO/DPLY – 0 X 0 X (STBD MPM STO/DPLY – X 0 X 0):

4. INHIBIT MICROSWITCH
   MA73C:B
   CRT
   √ PORT MPM STO/DPLY – 0 1 0 X (STBD MPM STO/DPLY – 1 0 X 0)

   5. STOW(DEPLOY) MPM
   MA73C:C cb
   R13L
   CRT
   √ PORT MPM STO/DPLY – X 0 1 0 (STBD MPM STO/DPLY – 0 X 0 1)

   CAUTION
   If switch is not turned off, mtr will continue to run. Mechanical damage to mtr may result.

   A8L PORT(STBD) RMS – STO(DPY) as reqd (68 sec max)
   – OFF

   CRT
   √ PORT MPM STO/DPLY – X 1 X 1 (STBD MPM STO/DPLY – 1 X 1 X)

   MCC can verify status of FWD, MID, AFT pedestals

   R13L PL BAY MECH PWR SYS 1 – OFF

6. ENABLE BUS
   MA73C:B
   CRT PORT(STBD) RMS – STO(DPY)
PDRS SSR-3
BACKDRIVE TECHNIQUE – JOINT FREE

SP – FAILED

**WARNING**
PORT RADIATOR must be stowed

**NOTE**
Can expect CONTR ERR and Master Alarm

1. **SETUP**
   If RADIATORS deployed:
   Perform RAD STOW (ORB OPS, ECLS)

   √ BRAKES – ON (tb-ON)
   PARAM sel – JOINT ANGLE

   √ DAP: VERN(FREE)

   If SP < 7.5 deg, go to step 3

   Calculate IC:
   If SP < 45, IC = -(2 x SP)
   Otherwise, IC = -90

   MODE – DIRECT (lt on)

   DIRECT DR to:

<table>
<thead>
<tr>
<th>SY</th>
<th>SP</th>
<th>EP</th>
<th>WP</th>
<th>WY</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ 75</td>
<td>FREE</td>
<td>IC</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

   MODE – not DIRECT (lt off)
   SM 94 PDRS CONTROL
   AUTO BRAKE INH – ITEM 10 EXEC (*)

2. **BACKDRIVE OPERATION**

   **NOTE**
   Hold SINGLE DR command for 4 sec,
   apply BRAKES – ON, then release
   SINGLE DR command

   RATE – COARSE (RATE MIN tb-OFF)

   JOINT sel – EP
   BRAKES – OFF (tb-OFF)
   MODE – SINGLE, ENTER

   SINGLE DR – ‘+’ after 4 sec and while holding sw
   BRAKES – ON (tb-ON)

   If SP < 7.5 deg, go to step 3

   If EP ≥ -15 deg, reconfig EP:
   MODE – DIRECT (lt on)
   DIRECT DR EP to: -(2 x SP) or max -90
   MODE – not DIRECT (lt off)

   Repeat step 2
3. **RECONFIG JOINTS FOR CRADLE**

   **CAUTION**
   Use CCTVs to monitor proximity of RMS to orbiter

   BRAKES – ON (tb-ON)
   MODE – DIRECT (lt on)

   DIRECT DR to:

<table>
<thead>
<tr>
<th>SY</th>
<th>SP</th>
<th>EP</th>
<th>WP</th>
<th>WY</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREE</td>
<td>+1</td>
<td>+10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

   MODE – not DIRECT (lt off)

4. **START RMS CRADLE**

   **NOTE**
   Hold SINGLE DR command for 1/2 sec
   Apply BRAKES – ON then release
   SINGLE DR command

   JOINT sel – EP
   BRAKES – OFF (tb-OFF)
   MODE – SINGLE, ENTER

   SINGLE DR – ‘+’ after 1/2 sec and while holding sw
   BRAKES – ON (tb-ON)

   If PORT RMS R-F-L FWD tb – gray, go to step 5

   If EP ≥ +1 deg, reconfig EP:
   MODE – DIRECT (lt on)
   DIRECT DR EP to: 0
   MODE – not DIRECT (lt off)

   Repeat step 4

5. **COMPLETE RMS CRADLE**

   BRAKES – ON (tb-ON)
   MODE – DIRECT (lt on)

   DIRECT DR to:

<table>
<thead>
<tr>
<th>SY</th>
<th>SP</th>
<th>EP</th>
<th>WP</th>
<th>WY</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>FREE</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

   MODE – not DIRECT (lt off)

   PORT RMS R-F-L tb (three) – gray

   Go to step 3, RMS PWRDN (PDRS OPS) >>
PDRS SSR-3 (Cont)

EP – FAILED

NOTE
Can expect CONTR ERR and Master Alarm

1. SETUP
   √ BRAKES – ON (tb-ON)
   PARAM sel – JOINT ANGLE
   √ DAP: VERN(FREE)

   If EP ≥ -1 deg, go to step 3

   Calculate IC: If EP > -65, IC = -(2 x EP)
   Otherwise, IC = +130

   MODE – DIRECT (lt on)

   DIRECT DR to:

<table>
<thead>
<tr>
<th>SY</th>
<th>SP</th>
<th>EP</th>
<th>WP</th>
<th>WY</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURRENT VALUE</td>
<td>IC</td>
<td>FREE</td>
<td>+5</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

   MODE – not DIRECT (lt off)

   SM 94 PDRS CONTROL
   AUTO BRAKE INH – ITEM 10 EXEC (*)

2. BACKDRIVE OPERATION

   NOTE
   Hold SINGLE DR command for 4 sec
   Apply BRAKES – ON, then release
   SINGLE DR command

   RATE – COARSE (RATE MIN tb-OFF)

   JOINT sel – SP
   BRAKES – OFF (tb-OFF)
   MODE – SINGLE, ENTER

   SINGLE DR – '-' after 4 sec and while holding sw
   BRAKES – ON (tb-ON)

   If EP ≥ -1 deg, go to step 3

   If SP < -(EP), reconfig SP:
   MODE – DIRECT (lt on)
   DIRECT DR SP to: -(2 x EP) or max +130
   MODE – not DIRECT (lt off)

   Repeat step 2
3. **RECONFIG FOR CRADLE**
   \textbf{BRAKES – ON (tb-ON)}
   MODE – DIRECT (lt on)

   DIRECT DR to:

<table>
<thead>
<tr>
<th>SY</th>
<th>SP</th>
<th>EP</th>
<th>WP</th>
<th>WY</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>FREE</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

   MODE – not DIRECT (lt off)

4. **START RMS CRADLE**

   **NOTE**
   Hold SINGLE DR command for 1/2 sec
   Apply BRAKES – ON, then release
   SINGLE DR command

   JOINT sel – SP
   BRAKES – OFF (tb-OFF)
   MODE – SINGLE, ENTER

   If EP > +0.1:
   SINGLE DR – ‘+’ after 1/2 sec and while holding sw
   BRAKES – ON (tb-ON)

   If EP < -0.1:
   SINGLE DR – ‘-’ after 1/2 sec and while holding sw
   BRAKES – ON (tb-ON)

   Repeat step 4 until -0.1 < EP < +0.1

5. **COMPLETE RMS CRADLE**
   \textbf{BRAKES – ON (tb-ON)}
   MODE – DIRECT (lt on)

   DIRECT DR to:

<table>
<thead>
<tr>
<th>SY</th>
<th>SP</th>
<th>EP</th>
<th>WP</th>
<th>WY</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>FREE</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

   MODE – not DIRECT (lt off)

   \textbf{PORT RMS R-F-L tb (three) – gray}

   Go to step 3, RMS PWRDN (PDRS OPS)
PDRS SSR-3 (Cont)

WP – FAILED

NOTE
Can expect CONTR ERR and Master Alarm

1. SETUP
√ BRAKES – ON (tb-ON)
√ DAP: VERN(FREE)
MODE – DIRECT (lt on)

DIRECT DR to:

<table>
<thead>
<tr>
<th>SY</th>
<th>SP</th>
<th>EP</th>
<th>WP</th>
<th>WY</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>+90</td>
<td>-90</td>
<td>FREE</td>
<td>0</td>
<td>+19.5</td>
</tr>
</tbody>
</table>

MODE – not DIRECT (lt off)
PARAM sel – JOINT ANGLE

SM 94 PDRS CONTROL
AUTO BRAKES INH – ITEM 10 EXEC (*)

2. BACKDRIVE OPERATION (To config -0.1 ≤ WP ≤ +0.1 deg)

NOTE
For steps 2a and 2b, THC input will be at 1/3 to 1/2 deflection. After 2-3 sec, quickly command full scale deflection in opposite direction. When WP joint angle displayed is constant, apply BRAKES – ON and release THC

2a. If WP < -0.1 deg

RATE sw – COARSE (RATE MIN tb-OFF)
If WP > -2.0 deg,
RATE sw – VERN (RATE MIN tb-ON)

√ JOINT sel – WP
BRAKES – OFF (tb-OFF)
MODE – END EFF, ENTER
THC – ’Z’ (UP) 1/3 to 1/2 deflection

After 2-3 sec,
THC – ’+Z’ (DOWN) full deflection

When WP joint angle is constant:
BRAKES – ON (tb-ON)
Release THC

If -0.1 ≤ WP ≤ +0.1, go to step 2c
If SP > 120 deg or < 60 deg, go to step 3
If WP < -0.1 deg, repeat step 2a
If WP > +0.1 deg, go to step 2b

2b. If WP > +0.1 deg

RATE sw – COARSE (RATE MIN tb-OFF)
If WP < +2.0 deg,
RATE sw – VERN (RATE MIN tb-ON)

√ JOINT sel – WP
BRAKES – OFF (tb-OFF)
MODE – END EFF, ENTER
THC – ’+Z’ (DOWN) 1/3 to 1/2 deflection

After 2-3 sec,
THC – ’-Z’ (UP) full deflection

When WP joint angle is constant:
BRAKES – ON (tb-ON)
Release THC
PDRS SSR-3 (Cont)

If -0.1 ≤ WP ≤ +0.1, go to step 2c
If SP > 120 deg or < 60 deg, reconfig per step 3
If WP > +0.1 deg, repeat step 2b
If WP < -0.1 deg, go to step 2a

2c. If -0.1 ≤ WP ≤ +0.1 deg

\BRAKES – ON (tb-ON)
MODE – DIRECT (lt on)

DIRECT DR to cradle:

<table>
<thead>
<tr>
<th>SY</th>
<th>SP</th>
<th>EP</th>
<th>WP</th>
<th>WY</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>CURRENT VALUE</td>
<td>+1 MA</td>
<td>FREE</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0 (MA)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MODE – not DIRECT (lt off)

\PORT RMS R-F-L tb (three) – gray

Go to step 3, RMS_PWRDN (PDRS OPS) >>

3. RECONFIG OF JOINTS

\BRAKES – ON (tb-ON)
MODE – DIRECT (lt on)

DIRECT DR to:

<table>
<thead>
<tr>
<th>SY</th>
<th>SP</th>
<th>EP</th>
<th>WP</th>
<th>WY</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>+90</td>
<td>-90</td>
<td>FREE</td>
<td>0</td>
<td>+19.5</td>
</tr>
</tbody>
</table>

MODE – not DIRECT (lt off)

If WP < -0.1 deg, go to step 2a
If WP > +0.1 deg, go to step 2b
PDRS SSR-3 (Cont)

WY – FAILED

NOTE
Can expect CONTR ERR and Master Alarm. Can also expect SINGULAR if WY is between +75 and +105 degrees or if the WY is between -75 and -105 degrees

1. SETUP

- BRAKES – ON (tb-ON)
- DAP: VERN (FREE)
- MODE – DIRECT (lt on)

DIRECT DR to:

<table>
<thead>
<tr>
<th>SY</th>
<th>SP</th>
<th>EP</th>
<th>WP</th>
<th>WY</th>
<th>WR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>+90</td>
<td>-90</td>
<td>0</td>
<td>FREE</td>
<td>+19.5</td>
</tr>
</tbody>
</table>

MODE – not DIRECT (lt off)
PARAM sel – JOINT ANGLE
SM 94 PDRS CONTROL
AUTO BRAKE INH – ITEM 10 EXEC (*)

2. BACKDRIVE OPERATION (To config -0.1 ≤ WY ≤ +0.1 deg)

NOTE
For steps 2a and 2b, THC input will be at 1/3 to 1/2 deflection. After 2-3 sec, quickly command full scale deflection in opposite direction. When WY joint angle displayed is constant, apply BRAKES – ON and release THC

2a. If WY < -0.1 deg
- RATE sw – COARSE (RATE MIN tb-OFF)
- If WY > -2.0 deg,
  - RATE sw – VERN (RATE MIN tb-ON)
- JOINT sel – WY
- BRAKES – OFF (tb-OFF)
- MODE – END EFF, ENTER

THC – ‘+Y’ (Right) 1/3 to 1/2 deflection

After 2-3 sec,

THC – ‘-Y’ (Left) full deflection

When WY joint angle is constant:

- BRAKES – ON (tb-ON)
- Release THC

If -0.1 ≤ WY ≤ +0.1 deg, go to step 2c

If SP < 60 deg or EP > -60 deg, go to step 3

If WY < -0.1 deg, repeat step 2a

If WY > +0.1 deg, go to step 2b

2b. If WY > +0.1 deg
- RATE sw – COARSE (RATE MIN tb-OFF)
- If WY < +2.0 deg,
  - RATE sw – VERN (RATE MIN tb-ON)
- JOINT – WY
- BRAKES – OFF (tb-OFF)
- MODE – END EFF, ENTER

THC – ‘-Y’ (Left) 1/3 to 1/2 deflection

After 2-3 sec,

THC – ‘+Y’ (Right) full deflection

When WY joint angle is constant:

- BRAKES – ON (tb-ON)
- Release THC
PDRS SSR-3 (Cont)

If -0.1 \leq WY \leq +0.1 deg, go to step 2c
If SP < 60 deg or EP > -60 deg, go to step 3
If WY > +0.1 deg, repeat step 2b
If WY < -0.1 deg, go to step 2a

2c. If -0.1 \leq WY \leq 0.1 deg

\textbf{BRAKES – ON (tb-ON)}
\textbf{MODE – DIRECT (lt on)}

DIRECT DR to cradle:

\begin{center}
\begin{tabular}{|c|c|c|c|c|c|}
\hline
SY & SP & EP & WP & WY & WR \\
\hline
0 & CURRENT VALUE & + 1 MA & + 5 & FREE & 0 \\
\hline
0 & 0 & 0 & 0 & 0 & 0 \\
\hline
\end{tabular}
\end{center}

\textbf{MODE – not DIRECT (lt off)}
\textbf{PORT RMS R-F-L lb (three) – gray}

Go to step 3, \textbf{RMS PWRDN (PDRS OPS)} >>

3. \textbf{RECONFIG OF JOINTS}
\textbf{BRAKES – ON (tb-ON)}
\textbf{MODE – DIRECT (lt on)}

DIRECT DR to:

\begin{center}
\begin{tabular}{|c|c|c|c|c|c|}
\hline
SY & SP & EP & WP & WY & WR \\
\hline
0 & + 90 & - 90 & 0 & FREE & + 19.5 \\
\hline
\end{tabular}
\end{center}

\textbf{MODE – not DIRECT (lt off)}
If WY < -0.1 deg, go to step 2a
If WY > +0.1 deg, go to step 2b
NOTE
Applicable AC/DC sw powering kit will remain OFF until immediately prior to reqd operation and will be returned to OFF immediately after operation is completed. When kit is powered, RMS is one failure away from uncommanded motion and/or End Effector ops.

If unexpected arm motion occurs during D&C Kit ops, turn RMS PWR (pnl A8L) to OFF, take DC UTIL PWR MNA (pnl O19) to OFF, then √MCC. If failure causing unexpected motion is in D&C Kit, applying brakes will be ineffective.

All pnl A8U, A8L tbs and C/W annunciators are functional with RMS IFM D&C Kit installed. All pnl A8U functions available except those provided by RMS IFM D&C Kit.

Operation of kit END EFFECTOR, JOINT SELECT, DIRECT DRIVE switches is similar to corresponding pnl A8U switches. Limping of arm not available for End Effector functions. May get brakeslip msg during direct drive ops. Cancel MSTR ALARM, and cycle BRAKES sw or cycle RMS SEL sw. TMBU can prevent subsequent msg.

For loaded RMS ops, downlink must be available to confirm lack of End Effector stall currents.

Orbiter pilot must be available to perform separation in case of uncommanded release. Review RMS-LOADED/RELEASE (Cue Card)

1. SETUP
Install RMS IFM D&C KIT, RMS CONTINGENCY OPERATION/INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM, PROCEDURES M THRU R)

A8L
RMS PWR – PRI (MA)

SM 94 PDRS CONTROL
I/O ON – ITEM 5 EXEC (*)

A8L
RMS SEL – PORT

A8U
SAFING – CANCEL (tb-gray)

2. SHOULDER BRACE RELEASE
If Shoulder Brace still engaged:

O19
COAS PWR – ON

D&C Kit
SHOULDER BRACE – RELEASE (Hold for 2 sec following tb-gray on pnl A8U)

O19
COAS PWR – OFF
Go to step 7

3. INITIAL D&C KIT POWERUP FOR END EFFECTOR/DIRECT DRIVE
Position RMS/payload at least 5 ft away from structure, using best available mode on pnl A8U

If unloaded:

D&C Kit
JOINT sw – WRIST YAW

If loaded:

√MCC for JOINT sw position for benign motion if uncommanded direct drive occurs and for RMS position for payload rotations due to uncommanded derig/release

WARNING
If unexpected arm/payload motion occurs, (A8L) RMS PWR – OFF, (O19) DC UTIL PWR MNA – OFF, then √MCC

O19
DC UTIL PWR MNA – ON

√No arm/payload motion
DC UTIL PWR MNA – OFF
4. **UNLOADED END EFFECTOR TEST**  
   (Reqd for End Effector ops, Direct Drive)

   **CAUTION**
   End Effector test must be completed within 2.5 min of DC UTIL PWR MNA sw – ON or End Effector mtr burnout could occur

A8U  
\( ^\uparrow \text{BRAKES – ON (tb-ON)} \)
\( ^\downarrow \text{tb(s)} \)

<table>
<thead>
<tr>
<th>RIGID</th>
<th>CLOSE</th>
<th>CAPTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>✅</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>DERIGID</td>
<td>OPEN</td>
<td>EXTEND</td>
</tr>
</tbody>
</table>

O19  
DC UTIL PWR MNA – ON  
\( ^\downarrow \text{No tb(s) change} \)

D&C Kit  
EE CAPTURE/RELEASE sw – CAPTURE, until CLOSE tb – gray (3 sec max)

<table>
<thead>
<tr>
<th>RIGID</th>
<th>CLOSE</th>
<th>CAPTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>✅</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>DERIGID</td>
<td>OPEN</td>
<td>EXTEND</td>
</tr>
</tbody>
</table>

\( ^\downarrow \text{No tb(s) change after capture} \)

EE RIGID/DERIGID sw – RIGID, until RIGID tb – gray (25 sec max)

<table>
<thead>
<tr>
<th>RIGID</th>
<th>CLOSE</th>
<th>CAPTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>❌</td>
<td>❌</td>
<td>✅</td>
</tr>
<tr>
<td>DERIGID</td>
<td>OPEN</td>
<td>EXTEND</td>
</tr>
</tbody>
</table>

\( ^\downarrow \text{No tb(s) change after rigidizing} \)

EE RIGID/DERIGID sw – DERIGID; until DERIGID,EXTEND tb – gray (25 sec max)  
(MA, DERIGIDIZE lt – ON)

<table>
<thead>
<tr>
<th>RIGID</th>
<th>CLOSE</th>
<th>CAPTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>❌</td>
<td>❌</td>
<td>✅</td>
</tr>
<tr>
<td>DERIGID</td>
<td>OPEN</td>
<td>EXTEND</td>
</tr>
</tbody>
</table>
PDRS SSR-4 (Cont)

EE CAPTURE/RELEASE sw – RELEASE, until OPEN tb – gray (3 sec max)
(Expect MA, RELEASE it – on during actual Payload Release)

<table>
<thead>
<tr>
<th>RIGID</th>
<th>CLOSE</th>
<th>CAPTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DERIGID OPEN EXTEND

O19 DC UTIL PWR MNA – OFF

To extinguish DERIGIDIZE lt, take EE MAN CONTR sw to RIGID momentarily or cycle RMS SEL sw

5. DIRECT DRIVE TEST (For Direct Drive ops only)

A8U

- BRAKES – ON (tb-ON)
- PARAM sel – JOINT ANGLE

O19 DC UTIL PWR MNA – ON

D&C Kit

For first joint:
  Drive ‘+’ then ‘-’
  Correct joint responses and that only selected joint drives
  (Expect MA, CK CRT lt on, ‘PDRS SLIP’ for driven joint, and ‘S96 PDRS ABE’ for five undriven joints)

For other joints:
  Drive ‘+’
  Correct joint responses
  (Expect MA, CK CRT lt on, ‘PDRS SLIP’ for driven joint, and ‘S96 PDRS ABE’ for five undriven joints)

O19 DC UTIL PWR MNA – OFF

6. END EFFECTOR/DIRECT DRIVE

NOTE
(Pnl O19) DC UTIL PWR MNA sw – OFF immediately after completing Direct Drive, or End Effector ops, or when unattended

DC UTIL PWR MNA – ON

Perform RMS IFM D&C Kit End Effector/Direct Drive function as reqd

DC UTIL PWR MNA – OFF

7. RECONFIG

Remove RMS IFM D&C KIT, RMS CONTINGENCY OPERATION/INSTALLATION AND REMOVAL OF THE RMS IFM D&C KIT (IFM, PROCEDURES M THRU R)

Power up RMS if further ops reqd

Refer to ON-ORBIT INITIALIZATION, step 2 and RMS POWERUP, step 2 (PDRS OPS)

(Note: disregard joint angle and position data in the nominal procedures if arm not starting at cradle)
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MALFUNCTION PROCEDURES
STS ALL